FUTURE URBAN

APPENDIX 6. INVESTIGATIONS – TRAFFIC

Ref: **19384|BNW**

22 November 2021

Ms Emily Nankivell
Future Urban Pty Ltd
Level 1, 74 Pirie Street
ADELAIDE SA 5000

Dear Emily,

SCOTTY'S CORNER CODE AMENDMENT RESPONSE TO COUNCIL AND DIT SUBMISSIONS

I refer to the proposed Code Amendment for the Scotty's Corner site, Medindie. Specifically, this letter provides a response to traffic matters raised in submissions received from the City of Walkerville and the Department for Infrastructure and Transport (DIT) in relation to the Code Amendment.

1. CITY OF WALKERVILLE/GTA-STANTEC COMMENTS

The comments identified in the City of Walkerville's response largely duplicate comments provided by Mr Paul Froggatt of GTA Consultants (now Stantec and herein referred to as GTA) (who was engaged by Council to provide a review of the Code Amendment). Having reviewed the submissions provided, we have concerns with a number of the points raised by GTA as they appear to be based on misinterpretation of our assessment or inaccurate assumptions. Specifically, I provide key comments made by GTA in italics within the separate items, followed by my response:

1.1 SITE ACCESS PROVISION

> *"…whilst the site is located within a <u>comfortable bicycle ride of the CBD and many other local destinations</u>, no immediately accessible bicycle infrastructure exists that would encourage more cycling."* (my emphasis)

I highlight that GTA consider that the site is within a '*comfortable*' bicycle ride of the CBD and many other local destinations. In addition, I note that the recent upgrades to the intersection immediately adjacent the site have extended the northbound bicycle lane on Main North Road through the intersection (improving conditions compared to the pre-upgrade arrangements). Proximity to key destinations is a significant factor in modal share. While GTA has suggested that there are no immediately accessible bicycle facilities, cyclists are legally permitted to utilise the adjacent footpaths (as well as the adjacent roads). In addition to the footpaths immediately adjacent the site, there are safe, lower volume local roads within close proximity of the site which can be utilised to access cycling facilities and destinations in the broader area. Of particular note, GTA (in it's Medindie Transport and Parking Plan prepared for Council) recommended a bicycle link be provided approximately 115 m east of the site utilising Victoria Avenue, Corbin Road and Dutton Terrace with broader connections to the City of Prospect bicycle network and shared paths within the Park Lands to the south. Even if this was not formally designated, the link effectively exists with cyclists able to (generally) utilise relatively low volume local roads to access the associated destinations/facilities. Given the site's relatively close proximity to the CBD (approximately 3 km), the short section of access required via the footpaths adjacent the site (or arterial road carriageways) to local road access routes is considered to have minimal impact on the viability of cycling for access to/from the site.

> *"Furthermore, in the report CIRQA identifies a high number of bus services to the site. This is misleading because only Route 222 stops near the site with the other bus routes operating express services past this location."*

I do not concur with GTA's comments in respect to the bus services in the vicinity of the site and the above statement is incorrect. GTA has suggested that the other services identified by CIRQA are 'express' services - this is not the case. Adelaide Metro/SAPTA identify express services with an 'X' in the route name. No services with an 'X' were included in those identified in the CIRQA report. An express service is a service that does not set down or pick up (at all) within a section of the associated travel route. It is acknowledged that there are some restrictions on some of the services that were identified, but none of these operate with 'express' service arrangements. The restrictions relate to constraints on some services whereby either set-down or pick-up does not occur at the stops for certain directions. For instance, the 224F service does not set-down passengers when travelling to the City but will pick up passengers. Accordingly, it is acknowledged that some of the other routes noted do have a lesser degree of service than Route 222. However, these routes do provide additional accessibility for the subject area above just those associated with Route 222.

> *"Route 222 is a designated Go Zone service that operates <u>every 7 or 8 minutes during the peak</u> directions, every 15 minutes during the daytime and every 30 minutes after 6 pm and on weekends. A frequent bus service that would potentially attract more patronage would operate at least every 15 minutes until 8 pm on weeknights and every 15 minutes at least 8am to 6pm on weekends."* (my emphasis)

The Planning and Design Code notes that a 'high frequency public transit service' is defined as *"a route serviced every 15 minutes between 7.30am and 6.30pm Monday to Friday and every 30 minutes at night, Saturday, Sunday and public holidays until 10pm"*. It is unclear why GTA considers a higher level of frequency is applicable to this site compared to the numerous other Designated Areas within metropolitan Adelaide. Additionally, as noted by GTA, the Route 222 service operates at an even greater frequency than identified by the Code to meet the Designated Area classification. Furthermore, it is reiterated that other services do stop in close proximity to site as detailed above (and contrary to the GTA comments on public transport services).

> *"Furthermore, Route 222 only provides travel between Adelaide CBD and Mawson Lakes via Main North Road. For access to employment, education and retail opportunities outside this single corridor, public transport is not a convenient option as these future residents would need to travel into Adelaide CBD or out to Mawson Lakes and change buses to get to other destinations."*

As noted above, there are additional bus routes servicing the site other than just the 222 service as suggested by GTA. These additional routes provide access to and from other locations above those noted by GTA. In addition, there are connecting services within the Adelaide CBD as well as various interchanges accessed by these routes which provide further connectivity to/from other destinations within metropolitan Adelaide. Many of these connections are also high frequency and the requirement to change routes (or modes) is a common approach to public transport servicing (particularly where high frequency services are provided).

1.2 PARKING PROVISION

> *"The parking provision for the residential use is proposed as one per space per two-bedroom unit. If no flexibility is provided in the allocation of parking, this may lead to some unused parking whilst some apartments with two cars either use the visitor parking or park on-street."*

The application of the Planning and Design Code provides flexibility in the assessment (and designation) of parking provision within a site. The rates provided for residential use in the Code for the Designated Areas are a minimum rate to meet the Deemed-to-Satisfy criteria. There is no maximum (residential) provision, which allows flexibility for additional parking to be proposed within a development on the site. Furthermore, while there are specific rates for the Deemed-to-Satisfy criteria, further flexibility is afforded within the relevant Performance Objective (which allows consideration of lower rates if justified based on various factors associated with a proposal). Nevertheless, the Planning and Design Code does seek that sufficient on-site parking be provided to meet the demands associated with a land use and, accordingly, there should be no significant reliance or impact on on-street parking as a result of redevelopment of the site. Such considerations would be assessed in more detail as part of any future development application(s) for the site.

In respect to the use of on-street parking, DTS/DPF 5.1 of the General Development Policies (Transport, Access and Parking) seeks that sufficient parking be provided on-site to service a development.

> *"If the final mix of commercial use tends more towards retail, the parking provision may be sufficient as it would be expected to be short stay and higher turnover, as well as a likelihood of more local walk in from existing and proposed residential uses and nearby commercial uses. However, if the final mix is more commercial and office use then most of the parking will be long stay all day parking and 75 spaces is likely to be insufficient, as a standard office parking rate would be 4 spaces per 100 sqm, equating to a provision of 100 spaces."*

Parking provisions for specific development applications for the site can be assessed as/when proposed. Notably, the above office parking rate identified by GTA is within the range identified for the subject Zone/Designated Area by the Planning and Design Code. The specified range would not preclude such a rate from being adopted. Nevertheless, lower rates are accepted by the Planning and Design Code (to three spaces per 100 m²) given the mixed-use nature of the Zone, the potential mixed-use nature of development on individual development sites and the accessibility by modes other than private vehicle. Such factors can result in various efficiencies being achieved within sites (including shared parking opportunities between the mix of land uses) as well as reduced reliance on private motor vehicles for access. These considerations are the basis for the acceptance of lower than 'typical' rates within Urban Corridor Zones and Designated Areas.

> *"…despite <u>the site's good location in relation to the CBD and other local centres</u>, it will remain heavily car dependent due to lack of safe and widely accessible alternative transport options. As a result, the proposed parking provision is likely to be insufficient and could be expected to lead to overspill parking on local streets from both the residential and commercial uses."* (my emphasis)

As noted above, GTA's comments on limited bus access are incorrect and there are reasonable local road and footpath routes for pedestrians and cyclists to access the broader networks for such modes. Accordingly, I do not concur with GTA's conclusion on parking provision. Furthermore, and on the contrary, continued requirement for high levels of car parking would be at the detriment of broader transport and land use planning principles of reducing the reliance on private motor vehicles.

In addition, it is noted that parking provisions can be further assessed as part of any future development application(s) for the site.

1.3 TRAFFIC GENERATION, DISTRIBUTION AND MODELLING

"A rate of 6.5 trips per 100 sqm has been adopted for medium density (townhouse) dwellings. While this rate is considered appropriate, the traffic generation excludes the proposed townhouses. Whilst it is understood that there will not be a significant number of townhouses, they would still add to the traffic generation."

The inclusion of the medium density (townhouses) in the spreadsheet in Appendix B was carried over from an earlier version of the traffic assessment which considered the inclusion of townhouses but a significantly reduced number of apartment dwellings. The yields identified in the current Transport Investigations report do not include the townhouses (and hence traffic volumes have not been included for such dwellings). Should townhouses be proposed on the site (as part of a development application), there would likely be a greater reduction in apartment dwellings which would offset the traffic generation. Nevertheless, future development applications would include further assessment for the ultimate yields proposed.

It is also noted that dwelling numbers/type and land uses considered in the traffic assessment were hypothetical and not representative of a final development outcome on the site. In considering anticipated traffic impacts resulting from the Code Amendments, the modelling adopted a worst case scenario.

"A rate [sic] *of 0.53, 0.32 and 1.53 trips has* [sic] *been adopted for the weekday AM, PM and daily periods respectively for a high-density development (apartments). These rates appear to be based on empirical data from Sydney, which were close to public transport, greater than six storeys and almost exclusively residential in nature. Given the limited walking / cycling catchment and provision of public transport services to the site and that the site is not located within the CBD or a metropolitan sub-centre, these rates are considered optimistic. The Guide to Traffic Generating Developments (2002) provides a rate of 0.4–0.5 for peak hours and 4-5 daily trips as more appropriate and reflective of higher private vehicle use."*

The peak hour volumes adopted for the analysis are not related to the Sydney based data identified in the RTA/RMS Guide update. Notably, the RTA/RMS Guide update identifies rates of 0.19 am peak hour trips per dwelling and 0.15 pm peak hour trips per dwelling for high density apartments in Sydney (where higher public transport accessibility would be available). The peak hour rates adopted in the CIRQA assessment relate to the regional rates identified in the RTA/RMS Guide (higher than those applied in inner Sydney) and are considered appropriate for the proposed assessment (given general dwelling densities and accessibility factors for the subject site are closer to the regional settings than the inner Sydney area). It is noted that DIT has raised no issue with the rates adopted (refer Section 2 below).

It is noted, however, that the daily rate adopted does relate to the Sydney data. This should have been identified in the CIRQA report as 4.58 daily trips per apartment. Adopting this rate, results in a total of 1,893 daily trips potentially being generated by the (overall) redevelopment. Nevertheless, this does not impact the analysis provided in the report as that was based on peak hour volumes. Further discussion on the impacts of daily traffic volumes on the surrounding local roads is, however, provided below.

> *"...if the final mix of commercial and retail use include a higher proportion of retail, the traffic generation could be significantly higher. If all of the non-residential use were retail, the total daily traffic generation from the site could increase from 1,404 trips to 1,993 trips which is a 40% increase."*

While a larger extent of retail could potentially be *proposed* for the site, an assessment would still need to be made against the relevant provisions of the Planning and Design Code (which do not appear to have been considered by GTA). In this regard, I note that:

- the Urban Corridor (Business) Zone lists any shop as being restricted development unless it has a floor area less than 2,000 m² or is a restaurant;
- Performance Outcome 1.2 of the Urban Corridor (Business) Zone seeks a range of small-to-medium scale non-residential uses, services and facilities such as shops, offices and consulting rooms that meet the day to day needs of the local community. Notably, the Code Amendment seeks to apply the Urban Corridor Business Retail Subzone. The Subzone will allow a floor area of up to 2,000 m² for shops, offices and consulting uses (in comparison, the CIRQA assessment adopted 2,500 m² of commercial floor area);
- the Traffic Generating Development Overlay identifies specific land uses with floor areas over certain sizes as requiring referral to DIT (noting also that the Major Urban Transport Routes Overlay also triggers referral to DIT in relation to access arrangements); and
- any development proposed for the site would require referral to DIT and agreement would need to be reached in respect to access and traffic movements in respect to a specific development.

On the basis of the above, even if such a higher proportion of retail was proposed (compared to office/consulting room uses) it would be subject to further assessment, analysis and consideration by both the City of Walkerville and DIT.

> *"It is not clear why no exiting traffic has been allocated to the Nottage Terrace access..."*

Exiting traffic has been assigned to the Nottage Terrace access (as is confirmed by the SIDRA tables for the Nottage Terrace access points). The GTA comment appears to be based on a misinterpretation of the distribution assessment (which is discussed further below).

> *"The models generally provide little differential in performance based on the existing and future volumes. While this is indicative of the network volumes being much more significant than the traffic volume associated with the development, the exit distribution of the site traffic has been set up such that all exiting site vehicles would avoid the intersection, using only the Main North Road exit. Only a small proportion of site traffic that would use Main North Road (north) to access the site has been included in the model."*

This is a misinterpretation of the distribution assessment. The distribution identified in the report relates to the general (broader) use of the immediately adjacent roads for access to and from the site (rather than a direct distribution at the access points). A proportion of egress movements have been assigned to be distributed through the signalised intersection. For instance, egress movements distributed to the northern leg of Main North Road have been distributed through the signalised intersection (via a left-turn out on to Nottage Terrace and then a right-turn to Main North Road) given that right-out movements would not be possible at an access on Main North Road. All movements forecast to be distributed to and from the Main North Road (northern leg) are included in the model.

> *"The SIDRA analysis will need to be recalibrated after the current upgrade for the Main North Road/Nottage Terrace intersection project is completed by DIT. This would be required after the construction of the intersection in early 2022 and would be included in any subsequent development applications."*

Traffic analysis associated with rezoning proposals (formerly Development Plan Amendments and now Code Amendments) is typically prepared on a high-level basis. It is common practice that more detailed analysis be provided as part of future development applications (i.e. once specific yields have been proposed). It is assumed that this would occur as part of a future development application. This is also consistent with commentary in the CIRQA report as well as DIT's response.

1.4 LOCAL ROAD NETWORK IMPACTS

> *"The traffic distribution in the report has only considered the immediate access which would be used. No assessment has been made of the wider access routes that would be used to reach the site. Due to the left-in and left-out arrangements for all the site accesses and peak period congestion at other intersections, entry and exit to and from varying directions is likely to result in traffic using local routes within Medindie."*

Consideration has been given to the broader distribution to/from the immediately adjacent roads. Nevertheless, it is acknowledged that further detail could have been provided in respect to local road impacts. Given the forecast increase (of approximately 1,500 vehicles per day (vpd) including adoption of the higher daily rate for apartments), the additional distribution of movements to any one local street would be low. The distribution of these movements would be split to the adjacent arterial roads and, to a lesser extent, surrounding local roads including those to the south/south-east of the site (such as Victoria Avenue and Tennyson Street), those north-east of the site (such as Corbin Road) and those to the west of the site (such as Penn Place). The increase on any one non-arterial road would likely be below 300 vpd (noting that there would also be a level of existing use of these local roads by traffic associated with the existing site uses).

I note from the GTA response that the closest adjacent local roads currently have the following average weekday volumes:

- Victoria Avenue – 586 vpd;
- Tennyson Street – 195 vpd; and
- Dutton Terrace – 1,560 vpd (western end) to 1,953 vpd (eastern end).

The above volumes identified for Victoria Avenue and Tennyson Street suggest these roads function as 'local roads'. Such roads are typically considered to have an upper amenity limit of 1,500 vpd. There is therefore significant capacity to accommodate additional daily trips on these roads whilst retaining their current nature and function. Similarly, the volumes for Dutton Terrace (as well as its cross section) indicate this road functions as a 'minor collector' (typically assumed to have a capacity of 1,500 to 3,000 vpd) and the additional volumes associated with the redevelopment of the subject site would not change the current nature and function.

2. DEPARTMENT FOR INFRASTRUCTURE & TRANSPORT COMMENTS

The response provided by Mr Jim Psyridis on behalf of the Department for Infrastructure and Transport (DIT) was supportive of the proposed Code Amendment. The specific responses provided by Mr Psyridis (such as requiring restriction of access points to left-in and/or left-out, conformance of access treatments with relevant design guidelines and preparation of traffic impact assessment for future developments) are considered appropriate and consistent with CIRQA's recommendations in our transport investigations report.

The only point of difference between the DIT response and the CIRQA assessment relates to the acceptance of three versus two access points. CIRQA identified that two access points would likely be most appropriate (as per DIT's comments) however included allowance for consideration of a third access point depending on the ultimate development proposal(s). Such an approach provides flexibility for the future development of the site (for instance, provision of separate ingress and egress points with an additional two-way access which would be counted as three access points but provide the same number of conflict points as two (2x) two-way access points).

Nevertheless, the ultimate access arrangements would be subject to further design and assessment as part of future applications, including agreement with DIT.

3. SUMMARY

Having undertaken a review of the comments provided by the City of Walkerville/GTA Consultants (now Stantec) and DIT, I remain of the opinion that the Code Amendment is appropriate from a traffic, transport and parking perspective.

In particular, supplementary information has been provided in response to the matters raised including clarification of the bases of the original CIRQA assessments, correction of the GTA assumptions in respect to public transport servicing for the site and provision of additional information in respect to the local road impacts.

I reiterate that DIT has largely supported the proposed rezoning (and the associated traffic impact assessment) with the only point of difference being the number of access points, which will be influenced by the final development outcome. Regardless, a future development can function with two or three access points.

Finally, I also highlight that any development proposal(s) will need to be assessed against the provisions of the Planning and Design Code and would also be reviewed by DIT. It is anticipated that, once specific development proposals are identified, further traffic and parking assessment would be prepared and provided as part of the associated applications.

Please feel free to contact me on (08) 7078 1801 should you require any additional information.

Yours sincerely,

BEN WILSON
Director | CIRQA Pty Ltd

CODE AMENDMENT
1 NOTTAGE TERRACE, MEDINDIE

TRANSPORT INVESTIGATIONS

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1. INTRODUCTION

CIRQA has been engaged to undertake traffic impact investigations for the proposed Code Amendment of seven allotments located on the southern corner of the Main North Road/Nottage Terrace intersection, Medindie.

This report includes assessment of the potential traffic generation associated with the potential rezoning and redevelopment of the subject land, the associated traffic impact on the adjacent existing road network, active and sustainable transport provisions and consideration of appropriate road infrastructure upgrades/ requirements.

2. BACKGROUND

2.1 STUDY AREA

The subject site is located on the south-eastern corner of Nottage Terrace and Main North Road, approximately 5 km north of Adelaide's Central Business District (CBD) and comprises approximately 7,500 m². The site is bound by Nottage Terrace to the north, residential properties to the south and east, and Main North Road and commercial premises to the west. Figure 1 illustrates the subject site and adjacent road network.

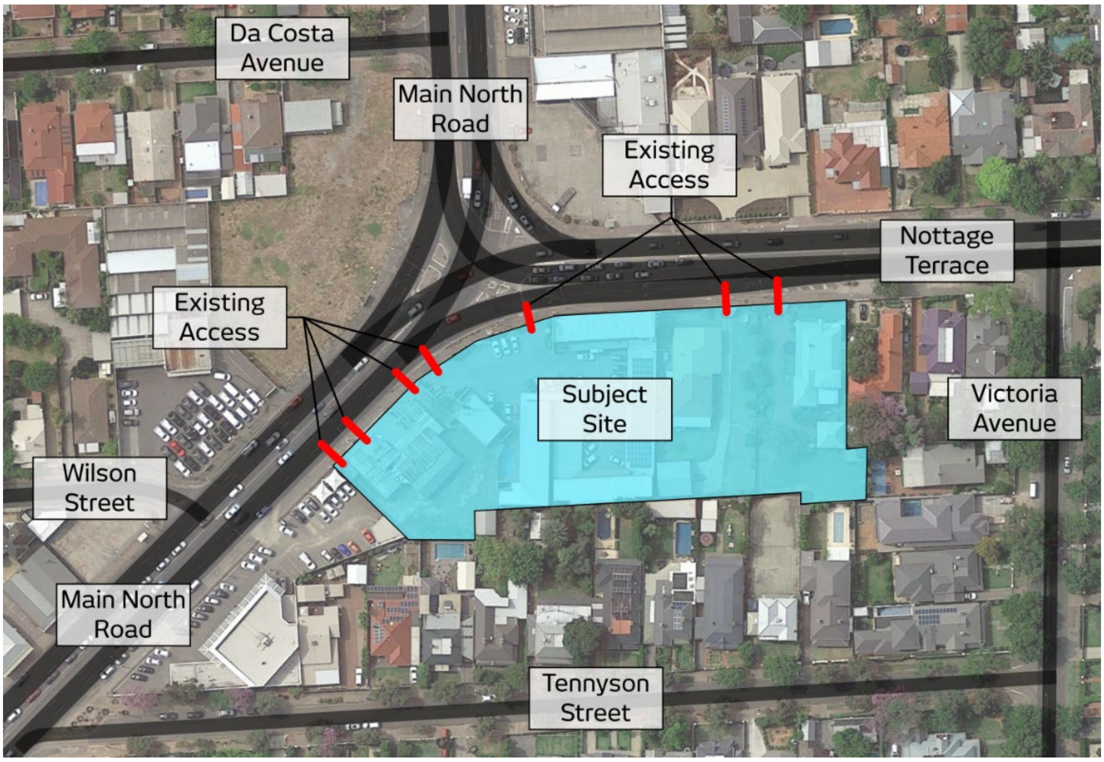


Figure 1 – Subject site and adjacent road network

The subject site comprises of seven allotments, separated over two zones. The allotments upon which this Code Amendment are based include:

- Allotment 98 on filed plan 137,049 in the area named Medindie, Hundred of Yatala (CT5761/575) – Suburban Business Zone – former motor repair station;
- Allotment 99 on filed plan 137,050 in the area named Medindie, Hundred of Yatala (CT5761/569) – Suburban Business Zone – former motor repair station;
- Allotment 8 on filed plan 100,750 in the area named Medindie, Hundred of Yatala (CT5106/255) – Suburban Business Zone – motel;

- Allotment 15, filed plan 100,755 in the area named Medindie, Hundred of Yatala (CT5106/256) – Suburban Business Zone – motel;
- Allotment 7 on filed plan 137,058 in the area named Medindie, Hundred of Yatala (CT5798/222) – Established Neighbourhood Zone – detached dwelling;
- Allotment 3 on filed plan 126,001 in the area named Medindie, Hundred of Yatala (CT5228/569) – Established Neighbourhood Zone – detached dwelling; and
- Allotment 2 on filed plan 126,000 in the area named Medindie, Hundred of Yatala (CT5228/570) – Established Neighbourhood Zone – detached dwelling.

In addition to the Zones noted above the following overlays also apply to the sites:

- Allotments within the Suburban Business Zone
  - Aircraft Noise Exposure (ANEF 20);
  - Airport Building Heights (Regulated) (All structures over 45 metres);
  - Advertising Near Signalised Intersections;
  - Future Road Widening;
  - Hazards (Flooding - Evidence Required);
  - Major Urban Transport Routes;
  - Prescribed Wells Area;
  - Regulated and Significant Tree; and
  - Traffic Generating Development.
- Allotments within the Established Neighbourhood Zone
  - Aircraft Noise Exposure (ANEF 20);
  - Airport Building Heights (Regulated) (All structures over 45 metres);
  - Advertising Near Signalised Intersections;
  - Future Road Widening;
  - Historic Area (Walk2);
  - Hazards (Flooding - Evidence Required);
  - Major Urban Transport Routes;
  - Prescribed Wells Area;
  - Regulated and Significant Tree;
  - Stormwater Management;
  - Traffic Generating Development; and
  - Urban Tree Canopy.

Vehicle access to the various allotments is provided via Main North Road (three crossovers) and Nottage Terrace (three crossovers). All crossovers are restricted to left-in/left-out movements only due to raised central medians on both Main North Road and Nottage Terrace. It should be noted that both crossovers to Scotty's Motel are accessed from within the signalised intersection of Main North Road and Nottage Terrace.

Pedestrian access to the subject site is provided via the site's frontages to Main North Road and Nottage Terrace.

2.2 ADJACENT ROAD NETWORK

2.2.1 ROAD FRONTAGES

Main North Road is an arterial road under the care and control of the Department for Infrastructure and Transport (DIT). Adjacent the site (south of Nottage Terrace), Main North Road comprises three traffic lanes in each direction, separated by a raised median. It should be noted that the central northbound traffic lane (adjacent the central median) is a right-turn lane for the Main North Road/Nottage Terrace signalised intersection. Traffic data obtained from DIT indicates that this section of Main North Road has an Annual Average Daily Traffic (AADT) volume in the order of 52,300 vehicles per day (vpd), of which approximately 4.0% are commercial vehicles. Adjacent the site, a 60 km/h speed limit applies on Main North Road.

Nottage Terrace is an arterial road under the care and control of DIT. Adjacent the site, Nottage Terrace comprises four westbound traffic lanes (two right-turn and two left-turn lanes for the Main North Road/Nottage Terrace signalised intersection) and a single eastbound traffic lane. Eastbound and westbound traffic movements are separated by a narrow, raised median. Traffic data obtained from DIT indicates that this section of Nottage Terrace has an AADT volume in the order of 34,900 vpd, of which approximately 3.5% are commercial vehicles. Adjacent the site, a 60 km/h speed limit applies on Nottage Terrace.

2.2.2 ROAD INTERSECTIONS

Main North Road and Nottage Terrace intersect at a three-way signalised intersection. All turning movements are currently permitted at the intersection and are controlled via signalisation (with the exception of the left-turn movement from the northern Main North Road approach into Nottage Terrace). It should be noted that the intersection includes a bus priority lane for buses turning right from Main North Road (northern approach) onto Main North Road (south-western approach).

Traffic volumes using the intersection (recorded on 03 September 2019 by DIT) during the am and pm peak hours are illustrated below in Figure 2.

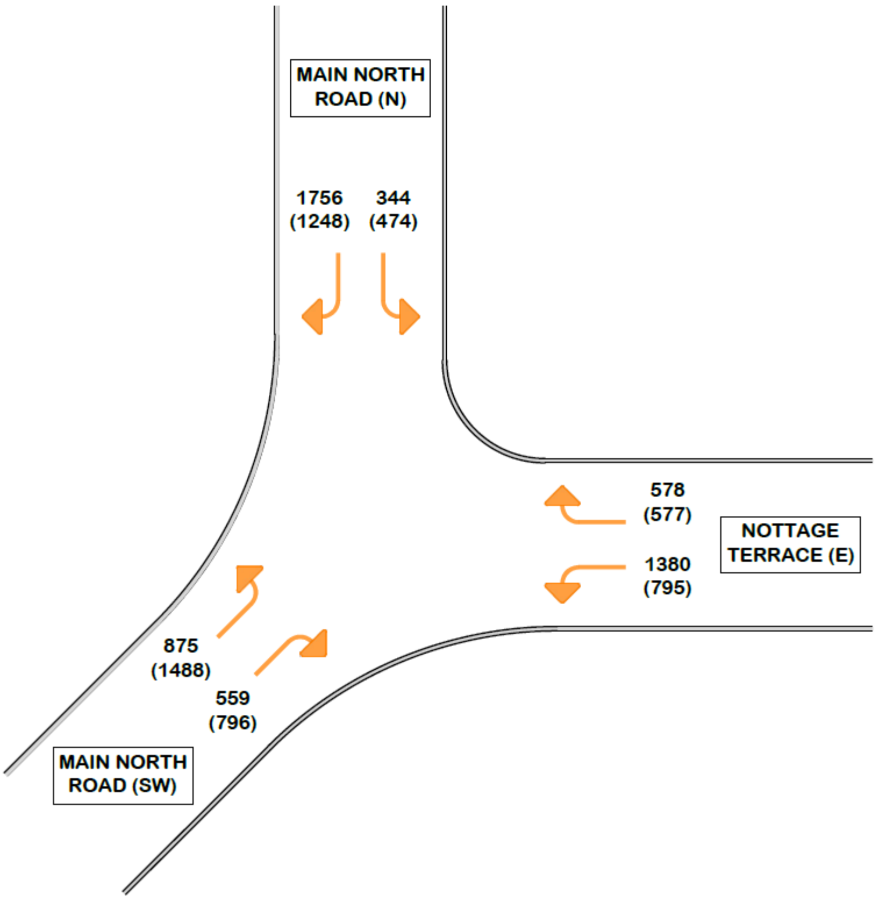


Figure 2 – Existing am (pm) traffic volumes using the Main North Road/Nottage Terrace intersection

Furthermore, the South Australian Government (in conjunction with the Federal Government) previously announced $19 million in joint funding for the upgrade of the Main North Road and Nottage Terrace intersection. Construction works for the upgrade have recently commenced and will comprise the installation of an additional right-turn lane and throughbound bus-priority lane on the southern Main North Road approach with extension to other turn lanes at the intersection on the other approaches. The road widening is primarily being undertaken along the western side of Main North Road.

2.2.3 ROAD WIDENING REQUIREMENTS

Both of the site's Main North Road and Nottage Terrace frontages are subject to road widening requirements as per the Metropolitan Adelaide Road Widening Plan (MARWP) Act of 1972. Information has been obtained from DIT stating that the plan shows "*… a possible requirement for a strip of land up to 4.5 metres in width from the Main North Road and Nottage Terrace frontages of these sites for future upgrading of the Main North Road/Nottage Terrace intersection*". Furthermore, DIT has also stated that "*… consent of the Commissioner of Highways under the*

Metropolitan Adelaide Road Widening Plan Act is required to all building works on or within 6.0 metres of the possible requirement".

DIT has, however, advised that there is no land acquisition associated the upgrade currently being undertaken at the adjacent intersection.

2.3 WALKING AND CYCLING

Sealed footpaths are provided on both sides of Main North Road and Nottage Terrace. Pedestrian crossing movements are facilitated at the signalised intersection of Main North Road and Nottage Terrace.

No formal cycling facilities are provided on either Main North Road or Nottage Terrace with the exception of a northbound bicycle lane on Main North Road (which is being extended as part of the intersection upgrade). As such, cyclists are required to use the traffic lanes (under a standard shared arrangement) or the adjacent footpath network. Local road connections are provided through the adjacent streets to/from the shared paths within the Adelaide Park Lands (including a refuge on Robe Terrace near Palm Street).

2.4 PUBLIC TRANSPORT

Numerous public transport services operate within close vicinity to the subject site. Specifically, frequent bus services operate from 'Go Zone' bus stops on Main North Road (within 200 m walking distance of the subject site). The following bus routes operate within the vicinity of the subject site:

- Route 209F – Tea Tree Plaza Interchange to City;
- Route 222, 222R – Mawson Interchange to City;
- Route 224, 224F – Elizabeth Interchange to City;
- Route 225F – Salisbury Interchange to City;
- Route 228, 228F – Smithfield Interchange to City;
- Route 229F – Para Hills to City; and
- Route N224 (night service) – Gawler to City.

3. PROPOSED REZONING

The proposal comprises the rezoning of the subject site to facilitate a mix of medium (townhouses) and high-density (apartments) residential living, with complimentary commercial and retail uses located at-grade. It is anticipated that the medium density residential will be located on the eastern portion of the site, providing an interface between future higher density development and the adjacent Established Neighbourhood Zone.

The high-density residential would likely be located within a multi-storey building(s) in the order of five to seven stories high, with commercial and retail floor spaces located at-grade. This component will be focused adjacent the Main North Road/Nottage Terrace intersection.

3.1 ANTICIPATED DEVELOPMENT YIELDS

CIRQA has been advised of anticipated development yields forecast to be accommodated on the subject site. The highest likely development yield scenario comprises full development for high density apartments plus a commercial component as follows:

- 160x two-bedroom apartments, serviced by a basement parking area comprising in the order of 200 parking spaces; and
- 2,500 m² of commercial/retail floor area, serviced by an at-grade parking area containing approximately 75 parking spaces.

3.2 ACCESS AND TRANSPORT INFRASTRUCTURE

Due to the site's location adjacent the Main North Road/Nottage Terrace intersection, vehicle access provisions should be consolidated where possible. However, it is considered appropriate to provide separate access points to the medium-density residential and high-density residential/retail/commercial components of the site (desirably no more than three access points, however, additional provisions could be considered subject to further design, assessment and DIT liaison).

Access points should be located adjacent the eastern and south-western boundaries of the site, with a possible additional (third) access located immediately east of the signalised intersection (complying with the separation requirements of the Australian/New Zealand Standard for "*Parking Facilities – Part 1: Off-street car parking*" (AS/NZS 2890.1:2004). Vehicle access via the intersection of Main North Road and Nottage Terrace should be avoided (and would be highly unlikely to be accepted by DIT)

The provision of vehicle access should give consideration to the adjacent road frontages, with appropriate traffic control treatments provided as necessary (i.e.

left-in/left-out access only). Nevertheless, this would be subject to further design input to confirm appropriate access provisions and can be investigated further as the future site layout and internal road network are planned in more detail.

Each access point shall be connected to an internal roadway with appropriate geometry and design to accommodate traffic volumes and vehicle types (including service vehicles) anticipated to be associated with the site development. The internal connections could be either new public roads or private circulation driveways depending on the ultimate design of future development(s) on the site.

Vehicle access directly to potential garaged and/or basement parking areas should be appropriately separated from the site's Main North Road and Nottage Terrace frontages such that vehicles do not queue from the site onto the adjacent roadways. Similarly, direct vehicle access to parking spaces and garages should not be provided directly via Main North Road or Nottage Terrace.

4. PARKING ASSESSMENT

The Planning and Design Code identifies two separate sets of parking provision rates relevant to the subject allotments. Specifically, the general (Table 1) requirements apply to both residential and commercial development within the Established Neighbourhood Zone as well as residential development within the Suburban Business Zone, whereas the Designated Area (Table 2) rates apply to non-residential land uses (excluding Tourist Accommodation) in the Suburban Business Zone. Specifically, the following rates are applicable for each anticipated/potential land use and zone:

- Residential Development (both Zones)
  - residential flat building – 1 space per one or two bedroom dwelling plus 1 space per three or more bedroom dwelling plus 0.33 spaces per dwelling for visitor parking;
  - row dwelling (access to primary street) or semi-detached dwelling – 1 space per one bedroom dwelling plus 2 spaces per two or more bedroom dwelling;
  - row dwelling (no access to primary street/rear-loaded) – 1 space per one or two bedroom dwelling plus 2 spaces per three or more bedroom dwelling;
- Commercial Development (Established Neighbourhood Zone)
  - shop (no commercial kitchen) – 5.5 spaces per 100 m² where not in an integrated complex or 5.0 spaces per 100 m² where within an integrated complex;
  - shop (restaurant) – 0.4 spaces per seat;
- Commercial Development (Suburban Business Zone)
  - 3 spaces per 100 m² (minimum) to 6 spaces per 100 m² (maximum) of gross leasable area.

The above parking rates are generally considered appropriate. However, depending on the ultimate zoning adopted for the overall site, it is considered desirable that the Designated Area rates extend to the portion of the site currently within the Established Neighbourhood Zone. This would reflect both the proximity of the site to high frequency public transport and the likely mixed use nature of the overall of redevelopment of the site.

5. TRAFFIC IMPACT ASSESSMENT

5.1 TRAFFIC GENERATION

In order to determine the impacts of the proposed rezoning on the adjacent road network, traffic volumes associated with the existing and potential future site (based upon the above yields) have been forecast. Traffic volumes have generally been forecast using rates adopted from the NSW Roads and Maritime Services' *"Guide to Traffic Generating Developments"* (the RMS Guide) or other rates considered appropriate based on CIRQA's experience. The following rates have been adopted:

- Motor Repair Station
  - 33.5 daily trips per 100 m² of gross floor area;
  - 3.35 peak hour trips per 100 m² of gross floor area;
- Motel
  - 3 daily trips per unit;
  - 0.4 peak hour trips per unit;
- Detached Dwellings
  - 8 daily trips per dwelling;
  - 0.8 peak hour trips per dwelling;
- High-Density Dwellings *(residential flat building)*
  - 1.52 daily trips per dwelling;
  - 0.53 am and 0.32 pm peak hour trips per dwelling;
- Retail
  - 70 daily trips per 100 m² of gross floor area;
  - 4.5 am and 9 pm peak hour trips per 100 m² of gross floor area;
- Office/commercial
  - 11 daily trips per 100 m² of gross floor area; and
  - 1.6 am and 1.2 pm peak hour trips per 100 m² of gross floor area.

As noted in Section 3.1, the anticipated Code Amendment yield comprises 2,500 m² of commercial/retail floor area. For the purposes of this assessment, it has been conservatively assumed that 1,500 m² will be retail while the remaining 1,000 m² is assumed to be commercial use.

On the basis of the above rates, the following number of vehicle movements are forecast to be generated by the existing and anticipated future development yields:

- Existing development
  - 365 daily trips;
  - 42 am peak hour trips;
  - 42 pm peak hour trips;
- Future development
  - 1,404 daily trips;
  - 169 am peak hour trips; and
  - 199 pm peak hour trips.

5.2 TRAFFIC DISTRIBUTION

As noted in Section 2.1, the forecast existing traffic volumes are distributed to the adjacent road network via three crossovers on Main North Road and three crossovers on Nottage Terrace. However, in order to provide a comparative assessment, it has been assumed that all existing traffic volumes are distributed via three crossovers (one on Main North Road and two on Nottage Terrace). The crossovers are assumed to be in a similar location to that of the anticipated Code Amendment development.

It should also be noted that the easternmost crossover on Nottage Terrace has been assumed to provide residential access only. Specifically, in the case of the existing scenario, the access has been assumed to be used by both detached dwellings and in the case of the future scenario, the access has been assumed to be used by nine of the medium-density townhouses.

In order to forecast traffic volumes at the associated access points and on the adjacent road network, the following distributions have been assumed:

- Motor Repair Station
  - 75% enter and 25% exit the site during the am peak hour (and vice versa during the pm peak hour);
  - ingress – 50% via Main North Road (north approach) and 50% via Nottage Terrace;
  - egress – 100% via Main North Road (southern approach);
- Motel
  - 30% enter and 70% exit during the am peak hour (and vice versa during the pm peak hour);
  - ingress – 50% via Main North Road (north approach) and 50% via Nottage Terrace;
  - egress – 100% via Main North Road (southern approach);

- Detached Dwellings
  - 30% enter and 70% exit during the am peak hour (and vice versa during the pm peak hour);
  - ingress – 100% via Nottage Terrace;
  - egress – 75% via Main North Road (southern approach) and 25% via Main North Road (northern approach);
- High-Density Dwellings *(residential flat building)*
  - 30% enter and 70% exit during the am peak hour (and vice versa during the pm peak hour);
  - ingress – 25% via Main North Road (northern approach) and 75% via Nottage Terrace;
  - egress – 75% via Main North Road (southern approach) and 25% via Main North Road (northern approach);
- Retail
  - 50% enter and 50% exit during both the am and pm peak hours;
  - ingress – 25% via Main North Road (northern approach) and 75% via Nottage Terrace;
  - egress – 75% via Main North Road (southern approach) and 25% via Main North Road (northern approach);
- Office/commercial
  - 80% enter and 20% exit during the am peak hour (and vice versa during the pm peak hour);
  - ingress – 25% via Main North Road (northern approach) and 75% via Nottage Terrace; and
  - egress – 75% via Main North Road (southern approach) and 25% via Main North Road (northern approach).

On the basis of the above distribution, traffic volumes for both the existing and future scenarios have been forecast at the site's three access locations. It should be reiterated that existing traffic volumes at the three access locations have only been determined such that traffic volumes associated with the potential Code Amendment can be compared and assessed (i.e. impacts associated with the proposed rezoning can determined without double counting existing site-related movements). Total traffic volumes forecast including the existing and Code Amendment site uses (i.e. development volumes only) are attached in Appendix A and Appendix B respectively.

6. TRAFFIC IMPACT

6.1 SIDRA INTERSECTION MODELLING

SIDRA Intersection modelling software has been used to assess the impacts of the proposed rezoning and anticipated development on the adjacent road network. The SIDRA analysis has been undertaken at the signalised intersection of Main North Road and Nottage Terrace for the existing scenario and includes the three primary access points for the Code Amendment scenarios. It should be noted that the SIDRA Intersection modelling has included consideration of DIT's SIDRA Modelling Guidelines.

In order to assess the potential impact of the proposed rezoning, the following scenarios have been modelled:

- Pre-Upgrade Intersection Configuration
  - Base Case (existing volumes) – existing traffic volumes using the Main North Road/Nottage Terrace intersection in order to establish the baseline performance of the intersection;
- DIT Upgrade Configuration
  - Base Case (existing volumes) – existing traffic volumes using the Main North Road/Nottage Terrace intersection, with a modified layout reflective of DIT's upgrade;
  - Future Scenario – base case volumes plus development volumes with a modified intersection layout reflective of DIT's intersection upgrade;
- Site Access
  - Access 1/Nottage Terrace – forecast traffic volumes associated with the Code Amendment rezoning at the possible 'access 1' location;
  - Access 2/Nottage Terrace – forecast traffic volumes associated with the Code Amendment rezoning at the possible 'access 2' location; and
  - Access 3/Nottage Terrace – forecast traffic volumes associated with the Code Amendment rezoning at the possible 'access 3' location.

Total traffic volumes used for the base case assessments (existing and upgrade configurations) are illustrated in Appendix A, while traffic volumes associated with 'Scenario 1', 'Scenario 2' and the site access assessments are illustrated in Appendix B.

6.2 PRE-UPGRADE INTERSECTION CONFIGURATION

The Main North Road and Nottage Terrace model has been set-up to replicate the intersection performance prior to the upgrade (currently being undertaken) using signal phasing data provided by DIT (i.e. User Given Phase Times). The data identifies average cycle times and phase lengths which occurred at the intersection and also includes data relating to the frequency in which the bus priority movement (from Main North Road northern approach onto Main North Road south-western approach) is triggered. Phasing output from the SIDRA analyses used in the base case am and pm scenarios is attached in Appendix C1

6.2.1 BASE CASE (EXISTING LAYOUT)

Key SIDRA output from the modelling of the 'Base Case (Existing Layout)' scenario for the intersection of Main North Road and Nottage Terrace is outlined in Table 1, with detailed output attached in Appendix C2.

Table 1 – Key am (pm) peak hour existing traffic results for the existing Main North Road/Nottage Terrace intersection configuration ('Base Case – Existing Volumes')

Arm	Movement	Degree of Saturation	Average Delay (sec)	95%ile Queue Distance (m)	Level of Service
Main North Rd (N)	Left turn	0.211 (0.509)	5.9 (21.7)	10.8 (137.6)	A (C)
	Right turn	1.072 (0.967)	123.6 (109.1)	421.6 (291.9)	F (F)
Nottage Tce (E)	Left turn	0.810 (0.412)	32.1 (19.3)	236.1 (101.6)	C (B)
	Right turn	0.767 (0.820)	63.7 (68.1)	146.4 (152.5)	E (E)
Main North Rd (SW)	Left turn	0.336 (0.568)	11.2 (12.8)	78.0 (168.3)	B (B)
	Right turn	1.207 (1.344)	262.0 (375.8)	651.2 (1126.7)	F (F)

The above SIDRA results indicate that a number of movements are currently oversaturated during the am and pm peak hours. Of particular note, the right-turn movement from Main North Road (northern approach) is oversaturated during the am peak hour, while the right-turn from Main North Road (south-western approach) is oversaturated during both the am and pm peak hours.

6.3 DIT UPGRADE CONFIGURATION

The upgrade configuration for the intersection of Main North Road/Nottage Terrace intersection has been based on the most recent design layout available from DIT as shown in Figure 3.

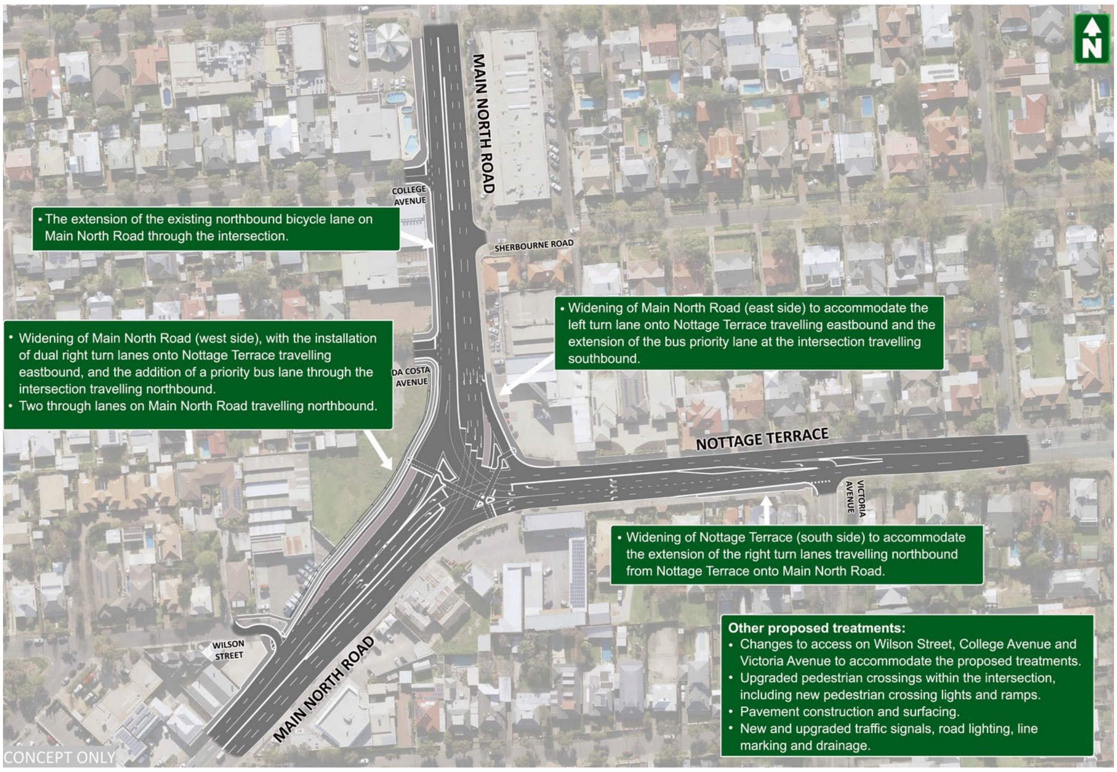


Figure 3 – DIT design for the Main North Road/Nottage Terrace intersection upgrade

6.3.1 BASE CASE (UPGRADED LAYOUT)

Key SIDRA output from the modelling of the 'base case (existing volumes with upgraded layout)' scenario for the upgraded intersection of Main North Road and Nottage Terrace is outlined in Table 3, with detailed output attached in Appendix D2.

Table 2 – Key am (pm) peak hour existing traffic results for the upgraded Main North Road/Nottage Terrace intersection configuration ('Base Case – Upgraded Layout')

Arm	Movement	Degree of Saturation	Average Delay (sec)	95%ile Queue Distance (m)	Level of Service
Main North Rd (N)	Left turn	0.211 (0.511)	7.2 (18.7)	10.8 (111.6)	A (B)
	Right turn	1.073 (0.996)	124.3 (98.1)	422.4 (457.7)	F (F)
Nottage Tce (E)	Left turn	0.817 (0.454)	32.2 (24.0)	265.7 (117.6)	C (C)
	Right turn	0.924 (0.781)	67.3 (62.6)	152.4 (143.6)	E (E)
Main North Rd (SW)	Left turn	0.640 (0.635)	42.1 (17.7)	188.4 (216.2)	D (B)
	Right turn	0.928 (1.315)	70.4 (259.4)	235.6 (740.7)	E (F)

Modelling of DIT's concept (upgrade) design indicates that the Main North Road/Nottage Terrace intersection will generally improve conditions compared to the pre-upgrade conditions. Further improvements may also be achieved through detailed review of phase sequence and timings. Nevertheless, the above provides an appropriate base line assessment for this assessment.

6.3.2 SCENARIO 2 (FUTURE TRAFFIC)

In order to provide a comparative assessment, the same cycle and phase times used to model the 'base case (upgraded layout) have been adopted to assess 'Scenario 2'. Key SIDRA output from the modelling of 'Scenario 2' for the upgraded intersection of Main North Road and Nottage Terrace is outlined in Table 4, with detailed output attached in Appendix D3.

Table 3 – Key am (pm) peak hour future traffic results for the upgraded Main North Road/Nottage Terrace intersection configuration ('Scenario 2')

Arm	Movement	Degree of Saturation	Average Delay (sec)	95%ile Queue Distance (m)	Level of Service
Main North Rd (N)	Left turn	0.211 (0.513)	7.2 (18.7)	10.8 (111.6)	A (B)
	Right turn	1.076 (0.998)	126.1 (99.1)	426.7 (461.9)	F (F)
Nottage Tce (E)	Left turn	0.835 (0.480)	34.3 (24.4)	278.7 (126.4)	C (C)
	Right turn	0.855 (0.787)	70.2 (62.9)	159.5 (144.7)	E (E)
Main North Rd (SW)	Left turn	0.655 (0.635)	41.0 (17.7)	198.0 (216.2)	D (B)
	Right turn	0.928 (1.315)	70.4 (259.4)	235.6 (740.7)	E (F)

Table 5 indicates that the upgraded intersection of Main North Road and Nottage Terrace would continue to operate with the same Levels of Service for all movements upon realisation of the full Code Amendment yield and associated traffic generation. The results indicate that queues and delays would be similar both with and without the potential redevelopment of the site.

Notwithstanding the above, the intersection performance could be reviewed further as part of any future development application(s) associated with the site. This would allow further review of traffic conditions post-completion of the intersection upgrade and once more detail is available in respect to yields. Detailed assessment of phase sequence and times could be undertaken at such time and would provide opportunity to further improve conditions compared to the theoretical assessment detailed above.

6.4 SITE ACCESS

In order to ensure that the site's access points will operate satisfactorily upon realisation of the full Code Amendment yield, SIDRA modelling has been undertaken for each of the site's access points. As noted in Section 3.2, two access points have been assumed on Nottage Terrace, with a third access located on Main North Road.

Each access point has been assumed to be restricted to left-in/left-out only due to the site's proximity to the adjacent Main North Road/Nottage Terrace signalised intersection. Turning restrictions are anticipated to be physically restricted by existing (and modified, where required) raised central medians on both Main North Road and Nottage Terrace.

6.4.1 ACCESS 1/NOTTAGE TERRACE

Key SIDRA output from the modelling of Nottage Terrace and Access 1 is outlined in Table 5, with detailed output attached in Appendix E1.

Table 4 – Key am (pm) peak hour traffic results for the site's 'Access 1' on Nottage Terrace

Arm	Movement	Degree of Saturation	Average Delay (sec)	95%ile Queue Distance (m)	Level of Service
Nottage Tce (E)	Left turn	0.276 (0.199)	5.6 (5.6)	0 (0)	A (A)
	Through	0.276 (0.199)	0.0 (0.0)	0 (0)	A (A)
Access 1 (S)	Left turn	0.052 (0.010)	8.3 (7.1)	1.3 (0.3)	A (A)
	Right turn	N/A	N/A	N/A	N/A
Nottage Tce (W)	Through	0.498 (0.700)	0.0 (0.0)	0 (0)	A (A)
	Right turn	N/A	N/A	N/A	N/A

As illustrated in Table 5, the proposed 'Access 1' to the subject site will operate satisfactorily upon realisation of the full Code Amendment yield. Specifically, queues and delays associated with egress movements from the site will be negligible during the am and pm peak periods, with delays associated with left-turn movements into the site (from Nottage Terrace east) relating only to geometric delays. Importantly, the proposed access will not impact upon through movements on Nottage Terrace (i.e. eastbound and westbound movements) during either the am or pm peak periods. Accordingly, the proposed access is considered to be appropriate with regard to the anticipated yield and associated road frontage.

6.4.2 ACCESS 2/NOTTAGE TERRACE

Key SIDRA output from the modelling of Nottage Terrace and Access 2 is outlined in Table 6, with detailed output attached in Appendix E2.

Table 5 – Key am (pm) peak hour traffic results for the site's 'Access 2' on Nottage Terrace

Arm	Movement	Degree of Saturation	Average Delay (sec)	95%ile Queue Distance (m)	Level of Service
Nottage Tce (E)	Left turn	0.280 (0.198)	5.6 (5.6)	0.0 (0.0)	A (A)
	Through	0.280 (0.198)	0.0 (0.0)	0.0 (0.0)	A (A)
Access 2 (S)	Left turn	0.008 (0.016)	7.9 (6.9)	0.2 (0.4)	A (A)
	Right turn	N/A	N/A	N/A	N/A
Nottage Tce (W)	Through	0.498 (0.700)	0.1 (0.2)	0.0 (0.0)	A (A)
	Right turn	N/A	N/A	N/A	N/A

SIDRA modelling of the site's second Nottage Terrace access indicate that the access and Nottage Terrace will operate satisfactorily upon realisation of the full Code Amendment yield. Queues and delays reported at the access are negligible, with westbound vehicles unaffected by vehicles turning left into the subject site. The modelling has reported a LoS A for all movements through the intersection. On this basis, it is considered that the second site access (Access 2) on Nottage Terrace will operate satisfactorily.

6.4.3 ACCESS 3/NOTTAGE TERRACE

Key SIDRA output from the modelling of Nottage Terrace and Access 3 is outlined in Table 7, with detailed output attached in Appendix E3.

Table 6 – Key am (pm) peak hour traffic results for the site's 'Access 3' on Main North Road

Arm	Movement	Degree of Saturation	Average Delay (sec)	95%ile Queue Distance (m)	Level of Service
Main North Rd (NE)	Left turn	0.586 (0.389)	5.7 (5.6)	0.0 (0.0)	A (A)
	Through	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	A (A)
Access 3 (SE)	Left turn	0.077 (0.084)	18.8 (10.4)	1.6 (2.0)	C (B)
	Right turn	N/A	N/A	N/A	N/A
Main North Rd (SW)	Through	0.397 (0.632)	0.1 (0.1)	0.0 (0.0)	A (A)
	Right turn	N/A	N/A	N/A	N/A

Table 7 illustrates that the site access (Access 3) will operate satisfactorily upon realisation of the full Code Amendment yield. While small queues and delays will be experienced internally within the site they will not impact upon through-bound movements on Main North Road. This is reflected by a LoS of A being maintained for all movements on Main North Road. On this basis, the possible Main North Road access is considered to be satisfactory with regard to the proposed rezoning and anticipated yields.

7. SUMMARY

The subject rezoning (Code Amendment) within Medindie will facilitate the future redevelopment of the study area for a mixture of residential and commercial development. It is anticipated that in the order of 160 high-density dwellings plus 2,500 m² of commercial floor area could ultimately be developed within the overall site (albeit specific yields would be subject to future planning, design and assessment processes).

It is considered appropriate that the Code Amendment area is accessed via three connections to the adjacent road network, however all connections should be located outside of the adjacent Main North Road/Nottage Terrace intersection and be separated in accordance with AS/NZS 2890.1:2004. The provision of three connections will adequately accommodate movements into and out of the site while minimising impact on through movements on the adjacent road network. These connections can be provided as priority-controlled T-intersections but should be restricted to left-in/left-out only due to the proximity of the adjacent signalised intersection.

The study area connections should provide connectivity to an internal road network designed and constructed in accordance with relevant planning and design guidelines and shall ensure that adequate provisions for parking, waste collection vehicle movements and appropriate traffic control treatments within the site are provided.

Forecasting of the site's existing and future traffic generations has been undertaken using current and maximum anticipated Code Amendment yields respectively. The assessment identifies that the proposed Code Amendment rezoning will generate in the order of an additional 110 am and 150 pm peak hour trips (approximate additional 1,050 daily trips).

SIDRA Intersection modelling software has been used to compare the impacts of existing site volumes against the future forecasts. The analyses indicate that proposed Code Amendment rezoning (and associated yields) will have minimal impact upon the performance of the adjacent Main North Road/Nottage Terrace intersection (i.e. no change in Level of Service for each movement at the intersection). Nevertheless, further detailed analysis can be prepared as part of any future development application(s) for development on the site (and also be informed by a review of conditions once the intersection upgrade has been completed).

Further modelling of the three anticipated connections to the adjacent road network indicates that each will operate satisfactorily with minimal queues and delays on-site. Importantly, the modelling indicates that the connections will not impact upon through movements on Main North Road or Nottage Terrace.

APPENDIX A

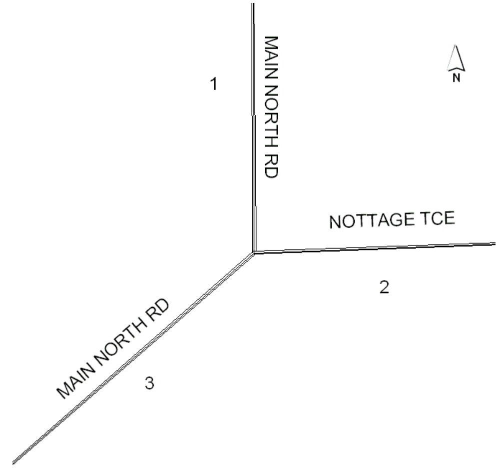
EXISTING TRAFFIC VOLUMES

Department of Planning, Transport and Infrastructure

Vehicle Turning Movement Survey

Intersection of: MAIN NORTH ROAD / NOTTAGE TERRACE
Locality: MEDINDIE GARDENS
AMG Reference: TG809360
Date of Count: 03/09/2019 Day: Tuesday
Weather: Dry Control: SIGNALS
Survey Status:

Arm	Road Number - Name
1	5610 - MAIN NORTH ROAD
2	5618 - NOTTAGE TERRACE
3	5610 - MAIN NORTH ROAD



	Arm	1		2		3	
	Exit Arm	2 (L)	3	3 (L)	1 (R)	1	2 (R)
11 hour totals	Cars	**4258**	**12538**	**9202**	**5517**	**10964**	**6487**
	CV	**154**	**577**	**268**	**201**	**528**	**259**
	Total	**4412**	**13115**	**9470**	**5718**	**11492**	**6746**
AM Peak hour (07:15)	Cars	**329**	**1681**	**1343**	**560**	**818**	**530**
	CV	**15**	**75**	**37**	**18**	**57**	**29**
	Total	**344**	**1756**	**1380**	**578**	**875**	**559**
PM Peak hour (16:45)	Cars	**470**	**1205**	**785**	**570**	**1450**	**781**
	CV	**4**	**43**	**10**	**7**	**38**	**15**
	Total	**474**	**1248**	**795**	**577**	**1488**	**796**

		1				2				3			
One-way Flows	11 Hour Totals	**(IN) 17527**		**(OUT) 17210**		**(IN) 15188**		**(OUT) 11158**		**(IN) 18238**		**(OUT) 22585**	
	AM Peak Hour	**07:15**	**2100**	**07:45**	**1654**	**08:00**	**1998**	**11:30**	**958**	**08:00**	**1494**	**07:15**	**3136**
	PM Peak Hour	**16:45**	**1722**	**15:45**	**2225**	**15:30**	**1485**	**17:00**	**1314**	**16:15**	**2388**	**16:45**	**2043**
Two-way Flows	AM Peak Hour	**07:45**	**3648**			**08:00**	**2883**			**07:15**	**4570**		
	PM Peak Hour	**16:45**	**3787**			**16:45**	**2642**			**16:45**	**4327**		
All Vehicles	11 Hour Totals	**34737**	**4.2% CV**			**26346**	**3.3% CV**			**40823**	**4.0% CV**		
	Estimated AADT	**45500**	**SF(1.00) ZF(1.31)**			**34500**	**SF(1.00) ZF(1.31)**			**53500**	**SF(1.00) ZF(1.31)**		

AADT - Annual Average Daily Traffic SF - Seasonal Factor ZF - Zone Factor CV - Commercial Vehicles

APPENDIX B

FORECAST TRAFFIC VOLUMES

SCOTTY'S SITE CODE AMENDMENT - TRAFFIC GENERATION AND DISTRIBUTION ASSESSMENT

Existing

	Daily				AM																		
					Gen					IN							OUT						
Use	**Quantity**	**Daily Rate**	**Unit**	**Daily Trips**	**AM Rate**	**Unit**	**AM Trips**	**%IN**	**%OUT**	**#IN**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**	**#OUT**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**
Detached Dwelling	2	8	per dwelling	16	0.8	per dwelling	1.6	30%	70%	0.48	0%	100%	0%	0	1	0	1.12	25%	0%	75%	0	0	1
Motel	53	3	per unit	159	0.4	per unit	21.2	30%	70%	6.36	50%	50%	0%	3	3	0	14.8	0%	0%	100%	0	0	15
Motor Repair	560	33.5	per 100 sqm	187.6	3.35	per 100 sqm	18.76	75%	25%	14.1	50%	50%	0%	7	7	0	4.69	0%	0%	100%	0	0	5
			Total	**363**			**42**			**21**				**10**	**11**	**0**	**21**				**0**	**0**	**21**

PM																		
Gen					IN							OUT						
PM Rate	Unit	PM Trips	%IN	%OUT	#IN	MNR (N)	Nottage (E)	MNR (SW)	MNR (N)	Nottage (E)	MNR (SW)	#OUT	MNR (N)	Nottage (E)	MNR (SW)	MNR (N)	Nottage (E)	MNR (SW)
0.8	per dwelling	1.6	70%	30%	1.12	0%	100%	0%	0	1	0	0.48	25%	0%	75%	0	0	1
0.4	per unit	21.2	70%	30%	14.8	50%	50%	0%	8	8	0	6.36	0%	0%	100%	0	0	6
3.35	per 100 sqm	18.76	25%	75%	4.69	50%	50%	0%	2	2	0	14.1	0%	0%	100%	0	0	14
		42			**21**				**10**	**11**	**0**	**21**				**0**	**0**	**21**

Proposed

	Daily				AM																		
					Gen					IN							OUT						
Use	**Quantity**	**Daily Rate**	**Unit**	**Daily Trips**	**AM Rate**	**Unit**	**AM Trips**	**%IN**	**%OUT**	**#IN**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**	**#OUT**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**
Medium-Density	0	6.5	per dwelling	0	0.65	per dwelling	0	30%	70%	0	25%	75%	0%	0	0	0	0	25%	0%	75%	0	0	0
High-Density	160	1.52	per dwelling	243.2	0.53	per dwelling	84.8	30%	70%	25.4	25%	75%	0%	6	19	0	59.4	25%	0%	75%	15	0	45
Commercial	1000	11	per 100 sqm	110	1.6	per 100 sqm	16	80%	20%	12.8	25%	75%	0%	3	10	0	3.2	25%	0%	75%	1	0	2
Retail	1500	70	per 100 sqm	1050	4.5	per 100 sqm	67.5	50%	50%	33.8	25%	75%	0%	8	25	0	33.8	25%	0%	75%	8	0	25
			Total	**1404**			**169**			**72**				**17**	**54**	**0**	**97**				**24**	**0**	**72**

PM																		
Gen					IN							OUT						
PM Rate	**Unit**	**PM Trips**	**%IN**	**%OUT**	**#IN**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**	**#OUT**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**	**MNR (N)**	**Nottage (E)**	**MNR (SW)**
0.65	per dwelling	0	70%	30%	0	25%	75%	0%	0	0	0	0	25%	0%	75%	0	0	0
0.32	per dwelling	51.2	70%	30%	35.8	25%	75%	0%	9	27	0	15.4	25%	0%	75%	4	0	12
1.2	per 100 sqm	12	20%	80%	2.4	25%	75%	0%	1	2	0	9.6	25%	0%	75%	2	0	7
9	per 100 sqm	135	50%	50%	67.5	25%	75%	0%	17	51	0	67.5	25%	0%	75%	17	0	51
		199			**106**				**27**	**80**	**0**	**93**				**23**	**0**	**70**

APPENDIX C

EXISTING INTERSECTION CONFIGURATION

APPENDIX C1

SIGNAL PHASING

TS031 – Main North Road / Nottage Terrace: Medindie

PHASING OPERATION:

- Three phase intersection with bus signal group
- Running phase sequence: A, B, C, D, E, F.
- Bus runs in B, D and F phases

TURNING MOVEMENT OPERATION:

- Right turns from Main North Road (south) do not filter

PHASE TIMES DURING PEAK PERIODS:

- A phase (Main North Road) is the stretch phase
- Average phase times on 7th March 2019:

Period	Time	Avg CL	A	C	D[1]	E	F[2]
AM	0730-0830	140s	56s	44s	1s	37s	2s
BUS	1400-1500	140s	50s	56s	-	33s	1s
PM	1615-1715	140s	48s	54s	3s	35s	-

[1]D phase ran 2 out of 26 cycles during the AM peak, it ran for an average of 12 seconds when it ran
ran 6 out of 26 cycles during the PM peak, it ran for an average of 12 seconds when it ran

[2]F phase ran 6 out of 26 cycles during the AM Peak, it ran for an average of 10 seconds when it ran
ran 2 out of 26 cycles during the BUS Peak, it ran for an average of 10 seconds when it ran

LINKING:

- TS031 is linked to TS032 (Main North Road/ Fitzroy Terrace/ Robe Terrace)
- PC007 is permanently linked to TS031 (same subsystem)
- TS029 (Nottage Terrace/ North East Road/ Stephen Terrace/ Northcote Terrace) and PC006 (Main North Road near Barker Road) are linked to TS031

INTERGREEN TIME

- Phase A has 6.0 seconds of intergreen time (Yellow = 4.0s, Red = 2.0s)
- Phases B, D, and F have 5.5 seconds of intergreen time (Yellow = 4.0s, Red = 1.5s)
- Phase C has 7.0 seconds of intergreen time (Yellow = 4.0s, Red = 3.0s)
- Phase E has 6.5 seconds of intergreen time (Yellow = 4.0s, Red = 2.5s)

MINIMUM GREEN TIME

- Phases A, B and D have 6.0 seconds minimum green time
- Phase C has 7.0 seconds minimum green time
- Phase E has 8.0 seconds minimum green time
- Phase F has 4.0 seconds minimum green time

CYCLE TIME

- Maximum cycle time is 140 seconds

WALKING TIME:

Pedestrian	Parallel Vehicle Phase	Walk	Clearance 1	Clearance 2	AM Activation	BUS Activation	PM Activation
P1	A, B, D, F	5.0s	10s	3.0s	10	2	7
P2	E	5.0s	18s	4.0s	10	1	6
P3	A, B, D, F	5.0s	4.0s	3.0s	6	3	7

SCATS GRAPHICS

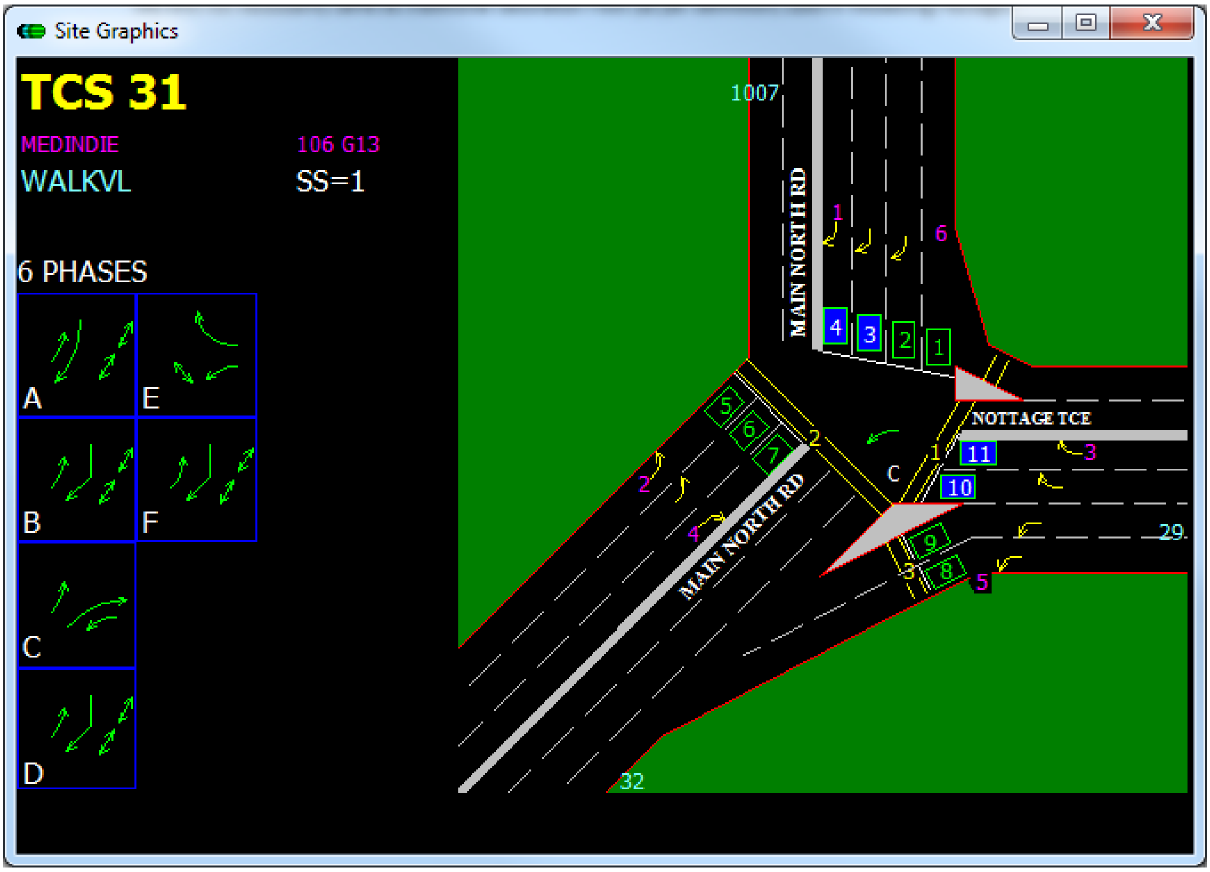


TABLE: SCATS Maximum Flow recorded on 20th March 2019

Detector No	Maximum Flow	Detector No	Maximum Flow
2	1773	7	2169
3	1967	8	1690
4	1905	9	1494
5	1739	10	1714
6	1644	11	1773

Note: SCATS Maximum Flow is just an indication of the lane Saturation Flow which may vary during time of day and not necessarily same as traditional Saturation Flow (as per definition) used in Modelling Packages.

APPENDIX C2

BASE CASE – EXISTING LAYOUT

MOVEMENT SUMMARY

Site: 101 [Exist AM - MNR/Nottage - With Buses (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated   Cycle Time = 141 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Nottage Tce (E)														
4a	L1	1380	46	1453	3.3	0.810	32.1	LOS C	36.6	263.1	0.91	0.89	0.91	42.2
6	R2	578	19	608	3.3	* 0.767	63.7	LOS E	20.3	146.4	1.00	0.88	1.05	41.3
Approach		1958	65	2061	3.3	0.810	41.4	LOS D	36.6	263.1	0.94	0.89	0.95	41.8
North: Main North Rd (N)														
7	L2	344	14	362	4.0	0.211	5.9	LOS A	1.5	10.8	0.07	0.57	0.07	57.2
9a	R1	1731	97	1822	5.6	* 1.072	123.6	LOS F	57.8	421.6	1.00	1.15	1.76	28.3
Approach		2075	111	2184	5.3	1.072	104.1	LOS F	57.8	421.6	0.85	1.05	1.48	30.7
SouthWest: Main North Rd (SW)														
30a	L1	875	37	921	4.2	0.336	11.2	LOS B	10.8	78.0	0.38	0.64	0.38	55.6
32a	R1	559	23	588	4.2	* 1.207	262.0	LOS F	89.8	651.2	1.00	1.53	2.33	13.5
Approach		1434	60	1509	4.2	1.207	109.0	LOS F	89.8	651.2	0.62	0.99	1.14	31.4
All Vehicles		5467	236	5755	4.3	1.207	82.9	LOS F	89.8	651.2	0.82	0.98	1.20	33.4

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Nottage Tce (E)												
P2	Full	50	53	32.1	LOS D	0.1	0.1	0.68	0.68	57.2	32.7	0.57
P2S	Slip/ Bypass	50	53	29.4	LOS C	0.1	0.1	0.65	0.65	50.7	27.6	0.54
SouthWest: Main North Rd (SW)												
P8	Full	50	53	54.6	LOS E	0.2	0.2	0.88	0.88	87.4	42.6	0.49
All Pedestrians		150	158	38.7	LOS D	0.2	0.2	0.73	0.73	65.1	34.3	0.53

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Exist PM - MNR/Nottage - With Buses (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated   Cycle Time = 140 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Nottage Tce (E)															
4a	L1	795	26	837	3.3	0.412	19.3	LOS B	14.1	101.6	0.63	0.74	0.63	47.6
6	R2	577	19	607	3.3	* 0.820	68.1	LOS E	21.2	152.5	1.00	0.91	1.12	40.5
Approach		1372	45	1444	3.3	0.820	39.8	LOS D	21.2	152.5	0.79	0.81	0.84	43.3
North: Main North Rd (N)															
7	L2	474	19	499	4.0	0.509	21.7	LOS C	19.0	137.6	0.66	0.77	0.66	51.7
9a	R1	1217	81	1281	6.6	* 0.967	109.1	LOS F	39.7	291.9	1.00	1.09	1.41	34.9
Approach		1691	100	1780	5.9	0.967	84.6	LOS F	39.7	291.9	0.90	1.00	1.20	38.2
SouthWest: Main North Rd (SW)															
30a	L1	1488	62	1566	4.2	0.568	12.8	LOS B	23.2	168.3	0.48	0.70	0.48	55.0
32a	R1	796	33	838	4.2	* 1.344	375.8	LOS F	155.4	1126.7	1.00	1.78	2.81	10.1
Approach		2284	96	2404	4.2	1.344	139.3	LOS F	155.4	1126.7	0.66	1.08	1.29	28.1
All Vehicles		5347	241	5628	4.5	1.344	96.5	LOS F	155.4	1126.7	0.77	0.99	1.15	33.9

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Nottage Tce (E)												
P2	Full	50	53	39.5	LOS D	0.2	0.2	0.75	0.75	64.6	32.7	0.51
P2S	Slip/ Bypass	50	53	36.5	LOS D	0.2	0.2	0.72	0.72	57.7	27.6	0.48
SouthWest: Main North Rd (SW)												
P8	Full	50	53	55.9	LOS E	0.2	0.2	0.89	0.89	88.7	42.6	0.48
All Pedestrians		150	158	44.0	LOS E	0.2	0.2	0.79	0.79	70.4	34.3	0.49

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

APPENDIX D

DIT UPGRADE CONFIGURATION

APPENDIX D1

BASE CASE – UPGRADED LAYOUT

MOVEMENT SUMMARY

Site: 101 [Exist AM - MNR/Nottage Upgrade - With Buses - USED (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated   Cycle Time = 141 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Nottage Tce (E)														
4a	L1	1380	46	1453	3.3	0.817	32.2	LOS C	36.9	265.7	0.91	0.89	0.92	42.4
6	R2	578	19	608	3.3	* 0.825	67.3	LOS E	21.2	152.4	1.00	0.91	1.13	40.6
Approach		1958	65	2061	3.3	0.825	42.6	LOS D	36.9	265.7	0.94	0.90	0.98	41.7
North: Main North Rd (N)														
7	L2	344	14	362	4.0	0.211	7.2	LOS A	1.5	10.8	0.07	0.57	0.07	57.2
9a	R1	1731	97	1822	5.6	* 1.073	124.3	LOS F	57.9	422.4	1.00	1.17	1.77	28.3
Approach		2075	111	2184	5.3	1.073	104.9	LOS F	57.9	422.4	0.85	1.07	1.49	30.7
SouthWest: Main North Rd (SW)														
30a	L1	850	62	895	7.3	0.640	42.1	LOS D	25.4	188.4	0.87	0.83	0.87	46.9
32a	R1	559	23	588	4.2	* 0.928	70.4	LOS E	32.5	235.6	0.96	0.95	1.17	31.6
Approach		1409	85	1483	6.0	0.928	53.3	LOS D	32.5	235.6	0.91	0.88	0.99	41.8
All Vehicles		5442	261	5728	4.8	1.073	69.1	LOS E	57.9	422.4	0.89	0.96	1.18	35.8

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Nottage Tce (E)												
P2	Full	50	53	34.1	LOS D	0.1	0.1	0.70	0.70	61.8	36.0	0.58
P2S	Slip/ Bypass	50	53	29.4	LOS C	0.1	0.1	0.65	0.65	50.7	27.6	0.54
SouthWest: Main North Rd (SW)												
P8	Full	50	53	60.1	LOS F	0.2	0.2	0.92	0.92	97.9	49.2	0.50
All Pedestrians		150	158	41.2	LOS E	0.2	0.2	0.76	0.76	70.1	37.6	0.54

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [Exist PM - MNR/Nottage Upgrade - With Buses - USED (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated   Cycle Time = 138 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Nottage Tce (E)														
4a	L1	795	26	837	3.3	0.454	24.0	LOS C	16.3	117.6	0.70	0.75	0.70	45.7
6	R2	577	19	607	3.3	* 0.781	62.6	LOS E	19.9	143.6	0.99	0.89	1.07	41.6
Approach		1372	45	1444	3.3	0.781	40.2	LOS D	19.9	143.6	0.82	0.81	0.85	43.3
North: Main North Rd (N)														
7	L2	474	19	499	4.0	0.511	18.7	LOS B	15.4	111.6	0.55	0.73	0.55	53.4
9a	R1	1217	81	1281	6.6	* 0.996	98.1	LOS F	63.1	457.7	0.99	1.12	1.43	36.5
Approach		1691	100	1780	5.9	0.996	75.8	LOS E	63.1	457.7	0.87	1.01	1.19	39.8
SouthWest: Main North Rd (SW)														
30a	L1	1513	87	1593	5.8	0.635	17.7	LOS B	29.8	216.2	0.61	0.75	0.61	53.5
32a	R1	796	33	838	4.2	* 1.315	259.4	LOS F	102.1	740.7	0.97	1.46	2.19	13.7
Approach		2309	121	2431	5.2	1.315	101.0	LOS F	102.1	740.7	0.73	1.00	1.15	33.0
All Vehicles		5372	266	5655	5.0	1.315	77.6	LOS E	102.1	740.7	0.80	0.95	1.09	37.2

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Nottage Tce (E)												
P2	Full	50	53	34.9	LOS D	0.1	0.1	0.71	0.71	62.6	36.0	0.58
P2S	Slip/ Bypass	50	53	30.1	LOS D	0.1	0.1	0.66	0.66	51.3	27.6	0.54
SouthWest: Main North Rd (SW)												
P8	Full	50	53	58.6	LOS E	0.2	0.2	0.92	0.92	96.4	49.2	0.51
All Pedestrians		150	158	41.2	LOS E	0.2	0.2	0.76	0.76	70.1	37.6	0.54

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

APPENDIX D2

FUTURE TRAFFIC

MOVEMENT SUMMARY

Site: 101 [Future AM - MNR/Nottage Upgrade - With Buses - USED (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated   Cycle Time = 141 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Nottage Tce (E)														
4a	L1	1411	47	1485	3.3	0.835	34.3	LOS C	38.7	278.7	0.93	0.91	0.94	41.7
6	R2	587	19	618	3.3	* 0.855	70.2	LOS E	22.2	159.5	1.00	0.94	1.18	40.1
Approach		1998	66	2103	3.3	0.855	44.8	LOS D	38.7	278.7	0.95	0.92	1.01	41.0
North: Main North Rd (N)														
7	L2	344	14	362	4.0	0.211	7.2	LOS A	1.5	10.8	0.07	0.57	0.07	57.2
9a	R1	1735	98	1826	5.7	* 1.076	126.1	LOS F	58.5	426.7	1.00	1.17	1.78	28.1
Approach		2079	112	2188	5.4	1.076	106.4	LOS F	58.5	426.7	0.85	1.07	1.49	30.6
SouthWest: Main North Rd (SW)														
30a	L1	900	62	947	6.9	0.655	41.0	LOS D	26.8	198.0	0.87	0.84	0.87	47.1
32a	R1	559	23	588	4.2	* 0.928	70.4	LOS E	32.5	235.6	0.96	0.95	1.17	31.6
Approach		1459	85	1536	5.8	0.928	52.3	LOS D	32.5	235.6	0.91	0.88	0.98	42.1
All Vehicles		5536	263	5827	4.8	1.076	69.9	LOS E	58.5	426.7	0.90	0.97	1.19	35.7

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Nottage Tce (E)												
P2	Full	50	53	34.1	LOS D	0.1	0.1	0.70	0.70	61.8	36.0	0.58
P2S	Slip/ Bypass	50	53	29.4	LOS C	0.1	0.1	0.65	0.65	50.7	27.6	0.54
SouthWest: Main North Rd (SW)												
P8	Full	50	53	60.1	LOS F	0.2	0.2	0.92	0.92	97.9	49.2	0.50
All Pedestrians		150	158	41.2	LOS E	0.2	0.2	0.76	0.76	70.1	37.6	0.54

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Project: C:\Users\BenWilson(CIRQA)\Cirqa Pty Ltd\Cirqa Pty Ltd Team Site - Public\2019\19384 Scotty's Motel 1 Nottage Terrace Medindie DPA \SIDRA\19384 - Scottys CA July 2021.sip9

MOVEMENT SUMMARY

Site: 101 [Future PM - MNR/Nottage Upgrade - With Buses - USED (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 138 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Nottage Tce (E)														
4a	L1	840	28	884	3.3	0.480	24.4	LOS C	17.6	126.4	0.71	0.76	0.71	45.6
6	R2	579	19	609	3.3	* 0.787	62.9	LOS E	20.1	144.7	0.99	0.89	1.08	41.5
Approach		1419	47	1494	3.3	0.787	40.1	LOS D	20.1	144.7	0.83	0.81	0.86	43.2
North: Main North Rd (N)														
7	L2	474	19	499	4.0	0.513	18.7	LOS B	15.4	111.6	0.55	0.73	0.55	53.4
9a	R1	1233	83	1298	6.7	* 0.998	99.1	LOS F	63.6	461.9	0.99	1.13	1.44	36.5
Approach		1707	102	1797	6.0	0.998	76.8	LOS E	63.6	461.9	0.87	1.02	1.19	39.7
SouthWest: Main North Rd (SW)														
30a	L1	1513	87	1593	5.8	0.635	17.7	LOS B	29.8	216.2	0.61	0.75	0.61	53.5
32a	R1	796	33	838	4.2	* 1.315	259.4	LOS F	102.1	740.7	0.97	1.46	2.19	13.7
Approach		2309	121	2431	5.2	1.315	101.0	LOS F	102.1	740.7	0.73	1.00	1.15	33.0
All Vehicles		5435	270	5721	5.0	1.315	77.5	LOS E	102.1	740.7	0.80	0.96	1.09	37.2

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Nottage Tce (E)												
P2	Full	50	53	34.9	LOS D	0.1	0.1	0.71	0.71	62.6	36.0	0.58
P2S	Slip/ Bypass	50	53	30.1	LOS D	0.1	0.1	0.66	0.66	51.3	27.6	0.54
SouthWest: Main North Rd (SW)												
P8	Full	50	53	58.6	LOS E	0.2	0.2	0.92	0.92	96.4	49.2	0.51
All Pedestrians		150	158	41.2	LOS E	0.2	0.2	0.76	0.76	70.1	37.6	0.54

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

APPENDIX E

SITE ACCESS POINTS

APPENDIX E1

ACCESS 1 – NOTTAGE TERRACE

MOVEMENT SUMMARY

▽ Site: 101 [Future AM - Nottage/Access1 (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access 1 (S)														
1	L2	37	1.0	39	1.0	0.052	8.3	LOS A	0.2	1.3	0.49	0.71	0.49	51.5
Approach		37	1.0	39	1.0	0.052	8.3	LOS A	0.2	1.3	0.49	0.71	0.49	51.5
East: Nottage Tce (E)														
4	L2	12	1.0	13	1.0	0.276	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	58.1
5	T1	1990	3.3	2095	3.3	0.276	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		2002	3.3	2107	3.3	0.276	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
West: Main North Rd (W)														
11	T1	903	3.3	951	3.3	0.498	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach		903	3.3	951	3.3	0.498	0.2	NA	0.0	0.0	0.00	0.00	0.00	59.6
All Vehicles		2942	3.3	3097	3.3	0.498	0.2	NA	0.2	1.3	0.01	0.01	0.01	59.6

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
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 [Future PM - Nottage/Access1 (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %	v/c	sec		[Veh. veh	Dist] m				km/h
South: Access 1 (S)														
1	L2	9	1.0	9	1.0	0.010	7.1	LOS A	0.0	0.3	0.40	0.59	0.40	52.3
Approach		9	1.0	9	1.0	0.010	7.1	LOS A	0.0	0.3	0.40	0.59	0.40	52.3
East: Nottage Tce (E)														
4	L2	17	1.0	18	1.0	0.199	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	58.0
5	T1	1425	3.3	1500	3.3	0.199	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.8
Approach		1442	3.3	1518	3.3	0.199	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
West: Main North Rd (W)														
11	T1	1270	3.3	1337	3.3	0.700	0.5	LOS A	0.0	0.0	0.00	0.00	0.00	59.1
Approach		1270	3.3	1337	3.3	0.700	0.5	NA	0.0	0.0	0.00	0.00	0.00	59.1
All Vehicles		2721	3.3	2864	3.3	0.700	0.3	NA	0.0	0.3	0.00	0.01	0.00	59.4

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX E2

ACCESS 2 – NOTTAGE TERRACE

MOVEMENT SUMMARY

▽ Site: 101 [Future AM - Nottage/Access2 (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access 2 (S)														
1	L2	6	1.0	6	1.0	0.008	7.9	LOS A	0.0	0.2	0.47	0.63	0.47	51.8
Approach		6	1.0	6	1.0	0.008	7.9	LOS A	0.0	0.2	0.47	0.63	0.47	51.8
East: Nottage Tce (E)														
4	L2	38	1.0	40	1.0	0.280	5.6	LOS A	0.0	0.0	0.00	0.04	0.00	57.8
5	T1	1989	3.3	2094	3.3	0.280	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach		2027	3.3	2134	3.3	0.280	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
West: Main North Rd (W)														
11	T1	903	3.3	951	3.3	0.498	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach		903	3.3	951	3.3	0.498	0.2	NA	0.0	0.0	0.00	0.00	0.00	59.6
All Vehicles		2936	3.3	3091	3.3	0.498	0.2	NA	0.0	0.2	0.00	0.01	0.00	59.7

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
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 [Future PM - Nottage/Access2 (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Access 2 (S)														
1	L2	15	1.0	16	1.0	0.016	6.9	LOS A	0.1	0.4	0.37	0.59	0.37	52.4
Approach		15	1.0	16	1.0	0.016	6.9	LOS A	0.1	0.4	0.37	0.59	0.37	52.4
East: Nottage Tce (E)														
4	L2	59	1.0	62	1.0	0.198	5.6	LOS A	0.0	0.0	0.00	0.10	0.00	57.4
5	T1	1375	3.3	1447	3.3	0.198	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach		1434	3.2	1509	3.2	0.198	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.6
West: Main North Rd (W)														
11	T1	1270	3.3	1337	3.3	0.700	0.5	LOS A	0.0	0.0	0.00	0.00	0.00	59.1
Approach		1270	3.3	1337	3.3	0.700	0.5	NA	0.0	0.0	0.00	0.00	0.00	59.1
All Vehicles		2719	3.2	2862	3.2	0.700	0.4	NA	0.1	0.4	0.00	0.02	0.00	59.3

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX E3

ACCESS 3 – NOTTAGE TERRACE

MOVEMENT SUMMARY

Site: 101 [Future AM - MNR/Access3 (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Access 3 (SE)														
1	L2	18	1.0	19	1.0	0.077	18.8	LOS C	0.2	1.6	0.83	0.93	0.83	44.9
Approach		18	1.0	19	1.0	0.077	18.8	LOS C	0.2	1.6	0.83	0.93	0.83	44.9
NorthEast: Main North Rd (NE)														
4	L2	16	1.0	17	1.0	0.586	5.8	LOS A	0.0	0.0	0.00	0.01	0.00	57.7
5	T1	3157	4.0	3323	4.0	0.586	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	59.4
Approach		3173	4.0	3340	4.0	0.586	0.3	NA	0.0	0.0	0.00	0.00	0.00	59.4
SouthWest: Main North Rd (SW)														
11	T1	1434	4.0	1509	4.0	0.397	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
Approach		1434	4.0	1509	4.0	0.397	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.7
All Vehicles		4625	4.0	4868	4.0	0.586	0.3	NA	0.2	1.6	0.00	0.01	0.00	59.4

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
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 [Future PM - MNR/Access3 (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Access 3 (SE)														
1	L2	44	1.0	46	1.0	0.084	10.4	LOS B	0.3	2.0	0.60	0.83	0.60	50.1
Approach		44	1.0	46	1.0	0.084	10.4	LOS B	0.3	2.0	0.60	0.83	0.60	50.1
NorthEast: Main North Rd (NE)														
4	L2	26	1.0	27	1.0	0.389	5.7	LOS A	0.0	0.0	0.00	0.02	0.00	57.9
5	T1	2078	4.0	2187	4.0	0.389	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach		2104	4.0	2215	4.0	0.389	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.6
SouthWest: Main North Rd (SW)														
11	T1	2284	4.0	2404	4.0	0.632	0.4	LOS A	0.0	0.0	0.00	0.00	0.00	59.3
Approach		2284	4.0	2404	4.0	0.632	0.4	NA	0.0	0.0	0.00	0.00	0.00	59.3
All Vehicles		4432	4.0	4665	4.0	0.632	0.4	NA	0.3	2.0	0.01	0.01	0.01	59.4

Site Level of Service (LOS) Method: Delay (SIDRA). 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.