Broken Head Quarry Planning Proposal (Residential Subdivision)

Traffic Impact Assessment

Prepared for Winten Property Group

July 2024

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E240639 RP#1

July 2024

Version	Date	Prepared by	Approved by	Comments
1	15 July 2024	Dr John Mai	Abdullah Uddin	Draft
2	18 July 2024	Dr John Mai	Abdullah Uddin	Client's comments are incorporated

Approved by

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18 July 2024

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Executive Summary

This traffic impact assessment (TIA) evaluates the potential effects of a proposed residential development on the surrounding transport network, addressing the requirements set forth by Byron Shire Council. The key findings and proposals are as follows:

- **Land use**: The site is designated exclusively for residential purposes, with no commercial, retail, or industrial activities planned.

- Access points: The project is not proposing any new vehicular access onto Broken Head Road, rather retrofitting the existing accesses based on the road geometry, crash history and traffic volumes along Broken Head Road. The following two accesses are proposed:

    - **Primary access**: Vehicles will access the southern portion of the site via a newly installed roundabout on Broken Head Road at the Southern Site Access, allowing movement in both north and south directions.

    - **Secondary access**: Vehicles can access the northern portion of the site from Broken Head Road south approach via a left turn into the Northern Site Access. Exiting vehicles can only turn left onto Broken Head Road (north).

- Traffic analysis:

    - SIDRA traffic analysis indicates that all intersections will operate at a level of service (LOS) A or B, with a degree of saturation (DOS) of less than 0.3. This suggests that the additional traffic from the development will have a minor impact on the intersections.

- Proposed infrastructure:

    - A basic left turn (BAL) or a widened shoulder is necessary to facilitate left turns from Broken Head Road south approach to the Northern Site Access.

    - A shared path will be installed from the Northern Site Access to connect to the existing shared path on Clifford Street, Suffolk Park in accordance with the Proponent's letter of offer to enter into a VPA.

- Safety improvements:

    - The speed limit is proposed to be reduced from 80 km/h to 60 km/h in the vicinity of the site.

    - A roundabout is proposed to be installed at the Broken Head Road/Southern Site Access intersection.

    - A left-in/left-out arrangement at the Broken Head Road/Northern Site Access intersection is proposed to be implemented, with a small amount of vegetation to be trimmed or removed to improve sight distances.

    - An approximately 1 km long separated shared path for pedestrians and cyclists is proposed to be provided to enhance active transport connectivity in the area.

This assessment ensures that the proposed residential development will integrate into the existing transport network, maintaining efficient traffic flow and enhancing road safety.

TABLE OF CONTENTS

Appendices

Tables

Figures

Plates

1 Introduction

1.1 Project overview

This Traffic Impact Assessment (TIA) report has been prepared to assess the traffic impacts of the planning proposal for a residential subdivision of the former Broken Head Quarry at Broken Head Road, Suffolk Park (the site) (Figure 1.1).

The site encompasses the former Broken Head Quarry located on the western side of Broken Head Road. The old quarry on the eastern side is excluded from this planning proposal. The site consists of Lot 1 DP 123302 and Lot 2 DP 700806 on Broken Head Road (Figure 1.2), with a combined area of approximately 32.7 hectares (ha).

The site is currently partly zoned RU 1 Primary Production and partly E2 Environmental Conservation, as illustrated in Figure 1.3. The planning proposal seeks consent to rezone the RU1 Primary Production portion of the site to R2 Low Density Residential, which is applied to an approximately 11.8 ha area. It will also change the Minimum Lot Size from 40 ha to 400 square metres (m^2), and apply a maximum Floor Space Ratio (FSR) of 0.6:1.

1.2 Report objectives

This TIA has been prepared generally in accordance with the requirements of the New South Wales (NSW) Road and Traffic Authority (RTA) (now Transport for NSW (TfNSW)) *Guide to Traffic Generating Developments* (2002) and incorporates:

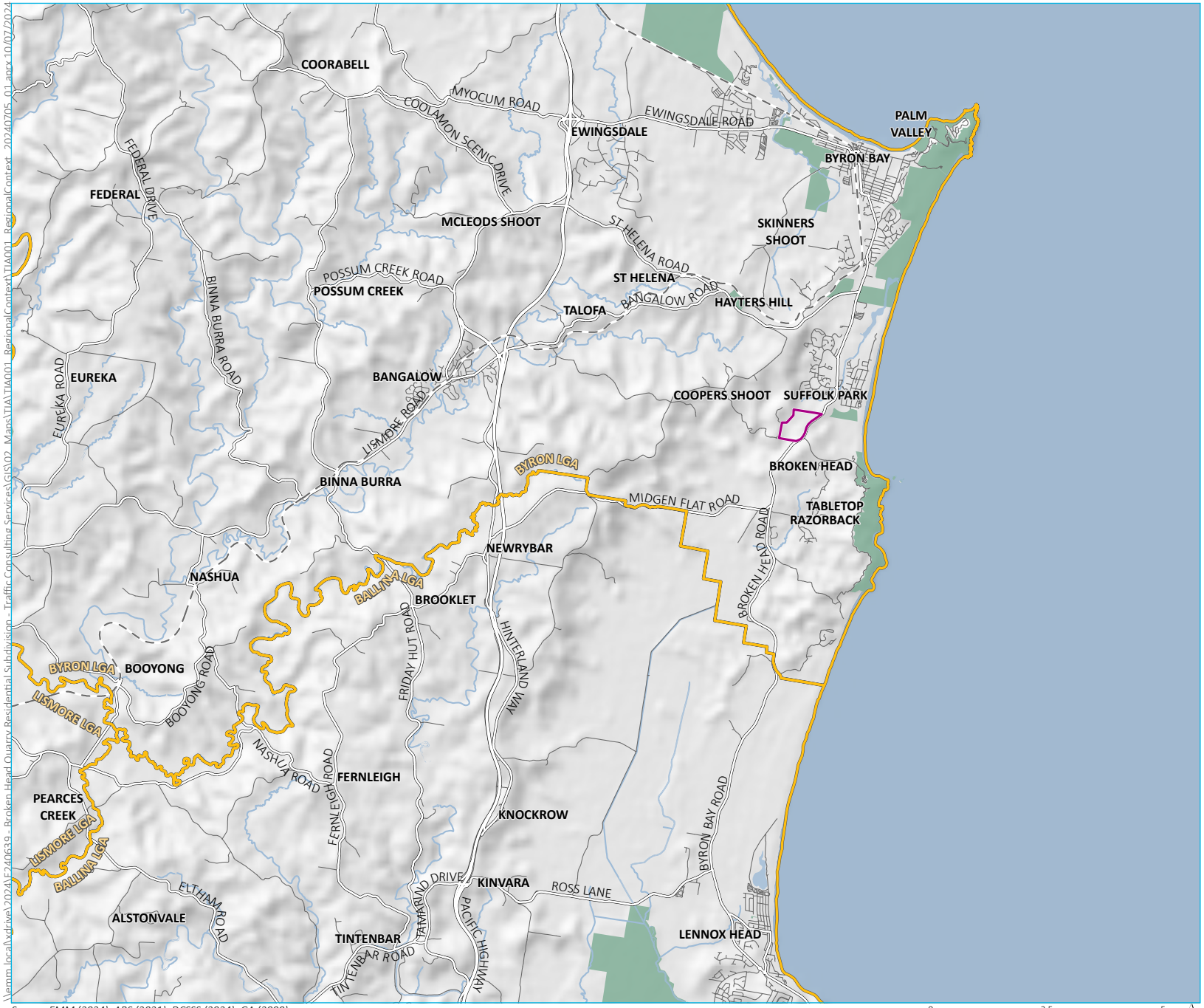
- description of the project, local setting and surrounds
- consideration of existing traffic volumes and results of traffic surveys
- SIDRA intersection analysis to identify any traffic impacts at the relevant intersections
- identification and consideration of nearby developments and cumulative traffic
- consideration of future intersection and road upgrade requirements and maintenance impacts
- reporting investigations and analyses.

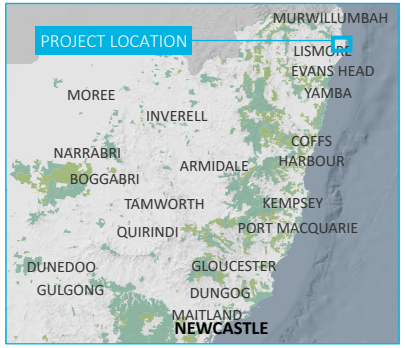
1.3 Methodology

This TIA has been prepared in accordance with:

- Austroads Guide to Road Design Part 4: Intersections and Crossings – General
- Austroads Guide to Road Design Part 4A: Unsignalised & Signalised Intersections
- Austroads Guide to Traffic Management Part 3: Transport Study and Analysis Methods
- Austroads Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments
- Road and Traffic Authority (RTA) Guide to Traffic Generating Developments.

A site visit was conducted by EMM Consulting Pty Limited (EMM) on Thursday 27 June 2024 for the traffic assessment. The traffic count was undertaken at the same day.





KEY

- Project boundary

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody
- NPWS reserve
- Local government area

INSET KEY

- NPWS reserve
- State forest

Source: EMM (2024); ABS (2021); DCSSS (2024); GA (2009)

0 2.5 5 km

GDA2020 MGA Zone 56

N

Regional context

Broken Head Quarry Residential Subdivision
Traffic Impact Assessment
Figure 1.1

EMM creating opportunities

KEY

- Project boundary

Existing environment

- Major road
- Minor road
- Vehicular track
- Named watercourse
- Cadastral boundary
- NPWS reserve

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Source: EMM (2024); ABS (2021); DCSSS (2024); Metromap (2024)

0 0.5 1 km

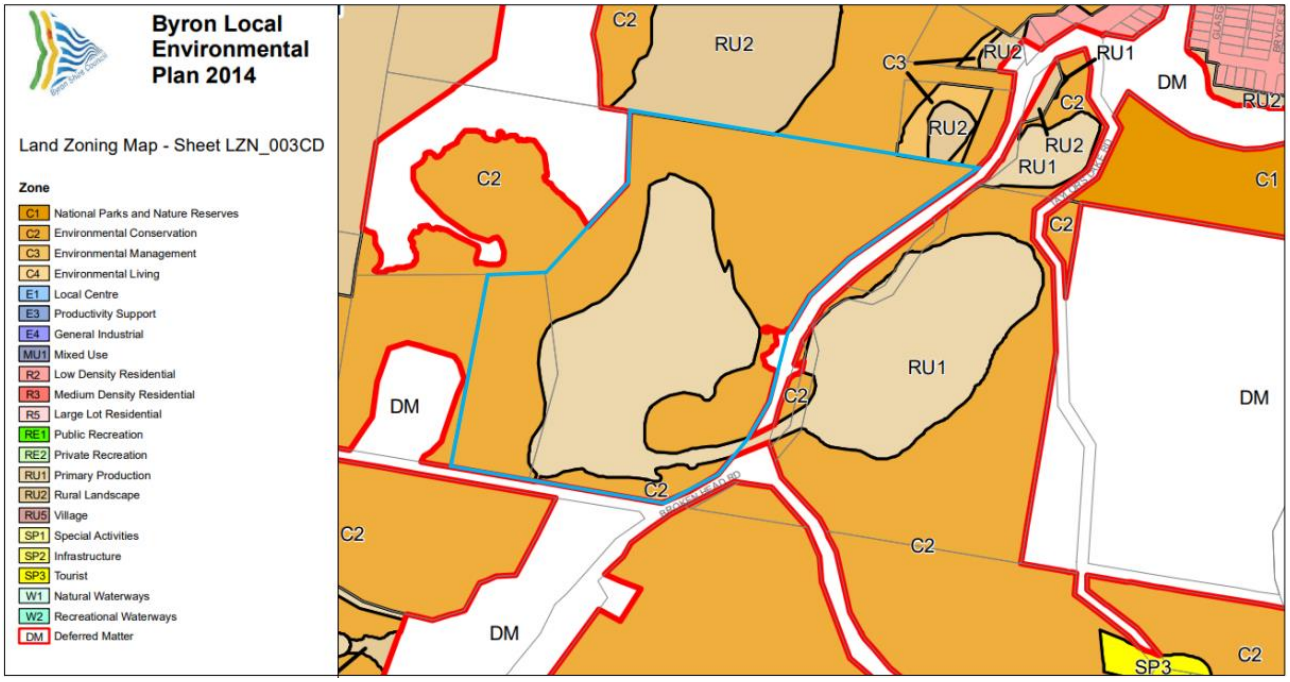
GDA2020 MGA Zone 56

N

Local context

Broken Head Quarry Residential Subdivision
Traffic Impact Assessment
Figure 1.2

EMM
creating opportunities



Source: Byron Shire Council

Figure 1.3 Existing land zoning

1.4 Definitions

The following definitions have been used throughout the report to describe vehicular journeys.

1.4.1 Movement

In this report, a movement is a vehicle travelling in one direction from an origin to a destination.

1.4.2 Trip

A trip consists of two one-way movements. For example, a trip may consist of both a movement from the place of residence to the location of employment in the AM peak and a second movement from the location of employment to the place of residence in the PM peak.

2 Existing conditions

2.1 Site location

The site is located within Byron Shire local government area (LGA) on the NSW North Coast, approximately 0.4 kilometres (km) south-west of the existing southern residential boundary of Suffolk Park, which is approximately 5 km south of the town centre in Byron Bay (Figure 1.1).

2.2 Road network

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy as:

- state roads – freeways and primary arterials (TfNSW managed)
- regional roads – secondary or sub arterials (Council managed and part funded by the State)
- local roads – collector and local access roads (Council managed).

The key road in the vicinity of the project is Broken Head Road, which is shown in Figure 2.1. The road geometry of Broken Head Road is provided in Table 2.1.

Source: MetroMap

Figure 2.1 Road network

Table 2.1 Broken Head Road

Aspect	Description
Road classification and connectivity	Regional road stretching between Bangalow Road, Byron Bay (north) and Bundaleer Road, Broken Head (south)
Alignment	North–south
Number of lanes	One lane each way, with additional lanes near intersections
Carriageway type	Sealed road
Carriageway width	Approximately 7.2 metres (m) sealed width with 3.1 m travel lane each way and 0.5 m shoulders on both sides
Posted speed limit	80 kilometres per hour (km/h)
Heavy vehicle access	Approved for B-doubles up to 19 m in length and greater than 50 tonnes (t) between Beech Drive (north) and Bundaleer Road (south)
Traffic function	Carries regional and local traffic

Plate 2.1 Broken Head Road (looking south from the southern site access)

2.3 Key intersections

The following intersections have been assessed as they are in the vicinity of the site where vehicles are expected to pass through:

- Broken Head Road/Broken Head Reserve Road
- Broken Head Road/Natural Lane

The location of the intersections is shown in Figure 2.1. Intersection geometry details are presented in the following tables.

2.3.1 Broken Head Road/Broken Head Reserve Road

Table 2.2 Broken Head Road/Broken Head Reserve Road intersection

Aspect	Description
Location	Directly south-east of the site
Intersection control	Priority controlled (give way)
Major road	Broken Head Road
North-east approach	One arrival lane and two departure lanes
South-east approach	One arrival lane and one departure lane
South-west approach	Two arrival lanes and one departure lane
Pedestrian connectivity	None
Traffic function	The intersection carries regional and local traffic movements
Speed limit	80 km/h on Broken Head Road 50 km/h on Broken Head Reserve Road

Figure 2.2 Broken Head Road/Broken Head Reserve Road intersection

2.3.2 Broken Head Road/Natural Lane

Table 2.3 Broken Head Road/Natural Lane intersection

Aspect	Description
Location	Directly south of the site
Intersection control	Priority controlled (give way)
Major road	Broken Head Road
North-east approach	One arrival lane and two departure lanes
South-west approach	Two arrival lanes and one departure lane
North-west approach	One arrival lane and one departure lane
Pedestrian connectivity	None
Traffic function	The intersection carries regional and local traffic movements
Speed limit	80 km/h on Broken Head Road 50 km/h on Natural Lane

Figure 2.3 Broken Head Road/Natural Lane intersection

2.4 Crash data analysis

Crash data from TfNSW Centre for Road Safety interactive history database for five available years between 2018 and 2022 (inclusive) has been studied within approximately 3 km of the project area. A total of 19 crashes were found to have occurred on the regional road network – the distribution of where these occurred is presented in Figure 2.4 and summarised in Table 2.4.

The crashes are categorised based on the severity of the crashes as:

- fatal
- serious injury
- moderate injury
- minor/other injury
- non-casualty (towaway).

Source: TfNSW Centre for Road Safety

Figure 2.4 Crash data

Table 2.4 Crash data summary on Broken Head Road

Type of crash	Severity of injury				
	Non-casualty	Minor	Moderate	Serious	Fatal
Run off road into object	3	2	1	1	
Run off road	2			1	
Head on			1		
Rear end		1	1	1	
Side swipe		1			
T-bone		1		1	
Out of control				1	
Object on road		1			
Total	**5**	**6**	**3**	**5**	**0**

The 19 crashes identified resulted in five serious injuries, three moderate injuries, six minor injuries and five crashes that did not cause any injuries. There were no fatalities recorded. The majority of crashes involved a vehicle running off the road. Rear end type crashes also occurred on three occasions. Speeding was involved in six crashes. Fatigue was involved in four crashes, mainly within the residential area of Suffolk Park.

The town of Byron Bay, situated approximately 5 km north of the site, is a popular destination that attracts lots of visitors, especially during the holiday seasons. To reduce the occurrences of crashes from speeding and fatigue, greater enforcement is recommended to encourage motorists to slow down and not drive while tired.

The Broken Head Road/Broken Head Reserve Road intersection directly south-east to the site only has one crash caused by speeding that did not cause any injuries. Hence, the road network adjacent to the site can be considered safe. However, consideration should be given in relation to traffic safety when designing the proposed site accesses on Broken Head Road.

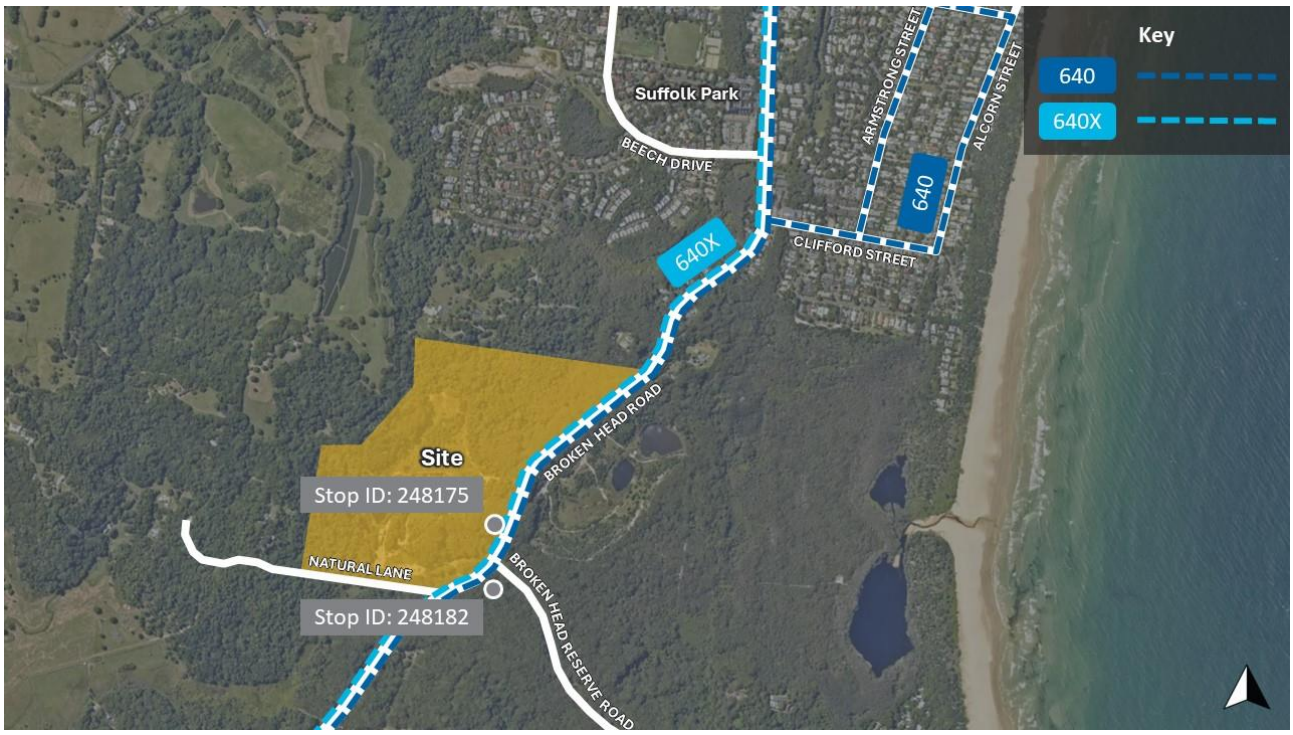
2.5 Public transport

2.5.1 Public bus

The site is served by two bus stops (Stop IDs 248175 and 248182) directly adjacent to the site (Figure 2.5). These bus stops are served by two bus routes:

- Route 640 – Ballina to Mullumbimby via Byron Bay
- Route 640X – Byron Bay to Lismore via Lennox Head, Ballina and Alstonville.

Both of these bus routes are served by the North Coast Network.



Source: MetroMap

Figure 2.5 Public bus routes in the vicinity of the site

i Route 640

Route 640 buses run on the following schedule:

- Monday to Friday: 8 am to 6 pm with services at approximately two hour intervals.
- Saturday: 8 am to 5 pm with services at approximately two hour intervals.
- Sunday and Public Holidays: one service in the morning and two services in the afternoon in each direction.

While the route 640 public bus service offer an opportunity for commuters to travel into neighbouring town centres, the relatively low frequency means that the bus service will experience low patronage. Driving will be a more desirable option for most types of journeys for the future occupants of the site.

ii Route 640X

Route 640X only operates on weekdays, with one service travelling southbound in the morning and a return service travelling northbound in the evening. The service generally provides a once a day service to and from Lismore and will not be relied upon to make general trips between townships during the day.

2.5.2 School bus

A number of school bus routes pass through the area that are operated by CDC NSW. These school bus routes generally have the option of stopping at the two bus stops shown in Figure 2.5.

The existing school buses provide a good transport option for students travelling to various schools in neighbouring townships.

2.6 Active transport

There are currently no formal active transport links adjacent to the site.

The residential areas of Suffolk Park have some shared paths and mixed-use streets, but these active transport networks do not extend south of Clifford Street (Figure 2.6).

There are no pedestrian paths directly adjacent to the site.

Source: MetroMap

Figure 2.6 Active transport routes in the vicinity of the site

2.7 Parking

Parking is available on site. There are no parking facilities available on the existing public road network.

2.8 Existing vehicular accesses

The site has two existing vehicular accesses, one on the north and one on the south, as shown in Figure 2.7. The Southern Site Access will be used as the primary access while the Northern Site Access will be used as the secondary access.

2.8.1 Northern Site Access

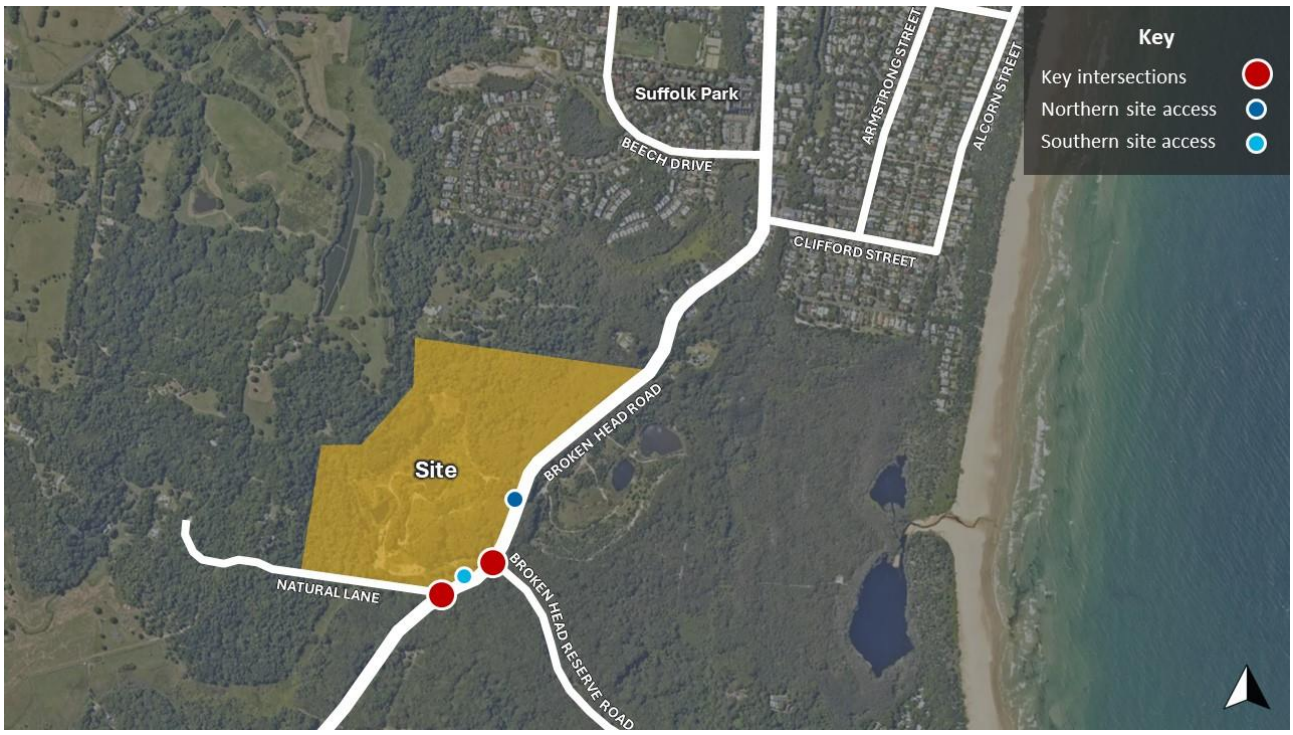
The Northern Site Access is located 150 m north of Broken Head Road/Broken Head Reserve Road intersection on the west side of Broken Head Road. The site access is characterised by a driveway with a short sealed section of road, followed by an unsealed road further into the site. There are no existing formal turn treatments to the Northern Site Access. Vehicles exiting via the Northern Site Access face stop signs on both sides of the driveway (Plate 2.2). Currently the driveway is only wide enough to allow one vehicle to move through at one time and is currently signposted to not allow any entering vehicles.

Plate 2.2 View of Broken Head Road from Northern Site Access

2.8.2 Southern Site Access

The Southern Site Access is located 90 m south-east of Broken Head Road/Broken Head Reserve Road intersection on the west side of Broken Head Road. The site access is characterised by a driveway with a short sealed section of road, followed by an unsealed road further into the site. An auxiliary left turn lane is provided to the Southern Site Access. Vehicles exiting via the Southern Site Access face a give way sign. Separate lanes are provided to allow vehicles to enter and exit without conflict.

Plate 2.3 View of Broken Head Road from Southern Site Access



Source: MetroMap

Figure 2.7 Existing site accesses

2.9 Existing traffic volumes

The intersection of Broken Head Road/Broken Head Reserve Road was surveyed on Thursday 27 June 2024 during a non-school holiday period between 6 am to 9 am and 3 pm to 6 pm. The raw intersection count data is provided in Appendix A.

The peak hours were found to be:

- AM peak: 8 am to 9 am
- PM peak: 3:30 pm to 4:30 pm.

The existing traffic volumes are shown in Figure 2.8.

Source: MetroMap

Figure 2.8 Existing traffic volumes

The traffic volumes on Figure 2.8 show that:

- Broken Head Road carries approximately 860 to 880 vehicles during the AM peak hour and PM peak hour
- approximately 10% of vehicles on Broken Head Road during the peak hour are heavy vehicles, which aligns with the regional road classification of Broken Head Road.

It is assumed that there are no existing traffic volumes accessing the northern and southern site accesses, as there is currently no activity on site. Hence, the traffic volumes for the northern and southern site accesses can be extrapolated based on the existing traffic volumes at Broken Head Road/Broken Head Reserve Road.

The existing traffic volumes also form the baseline traffic volumes on which the development traffic volumes are to be added. The baseline traffic volumes at the following intersections are shown in Figure 2.9:

- Broken Head Road/Northern Site Access.
- Broken Head Road/Broken Head Reserve Road.
- Broken Head Road/Southern Site Access.

The Broken Head Road/Clifford Road roundabout is located 1.3 km from the southern site access. Given the location of this roundabout and its estimated minor development traffic, this intersection has been excluded from analysis.

Source: MetroMap

Figure 2.9 Baseline traffic volumes

3 The development

3.1 Development proposal

The planning proposal seeks to amend Byron LEP 2014 by rezoning the RU1 Primary Production area to R2 Low Density Residential, impacting approximately 11.8 ha. This change will also adjust the minimum lot size from 40 ha to 400 m² and set a maximum floor space ratio (FSR) of 0.6:1.

The applicant has proposed:

- constructing a shared pedestrian and cycle path connecting the site to Suffolk Park
- dedicating 20% of the lots to the Council for affordable housing.

A preliminary concept plan outlines potential road and intersection locations and lot layouts featuring approximately 92 residential lots of varying sizes from 383 m² to 1,505 m² (Figure 3.1). Most of the lots will consist of single dwellings, with four lots flagged for potential duplexes. This concept is preliminary and subject to approval upon rezoning.

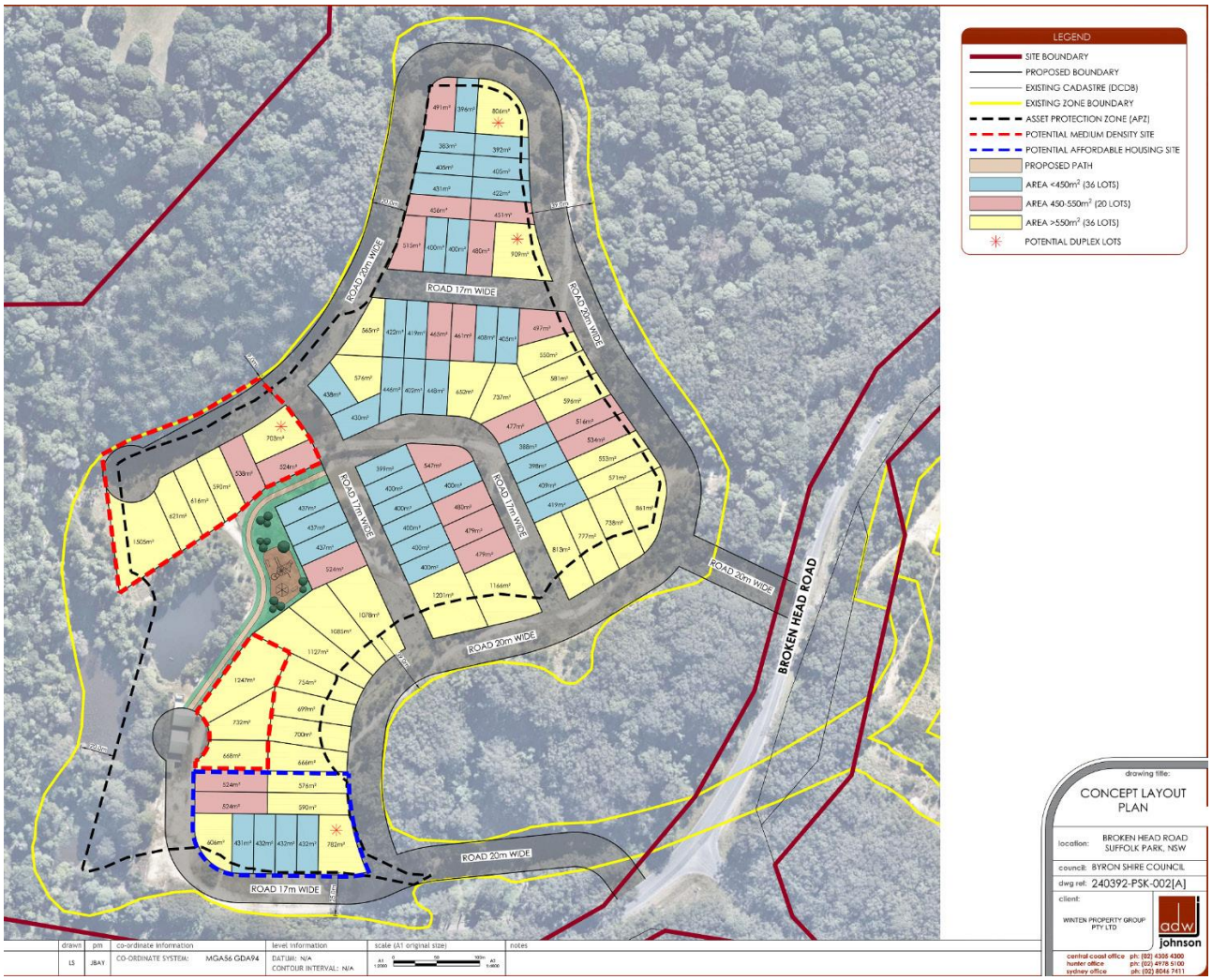


Figure 3.1 Concept layout of future residential development on the site

For the purposes of this traffic assessment, it will be conservatively assumed that there will be 100 dwellings when determining the impact of the future residential development.

3.2 Internal road network and connectivity

The widths and gradients of the internal site roads will be designed to comply with the Northern Rivers Local Government Development Design and Construction Manual – *Development Design Specification D1: Geometric Road Design (Urban and Rural)* (Northern Rivers Road Design Standard) (NRLG 2019), which provide uniform road design standards for road design speeds and gradients for all the associated Councils in the region. For individual subdivision roads, the design requirements of the Byron Shire Development Control Plan (DCP) 2014 – *Chapter B3 Services* (BSC 2014b) also apply.

Most of the internal roads will be local access streets, which require a sealed carriageway width of 7 to 9 m, mountable kerbs, and a corresponding minimum road reserve width of 17 m. On-street car parking will be permitted with these road carriageway and reservation widths. These streets are suitable for local subdivision access roads which serve more than 15 lots. In Table D.1.5 of the Northern Rivers Road Design Standard, it is specified these roads can accommodate traffic volumes of up to 2,000 vehicles daily.

Distributor roads that connect to the two site access points will require a sealed width of 13 m, upright kerbs and a minimum road reserve width of 20 m. A footpath will be provided on at least one side of the road. In Table D.1.5 of the Northern Rivers Road Design Standard, it is specified these roads can accommodate higher volumes of traffic.

In Table D.1.1 of the Northern Rivers Road Design Standard, the desirable maximum gradient for this type of street is also specified, which is 12 percent, although an absolute maximum gradient of 16 percent is also permitted.

The recommended road design speed for the sections of Broken Head Road which are adjacent to the subdivision should be converted from 80 km/h to 60 km/h. For pedestrian, cyclist, and local traffic safety on Broken Head Road in the vicinity of the subdivision, the 60 km/h speed reduction is proposed to be applied up until Broken Head Road approaches the existing Suffolk Park residential area, which is signposted at 50 km/h. This is consistent with the existing roundabout at Byron Bay Road/Ross Lane intersection where the speed limit is reduced from 80 km/h or 100 km/h to 60 km/h on approaches to the roundabout from all directions.

The recommended road design speed for the internal roads of the subdivision is 50 km/h. However, a 40 km/h speed limit ‘local traffic zone’ is proposed to be signposted with traffic appropriate traffic calming devices, for environmental and safety reasons, within the future residential streets of the subdivision.

Source: MetroMap

Figure 3.2 Existing and proposed speed limits on Broken Head Road in the vicinity of the site

3.3 Proposed vehicular accesses

3.3.1 Northern Site Access

The Northern Site Access is proposed to be in the form of a left-in/left-out arrangement. This site access will allow vehicles travelling in the northbound direction to enter the Northern Site Access via a left turn, while exiting vehicles will turn left and travel northbound on Broken Head Road. No right turn movements will be permitted – this will be enforced by the installation of a central median island on Broken Head Road.

3.3.2 Southern Site Access

The Southern Site Access will continue to be used along its existing alignment. A roundabout is proposed to facilitate movements going into and out of the Southern Site Access.

The proposed roundabout is supported by the following principles:

- The intersection is a junction between a regional road (Broken Head Road) and a local collector road (Southern Site Access). A roundabout is considered to be an appropriate treatment since there is not a huge difference in the road hierarchy levels of the two roads (Austroads 2020).
- A reduction in the speed of vehicles on the approach to the intersection reduces the severity of any crashes.
- A reduction in the number of conflict points when vehicles are turning reduces the number of potential crash types.
- A requirement for drivers to only look to the right while slowing down increases alertness of drivers with the expectation that they may need to stop, as well as reducing the cognitive load when compared to the requirement to look in two directions at a T-intersection.

- Limited sight distances to the left from the minor road approach (Southern Site Access) beyond the intersection due to the curvature of the road means the roundabout will be an improvement over the existing priority controlled (give-way) T-intersection.

- To achieve the required sight distance to the left, several mature street trees need to be removed. Thus, a roundabout would result in less ecological impact because motorists give way to any vehicles on the roundabout to their right, which only requires sufficient sight distance of the roundabout to the right.

- The presence of a roundabout slows down traffic in the vicinity of the site, increasing safety benefits at the nearby Broken Head Road/Broken Head Reserve Road priority controlled (give-way) T-intersection.

A speed limit reduction from 80 km/h to 60 km/h is proposed south of the roundabout to facilitate safe traffic movements. Given the current crash statistics as stated in Section 2.4, the roundabout and left-in/left-out vehicular accesses for the site would bring significant community benefits for all road users.

3.4 Proposed traffic generation

The traffic generated by the site will be exclusively from residential development.

The RTA *Guide to Traffic Generating Developments* (RTA 2002) recommends the following traffic generations rates for new dwellings:

- 9.0 external vehicle movements per dwelling per day

- 0.85 external vehicle movements per dwelling during each peak hour.

Furthermore, the RMS *Technical Direction TDT 2013/04a* (RMS 2013) recommends a revised traffic generation rates based on updated surveys in regional areas of NSW, which are:

- 7.4 external vehicle movements per dwelling per day

- 0.71 external vehicle movements per dwelling during the AM peak hour

- 0.78 external vehicle movements per dwelling during the PM peak hour.

The lower rates of 7.4 daily movements, 0.71 AM movements and 0.78 PM movements are considered appropriate, given:

- the site is located in a regional area

- the rate suggested in the RTA *Guide to Traffic Generating Developments* (2002) is over 20 years old and may not be relevant

- current work from home patterns may result in reduced work trips.

For 100 dwellings, the RMS daily traffic generation rates would generate daily site traffic totals of:

- 740 external vehicle movements per day

- 71 external vehicle movements during the AM peak hour

- 78 external vehicle movements during the PM peak hour.

Furthermore, the following inbound and outbound distribution is assumed to/from the site, which is generally reflective of residential traffic demand:

- AM peak hour: 20% inbound and 80% outbound
- PM peak hour: 60% inbound and 40% outbound.

The traffic generation for the site is shown in Table 3.1.

Table 3.1 Site traffic generation

Peak hour	Inbound movements	Outbound movements	Total movements
AM	14	57	71
PM	47	31	78

3.5 Traffic distribution

During the morning and afternoon peak hour traffic periods, when most of the longer distance 'journey to work' type commuter travel movements will be occurring, the future distribution of the site generated external traffic movements would be similar to Byron Shire LGA and Ballina Shire LGA resident's journey to work travel distribution. The results are summarised in Table 3.2.

Table 3.2 Existing distribution of Byron Shire LGA and Ballina Shire LGA residents' journey to work travel (2021 census)

Destination LGA	Byron Shire LGA		Ballina Shire LGA	
	Number of persons employed	Distribution to each destination (%)	Number of persons employed	Distribution to each destination (%)
Byron	11,741	70.5	1,955	9.4
Ballina	1,004	6.0	12,913	62.4
Lismore	793	4.8	3,227	15.6
Tweed	615	3.7	145	0.7
Gold Coast	233	1.4	97	0.5
Sydney	216	1.3	145	0.7
Brisbane	163	1.0	107	0.5
Richmond Valley	37	0.2	338	1.6
Other destinations	344	2.1	264	1.3
No usual address	1,261	7.6	1,254	6.1
Not stated	241	1.4	250	1.2
Total	**16,648**	**100**	**20,695**	**100**

Source: profile.id

While the site is located within Byron Shire LGA, the boundary to Ballina Shire LGA is only 3 km away on Midgen Flat Road, or 5 km away on Broken Head Road, as shown in Figure 1.1. Therefore, future residents are likely to have similar commuting characteristics to the average of the two LGAs.

From the census data in Table 3.2, the majority of the Byron Shire LGA journey to work travel movements (70.5%) are self-contained within the LGA. The three most significant external traffic destinations are the Ballina, Lismore and Tweed LGAs. There are significant proportions (9.0% in total) of the journey to work trips where the workplace destination is either not fixed or not stated in the census data.

Similarly in Table 3.2, the majority of the Ballina Shire LGA journey to work travel movements (62.4%) are self-contained within the LGA. The three most significant external traffic destinations are the Lismore, Byron and Richmond Valley LGAs. There are also significant proportions (7.3% in total) of the journey to work trips where the workplace destination is either not fixed or not stated in the census data.

Giving due consideration to this uncertainty, the future proportions of the subdivision generated peak hour traffic, which would be travelling either north, south or west from the locality, are estimated as:

- approximately 50% of site traffic would be travelling to and from Byron Bay and other destinations in the north via Suffolk Park
- approximately 40% of site traffic would be travelling to and from Ballina and other destinations in the south via Lennox Head
- approximately 10% of site traffic would be travelling to and from Lismore and other destinations in the west via Bangalow Road (north of the site).

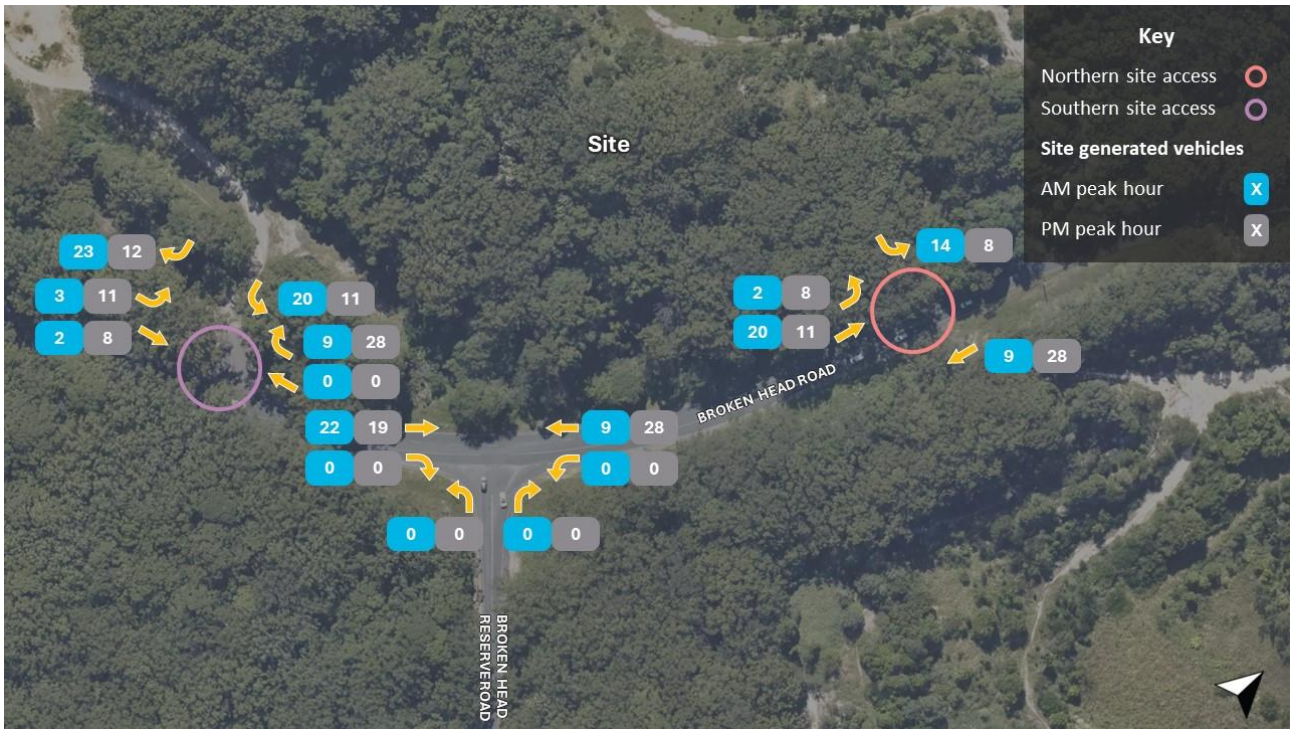
In the vicinity of the site, this equates to 60% of future residential traffic travelling to and from the north, and 40% of future residential traffic travelling to and from the south. Furthermore, the Northern Site Access can be accessed by 40% of all incoming and outgoing northbound residential traffic volumes. The traffic distribution at the northern and southern site accesses are shown in Figure 3.3.

Source: MetroMap

Figure 3.3 Traffic distribution at the northern and southern site accesses

3.6 Traffic volumes

The traffic generation from the future residential development on the site (Section 3.4) have been distributed according to the traffic distribution in Figure 3.3 to obtain the traffic volumes at the site accesses. The traffic volumes are shown in Figure 3.4.



Source: MetroMap

Figure 3.4 Future residential development traffic volumes

The baseline traffic volumes (Figure 2.8) have been combined with the future development traffic volumes (Figure 3.4) and is shown in Figure 3.5.

Source: MetroMap

Figure 3.5 Baseline + future residential development traffic volumes

As it is assumed that there are no existing traffic volumes accessing the northern and southern site accesses, all traffic movements to and from the site are related to the future residential development. Through movement traffic volumes at the Northern Site Access and Southern Site Access (Figure 3.5) have been extrapolated from the intersection movement at Broken Head Road/Broken Head Reserve Road.

The traffic volumes in Figure 3.5 are used for the traffic impact assessments in Chapter 4.

3.7 Pedestrian connectivity

Pedestrian access will be provided by the distributor roads to the site accesses on Broken Head Road.

A shared path (for pedestrians and cyclists) is also proposed from the Northern Site Access and connect to the existing shared path network in the existing residential area of Suffolk Park. The shared path will extend approximately 1 km along Broken Head Road, predominately on the western side of the existing carriageway and switching over to the eastern side south of the township (Appendix C). The split in the shared path between the western and eastern side of Broken Head Road is required due to site constraints along the western side of Broken Head Road.

3.8 Parking generation

There will be approximately 92 dwellings in the subdivision. According to Byron Shire Development Control Plan (DCP) 2014, *Chapter B4 Traffic Planning, Vehicle Parking, Circulation and Access* (BSC 2014b), two car parking spaces are required per dwelling. On-street parking will also be available near all dwellings. As the site is purely residential in a low density setting, the proposed concept layout will be able to accommodate any parking demand from residents or visitors. Hence, there is no potential parking impact on Broken Head Road.

4 Impact assessment

4.1 Intersection performance

The intersections along Broken Head Road have been modelled with the SIDRA Intersection 9.1 software, a micro-analytical tool for individual intersections and linked intersection-network modelling. The modelling is based on the existing traffic volumes detailed in Section 2.9 and development traffic volumes in Section 3.6. SIDRA provides the following performance indicators:

- Degree of saturation (DOS) – the total usage of the intersection expressed as a factor of 1 with 1 representing 100% use/saturation (e.g. 0.8 = 80% saturation).

  In practice, the target degrees of saturation of 0.90 for signals, 0.85 for roundabouts and 0.80 for unsignalised intersections are generally agreed to. These are usually called 'practical degrees of saturation'.

- Average delay (DEL) – for a signalised or roundabout intersection, this is the average delay in seconds encountered by all vehicles passing through the intersection. For a priority-controlled intersection, this is the average delay experienced by the worst approach and turning movement. It is often important to review the average delay of each approach as a side road could have a long delay time, while the large free flowing major traffic will provide an overall low average delay.

- Level of service (LOS) – this is a categorisation of average delay, intended for simple reference. For a priority-controlled intersection, this is the categorisation of the average delay experienced by the worst approach and turning movement.

- 95% queue lengths (Q95) – is defined to be the queue length in metres that has only a 5% probability of being exceeded during the analysed time period. It transforms the average delay into measurable distance units.

The LOS is a good indicator of overall performance for individual intersections, with each level summarised in Table 4.1.

Table 4.1 Intersection LOS standards

Level of service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Priority intersection ('Stop' and 'Give Way')
A	<14	Good operation	Good operations
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity. At traffic signals, incidents will cause extensive delays. Roundabouts require other control mode.	At capacity, required other control mode
F	>71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; required other control mode

Source: *RTA Guide to Traffic Generating Developments* (RTA 2002)

SIDRA intersection modelling has been conducted for the following scenarios:

- Baseline traffic volumes – based on Figure 2.9.
- Baseline + residential development traffic volumes – based on Figure 3.5.

The following abbreviations are used for the turn movements:

- TH: through
- LT: left turn
- RT: right turn.

The SIDRA results for the intersections along Broken Head Road are presented in the following tables.

Detailed SIDRA results can be found in Appendix B.

4.1.1 Broken Head Road/Northern Site Access intersection

Table 4.2 SIDRA modelling results for Broken Head Road/Northern Site Access intersection

Control: a) Priority controlled (Stop) b) Priority controlled (Give way)	AM peak						PM peak					
Scenarios	**Intersection volume**	**DEL (s)**	**LOS**	**DOS**	**Q95 (m)**	**Q95 approach and direction**	**Intersection volume**	**DEL (s)**	**LOS**	**DOS**	**Q95 (m)**	**Q95 approach and direction**
a) Baseline	909	9.8	A	0.265	0.0	N/A	923	9.2	A	0.267	0.0	N/A
b) Baseline + development	955	6.6	A	0.277	0.4	LT from Northern Site Access (north-west)	979	6.0	A	0.282	0.2	LT from Northern Site Access (north-west)

Key findings for Broken Head Road/Northern Site Access intersection:

- In AM and PM, the intersection performs satisfactorily within capacity with LOS A (good operation) and DOS <0.3 for all scenarios.
- The intersection has capacity to accommodate the additional development traffic volumes.

4.1.2 Broken Head Road/Broken Head Reserve Road intersection

Table 4.3 SIDRA modelling results for Broken Head Road/Broken Head Reserve Road intersection

Control: a) Priority controlled (Give way) b) Priority controlled (Give way)	AM peak						PM peak					
Scenarios	**Intersection volume**	**DEL (s)**	**LOS**	**DOS**	**Q95 (m)**	**Q95 approach and direction**	**Intersection volume**	**DEL (s)**	**LOS**	**DOS**	**Q95 (m)**	**Q95 approach and direction**
a) Baseline	954	13.0	A	0.213	4.9	LT and RT from Broken Head Reserve Road (south-east)	988	13.4	A	0.268	5.4	LT and RT from Broken Head Reserve Road (south-east)
b) Baseline + development	986	14.0	A	0.242	5.2	LT and RT from Broken Head Reserve Road (south-east)	1,038	14.7	B	0.283	5.9	LT and RT from Broken Head Reserve Road (south-east)

Key findings for Broken Head Road/Broken Head Reserve Road intersection:

- In AM and PM, the intersection performs satisfactorily within capacity with LOS A (good operation) or B (good with acceptable delays and spare capacity) and DOS <0.3 for all scenarios.
- The intersection has capacity to accommodate the additional development traffic volumes.

4.1.3 Broken Head Road/Southern Site Access intersection

Table 4.4 SIDRA modelling results for Broken Head Road/Southern Site Access intersection

Control: **a) Baseline: Priority controlled (Give way)** **b) with Development: Roundabout**	**AM peak**						**PM peak**					
Scenarios	**Intersection volume**	**DEL (s)**	**LOS**	**DOS**	**Q95 (m)**	**Q95 approach and direction**	**Intersection volume**	**DEL (s)**	**LOS**	**DOS**	**Q95 (m)**	**Q95 approach and direction**
a) Baseline	824	11.7	A	0.242	0.1	LT and RT from Southern Site Access (north-west)	855	12.1	A	0.248	0.1	LT and RT from Southern Site Access (north-west)
b) Baseline + development	880	4.2	A	0.286	14.6	LT and TH from Broken Head Road (south-west)	924	4.1	A	0.310	18.2	TH and RT from Broken Head Road (north-east)

Key findings for Broken Head Road/Southern Site Access intersection:

- In AM and PM, the intersection performs satisfactorily within capacity with LOS A (good operation) and DOS <0.3 for all scenarios.
- The addition of a roundabout does not decrease the overall LOS of the intersection.
- The overall intersection delay of the roundabout will be significantly lower than the delay on the minor approach controlled by an existing give way arrangement.
- The intersection has capacity to accommodate the additional development traffic volumes.

4.2 Austroads turn treatment assessment

Intersection operations are assessed from a combination of the peak hourly through and turning traffic movements that occur at each intersection. This determines the need for additional intersection turning lanes (e.g. basic, auxiliary lane and channelised) in accordance with the current intersection design standards (Austroads 2023) *Guide to Road Design Part 4A, Unsignalised and Signalised Intersections* (Figure 4.1), where:

- Curve 1 (red line) represents the boundary between a basic right turn (BAR) and a channelised short right turn (CHR(s)) turn treatment and between a basic left turn (BAL) and an auxiliary short left turn (AUL(s)) turn treatment.
- Curve 2 (blue line) represents the boundary between a CHR(s) and a full length CHR treatment and between an AUL(s) and a full length AUL or CHL treatment. The choice of CHL over an AUL will depend on factors such as the need to change the give way rule in favour of other manoeuvres at the intersection and the need to define the driving path more appropriately by reducing the area of bitumen surfacing.

Figure 4.1 contains a graph for the selection of turn treatments on roads with a design speed less than or equal to 70 km/h.

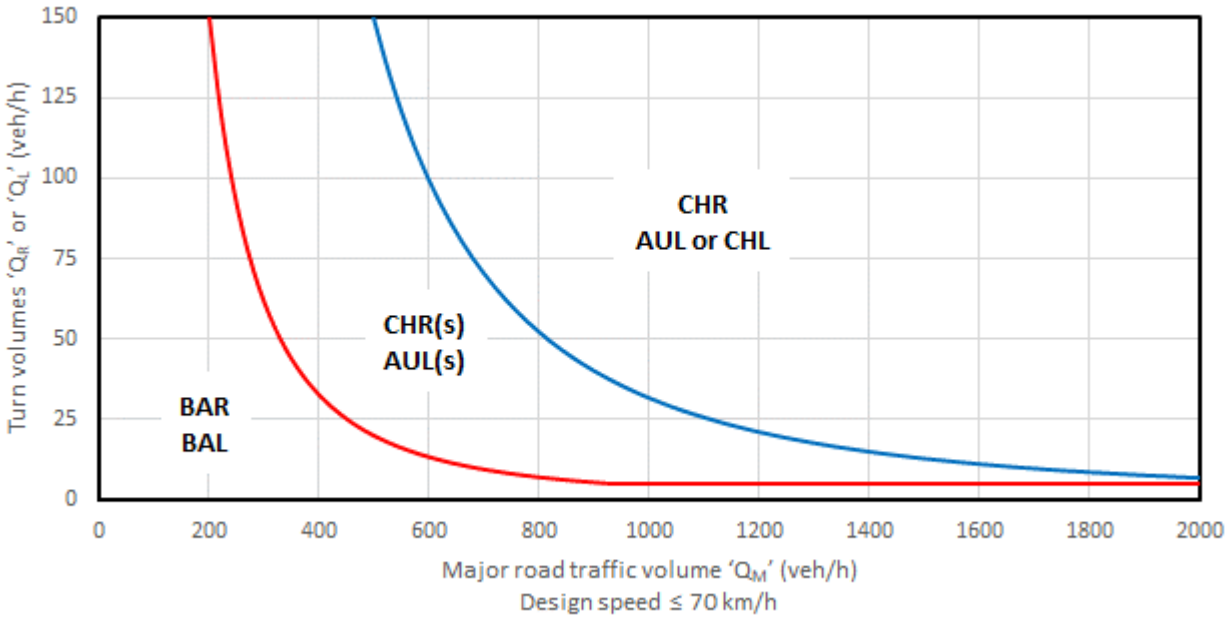


Figure 4.1 Austroads warrant design charts for rural intersection turning lanes

TfNSW recommends intersections should be designed for a travel speed 10 km/h greater than the posted speed limit. As Broken Head Road is proposed to have a speed limit of 60 km/h in the vicinity of the site, intersections with Broken Head Road should be designed for 70 km/h, which is 10 km/h above the posted speed limit. Hence, Figure 4.1 is appropriate for determining the turn treatment.

To provide conservative results, the warrant for turn treatments has been assessed based on the combination of baseline and development traffic.

No development-related vehicles are expected to be turning at the intersection of Broken Head Road/Broken Head Reserve Road. Hence a turn treatment assessment will not be required at this intersection.

Furthermore, the intersection of Broken Head Road/Southern Site Access is proposed to be a roundabout. Hence a turn treatment assessment is also not required at this intersection.

4.2.1 Broken Head Road/Northern Site Access intersection

Development-related vehicles are assumed to be coming from the south approach on Broken Head Road and turning left onto the Northern Site Access. Vehicles will be restricted from turning right on the north approach. Hence, an assessment is only required for a possible left turn bay from Broken Head Road. The left turn treatment warrant design chart for Broken Head Road/Northern Site Access is shown in Figure 4.2.

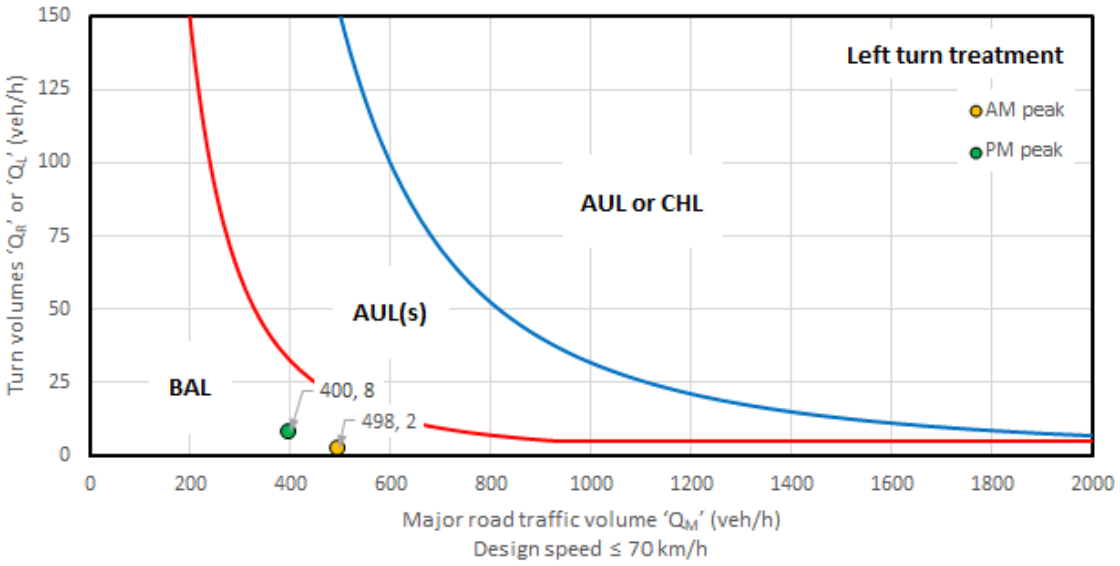
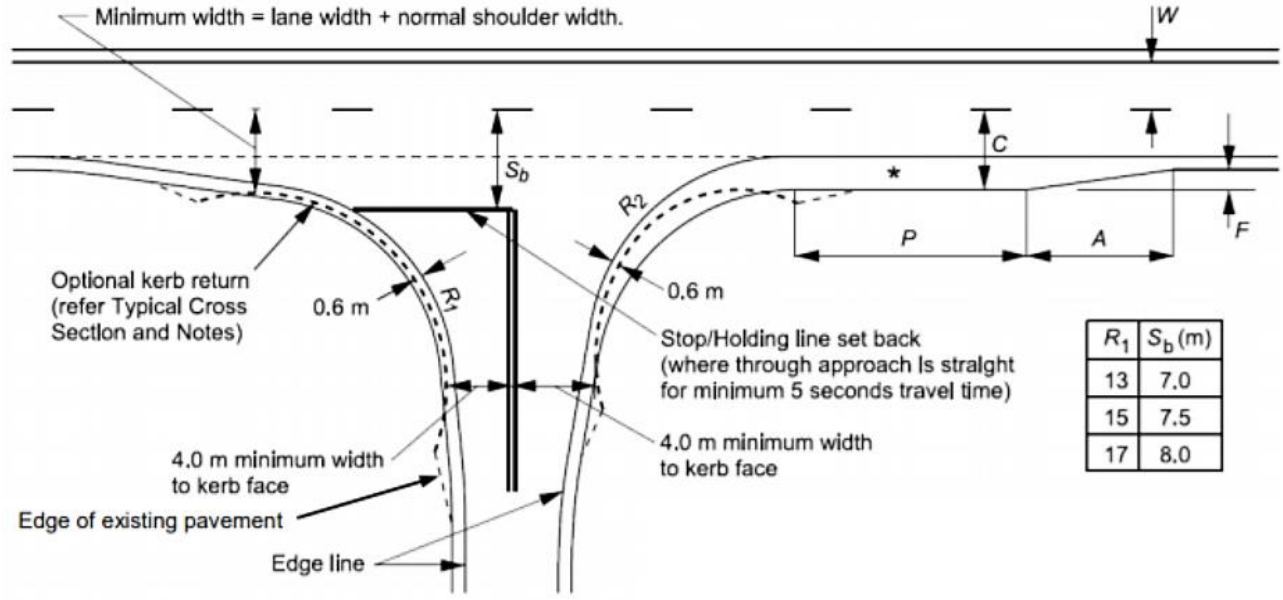


Figure 4.2 Austroads warrant design charts for rural intersection turning lanes at the intersection of Broken Head Road/Northern Site Access

For 8 left turning vehicles and 400 northbound vehicles on Broken Head Road, a basic left turn (BAL) treatment will be required. In accordance with Figure 8.2 of Austroads (2023) *Guide to Road Design (Part 4A)*, a widened shoulder will be required (see Figure 4.3).



Source: Austroads

Figure 4.3 BAL turn treatment

A concept design for the intersection of Broken Head Road/Northern Site Access showing the required turn treatment are shown in Appendix C.

4.3 Road safety assessment at the proposed site accesses

As Broken Head Road will have a revised speed limit of 60 km/h in the vicinity of the site, the road safety assessment should be assessed at a 70 km/h design speed, which is 10 km/h above the posted speed limit. In accordance with *Austroads Guide to Road Design Part 4A (Unsignalised and Signalised Intersections)* (Austroads 2023), for a road with a 70 km/h design speed, the minimum safe intersection sight distance (SISD) required for a minimum 2.0 second driver reaction time is 151 m.

At the proposed roundabout at the intersection of Broken Head Road/Southern Site Access, the SISD does not apply, as all vehicles will need to slow down on the approach to the roundabout. Vehicles approaching the roundabout only need to give way to vehicles already on the roundabout on the right. Hence a road safety assessment is not required at Broken Head Road/Southern Site Access. Notwithstanding this, there is adequate sight distance to the right (Plate 4.1).

Plate 4.1 View to the right of the Southern Site Access

At the intersection of Broken Head Road/Northern Site Access, it is proposed that vehicles will only turn left from the Northern Site Access to Broken Head Road. Hence, a sight distance analysis is only required to the right towards Broken Head Road south approach.

4.3.1 Broken Head Road/Northern Site Access intersection

The sight distances on Broken Head Road at the Northern Site Access have been estimated based on the line of sight and observations at this intersection (see Plate 4.2 and Figure 4.4). Based on the sight distance analysis, the sight distance to the right is 140 m, which does not meet the minimum requirement (151 m) stipulated in the *Austroads Guide to Road Design*.

Plate 4.2 **View to the right of the Northern Site Access**

Source: MetroMap

Figure 4.4 **Sight distance to the right of the Northern Site Access**

To meet the sight distance requirements, a small amount of vegetation will need to be trimmed/removed, as shown in Figure 4.5.

Source: MetroMap

Figure 4.5 Trimming or potential removal of vegetation required to achieve the sight distance

4.4 Concept plans of the proposed site accesses

Concept plans have been prepared for the northern and southern site accesses.

The Northern Site Access will be the secondary access and include the following upgrades:

- Conversion of existing priority-controlled intersection from “Stop” to “Give Way”, including the installation of signage and line marking.
- Addition of a central median island on Broken Head Road to prevent any right turning vehicles.
- Addition of a widened shoulder to facilitate left turn movements from Broken Head Road (south) to the Northern Site Access.

The Southern Site Access will be the primary access and include the following upgrades:

- Conversion of existing priority-controlled (give way) intersection to a roundabout, including the installation of associated infrastructure, signage and line marking.
- Addition of a pedestrian refuge on the north approach.
- Speed limit reduction from 80 km/h to 60 km/h on the south approach to the roundabout.
- For the neighbouring Broken Head Road/Broken Head Reserve Road intersection, conversion of existing northbound lane to a right turn bay from Broken Head Road (south) to Broken Head Reserve Road.

Swept paths have been performed using a 12.5 m long heavy rigid vehicle (HRV) to access the site via the northern and southern site accesses.

Furthermore, swept paths have been performed using a 19 m long semi-trailer to allow through movements on Broken Head Road at the roundabout on the Broken Head Road/Southern Site Access intersection.

Concept plans are shown in Appendix C.

The above proposal would need to be considered by Byron Shire Council's Local Traffic Committee (LTC). This concept plan can be updated and any LTC's recommendations can be incorporated in the detailed design stage, after the development is approved. This can be a condition of consent.

4.5 Impacts on the pedestrian, cyclist and public transport infrastructure

A review of the Byron Shire Council's existing and proposed Pedestrian Infrastructure plan shows that there is an existing shared pedestrian and cycling path on the northern side of Clifford Street (BSC 2024a). Furthermore, council has plans to construct a footpath on the southern side of Clifford Street with a number of crossing facilities. Therefore, the proposed shared path will provide active transport connectivity between the site and Suffolk Park town centre.

A review of the council's Bike Plan shows that council has future plans to provide cycle paths on both sides of Broken Head Road and a shared path along Broken Head Reserve Road (BSC 2024b). Therefore, the proposed shared path will not only promote the active transport to the future occupants of the site but also general public. Hence, the proposal has enormous community benefits (Appendix C).

As part of the roundabout development, the proposed reduction of speed limit of Broken Head Road from 80 km/h to 60 km/h in the vicinity of the site will provide a slower traffic environment for pedestrians and cyclists on the neighbouring shared path.

There are not proposed to be any adverse impacts to the public transport routes on Broken Head Road. As part of the roundabout development, a pedestrian refuge will be provided at the Southern Site Access to allow pedestrians to more safely cross Broken Head Road and access the bus stop located on the opposite side of Broken Head Road.

5 Summary and conclusion

This traffic impact assessment considers the proposed residential development on the surrounding transport network and responds to Byron Shire Council's requirement for the traffic assessment.

In summary:

- The site will have exclusively residential land uses, with no commercial, retail or industrial land uses.
- Vehicles will be able to access the Southern Site Access (primary access) from Broken Head Road in both the north and south directions via a newly installed roundabout.
- Vehicles can access the Northern Site Access (secondary access) from Broken Head Road south approach via a left turn into the Northern Site Access. Vehicles exiting the Northern Site Access can only turn left onto Broken Head Road (north).
- The SIDRA traffic analysis show that all the intersections will be operating at level of service (LOS) A or B and degree of saturation (DOS) of less than 0.3. Therefore, additional traffic volumes from the development will only have a minor impact at the intersections.
- A basic left turn (BAL) or a widened shoulder would be required to facilitate left turns from Broken Head Road south approach to the Northern Site Access.
- An approximately 1 km long shared path is proposed to be installed from the Northern Site Access to connect to the existing shared path on Clifford Street, Suffolk Park.
- Safety improvements to the road network will result from:
    - a reduction in the speed limit from 80 km/h to 60 km/h in the vicinity of the site
    - the installation of a roundabout at the Broken Head Road/Southern Site Access intersection, and the provision of a pedestrian refuge on the northern leg of the intersection
    - enforcing a left-in/left-out arrangement at the Broken Head Road/Northern Site Access intersection, and the removal of a small amount of vegetation to improve sight distances
    - installation of a separated shared path for pedestrians and cyclists to improve connectivity in the locality.
- In summary, the proposed development is unlikely to have any significant impact to the adjoining road network and the transport infrastructure proposed as part of this site development has significant community benefits.

References

Austroads 2023, *Guide to Road Design Part 4A, Unsignalised and Signalised Intersections*

Austroads 2020, *Guide to Traffic Management Part 6, Intersections, Interchanges and Crossings Management*

BSC 2024a, *Map of existing and proposed pedestrian infrastructure*, Byron Shire Council

BSC 2024b, *Map of existing and proposed cycling infrastructure,* Byron Shire Council

BSC 2014a, *Local Environmental Plan LEP 2014*, Byron Shire Council

BSC 2014b, *Development Control Plan DCP 2014*, Byron Shire Council

NRLG 2019, *Northern Rivers Local Government Development Design and Construction Manual – Development Design Specification D1: Geometric Road Design (Urban and Rural)*, Northern Rivers Local Government

RMS 2013, *Technical Direction TDT 2013/04a*, Transport for New South Wales

RTA 2002, *Guide to Traffic Generating Developments*, Transport for New South Wales

TfNSW 2023, *Interactive crash statistics*, Transport for New South Wales Centre for Road Safety

Appendix A
Traffic survey data

EMM
creating opportunities

TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY

traffic survey.com.au

Intersection of Broken Head Rd and Broken Head Res

GPS -28.697810, 153.600572

Date:	Thu 27/06/24
Weather:	Fine
Suburban:	Suffolk Park
Customer:	EMM

North:	Broken Head Rd
East:	Broken Head Reserve Rd
South:	Broken Head Rd
West:	N/A

Survey Period	AM:	8:00 AM-9:00 AM
	PM:	3:00 PM-4:00 PM
Traffic Peak	AM:	8:00 AM-9:00 AM
	PM:	3:30 PM-4:30 PM

All Vehicles

Time		Approach Broken Head			Approach Broken Head Res			Approach Broken Head			Hourly Total	
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	Hour	Peak
6:00	6:15	0	21	11	0	4	1	0	2	37	403	
6:15	6:30	0	26	14	0	3	0	0	5	38	440	
6:30	6:45	0	30	7	0	6	1	0	2	53	499	
6:45	7:00	0	38	9	0	7	2	0	7	79	576	
7:00	7:15	0	46	12	0	7	2	0	3	43	607	
7:15	7:30	0	41	16	0	8	3	0	8	69	729	
7:30	7:45	0	69	12	0	6	0	0	2	87	828	
7:45	8:00	0	49	12	0	17	4	0	2	89	904	
8:00	8:15	0	71	21	0	16	5	1	1	120	907	Peak
8:15	8:30	0	83	9	0	14	3	0	10	125		
8:30	8:45	0	89	22	0	20	9	0	7	105		
8:45	9:00	0	77	12	0	13	5	0	4	65		
15:00	15:15	0	93	17	0	18	4	0	4	64	892	
15:15	15:30	0	85	21	0	15	6	0	5	63	938	
15:30	15:45	0	129	19	0	15	5	0	10	85	939	Peak
15:45	16:00	0	120	18	0	20	9	0	11	56	845	
16:00	16:15	0	102	17	0	12	5	0	6	104	798	
16:15	16:30	0	68	13	0	17	12	0	6	80	749	
16:30	16:45	0	73	6	0	17	2	0	2	69	741	
16:45	17:00	0	83	7	0	19	6	0	3	69	763	
17:00	17:15	0	92	2	0	17	4	0	1	81	726	
17:15	17:30	0	79	3	0	24	3	0	2	77		
17:30	17:45	0	77	4	0	24	4	0	0	82		
17:45	18:00	0	62	1	0	22	0	0	0	65		

Peak Time		Approach Broken Head			Approach Broken Head Res			Approach Broken Head			Peak
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	total
8:00	9:00	0	320	64	0	83	22	1	22	415	907
15:30	16:30	0	419	67	0	64	31	0	33	325	939

Pedestrians Crossing

Time		Approach Broken		Beach Broken Head		Approach Broken		Hourly Tot
Period Start	Period End	astbound	astbound	orthbound	outhbou	estbound	astbound	
6:00	6:15	0	0	0	0	0	0	0
6:15	6:30	0	0	0	0	0	0	0
6:30	6:45	0	0	0	0	0	0	0
6:45	7:00	0	0	0	0	0	0	0
7:00	7:15	0	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0
8:00	8:15	0	0	0	0	0	0	0
8:15	8:30	0	0	0	0	0	0	
8:30	8:45	0	0	0	0	0	0	
8:45	9:00	0	0	0	0	0	0	
15:00	15:15	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	1
15:30	15:45	0	0	0	0	0	0	1
15:45	16:00	0	0	0	0	0	0	1
16:00	16:15	0	0	0	1	0	0	1
16:15	16:30	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	
17:30	17:45	0	0	0	0	0	0	
17:45	18:00	0	0	0	0	0	0	

Peak Time		Approach Broken		Beach Broken Head		Approach Broken		Peak
Period Start	Period End	astbound	astbound	orthbound	outhbou	estbound	astbound	total
8:00	9:00	0	0	0	0	0	0	0
15:30	16:30	0	0	0	1	0	0	1

Bicycles and Scooters

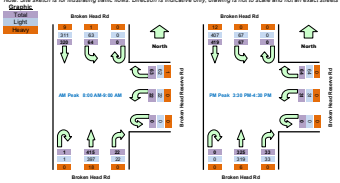
Time		Approach Broken		Beach Broken Head		Approach Broken		Hourly Tot
Period Start	Period End	astbound	astbound	orthbound	outhbou	estbound	astbound	
6:00	6:15	0	0	0	0	0	0	0
6:15	6:30	0	0	0	0	0	0	0
6:30	6:45	0	0	0	0	0	0	0
6:45	7:00	0	0	0	0	0	0	0
7:00	7:15	0	0	0	0	0	0	0
7:15	7:30	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0
8:00	8:15	0	0	0	0	0	0	0
8:15	8:30	0	0	0	0	0	0	
8:30	8:45	0	0	0	0	0	0	
8:45	9:00	0	0	0	0	0	0	
15:00	15:15	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0
15:45	16:00	0	0	0	0	0	0	0
16:00	16:15	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0
16:30	16:45	0	0	0	0	0	0	0
16:45	17:00	0	0	0	0	0	0	0
17:00	17:15	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	
17:30	17:45	0	0	0	0	0	0	
17:45	18:00	0	0	0	0	0	0	

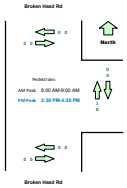
Peak Time		Approach Broken		Beach Broken Head		Approach Broken		Peak
Period Start	Period End	astbound	astbound	orthbound	outhbou	estbound	astbound	total
8:00	9:00	0	0	0	0	0	0	0
15:30	16:30	0	0	0	0	0	0	0

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

Graphic

Total
Light
Heavy





Light Vehicles

Time		Approach Broken Head			Approach Broken Head Res			Approach Broken Head		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
6:00	6:15	0	19	11	0	4	1	0	2	37
6:15	6:30	0	25	14	0	3	0	0	5	38
6:30	6:45	0	29	7	0	6	1	0	2	52
6:45	7:00	0	36	9	0	7	2	0	7	72
7:00	7:15	0	43	12	0	7	2	0	3	38
7:15	7:30	0	40	15	0	8	3	0	8	64
7:30	7:45	0	60	12	0	6	0	0	2	83
7:45	8:00	0	48	11	0	17	4	0	2	87
8:00	8:15	0	66	21	0	16	5	1	1	116
8:15	8:30	0	81	9	0	14	3	0	10	116
8:30	8:45	0	88	21	0	20	9	0	7	104
8:45	9:00	0	76	12	0	12	5	0	4	61
15:00	15:15	0	92	17	0	18	4	0	4	61
15:15	15:30	0	83	21	0	15	6	0	5	59
15:30	15:45	0	127	19	0	15	5	0	10	85
15:45	16:00	0	117	18	0	20	9	0	11	53
16:00	16:15	0	97	17	0	12	5	0	6	102
16:15	16:30	0	66	13	0	17	12	0	6	79
16:30	16:45	0	72	6	0	17	2	0	2	68
16:45	17:00	0	81	7	0	19	6	0	3	68
17:00	17:15	0	90	2	0	17	4	0	1	81
17:15	17:30	0	78	3	0	24	3	0	2	77
17:30	17:45	0	77	4	0	24	4	0	0	82
17:45	18:00	0	60	1	0	22	0	0	0	65

Peak Time		Approach Broken Head			Approach Broken Head Res			Approach Broken Head			Peak
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	total
8:00	9:00	0	311	63	0	62	22	1	22	397	878
15:30	16:30	0	407	67	0	64	31	0	33	319	921

Heavy Vehicles

Time		Approach Broken Head			Approach Broken Head Res			Approach Broken Head		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
6:00	6:15	0	2	0	0	0	0	0	0	0
6:15	6:30	0	1	0	0	0	0	0	0	0
6:30	6:45	0	1	0	0	0	0	0	0	1
6:45	7:00	0	2	0	0	0	0	0	0	7
7:00	7:15	0	3	0	0	0	0	0	0	5
7:15	7:30	0	1	1	0	0	0	0	0	5
7:30	7:45	0	9	0	0	0	0	0	0	4
7:45	8:00	0	1	1	0	0	0	0	0	2
8:00	8:15	0	5	0	0	0	0	0	0	4
8:15	8:30	0	2	0	0	0	0	0	0	9
8:30	8:45	0	1	1	0	0	0	0	0	1
8:45	9:00	0	1	0	0	1	0	0	0	4
15:00	15:15	0	1	0	0	0	0	0	0	3
15:15	15:30	0	2	0	0	0	0	0	0	4
15:30	15:45	0	2	0	0	0	0	0	0	0
15:45	16:00	0	3	0	0	0	0	0	0	3
16:00	16:15	0	5	0	0	0	0	0	0	2
16:15	16:30	0	2	0	0	0	0	0	0	1
16:30	16:45	0	1	0	0	0	0	0	0	1
16:45	17:00	0	2	0	0	0	0	0	0	1
17:00	17:15	0	2	0	0	0	0	0	0	0
17:15	17:30	0	1	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	0
17:45	18:00	0	2	0	0	0	0	0	0	0

Peak Time		Approach Broken Head			Approach Broken Head Res			Approach Broken Head			Peak
Period Start	Period End	U	SB	L	U	R	L	U	R	NB	total
8:00	9:00	0	9	1	0	1	0	0	6	18	29
15:30	16:30	0	12	0	0	0	0	0	0	6	18

Cyclists

Time		Approach Broken Head			Approach Broken Head Res			Approach Broken Head		
Period Start	Period End	U	SB	L	U	R	L	U	R	NB
6:00	6:15	0	0	0	0	0	0	0	0	0
6:15	6:30	0	1	0	0	0	0	0	0	0
6:30	6:45	0	0	0	0	0	0	0	0	0
6:45	7:00	0	0	0	0	0	0	0	0	0
7:00	7:15	0	0	0	0	0	0	0	0	1
7:15	7:30	0	0	0	0	0	0	0	0	0
7:30	7:45	0	0	0	0	0	0	0	0	0
7:45	8:00	0	0	0	0	0	0	0	0	1
8:00	8:15	0	0	0	0	0	0	0	0	1
8:15	8:30	0	0	0	0	0	0	0	0	1
8:30	8:45	0	0	0	0	0	1	0	0	0
8:45	9:00	0	0	0	0	0	0	0	0	0
15:00	15:15	0	0	0	0	0	0	0	0	0
15:15	15:30	0	0	0	0	0	0	0	0	0
15:30	15:45	0	0	0	0	0	0	0	1	0
15:45	16:00	0	0	0	0	0	0	0	0	0
16:00	16:15	0	1	0	0	0	0	0	0	0
16:15	16:30	0	0	0	0	0	0	0	0	0
16:30	16:45	0	1	0	0	1	0	0	0	0
16:45	17:00	0	0	0	0	0	1	0	0	0
17:00	17:15	0	0	0	0	0	0	0	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0
17:30	17:45	0	0	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0	0	0

Appendix B
SIDRA results

EMM
creating opportunities

MOVEMENT SUMMARY

Site: 101 [Ex Broken Head Rd Northern Site Access AM (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Ex AM (Network Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Broken Head Road															
8	T1	All MCs	404	2.6	404	2.6	0.211	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach			404	2.6	404	2.6	0.211	0.0	NA	0.0	0.0	0.00	0.00	0.00	79.9
NorthWest: Northern Site Access															
10	L2	All MCs	1	0.0	1	0.0	0.001	9.8	LOS A	0.0	0.0	0.49	0.79	0.49	50.5
Approach			1	0.0	1	0.0	0.001	9.8	LOS A	0.0	0.0	0.49	0.79	0.49	50.5
SouthWest: Broken Head Road															
1	L2	All MCs	1	0.0	1	0.0	0.265	6.7	LOS A	0.0	0.0	0.00	0.00	0.00	70.3
2	T1	All MCs	503	4.0	503	4.0	0.265	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach			504	4.0	504	4.0	0.265	0.0	NA	0.0	0.0	0.00	0.00	0.00	79.8
All Vehicles			909	3.4	909	3.4	0.265	0.0	NA	0.0	0.0	0.00	0.00	0.00	79.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 102 [Ex Broken Head Rd Broken Head Reserve Rd AM (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Ex AM (Network Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Broken Head Reserve Road															
4	L2	All MCs	23	0.0	23	0.0	0.187	5.8	LOS A	0.7	4.9	0.64	0.82	0.64	38.4
6	R2	All MCs	66	1.6	66	1.6	0.187	13.0	LOS A	0.7	4.9	0.64	0.82	0.64	38.4
Approach			89	1.2	89	1.2	0.187	11.1	LOS A	0.7	4.9	0.64	0.82	0.64	38.4
NorthEast: Broken Head Road															
7	L2	All MCs	67	1.6	67	1.6	0.213	6.7	LOS A	0.0	0.0	0.00	0.11	0.00	67.2
8	T1	All MCs	337	2.8	337	2.8	0.213	0.0	LOS A	0.0	0.0	0.00	0.11	0.00	68.6
Approach			404	2.6	404	2.6	0.213	1.1	NA	0.0	0.0	0.00	0.11	0.00	67.9
SouthWest: Broken Head Road															
2	T1	All MCs	437	4.3	437	4.3	0.192	0.2	LOS A	0.2	1.6	0.06	0.08	0.06	72.2
3	R2	All MCs	23	0.0	23	0.0	0.192	8.6	LOS A	0.2	1.6	0.08	0.10	0.08	49.6
Approach			460	4.1	460	4.1	0.192	0.6	NA	0.2	1.6	0.06	0.08	0.06	64.6
All Vehicles			954	3.2	954	3.2	0.213	1.8	NA	0.7	4.9	0.09	0.16	0.09	56.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 103 [Ex Broken Head Rd Southern Site Access AM (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Ex AM (Network Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Broken Head Road															
8	T1	All MCs	360	2.6	360	2.6	0.189	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	79.9
9	R2	All MCs	1	0.0	1	0.0	0.189	5.6	LOS A	0.0	0.1	0.00	0.00	0.00	50.2
Approach			361	2.6	361	2.6	0.189	0.0	NA	0.0	0.1	0.00	0.00	0.00	79.8
NorthWest: Southern Site Access															
10	L2	All MCs	1	0.0	1	0.0	0.004	6.2	LOS A	0.0	0.1	0.57	0.61	0.57	40.3
12	R2	All MCs	1	0.0	1	0.0	0.004	11.7	LOS A	0.0	0.1	0.57	0.61	0.57	50.4
Approach			2	0.0	2	0.0	0.004	8.9	LOS A	0.0	0.1	0.57	0.61	0.57	46.4
SouthWest: Broken Head Road															
1	L2	All MCs	1	0.0	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
2	T1	All MCs	460	4.1	460	4.1	0.242	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach			461	4.1	461	4.1	0.242	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.8
All Vehicles			824	3.4	824	3.4	0.242	0.1	NA	0.0	0.1	0.00	0.00	0.00	79.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Ex Broken Head Rd Northern Site Access PM (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Ex PM (Network Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Broken Head Road															
8	T1	All MCs	512	2.5	512	2.5	0.267	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach			512	2.5	512	2.5	0.267	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.8
NorthWest: Northern Site Access															
10	L2	All MCs	1	0.0	1	0.0	0.001	9.2	LOS A	0.0	0.0	0.44	0.79	0.44	50.9
Approach			1	0.0	1	0.0	0.001	9.2	LOS A	0.0	0.0	0.44	0.79	0.44	50.9
SouthWest: Broken Head Road															
1	L2	All MCs	1	0.0	1	0.0	0.213	6.7	LOS A	0.0	0.0	0.00	0.00	0.00	70.3
2	T1	All MCs	409	1.5	409	1.5	0.213	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach			411	1.5	411	1.5	0.213	0.0	NA	0.0	0.0	0.00	0.00	0.00	79.8
All Vehicles			923	2.1	923	2.1	0.267	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 102 [Ex Broken Head Rd Broken Head Reserve Rd PM (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Ex PM (Network Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Broken Head Reserve Road															
4	L2	All MCs	33	0.0	33	0.0	0.206	6.4	LOS A	0.8	5.4	0.65	0.84	0.66	38.4
6	R2	All MCs	67	0.0	67	0.0	0.206	13.4	LOS A	0.8	5.4	0.65	0.84	0.66	38.4
Approach			100	0.0	100	0.0	0.206	11.1	LOS A	0.8	5.4	0.65	0.84	0.66	38.4
NorthEast: Broken Head Road															
7	L2	All MCs	71	0.0	71	0.0	0.268	6.7	LOS A	0.0	0.0	0.00	0.09	0.00	68.4
8	T1	All MCs	441	2.9	441	2.9	0.268	0.0	LOS A	0.0	0.0	0.00	0.09	0.00	70.1
Approach			512	2.5	512	2.5	0.268	0.9	NA	0.0	0.0	0.00	0.09	0.00	69.4
SouthWest: Broken Head Road															
2	T1	All MCs	342	1.8	342	1.8	0.162	0.2	LOS A	0.4	2.6	0.12	0.15	0.12	65.3
3	R2	All MCs	35	0.0	35	0.0	0.162	10.1	LOS A	0.4	2.6	0.17	0.21	0.17	48.8
Approach			377	1.7	377	1.7	0.162	1.1	NA	0.4	2.6	0.13	0.16	0.13	57.6
All Vehicles			988	1.9	988	1.9	0.268	2.0	NA	0.8	5.4	0.11	0.19	0.11	55.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 103 [Ex Broken Head Rd Southern Site Access PM (Site Folder: Existing)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Ex PM (Network Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Broken Head Road															
8	T1	All MCs	474	2.7	474	2.7	0.248	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	79.9
9	R2	All MCs	1	0.0	1	0.0	0.248	4.9	LOS A	0.0	0.1	0.00	0.00	0.00	50.3
Approach			475	2.7	475	2.7	0.248	0.0	NA	0.0	0.1	0.00	0.00	0.00	79.8
NorthWest: Southern Site Access															
10	L2	All MCs	1	0.0	1	0.0	0.004	5.8	LOS A	0.0	0.1	0.57	0.59	0.57	40.3
12	R2	All MCs	1	0.0	1	0.0	0.004	12.1	LOS A	0.0	0.1	0.57	0.59	0.57	50.4
Approach			2	0.0	2	0.0	0.004	8.9	LOS A	0.0	0.1	0.57	0.59	0.57	46.4
SouthWest: Broken Head Road															
1	L2	All MCs	1	0.0	1	0.0	0.001	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	64.6
2	T1	All MCs	377	1.7	377	1.7	0.195	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach			378	1.7	378	1.7	0.195	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.8
All Vehicles			855	2.2	855	2.2	0.248	0.1	NA	0.0	0.1	0.00	0.00	0.00	79.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Dev Broken Head Rd Northern Site Access AM (Site Folder: Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Dev AM (Network Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Broken Head Road															
8	T1	All MCs	414	2.5	414	2.5	0.216	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach			414	2.5	414	2.5	0.216	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
NorthWest: Northern Site Access															
10	L2	All MCs	15	0.0	15	0.0	0.015	6.6	LOS A	0.1	0.4	0.48	0.62	0.48	47.9
Approach			15	0.0	15	0.0	0.015	6.6	LOS A	0.1	0.4	0.48	0.62	0.48	47.9
SouthWest: Broken Head Road															
1	L2	All MCs	2	0.0	2	0.0	0.277	5.6	LOS A	0.0	0.0	0.00	0.00	0.00	56.0
2	T1	All MCs	524	3.8	524	3.8	0.277	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			526	3.8	526	3.8	0.277	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.8
All Vehicles			955	3.2	955	3.2	0.277	0.2	NA	0.1	0.4	0.01	0.01	0.01	59.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 102 [Dev Broken Head Rd Broken Head Reserve Rd AM (Site Folder: Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Dev AM (Network Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Broken Head Reserve Road															
4	L2	All MCs	23	0.0	23	0.0	0.201	5.9	LOS A	0.7	5.2	0.66	0.83	0.66	37.8
6	R2	All MCs	66	1.6	66	1.6	0.201	14.0	LOS A	0.7	5.2	0.66	0.83	0.66	37.8
Approach			89	1.2	89	1.2	0.201	11.9	LOS A	0.7	5.2	0.66	0.83	0.66	37.8
NorthEast: Broken Head Road															
7	L2	All MCs	67	1.6	67	1.6	0.217	5.6	LOS A	0.0	0.0	0.00	0.10	0.00	54.8
8	T1	All MCs	346	2.7	346	2.7	0.217	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	54.4
Approach			414	2.5	414	2.5	0.217	0.9	NA	0.0	0.0	0.00	0.10	0.00	54.6
SouthWest: Broken Head Road															
2	T1	All MCs	460	4.1	460	4.1	0.242	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	All MCs	23	0.0	23	0.0	0.019	6.5	LOS A	0.1	0.6	0.45	0.61	0.45	42.3
Approach			483	3.9	483	3.9	0.242	0.5	NA	0.1	0.6	0.02	0.03	0.02	54.3
All Vehicles			986	3.1	986	3.1	0.242	1.7	NA	0.7	5.2	0.07	0.13	0.07	49.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 103 [Dev Broken Head Rd Southern Site Access AM (Site Folder: Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Dev AM (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Broken Head Road															
8	T1	All MCs	360	2.6	360	2.6	0.242	3.7	LOS A	1.8	13.1	0.16	0.39	0.16	51.7
9	R2	All MCs	9	0.0	9	0.0	0.242	8.4	LOS A	1.8	13.1	0.16	0.39	0.16	45.0
Approach			369	2.6	369	2.6	0.242	3.9	LOS A	1.8	13.1	0.16	0.39	0.16	51.5
NorthWest: Southern Site Access															
10	L2	All MCs	21	0.0	21	0.0	0.050	5.6	LOS A	0.3	1.9	0.58	0.63	0.58	41.4
12	R2	All MCs	24	0.0	24	0.0	0.050	10.1	LOS A	0.3	1.9	0.58	0.63	0.58	47.2
Approach			45	0.0	45	0.0	0.050	8.0	LOS A	0.3	1.9	0.58	0.63	0.58	45.2
SouthWest: Broken Head Road															
1	L2	All MCs	3	0.0	3	0.0	0.286	3.8	LOS A	2.0	14.6	0.08	0.39	0.08	50.6
2	T1	All MCs	462	4.1	462	4.1	0.286	4.1	LOS A	2.0	14.6	0.08	0.39	0.08	52.5
Approach			465	4.1	465	4.1	0.286	4.1	LOS A	2.0	14.6	0.08	0.39	0.08	52.5
All Vehicles			880	3.2	880	3.2	0.286	4.2	LOS A	2.0	14.6	0.14	0.40	0.14	51.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Dev Broken Head Rd Northern Site Access PM (Site Folder: Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Dev PM (Network Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Broken Head Road															
8	T1	All MCs	541	2.3	541	2.3	0.282	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach			541	2.3	541	2.3	0.282	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
NorthWest: Northern Site Access															
10	L2	All MCs	8	0.0	8	0.0	0.008	6.0	LOS A	0.0	0.2	0.42	0.56	0.42	48.1
Approach			8	0.0	8	0.0	0.008	6.0	LOS A	0.0	0.2	0.42	0.56	0.42	48.1
SouthWest: Broken Head Road															
1	L2	All MCs	8	0.0	8	0.0	0.223	5.5	LOS A	0.0	0.0	0.00	0.01	0.00	56.0
2	T1	All MCs	421	1.5	421	1.5	0.223	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach			429	1.5	429	1.5	0.223	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.6
All Vehicles			979	1.9	979	1.9	0.282	0.2	NA	0.0	0.2	0.00	0.01	0.00	59.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 102 [Dev Broken Head Rd Broken Head Reserve Rd PM (Site Folder: Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Dev PM (Network Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Broken Head Reserve Road															
4	L2	All MCs	33	0.0	33	0.0	0.223	6.7	LOS A	0.8	5.9	0.68	0.87	0.72	37.6
6	R2	All MCs	67	0.0	67	0.0	0.223	14.7	LOS B	0.8	5.9	0.68	0.87	0.72	37.6
Approach			100	0.0	100	0.0	0.223	12.1	LOS A	0.8	5.9	0.68	0.87	0.72	37.6
NorthEast: Broken Head Road															
7	L2	All MCs	71	0.0	71	0.0	0.283	5.6	LOS A	0.0	0.0	0.00	0.08	0.00	55.1
8	T1	All MCs	471	2.7	471	2.7	0.283	0.0	LOS A	0.0	0.0	0.00	0.08	0.00	55.3
Approach			541	2.3	541	2.3	0.283	0.7	NA	0.0	0.0	0.00	0.08	0.00	55.2
SouthWest: Broken Head Road															
2	T1	All MCs	362	1.7	362	1.7	0.188	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	All MCs	35	0.0	35	0.0	0.034	7.3	LOS A	0.1	1.0	0.52	0.68	0.52	41.8
Approach			397	1.6	397	1.6	0.188	0.8	NA	0.1	1.0	0.05	0.06	0.05	51.3
All Vehicles			1038	1.8	1038	1.8	0.283	1.8	NA	0.8	5.9	0.08	0.15	0.09	49.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data 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 (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 103 [Dev Broken Head Rd Southern Site Access PM (Site Folder: Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

Network: N101 [Dev PM (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
NorthEast: Broken Head Road															
8	T1	All MCs	474	2.7	474	2.7	0.310	3.7	LOS A	2.5	18.2	0.11	0.40	0.11	51.8
9	R2	All MCs	29	0.0	29	0.0	0.310	8.3	LOS A	2.5	18.2	0.11	0.40	0.11	45.1
Approach			503	2.5	503	2.5	0.310	3.9	LOS A	2.5	18.2	0.11	0.40	0.11	51.4
NorthWest: Southern Site Access															
10	L2	All MCs	12	0.0	12	0.0	0.025	5.0	LOS A	0.1	1.0	0.53	0.58	0.53	42.0
12	R2	All MCs	13	0.0	13	0.0	0.025	9.4	LOS A	0.1	1.0	0.53	0.58	0.53	47.6
Approach			24	0.0	24	0.0	0.025	7.3	LOS A	0.1	1.0	0.53	0.58	0.53	45.7
SouthWest: Broken Head Road															
1	L2	All MCs	12	0.0	12	0.0	0.261	4.0	LOS A	1.8	12.5	0.16	0.39	0.16	50.3
2	T1	All MCs	385	1.6	385	1.6	0.261	4.2	LOS A	1.8	12.5	0.16	0.39	0.16	51.9
Approach			397	1.6	397	1.6	0.261	4.2	LOS A	1.8	12.5	0.16	0.39	0.16	51.8
All Vehicles			924	2.1	924	2.1	0.310	4.1	LOS A	2.5	18.2	0.14	0.40	0.14	51.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Appendix C
Concept designs

EMM
creating opportunities

A1

PLAN
SCALE 1:400

LEGEND
- PROPOSED SIGN
- EXISTING SIGN

SHEET INDEX

SHEET No	DESCRIPTION	REV
EMM - C01	ACCESS CONCEPT	-
EMM - C02	SPEED SIGNS	-
EMM - C03	SWEPT PATH PLAN-12.5m TRUCK	-
EMM - C04	SWEPT PATH PLAN-19m SEMI TRAILER	-
EMM - C05	SHARED PATH PLAN	-

EMM creating opportunities

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Ground Floor
20 Chandos Street,
St Leonards NSW 2065

Phone # 02 9493 9500

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REV	DATE	COMMENT	DRAWN	REVIEWED	REV	DATE	COMMENT	DRAWN	REVIEWED
-	8/7/24	CONCEPT	C.J.	A.U.					

PROJECT:
BROKEN HEAD QUARRY SUBDIVISION
Lot 1 DP123302, Broken Head Road, SUFFOLK PARK

DRAWING TITLE:
ACCESS CONCEPT

CLIENT: WINTEN PROPERTY GROUP

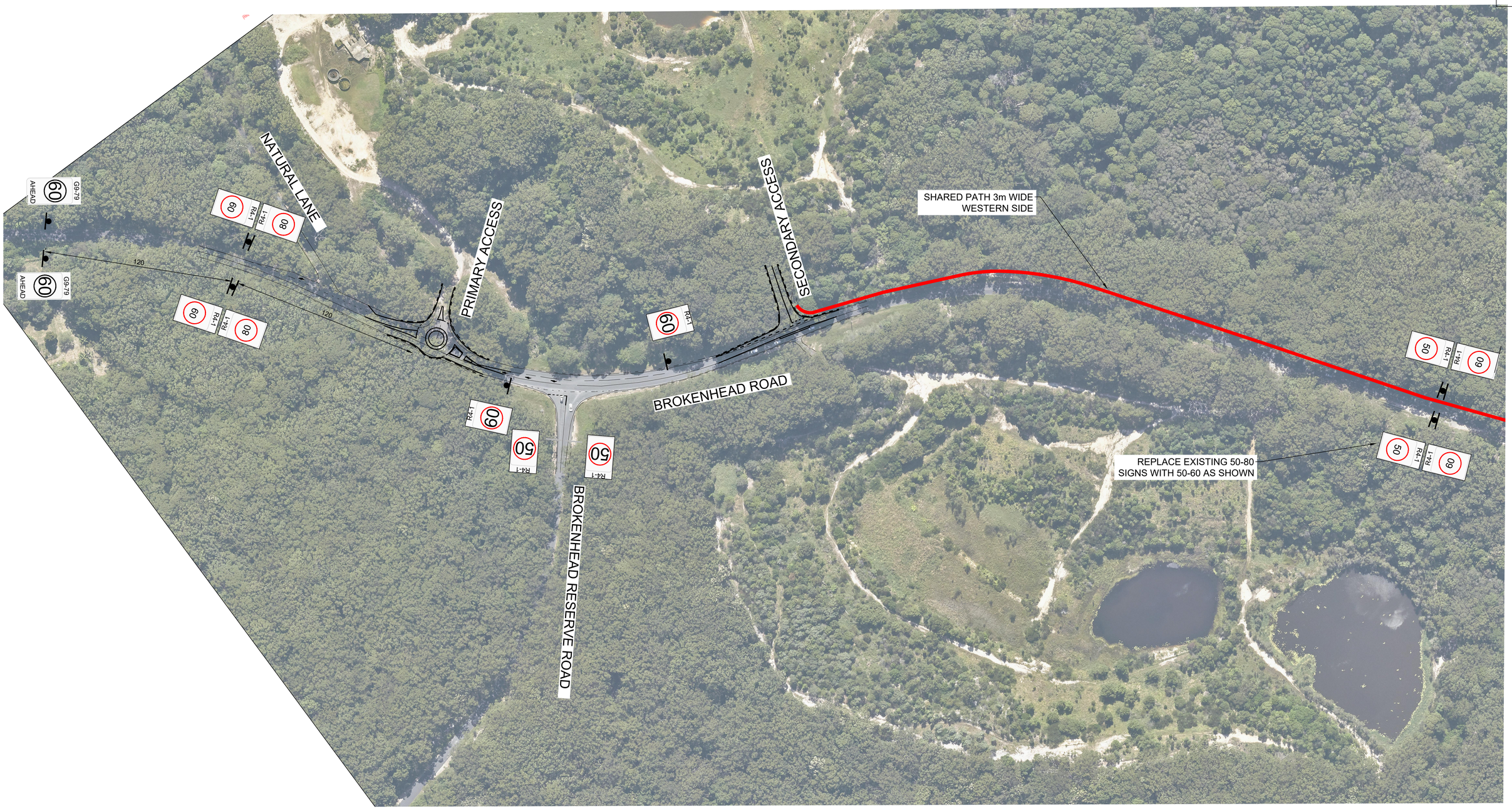
DRG. #: EMM - C01

PROJECT #: E240639

SCALE: AS SHOWN

REV: -

A1



PLAN
SCALE 1:1250

LEGEND
- PROPOSED SIGN
- EXISTING SIGN

EMM creating opportunities

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REV	DATE	COMMENT	DRAWN	REVIEWED	REV	DATE	COMMENT	DRAWN	REVIEWED
-	8/7/24	CONCEPT	C.J.	A.U.					

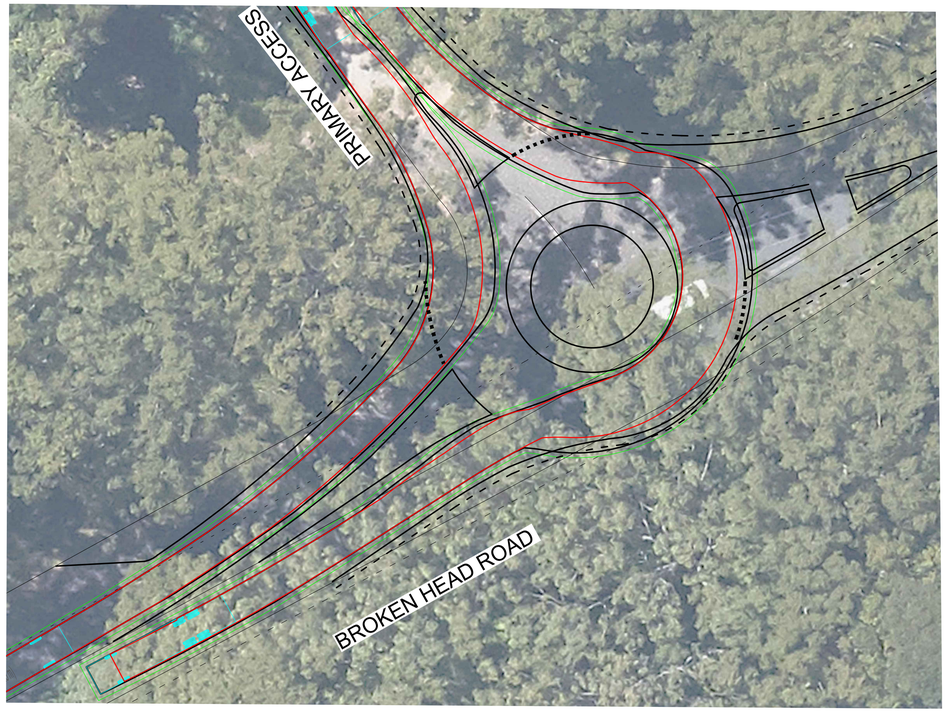
PROJECT:
BROKEN HEAD QUARRY SUBDIVISION
Lot 1 DP123302, Broken Head Road,
SUFFOLK PARK

DRAWING TITLE:
SPEED SIGNS

CLIENT: WINTEN PROPERTY GROUP
DRG. #: EMM - C02
PROJECT #: E240639
SCALE: AS SHOWN

REV: -

A1

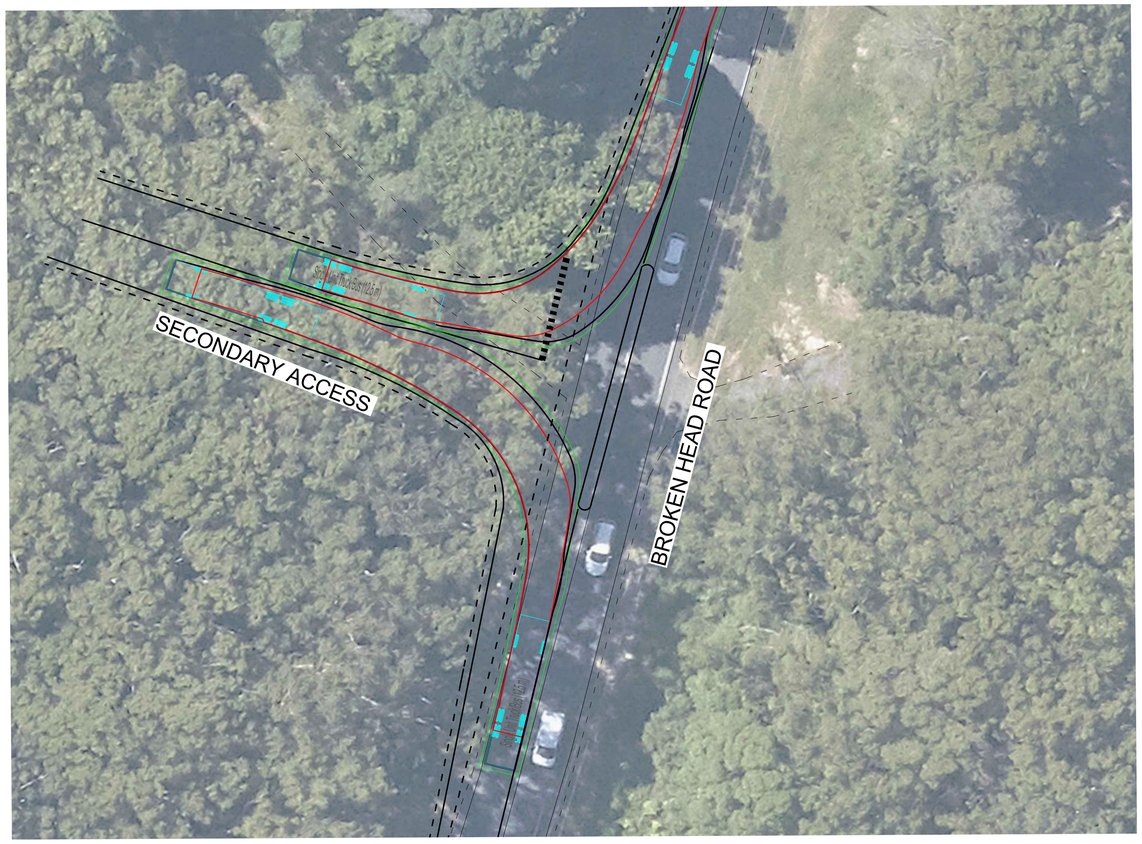


PLAN-12.5m SINGLE UNIT TRUCK

SCALE 1:250

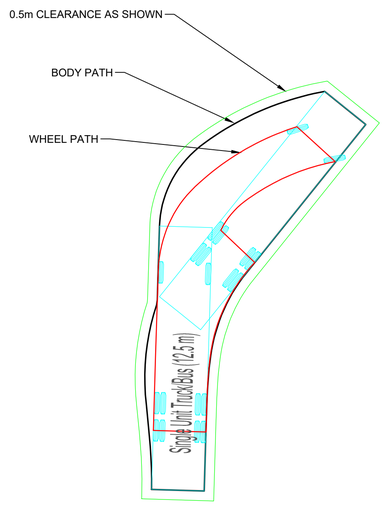
PLAN-12.5m SINGLE UNIT TRUCK

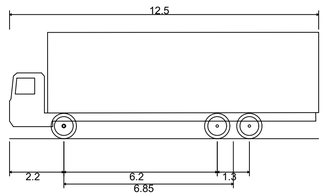
SCALE 1:250



PLAN-12.5m SINGLE UNIT TRUCK

SCALE 1:250





Single Unit Truck/Bus (12.5 m)	
Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.490m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

EMM creating opportunities

SYDNEY | Suite 01
Ground Floor
20 Chandos Street,
St Leonards NSW 2065

Phone # 02 9493 9500

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REV	DATE	COMMENT	DRAWN	REVIEWED	REV	DATE	COMMENT	DRAWN	REVIEWED
-	8/7/24	CONCEPT	C.J.	A.U.					

PROJECT:
BROKEN HEAD QUARRY SUBDIVISION
Lot 1 DP123302, Broken Head Road, SUFFOLK PARK

DRAWING TITLE:
SWEPT PATH PLAN-12.5m TRUCK

CLIENT: WINTEN PROPERTY GROUP

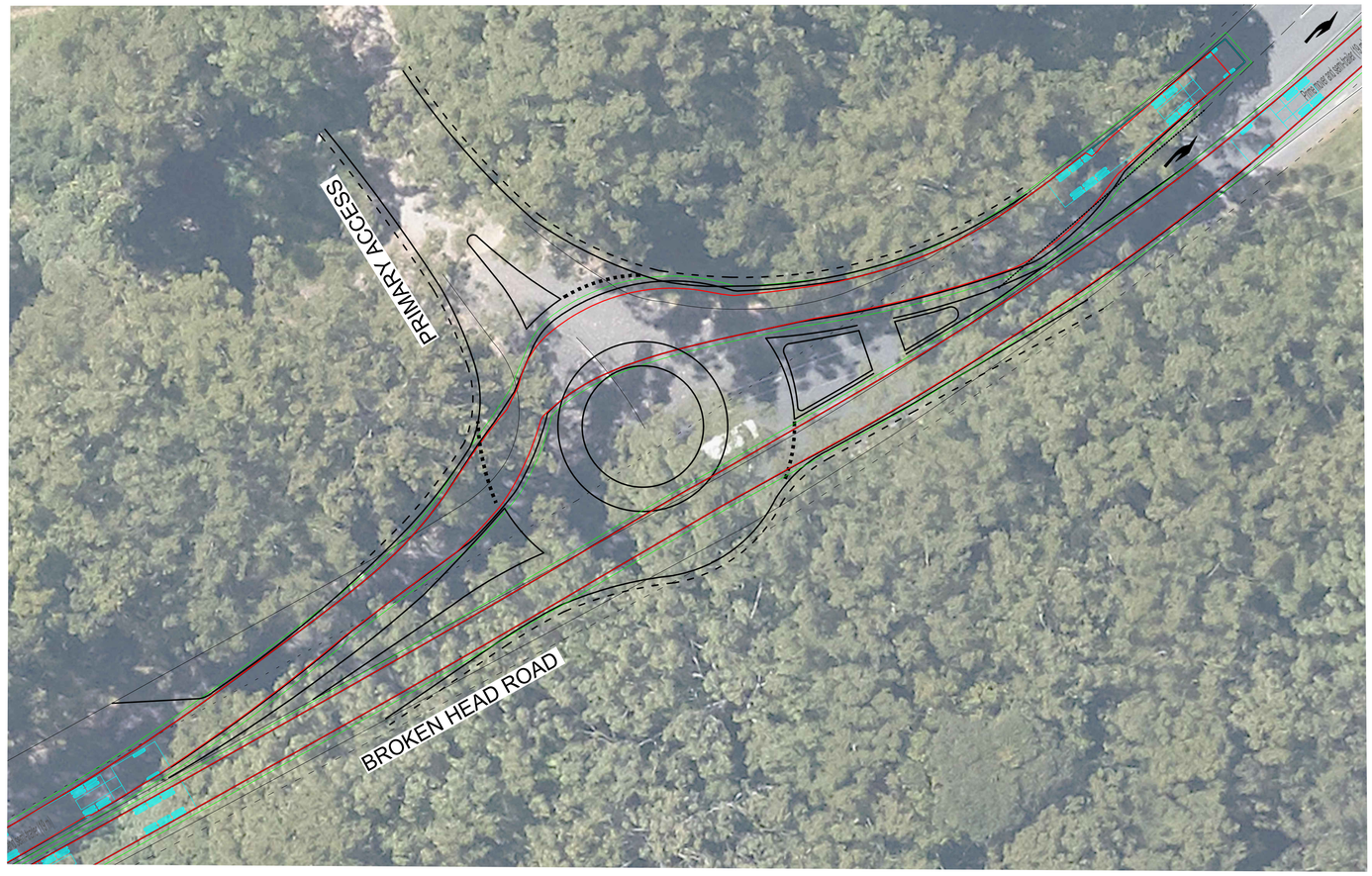
DRG. #: EMM - C03

PROJECT #: E240639

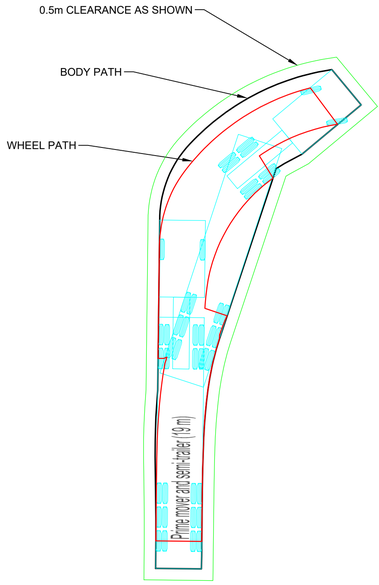
SCALE: AS SHOWN

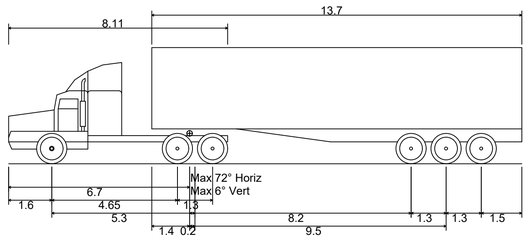
REV: -

A1



PLAN-19m SEMI TRAILER
SCALE 1:250





Prime mover and semi-trailer (19 m)

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

EMM creating opportunities

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Ground Floor
20 Chandos Street,
St Leonards NSW 2065

Phone # 02 9493 9500

www.emmconsulting.com.au

REV	DATE	COMMENT	DRAWN	REVIEWED	REV	DATE	COMMENT	DRAWN	REVIEWED
-	8/7/24	CONCEPT	C.J.	A.U.					

PROJECT:
BROKEN HEAD QUARRY SUBDIVISION
Lot 1 DP123302, Broken Head Road,
SUFFOLK PARK

DRAWING TITLE:
SWEPT PATH PLAN-19m SEMI TRAILER

CLIENT: WINTEN PROPERTY GROUP

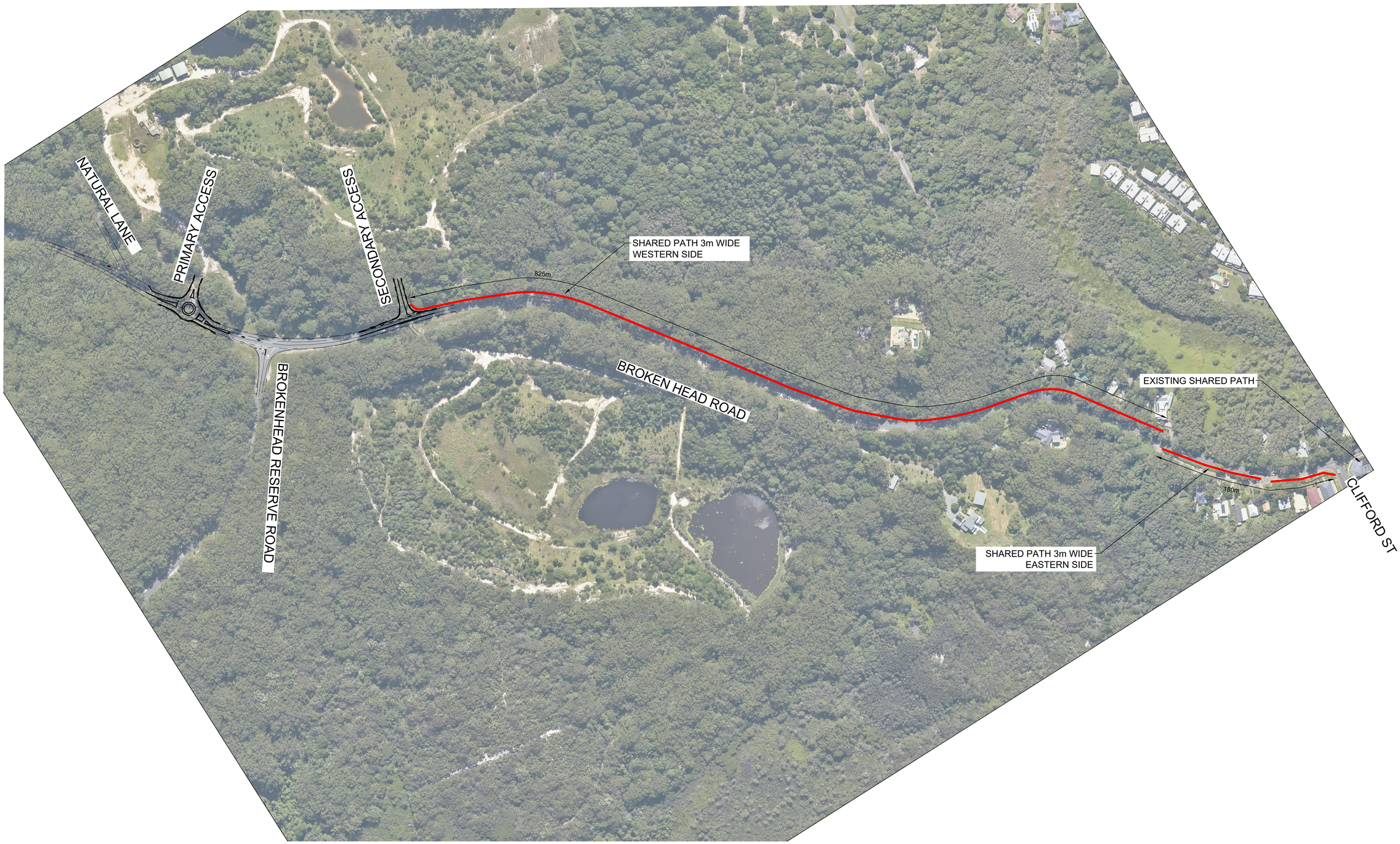
DRG. #: EMM - C04

PROJECT #: E240639

SCALE: AS SHOWN

REV: -

A1



PLAN-SHARED PATH

SCALE 1:2000

EMM creating opportunities

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REV	DATE	COMMENT	DRAWN	REVIEWED	REV	DATE	COMMENT	DRAWN	REVIEWED
-	8/7/24	CONCEPT	C.J.	A.U.					

PROJECT:
BROKEN HEAD QUARRY SUBDIVISION
Lot 1 DP123302, Broken Head Road,
SUFFOLK PARK

DRAWING TITLE:
SHARED PATH PLAN

CLIENT: WINTEN PROPERTY GROUP

DRG. #: EMM - C05

PROJECT #: E240639

SCALE: AS SHOWN

REV: -

240392-PSK-007-C

EXISTING VILLAGE CENTRE

CROSSING OF CLIFFORD STREET SUBJECT TO DETAILED DESIGN

LOW SPEED MIXED-USE ZONE ALONG EXISTING SIDE ACCESS LANE. PAVEMENT TREATMENT AND LINE MARKING SUBJECT TO DETAILED DESIGN.

LOCATE PATH ON EASTERN SIDE OF ROAD TO AVOID ENCROACHMENT TO COASTAL WETLAND

PATH LOW OF ROAD. VEHICLE BARRIER LIKELY

CROSSING OF BROKEN HEAD ROAD SUBJECT TO DETAILED DESIGN.

OUTSIDE RETAINING WALL AND CYCLE BARRIER 3.5m HIGH MAX.

POTENTIAL RELOCATION OF ELECTRICAL POLE

EXISTING DRIVEWAYS TO BE RETAINED. ADJUST AS REQUIRED

POTENTIAL RELOCATION OF EXISTING POLE

RAISED PLATFORM OVER EXISTING EMBANKMENT. MAX. 3.5m HIGH

SPEED ZONE CHANGE. 50KM/H (NORTH) 80KM/H (SOUTH)

OUTSIDE RETAINING WALL AND CYCLE BARRIER MAX. 3m HIGH

BATTER TO ROAD SHOULDER AS REQUIRED

RAISED PLATFORM OVER EXISTING EMBANKMENT. MAX 4.5m HIGH

PROVIDE CYCLE BARRIER ON NORTHERN SIDE

CONNECTION TO SITE SUBJECT TO DETAILED DESIGN

POTENTIAL RELOCATION OF EXISTING POLE

BATTER MAX 1V:3H

LEVELS AND CROSSFALL TO MATCH EXISTING ROAD FORMATION

POTENTIAL RELOCATION OF EXISTING POLES

POTENTIAL RELOCATION OF EXISTING POLES

POTENTIAL RELOCATION OF ELECTRICAL POLE

CLIFFORD STREET

ROAD

HEAD

BROKEN

1004
1000
900
800
700
600
500
400
300
200
100
0

1
DP563731

6
DP258562

4
DP802745

4
DP245836

1
DP123302

5
DP245836

2
DP245836

6
DP245836

1
DP184443

LEGEND

- EXISTING POWER POLE
- OVERHEAD ELECTRICITY
- 1m CONTOURS
- BATTER EXTENTS
- PROPOSED 2.0m PATH
- (900) INDICATIVE PATH CHAINAGE

GDA2020

nearmap

ver.	date	comment	drawn	pm	co-ordinate information	level information	scale (A1 original size)	notes
C	10/07/2024	CLIENT COMMENTS ADDED	DW	MK	CO-ORDINATE SYSTEM: GDA2020	DATUM: LIDAR CONTOUR INTERVAL: 1m	0 50 100m SCALE: 1:2000 (FULL)	

drawing title:

SHARED PATH ROUTE OPTION 3

location: BROKEN HEAD ROAD, SUFFOLK PARK

council: BYRON

dwg ref: 240392-PSK-007-C.dwg

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working beyond expectations

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