

# Traffic Impact Assessment

## Linnaeus Property Eco Tourism Mixed Use Proposal



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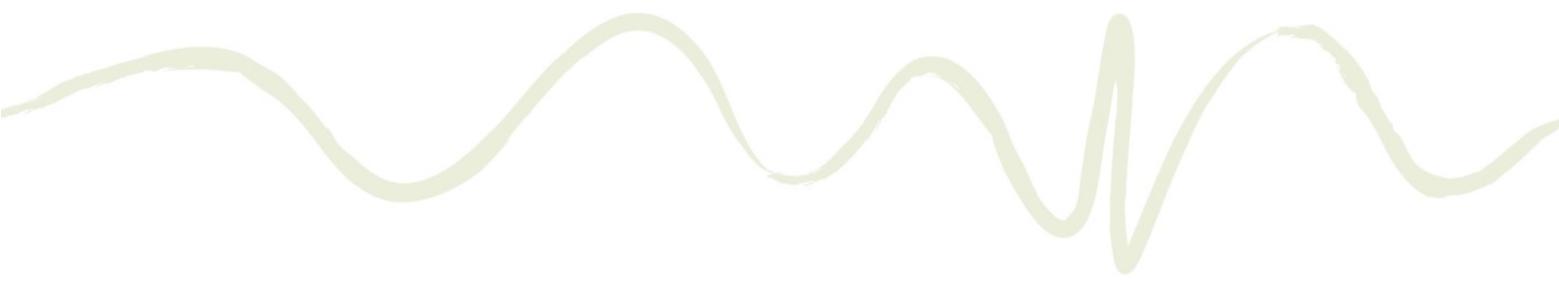
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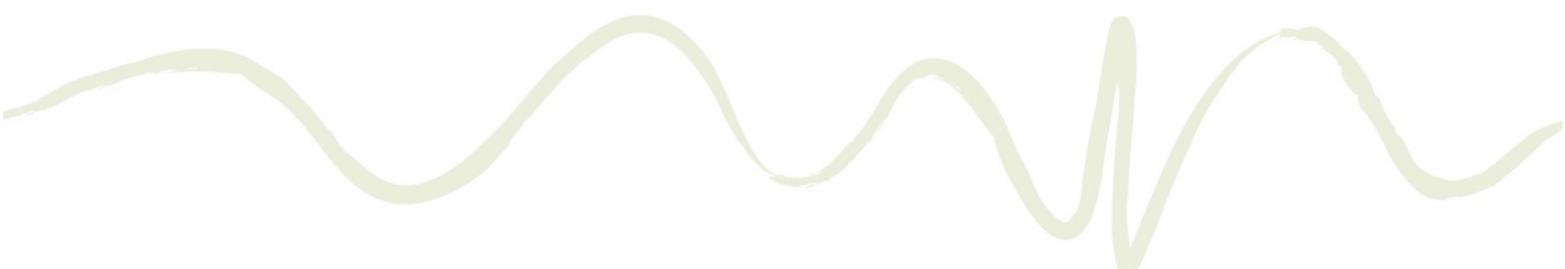
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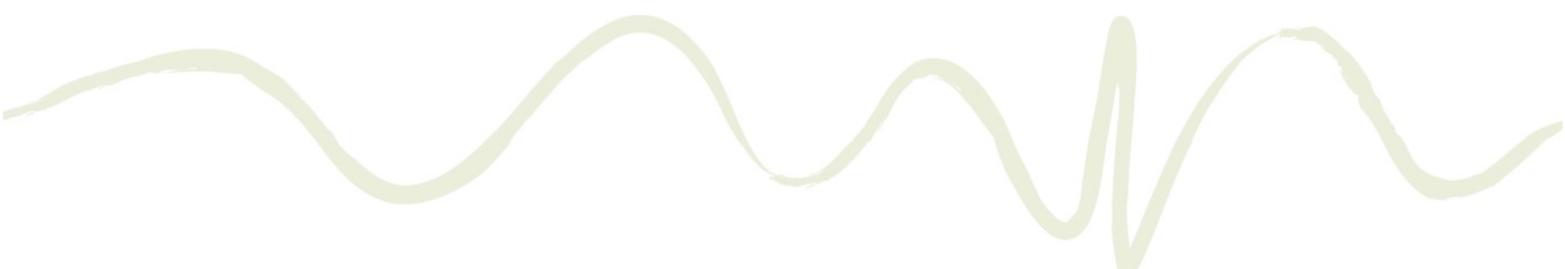


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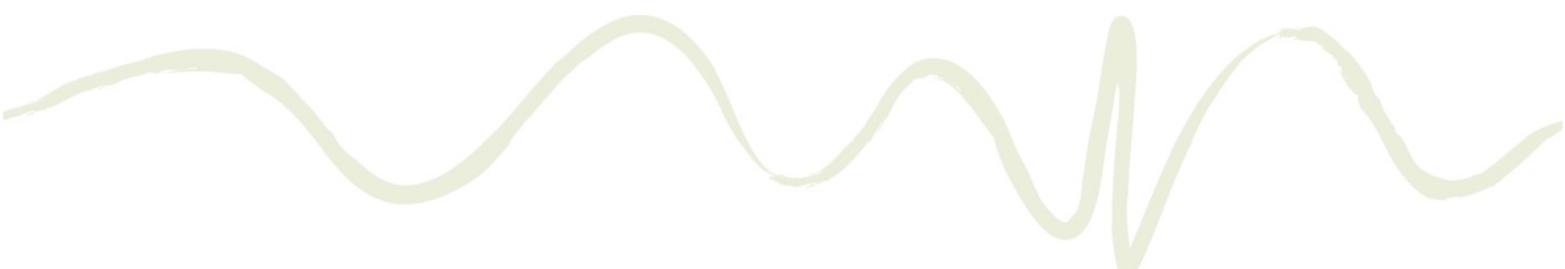
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# 1. Introduction

## 1.1 Background

This Traffic Impact Assessment (TIA) has been prepared to accompany a development application (DA) prepared by Planners North to be lodged with Byron Shire Council (BSC) for a proposed low scale eco-tourism development at the Linnaeus estate at 951 Broken Head Road, Lot 1 DP 1031848, Broken Head.

The proposed development involves a number of new tourist accommodation cabins, associated internal infrastructure upgrades and back-of-house facilities, supplementing existing educational facilities at the site.

## 1.2 The Need for a Traffic Impact Assessment

Traffic generated by a new land use development or alterations to an existing development can have significant impacts on the performance of the current or future road network. As such, various aspects of proposed developments must be properly assessed and addressed to ensure satisfactory levels of road safety and transport efficiency are maintained.

Various criteria exist to assist with determining what level of assessment is required, generally based on the size, type and location of the development, as well as the expected volume of traffic generated.

According to the *Austrroads Guide to Traffic Management Part 12: Traffic Impacts of Development* (AGTM12, 2019), Section 4.2.2, Figure 4.1, a TIA is required where a development is expected to generate more than 100 vehicle trips during the development's peak hour.

Additionally, the BSC Development Control Plan, 2014 (DCP), Chapter B4, Section 4.2.1, gives guidance that suggests a Traffic Impact Study, as defined in the *RTA Guide to Traffic Generating Developments 2002* (RTA GTGD), should be carried out for 'High Impact' development generating more than 50 peak hour trips. It is further stated that, '*where other criteria are significant, the discretion of Council can be exercised.*'

BSC advised Planners North, in their follow-up letter to the Development Advisory Panel (DAP) meeting of the 15<sup>th</sup> of August 2019, that a TIA would be required for the development. For all intents and purposes, the Traffic Impact Study referred to in the BSC DCP is the same as a TIA.

## 1.3 The Need for Referral to Roads and Maritime Services (RMS)

It is noted in the BSC DCP Chapter B4 that (for sites with access to a classified road or to a road that connects to a classified road within 90m of the access location) all developments listed in Column 3 of Schedule 3 of *State Environmental Planning Policy (Infrastructure) 2007* require referral to either a Regional Traffic Development Committee or a Local Traffic Development Committee. Figures relating to relevant categories of Schedule 3 for the proposed development are summarised in **Table 1.1** on the following page.

**Table 1.1 Warrants for Referral to RMS**

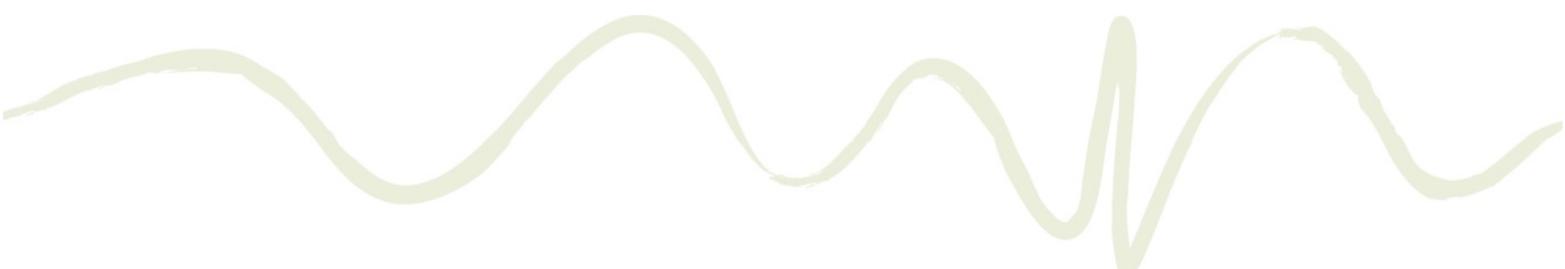
| <i>Purpose of Development</i>        | <i>Size / Capacity</i>  | <i>Proposed Development</i>    | <i>Referral Required?</i> |
|--------------------------------------|-------------------------|--------------------------------|---------------------------|
| Car parks (ancillary to development) | 50+ parking spaces      | 70 vehicles (111 total)        | Yes                       |
| Residential accommodation            | 75+ dwellings           | 27 new accommodation buildings | No                        |
| Any other purpose                    | 50+ motor vehicles/hour | 20 peak hour trips             | No                        |

The proposed development should be referred to the RMS for consideration.

## **1.4 Structure and Scope**

This report is based on the methodologies described in the 2019 Austroads publication, AGTM12 and the RTA GTGD.

- **Section 2** will describe the existing site, traffic and road conditions.
- **Section 3** will describe the proposed development, in particular any details relating to access, circulation and traffic generation.
- **Section 4** provides an assessment of the expected impact of the development on traffic efficiency, amenity, safety and on the existing road network and road users.
- **Section 5** provides a summary and recommendations.



## 2. Existing Conditions

### 2.1 Description of the Site

The subject site is located at the western side of 951 Broken Head Road, Lot 1 DP 1031848, Broken Head. It comprises approximately 110.7 ha of land with various existing conditions including cleared grass paddocks, heavily vegetated areas, wetlands, educational facility buildings and access to Seven Mile Beach along the eastern boundary. Adjoining land uses include rural, agricultural, residential and tourist facilities, with large areas of vegetated land to the north and south.

The site includes low-lying areas to the south and east, with elevations close to 0-5 mAHD, and more elevated areas to the west and north, with elevations rising to 50 mAHD and higher. The low-lying areas are generally flat or gently sloped, while higher elevation areas of the site include moderate to steep slopes. In the area where new building works are proposed, existing grades are generally around 10-20%.

The CBD of Lennox Head is approximately 6.8 km south of the site via Byron Bay Road, while Suffolk Park and Byron Bay are 7.4 km north and 12.5 km north respectively, via Broken Head Road. The site itself is within the BSC local government area, however the existing site entry is situated on Byron Bay Road within the Ballina Shire.

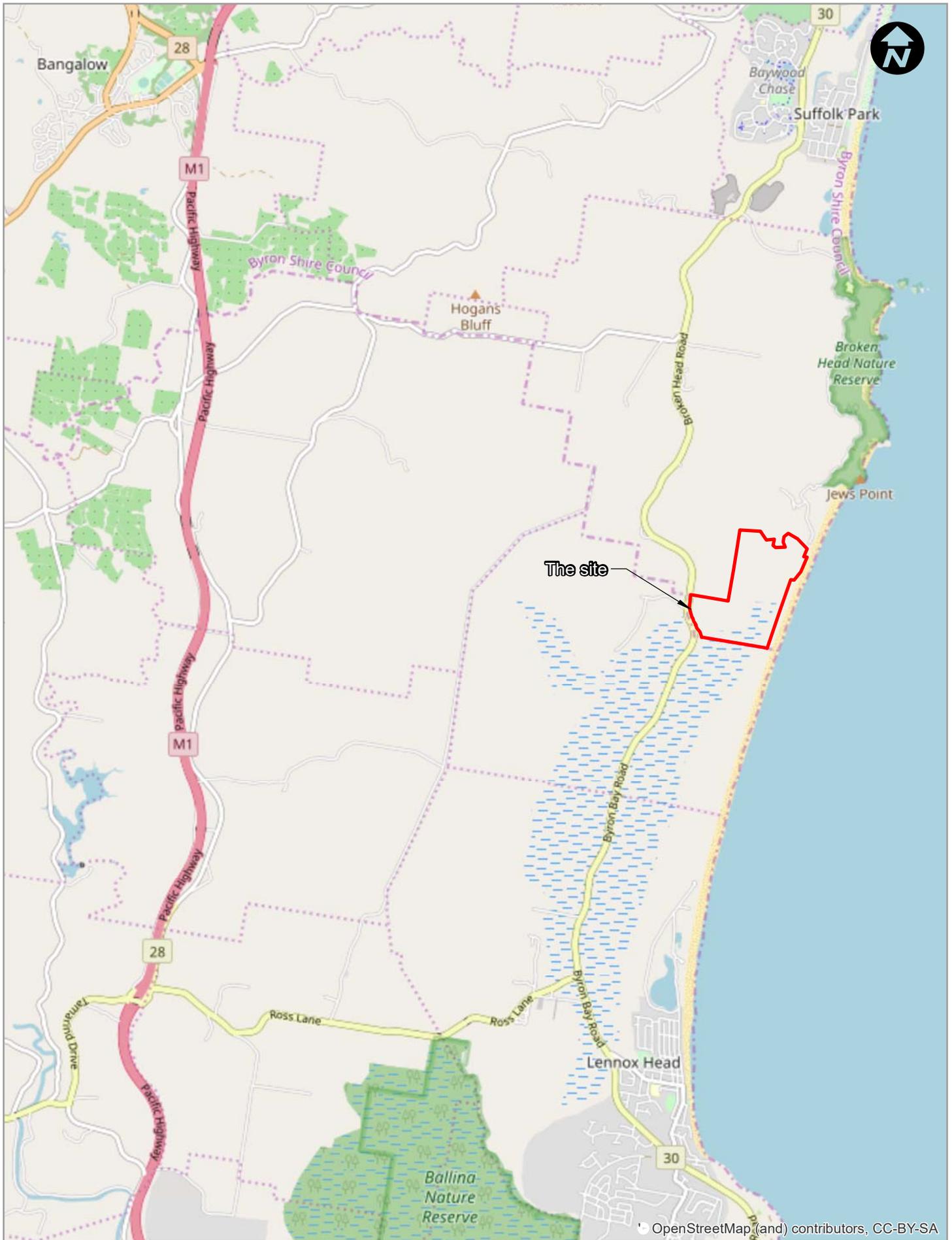
A layout of the site can be found in the project plans attached in **Appendix A**. A depiction of the site locality is provided in **Illustration 2.1** on the following page.

### 2.2 Surrounding Road Network

The site is accessed directly from classified road MR545, which consists of Broken Head Road to the immediate north of the site access location and Byron Bay Road at the site access location and to the immediate south. MR545 is classified as a regional road and has a speed zone of 80 km/h at the site frontage. MR545 is a two-lane, two-way road with wide traffic lanes and sealed shoulders north and south of the site.

MR545 is intersected by Ross Lane approximately 4.5 km south of the site, which provides connection to the Pacific Highway (northbound and southbound) approximately 10.5 km from the site. Ballina Airport can also be accessed approximately 21 km south of the site. The intersection of Ross Lane and MR545 has been recently upgraded to a roundabout.

North of the site, MR545 is intersected by Midgen Flat Road (4.1 km) and Bangalow Road (9.4 km), together with some minor laneways and the local streets of Suffolk Park and, further north, the Byron Bay urban area.



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Site Locality - Illustration 2.1

## 2.3 Traffic Flows

Existing traffic data for MR545 has been provided by Ballina Shire Council (BaSC) and BSC and is summarised in **Table 2.1** below.

**Table 2.1 MR545 Traffic Flows**

| <b>Count Location</b>                    | <b>Dates</b>          | <b>AADT</b> | <b>AM Peak Hour</b> | <b>PM Peak Hour</b> | <b>% Heavy Vehicles</b> |
|--|-----------------------|-------------|---------------------|---------------------|-------------------------|
| 400 m north of site access               | 03/09/2014-19/09/2014 | 5,655       | 499                 | 470                 | -                       |
| 3.65 km north of site access (BSC ST068) | 31/10/2019-14/11/2019 | 5,931       | 461                 | 511                 | 9.3                     |
| 3.65 km north of site access (BSC ST068) | 06/11/2014-13/11/2014 | 6,102       | 507                 | 510                 | 6.5                     |
| 3.65 km north of site access (BSC ST068) | 13/10/2010-20/10/2010 | 5,987       | 471                 | 521                 | 5.8                     |

An on-site traffic count was carried out for a 15-minute period during the afternoon (PM) peak period on the 25<sup>th</sup> of November 2019, at the site access intersection. The 15-minute traffic total was 111 vehicles, giving a calculated peak hour total of 444, which is about 87% of the peak hour volume for the traffic counter data supplied by Council. It can be expected that the peak hour traffic counter data gives an accurate representation of the peak hour traffic at the site.

Comparing data for the BSC ST068 counter location across 2010, 2014 and 2019, there is no clear growth trend for traffic on MR545. However, with completion of the Ewingsdale interchange connection to the Pacific Highway and St Helena Tunnel on the Pacific Highway in late 2015/early 2016, it can be inferred that some traffic that would previously have used MR545 would now be using the Pacific Highway. As a result, the growth rate of traffic using MR545 has been calculated using the change in traffic volumes from 2010 to 2014 at BSC ST068.

The calculated growth rate for traffic volumes on MR545 was 0.5% per annum.

Existing use traffic generation for the site has been calculated using rates provided in the RTA GTGD and the *RMS Guide to Traffic Generating Developments Technical Direction 2013/04A Updated Traffic Surveys* (RMS TDT 2013/04a). It is important to note that not all buildings approved under existing development consents for the site have been constructed. As a result, only existing traffic generation for existing completed buildings has been calculated. In **Section 3**, this has then been compared with the proposed fully developed case, including proposed construction of previously approved buildings, to demonstrate the expected impact of future works.

Existing use of the site includes a single residential dwelling and multiple education accommodation units. Traffic generation for the dwelling has been estimated using the rates provided in RMS TDT 2013/04a for dwellings in regional areas.

Traffic generation rates for motel accommodation have been used for the education accommodation buildings. This corresponds to the parking provision rates recommended by BSC and is likely to be a conservative estimate as it is expected that, in general, educational use of the accommodation is likely to involve fewer trips than typical motel accommodation.

It is further recommended in the RTA GTGD that motel accommodation trip generation calculations be based on 85% occupancy. This recommendation has been adopted.

Existing traffic generation estimates are summarised in **Table 2.2**.

**Table 2.2 Linnaeus Existing Use Traffic Estimate**

| <i>Existing Use</i>     | <i>Number</i> | <i>Daily Trip Rate per Unit</i> | <i>Peak Hour Trip Rate per Unit</i> | <i>Total Daily Trips</i> | <i>Total Peak Hour Trips</i> |
|-------------------------|---------------|---------------------------------|-------------------------------------|--------------------------|------------------------------|
| Dwelling                | 1             | 7.4                             | 0.78                                | 7.4                      | 0.78                         |
| Education accommodation | 19            | 3                               | 0.4                                 | 57                       | 7.6                          |
| Total                   |               |                                 |                                     | 65                       | 9                            |

## 2.4 Parking

Existing parking is provided on site in a number of locations. Each of the existing accommodation building has a single covered car parking space provided adjacent to the building. There are also some larger central formal parking areas along with informal parking provided in a variety of locations across the site.

The central formal car parking areas provide a minimum of 49 parking spaces including at least three spaces for people with disabilities. The existing dwelling has two associated parking spaces and there are hardstand parking areas associated with the maintenance shed and other buildings on the site. As a result, a minimum of 66 parking spaces are available on site.

Required parking for the existing buildings on site has been calculated using the parking rates recommended for use by BSC in their letter following on from the 15<sup>th</sup> of August 2019 DAP meeting for the development. These rates correspond to the figures provided in BSC DCP Chapter B4, Table B4.1 for hotel or motel accommodation and will be applicable to the buildings proposed to be used for accommodation purposes:

- 1 space per unit
- 1 space per 2 employees on site
- 1 space for on-site manager

Staff numbers for the existing use have been estimated according to the staff requirements figures provided by the client for the proposed development. It is estimated that there will be one staff member on site for every two patrons on site with a maximum of 85% occupancy in accordance with the recommendations of the RTA GTGD for motel traffic generation. This gives a maximum of 26 staff on site concurrently and a maximum staff parking requirement of 14, including the site manager.

As a result, the required number of parking spaces for the existing uses, including parking associated with the existing dwelling, existing education accommodation and existing staff requirements, has been calculated to be 38. Parking requirements for existing uses are summarised in **Table 2.3**.

Approved accommodation buildings that have not been built include an additional 12 units and one dwelling house. These buildings would require 14 associated occupant parking spaces as well as three staff parking spaces if they were to be built.

**Table 2.3 Required Parking Provision for Existing Uses**

| <i>Building Numbers</i> | <i>Existing Use</i> | <i>Approved Occupancy/Unit</i> | <i>Required Parking/Unit</i> | <i>Total Required Parking</i> |
|-------------------------|---------------------|--------------------------------|------------------------------|-------------------------------|
| 2, 34                   | Dwelling            | 4                              | 2                            | 4                             |
| 3-17                    | Accommodation       | 3                              | 1                            | 15                            |
| 24-27                   | Accommodation       | 2                              | 1                            | 4                             |
| -                       | Staffing            | -                              | 0.5                          | 13                            |
| -                       | On-site Manager     | -                              | 1                            | 1                             |
| Total                   |                     |                                |                              | 38                            |

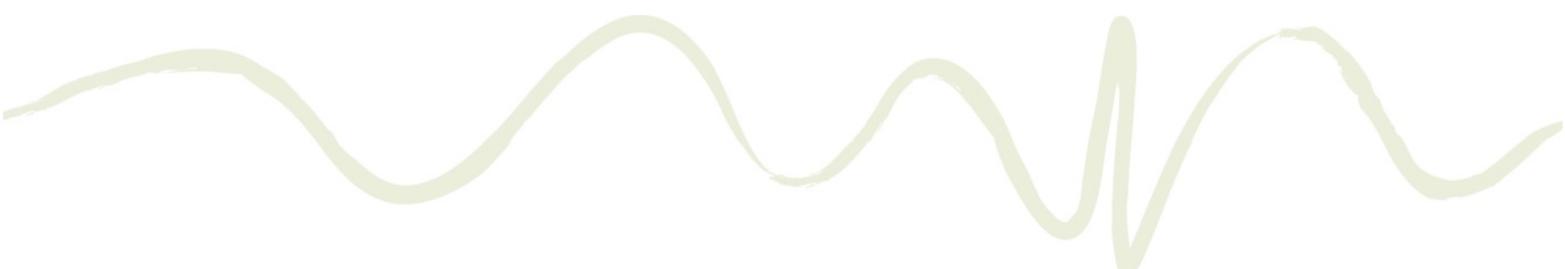
## 2.5 Site Access

A depiction of the existing site access is provided in **Illustration 2.2** and the intersection layout is shown below.



**Figure 2.1 Intersection of Byron Bay Road and the Site Access**

Intersection turn treatments have been constructed at the site access location providing approximately 120 m of inbound right turn lane and approximately 100 m of inbound left turn lane in a 'seagull' type arrangement. These lengths correspond to the relevant geometric requirements for auxiliary left (AUL) and channelised right (CHR) turning lane treatments as part of a seagull intersection design for an



80 km/h design speed according to the *Austrroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections, 2017 (AGRD04A)*, with a provision of 20 m of queue storage for the CHR turn lane.

A check of the requirements for safe intersection sight distance (SISD) for the intersection according to AGRD04A found that the sight distance required is 181 m in both directions. Sight distance available on MR545 was measured at approximately 204 m for the northbound lane and 224 m for the southbound lane.

Where the site access driveway connects to MR545, it consists of a sealed pavement with a flared connection approximately 17 m wide at the edge of shoulder of MR545, narrowing to approximately 4 m wide at the property boundary gate, with a distance between the gate and road shoulder of approximately 20 m.

Internally, the access driveway generally has a 4 m sealed width with passing areas every 300 m measuring approximately 20 m long by 4.5 m wide. The land adjacent to the internal driveway is generally flat, allowing for informal passing for the majority of its length.

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**LEGEND**

- Site boundary
- Road or track



Site Access - Illustration 2.2

# 3. Proposed Development

## 3.1 General

The proposed development involves retaining existing educational use of many of the existing buildings on the site and supplementing that use with new eco-tourist facilities. Existing internal infrastructure will be expanded upon to cater for the additional uses of the site.

Proposed new buildings include a total of 27 new accommodation units in a variety of forms. It is also proposed to increase the occupancy (per unit) of some of the existing education accommodation units. As a result, it is proposed to increase the total occupancy of the site from the existing approval for 112 occupants to a new total of 161 occupants.

## 3.2 Traffic Generation

### 3.2.1 Traffic Generation Rates

Traffic generation rates for the eco-tourist aspect of the development will be according to the RTA GTGD rates for motel accommodation, which is in accordance with the recommended parking rates from BSC. Traffic generation for the proposed new dwelling will be according to the RMS TDT 2013/04a rate for dwellings in regional areas.

It can also be expected that traffic on MR545 will increase across the 10-year design horizon. Average annual growth of traffic volumes on MR545 was calculated using data provided by BalSC and BSC to be approximately 0.5% per year. This rate has been applied to the November 2019 data provided by BSC in order to determine design traffic volumes for MR545, as shown in **Table 3.1** below.

**Table 3.1 Estimated Traffic Growth on MR545**

|                      | 2019 Northbound | 2019 Southbound | Annual Growth | 2029 Northbound | 2029 Southbound |
|----------------------|-----------------|-----------------|---------------|-----------------|-----------------|
| AADT (veh/day)       | 2957            | 2974            | 0.5%          | 3109            | 3127            |
| AM Peak Hour (veh/h) | 253             | 208             | 0.5%          | 266             | 219             |
| PM Peak Hour (veh/h) | 242             | 270             | 0.5%          | 255             | 284             |

Traffic generation figures for the development are summarised in **Table 3.2**.

**Table 3.2 Estimated Traffic Generation of Proposed Development**

| Proposed Use              | Number | Daily Trip Rate per Unit | Peak Hour Trip Rate per Unit | Total Daily Trips | Total Peak Hour Trips |
|---------------------------|--------|--------------------------|------------------------------|-------------------|-----------------------|
| Eco-tourism Accommodation | 27     | 3                        | 0.4                          | 81                | 10.8                  |

### 3.2.2 Traffic Distribution

Traffic impact of the development can be greatly affected by the distribution of generated traffic. In general, it is expected that the daily peak traffic generation period for the development will not coincide with the peak traffic period of the surrounding road network. This comes down to a range of factors related to expected arrival and departure times for accommodation generated traffic as opposed to commuter traffic on the surrounding road network.

However, it can be reasonably expected that there will be times where these peak periods will overlap. For this reason, two primary traffic distribution cases have been developed based on expected operation of the site and using the conservative assumption that the peak periods for all uses will coincide both with the other internal uses and with the peak traffic period of the surrounding road network.

The following traffic distribution cases have been estimated according to the method described in AGTM12, Section 4.4.6. Because of the inherent uncertainty in estimating traffic distribution for new developments, the cases developed have also been tested for sensitivity, with results provided in **Section 4**.

#### 3.2.2.1 Case 1

The first traffic distribution case is based on coinciding peak arrival or coinciding peak departure of all patrons for both the educational accommodation and eco-tourist accommodation. Although it is expected that the arrival and departure distribution of each use will generally be offset, it can be reasonably expected that there will be times where these will coincide. This case is likely to have the greatest traffic impact.

In this case, it has been assumed that 80% of accommodation generated traffic will either be outbound (e.g. departure peak) or inbound (e.g. arrival peak), with the opposing 20% accounting for staff or resident-generated trips, taxi arrivals for pick-up at departure or similar. Because there are significant trip origin and destination options both north and south of the development (e.g. Lennox Head, Ballina and Byron Bay), origin/destination has been estimated to be split 50/50 north/south.

Peak hour traffic distribution figures for Case 1 are summarised below. Calculated figures have been rounded up to the nearest whole number in accordance with *Austrroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings* (AGTM06, 2019). It is expected that the peak arrival period will generally be in the afternoon or evening and peak departure period will generally be in the morning.

**Table 3.3 Case 1 Departure (AM) Peak Hour Distribution**

|                            |          | <i>North</i> | <i>South</i> | <i>Right Turn</i> | <i>Left Turn</i> |
|----------------------------|----------|--------------|--------------|-------------------|------------------|
| Estimated Existing Traffic | Outbound | 40%          | 40%          | 4                 | 4                |
|                            | Inbound  | 10%          | 10%          | 1                 | 1                |
| Estimated 2029 Traffic     | Outbound | 40%          | 40%          | 8                 | 8                |
|                            | Inbound  | 10%          | 10%          | 2                 | 2                |

**Table 3.4 Case 1 Arrival (PM) Peak Hour Distribution**

|                            |          | <i>North</i> | <i>South</i> | <i>Right Turn</i> | <i>Left Turn</i> |
|----------------------------|----------|--------------|--------------|-------------------|------------------|
| Estimated Existing Traffic | Outbound | 10%          | 10%          | 1                 | 1                |
|                            | Inbound  | 40%          | 40%          | 4                 | 4                |
| Estimated 2029 Traffic     | Outbound | 10%          | 10%          | 2                 | 2                |
|                            | Inbound  | 40%          | 40%          | 8                 | 8                |

**3.2.2.2 Case 2**

The second traffic distribution case is based on opposing peak arrival or peak departure of all patrons for both the educational accommodation and eco-tourist accommodation. In some cases, opposing inbound and outbound movements can cause extended delays for turning traffic, which can reduce the level of service (LOS). This case has been tested assuming 80% of education accommodation generated traffic is outbound while 80% of eco-tourist accommodation generated traffic is inbound. Dwelling generated traffic has been assumed to be 50/50 inbound/outbound in this case, which will exacerbate any modelled impacts of the opposing traffic movements.

**Table 3.5 Case 2 Tourist Departure Peak Hour Distribution**

|                                 |          | <i>North</i> | <i>South</i> | <i>Right Turn</i> | <i>Left Turn</i> |
|---------------------------------|----------|--------------|--------------|-------------------|------------------|
| Eco-Tourist Traffic             | Outbound | 40%          | 40%          | 5                 | 5                |
|                                 | Inbound  | 10%          | 10%          | 2                 | 2                |
| Education Accommodation Traffic | Outbound | 10%          | 10%          | 1                 | 1                |
|                                 | Inbound  | 40%          | 40%          | 4                 | 4                |
| Total Site Traffic              | Outbound | 29.2%        | 29.2%        | 6                 | 6                |
|                                 | Inbound  | 20.8%        | 20.8%        | 5                 | 5                |

**Table 3.6 Case 2 Tourist Arrival Peak Hour Distribution**

|                                 |          | <i>North</i> | <i>South</i> | <i>Right Turn</i> | <i>Left Turn</i> |
|---------------------------------|----------|--------------|--------------|-------------------|------------------|
| Eco-Tourist Traffic             | Outbound | 10%          | 10%          | 2                 | 2                |
|                                 | Inbound  | 40%          | 40%          | 5                 | 5                |
| Education Accommodation Traffic | Outbound | 40%          | 40%          | 4                 | 4                |
|                                 | Inbound  | 10%          | 10%          | 1                 | 1                |
| Total Site Traffic              | Outbound | 20.8%        | 20.8%        | 5                 | 5                |
|                                 | Inbound  | 29.2%        | 29.2%        | 6                 | 6                |

### 3.3 Parking

#### 3.3.1 Car Parking

Existing car parking areas have been checked to confirm compliance with AS2890 for dimensions and manoeuvring to suit user classes 1A and 2. It was found that nominated 90° parking bays were 2.5 m wide and 5.4 m long, and parking aisles were 5.9 m wide. These dimensions correspond to the requirements for user class 2 parking bays, with a slightly wider parking aisle than required to meet AS2890 (5.8 m required).

Applicable parking rates will be according to BSC DCP Chapter B4 Table 4.1. BSC have advised in their letter following on from the 15<sup>th</sup> of August 2019 DAP meeting that the applicable parking rates for new accommodation units would be:

- 1 space per unit
- 1 space per 2 employees on site
- 1 space for on-site manager

BSC have also advised in their letter that no additional parking would be required for the proposed restaurant as it is considered ancillary to the accommodation and not open to the public. A summary of the proposed facilities, required parking rates and proposed parking provision for occupants is provided in **Table 3.7**. See **Appendix A** for building types and number identifiers.

In addition to parking for occupants, parking must also be provided for employees and an on-site manager. The expected number of staff servicing the facility concurrently will be 75. This equates to approximately one staff member for every two patrons on site with an 85% occupancy rate according to the RTA GTGD recommendation for motel accommodation.

Using the applicable parking rate of one space per two employees on site, gives a required parking provision of 39 spaces, including one space for the on-site manager.

It is also proposed to provide an additional 10 parking spaces for visitors, which may include day visitors to the educational facilities or visitors of guests in the eco-tourist accommodation.

**Table 3.7 Required and Proposed Parking Provision for Development**

| <b>Building Number</b> | <b>Proposed Use</b> | <b>Proposed Occupancy</b> | <b>Required Parking/Unit</b> | <b>Proposed Parking/Unit</b> | <b>Total Parking</b> |
|------------------------|---------------------|---------------------------|------------------------------|------------------------------|----------------------|
| 2, 34                  | Residential         | 4.5                       | 2                            | 2                            | 4                    |
| 12-16                  | Education           | 4.5                       | 1                            | 1                            | 5                    |
| 3-11, 17               | Tourism             | 3.5                       | 1                            | 1                            | 10                   |
| 24-27                  | Tourism             | 2                         | 1                            | 1                            | 4                    |
| A1-A22                 | Tourism             | 2                         | 1                            | 1                            | 22                   |
| B1-B4                  | Tourism             | 2                         | 1                            | 1                            | 4                    |
| C1                     | Tourism             | 2                         | 1                            | 1                            | 1                    |
| -                      | Staff               | 75                        | 0.5                          | 0.5                          | 38                   |
| -                      | On-site Manager     | 1                         | 1                            | 1                            | 1                    |
| -                      | Visitors            | -                         | -                            | -                            | 10                   |
| <b>Total</b>           |                     |                           |                              |                              | <b>99</b>            |

Accounting for overlap between existing uses and proposed uses (assuming half of the proposed visitor parking spaces are already provided for current uses), space for approximately 66 additional vehicles will be required, giving a total parking provision requirement of 99 spaces. With existing parking provision of at least 66 spaces, a maximum of 33 additional spaces will be required. At least 45 additional parking bays are proposed as part of the new development.

### 3.3.2 Parking for People with Disabilities

According to BSC DCP Chapter B13, section 13.2.2, at least one accessible parking space for the disabled must be provided for 10% of units, rounded up to the nearest whole number. With 21 existing units and 27 proposed, a total of five accessible parking spaces will be required. With three accessible parking spaces already available, an additional two will be required (and are proposed) as part of the development.

## 3.4 Access

The existing access connection to MR545 is proposed to be retained and modified as required to serve the additional traffic generated by the development. Access requirements have been assessed for both passenger car and commercial vehicle access according to the relevant parts of Australian Standard 2890.

### 3.4.1 Access for Passenger Cars

According to AS2890.1:2004 – *Off Street Car Parking* (AS2890.1), ‘all accesses to off-street car parks from frontage roads shall be formed in such a way as to be clearly recognised by road users as either an access driveway or as an intersection.’ It is further stated, ‘for access driveways... the appearance and character of the driveway shall be such that it will be clear to vehicle drivers that... frontage road traffic [has] priority of movement.’

The existing access has the form of an ‘access driveway’ as described in AS2890.1.

Table 3.1 of AS2890.1 provides categories for access facilities according to the number of parking spaces, frontage road type (local or arterial) and user class. The access facility category can then be used to determine the appropriate access design.

According to AS2890.1, the proposed development will require user class 1A (residential, domestic and employee) and class 2 (hotels, motels) parking facilities. Total on-site parking required as outlined in **Section 3.3** will be 99 parking spaces. However, with the existing 66 bays and 45 proposed, this equates to more than 100, thus the development will be access facility category 3.

Using the access facility category and Table 3.2 of AS2890.1, the appropriate access dimensions have been determined as shown in **Figure 3.1** below.

**ACCESS DRIVEWAY WIDTHS**

| metres   |  |                       |                         |
|----------|--|-----------------------|-------------------------|
| Category | Entry width  | Exit width            | Separation of driveways |
| 1        | 3.0 to 5.5   | (Combined) (see Note) | N/A                     |
| 2        | 6.0 to 9.0   | (Combined) (see Note) | N/A                     |
| 3        | 6.0  | 4.0 to 6.0            | 1 to 3                  |
| 4        | 6.0 to 8.0   | 6.0 to 8.0            | 1 to 3                  |
| 5        | To be provided as an intersection, not an access driveway, see Clause 3.1.1. |                       |                         |

NOTE: Driveways are normally combined, but if separate, both entry and exit widths should be 3.0 m min.

**Figure 3.1 Access Driveway Dimensions according to Table 3.2 of AS2890.1**

The existing access would require separation of entry and exit by a painted or raised median, with entry and exit widths as per **Figure 3.1** in order to meet the requirements of AS2890.1.

Measurement of the existing access geometry revealed that the existing driveway width at the connection to MR545 is approximately 17 m. This provides ample room for a 6 m wide entry and 4-6 m wide exit lane without the need for a median

According to Clause 3.2.3 of AS2890.1, category 3 driveways connecting to arterial roads require entrances and exits to be designed and constructed as intersection treatments catering adequately for all projected traffic flows.

The existing seagull intersection treatment on MR545 at the access driveway provides these intersection treatments for all entrances and exits. The capacity of the existing intersection treatment has been checked for the projected traffic flows in **Section 4**, with recommendations provided. Furthermore, Appendix D of AS2890 provides maximum lane capacity figures for car park entry points, with a figure of 250 vehicles per hour per lane for manually controlled entries. From this it can be seen that the existing access intersection provides more than enough capacity for the expected traffic volumes.

Table 3.3 of Section 3.4 of AS2890.1 provides the following queue storage requirements for the access driveway.

**MINIMUM QUEUING LENGTH AT A CAR PARK WITH  
CONTROL POINTS AT ENTRANCES**

| Capacity of car park<br>(Note 1) | Peak hourly in-flow of traffic   |  |
|----------------------------------|--|--|
|                                  | Up to 75% of capacity (Note 2)   | More than 75% of capacity (Note 3)   |
| Not more than 100 cars           | The greater of a minimum of 2 cars or 3% of capacity                       | The greater of a minimum of 2 cars or 4% of capacity                         |
| More than 100 cars               | 1st 100 cars: 3% of capacity<br>2nd 100 cars: 2% of capacity               | 1st 100 cars: 4% of capacity<br>2nd 100 cars: 2% of capacity                 |
|                                  | Additional cars: 1% of capacity<br>A minimum queuing length of 3 cars/lane | Additional cars: 1.5% of capacity<br>A minimum queuing length of 3 cars/lane |

NOTES:

- 1 Equal to the total number of parking spaces served by the entrance (proportioned where several entrances service a common parking area).
- 2 Generally casual (short-staying) and mixed patronage.
- 3 Tidal traffic typical of car parking for a special event.

**Figure 3.2 Queue Length Requirements According to Table 3.3 of AS2890.1**

Peak hour traffic for the site, including existing uses and proposed uses, is expected to be around 20 vehicle trips per hour which equates to around 20% of on-site parking capacity. As a result, queue length provision was calculated using values provided for peak hourly in-flow of traffic up to 75% of capacity, giving a required queue length provision of four cars, or 24 m.

The existing site access has queue length provision of approximately 20 m at the site access gate and additional queue storage capacity within the turning lanes of the seagull intersection treatment. As a result, sufficient queue storage is available at the site access for the expected traffic generation of the development.

### 3.4.2 Access for Commercial Vehicles

The design vehicle for the development access geometry will be a medium rigid vehicle (MRV) which will carry out occasional deliveries to the site. The requirements for occasional service according to Clause 3.2.2 of *AS2890.2:2002 Parking Facilities – Off-street Commercial Vehicle Facilities* (AS2890.2) are summarised in **Figure 3.3**.

#### 3.2.2 Occasional service

Requirements and recommendations for providing for occasional service are as follows:

- (a) The vehicle shall be able to stand wholly within the site.
- (b) Reverse manoeuvres at the property boundary, if permitted by the relevant authority, shall be limited to one only, either on entering or departing, and shall be subject to consideration of both safety and obstruction to other on-street traffic.
- (c) The swept path plus clearances shall be accommodated within the access driveway or circulation roadway.
- (d) The full width of the access driveway may be used for both entering and leaving the site.

**Figure 3.3 Commercial Vehicle Access Requirements from AS2890.2**

There is ample room for an MRV to stand wholly within the site. Reverse manoeuvres at the property boundary will not be required as vehicles can turn around on site. The swept path plus clearances are accommodated within the access driveway and circulation roadway, which already caters for MRV access to the site. As a result, the existing access driveway meets the requirements of Clause 3.2.2 of AS2890.2.

# 4. Traffic Impact of Development

## 4.1 General

A primary focus of the TIA is to assess the impact of the proposed development on the existing access driveway intersection with MR545. It has been shown in **Section 2** that the existing arrangement appears to be suitable for the existing use case, with geometry meeting standard requirements according to AGRD04A. These details have been checked for the proposed development traffic generation in two ways:

- Assessment of the minor road (access driveway) and major road (MR545) volumes against the warrants for intersection treatments according to the AGTM06; and
- Modelling of the proposed intersection using SIDRA Intersection 8.1 software to determine the expected impacts on level of service (LOS).

SIDRA modelling provides a method for assessing the existing and future LOS of MR545 and impacts that the development may have.

It is expected that, due to the relatively small number of trips generated by the development compared to existing traffic volumes on MR545, that traffic impacts of the development on parts of the road network further afield will be negligible and have therefore not been quantified.

Assessment of the internal access has also been carried out to ensure traffic safety and efficiency is maintained within the site.

## 4.2 Traffic Safety

### 4.2.1 Intersection Turn Treatments

The existing seagull intersection treatment on MR545 was assessed to determine if any improvements would be required as a result of the development. Warrants for turn treatments at intersections can be found in AGTM06. The relevant figure for MR545 with an 80 km/h speed zone is shown in **Figure 4.1**.

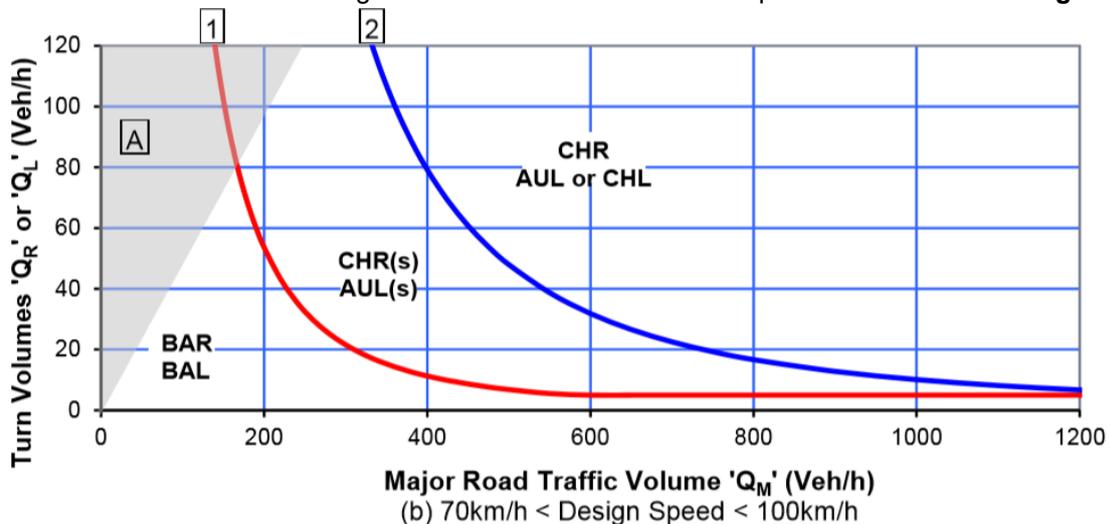
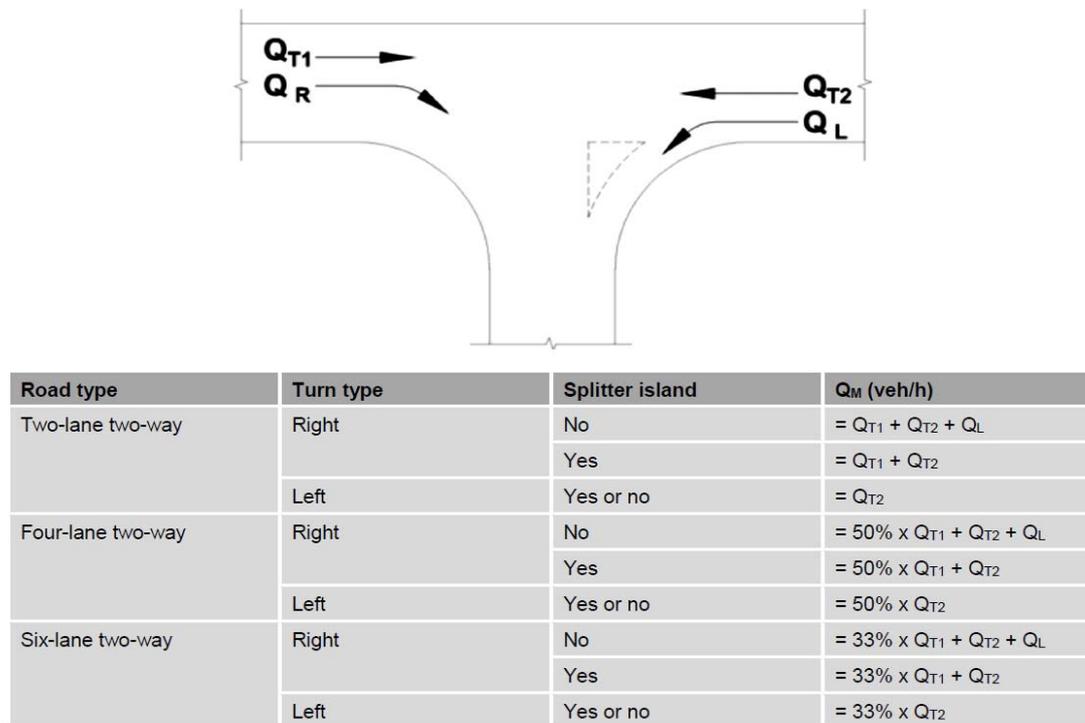


Figure 4.1 Warrants for Intersection Treatment, Design Speed 70-100 km/h, AGTM06 2019

'BAL' and 'BAR' refer to 'basic left' and basic right' turning treatments respectively. 'CHL' and 'CHR' refer to channelised left and right turn treatments, and AUL refers to an auxiliary left turn lane. The '(s)' designation refers to 'short', as in a shortened version of the full treatment. AGTM06 also provides the following figure for calculation of the major road volume.



**Figure 4.2 Calculation of the Major Road Traffic Volume Q<sub>M</sub>, AGTM6 2019**

The relevant volume figures for Case 1 and Case 2 are summarised below.

**Table 4.1 2029 Peak Hour Traffic Volumes**

|        | Time | Q <sub>T1</sub> | Q <sub>T2</sub> | Q <sub>R</sub> | Q <sub>L</sub> | Q <sub>M</sub> (right) | Q <sub>M</sub> (left) |
|--------|------|-----------------|-----------------|----------------|----------------|------------------------|-----------------------|
| Case 1 | AM   | 266             | 219             | 8              | 8              | 493                    | 219                   |
|        | PM   | 255             | 284             | 2              | 2              | 541                    | 284                   |
| Case 2 | AM   | 266             | 219             | 6              | 6              | 491                    | 219                   |
|        | PM   | 255             | 284             | 5              | 5              | 544                    | 284                   |

From the above it can be seen that the highest volumes are expected for the Case 2 PM peak. Checking all cases against **Figure 4.1** reveals that the required intersection turn treatments according to AGTM06 are CHR(s) and BAL. The existing intersection has AUL and CHR treatments, which are more than what is required. For reference, based on **Figure 4.1** and the estimated traffic generation scenarios, traffic generated by the development could be three times higher and still only require CHR(s) and BAL treatments.

As a result, it is expected that the existing intersection treatments on MR545 will continue to function safely under traffic generated by the proposed development.

#### 4.2.2 Emergency Vehicular Access and Evacuation Traffic

A *Bush Fire Emergency Management and Evacuation Plan* will need to be prepared, consistent with the NSW RFS guidelines and AS 3745:2010 *Planning for Emergencies in Facilities* in accordance with Table 6.8d of *Planning for Bush Fire Protection (PBP)* (NSW Rural Fire Service, 2019). A copy of this document should be provided to the relevant local authorities prior to occupation of the development.

Items to be determined and addressed in the plan are detailed below.

- a) *Capacity of road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes).*

The main route between the site entry and the two refuge buildings crosses three bridges constructed in the late 1990s. Although fully loaded firefighting vehicles have been known to cross these bridges on a number of occasions, documentation is not readily available specifying their load capacity. However, a secondary route is available, bypassing all three bridges. This route will be marked in some way as the emergency vehicle route.

- b) *Hydrants are to be located outside parking reserves and carriageways in accordance with the relevant clauses of AS 2419.1. Where no reticulated supply is available, suitable access within 4m of the static water supply must be available.*

The majority of the site is serviced by a reticulated water supply fed by a large water reservoir. The system includes several in-ground fire hydrants was designed in accordance with AS 2419.1. A recent (April 2020) test has been carried out on the system and the most disadvantaged hydrant, demonstrating current compliance with AS 2419.1 with respect to flow and pressure. The route to the two refuge buildings provides access to a hydrant (one existing and one proposed) which can service all sides of the refuge buildings with a 60m hose length and 10m jet stream. Turning is available using Type A, B or C turning head as per Figure A3.3. of PBP2019. The only building without access to a reticulated system is the depot building in the south western portion of the site. This area has been designed to accommodate a fire truck with turning head Type C and access to a 10kL water tank with Storz fitting.

- c) *The amount of travel likely to be generated during an emergency evacuation.*

The worst case would be the maximum number of expected vehicles on site at any one time. Assuming all proposed available parking on site were occupied, this equates to 111 vehicles.

- d) *The capacity of the broader road network to facilitate safe emergency evacuation.*

Assuming a worst-case scenario of the maximum expected vehicles on-site at any one time all (111) exiting the site and turning right onto Broken Head Road during the peak hour traffic, SIDRA modelling demonstrates that the delays for exiting vehicles will be minor (< 10 seconds), with this movement still offering a LOS A.

The model was again adjusted to increase the northbound flow of traffic on Byron Bay / Broken Head Road by 50% and allow for a generous 20 emergency (heavy) vehicles entering the site from the south, being the worst case as this movement opposes the right turn movement out of the development site. The SIDRA modelling still provided an expected LOS A for all movements, with the worst delay being for the traffic exiting the development, at 11.9 seconds. At this rate, all 111 vehicles would be able to leave the site within 22 minutes.

- e) *Limitations/constraints inherent in the road system and management of potential traffic conflicts (such as emergency vehicles versus evacuating members of the public).*

PBP2019 requires acceptable solutions to address several performance criteria associated with this type of development, as detailed in Tables 5.3b and 6.8b. The proposed development

achieves most of these, with one exception regarding the specified 'minimum 4m carriageway width'. The access road from the site entry to the refuge buildings varies from 3-6m sealed all-weather two-wheel drive carriageway. However, given the existing shoulders are grassed, flush with the carriageway and free of obstructions with sufficient width to provide a minimum total trafficable width of 5.5m (generally 6.0m+) for the full length with two short (< 10m) pinch points. The pinch points include the entry gate and an existing culvert. Both have clear sight distance and it is expected that in the event of evacuating occupants needing to pass entering emergency vehicles, the evacuating vehicles will be able to pull aside to allow the emergency vehicle(s) to pass. This will be particularly important at the entry gate given that all exiting and entering vehicles must pass through this point. The culvert restriction, however, is on one of two available routes for non-heavy vehicles to enter/exit the site.

### 4.3 Traffic Efficiency

#### 4.3.1 Intersection Level of Service

The site access intersection was modelled using SIDRA Intersection 8.1 (see **Appendix B**) to determine the expected traffic impact of the development. Modelling was carried out in accordance with the *RMS Traffic Modelling Guidelines 2013* (RMS TMG). The intersection traffic flows were modelled for both the short-term horizon (existing traffic plus development generated traffic) and the 10-year horizon.

LOS for intersections based on delays is defined in Table 14.3 of the RMS TMG (**Figure 4.3** below). In both cases, the predicted LOS for all lanes is LOS A.

| LoS                           | Control delay per vehicle in seconds (d)<br>(including geometric delay) |
|-------------------------------|---|
| <b>All intersection types</b> |   |
| A                             | d < 14  |
| B                             | d < 15 to 28  |
| C                             | d < 29 to 42  |
| D                             | d < 43 to 56  |
| E                             | d ≤ 57 to 70  |
| F                             | d > 70  |

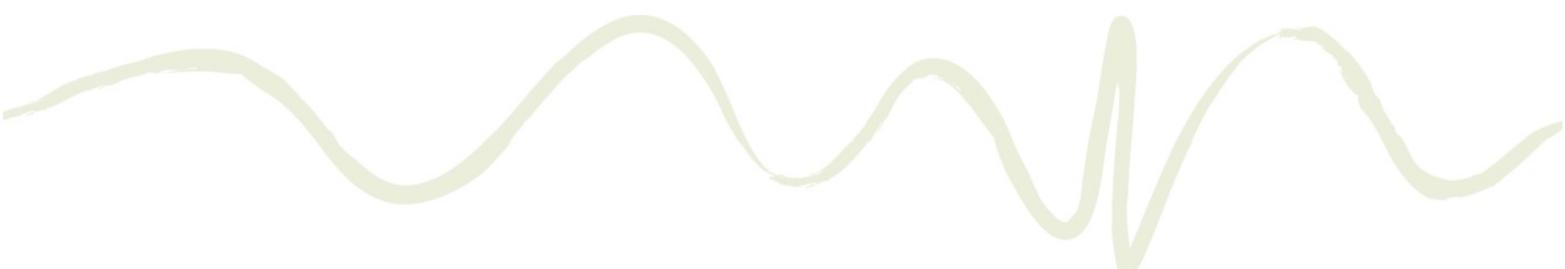
**Figure 4.3 Intersection LOS Definition, RMS TMG**

#### 4.3.2 Sensitivity Analysis

As a check of the capacity of the intersection, modelled traffic volumes for the site were increased to determine what would be required for a reduction in LOS. LOS A was maintained for all lanes with four times the development-generated traffic and higher. It was only with double the predicted traffic on MR545 and four times the traffic generated by the development that LOS impacts occurred, with the site access LOS dropping to C and MR545 lanes being maintained at LOS A.

This is in line with expectations, as the existing seagull intersection treatment provides for much greater traffic efficiency than the turn treatments warranted by AGRD06 for the site access.

As a result, the predicted traffic generation of the development, together with potential traffic generation of the broader region, is not expected to cause a reduction in the LOS on MR545.



## 5. Conclusion

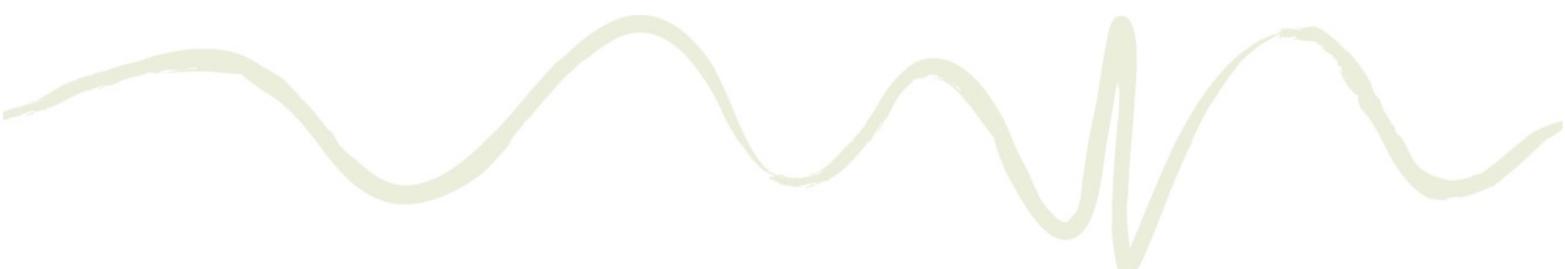
The expected traffic impact of the proposed development at the Linnaeus estate has been assessed to determine what changes (if any) would be required to ensure traffic safety and efficiency are maintained. This was carried out through an assessment of the existing site conditions, estimated parking requirements and estimated traffic generation of the development.

Parking requirements were calculated in accordance with the BSC DCP. The minimum required parking provision for the site, including existing and proposed uses, will be 99 parking spaces. Existing parking areas comply with the requirements of AS2890 for dimensions and manoeuvring and provide a minimum of 66 parking spaces, including three spaces for people with disabilities.

An additional two spaces will be required to be allocated for accessible parking in accordance with AS2890.6 as part of the proposed development. Additional parking areas to make up the total 99 parking spaces required should be designed according to AS2890.

The existing 'seagull' intersection arrangement on MR545 has been assessed according to the warrants for turn treatment and safe intersection sight distance according to Austroads. The existing arrangement provides for traffic safety and efficiency for both the existing development and expected development traffic generation, with ample capacity for much higher traffic volumes. The existing access connection to MR545 also has enough width and length to meet the requirements of AS2890 for access. As a result, it is expected that the existing arrangement will continue to operate satisfactorily for traffic safety under the proposed development.

As a result, no changes to the existing site access connection with MR545 are considered necessary. It is recommended that plans for additional car parking on the site be prepared in accordance with AS2890 and the BSC DCP and submitted to Council for approval. Car parking plans should include provision for at least two accessible parking spaces (five total) and provide enough spaces to bring the total parking on site to at least 99 parking spaces.



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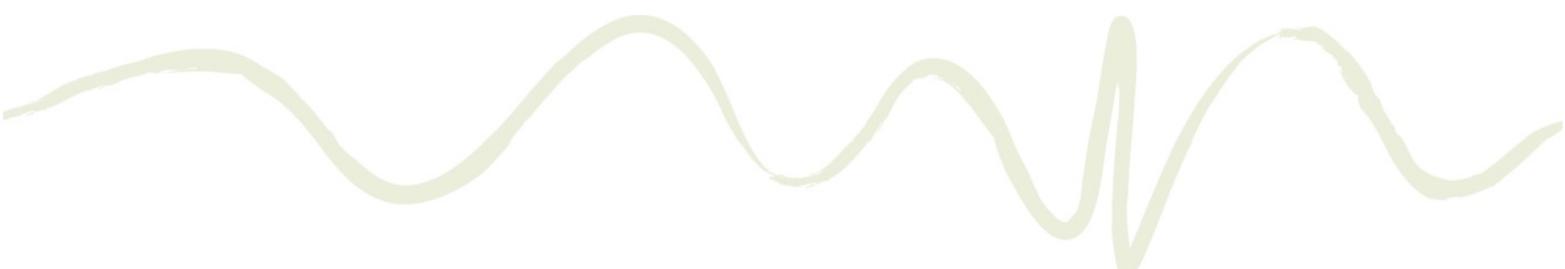
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The dimensions, number, size and shape of lots shown on drawings are subject to detailed engineering design, final survey and Council conditions of consent.

Topographic information presented on the drawings is suitable only for the purpose of the document as stated above. No reliance should be placed upon topographic information contained in this report for any purpose other than that stated above.



# Appendix A

## Project Plans

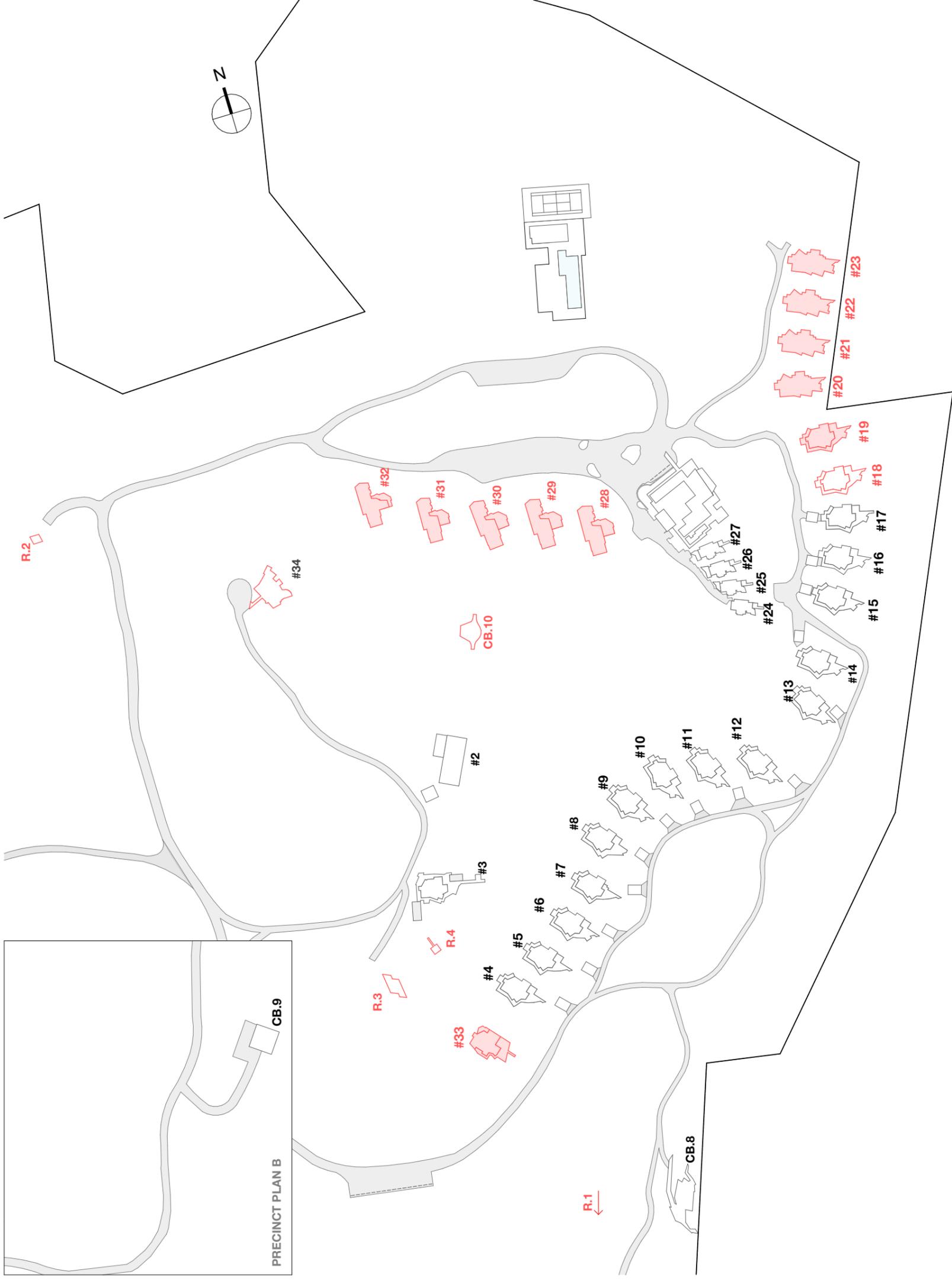


# BUILDING CLASSIFICATION LIST

| DA Buildings - Existing |                      |                      |           |                      |
|-------------------------|----------------------|----------------------|-----------|----------------------|
| N#                      | Name                 | Area                 | Occupancy | Category             |
| 2                       | Hill House           | 220                  | 4         | Residence            |
| 3                       | Accommodation (Hill) | 184                  | 3         | Accommodation Type A |
| 4                       | Accommodation        | 184                  | 3         | Accommodation Type A |
| 5                       | Accommodation        | 184                  | 3         | Accommodation Type A |
| 6                       | Accommodation        | 184                  | 3         | Accommodation Type A |
| 7                       | Accommodation        | 184                  | 3         | Accommodation Type A |
| 8                       | Accommodation        | 184                  | 3         | Accommodation Type A |
| 9                       | Accommodation        | 184                  | 3         | Accommodation Type A |
| 10                      | Accommodation        | 184                  | 3         | Accommodation Type A |
| 11                      | Accommodation        | 184                  | 3         | Accommodation Type A |
| 12                      | Accommodation        | 184                  | 3         | Accommodation Type A |
| 13                      | Accommodation        | 184                  | 3         | Accommodation Type A |
| 14                      | Accommodation        | 184                  | 3         | Accommodation Type A |
| 15                      | Accommodation        | 184                  | 3         | Accommodation Type A |
| 16                      | Accommodation        | 184                  | 3         | Accommodation Type A |
| 17                      | Accommodation        | 184                  | 3         | Accommodation Type A |
| 24                      | Centre Accom         | 55                   | 2         | Accommodation Type B |
| 25                      | Centre Accom         | 55                   | 2         | Accommodation Type B |
| 26                      | Centre Accom         | 55                   | 2         | Accommodation Type B |
| 27                      | Centre Accom         | 55                   | 2         | Accommodation Type B |
| CB.1                    | Centre               | 368                  | -         | Community Building   |
| CB.4                    | Pool                 | 65                   | -         | Community Building   |
| CB.8                    | Crab                 | 60                   | -         | Community Building   |
| CB.9                    | Interpretive Centre  | 150                  | -         | Community Building   |
| TOTAL                   |                      | 3,843 m <sup>2</sup> | 57        |                      |

| DA Buildings - Approved/Unbuilt |                    |                    |           |                      |
|---------------------------------|--------------------|--------------------|-----------|----------------------|
| N#                              | Name               | Area               | Occupancy | Category             |
| 1.1                             | Retiree Building   | 36                 | -         | Community Building   |
| 18                              | Accommodation      | 184                | 3         | Accommodation Type A |
| 34                              | Hill House         | 205                | 4         | Residence            |
| CB.10                           | Underground Chapel | 41                 | -         | Community Building   |
| R.1                             | Retreat A          | 39                 | -         | Retreats             |
| R.2                             | Retreat B          | 32                 | -         | Retreats             |
| R.3                             | Retreat C          | 68                 | -         | Retreats             |
| R.4                             | Retreat D          | 9                  | -         | Retreats             |
| TOTAL                           |                    | 614 m <sup>2</sup> | 7         |                      |

| Buildings - Approved (Not Utilised) |               |                      |            |                      |
|-------------------------------------|---------------|----------------------|------------|----------------------|
| N#                                  | Zone Name     | Area                 | Occupancy  | Category             |
| 19                                  | Accommodation | 184                  | 3.5        | Accommodation Type A |
| 20                                  | Accommodation | 184                  | 3.5        | Accommodation Type A |
| 21                                  | Accommodation | 184                  | 3.5        | Accommodation Type A |
| 22                                  | Accommodation | 184                  | 3.5        | Accommodation Type A |
| 23                                  | Accommodation | 184                  | 3.5        | Accommodation Type A |
| 28                                  | Ridge House   | 206                  | 3.5        | Accommodation Type D |
| 29                                  | Ridge House   | 206                  | 3.5        | Accommodation Type D |
| 30                                  | Ridge House   | 206                  | 3.5        | Accommodation Type D |
| 31                                  | Ridge House   | 206                  | 3.5        | Accommodation Type D |
| 32                                  | Ridge House   | 206                  | 3.5        | Accommodation Type D |
| 33                                  | Accommodation | 213                  | 3.5        | Accommodation Type C |
| TOTAL                               |               | 2,163 m <sup>2</sup> | 38.5       |                      |
| Unallocated                         |               |                      | 9.5        |                      |
| <b>APPROVED OCCUPANCY</b>           |               |                      | <b>112</b> |                      |



**LEGEND**  
 Existing Buildings  
 Approved + Unbuilt buildings.  
 Approved + Not Utilised

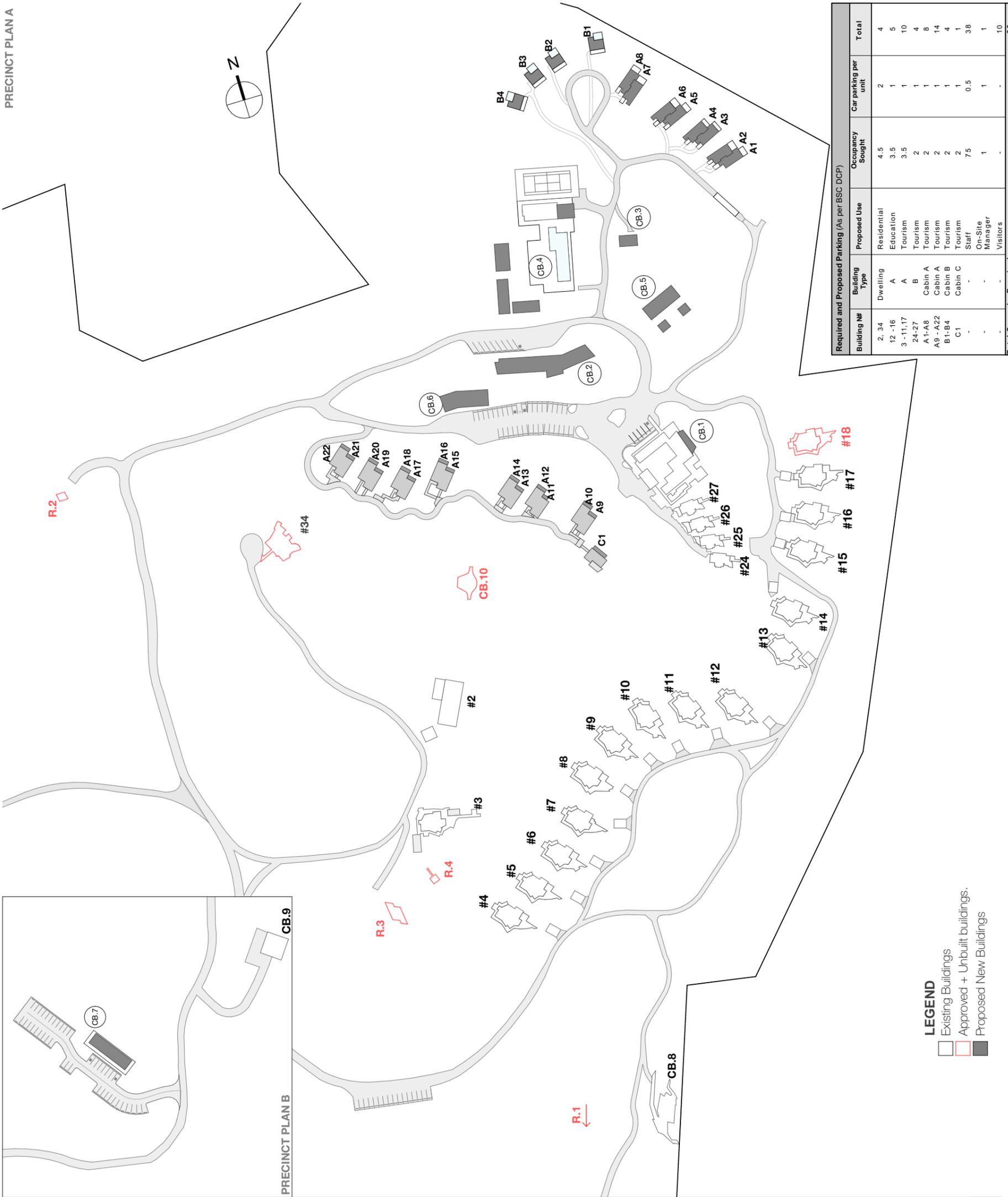
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| <b>HARLEY GRAHAM ARCHITECTS</b><br>LEVEL 1/144 JOHNSON STREET BYRON BAY   PO BOX 1285 NSW 2481<br>F: 02 66809820   T: 02 66809690   E: office@harleygraham.com<br>ABN: 85158246003 NSW 7892 |  | All building works to be carried out in accordance with the Building Code of Australia (BCA) and to the satisfaction of the principle certifying authority.<br>Builders/Contractors are to verify all dimensions prior to commencement of site work or off-site fabrication.<br>* Figured dimensions take precedence - do not scale. | SCALE: <b>1:2000</b><br>SHEET N <sup>o</sup> : <b>DA 01</b><br>DATE: 17/9/20   |
|   |  | REVISION: <b>DA</b><br>PAPER: <b>A3</b>  | ADDRESS: <b>951 BROKEN HEAD RD</b><br>LOT + DP: <b>LOT 1 DP 1031848</b>  |
|   |  | CLIENT: <b>Limaeus Property Trust</b><br>JOB NAME: <b>HGA 206 - ECO TOURISM</b>  | DATE: 24/0/20<br>DEVELOPMENT APPLICATION: 2/6/20<br>REVISED DA: 24/7/20<br>REVISED DA - AS PER RFS RESPONSE: 17/9/20 |
|   |  | DRAWING: <b>Precinct Plan (Existing Approvals)</b><br>DRAWN: H.P.<br>CHECKED: H.G.   |  |

**BUILDING CLASSIFICATION LIST**

| DA Buildings - Existing |                      |                      |                    |
|-------------------------|----------------------|----------------------|--------------------|
| N#                      | Name                 | Area                 | Proposed Occupancy |
| 2                       | Hill House           | 220                  | 4.5                |
| 3                       | Accommodation (Hill) | 184                  | 3.5                |
| 4                       | Accommodation        | 184                  | 3.5                |
| 5                       | Accommodation        | 184                  | 3.5                |
| 6                       | Accommodation        | 184                  | 3.5                |
| 7                       | Accommodation        | 184                  | 3.5                |
| 8                       | Accommodation        | 184                  | 3.5                |
| 9                       | Accommodation        | 184                  | 3.5                |
| 10                      | Accommodation        | 184                  | 3.5                |
| 11                      | Accommodation        | 184                  | 3.5                |
| 12                      | Accommodation        | 184                  | 3.5                |
| 13                      | Accommodation        | 184                  | 3.5                |
| 14                      | Accommodation        | 184                  | 3.5                |
| 15                      | Accommodation        | 184                  | 3.5                |
| 16                      | Accommodation        | 184                  | 3.5                |
| 17                      | Accommodation        | 184                  | 3.5                |
| 24                      | Centre Accom         | 55                   | 2                  |
| 25                      | Centre Accom         | 55                   | 2                  |
| 26                      | Centre Accom         | 55                   | 2                  |
| 27                      | Centre Accom         | 55                   | 2                  |
| CB.1                    | Centre               | 368                  | -                  |
| CB.4                    | Pool                 | 65                   | -                  |
| CB.8                    | Crab                 | 60                   | -                  |
| CB.9                    | Interpretive Centre  | 150                  | -                  |
|                         |                      | 3,843 m <sup>2</sup> | 65                 |

| DA Buildings - Approved/Unbuilt |                    |                          |                    |
|---------------------------------|--------------------|--------------------------|--------------------|
| N#                              | Name               | Area                     | Proposed Occupancy |
| 1.1                             | Refuse Building    | 36                       | -                  |
| 18                              | Accommodation      | 184                      | 3.5                |
| 34                              | Hill House         | 205                      | 4.5                |
| CB.10                           | Underground Chapel | 41                       | -                  |
| R.1                             | Retreat A          | 39                       | -                  |
| R.2                             | Retreat B          | 32                       | -                  |
| R.3                             | Retreat C          | 68                       | -                  |
| R.4                             | Retreat D          | 9                        | -                  |
|                                 | <b>TOTAL</b>       | <b>614 m<sup>2</sup></b> | <b>8</b>           |

| DA Buildings - Proposed |                          |                            |                                 |
|-------------------------|--------------------------|----------------------------|---------------------------------|
| N#                      | Name                     | Area                       | Occupancy                       |
| A                       | Cabin (9-22)             | 630                        | 28                              |
| A                       | Cabin (1-8)              | 360                        | 16                              |
| B                       | Rainforest Retreat (1-4) | 176                        | 8                               |
| C                       | Treehouse Retreat        | 55                         | 2                               |
| CB.1                    | Centre Additions         | 41                         | -                               |
| CB.2                    | Refuge Building 1        | 370                        | -                               |
| CB.3                    | Refuge Building 2        | 50                         | -                               |
| CB.4                    | Food Offering (Pool)     | 64                         | -                               |
| CB.4                    | Wellness Facilities      | 313                        | -                               |
| CB.5                    | Shed                     | 186                        | -                               |
| CB.6                    | Bin + Store Building     | 135                        | -                               |
| CB.7                    | Depot Building           | 164                        | -                               |
|                         | <b>TOTAL</b>             | <b>2,544 m<sup>2</sup></b> | <b>54</b>                       |
|                         | Unallocated              |                            | 21.5                            |
|                         |                          |                            | <b>PROPOSED OCCUPANCY 148.5</b> |



**LEGEND**  
 Existing Buildings  
 Approved + Unbuilt buildings.  
 Proposed New Buildings

| Required and Proposed Parking (As per BSC DCF) |               |                 |                  |                      |           |
|--|---------------|-----------------|------------------|----------------------|-----------|
| Building #                                     | Building Type | Proposed Use    | Occupancy Sought | Car parking per unit | Total     |
| 2, 34  | Dwelling      | Residential     | 4.5              | 2                    | 4         |
| 12 -16   | A             | Education       | 3.5              | 1                    | 5         |
| 3 -11,17                                       | A             | Tourism         | 3.5              | 1                    | 10        |
| 24-27  | B             | Tourism         | 2                | 1                    | 4         |
| A1-A8  | Cabin A       | Tourism         | 2                | 1                    | 8         |
| A9 - A22                                       | Cabin A       | Tourism         | 2                | 1                    | 14        |
| B1-B4  | Cabin B       | Tourism         | 2                | 1                    | 4         |
| C1   | Cabin C       | Tourism         | 2                | 1                    | 1         |
| -  | -             | Staff           | 75               | 0.5                  | 38        |
| -  | -             | On-Site Manager | 1                | 1                    | 1         |
| -  | -             | Visitors        | 1                | 1                    | 10        |
|  |               |                 |                  |                      | <b>99</b> |

|  |                                  |   |               |
|--|----------------------------------|---|---------------|
| <b>HARLEY GRAHAM ARCHITECTS</b>  |                                  | LEVEL 1/144 JOHNSON STREET BYRON BAY   PO BOX 1285 NSW 2481 |               |
| F: 02 66809820   T: 02 66809690   E: office@harleygraham.com   |                                  | ABN: 85158246003 NSW 7892                                   |               |
| • All building works to be carried out in accordance with the Building Code of Australia (BCA) and to the satisfaction of the principle certifying authority.<br>• Builders/Contractors are to verify all dimensions prior to commencement of site work or off-site fabrication.<br>• Figured dimensions take precedence - do not scale. |                                  | © COPYRIGHT HARLEY GRAHAM ARCHITECTS                        |               |
| REV  | ISSUE NAME                       | CLIENT  | DATE          |
| 01   | DEVELOPMENT APPLICATION          | Limaseus Property Trust                                     | 24/02/20      |
| 02   | REVISED DA                       |   | 26/02/20      |
| 03   | REVISED DA                       |   | 24/7/20       |
| 04   | REVISED DA - AS PER RFS RESPONSE |   | 17/9/20       |
| ADDRESS: 951 BROKEN HEAD RD  |                                  | REVISION  | SCALE: 1:2000 |
| LOT + DP: LOT 1 DP 1031848   |                                  | PAPER   | SHEET N#      |
|  |                                  | DA  | DA 02         |
|  |                                  | A3  | DA 02         |
|  |                                  |   | DATE: 17/9/20 |
|  |                                  |   | CHECKED: H.G  |
|  |                                  |   | DRAWN: H.P    |
| <b>Precinct Plan A + B + (Existing + Proposed)</b>   |                                  |   |               |

| Category     | Name                     | Cabin     | Type       |
|--------------|--------------------------|-----------|------------|
| Cabin Type A | Cabin (1-8)              | 01        | Standard   |
| Cabin Type A | Cabin (1-8)              | 02        | Standard   |
| Cabin Type A | Cabin (1-8)              | 03        | Accessible |
| Cabin Type A | Cabin (1-8)              | 04        | Accessible |
| Cabin Type A | Cabin (1-8)              | 05        | Accessible |
| Cabin Type A | Cabin (1-8)              | 06        | Accessible |
| Cabin Type A | Cabin (1-8)              | 07        | Standard   |
| Cabin Type A | Cabin (1-8)              | 08        | Standard   |
| Cabin Type A | Cabin (9-22)             | 09        | Standard   |
| Cabin Type A | Cabin (9-22)             | 10        | Standard   |
| Cabin Type A | Cabin (9-22)             | 11        | Standard   |
| Cabin Type A | Cabin (9-22)             | 12        | Standard   |
| Cabin Type A | Cabin (9-22)             | 13        | Standard   |
| Cabin Type A | Cabin (9-22)             | 14        | Standard   |
| Cabin Type A | Cabin (9-22)             | 15        | Standard   |
| Cabin Type A | Cabin (9-22)             | 16        | Standard   |
| Cabin Type A | Cabin (9-22)             | 17        | Standard   |
| Cabin Type A | Cabin (9-22)             | 18        | Standard   |
| Cabin Type A | Cabin (9-22)             | 19        | Standard   |
| Cabin Type A | Cabin (9-22)             | 20        | Standard   |
| Cabin Type A | Cabin (9-22)             | 21        | Standard   |
| Cabin Type A | Cabin (9-22)             | 22        | Standard   |
| Cabin Type B | Rainforest Retreat (1-4) | 1         | Standard   |
| Cabin Type B | Rainforest Retreat (1-4) | 2         | Standard   |
| Cabin Type B | Rainforest Retreat (1-4) | 3         | Standard   |
| Cabin Type B | Rainforest Retreat (1-4) | 4         | Standard   |
| Cabin Type C | Trehouse Retreat         | 1         | Standard   |
|              | TOTAL                    | <b>27</b> |            |

- Accessible Compliant Buildings
- Accessible Path of Travel

**REFER TO BCA TABLE D3.1 & BCA TABLE D3.5**

**ACCESSIBILITY ASSESSMENT**

Completed by Francis Lenny @ DDA Consult.

**ACCESSIBILITY**

- 4 x Type A Cabins

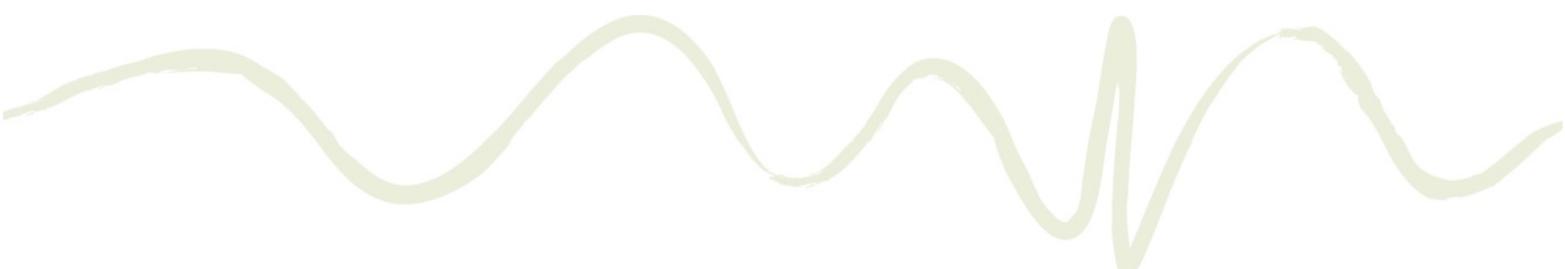
**PARKING**

- Distances to car parks to be minimum requirement for Class 3 Buildings.
- All Accessible Cabins to have accessible car spaces as per BCA requirements.
- Detail to be provided with Construction Certificate Drawings
- Performance solution required for Pedestrian Access



|   |  |                           |            |              |          |
|---|--|---------------------------|------------|--------------|----------|
| <b>HARLEY GRAHAM ARCHITECTS</b>                             |  | 951 BROKEN HEAD RD        |            | REVISION     | SCALE    |
|   |  | LOT 1                     | DP 1031848 | DA           | 1:1000   |
| LEVEL 1/144 JOHNSON STREET BYRON BAY   PO BOX 1285 NSW 2481 |  | Linnaeus Property Trust   |            | PAPER        | SHEET N° |
| F: 02 66809820   T: 02 66809690   E: office@haleygraham.com |  | HGA 206 - ECO TOURISM     |            | A3           | DA 03    |
| ABN: 85158246003 NSW 7892                                   |  | DRAWING                   |            | DRAWN: H.P   | DATE     |
|   |  | <b>Accessibility Plan</b> |            | CHECKED: H.G | 17/9/20  |

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**Appendix B**  
**SIDRA Results**

# LANE SUMMARY

Site: Access [Linnaeus]

MR545

Site Category: (None)

Giveaway / Yield (Two-Way)

Sensitivity Analysis (Critical Gap & Follow-up Headway): Results for Parameter Scale = 80.0 %

Note that the figures used in the model for trip generation associated with the development were slightly higher than those proposed, based on a previous iteration of the proposal. Thus, the results are slightly conservative.

| Lane Use and Performance       |             |                   |            |               |              |                   |                  |  |  |
|--------------------------------|-------------|-------------------|------------|---------------|--------------|-------------------|------------------|--|--|
|                                | Total veh/h | Demand Flows HV % | Cap. veh/h | Req. Sain v/c | Lane Util. % | Average Delay sec | Level of Service |  |  |
| <b>South: Byron Bay Road</b>   |             |                   |            |               |              |                   |                  |  |  |
| Lane 1                         | 268         | 9.3               | 1810       | 0.148         | 100          | 0.0               | LOS A            |  |  |
| Lane 2                         | 5           | 2.0               | 1375       | 0.004         | 100          | 7.6               | LOS A            |  |  |
| Approach                       | 274         | 9.2               |            | 0.148         |              | 0.2               | NA               |  |  |
| <b>East: Linnaeus Access</b>   |             |                   |            |               |              |                   |                  |  |  |
| Lane 1                         | 15          | 2.0               | 911        | 0.016         | 100          | 4.1               | LOS A            |  |  |
| Approach                       | 15          | 2.0               |            | 0.016         |              | 4.1               | LOS A            |  |  |
| <b>North: Broken Head Road</b> |             |                   |            |               |              |                   |                  |  |  |
| Lane 1                         | 5           | 2.0               | 1802       | 0.003         | 100          | 7.0               | LOS A            |  |  |
| Lane 2                         | 299         | 9.3               | 1810       | 0.165         | 100          | 0.0               | LOS A            |  |  |
| Approach                       | 304         | 9.2               |            | 0.165         |              | 0.1               | NA               |  |  |
| Intersection                   | 593         | 9.0               |            | 0.165         |              | 0.2               | NA               |  |  |

| Lane Use and Performance       |                       |        |             |               |             |                |  |  |  |
|--------------------------------|-----------------------|--------|-------------|---------------|-------------|----------------|--|--|--|
|                                | 95% Back of Queue Veh | Dist m | Lane Config | Lane Length m | Cap. Adj. % | Prob. Block. % |  |  |  |
| <b>South: Byron Bay Road</b>   |                       |        |             |               |             |                |  |  |  |
| Lane 1                         | 0.0                   | 0.0    | Full        | 500           | 0.0         | 0.0            |  |  |  |
| Lane 2                         | 0.0                   | 0.1    | Short       | 100           | 0.0         | NA             |  |  |  |
| Approach                       | 0.0                   | 0.1    |             |               |             |                |  |  |  |
| <b>East: Linnaeus Access</b>   |                       |        |             |               |             |                |  |  |  |
| Lane 1                         | 0.1                   | 0.4    | Full        | 100           | 0.0         | 0.0            |  |  |  |
| Approach                       | 0.1                   | 0.4    |             |               |             |                |  |  |  |
| <b>North: Broken Head Road</b> |                       |        |             |               |             |                |  |  |  |
| Lane 1                         | 0.0                   | 0.0    | Short       | 80            | 0.0         | NA             |  |  |  |
| Lane 2                         | 0.0                   | 0.0    | Full        | 500           | 0.0         | 0.0            |  |  |  |
| Approach                       | 0.0                   | 0.0    |             |               |             |                |  |  |  |
| Intersection                   | 0.1                   | 0.4    |             |               |             |                |  |  |  |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Lane LOS values are based on average delay per lane.

Minor Road Approach LOS values are based on average delay for all lanes.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Atçelik M3D).

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

# LANE LEVEL OF SERVICE

Lane Level of Service

▽ Site: Access [Linnaeus]

MR545

Site Category: (None)

Giveaway / Yield (Two-Way)

Sensitivity Analysis (Critical Gap & Follow-up Headway): Results for Parameter Scale = 80.0 %

|     | Approaches |      |       | Intersection |
|-----|------------|------|-------|--------------|
|     | South      | East | North |              |
| LOS | NA         | A    | NA    | NA           |

