# Traffic Impact Assessment

Proposed Tourist Attraction Kuranda

QTT17026

Prepared for Reever and Ocean Pty Ltd

28 March 2018





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# 1 Introduction

Cardno has been commissioned by Reever and Ocean Pty Ltd (Reever and Ocean) to provide a Traffic Impact Assessment (TIA) report for a proposed tourist attraction, located at Barnwell Road, Kuranda, located 22km north-west of Cairns. The tourist attraction will provide a range of activities and experiences for visitors, including quad bike tours, horse riding tours, tractor and trailer rides, horse and cart rides, cow milking and presentations on rural operations. The key deliverable is to determine the impact and mitigation treatments (if any) required for the external road network, including the intersections of Kennedy Highway/Myola Road and Myola Road/Barnwell Road as outlined in Figure 2-1. Drawings of the proposed development have been provided and are attached in Appendix A.

#### 1.1 Scope

The objective of this report is to understand the traffic and transport issues associated with the proposed development of a tourist attraction. The report will form part of the Development Application (DA) for the proposal and provides the relevant approval authorities, including Mareeba Shire Council, the opportunity to adequately consider any traffic or transport related impacts.

Based on our understanding of the site and of Reever and Ocean's requirements, Cardno has been engaged to undertake the following tasks to complete this assessment:

- > Review the existing road network to understand the current road connections and conditions.
- > Estimate the traffic generation of the site based on the proposed land uses and activities.
- > Estimate the traffic distribution onto the surrounding road network
- > Provide engineering advice on access arrangements into the site and geometric requirements including upgrade requirements (if any) to adjacent roads and intersections.
- > Assessment of the impact of the additional trips generated from the development on the local road network.
- > Analysis of the impact of the development on the road network for the year of opening and the design horizon

#### 1.2 References

In preparing this report, references are made to the following traffic engineering and council sources:

- > Austroads Guide to Road Design Part 4A (2017)
- > Austroads Guide to Road Design Part 3 (2016)
- > Austroads Guide to Traffic Management Part 6 (2017)
- > Mareeba Shire Planning Scheme (2016)
- > Manual of Uniform Traffic Control Devices Part 2 (2003)
- > Guide to Traffic Impact Assessment (2017)
- > Far North Queensland Regional Organisation of Councils Development Manual (2014)
- > Department of Transport and Main Roads: Road Planning and Design Manual (2004)

# 2 Existing Situation

#### 2.1 Site location

The site is located west of Cairns in North Queensland and is accessible via the Kennedy Highway. Figure 2-1 provides a profile of the site within the northern region.





Source: https://geohub.au.cardno.com/





Source: Nearmap

#### 2.2 Land Use and Zoning

The proposed development falls within the Rural Zone of the Mareeba Shire Planning Scheme (2016). The anticipated traffic growth rate of the surrounding area is considered to be relatively low.



Figure 2-3 Extract from Mareeba Shire Planning Scheme

Source: Mareeba Shire Planning Scheme (2016) Zoning Map (ZM011)

#### 2.3 Road Network

The site is accessed from Barnwell Road. A profile of the surrounding road network site is outlined in Table 2-1.

#### Table 2-1 Existing road network

Road	Road Hierarchy	Form	Posted Speed
Kennedy Highway	State controlled road	Two lane undivided	80km/h
Myola Road	Major rural road	Two lane undivided	60km/h
Barnwell Road	Minor rural road	Two lane undivided	60km/h

Source: Mareeba Shire Council Overlay Map OM012f and site Inspection

Kennedy Highway is a state controlled road linking Cairns to the Atherton Tablelands which includes Kuranda. Kennedy Highway (Figure 2-4) is an 80km/h, 7.0m wide, two lane, undivided sealed road with line markings and shoulders which extend to four lanes on approach to its intersection with Myola Road.





Source: Nearmap

Myola Road is a major rural road connecting Kuranda to communities located along the Barron River including Myola and Kowrowa. The Kuranda District State College is also located on Myola Road. Myola Road is an undivided sealed road with a posted speed of 60km/h, with a pavement width varying from 6.0m to 7.0m and comprising of two lanes with line markings and shoulders (on intersection approaches only).

#### Figure 2-5 Myola Road



Source: Kuranda site visit

Barnwell Road is a 5.0m wide, two lane road with no line markings or shoulders. A 60km/h area sign posted at the Myola Road / Barnwell Road intersection applies throughout the area unless indicated otherwise. The northern section of Barnwell Road, approximately 650m south of Myola Road/Barnwell Road intersection, comprises of a sealed pavement and turns to a gravel surface ranging from 3.3m to 5.0m in width outlined in Figure 2-6 and Figure 2-7. This gravel section of the road currently provides access to only three (3) properties.





Source: Kuranda site visit

#### Figure 2-7 Barnwell Road (unsealed section)



Source: Kuranda site visit

### 2.4 Crash History

A review of the crash data for the past five (5) years for the road network around the site has been undertaken and is summarised in Table 2-2 with locations shown in Figure 2-8.

Table 2-2 Crash Data			
Location	Date	Type & DCA Code	Casualty
Myola Road	February 2013	Hit Object 804	Medically Treated
Kennedy Highway intersection	August 2013	Angle from Adjacent Approach 101	Medically Treated
Myola Road	November 2015	Hit Object 803	Hospitalisation





Source: Nearmap, & Department of Transport and Main Roads

### 2.5 Traffic flows

#### 2.5.1 Surveys

Traffic surveys were carried out by AusTraffic, on the Wednesday May 10<sup>th</sup> 2017, from 6:00AM to 8:00PM at the following locations;

- 1. Myola Road / Oak Forest Road / Barnwell Road Intersection
- 2. Kennedy Highway / Myola Road / Rob Veivers Drive Intersection
- 3. Barnwell Road (300m south of Kingfisher Drive)

#### Figure 2-9 Traffic Survey Locations



Source: Nearmap

The Average Annual Daily Traffic (AADT) Volume for Kennedy Highway was provided from Transport and Main Roads Traffic Census Data (2016). The daily volumes for Myola Road and Barnwell Road are estimated from peak hour flows (survey) and factored (15% for rural roads) as per *Austroads Guide to Traffic Management Part 6 (2017) Cl 2.3.6.* Table 2-3 outlines the AADT volumes for the roads of interest.

#### Table 2-3Daily Traffic Flows

Road	AADT* (vpd)
Kennedy Highway (North of Myola Road)	8740
Kennedy Highway (South of Myola Road)	5830
Myola Road	1560
Barnwell Road	55

#### \*Values rounded up

A review of the traffic survey data was undertaken, and the common peak hour period was identified for all surveyed intersections as follow;

- > Morning (AM) Peak: 8:15AM 9:15AM
- > Afternoon (PM) Peak: 2:30PM 3:30PM

A summary of the morning and afternoon peak hour traffic flows at the intersection of Myola Road and Kennedy Highway and the intersection of Barnwell Road and Myola Road is shown in Figure 2-10 and Figure 2-11. Full details for intersection surveys are provided in Appendix B.



Figure 2-10 Kennedy Highway/Myola Road Intersection flows (Peak Flows)

Figure 2-11 Myola Road/Barnwell Road Intersection flows (Peak Flows)



## 3 Proposed Development

#### 3.1 Summary of Development

The proposed development consists of a tourist attraction providing various outdoor activities. The development is planned for 300 tourists, which will consist of a three (3) stage masterplan consisting of:

- > Stage 1 up to 60 tourists (TA-60),
- > Stage 2 up to 150 tourists (TA-150),
- > Stage 3 up to 300 tourists (TA-300)

For the purpose of this assessment, the ultimate scale (TA-300) has been analysed. Development plans relevant to these three stages are enclosed in Appendix A.

Tourists will travel to the site via bus services to and from Cairns and Kuranda. Figure 3-1 provides an indicative development plan, enclosed in Appendix A is a detailed plan.

Figure 3-1 Development Proposal (Stage TA-300 Plan)



Source: Cardno HRP16299-006-FIG23 D

#### 3.2 Access

All traffic associated with the development will access the site from a driveway off Barnwell Road refer to Figure 3-2. Access to the external road network will be along Myola Road through to the intersection with Kennedy Highway.



Figure 3-2 Access to Development Site

Source: Nearmap, Site Inspection

# 4 Development Impact

### 4.1 Existing Traffic Movements

#### 4.1.1 Trip Generation

In order to analyse the impact of the development on the existing transport infrastructure, it is necessary to assess the number of trips generated to and from the site and where they are likely to travel. Whilst reference has been made to the Austroads Guides and RTA Guidelines, there are no specific traffic generation rates for tourist attractions.

The potential development traffic generation from the site has been reviewed based on information provided by the applicant. The facility will provide activities for up to 300 people per day (TA-300) split 150 people for morning activities and 150 people for afternoon activities. Buses will be used to transport tourists from Cairns and Kuranda to the site, buses will carry a maximum capacity of 50 tourists per bus, however for a conservative approach 30 tourists per bus have been assessed. Buses will arrive to site and drop off tourists then depart back to Cairns, similarly, they will arrive to pick up tourists and depart back to Cairns.

An estimate of 38 staff members are proposed on site, arriving in a private vehicle in the AM peak and departing in the PM peak. Table 4-1 outlines an estimate of trip generation for the TA-300 scale of the development.

#### Table 4-1 Daily Trip Generation (300 Tourists)

Daily Trip Generation			
Persons	Mode share	Trips	
300 Tourists	100% by Bus (30 tourists per bus)	30 Trips (15 arrivals and 15 departures)	
38 Staff	Private vehicle	76 Trips (38 arrivals and 38 departures)	
Total		106 trips	

Therefore the total daily trips generated from the development will 106 vehicles per day with 48 vehicles during the AM peak and 58 vehicles per hour during the PM peak.

#### 4.2 Traffic Growth Rate

Traffic growth applied to the background traffic volumes represents the increase in traffic associated with the surrounding area. A compound growth of 2% has been adopted to flows on Kennedy Highway and Rob Vievers Drive, and a growth of 1% has been applied to Myola Road and Barnwell Road. These flows have been analysed at the predicted 2019 opening year through to the 2029 design horizon (10-year design horizon).

#### 4.3 Assessed Intersections

The following intersections have been assessed to determine the operational performance. Figure 4-1 illustrates the locations of the assessed intersections:

- 1. Priority controlled T-intersection at Myola Road and Barnwell Road
- 2. Signalised intersection at Kennedy Highway, Myola Road and Rob Veivers Drive; and



Figure 4-1 SIDRA Assessment locations

Source: Nearmap

#### 4.4 Assessment Scenarios

The following scenarios have been assessed for the proposed development:

- > 2017 Background Traffic
- > 2019 Background Traffic (Year of Opening)
- > 2029 Background Traffic (10 year Design Horizon)
- > 2019 With Development TA-300 Scale (300 Tourists) (Year of Opening)
- > 2029 With Development TA-300 Scale (300 Tourists) (10 year Design Horizon)

The background, future traffic and development traffic scenario volumes have been included in Appendix C. Detailed SIDRA analysis outputs are provided in Appendix D.

#### 4.5 SIDRA Assessment Criteria

The performance of each intersection was analysed using SIDRA Intersection 7 (SIDRA) which is an industry recognised analysis tool that estimates the capacity and performance of intersections based on input parameters, including geometry and traffic volumes, and provides estimates of an intersection's Degree of Saturation (DOS), queues and delays. Simplistically, DOS is a measure of the proportion of traffic entering an intersection relative to the intersection's capacity. Table 4-2 provides the defined DOS intervention thresholds for intersections.

Table 4-2	Adopted	Intersection	Performance	Threshold	– Degree	of Saturation
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Intersection Control	DOS Threshold
Signals	Less than or equal to 0.90
Priority-controlled	Less than or equal to 0.80

Source: TMR Guidelines for Assessment of Road Impacts of Development (2006)

Importantly it is noted that DOS is not the only performance indicator and that other measures such as critical delay should also be considered when assessing the performance of an intersection. Other authorities such as the NSW Roads and Maritimes Services (RMS) recommend the use of the critical movement delay for assessing the performance of priority-controlled intersections. The RMS Guide to Traffic Generating Developments states that the average delay statistics for the critical movement provides a better indication of intersection performance and safety for priority-controlled intersections and roundabouts than DOS. Table 4-3 provides the RMS-defined delay thresholds.

Level of service is a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A key issue is determining the level of service that is deemed acceptable, and whether that level should be a projected level for future operations of a facility, or the level existing at the current operation of the facility.

LOS	Level of Service Description	Critical Delay
A	Good Operation	Less than 14 sec
В	Acceptable delays and spare capacity	15 to 28 sec
С	Satisfactory, but accident study required	29 to 42 sec
D	Near capacity and accident study required	43 to 56 sec
E	At capacity, requires or control mode	57 to 70 sec

 Table 4-3
 Adopted Intersection Performance Threshold – Critical Delay

Source: RMS Guide to Traffic Generating Developments

#### 4.6 Operational Assessment Results

#### 4.6.1 Kennedy Highway / Myola Road / Rob Veivers Drive Intersection

The current configuration of this intersection is a four-way signalised arrangement. The aerial and SIDRA assessed layout are illustrated in Figure 4-2. Phasing has been provided by TMR and has been attached for reference in Appendix E.

Figure 4-2 Current and SIDRA Assessed Layout – Kennedy Highway / Myola Road / Rob Veivers Drive Intersection



Source: Nearmap, SIDRA 7.0

Table 4-4	SIDRA Outputs	for Kennedy	Highway	/ Myola Road	/ Rob	Veivers	Drive	Intersection
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	AM Peak			PM Peak		
Scenarios	DOS	Delay	95 <sup>th</sup> %ile Queue	DOS	Delay	95 <sup>th</sup> %ile Queue
2017 Background	0.63	21sec	68m	0.73	25sec	59m
2019 Background	0.65	21sec	71m	0.74	26sec	62m
2029 Background	0.65	22sec	90m	0.82	27sec	77m
2019 With Development	0.66	21sec	71m	0.84	25sec	60m
2029 With Development	0.65	22sec	90m	0.88	27sec	82m

The results indicate the intersection operates within the typical performance thresholds (DOS  $\leq$  0.90 for signals) for all scenarios. It is noted that with the inclusion of the proposed expansion traffic, the critical delay and 95<sup>th</sup> percentile queue is not significantly impacted, when compared to the background scenarios. There is no requirement to provide mitigation measures for this intersection.

#### 4.6.2 Myola Road / Oak Forest Road / Barnwell Road Intersection

The current configuration of this intersection is priority controlled t-intersection. The aerial and SIDRA assessed layout are illustrated in Figure 4-3.

Figure 4-3 Current and SIDRA Assessed Layout - Myola Road / Oak Forest Road / Barnwell Road Intersection





		AM Pea	ık		PM Peak	
Scenarios	DOS	Delay	95 <sup>th</sup> %ile Queue	DOS	Delay	95 <sup>th</sup> %ile Queue
2017 Background	0.07	0.5sec	0m	0.06	0.4sec	0
2019 Background	0.06	0.5sec	0m	0.06	0.4sec	0m
2029 Background	0.07	0.5sec	0m	0.07	0.4sec	0m
2019 With Development TA-300 Scale	0.10	1.0sec	0m	0.07	1.6sec	1m
2029 With Development TA-300 Scale	0.10	1.3sec	0m	0.08	1.5sec	1m

The results indicate the current form of the intersection operates within the typical performance thresholds (DOS  $\leq$  0.90 for signals) for all scenarios. It is noted that with the inclusion of the proposed expansion traffic, the critical delay and 95<sup>th</sup> percentile queue is not significantly impacted, when compared to the background scenarios. No mitigation measures are required.

#### 4.7 Road Section Analysis

The traffic generation and distribution from the site has been assessed and the impacts of the proposed development on the state controlled road network, namely Kennedy Highway/Myola Road Intersection, have been reviewed.

TMR's Guide to Traffic Impact Assessment (2017) states, in Section 3.4, that TMR considers that it is unreasonable to require quantification of the impacts on intersections and road links, unless the development creates an increase in traffic exceeding 5% of base traffic for any movement.

The annual average daily traffic volume (AADT) for 2016 for Kennedy Highway has been obtained from TMR and indicates traffic flows of 8,740 vehicles per day in the vicinity of the subject site.

The proposed TA-300 scale (300 tourists) including the Myola Road / Barnwell Road intersection only generates an additional 106 trips per day [staff (76) + tourist buses (30)] to the road network. This traffic impact is below 5% of existing levels, therefore the impact on the state controlled road network is considered insignificant, and detailed analysis is considered unnecessary.

# 5 Road Safety

#### 5.1 Existing Safety Issues

An assessment of the existing road conditions has been undertaken via site inspection to determine if suitable improvements can be implemented to improve safety for all motorist. Consideration should be given to some additional traffic management devices to inform motorists of the road conditions in this area.

It should be noted that under current guidelines for rural roads it is the driver's responsibility to drive according to the road conditions, and maintain due care and attention at all times. Due to the varying conditions that gravel roads undergo as a result of changing weather conditions an assessment of the gravel pavement has not been undertaken.

Figure 5-3 indicates the areas of deficiencies within the road network.

- > Vehicles travelling to and from the site traverse a gravel access road of 3.3m-5.0m in width.
- > There is inadequate delineation to warn drivers of hazards such as culverts within the road reserve.
- > Existing signage throughout the access road is in poor condition reducing effectiveness.
- > Overgrown vegetation obstructs signage.

Sight visibility on both approaches to the bend illustrated below is constrained by dense vegetation. At the intersection road sign shown below is also completely obstructed. Guide posts warning vehicles of the culvert at the bend is the main concern of this obstruction.





Source: Site Inspection

#### 5.1.2 Delineation

As stated in Chapter 2 of the MUTCD Section 3.2.2.1 *Guide posts with delineators are normally the only devices used on undivided rural roads where pavements are less than 5.5m wide.* 

The delineation along various sections of Barnwell Road is inadequate and therefore it is recommended that guideposts be installed as per Clause 3.2.4 of Part 2 of the MUTCD along Barnwell Road. Guide Posts should be provided at, or near, the edge of the road formation with a recommended clearance between opposite guide posts of 6.2m minimum. It is recommended that guide posts be provided at a spacing of 300m on straight sections of road with 60m minimum spacing on curves. Guideposts are to be provided at all creek crossings (floodways) at a spacing of 25m maximum with posts provided in pairs, one each side of the formation.

#### 5.1.3 Warning Signs

There is no *gravel road* warning sign on Barnwell Road. There are no signs warning drivers of approaching crests and curves. It is recommended that a gravel road warning sign (W5-19) (refer to figure 5-3) be installed on Barnwell Road just prior to the end of the sealed pavement to warn road users of the unsealed road conditions. Whilst delineation will assist in guiding motorists, consideration may be given to providing a crest (W5-11) warning signs and Curve (W1-3) warning signs at appropriate locations.

Figure 5-2 Extract from MUTCD regarding Gravel Warning Signs



#### 5.1.4 Vegetation

There are locations along Barnwell Road where sight visibility could be enhanced by the removal of overgrown vegetation within the road reserve. Removal of overgrown vegetation within the road reserve will enhance sight visibility, and increase safety for motorists on approach to the two residential properties on the gravel section and on approaches to crests and curves.

#### 5.1.5 Dust Mitigation

The additional development traffic may have the potential to generate dust during times of dry weather. It is recommended that watering of the gravel road surface be undertaken near residential properties off Barnwell Road to suppress dust particles.

#### Figure 5-3 Areas of deficiencies



Source: Nearmap

# 6 Parking

#### 6.1 Parking Arrangements

In accordance with the guidelines for parking and access outlined in Council's Planning Scheme, the requirements for parking spaces for tourist attraction is not specified and "as determined by Council". Therefore, advice has been obtained from the operator to ensure the provision for parking adequately services the site.

As per the client's comments, the parking demand has been estimated at 38 staff members. A conservative assumption has been adopted as each staff member will require an individual parking space. The TA-300 scenario has been applied adopting 300 tourists at one (1) bus per thirty (30) tourists.

0	
	Parking Demand
Persons	Mode share
300 Tourists	5 Bus spaces at any time (buses arrive/depart in groups of 5 throughout the day)
38 Staff	38 Private vehicle
Total	43 spaces (including 5 bus spaces)

#### Table 6-1 Parking Demand TA-300 Scale (300 Tourists)

#### 6.2 Adequacy of Car Parking

Development plans indicate a gravel car parking area of which dimensions are able to accommodate over 38 staff parking spaces, 4 bus set down spaces with an additional 7 bus parking spaces to be provided on-site (refer to Appendix A for development plan). This provision is considered to be appropriate in accordance with the client's requirements of expected buses and staff.

It is recommended the design include specific provision for disabled parking with suitable pedestrian connections from the car park to the buildings. Safe and convenient pedestrian connection should also be provided for tourists arriving and departing by bus. Specific service areas should be allocated for waste collection, deliveries and loading and unloading of goods. Car parking must comply with AS2890.1 and servicing must comply with AS2890.2.

# 7 Design Consideration

### 7.1 Road Characteristics

A review of the capacity and formation of the existing sections of road has been undertaken to determine the suitability for a tourist attraction development of up to 300 tourists. In accordance with the Far North Queensland Regional Organisation of Councils Development Manual (FNQROC) (2014), rural roads with less than 100vpd require a formation of 8.0m and a seal width of 4.5m (Figure 7.1). The existing sealed width of Barnwell Road is approximately 5.0m, complying with FNQROC (2014). The southern gravel section of Barnwell Road currently functions as a driveway to access three rural properties.

Traffic Volume or Road Class	<100VPD	100 <u>-</u> 999	1000 - 2999 (or rural collector)	>3000 (or sub-arterial)
Road Reserve (flat terrain ≤ 5%)	20m	20m	25m	MR
Road Reserve <sup>2</sup> (Undulating/Hilly > 5%)	25m	25m	30m	DS or E
Formation	8m	8m	10m	ROAI
Pavement Width	5.5m	6.5m	8m	h AUST
Seal Width	4.5 <sup>1,7</sup>	6.5m	8m (incl. 0.5m sealed shoulders)	ce wit
Shoulders <sup>3</sup>	1.25m Approved Select material	0.75m gravel	1m gravel	d in accordan es.
Desirable Speed Environment	100kph	100kph	100kph	esignec
Design Speed for Individual Elements (Minimum)	80kph	80kph	80kph	To be de design g

Figure 7-1 Rural Road Elements	Figure 7	7-1	Rural	Road	<b>Elements</b>	
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Source: Far North Queensland Regional Organisation of Councils Development Manual (2014)

Barnwell Road is approaching 100vpd at the intersection with Myola Road, however toward the development site the traffic flows on Barnwell Road are very low. The estimated existing traffic flows on the gravel section of pavement is estimated to be less than 30 vehicles per day due to the residential catchment providing access to only two dwellings and the subject site. With the proposed development, Barnwell Road (sealed section) will fall within the 100-999vph criteria and will therefore require an upgraded seal width of 6.5m to comply with the FNQROC Development Manual (2014).

It is recommended that as part of the TA-300 stage of development of up to 300 tourists, which generates 30 bus trips and 76 staff trips, that additional traffic management improvements be made on the gravel section of Barnwell Road, as outlined in Section 5 of this report, to improve safety for all road users.

For the traffic flows of the TA-300 stage (300 tourists) it is recommended that the existing gravel section of Barnwell Road be widened to provide a minimum seal width of 6.5m.

# 8 Conclusion

This report has assessed the impact of traffic generated by the proposed tourist attraction on the external transport network. Consideration has been given to operational performance, road safety and access arrangements.

An assessment was carried out of the trips likely to be generated by the proposed development and the estimated distribution of trips on the existing street network. The impact of the proposed development on the road network has been analysed using procedures set out in *Austroads* and SIDRA Traffic modelling software. Results of analysis indicate that the road network continues to operate with capacity and the impact of development traffic on the operational performance of the external road network is insignificant.

The following mitigation measures are proposed:

- It is recommended that as part of the TA-300 stage of development of up to 300 tourists, (which generates 30 bus trips and 76 staff trips), that additional traffic management improvements be made on the gravel section of Barnwell Road, as outlined in Section 6 of this report, to improve safety for all road users.
- > It is also recommended that the existing gravel section of Barnwell Road be widened to provide a minimum seal width of 6.5m to comply with FNQROC Guidelines.

In conclusion, the proposed tourist attraction will not adversely impact on the operational performance of the surrounding road network and the proposed access arrangements are considered adequate and suitable for the proposed land use. Some additional improvements to the road network are required at various stages of the project to improve safety and comply with current standards.

# Proposed Kuranda

Tourist Attraction

# APPENDIX A DEVELOPMENT SITE





D	10	20	30	40	50m
SCALE 1	:500				@A1

TA-60 PLAN SCALE 1:500



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This plan is conceptual and for discussion purposes only. All areas, dimensions and land uses are preliminary, subject to investigation, survey, engineering, and Local Authority and Agency approvals.

REEVER AND OCEAN PTY LTD. TOURIST ATTRACTION 112 BARNWELL ROAD KURANDA	Date Scale 26/02/2018 1:500	Size A1
CARPARK CONCEPT	HRP16299-006-FIG-21	C
STAGE TA-60 PLAN	Drawing Number	Revision



)	10	20	30	40	50m
SCALE	1:500				@A1

TA-150 PLAN SCALE 1:500



Cairns Tel: 07 4051 0288

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This plan is conceptual and for discussion purposes only. All areas, dimensions and land uses are preliminary, subject to investigation, survey, engineering, and Local Authority and Agency approvals.

REEVER AND OCEAN PTY LTD. TOURIST ATTRACTION 112 BARNWELL ROAD KURANDA	Date 26/02/2018	Scale 1:500	Size A1
CARPARK CONCEPT	HRP16299-006	-FIG-22	B
STAGE TA-150 PLAN	Drawing Number		Revision





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This plan is conceptual and for discussion purposes only. All areas, dimensions and land uses are preliminary, subject to investigation, survey, engineering, and Local Authority and Agency approvals.

REEVER AND OCEAN PTY LTD. TOURIST ATTRACTION 112 BARNWELL ROAD KURANDA	Date 16/03/2018	Scale 1:500	Size A1
CARPARK CONCEPT STAGE TA-300 PLAN	HRP16299-006-I	FIG-23	D Revision

Proposed Kuranda

Tourist Attraction

# APPENDIX B AUSTRAFFIC SURVEY DATA

Cardno® **Shaping the Future** 



Note:   3.28%   = proportion of selected vehicle classification as a percentage of total vehicle classification as a percentag
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Note:	3.28%	= proportion of selected vehicle classification as a percentage of total vehicles
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# APPENDIX C





2) 5 8	(269) 180 T	(83) 91 L	Rob Veivers Drive
) 2 5 8	(0) (138) (52) (67)		-
Hig	hway (so	uth)	
end -	Left turn Through	00 (00)	AM Peak Volume PM Peak Volume
R J	Right turn U-turn	()	$\bigcirc$



3) 6 2 ) 3 6 9	(280) 187 T (0) (141) (53) (68)	(85) 93 L	Rob Veivers Drive
HIG	gnway (sol	utn)	
end			
-	Left turn	00	AM Peak Volume
Γ	Through	(00)	PIM Peak Volume
<u>د</u>	Right turn		
J	U-turn		$\downarrow$



8) 2 <u>8</u> ) 7 0 3	(334) 223 T (0) (155) (58) (75)	(93) 102 L	Rob Veivers Drive
Hig	ghway (sol	uth)	
end			
-	Left turn	00	AM Peak Volume
	Dialata	(00)	
<b>с</b>			
J	U-turn		+





Kennedy Highway (north)

(63) 99 <b>R</b>	(280) 187 T	(85) 93 L	Rob Veivers Drive
0 13	(0) (141)		
43 46	(141) (53)		
39	(68)		
dy Hig	hway (sou	uth)	
Ľ	Left turn	00	AM Peak Volume
Т	Through	(00)	PM Peak Volume
R	Right turn		Dev Traffic
U	U-turn		$\bigvee$



8) )5 <b>2</b> ) 7 0 3	(334) 223 T (0) (155) (58) (75)	(93) 102 L	Rob Veivers Drive
Hig	ıhway (so	uth)	
end			
-	Lett turn Through	(00)	AIVI Peak Volume
2	Right turn	(00)	Dev Traffic
J	U-turn		$\bigcirc$

Proposed Kuranda

Tourist Attraction

# APPENDIX D DETAILED SIDRA OUTPUTS





### Parameters

HV %

Heavy vehicles percentages have been adopted from 2017 survey data

		(	Oak For	est Roa	d				Barnwe	II Road		Myola Road									
		Through	1		Right			Left			Right			Left		Through					
			95th			95th			95th			95th			95th			95th			
	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile			
	200	(sec)	Queue	200	(sec)	Queue	200	(sec)	Queue	200	(sec)	Queue	200	(sec)	Queue	200	(sec)	Queue			
Scenario			(m)			(m)			(m)			(m)			(m)			(m)			
2017 AM BG	0.06	0	0	0.06	6	0	0.01	6	0	0.01	6	0	0.07	6	0	0.07	0	0			
2019 AM BG	0.07	0	0	0.07	6	0	0.01	6	0	0.01	6	0	0.07	6	0	0.07	0	0			
2029 AM BG	0.07	0	0	0.07	6	0	0.01	6	0	0.01	6	0	0.07	6	0	0.07	0	0			
2019 AM BG + Dev	0.07	0	0	0.07	6	0	0.02	6	0	0.02	6	0	0.1	6	0	0.1	0	0			
2029 AM BG + Dev	0.07	0	0	0.07	6	0	0.02	6	0	0.02	7	0	0.1	6	0	0.1	0	0			
2017 PM BG	0.05	0	0	0.05	6	0	0	6	0	0	6	0	0.06	6	0	0.06	0	0			
2019 PM BG	0.06	0	0	0.06	6	0	0	6	0	0	6	0	0.06	6	0	0.06	0	0			
2029 PM BG	0.06	0	0	0.06	6	0	0	6	0	0	6	0	0.07	6	0	0.07	0	0			
2019 PM BG + Dev	0.06	0	0	0.06	6	0	0.05	6	1	0.05	6	1	0.07	6	0	0.07	0	0			
2029 PM BG + Dev	0.06	0	0	0.06	6	0	0.05	6	1	0.05	6	1	0.08	6	0	0.08	0	0			





		Kennedy Highway (East)									Myola Road									Kennedy Highway (West)																
	Left Through Right									Left Through Right								Left Through Right								Left		Through			Right					
			95th			95th			95th			95th			95th			95th			95th			95th			95th			95th			95th			95th
	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile	DOS	Delay	%ile
	200	(sec)	Queue	200	(sec)	Queue	000	(sec)	Queue		(sec)	Queue	200	(sec)	Queue	200	(sec)	Queue	200	(sec)	Queue	000	(sec)	Queue	200	(sec)	Queue	000	(sec)	Queue	200	(sec)	Queue	200	(sec)	Queue
Scenario			(m)			(m)			(m)			(m)			(m)			(m)			(m)			(m)			(m)			(m)			(m)			(m)
2017 AM BG	0.03	7	2	0.16	16	6	0.15	21	5	0.07	9	4	0.56	19	37	0.21	23	8	0.06	9	4	0.63	38	22	0.26	42	11	0.05	8	2	0.56	26	68	0.27	25	13
2019 AM BG	0.03	8	2	0.16	16	6	0.15	21	5	0.07	9	4	0.58	19	39	0.21	23	8	0.06	9	5	0.65	38	23	0.26	42	12	0.05	8	3	0.59	26	71	0.27	25	14
2029 AM BG	0.04	8	3	0.19	17	7	0.18	23	7	0.08	9	5	0.61	19	48	0.25	25	10	0.06	10	6	0.63	38	25	0.24	42	13	0.06	8	3	0.65	27	90	0.32	27	16
2019 AM BG + Dev	0.03	8	2	0.16	16	6	0.15	21	5	0.07	9	4	0.58	19	39	0.37	23	8	0.06	9	5	0.67	38	23	0.26	42	12	0.05	8	3	0.59	26	71	0.27	25	14
2029 AM BG + Dev	0.04	8	3	0.19	17	7	0.18	23	7	0.08	9	5	0.61	19	48	0.42	25	17	0.07	10	6	0.65	39	25	0.24	42	13	0.06	9	3	0.65	27	90	0.32	27	16
2017 PM BG	0.06	8	5	0.34	37	14	0.73	47	45	0.06	8	3	0.70	21	58	0.21	25	8	0.06	9	5	0.65	42	19	0.38	47	15	0.03	8	2	0.45	26	59	0.13	26	6
2019 PM BG	0.06	8	5	0.73	37	15	0.75	47	46	0.07	8	3	0.73	22	62	0.21	25	8	0.06	9	5	0.66	42	20	0.39	47	15	0.03	8	2	0.47	26	62	0.13	26	6
2029 PM BG	0.07	9	7	0.40	38	17	0.82	52	56	0.07	8	4	0.75	22	77	0.25	26	10	0.07	10	6	0.82	49	24	0.45	50	18	0.04	8	2	0.51	26	77	0.15	27	7
2019 PM BG + Dev	0.06	8	5	0.40	38	15	0.84	52	49	0.07	8	3	0.69	20	59	0.25	25	10	0.11	9	9	0.83	46	21	0.39	47	15	0.03	8	2	0.45	25	60	0.13	26	6
2029 PM BG + Dev	0.07	9	7	0.40	38	17	0.82	52	56	0.07	8	4	0.79	24	82	0.29	26	11	0.15	10	11	0.88	52	25	0.39	48	18	0.04	8	2	0.53	27	78	0.15	27	7



# Proposed Kuranda

Tourist Attraction

# APPENDIX E PHASING PLAN (TMR)





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					RED	A5	1	1	1	1	1					
		-	1		YELLOW	A4	2	2	2	2	2					
_		-	+	+	RED	AS AR	3	4	3	1 4	4	4		+	-	
		-	12		YELLOW	A7	5	5		5	5	5				
_			4		GREEN	A6	6	6		6	6	6	<u> </u>			
			_	1	RED	A11	70	Y	13	71	3 1					
		-	3		YELLOW	A10	8 1	48	14	81	48					
			+	4	GREEN	A9	91	59	15	91	59					
					RED	A14		610		101	610	13			_	
			1		GREEN	A12	10	812		121	812	14	-			
			+	1	RED	B5	18-	013		131	013					
LICT)			5		YELLOW	B4	14-	114		141	114					
	PEC	GROUP	S		GREEN	B3	15 1	215		151	215					
11 12	1	2 3	4		RED	B8	167	16		167	16					
	+	X	6		CREEN	B7		17			17				-	
		x	+	-	RED D/WALK	Bb	10	10		1 188	1 <mark>1</mark> 2			$\vdash$		
	X		7	ł	PED 1		13	1.5								
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				1	RED D/WALK	B14	21	21								
			8		PED 2											
-+-+	-	++	-	4	GREEN WALK	B12	22	22								
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Proposed Kuranda

Tourist Attraction

# APPENDIX F



#### **RURAL DESIGN CRITERIA**

#### D1.27 GENERAL

 In addition to the foregoing sections this section specifically applies to all those sites identified as being suited to rural and rural residential subdivisions inclusive of rural home sites and hobby farms types of developments. For roads within the Rural Living Areas (under FNQ2031) reference should be made to Table D1.1. Table D1.4 details specific road demands for rural roads.

Traffic Volume or Road Class	<100VPD <sub>5,6</sub>	100 <u>-</u> 999	1000 - 2999 (or rural collector)	>3000 (or sub-arterial)
Road Reserve (flat terrain ≤ 5%)	20m	20m	25m	MR
Road Reserve <sup>2</sup> (Undulating/Hilly > 5%)	25m	25m	30m	JS or □
Formation	8m	8m	10m	ROAI
Pavement Width	5.5m	6.5m	8m	h AUST
Seal Width	4.5 <sup>1,7</sup>	6.5m	8m (incl. 0.5m sealed shoulders)	ce wit
Shoulders <sup>3</sup>	1.25m Approved Select material	0.75m gravel	1m gravel	d in accordan es.
Desirable Speed Environment	100kph	100kph	100kph	ssignec
Design Speed for Individual Elements (Minimum)	80kph	80kph	80kph	To be de design g

#### Table D1.4 Rural Road Elements <sup>8</sup>

#### Notes:

- 1. Cook Shire Council may consider relaxing the requirement to seal rural roads in some instances if there are no adverse impacts i.e. dust.
- 2. In undulating terrain this width shall be increased to enable services to be constructed on accessible flatter land on top and below batters.
- 3. Where the road is a designated on-road bicycle route (signposted and pavement marked) the shoulder provision needs to conform to the AUSTROADS
- 4. (Intentionally left blank)
- 5. In Cook Shire Council, all rural residential subdivisions within the urban expansion footprint are to comply with Residential Streets Table D1.1
- 6. In Cassowary Coast Regional Council, the seal and pavement width will be min 6.5m with a shoulder width of 0.75m unless otherwise approved by council
- 7. Tablelands Regional Council will consider reduction of sealed width to 3.5m. For roads with less than 50vpd it will also consider relaxing the requirement for bitumen sealing
- 8. In TRC, this table does not apply to Rural Residential areas where lot size is less than 10,000m<sup>2</sup>. For all Rural Residential areas where lot sizes are generally less than 10,000m<sup>2</sup> refer to the Urban road standards.