TRAFFIC ASSESSMENT

Taminda Employment Lands
Taminda, New South Wales

Reference: 19.654r01v05
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1. INTRODUCTION

TRAFFIX has been commissioned by Chan Abbey Holdings to undertake a traffic assessment in support of a Planning Proposal relating to an industrial and business development located at 55 Dampier Street and 21 & 72 Wallamore Road, Taminda. The planning proposal seeks to rezone approximately nine (9) hectares of land to part B5-Business Development and part IN1-General Industrial land under the Tamworth Regional Local Environmental Plan 2010. More specifically, the proposal comprises 35,410m^2 GFA of industrial units and 14,915m^2 GFA of retail/business units. The development seeks to extend the existing industrial estate south of the site.

This report documents the findings of our investigations and should be read in the context of the Planning Proposal Justification Report, prepared separately. The future industrial and business development is considered to be of such a size or scale as not to require referral to Transport for NSW (former Roads and Maritime Services) under the provisions of the State Environmental Planning Policy (Infrastructure) 2007.

The report is structured as follows:

- Section 2: Describes the site and its location
- Section 3: Documents existing traffic conditions
- Section 4: Describes the proposed development
- Section 5: Assesses traffic impacts
- Section 6: Presents the overall study conclusions

2. LOCATION AND SITE

The subject site is located at 55 Dampier Street and 21 & 72 Wallamore Road, Taminda and is legally identified as Lot 2 and Lot 3 in DP1234850. In a regional context, it is located approximately 3.2 kilometres west of the Tamworth Central Business District (CBD) and 5.5 kilometres east of the Tamworth Regional Airport.

The site has an irregular configuration and has a total site area of approximately 9 ha. It has an eastern frontage to Dampier Street measuring approximately 247 metres and a southern frontage to Wallamore Road measuring approximately 25 metres.

The site currently provides two (2) vehicular crossing. The eastern access to Wallamore Road is located approximately 77 metres north of Kingsford Smith Street whilst the southern access is located approximately 140 metres west of Kingsford Smith Street.

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

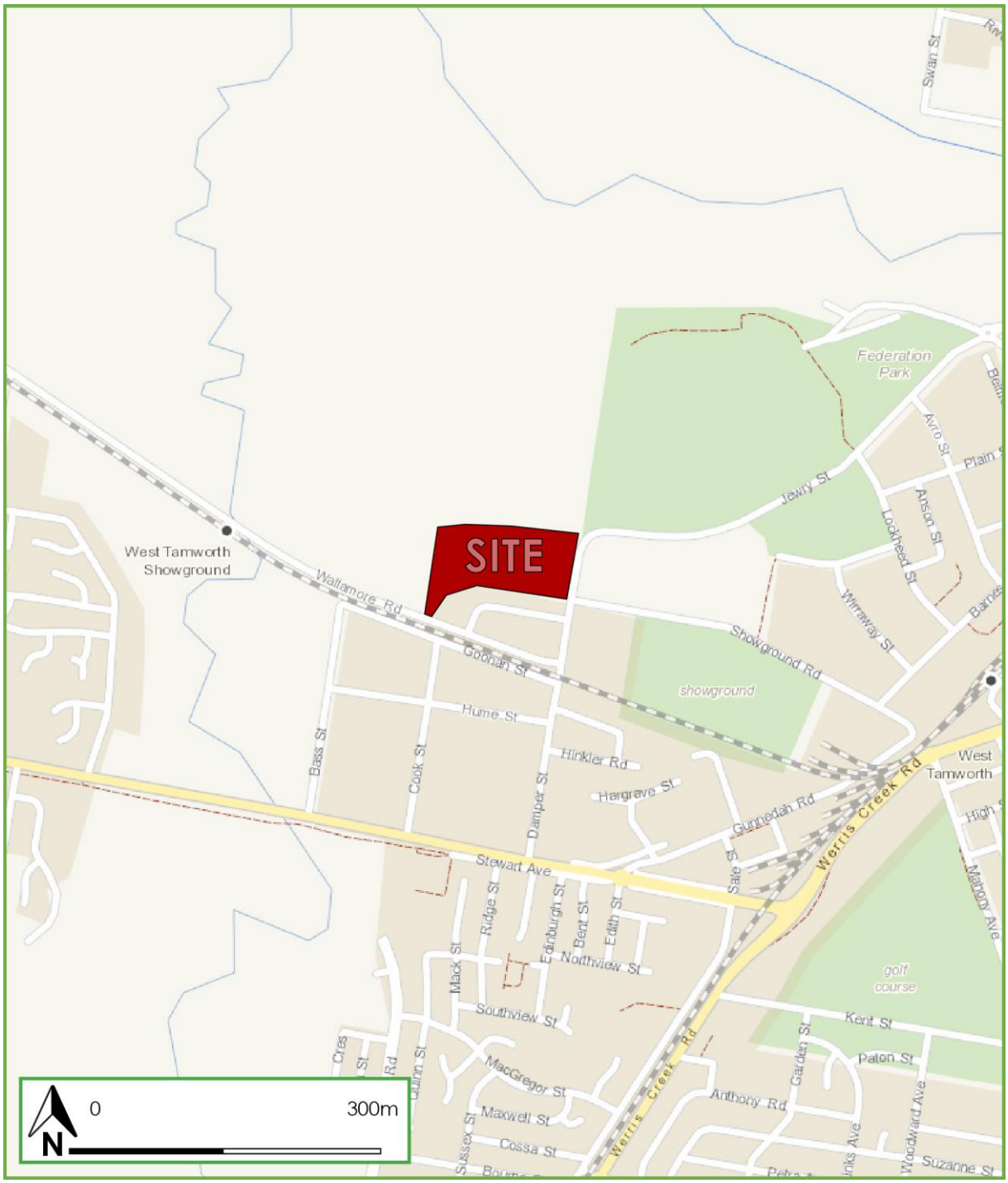

Figure 1: Location Plan

Figure 2: Site Plan (excluding solar farm)

3. EXISTING TRAFFIC CONDITIONS

3.1 Road Network

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

- Oxley Highway: This is Highway HW11 is controlled by Transport for NSW (TfNSW) and generally runs in an east-west direction and connects Tamworth Central Business District (CBD) in the east and the Newell Highway in the west. Within the vicinity of the site, the Oxley Highway accommodates a single lane of traffic in each direction within an undivided carriageway. Near the intersection of Dampier Street, it has a posted speed limit of 60 km/hr and kerbside parking is generally permitted along both sides of the road.
- Dampier Street: an unclassified regional road (URR 7744) that runs in a north-south direction between Jewry Street in the north and Gunnedah Road (Oxley Highway) in the south. Dampier Street accommodates a single lane of traffic in each direction within an undivided carriageway and is subject to a 60km/h speed zoning. Parking is generally permitted along both sides of Dampier Street in the vicinity of the site.
- Jewry Street: an unclassified regional road (URR 7744) that runs in an east-west direction between Peel Street in the east and Dampier Street in the west. Jewry Street accommodates a single lane of traffic in each direction within an undivided carriageway and is subject to a 60km/h speed zoning. Parking is generally permitted along both sides of Jewry Street in the vicinity of the site.
- Wallamore Road: a local road that generally runs in a northwest-southeast direction between Appleby lane in the northwest and Dampier Street in the southeast. Wallamore Road accommodates a single lane of traffic in each direction within an undivided carriageway and is

subject to a 60km/h speed zoning. Angle parking is permitted on the northern side of Wallamore Road in the vicinity of the site.

- Britten Road: a local road that traverses in an east-west direction between Jewry Street in the east and the Tamworth Jockey Club in the west. Britten Road accommodates a single lane of traffic in each direction within an undivided carriageway and is subject to a 50km/h speed zoning.
- Ebsworth Street: a local road that traverses in an east-west direction between Plain Street in the east and Jewry Street in the west. Ebsworth Street accommodates a single lane of traffic in each direction within an undivided carriageway and is subject to a 50km/h speed zoning.

It can be seen from **Figure 3** that the site is conveniently located with respect to local and arterial roads serving the region with connectivity to the north and south using Dampier Street/Wallamore Road and connectivity to the east and west using Gunnedah Road (the Oxley Highway).

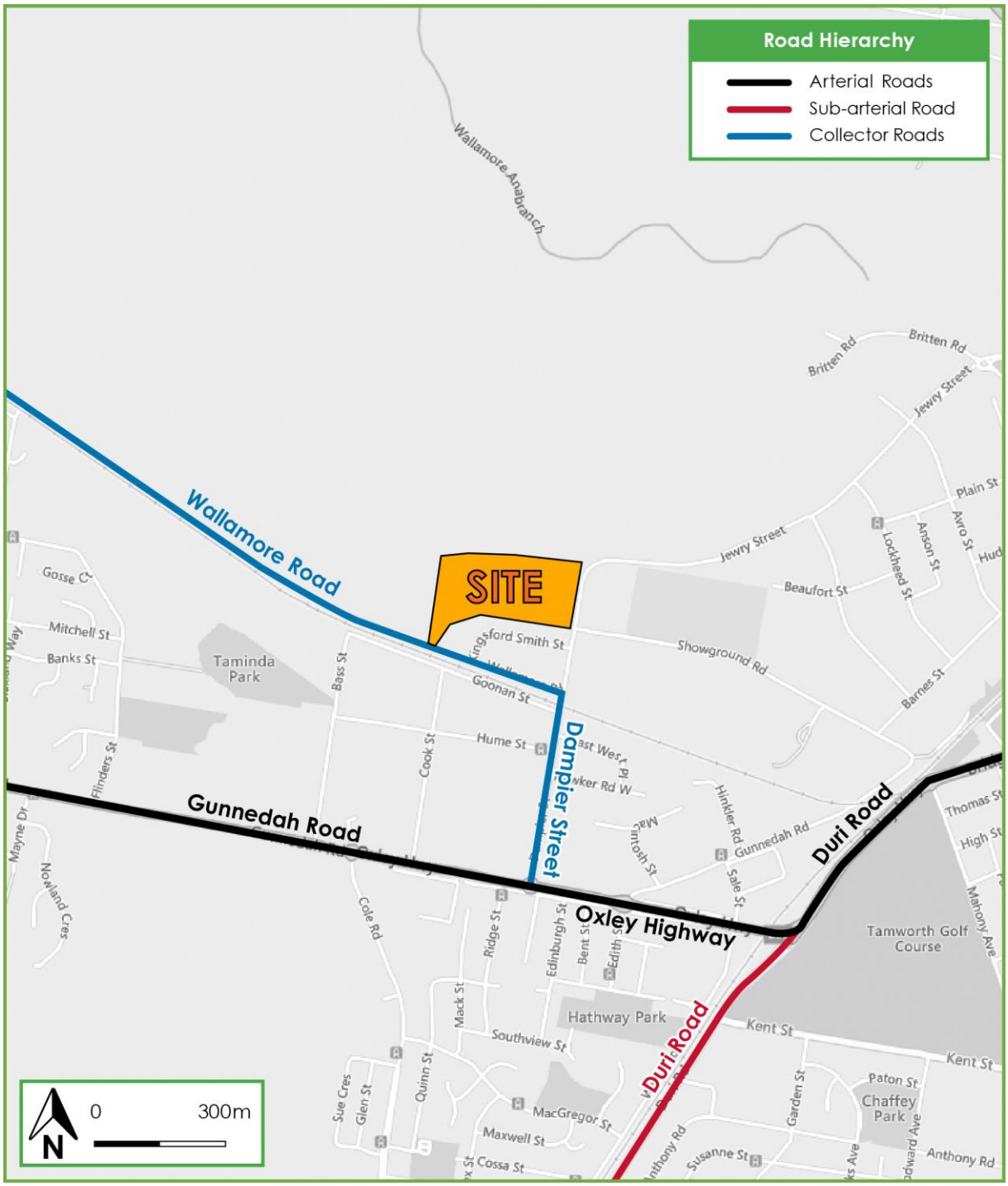

Figure 3: Road Hierarchy

3.2 Key Intersections

Three (3) key intersections have been identified in the vicinity of the site. These intersections are located at the junction of main thoroughfares that will be utilised by users associated with future developments.

3.2.1 Jewry Street / Britten Road / Ebsworth Street

Figure 4: Intersection of Jewry Street, Britten Road and Ebsworth Street

(Source: NearMap)

It can be seen from **Figure 4** that the intersection of Jewry Street, Britten Road and Ebsworth Street is a four-legged roundabout intersection. The main attributes of each approach are outlined below:

- Jewry Street (northeast leg)
  - A single approach lane with no movement restrictions; and
  - A single departure lane.

- Ebsworth Street (southeast leg)
  - A single approach lane with no movement restrictions; and
  - A single departure lane.
- Jewry Street (southwest leg)
  - A single approach lane with no movement restrictions; and
  - A single departure lane.
- Britten Road (northwest leg)
  - A single approach lane with no movement restrictions; and
  - A single departure lane.

3.2.2 Dampier Street / Wallamore Road

Figure 5: Intersection of Dampier Street and Wallamore Road

(Source: NearMap)

It can be seen from **Figure 5** that the intersection of Dampier Street and Wallamore Road is a three-legged priority-controlled intersection. The main attributes of each approach are outlined below:

- Dampier Street (northern leg)
  - A single approach lane with no movement restrictions; and
  - A single departure lane.
- Dampier Street (southern leg)
  - A single approach lane with no movement restrictions; and
  - A single departure lane.
- Wallamore Road (western leg)
  - A single approach lane with no movement restrictions. It is noted that the approach lane is significantly wide and allows for simultaneous left/right movements; and
  - A single departure lane.

3.2.3 Gunnedah Road / Dampier Street

Figure 6: Intersection of Gunnedah Road and Dampier Street

(Source: NearMap)

It can be seen from **Figure 6** that the intersection of Gunnedah Road and Dampier Street is a three-legged roundabout intersection. The main attributes of each approach are outlined below:

- Dampier Street (northern leg)
  - A dedicated left turn lane;
  - A single right turn lane; and
  - A single departure lane.
- Gunnedah Road (eastern leg)
  - A single approach lane;
  - A shared through/right turn lane; and
  - Two (2) departure lanes.
- Gunnedah Road (western leg)
  - A dedicated left turn lane;
  - A single through lane; and
  - Two (2) departure lanes, with the kerbside lane required to turn left into Ridge Street.

4. DESCRIPTION OF PROPOSED DEVELOPMENT

A detailed description of the changes sought to the Tamworth Regional Local Environmental Plan 2010 is provided in the Planning Proposal, prepared separately. In summary, approval is sought to amend the LEP to include 2.34 hectares in the B5-Business Development zone and 6.66 hectares in the IN1-General Industrial zone. The balance of the subject site and the road reserve will remain in its current RU4 Primary Production Small Lots zone.

For the purpose of assessment, an indicative reference scheme for an industrial and business development has been envisaged, which is representative of the full development potential of the site under the Planning Proposal and is an appropriate concept development for assessment purposes. It comprises the following components:

- Construction of a solar farm (Approved DA);
- 35,410m^2 GFA of industrial units;
- 14,915m^2 GFA of retail/business sheds;
- A roundabout intersection to Dampier Street; and
- A secondary access driveway to Wallamore Road.

The traffic impacts arising from the indicative reference scheme are discussed in **Section 5**. Reference should be made to the concept plans submitted separately to Council which are presented at reduced scale in **Appendix B**.

5. TRAFFIC AND TRANSPORT IMPACTS

5.1 Traffic Trip Generation

The Roads and Maritime Services Technical Direction (TDT 2013/04a) provides updated traffic generation rates for a number of land use developments including business parks and industrial estates. The Technical Direction recommends the following average traffic generating rates for business parks and industrial estates within regional areas:

- 0.70 vehicle trips per 100m^2 of GFA per hour during the AM peak period; and
- 0.78 vehicle trips per 100m^2 of GFA per hour during the PM peak period.

Application of the above traffic generation rates to the proposed 50,325m^2 GFA (35,410m^2 plus 14,915m^2) of business park development and adopting an 80/20 directional split results in the following traffic generation:

- 352 vehicle trips per hour during the AM peak period (282 in, 70 out)
- 393 vehicle trips per hour during the PM peak period (79 in, 314 out)

It should be noted that the proposed solar farm is an approved DA and will generate negligible traffic on any given day, with the majority of vehicle trips related to maintenance vehicles and workers (expected to be minimal). Therefore, any minor traffic generation by the solar farm will be omitted in the following SIDRA Intersection assessment. It should also be noted that the existing trips generated by the site have not been discounted from the above trips, thus providing a more conservative assessment of the traffic impacts.

5.2 Trip Distribution

In order to estimate the expected distribution of traffic from the subject development an interrogation of the journey to work data supplied by the NSW Government Bureau of Transport Statistics has been undertaken. The surveys of commuters who drive to and from the subject site, indicate the following distribution for the subject intersections:

Inbound Movements

- 42.4% arrive to the site from the north via Jewry Street;
- 43% arrive to the site from the south via Gunnedah Road (east leg);
- 7.9% arrive to the site from the south via Gunnedah Road (west leg); and
- 6.7% arrive to the site from the south via Wallamore Road.

Outbound Movements

- 42.4% depart the site towards the north via Jewry Street;
- 43% depart the site towards the south via Gunnedah Road (east leg);
- 7.9% depart the site towards the south via Gunnedah Road (west leg); and
- 6.7% depart the site towards the south via Wallamore Road.

Collectively, the development volumes assessed have been distributed across the road network as illustrated in **Figure 7** and **Figure 8**, for AM and PM peak periods respectively. It should be noted that vehicle access is not permitted from the future bypass road, thus this analysis assumes that the main vehicular access to the site will be achieved from Dampier Street, between Jewry Street and Showground Road. A secondary driveway access is also provided to Wallamore Road, however, due to the limited number of trips from Wallamore Road, the assessment will direct all the predicted traffic to/from the intersection on Dampier Street, thus providing a conservative assessment.

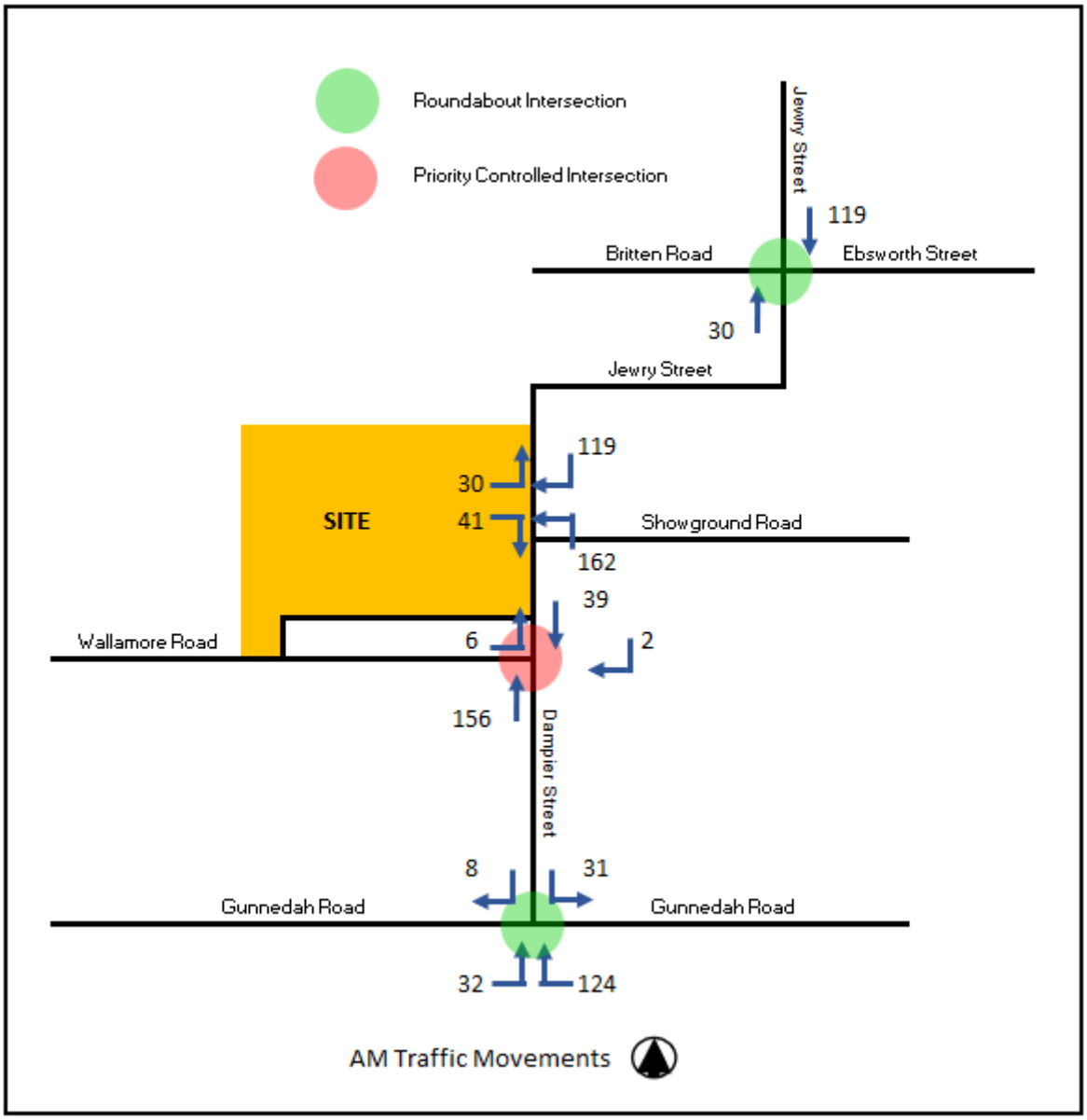

Figure 7: Proposed AM Peak Period Distribution (Vehicle trips per hour)

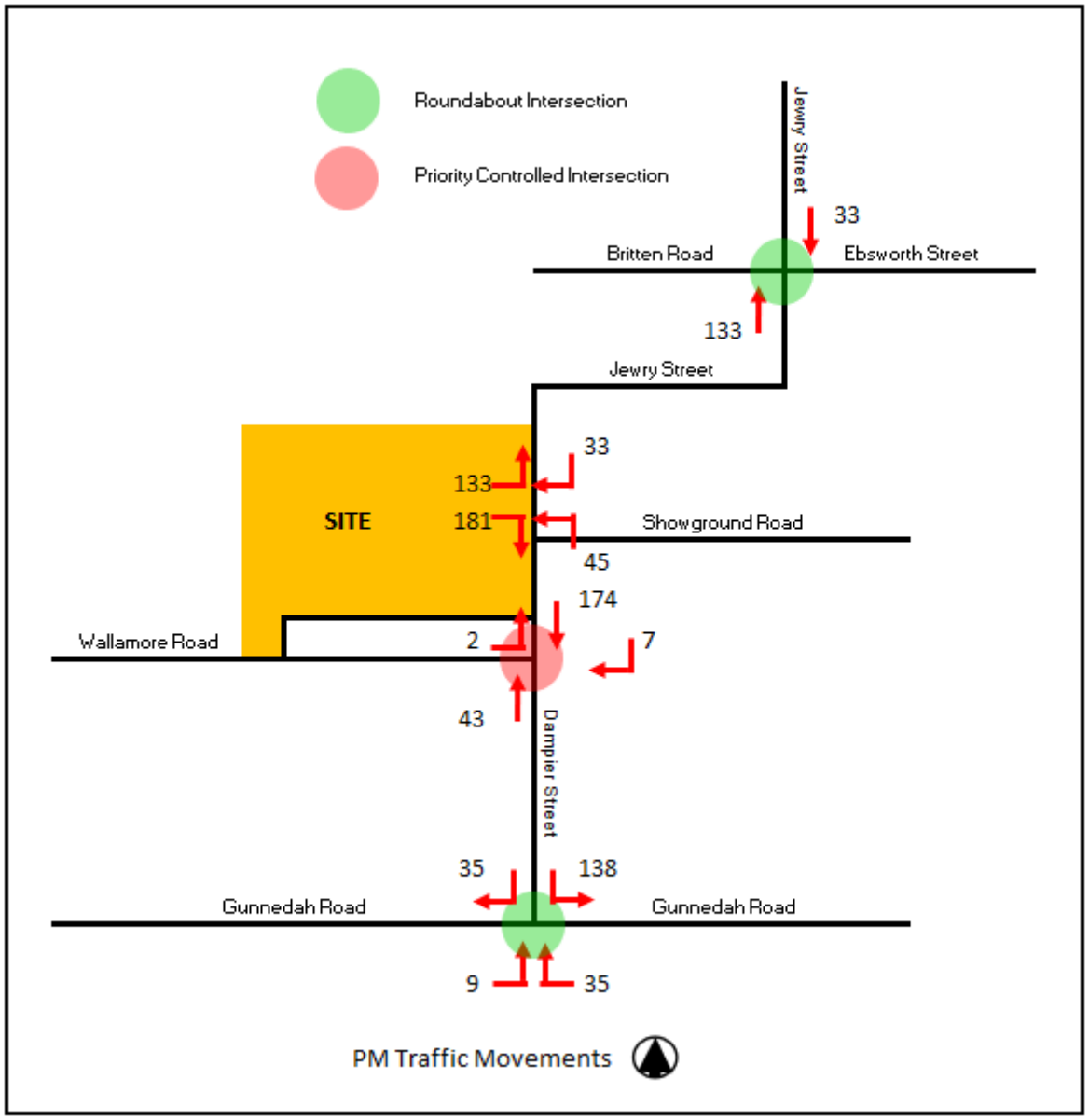

Figure 8: Proposed PM Peak Period Distribution (Vehicle trips per hour)

5.3 Modelled Scenarios

The predicted traffic impacts of the proposed development required examination of the following scenarios:

- 2020 Base Case;
- 2020 Base Case + Development;
- 2040 Base Case; as requested by Council; and
- Discussion of 2040 Base Case + Development Scenario.

It is noted that the 2040 future scenario incorporated a 1.5% annual growth (as requested by Council) of traffic based on the existing surveys, resulting in significant input flow onto the surrounding road network. The 2040 scenario does not take into account any infrastructure projects in the immediate area by Council or TfNSW over the next 20 years, which would be expected to accommodate this growth to maintain satisfactory operation of the network.

5.4 Peak Period Intersection Performance

Traffic surveys were undertaken of the intersections mentioned in Section 3.2, which are considered to be most critical in relation to the site. These counts were undertaken on Wednesday 4th March 2020 during the network peak periods, being between 7:00am – 9:00am (morning peak period) and 4:00pm – 6:00pm (evening peak period). The reliance on early 2020 traffic data is considered appropriate in the circumstance, noting the impacts caused by COVID lockdowns between April 2020 and October 2021 largely prevented traffic studies being undertaken. As such, for the purpose of progressing the planning proposal in a timely manner, reliance is made on the early March 2020 data. It should be noted that the survey camera at the intersection of Dampier Street and Gunnedah Road was vandalised on Wednesday afternoon, thus the survey was continued onto Thursday 5th March 2020 for this intersection to provide a full data set.

The traffic volumes in these surveys formed the base case volumes for software modelling undertaken to assess intersection performance characteristics under existing traffic conditions. The SIDRA Intersection 8 model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn

related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

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

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

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

Table 1: Intersection Performance Indicators (TfNSW)

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

A summary of the modelled results is provided below in **Table 2**. Reference should also be made to the detailed SIDRA outputs provided in **Appendix C** for individual movements.

Table 2: Existing, Proposed and Future Intersection Performances

Intersection	Control	Scenario	Period	Degree of Saturation	Average Delay (s)	Level of Service
Jewry St Britten Rd Ebsworth St	Roundabout	Base	AM	0.655	16.9	B
		Base+Dev		0.734	21.7	B
		2040*		1.168	187.2	F
		Base	PM	0.721	18.3	B
		Base+Dev		0.847	24.3	B
		2040*		1.278	277.8	F
Dampier St Wallamore Rd	Give-Way	Base	AM	0.361	14.9	B
		Base+Dev		0.423	19.2	B
		2040*		0.535	27.7	B
		Base	PM	0.428	14.7	B
		Base+Dev		0.543	21.7	B
		2040*		0.654	30.0	C
Gunnedah Rd Dampier St	Roundabout	Base	AM	0.348	13.4	A
		Base+Dev		0.390	13.4	A
		2040*		0.504	14.9	B
		Base	PM	0.315	13.7	A
		Base+Dev		0.364	14.1	A
		2040*		0.445	15.5	B

** 2040 volumes derived by adopting a background growth rate of 1.5% per annum.*

5.4.1 Base Case + Development Performance

It can be seen from **Table 2** that all intersections operate satisfactorily (with LoS A or B) under both the Base Case (2020) and Base Case Plus Development scenarios. The latter being the

scenario that reflects the criteria for assessing impacts under current TfNSW Guidelines. That is, the EP&A Act as well as the TfNSW Guidelines require that a development need only be assessed for improvements that are required to support the development itself. This is a consequence of the need to identify a nexus between development and any measures required to manage its associated impacts. As can be seen in Table 2, these scenarios are both satisfactory in terms of the network performance and projected impacts, such that the concept development is supportable on traffic grounds.

Specifically, the intersection of Jewry Street, Britten Road and Ebsworth Street recorded a minimal change to the intersection delay in the morning and evening peaks. The intersection remains at a level of service of 'B' in the morning and evening peaks during this scenario. The intersection of Dampier Street and Wallamore Road recorded an acceptable level of service of 'B' in the morning and evening peak periods, representing a small increase in average delay of 4.3 seconds and 7.0 seconds respectively. The intersection of Gunnedah Road and Dampier Street recorded a minimal change to the intersection delay in the morning and evening peaks, with the intersection remaining at a level of service 'A' during this scenario. In this regard, the impact of the development on the wider road network during the morning and evening network peak periods is considered acceptable with no external improvements required to support the proposed development scheme.

In summary, the Base Case Plus Development Scenario will operate satisfactorily with no road network improvements required.

This outcome deals with the development impacts as per standard practice based on TfNSW Guidelines. However, at Council's request and in the spirit of providing an input to Council and TfNSW in relation to their ongoing strategic planning responsibilities, further modelling has been undertaken as discussed in the following sections.

5.4.2 2040 Base Case Performance

The "2040 Base Case" scenario reflects traffic conditions in 2040 which will arise based on expected growth on the network generally. This 2040 scenario will include all developments in the locality that occur over the next 20 years, assuming a continued annual growth rate of 1.5% per annum. It also included growth in 'external' traffic on the main road network, relating to the wider region. That is, the 2040 Scenario includes development wherever it occurs, including

the subject site. There is no doubt other planning proposals will emerge over the next 20 years and it is reasonable to assume that Council's strategic planning has adopted a land use scenario that takes some account of these factors.

Hence, it may be argued that the 2040 Scenario is not a Base Case as such, but a strategic scenario for more general consideration and adoption by Council. There is also a case to be made that it would include the impacts of the subject site, though this would no doubt depend upon the strategic land use inputs adopted in Council's 2040 Strategic Plan.

The 2040 Base Case model constructed for the purpose of this assessment therefore provides an indication only of traffic flows in 20 years' time, assuming 1.5% growth per annum on all existing movements at all intersections examined. The results are shown in Table 2.

It is evident that the intersection of Dampier Street and Wallamore Road recorded a minimal change to the intersection delay in the morning peak period and maintains a level of service 'B'. The evening peak period showed a level of service 'C', representing a moderate increase in average delay. The intersection of Gunnedah Road and Dampier Street recorded an acceptable level of service of 'B' in the morning and evening peak periods representing a small increase in average delay of 1.5 seconds and 1.8 seconds respectively, with spare capacity in both peaks.

In summary, the intersections of Dampier Street/Wallamore Road and Gunnedah Road/Dampier Street will experience small increases to the average delay during the morning and evening peak periods, however, it will still provide spare capacity. The intersection of Jewry Street, Britten Road and Ebsworth Street is the only intersection to experience a significant increase in average delays during the morning and evening peak periods in 2040.

This outcome reflects conditions arising from 20 years of 'background' traffic growth at a rate of 1.5% per annum, which is a cumulative increase of 35% on all movements at all intersections. These are increases that are likely to occur irrespective of the proposed development and the need for improvements is the responsibility of Council and TfNSW in addressing their respective strategic planning responsibilities.

For example, in relation to the intersection of Jewry Street, Britten Road and Ebsworth Street, it reflects a total increase in throughput from 2,258 veh/hr currently to 3,041 veh/hr during the

more critical PM peak period. The results reflect increased delays associated with minor movements and it is expected that infrastructure changes to accommodate this background growth would be significant. The improvements may include upgrading the intersection to a signalised intersection or a metered roundabout for the major legs. This is a matter for Council or TfNSW to consider in their future strategic planning and assumptions that this background growth would hold in 2040.

5.4.3 Sensitivity Testing - *2040 Base Case Plus Development Performance*

As discussed above, the development impacts are expected to be included in the 2040 Base Case outlined above, which accommodates a substantial (35% increase in network traffic volumes that are orders of magnitude above the subject development site generation. That is, this scenario as requested by Council incorporates an element of 'double dipping' of the development impacts.

Nevertheless, this scenario has been constructed in order to facilitate Council's request. The results are also shown in Table 2 and show that the additional traffic volumes generated by the subject development represent a negligible incremental increase in delays and able to be accommodated by existing intersections.

The notable exception remains the critical intersection of Jewry Street, Britten Road and Ebsworth Street. In this regard, the proposed development is expected to generate an additional 166 veh/hr through this intersection in the evening as shown in Figure 7 and Figure 8. This represents approximately 5.4% of the 3,041 veh/hr that will arise at this intersection without the development. That is, infrastructure requirements under this scenario are fundamentally determined by strategic network volume increases over 20 years, not by the subject development.

5.4.4 Summary on Network Performance

In summary, the surrounding road network will experience small increases to the average delay during morning and evening peak periods, however, will still provide spare capacity. Therefore, no external intersections improvements are considered necessary to accommodate the proposed development scheme.

5.4.5 Future Road Network

It is noted that the Jewry Street extension project is set to commence in the next 5 years, as stated by Council. The project involves the construction of a bypass road that will link Wallamore Road to a new roundabout at the intersection of Jewry Street and Dampier Street. The only traffic movements redistributed by the proposed bypass link is vehicles arriving/departing the site from/to Wallamore Road and vehicles arriving/departing the site from/to Jewry Street. Journey to work data suggests that commuter vehicle movements to/from Wallamore Road is minimal and contribute to only 6.7% (24 veh/hr in AM and 26 veh/hr in PM) of all vehicle movements generated by the site (in and out), thus a redirection through the proposed Jewry Street/Dampier Street roundabout should have negligible impacts to its operation. Commuters travelling to/from the Tamworth CBD, North Tamworth and East Tamworth equate to 42.4% or 149 veh/hr in AM and 166 veh/hr in PM. The majority of AM vehicles will be making a left turn onto Dampier Street, thus should have a negligible impact to its operation. PM outbound vehicles will be required to make a right turn onto Jewry Street and will be required to yield to westbound vehicles. Whilst it is difficult at this stage to determine the exact volume of westbound vehicles movements, it is noted that outbound vehicles equate to 133 veh/hr or 1 vehicle movement every 30 seconds. This volume should have a moderate impact, noting that left turn movements from Jewry Street onto Dampier Street will likely be the dominant movement.

In addition to the above, Council has advised that "*access to/from the proposed site onto this link road would be possible but is likely to result in an expensive intersection treatment and will require additional land to accommodate the intersection geometry.*" As such, Council has suggested that a proposed vehicle access be located between Jewry Street and Showground Road as well as a secondary access via Wallamore Road. The Wallamore vehicle driveway access is expected to accommodate a limited number of vehicle trips from Wallamore Road, however, will serve as a secondary access during emergencies, maintenance, construction and convenience for some workers/visitors. In light of the above, the vehicle access point will be proposed from Dampier Street (between Jewry Street and Showground Road) and will be assessed accordingly.

6. ACCESS DESIGN ASPECTS

6.1 Site Vehicular Access

6.1.1 Main Intersection

The proposed development proposes a single lane roundabout intersection to Dampier Street in accordance with a Category 5 access in Table 3.2 of AS 2890.1 (2004). Accordingly, the entry and exit will be designed as if for a public roadway, with all necessary traffic control devices and intersection geometric design requirements. The intersection will link Dampier Street to the internal roadway, including connections to individual tenancies, parking spaces and loading bays. It is expected that the intersection will service light and heavy vehicles, therefore the proposed intersection will be designed in accordance AS 2890.2 (2018) to accommodate the largest vehicle accessing the site (to be confirmed at DA stage). It is noted that the proposed intersection will be designed (at a later DA stage) in accordance with the Austroads Guidelines, TfNSW requirements, and relevant Australian Standards as required. A preliminary layout has been derived for the intersection based on available traffic survey data (count data at Wallamore Road intersection) and expected trip distributions. In summary, the proposed intersection will comprise of a single lane roundabout between Jewry Street and Showground Road and the proposed location is presented in **Figure 9**.

It should be noted that a channelised right turn/auxiliary left turn intersection treatment was explored, however the right turn movement from the site onto Dampier Street experienced significant average delays, largely due to Dampier Street traffic movements and the projected distribution of right turn movements from the site. Thus, a higher order intersection treatment was investigated to ensure all vehicle movements have a satisfactorily level of service.

It is emphasised that the detailed design of the proposed intersection will be undertaken by a suitably qualified civil engineer at future development application stage/s, at which time, the design will be optimised to meet the relevant guidelines and standards.

6.1.2 Secondary Access Driveway

The proposed development will also provide a secondary access driveway to Wallamore Road. The access driveway will link Wallamore Road to the internal roadway, including

connections to individual tenancies, parking spaces and loading bays. It is expected that the access will service light and heavy vehicles, therefore the proposed access will be designed in accordance AS 2890.2 (2018) to accommodate the largest vehicle accessing the site (to be confirmed at DA stage). As mentioned in Section 5.2, the secondary access is expected to accommodate a limited number of vehicle trips from Wallamore Road, however, will serve as a secondary access during emergencies, maintenance, construction and convenience for some workers/visitors.

6.2 Roundabout Intersection Performance

In order to assess the traffic impacts of the proposed roundabout intersection to Dampier Street, traffic count data was used from the intersection of Dampier Street and Wallamore. SIDRA Intersection 8 model software was then used to determine the performance of the proposed intersection with trips distributed onto the surrounding road network as described in Section 5.3. The results are shown in **Table 3** below:

Table 3: Proposed Intersection Performance

Intersection	Control	Scenario	Period	Degree of Saturation	Average Delay (s)	Level of Service
Dampier St and Proposed Roundabout	Roundabout	Base + Dev	PM	0.613	12.8	A
		2040 Base +DEV*		0.810	15.2	B

** 2040 volumes derived by adopting a background growth rate of 1.5% per annum.*

It can be seen from **Table 3** that the proposed roundabout intersection to Dampier Street operates satisfactorily, with acceptable delays and spare capacity with a level of service of 'A' in the PM peak traffic generation period for the "Base Case Plus Development" and a level of service 'B' for the "2040 Base Case Plus Development" scenarios. Queuing along the northern leg extends approximately 44 metres during the "Base Case Plus Development" scenario and 104 metres during the "2040 Base Case Plus Development". The proposed intersection is located approximately 135 metres south of the proposed Jewry Street/Dampier Street roundabout intersection, thus impacts from the proposed intersection will be minimal. Queuing along the southern leg extends approximately 36 metres during the "Base Case Plus Development" scenario and 66 metres during the "2040 Base Case Plus Development". The

proposed intersection is located approximately 70 metres north of Showground Road, thus impacts from the proposed intersection will be moderate.

In summary, the proposed roundabout intersection is considered an appropriate and safe access treatment for the future development.

6.3 Sight Distance

Sight distances at the proposed accesses will be provided in accordance with AS 2890.2 (2018) and Austroad Guidelines as appropriate. It should be noted that a detailed sight distance assessment can be undertaken at later development application stage/s, however the proposed locations appears acceptable noting the flat terrain and good visibility along both frontages. It is noted that appropriate 'no stopping' restrictions may need to be installed adjacent to the proposed intersection and driveway to ensure sight distances are provided for drivers exiting the site. Again, this will be assessed in greater detail at future development application stage/s.

Figure 9: Proposed Access Location on Dampier Street

(Source: SIX Maps)

7. CONCLUSIONS

The following matters are noteworthy:

- The Planning Proposal seeks approval to rezone approximately nine (9) hectares of land to part B5-Business Development and part IN1- General Industrial land under the Tamworth Regional Local Environmental Plan 2010 for the site at 55 Dampier Street and 21 & 72 Wallamore Road, Taminda. A concept scheme has been assessed which is representative of the site being developed to its full potential with these proposed changes, comprising 35,410m^2 GFA of industrial units, 14,915m^2 GFA of retail/business units and a 77,165m^2 solar farm.
- In accordance with the Roads and Maritime Services Technical Direction (TDT 2013/04a), the concept scheme will generate 352 vehicle trips per hour in the AM peak period and 393 vehicle trips per hour in the PM peak period. The solar farm is expected to generate negligible trips during the AM and PM peaks (1-2 vehicle trips related to maintenance), thus was not included in this assessment.
- Journey to work data was interrogated to determine the approximate distribution of traffic onto the surrounding road network. The analysis found that 42.4% arrived/departed towards the north via Jewry Street, 43% arrived departed the site via Gunnedah Road (east), 7.9% arrived/departed the site via Gunnedah Road (west) and 6.7% arrived/departed the site via Wallamore Road.
- Traffic generation arising from the proposal has been assessed for various scenarios as discussed in detail in Section 5.3. In terms of the overall network performance arising from the proposed development, all intersections operate satisfactorily (with LoS A or B) under both the Base Case (2020) and Base Case Plus Development scenarios.
- In addition, at the request of Council sensitivity testing was conducted to provide an indication of the traffic flows near the site in 20 years' time, based on an accumulated 35% increase in volumes across all intersections examined and for all movements. The 2040 Base Case Scenario demonstrated small to moderate increases in average delay at the intersections of Dampier Street/Wallamore Road and Gunnedah Road/Dampier Street during both peaks period. The intersection of Jewry Street, Britten Road and Ebsworth Street is the only intersection to experience a significant increase in average delays during the

AM and PM peak periods in 2040. Intersection upgrades will need to be explored to accommodate the additional traffic movements (35% increase on all legs as per Council's advice) and this is a matter for Council or TfNSW to considered in their future strategic plans, noting that these improvements will be required even absent the proposed development.

- The "2040 Base Case Plus Development" Scenario is consider to represent an element of 'double dipping' of the development impacts of the subject site, given the 35% increase in traffic loadings under the 2040 Base Case Scenario, which would include impacts of numerous development proposals, as well as regional traffic growth more generally. This results in additional delays which are manageable, noting that the development itself represents only 5.4% of total network traffic volumes. This underscores the need for Council's ongoing strategic assessments based on cumulative, long term land use and road infrastructure scenarios.
- The development proposes a single lane roundabout intersection to Dampier Street and a secondary access driveway to Wallamore Road to facilitate traffic movements to and from the site. The proposed roundabout operates at a level of service 'A' in the PM peak traffic generation period for the "Base Case Plus Development" and a level of service 'B' for the "2040 Base Case Plus Development" scenarios. The detailed design of the proposed roundabout intersection will be undertaken by a suitably qualified civil engineer at future development application stage/s, at which time, the design will be optimised to meet the relevant guidelines and standards.
- The proposed development traffic generation or access location is not expected to have any significant impacts on the proposed Jewry Street bypass link for the reasons discussed in Section 5.4.4 and 6.2.

This traffic assessment therefore demonstrates that the subject application is supportable on traffic planning grounds. TRAFFIX anticipates an ongoing involvement during the development approval process.

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APPENDIX A

Photographic Record

Jewry Street/Britten Road/Ebsworth Street – View looking North

Jewry Street/Britten Road/Ebsworth Street – View looking East

Dampier Street/Wallamore Road – View looking South

Dampier Street/Wallamore Road – View looking West

Gunnedah Road/Dampier Street – View looking West

Gunnedah Road/Dampier Street – View looking West

Approximate Location of Access – View looking South

Approximate Location of Access – View looking North

APPENDIX B

Concept Plans

Drawing Register

No.	Title	Rev
TP00.01	EXISTING SITE & DEMOLITION PLAN	A
TP00.02	SITE CONSTRAINTS PLAN	A
TP00.03	SITE PLAN	A
TP03.01	SECTIONS	A

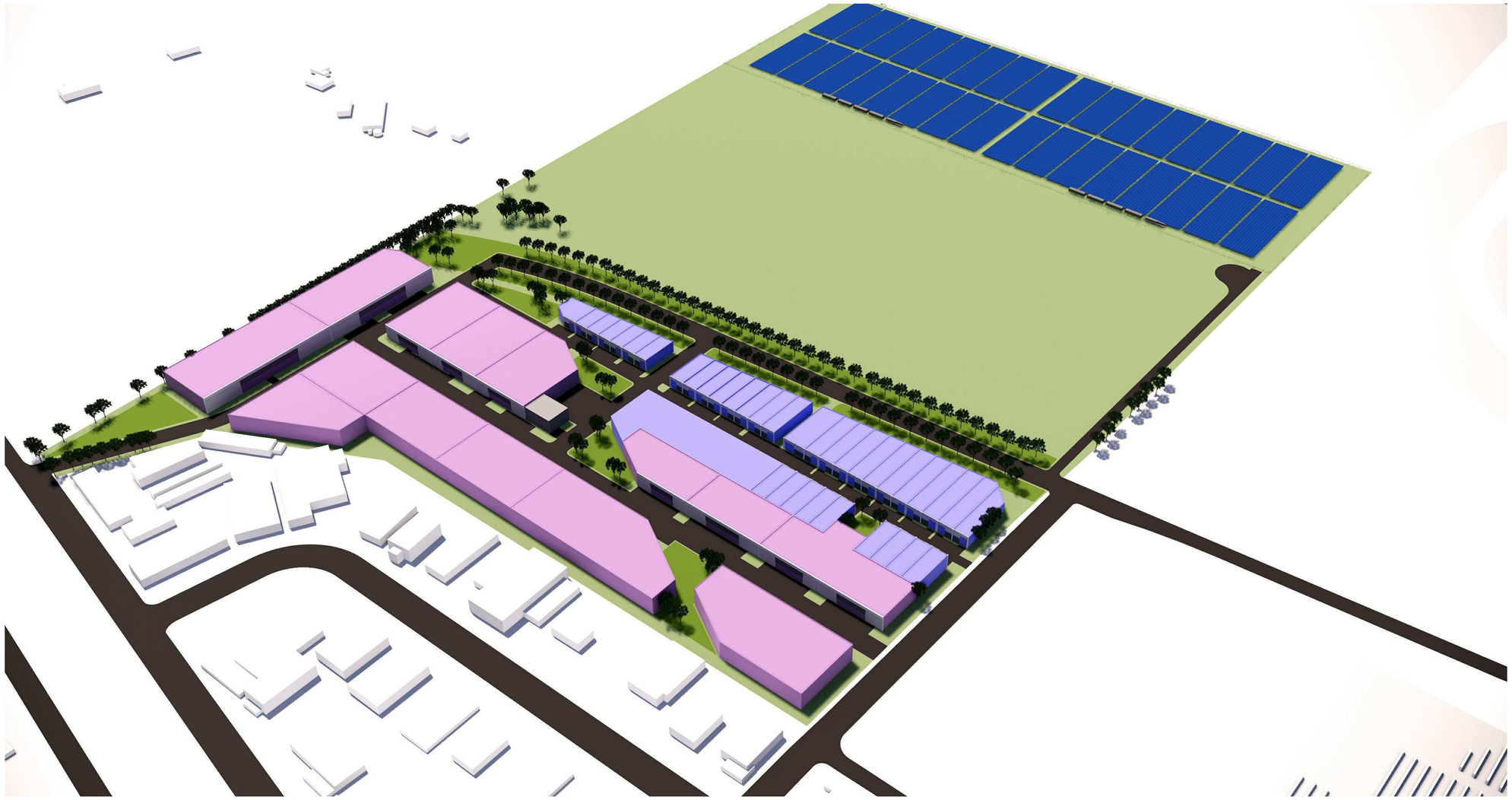
TAMINDA SOLAR FARM AND INDUSTRIAL PRECINCT DEVELOPMENT SUMMARY

SITE AREAS

NAME	AREA	
Solar Farm	~~77,165~~ m²	
IN1 Zone	65,684 m²	Excl. Pt Bypass Easement
B5 Zone	24,114 m²	Excl. Pt Bypass Easement

GFA AREAS

NAME	AREA	FSR
Industrial Units (IN1 Land Zone)	35,410 m² GFA	0.54:1 FSR
Retail/Business Sheds (B5 Land Zone)	14,915 m² GFA	0.62:1 FSR



Taminda Solar Farm & Industrial Precinct

Project
55 Dampier St & 72 Wallamore Rd,
Taminda, NSW 2340

6/08/2019 9:06:22 AM

Client
Chan Abbey Holdings Pty Ltd

PRELIMINARY

Project No	Date
218133	**13.11.18**
Drawing No.	Revision
TP00.00	**B**

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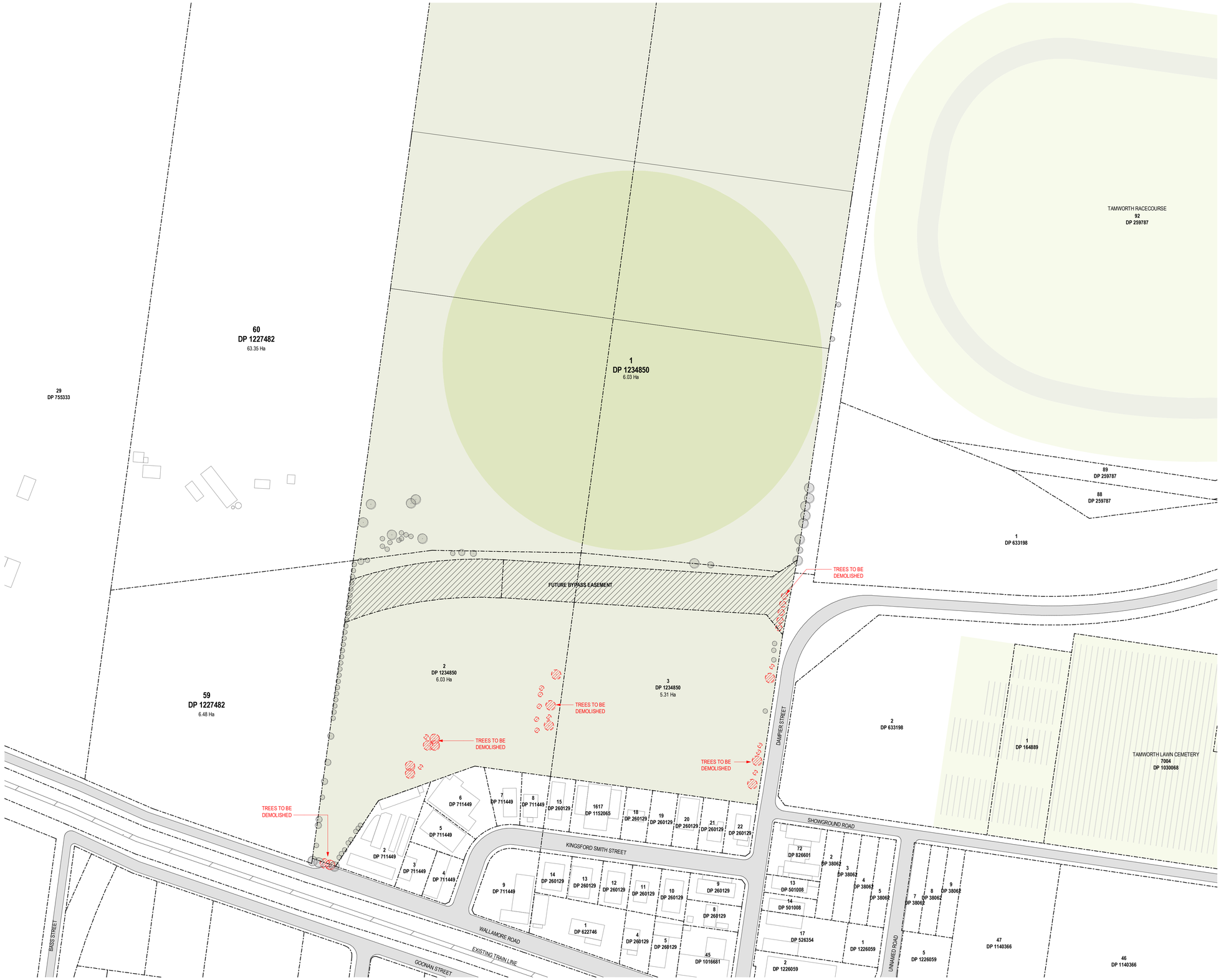

INDICATIVE MASTERPLAN

Revisions

-	20.12.18	PLANNING PROPOSAL	AK
A	27.02.19	AMENDED PLANNING PROPOSAL	AK

6/08/2019 9:06:31 AM

Demolition Notes

Contractor to confirm existing conditions on site.

Contractor to demolish existing structure/remove all materials. Cut and seal services as required in accordance with local authority requirements and a.s. codes for that trade u.n.o

Protection of works as required by local authorities

Cleaning of site to epa requirements by contractor

Preliminary
Precautionary measures to be undertaken as described in AS.2601-2001. A "hazardous substances management plan" is to be implemented before and during demolition if the preliminary investigation of the building identifies any hazardous materials contained therein. These materials will be removed as per the guidelines of the responsible authority and clearance certificate obtained before demolition commences

Safety fencing
Security fences shall be provided to the street boundary of the demolition site and any additional precautionary measures, taken as may be necessary to prevent unauthorised entry to the site, where the demolition site adjoins a public thoroughfare the common boundary between them shall be fenced for its full length with a hoarding unless the least horizontal distance between the common boundary and the nearest part of the structure is greater than twice the height of the structure. The fencing shall be the equivalent of the chain wire as specified in AS.1725

Notices lettered in accordance with AS.1319 and displaying the words "warning demolition in progress", or similar, shall be fixed to the fencing at appropriate places to warn the public. Provision shall be made for ready access to the site by emergency services personnel in the event of fire or accident

Demolition work
Structures shall be demolished in the reverse order to that of their construction. The order of demolition for buildings shall be progressive, storey by storey, having proper regard to the type of construction. No part of any structure shall be left unsupported or unattended in such a condition that it may collapse or become dangerous. Precautions shall be taken to ensure that the stability of all parts of the structure, and the safety of persons on and outside the site, will be maintained in the event of sudden and severe weather changes.

Walls on the boundaries are to be demolished in a safe and workmanship like manner. Walls shall not be laterally loaded by accumulated debris or rubble, to the extent that they are in danger of collapse, allowable loading of the suspended floors shall be determined by an independent structural engineer.

Dust control
The techniques adopted for stripping out and for demolition shall minimise the release of dust into the atmosphere. Before the commencement of stripping or demolition in an area of a structure, any existing accumulations of dust in that area shall be collected, placed in suitable containers and removed. Selection of an appropriate collection technique, such as vacuuming or hosing down, shall take due account of the nature of the dust and the type of hazard it presents. Dust generated during stripping, or during the breaking down of the building fabric to removable sized pieces, shall be kept damp until it is removed from the site or can be otherwise contained. The use of excess water for this purposed shall be avoided.

Noise control
Noise shall be minimised as far as practicable, by the selection of appropriate methods and equipment, and by the use of silencing devices wherever practicable to epa/code requirements.

Note:
1. Attention is drawn to recommendations in AS.2436
2. Hours of operating equipment may be restricted by regulatory authority

Fire services
Where a fire hydrant service or a fire hose reel service is provided in a building, it shall be available at all times during the demolition of the building, so that all remaining storeys except the two uppermost storeys, are serviced. Access to the fire protection services, including any booster fitting, shall be maintained at all times. If a sprinkler system is installed in a building to be demolished, it shall be maintained in an operable condition at each storey below the two uppermost unstripped storeys.

Suitable portable fire extinguishers shall be kept at all times in working area and are not protected by other fire services, and maintained in an operable condition.

Adjoining properties
Safe access to and egress from adjoining buildings shall be maintained at all times for the duration of the demolition work. No demolition activity shall cause damage to or adversely affect the structural integrity of adjoining buildings. The effects of vibration and conversion on adjoining buildings and their occupants shall be minimised by selecting demolition methods and equipment appropriate to the circumstances. Where any surface of an adjoining building is exposed by demolition, the need for weatherproofing the exposed surface shall be investigated and temporary or permanent protection provided as appropriate. Precautions shall be taken to minimise the spreading of mud and debris by vehicles leaving the site.

Project: **Taminda Solar Farm & Industrial Precinct**
55 Dampier St & 72 Wallamore Rd,
Taminda, NSW 2340

Drawing: **EXISTING SITE & DEMOLITION PLAN**

Project No. 218133 | Date 08.11.18 | Author AK | Scale: @ A1 1 : 2000 | Drawing No. TP00.01 A

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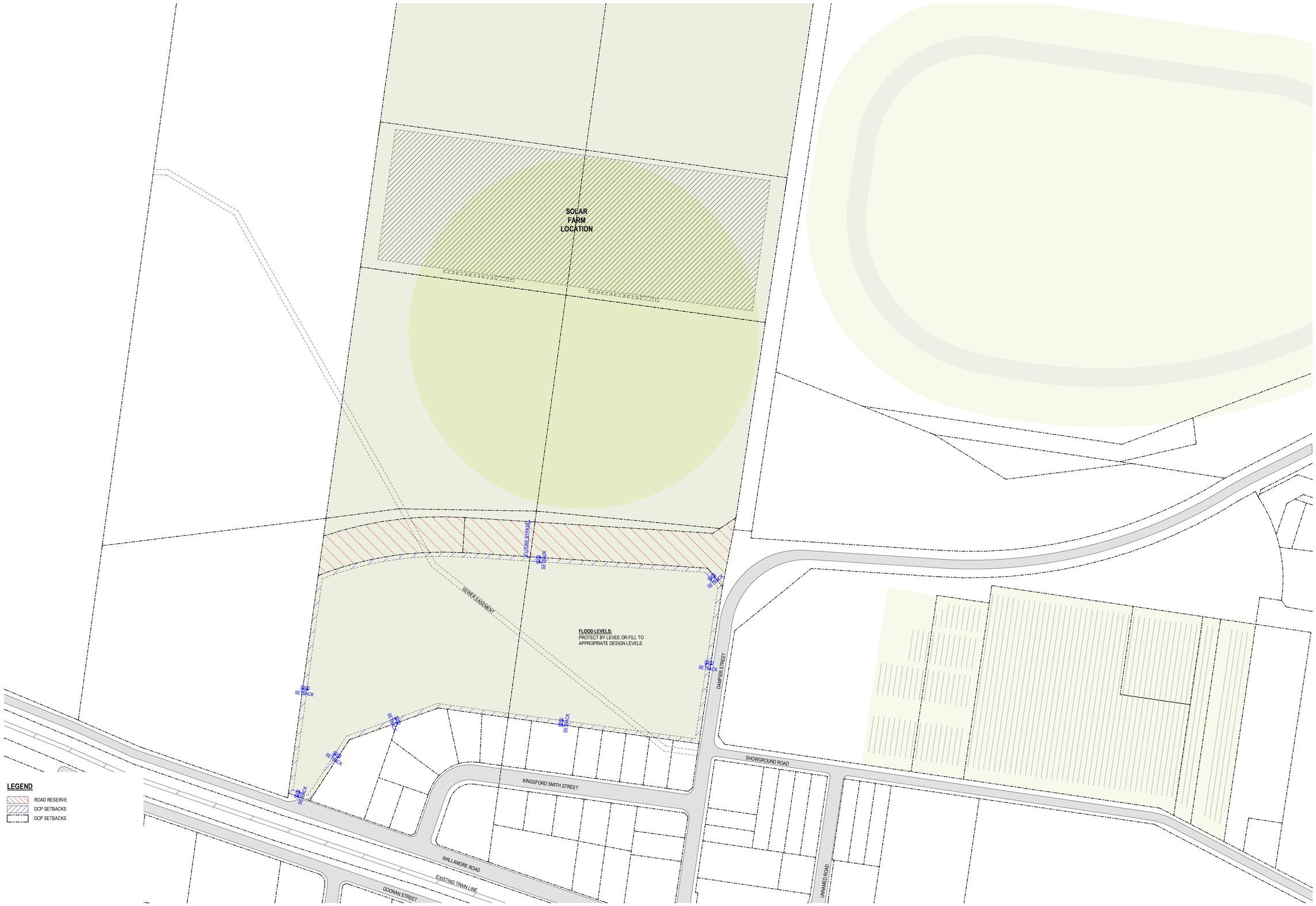

INDICATIVE MASTERPLAN

Revisions			
-	20.12.18	PLANNING PROPOSAL	AK
A	27.02.19	AMENDED PLANNING PROPOSAL	AK

6/08/2019 9:06:37 AM

Project: **Taminda Solar Farm & Industrial Precinct**
55 Dampier St & 72 Wallamore Rd,
Taminda, NSW 2340

Drawing: **SITE CONSTRAINTS PLAN**

Project No: **218133**

Date: **11/22/18**

Author: **AK**

Scale: @ A1: **1 : 2000**

Drawing No.: **TP00.02 A**

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INDICATIVE MASTERPLAN

Revisions

-	20.12.18	PLANNING PROPOSAL	AK
A	27.02.19	AMENDED PLANNING PROPOSAL	AK

6/08/2019 9:06:50 AM

Project: **Taminda Solar Farm & Industrial Precinct**
55 Dampier St & 72 Wallamore Rd,
Taminda, NSW 2340

Drawing: **SITE PLAN**

Project No: **218133** Date: **13.11.18** Author: **AK** Scale: @ A1 **1 : 2000** Drawing No.: **TP00.03 A**

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Revisions

-	20.12.18	PLANNING PROPOSAL	AK
A	27.02.19	AMENDED PLANNING PROPOSAL	AK
B	06.08.19	AMENDED PLANNING PROPOSAL	SM

6/08/2019 9:07:08 AM

Project: **Taminda Solar Farm & Industrial Precinct**
55 Dampier St & 72 Wallamore Rd,
Taminda, NSW 2340

Drawing: **GROUND FLOOR PLAN** | Project No: **218133** | Date: **11/13/18** | Author: **AK** | Scale: @ A1 **1 : 1000** | Drawing No.: **TP01.01 B**

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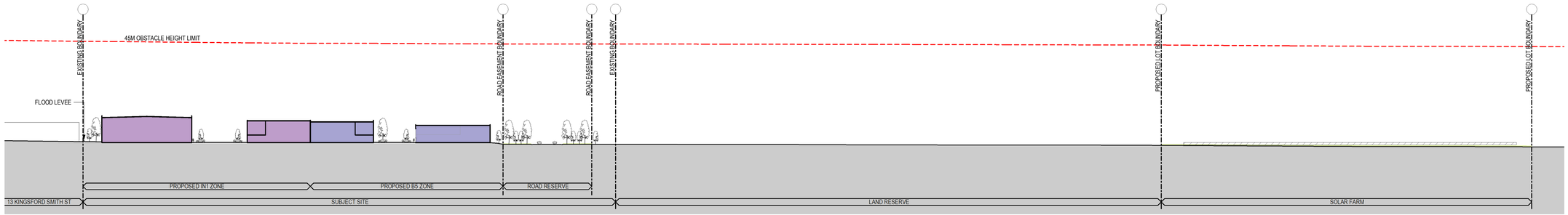
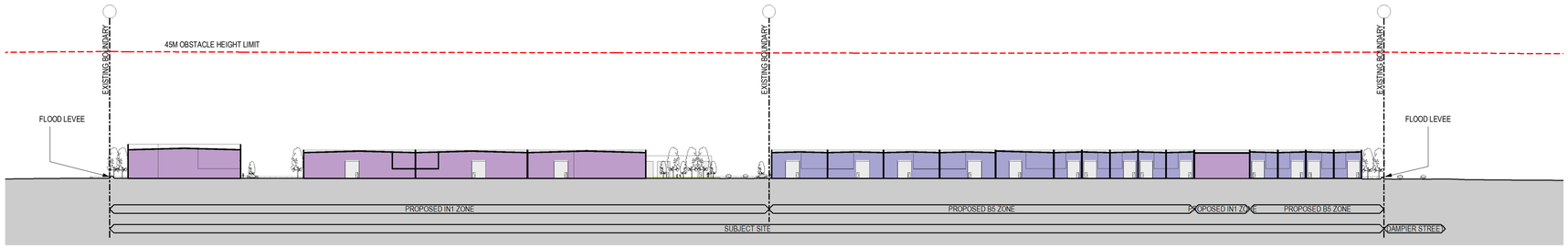


Section 01



Section 02

INDICATIVE MASTERPLAN

Revisions

-	20.12.18	PLANNING PROPOSAL	AK
A	27.02.19	AMENDED PLANNING PROPOSAL	AK

6/08/2019 9:07:16 AM

Project
Taminda Solar Farm & Industrial Precinct
55 Dampier St & 72 Wallamore Rd,
Taminda, NSW 2340

Drawing **SECTIONS**

Project No **218133**

Date **13.11.18**

Author **AK**

Scale: @ A1 **1 : 1000**

Drawing No. **TP03.01 A**

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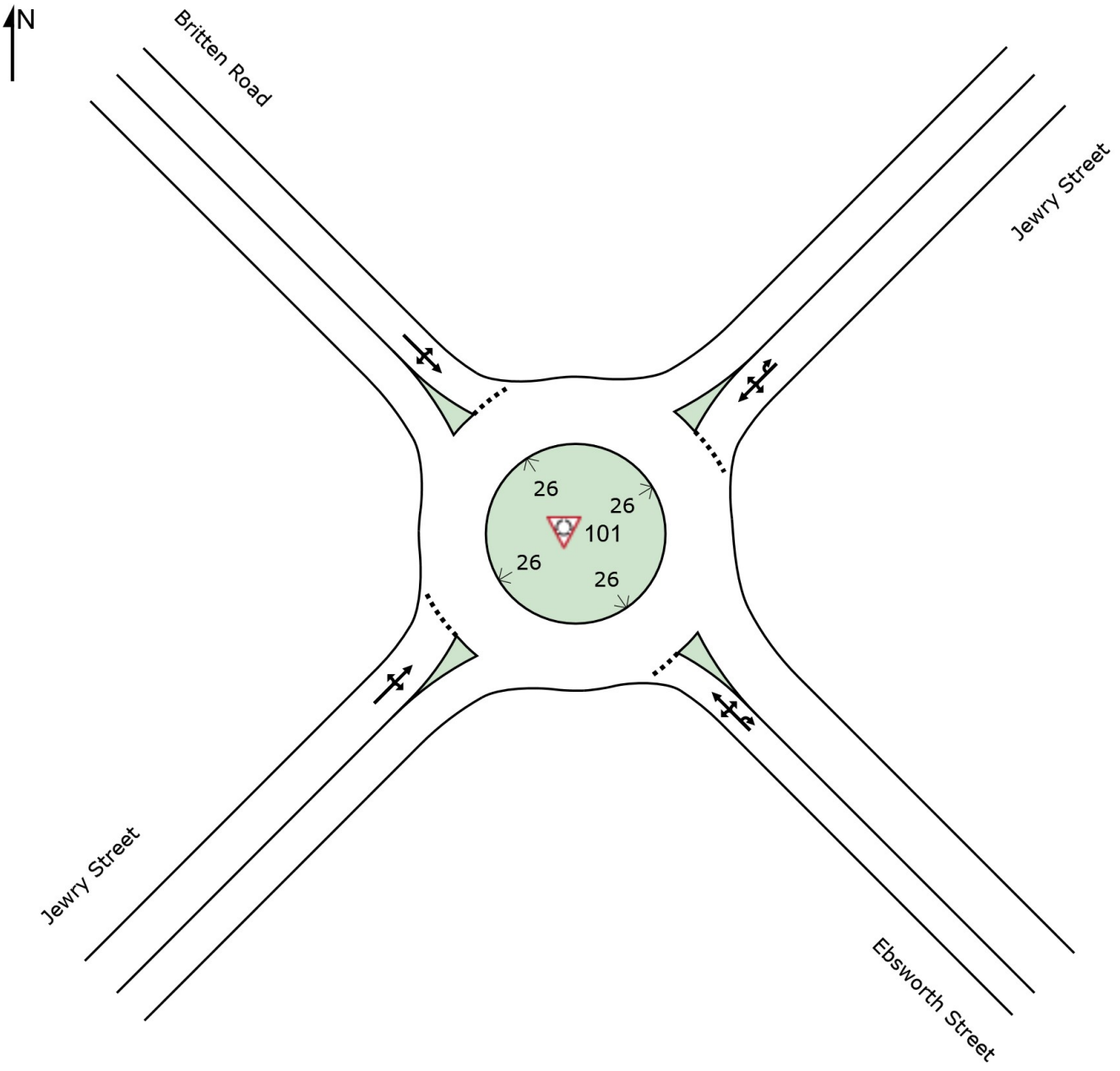
APPENDIX C

SIDRA Outputs

SITE LAYOUT

Site: 101 [Jewry Street / Britten Road / Ebsworth Street Intersection - Exist AM]

Jewry Street / Britten Road / Ebsworth Street Intersection - Exist AM
Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 101 [Jewry Street / Britten Road / Ebsworth Street Intersection - Exist AM]

Jewry Street / Britten Road / Ebsworth Street Intersection - Exist AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
SouthEast: Ebsworth Street												
21	L2	61	12.1	0.655	10.5	LOS A	7.1	52.2	0.87	1.03	1.15	44.0
22	T1	3	33.3	0.655	11.1	LOS A	7.1	52.2	0.87	1.03	1.15	43.2
23	R2	516	5.3	0.655	15.1	LOS B	7.1	52.2	0.87	1.03	1.15	48.4
23u	U	1	0.0	0.655	16.9	LOS B	7.1	52.2	0.87	1.03	1.15	43.3
Approach		581	6.2	0.655	14.6	LOS B	7.1	52.2	0.87	1.03	1.15	48.0
NorthEast: Jewry Street												
24	L2	437	2.9	0.634	3.9	LOS A	5.4	39.4	0.25	0.40	0.25	55.8
25	T1	552	7.6	0.634	4.0	LOS A	5.4	39.4	0.25	0.40	0.25	57.3
26	R2	3	0.0	0.634	9.2	LOS A	5.4	39.4	0.25	0.40	0.25	57.8
26u	U	1	0.0	0.634	11.5	LOS A	5.4	39.4	0.25	0.40	0.25	58.9
Approach		993	5.5	0.634	4.0	LOS A	5.4	39.4	0.25	0.40	0.25	56.7
NorthWest: Britten Road												
27	L2	13	8.3	0.037	9.6	LOS A	0.2	1.8	0.83	0.72	0.83	49.6
28	T1	4	0.0	0.037	9.1	LOS A	0.2	1.8	0.83	0.72	0.83	45.4
29	R2	3	33.3	0.037	15.5	LOS B	0.2	1.8	0.83	0.72	0.83	47.6
Approach		20	10.5	0.037	10.5	LOS A	0.2	1.8	0.83	0.72	0.83	48.6
SouthWest: Jewry Street												
30	L2	5	20.0	0.542	6.9	LOS A	4.1	30.9	0.73	0.70	0.80	52.6
31	T1	479	8.6	0.542	6.7	LOS A	4.1	30.9	0.73	0.70	0.80	55.1
32	R2	38	11.1	0.542	12.1	LOS A	4.1	30.9	0.73	0.70	0.80	53.0
Approach		522	8.9	0.542	7.1	LOS A	4.1	30.9	0.73	0.70	0.80	55.0
All Vehicles		2116	6.6	0.655	7.7	LOS A	7.1	52.2	0.55	0.65	0.64	53.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Jewry Street / Britten Road / Ebsworth Street Intersection - Exist+DEV AM]

Jewry Street / Britten Road / Ebsworth Street Intersection - Exist+DEV AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
SouthEast: Ebsworth Street												
21	L2	61	12.1	0.734	15.4	LOS B	9.6	71.1	0.97	1.22	1.51	41.4
22	T1	3	33.3	0.734	16.3	LOS B	9.6	71.1	0.97	1.22	1.51	40.9
23	R2	516	5.3	0.734	20.0	LOS B	9.6	71.1	0.97	1.22	1.51	46.1
23u	U	1	0.0	0.734	21.7	LOS B	9.6	71.1	0.97	1.22	1.51	40.5
Approach		581	6.2	0.734	19.5	LOS B	9.6	71.1	0.97	1.22	1.51	45.7
NorthEast: Jewry Street												
24	L2	437	2.9	0.709	4.0	LOS A	7.2	52.6	0.30	0.40	0.30	55.7
25	T1	677	6.2	0.709	4.0	LOS A	7.2	52.6	0.30	0.40	0.30	57.2
26	R2	3	0.0	0.709	9.3	LOS A	7.2	52.6	0.30	0.40	0.30	57.6
26u	U	1	0.0	0.709	11.5	LOS A	7.2	52.6	0.30	0.40	0.30	58.8
Approach		1118	4.9	0.709	4.0	LOS A	7.2	52.6	0.30	0.40	0.30	56.6
NorthWest: Britten Road												
27	L2	13	8.3	0.039	10.2	LOS A	0.3	1.9	0.86	0.73	0.86	49.4
28	T1	4	0.0	0.039	9.7	LOS A	0.3	1.9	0.86	0.73	0.86	45.1
29	R2	3	33.3	0.039	16.2	LOS B	0.3	1.9	0.86	0.73	0.86	47.3
Approach		20	10.5	0.039	11.0	LOS A	0.3	1.9	0.86	0.73	0.86	48.3
SouthWest: Jewry Street												
30	L2	5	20.0	0.582	7.3	LOS A	4.8	36.1	0.78	0.75	0.87	52.4
31	T1	511	8.0	0.582	7.0	LOS A	4.8	36.1	0.78	0.75	0.87	55.0
32	R2	38	11.1	0.582	12.4	LOS A	4.8	36.1	0.78	0.75	0.87	52.8
Approach		554	8.4	0.582	7.4	LOS A	4.8	36.1	0.78	0.75	0.87	54.8
All Vehicles		2273	6.1	0.734	8.9	LOS A	9.6	71.1	0.59	0.70	0.75	53.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Jewry Street / Britten Road / Ebsworth Street Intersection - 2040 AM]

Jewry Street / Britten Road / Ebsworth Street Intersection - 2040 AM
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
SouthEast: Ebsworth Street												
21	L2	82	12.1	1.168	180.9	LOS F[11]	93.0	685.3	1.00	4.62	8.74	13.8
22	T1	4	33.3	1.168	181.8	LOS F[11]	93.0	685.3	1.00	4.62	8.74	14.9
23	R2	695	5.3	1.168	185.5	LOS F[11]	93.0	685.3	1.00	4.62	8.74	17.5
23u	U	1	0.0	1.168	187.2	LOS F[11]	93.0	685.3	1.00	4.62	8.74	12.7
Approach		783	6.2	1.168	185.0	LOS F[11]	93.0	685.3	1.00	4.62	8.74	17.1
NorthEast: Jewry Street												
24	L2	588	2.9	0.868	4.4	LOS A	16.9	123.6	0.61	0.44	0.61	54.5
25	T1	743	7.6	0.868	4.5	LOS A	16.9	123.6	0.61	0.44	0.61	56.1
26	R2	4	0.0	0.868	9.7	LOS A	16.9	123.6	0.61	0.44	0.61	56.6
26u	U	1	0.0	0.868	11.9	LOS A	16.9	123.6	0.61	0.44	0.61	57.8
Approach		1337	5.5	0.868	4.4	LOS A	16.9	123.6	0.61	0.44	0.61	55.4
NorthWest: Britten Road												
27	L2	17	8.3	0.082	17.4	LOS B	0.6	4.5	0.98	0.86	0.98	46.3
28	T1	6	0.0	0.082	16.7	LOS B	0.6	4.5	0.98	0.86	0.98	41.5
29	R2	4	33.3	0.082	23.9	LOS B	0.6	4.5	0.98	0.86	0.98	43.7
Approach		27	10.5	0.082	18.3	LOS B	0.6	4.5	0.98	0.86	0.98	45.1
SouthWest: Jewry Street												
30	L2	7	20.0	0.820	12.8	LOS A	11.0	82.7	0.99	1.15	1.43	50.0
31	T1	645	8.6	0.820	12.5	LOS A	11.0	82.7	0.99	1.15	1.43	52.7
32	R2	51	11.1	0.820	17.9	LOS B	11.0	82.7	0.99	1.15	1.43	49.7
Approach		703	8.9	0.820	12.9	LOS A	11.0	82.7	0.99	1.15	1.43	52.5
All Vehicles		2850	6.6	1.168	56.2	LOS D[11]	93.0	685.3	0.82	1.77	3.05	34.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

MOVEMENT SUMMARY

Site: 101 [Jewry Street / Britten Road Intersection / Ebsworth Street - Exist PM]

Jewry Street / Britten Road Intersection / Ebsworth Street - Exist PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
SouthEast: Ebsworth Street												
21	L2	59	5.4	0.721	11.8	LOS A	9.2	65.6	0.92	1.10	1.31	43.2
22	T1	3	0.0	0.721	11.4	LOS A	9.2	65.6	0.92	1.10	1.31	42.5
23	R2	591	2.3	0.721	16.7	LOS B	9.2	65.6	0.92	1.10	1.31	47.7
Approach		653	2.6	0.721	16.2	LOS B	9.2	65.6	0.92	1.10	1.31	47.4
NorthEast: Jewry Street												
24	L2	415	0.8	0.625	3.9	LOS A	5.6	41.2	0.28	0.42	0.28	55.7
25	T1	526	10.2	0.625	4.0	LOS A	5.6	41.2	0.28	0.42	0.28	57.1
26	R2	1	0.0	0.625	9.2	LOS A	5.6	41.2	0.28	0.42	0.28	57.6
26u	U	24	0.0	0.625	11.5	LOS A	5.6	41.2	0.28	0.42	0.28	58.7
Approach		966	5.9	0.625	4.2	LOS A	5.6	41.2	0.28	0.42	0.28	56.6
NorthWest: Britten Road												
27	L2	5	0.0	0.024	13.5	LOS A	0.2	1.2	0.93	0.73	0.93	48.1
28	T1	4	0.0	0.024	13.3	LOS A	0.2	1.2	0.93	0.73	0.93	43.5
29	R2	1	0.0	0.024	18.3	LOS B	0.2	1.2	0.93	0.73	0.93	46.5
Approach		11	0.0	0.024	13.9	LOS A	0.2	1.2	0.93	0.73	0.93	46.3
SouthWest: Jewry Street												
30	L2	1	0.0	0.688	8.9	LOS A	7.1	50.8	0.89	0.97	1.10	52.4
31	T1	581	2.9	0.688	9.1	LOS A	7.1	50.8	0.89	0.97	1.10	54.5
32	R2	46	9.1	0.688	14.5	LOS B	7.1	50.8	0.89	0.97	1.10	52.2
Approach		628	3.4	0.688	9.5	LOS A	7.1	50.8	0.89	0.97	1.10	54.4
All Vehicles		2258	4.2	0.721	9.2	LOS A	9.2	65.6	0.64	0.77	0.81	53.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Jewry Street / Britten Road Intersection / Ebsworth Street - Exist+DEV PM]

Jewry Street / Britten Road Intersection / Ebsworth Street -Exist+DEV PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
SouthEast: Ebsworth Street												
21	L2	59	5.4	0.746	13.4	LOS A	10.1	72.3	0.95	1.16	1.43	42.4
22	T1	3	0.0	0.746	12.9	LOS A	10.1	72.3	0.95	1.16	1.43	41.8
23	R2	591	2.3	0.746	18.2	LOS B	10.1	72.3	0.95	1.16	1.43	47.0
Approach		653	2.6	0.746	17.7	LOS B	10.1	72.3	0.95	1.16	1.43	46.6
NorthEast: Jewry Street												
24	L2	415	0.8	0.648	3.9	LOS A	6.3	46.2	0.31	0.41	0.31	55.6
25	T1	561	9.6	0.648	4.0	LOS A	6.3	46.2	0.31	0.41	0.31	57.0
26	R2	1	0.0	0.648	9.3	LOS A	6.3	46.2	0.31	0.41	0.31	57.5
26u	U	24	0.0	0.648	11.5	LOS A	6.3	46.2	0.31	0.41	0.31	58.7
Approach		1001	5.7	0.648	4.2	LOS A	6.3	46.2	0.31	0.41	0.31	56.5
NorthWest: Britten Road												
27	L2	5	0.0	0.034	19.5	LOS B	0.3	1.8	1.00	0.79	1.00	45.7
28	T1	4	0.0	0.034	19.2	LOS B	0.3	1.8	1.00	0.79	1.00	40.7
29	R2	1	0.0	0.034	24.3	LOS B	0.3	1.8	1.00	0.79	1.00	43.6
Approach		11	0.0	0.034	19.9	LOS B	0.3	1.8	1.00	0.79	1.00	43.7
SouthWest: Jewry Street												
30	L2	1	0.0	0.847	13.4	LOS A	12.7	90.9	1.00	1.18	1.53	49.8
31	T1	721	2.3	0.847	13.5	LOS A	12.7	90.9	1.00	1.18	1.53	52.2
32	R2	46	9.1	0.847	19.0	LOS B	12.7	90.9	1.00	1.18	1.53	49.1
Approach		768	2.7	0.847	13.8	LOS A	12.7	90.9	1.00	1.18	1.53	52.1
All Vehicles		2433	3.9	0.847	10.9	LOS A	12.7	90.9	0.70	0.86	1.00	52.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Jewry Street / Britten Road Intersection / Ebsworth Street - 2040 PM]

Jewry Street / Britten Road Intersection / Ebsworth Street - 2040 PM
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
SouthEast: Ebsworth Street												
21	L2	79	5.4	1.278	273.0	LOS F[11]	140.6	1006.2	1.00	6.07	11.89	10.1
22	T1	4	0.0	1.278	272.5	LOS F[11]	140.6	1006.2	1.00	6.07	11.89	11.0
23	R2	795	2.3	1.278	277.8	LOS F[11]	140.6	1006.2	1.00	6.07	11.89	13.0
Approach		879	2.6	1.278	277.3	LOS F[11]	140.6	1006.2	1.00	6.07	11.89	12.7
NorthEast: Jewry Street												
24	L2	559	0.8	0.855	4.4	LOS A	15.6	115.0	0.62	0.45	0.62	54.5
25	T1	709	10.2	0.855	4.5	LOS A	15.6	115.0	0.62	0.45	0.62	55.9
26	R2	1	0.0	0.855	9.7	LOS A	15.6	115.0	0.62	0.45	0.62	56.5
26u	U	33	0.0	0.855	11.9	LOS A	15.6	115.0	0.62	0.45	0.62	57.8
Approach		1301	5.9	0.855	4.6	LOS A	15.6	115.0	0.62	0.45	0.62	55.4
NorthWest: Britten Road												
27	L2	7	0.0	0.063	24.3	LOS B	0.4	2.8	0.99	0.91	0.99	43.9
28	T1	6	0.0	0.063	24.1	LOS B	0.4	2.8	0.99	0.91	0.99	38.7
29	R2	1	0.0	0.063	29.1	LOS C	0.4	2.8	0.99	0.91	0.99	41.5
Approach		14	0.0	0.063	24.7	LOS B	0.4	2.8	0.99	0.91	0.99	41.8
SouthWest: Jewry Street												
30	L2	1	0.0	0.999	42.4	LOS C	34.0	244.6	1.00	1.96	3.32	37.0
31	T1	783	2.9	0.999	42.6	LOS D[11]	34.0	244.6	1.00	1.96	3.32	40.0
32	R2	62	9.1	0.999	48.1	LOS D[11]	34.0	244.6	1.00	1.96	3.32	34.5
Approach		846	3.4	0.999	43.0	LOS D[11]	34.0	244.6	1.00	1.96	3.32	39.7
All Vehicles		3041	4.2	1.278	94.2	LOS F[11]	140.6	1006.2	0.84	2.50	4.63	27.1

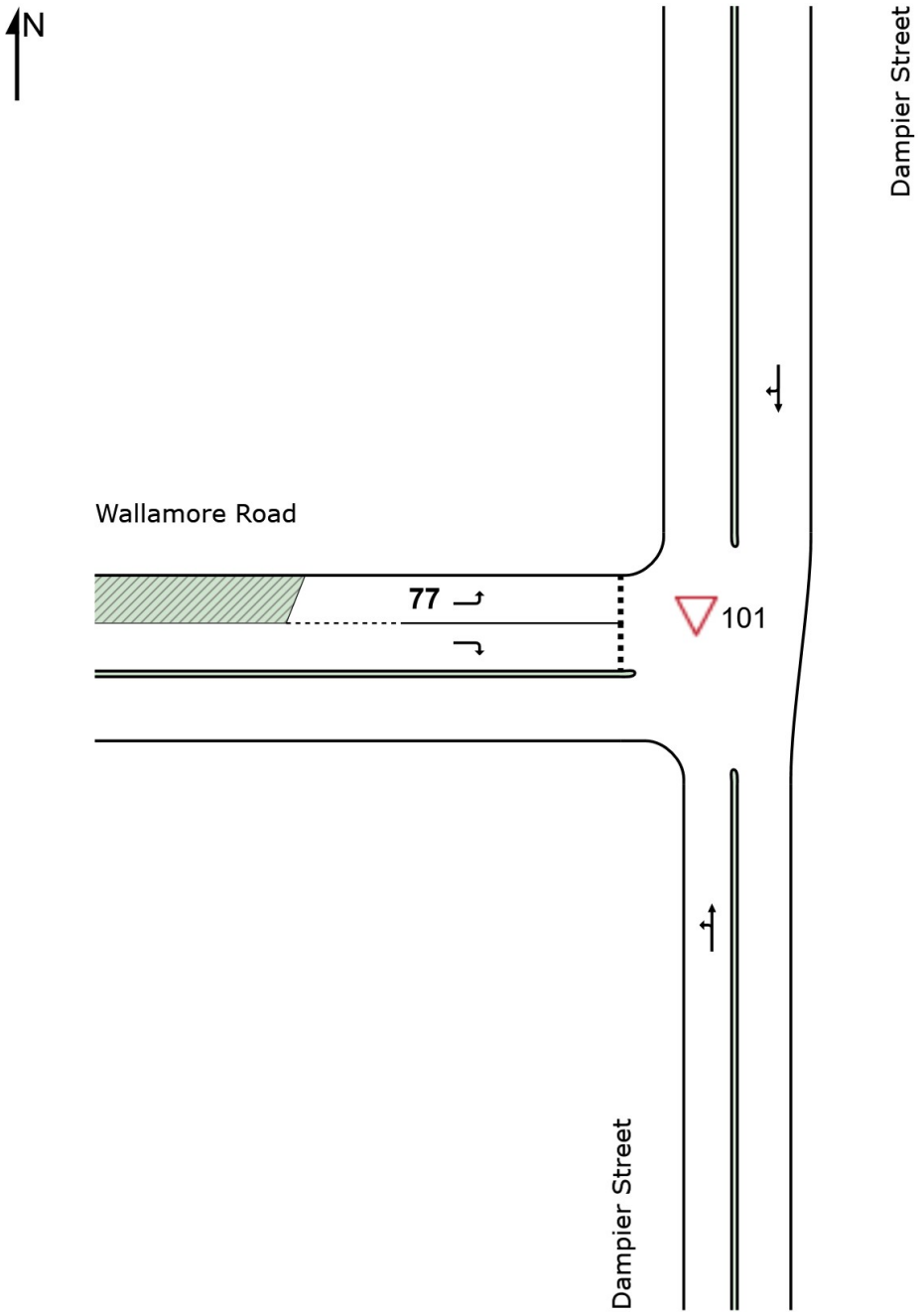
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

SITE LAYOUT

Site: 101 [Dampier Street / Wallamore Road Intersection - Exist AM]

Dampier Street / Wallamore Road Intersection - Exist AM
Site Category: (None)
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Dampier Street / Wallamore Road Intersection - Exist AM]

Dampier Street / Wallamore Road Intersection - Exist AM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Dampier Street												
1	L2	42	20.0	0.199	5.8	LOS A	0.0	0.0	0.00	0.06	0.00	57.1
2	T1	343	12.6	0.199	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.5
Approach		385	13.4	0.199	0.7	NA	0.0	0.0	0.00	0.06	0.00	59.2
North: Dampier Street												
8	T1	362	13.7	0.361	1.7	LOS A	2.3	18.1	0.44	0.25	0.50	56.6
9	R2	189	12.8	0.361	8.4	LOS A	2.3	18.1	0.44	0.25	0.50	55.1
Approach		552	13.4	0.361	4.0	NA	2.3	18.1	0.44	0.25	0.50	56.1
West: Wallamore Road												
10	L2	269	8.6	0.245	7.3	LOS A	1.1	8.1	0.46	0.68	0.46	51.8
12	R2	35	27.3	0.106	14.9	LOS B	0.3	2.8	0.73	0.88	0.73	47.7
Approach		304	10.7	0.245	8.2	LOS A	1.1	8.1	0.50	0.71	0.50	51.3
All Vehicles		1241	12.7	0.361	4.0	NA	2.3	18.1	0.32	0.30	0.34	55.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Dampier Street / Wallamore Road Intersection - Exist+DEV AM]

Dampier Street / Wallamore Road Intersection - Exist+DEV AM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Dampier Street												
1	L2	42	20.0	0.270	5.8	LOS A	0.0	0.0	0.00	0.05	0.00	57.3
2	T1	494	8.7	0.270	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	59.6
Approach		536	9.6	0.270	0.5	NA	0.0	0.0	0.00	0.05	0.00	59.4
North: Dampier Street												
8	T1	400	12.4	0.423	3.0	LOS A	3.4	26.3	0.53	0.28	0.72	55.6
9	R2	195	12.4	0.423	10.4	LOS A	3.4	26.3	0.53	0.28	0.72	54.0
Approach		595	12.4	0.423	5.4	NA	3.4	26.3	0.53	0.28	0.72	55.1
West: Wallamore Road												
10	L2	289	8.0	0.314	8.7	LOS A	1.5	11.2	0.57	0.82	0.64	51.0
12	R2	35	27.3	0.144	19.2	LOS B	0.4	3.7	0.81	0.92	0.81	45.5
Approach		324	10.1	0.314	9.8	LOS A	1.5	11.2	0.59	0.83	0.65	50.3
All Vehicles		1455	10.9	0.423	4.6	NA	3.4	26.3	0.35	0.32	0.44	55.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Dampier Street / Wallamore Road Intersection - 2040 AM]

Dampier Street / Wallamore Road Intersection - 2040 AM
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Dampier Street												
1	L2	57	20.0	0.268	5.8	LOS A	0.0	0.0	0.00	0.06	0.00	57.1
2	T1	462	12.6	0.268	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.5
Approach		519	13.4	0.268	0.7	NA	0.0	0.0	0.00	0.06	0.00	59.2
North: Dampier Street												
8	T1	488	13.7	0.535	3.9	LOS A	5.4	42.2	0.60	0.33	0.94	54.8
9	R2	255	12.8	0.535	11.3	LOS A	5.4	42.2	0.60	0.33	0.94	53.2
Approach		743	13.4	0.535	6.5	NA	5.4	42.2	0.60	0.33	0.94	54.3
West: Wallamore Road												
10	L2	363	8.6	0.384	8.9	LOS A	2.1	16.0	0.58	0.85	0.72	50.8
12	R2	47	27.3	0.273	27.7	LOS B	0.8	7.2	0.89	0.98	1.00	41.5
Approach		410	10.7	0.384	11.1	LOS A	2.1	16.0	0.62	0.86	0.75	49.4
All Vehicles		1672	12.7	0.535	5.8	NA	5.4	42.2	0.42	0.38	0.60	54.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Dampier Street / Wallamore Road Intersection - Exist PM]

Dampier Street / Wallamore Road Intersection - Exist PM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Dampier Street												
1	L2	48	10.9	0.216	5.7	LOS A	0.0	0.0	0.00	0.07	0.00	57.5
2	T1	382	8.5	0.216	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.4
Approach		431	8.8	0.216	0.7	NA	0.0	0.0	0.00	0.07	0.00	59.2
North: Dampier Street												
8	T1	348	13.0	0.428	2.6	LOS A	3.5	27.0	0.55	0.36	0.70	55.6
9	R2	268	8.2	0.428	9.0	LOS A	3.5	27.0	0.55	0.36	0.70	54.2
Approach		617	10.9	0.428	5.4	NA	3.5	27.0	0.55	0.36	0.70	55.0
West: Wallamore Road												
10	L2	293	7.2	0.274	7.5	LOS A	1.2	9.0	0.49	0.71	0.49	51.8
12	R2	43	9.8	0.128	14.7	LOS B	0.4	2.9	0.75	0.89	0.75	48.3
Approach		336	7.5	0.274	8.5	LOS A	1.2	9.0	0.53	0.73	0.53	51.3
All Vehicles		1383	9.4	0.428	4.7	NA	3.5	27.0	0.37	0.36	0.44	55.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Dampier Street / Wallamore Road Intersection - Exist+DEV PM]

Dampier Street / Wallamore Road Intersection - Exist+DEV PM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Dampier Street												
1	L2	48	10.9	0.236	5.7	LOS A	0.0	0.0	0.00	0.06	0.00	57.5
2	T1	424	7.7	0.236	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.5
Approach		473	8.0	0.236	0.6	NA	0.0	0.0	0.00	0.06	0.00	59.3
North: Dampier Street												
8	T1	517	8.8	0.543	3.3	LOS A	5.6	42.0	0.58	0.33	0.88	55.2
9	R2	291	7.6	0.543	10.4	LOS A	5.6	42.0	0.58	0.33	0.88	53.9
Approach		807	8.3	0.543	5.9	NA	5.6	42.0	0.58	0.33	0.88	54.8
West: Wallamore Road												
10	L2	298	7.1	0.293	7.9	LOS A	1.3	9.9	0.52	0.75	0.54	51.6
12	R2	43	9.8	0.201	21.7	LOS B	0.6	4.6	0.86	0.95	0.91	44.6
Approach		341	7.4	0.293	9.6	LOS A	1.3	9.9	0.56	0.77	0.59	50.5
All Vehicles		1621	8.1	0.543	5.1	NA	5.6	42.0	0.41	0.34	0.56	55.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Dampier Street / Wallamore Road Intersection - 2040 PM]

Dampier Street / Wallamore Road Intersection - Exist PM
Site Category: (None)
Giveway / Yield (Two-Way)
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

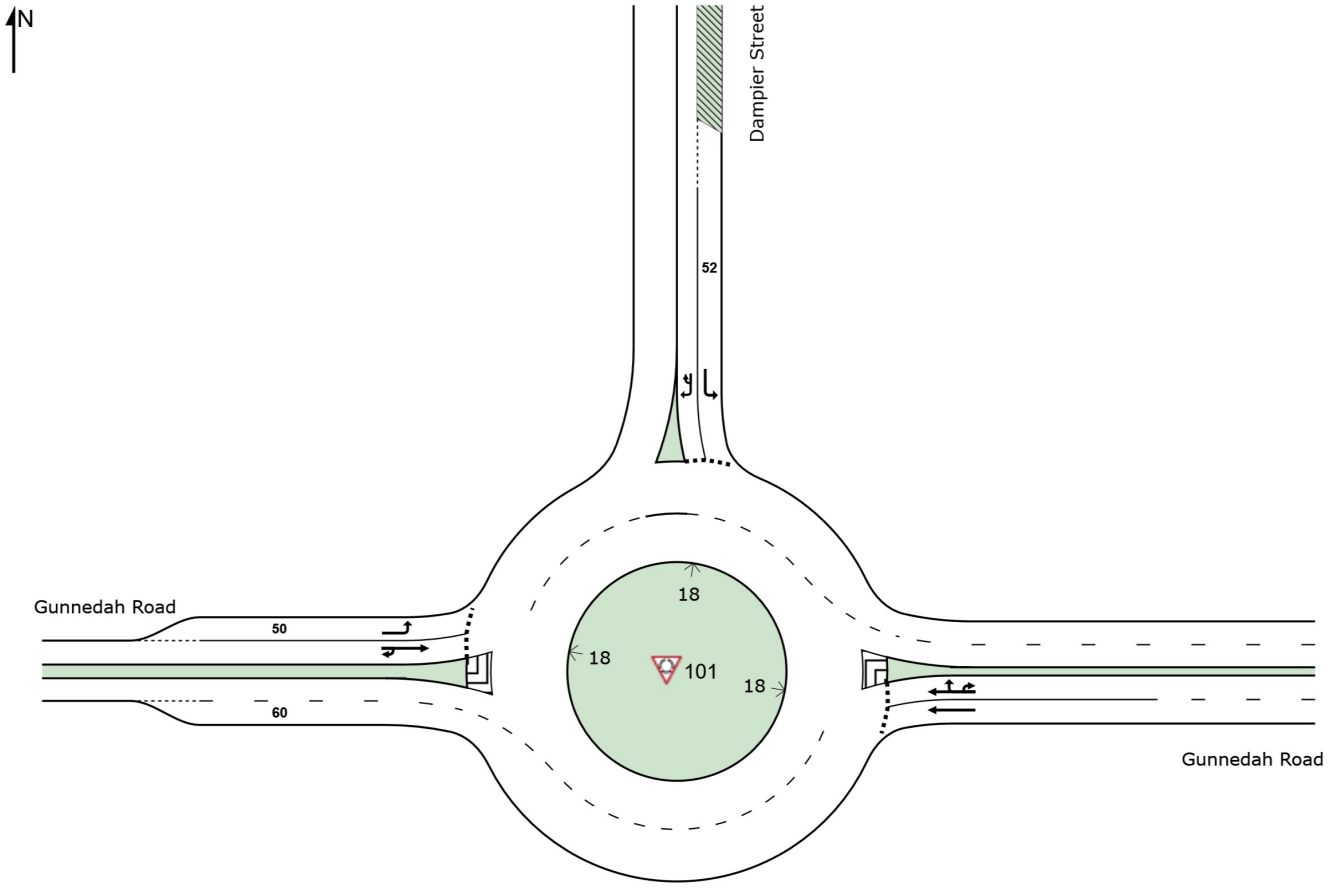
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Dampier Street												
1	L2	65	10.9	0.291	5.7	LOS A	0.0	0.0	0.00	0.07	0.00	57.5
2	T1	515	8.5	0.291	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	59.4
Approach		580	8.8	0.291	0.7	NA	0.0	0.0	0.00	0.07	0.00	59.2
North: Dampier Street												
8	T1	469	13.0	0.654	6.2	LOS A	8.5	65.3	0.78	0.51	1.43	52.8
9	R2	362	8.2	0.654	13.2	LOS A	8.5	65.3	0.78	0.51	1.43	51.2
Approach		831	10.9	0.654	9.3	NA	8.5	65.3	0.78	0.51	1.43	52.1
West: Wallamore Road												
10	L2	394	7.2	0.437	9.6	LOS A	2.6	19.4	0.62	0.92	0.84	50.4
12	R2	58	9.8	0.352	30.0	LOS C	1.1	8.3	0.91	1.00	1.08	40.9
Approach		452	7.5	0.437	12.3	LOS A	2.6	19.4	0.66	0.93	0.87	48.8
All Vehicles		1863	9.4	0.654	7.3	NA	8.5	65.3	0.51	0.47	0.85	53.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Gunnedah Road / Dampier Street Intersection - Exist AM]

Gunnedah Road / Dampier Street Intersection - Exist AM
Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 101 [Gunnedah Road / Dampier Street Intersection - Exist AM]

Gunnedah Road / Dampier Street Intersection - Exist AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Gunnedah Road												
5	T1	355	11.0	0.309	5.5	LOS A	2.3	17.7	0.46	0.55	0.46	52.5
6	R2	200	9.5	0.309	9.8	LOS A	2.3	17.7	0.46	0.58	0.46	51.1
6u	U	12	0.0	0.309	11.7	LOS A	2.3	17.7	0.46	0.58	0.46	50.3
Approach		566	10.2	0.309	7.1	LOS A	2.3	17.7	0.46	0.56	0.46	52.0
North: Dampier Street												
7	L2	128	10.7	0.166	7.5	LOS A	0.9	7.2	0.63	0.70	0.63	49.6
9	R2	167	11.3	0.190	11.6	LOS A	1.1	8.7	0.63	0.75	0.63	51.3
9u	U	1	0.0	0.190	13.4	LOS A	1.1	8.7	0.63	0.75	0.63	52.1
Approach		297	11.0	0.190	9.8	LOS A	1.1	8.7	0.63	0.73	0.63	50.7
West: Gunnedah Road												
10	L2	168	14.4	0.178	6.1	LOS A	1.1	8.5	0.49	0.58	0.49	53.5
11	T1	459	11.7	0.348	5.7	LOS A	2.6	20.1	0.51	0.53	0.51	51.8
12u	U	1	0.0	0.348	12.0	LOS A	2.6	20.1	0.51	0.53	0.51	55.7
Approach		628	12.4	0.348	5.8	LOS A	2.6	20.1	0.51	0.54	0.51	52.3
All Vehicles		1492	11.3	0.348	7.1	LOS A	2.6	20.1	0.51	0.59	0.51	51.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Gunnedah Road / Dampier Street Intersection - Exist+DEV AM]

Gunnedah Road / Dampier Street Intersection - Exist+DEV AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Gunnedah Road												
5	T1	355	11.0	0.377	5.6	LOS A	3.1	22.7	0.48	0.56	0.48	52.2
6	R2	327	5.8	0.377	9.8	LOS A	3.1	22.7	0.50	0.60	0.50	50.7
6u	U	12	0.0	0.377	11.8	LOS A	3.1	22.7	0.50	0.60	0.50	49.4
Approach		694	8.3	0.377	7.7	LOS A	3.1	22.7	0.49	0.58	0.49	51.5
North: Dampier Street												
7	L2	160	8.6	0.200	7.3	LOS A	1.2	9.0	0.66	0.71	0.66	49.9
9	R2	174	10.9	0.200	11.6	LOS A	1.2	9.5	0.65	0.75	0.65	51.2
9u	U	1	0.0	0.200	13.4	LOS A	1.2	9.5	0.65	0.75	0.65	52.1
Approach		335	9.7	0.200	9.6	LOS A	1.2	9.5	0.66	0.73	0.66	50.7
West: Gunnedah Road												
10	L2	192	12.6	0.220	7.0	LOS A	1.4	10.7	0.61	0.66	0.61	53.2
11	T1	459	11.7	0.390	6.5	LOS A	3.0	23.1	0.65	0.62	0.65	51.2
12u	U	1	0.0	0.390	12.7	LOS A	3.0	23.1	0.65	0.62	0.65	55.1
Approach		652	12.0	0.390	6.7	LOS A	3.0	23.1	0.64	0.63	0.64	51.8
All Vehicles		1680	10.0	0.390	7.7	LOS A	3.1	23.1	0.58	0.63	0.58	51.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Gunnedah Road / Dampier Street Intersection - 2040 AM]

Gunnedah Road / Dampier Street Intersection - Exist AM
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles												
Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Gunnedah Road												
5	T1	478	11.0	0.446	6.1	LOS A	3.9	29.5	0.59	0.60	0.59	51.9
6	R2	269	9.5	0.446	10.3	LOS A	3.9	29.5	0.61	0.62	0.61	50.5
6u	U	16	0.0	0.446	12.2	LOS A	3.9	29.5	0.61	0.62	0.61	49.4
Approach		763	10.2	0.446	7.7	LOS A	3.9	29.5	0.60	0.61	0.60	51.4
North: Dampier Street												
7	L2	173	10.7	0.279	9.3	LOS A	1.8	13.6	0.79	0.83	0.79	48.0
9	R2	225	11.3	0.313	13.2	LOS A	2.1	16.5	0.80	0.85	0.80	50.3
9u	U	1	0.0	0.313	14.9	LOS B	2.1	16.5	0.80	0.85	0.80	51.1
Approach		400	11.0	0.313	11.5	LOS A	2.1	16.5	0.79	0.84	0.79	49.5
West: Gunnedah Road												
10	L2	227	14.4	0.261	6.8	LOS A	1.7	13.4	0.60	0.65	0.60	53.1
11	T1	618	11.7	0.504	6.4	LOS A	4.4	34.1	0.69	0.62	0.69	51.0
12u	U	1	0.0	0.504	12.7	LOS A	4.4	34.1	0.69	0.62	0.69	55.0
Approach		846	12.4	0.504	6.5	LOS A	4.4	34.1	0.66	0.63	0.66	51.6
All Vehicles		2009	11.3	0.504	8.0	LOS A	4.4	34.1	0.66	0.66	0.66	51.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Gunnedah Road / Dampier Street Intersection - Exist PM]

Gunnedah Road / Dampier Street Intersection - Exist PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Gunnedah Road												
5	T1	309	7.1	0.244	5.5	LOS A	1.7	13.1	0.47	0.55	0.47	52.7
6	R2	119	14.2	0.244	10.0	LOS A	1.7	13.1	0.47	0.57	0.47	51.2
6u	U	8	0.0	0.244	11.8	LOS A	1.7	13.1	0.47	0.57	0.47	50.7
Approach		437	8.9	0.244	6.9	LOS A	1.7	13.1	0.47	0.56	0.47	52.3
North: Dampier Street												
7	L2	205	4.6	0.216	6.9	LOS A	1.3	9.5	0.62	0.68	0.62	50.8
9	R2	201	7.3	0.237	11.9	LOS A	1.4	10.4	0.64	0.77	0.64	51.3
9u	U	1	0.0	0.237	13.7	LOS A	1.4	10.4	0.64	0.77	0.64	52.0
Approach		407	5.9	0.237	9.4	LOS A	1.4	10.4	0.63	0.72	0.63	51.1
West: Gunnedah Road												
10	L2	165	4.5	0.153	5.2	LOS A	0.9	6.8	0.38	0.51	0.38	54.1
11	T1	469	4.9	0.315	5.1	LOS A	2.4	17.3	0.39	0.46	0.39	53.3
12u	U	1	0.0	0.315	11.5	LOS A	2.4	17.3	0.39	0.46	0.39	56.3
Approach		636	4.8	0.315	5.1	LOS A	2.4	17.3	0.39	0.48	0.39	53.6
All Vehicles		1480	6.3	0.315	6.8	LOS A	2.4	17.3	0.48	0.57	0.48	52.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Gunnedah Road / Dampier Street Intersection - Exist+DEV PM]

Gunnedah Road / Dampier Street Intersection - Exist+DEV PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
East: Gunnedah Road												
5	T1	309	7.1	0.270	5.7	LOS A	2.0	14.8	0.51	0.57	0.51	52.4
6	R2	155	10.9	0.270	10.1	LOS A	2.0	14.8	0.51	0.60	0.51	51.0
6u	U	8	0.0	0.270	11.9	LOS A	2.0	14.8	0.51	0.60	0.51	50.2
Approach		473	8.2	0.270	7.3	LOS A	2.0	14.8	0.51	0.58	0.51	52.0
North: Dampier Street												
7	L2	347	2.7	0.364	7.2	LOS A	2.5	17.6	0.69	0.73	0.69	50.8
9	R2	227	6.5	0.291	12.3	LOS A	1.8	13.0	0.67	0.80	0.67	51.0
9u	U	1	0.0	0.291	14.1	LOS A	1.8	13.0	0.67	0.80	0.67	51.7
Approach		576	4.2	0.364	9.2	LOS A	2.5	17.6	0.68	0.76	0.68	50.9
West: Gunnedah Road												
10	L2	172	4.3	0.163	5.5	LOS A	1.0	7.3	0.43	0.54	0.43	54.0
11	T1	469	4.9	0.327	5.3	LOS A	2.5	18.1	0.45	0.49	0.45	53.0
12u	U	1	0.0	0.327	11.7	LOS A	2.5	18.1	0.45	0.49	0.45	56.0
Approach		642	4.8	0.327	5.3	LOS A	2.5	18.1	0.44	0.50	0.44	53.3
All Vehicles		1691	5.5	0.364	7.2	LOS A	2.5	18.1	0.54	0.61	0.54	52.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Gunnedah Road / Dampier Street Intersection - 2040 PM]

Gunnedah Road / Dampier Street Intersection - Exist PM
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 20 years

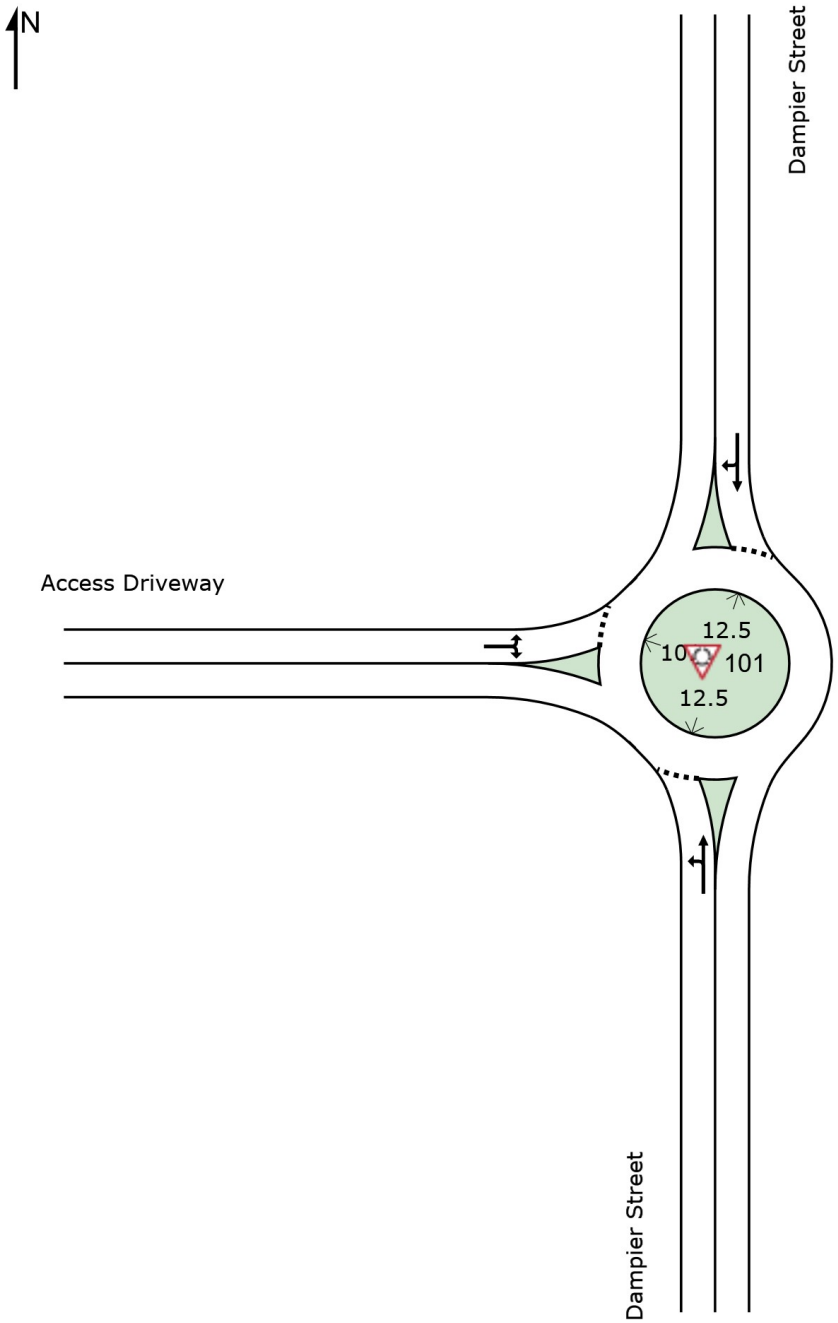
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Gunnedah Road												
5	T1	417	7.1	0.355	6.1	LOS A	2.8	21.4	0.59	0.61	0.59	52.2
6	R2	160	14.2	0.355	10.5	LOS A	2.8	21.4	0.61	0.62	0.61	50.7
6u	U	11	0.0	0.355	12.3	LOS A	2.8	21.4	0.61	0.62	0.61	49.9
Approach		588	8.9	0.355	7.4	LOS A	2.8	21.4	0.60	0.61	0.60	51.7
North: Dampier Street												
7	L2	276	4.6	0.347	8.5	LOS A	2.4	17.5	0.79	0.81	0.79	49.4
9	R2	271	7.3	0.389	13.8	LOS A	2.6	19.5	0.80	0.88	0.80	50.0
9u	U	1	0.0	0.389	15.5	LOS B	2.6	19.5	0.80	0.88	0.80	50.7
Approach		549	5.9	0.389	11.1	LOS A	2.6	19.5	0.79	0.85	0.79	49.8
West: Gunnedah Road												
10	L2	223	4.5	0.217	5.6	LOS A	1.4	10.3	0.47	0.56	0.47	53.8
11	T1	632	4.9	0.445	5.5	LOS A	3.9	28.3	0.53	0.52	0.53	52.6
12u	U	1	0.0	0.445	11.9	LOS A	3.9	28.3	0.53	0.52	0.53	55.7
Approach		856	4.8	0.445	5.5	LOS A	3.9	28.3	0.51	0.53	0.51	53.0
All Vehicles		1993	6.3	0.445	7.6	LOS A	3.9	28.3	0.62	0.64	0.62	51.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Access Driveway Exist+DEV PM - Roundabout]

Access Driveway Exist+DEV PM - Roundabout
Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 101 [Access Driveway Exist+DEV PM - Roundabout]

Access Driveway Exist+DEV PM - Roundabout
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Dampier Street												
1	L2	47	0.0	0.499	4.7	LOS A	4.8	35.6	0.25	0.26	0.25	52.3
2	T1	664	8.1	0.499	2.4	LOS A	4.8	35.6	0.25	0.26	0.25	59.6
Approach		712	7.5	0.499	2.6	LOS A	4.8	35.6	0.25	0.26	0.25	59.3
North: Dampier Street												
8	T1	617	10.9	0.613	6.4	LOS A	5.8	44.4	0.68	0.63	0.68	52.5
9	R2	35	0.0	0.613	9.8	LOS A	5.8	44.4	0.68	0.63	0.68	36.9
Approach		652	10.3	0.613	6.6	LOS A	5.8	44.4	0.68	0.63	0.68	51.7
West: Access Driveway												
10	L2	140	0.0	0.280	4.9	LOS A	2.1	14.4	0.73	0.72	0.73	50.5
12	R2	191	0.0	0.280	12.8	LOS A	2.1	14.4	0.73	0.72	0.73	54.2
Approach		331	0.0	0.280	9.4	LOS A	2.1	14.4	0.73	0.72	0.73	52.6
All Vehicles		1694	7.1	0.613	5.5	LOS A	5.8	44.4	0.51	0.49	0.51	55.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Access Driveway Exist+DEV PM - Roundabout 2040]

Access Driveway Exist+DEV PM - Roundabout
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 20 years

Movement Performance - Vehicles

Mov ID	Turn	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	Aver. No. Cycles	Average Speed km/h
South: Dampier Street												
1	L2	47	0.0	0.652	4.8	LOS A	8.9	66.5	0.35	0.27	0.35	51.5
2	T1	895	8.1	0.652	2.5	LOS A	8.9	66.5	0.35	0.27	0.35	59.0
Approach		942	7.7	0.652	2.6	LOS A	8.9	66.5	0.35	0.27	0.35	58.7
North: Dampier Street												
8	T1	831	10.9	0.810	9.3	LOS A	13.6	103.8	0.94	0.76	1.05	51.2
9	R2	35	0.0	0.810	12.6	LOS A	13.6	103.8	0.94	0.76	1.05	35.9
Approach		866	10.5	0.810	9.5	LOS A	13.6	103.8	0.94	0.76	1.05	50.7
West: Access Driveway												
10	L2	140	0.0	0.356	7.3	LOS A	3.0	21.2	0.91	0.84	0.91	48.7
12	R2	191	0.0	0.356	15.2	LOS B	3.0	21.2	0.91	0.84	0.91	52.0
Approach		331	0.0	0.356	11.8	LOS A	3.0	21.2	0.91	0.84	0.91	50.6
All Vehicles		2138	7.6	0.810	6.8	LOS A	13.6	103.8	0.68	0.56	0.72	54.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.