



Maria River Road Upgrade

Traffic Impact Assessment

Port Macquarie Hastings Council and Kempsey Shire
Council

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Executive summary

The proposal

Port Macquarie-Hastings Council (PMHC) and Kempsey Shire Council (KSC) proposes to upgrade the unsealed section of Maria River Road (inclusive of sections in both the PMHC and KSC area), between Port Macquarie and Crescent Head in northern NSW. The unsealed section consists of approximately 25 kilometres of road extending from just north of Shoreline Drive, Riverside to approximately five kilometres south of Crescent Head Road.

Due to the existing condition of the road, the community has expressed serious concerns for the safety of road users due to the number of accidents that have occurred on Maria River Road. The existing unsealed stretch of the road is characterised by numerous sharp bends and the inconsistent condition of the unsealed road pavement, particularly after wet weather events.

The proposal would improve the surface of Maria River Road, which would improve road safety and reduce annual maintenance costs.

This report

This Traffic Impact Assessment has been prepared on behalf of PMHC to support the environmental impact assessment for the proposal and responds to PMHC's request for information on the expected traffic conditions post construction, as a comparison to existing traffic conditions experienced on Maria River Road.

Existing environment

Existing weekday traffic volumes along Maria River Road range from approximately 200 vehicles per day towards Crescent Head Road, to just over 100 vehicles per day towards Shoreline Drive (towards Port Macquarie). Peak hour volumes similarly vary, with 36 vehicles per hour (northbound and southbound) in the PM peak towards Crescent Head Road, to 16 vehicles in the AM peak towards Shoreline Drive. Night-time volumes are generally low for the extent of the corridor from 7:00 pm to 7:00 am, ranging from nine to 18 vehicles over the period, reflecting the general rural land use along the corridor.

There is a minor northbound trend in the AM peak towards Crescent Head Road in the northern extent of the Maria River Road, with the reverse occurring in the southern extent of Maria River Road. These counts indicate Crescent Head and Kempsey as being the dominant centres in the study area, with most trips appearing to have morning destinations toward Crescent Head and/or Kempsey, with returning journeys to residences along the Maria River Road corridor in the afternoon peak.

With respect to existing travel speeds along the corridor, the 85th percentile speed on gravel sections of Maria River Road vary from 67.4 kilometres per hour (km/h) to 94.2 km/h, with speeds varying with road curvature condition, road width, verge, and road surface condition. As a comparison, the 85th percentile speed along a sealed portion of the Maria River Road was 87.2 km/h. When considering the impact of road grading on gravel portions of Maria River Road, grading appears to have a positive impact on vehicle speeds, with vehicles travelling up to 6 km/h faster.

Post upgrade construction findings

The improved condition of Maria River Road is expected to realise a minor increase in traffic volumes, associated with faster travel times along the upgraded corridor, with potentially a 25% increase during weekdays (or approximately 30 vehicles per day). Additional movements are also expected to be made on weekends and during holiday periods, particularly as day trips to/from Port Macquarie.

With respect to night time traffic volumes, these are expected to remain similar, where road users are expected to continue to use the Pacific Highway corridor for through trips, due to the increased safety and amenity of that corridor for night time travel.

Future travel speed associated with the widened and upgraded Maria River Road was estimated by using the operating speed model. The results indicate that operating speeds (85th percentile) along the upgraded corridor are expected to increase by 5.6 km/h in the southern extents of the corridor (within the 100 km/hr sign posted area), and 3.4 km/h in the northern extents of the corridor (within the 80 km/h sign posted area).

Due to the improved road surface condition (from sealing of the gravel road), stopping distances are expected to reduce by 33 metres (in the 100 km/h sign posted area), and 22.5 metres (in the 80 km/h sign posted area), representing a 17 per cent improvement (or reduction) in stopping distance.

Other benefits of the upgrade include improved delineation of the corridor, reduced dust emissions and improved maintenance practices.

The net impact of the sealing and upgrading of Maria River Road (in absence of additional mitigation measures) appears to be either a negligible or minor reduction in the risk of animal strikes.

The upgrade of Maria River Road is also expected to provide a significantly safer road environment.

Mitigation and management measures

Should it be considered appropriate to further reduce the risk of animal strikes on an upgraded Maria River Road corridor, additional mitigation measures could be further considered along the Maria River Road including (and are discussed further in the report):

- Animal fencing
- Additional signage and pavement markings (noting these have been used elsewhere within the PMHC LGA)
- Virtual fencing.

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1. Introduction

Port Macquarie-Hastings Council (PMHC) and Kempsey Shire Council (KSC) propose upgrading the unsealed section of Maria River Road, between Port Macquarie and Crescent Head in northern NSW. The unsealed section consists of approximately 25 kilometres of road extending from just north of Shoreline Drive, Riverside to approximately five kilometres south of Crescent Head Road (see Figure 1.1).

The proposal is situated in two local government areas (LGA), with the southern 13 kilometres of road in the Port Macquarie-Hastings LGA and the northern 12 kilometres of road within the Kempsey LGA. The road provides an alternate link (to the Pacific Highway) for travel between Crescent Head and Port Macquarie, via the Hibbard and Settlement Point ferries.

The proposal would improve the surface of Maria River Road, which would improve road safety and reduce annual maintenance costs.

The community has expressed serious concerns for the safety of road users due to the number of accidents that have occurred on Maria River Road. The existing unsealed stretch of the road is characterised by numerous sharp bends and the inconsistent condition of the unsealed road pavement, particularly after wet weather events.

Sealing the road will improve amenity for residents along the road, and reduce dust and gravel being deposited in the surrounding environment.

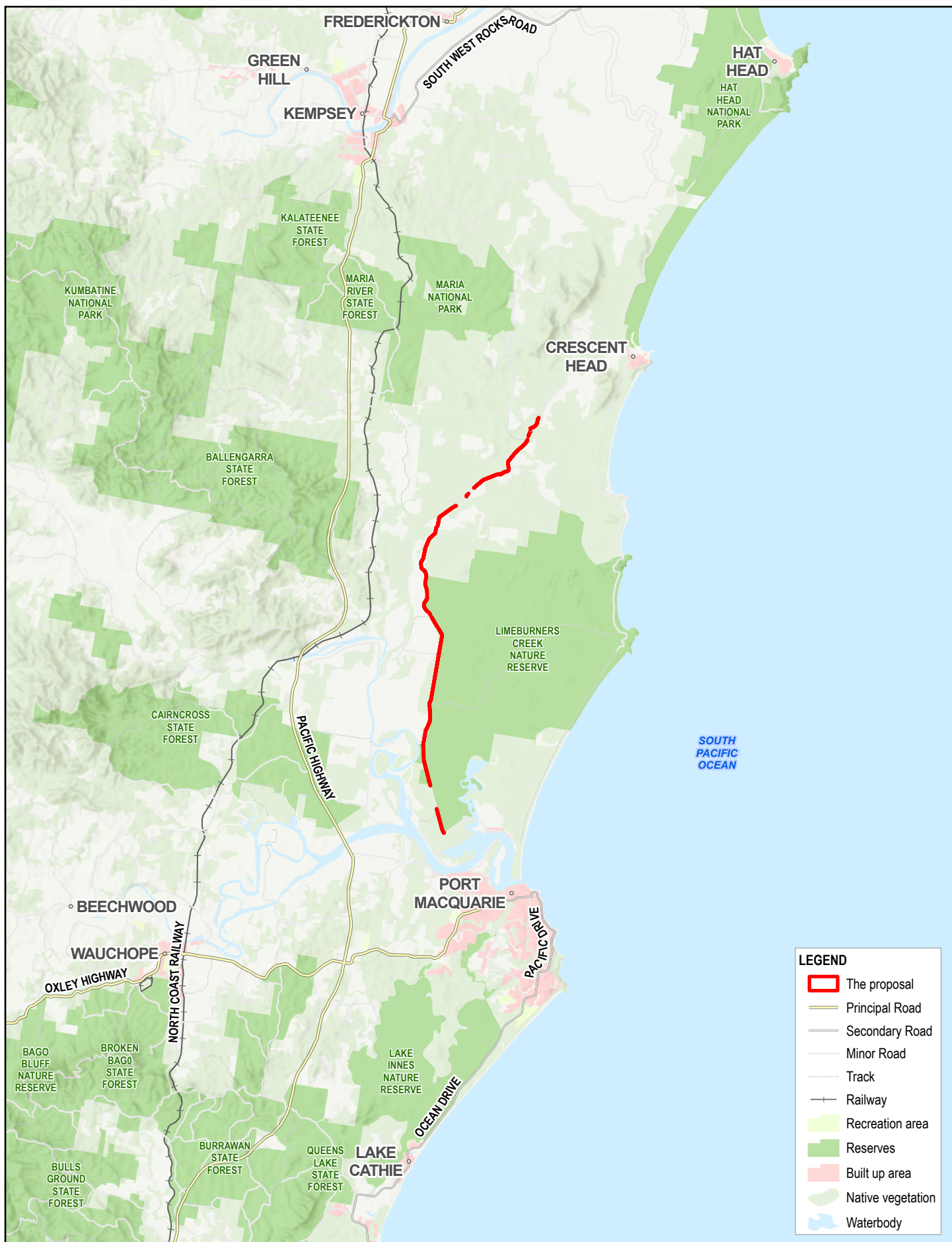
Heavy rainfall in the 2021/22 calendar years has also made the unsealed road difficult for local users to use during and after these events. Some landowners advised that they were also not able to leave their properties during flood events.

In its present form, the road does not comply with current standards for roadway design. An upgrade to the surface will increase the safety of road users with providing a design meeting Australian standards, reduce ongoing maintenance, and facilitate use of the road as an alternate route between Port Macquarie and Crescent Head.

1.1 Purpose of this report

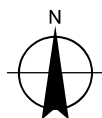
This Traffic Impact Assessment (TIA) report has been prepared to estimate potential changes in traffic conditions which may result following the upgrading and sealing of Maria River Road. These changes may include:

- Travelling speeds, following the sealing of gravel sections of Maria River Road.
- Potential increases in traffic volumes, where some residents may opt to use the Maria River Road for travel to/from Port Macquarie, and/or Crescent Head.
- Improved road safety outcomes for road users, from an upgraded road consistent with relevant guidelines and standards.
- Other potential qualitative changes, such as improved accessibility and maintenance practices from an upgraded road corridor.
- Any potential changes in risk profile for fauna movement along/across the Maria River Road corridor, including an analysis of historical fauna sighting data.



Paper Size ISO A4
0 1.5 3 4.5 6 7.5
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



Port Macquarie Hastings Council
Maria River Road Upgrade
Traffic Impact Assessment

Project No. 12542943
Revision No. 2
Date 24/09/2024

Proposal location

FIGURE 1.1

2. Scope and limitations

2.1 Scope of work

This TIA has been based on a rapid desktop assessment of available information which has sought to consider the varying factors that impact on the risk of animal strikes following the completion of the Maria River Road upgrade and sealing project.

The scope of the TIA has largely been to establish a “baseline” condition, reflective of the existing unsealed nature of Maria River Road, before a “project” scenario has been considered which seeks to quantify the expected change in travel conditions following the upgrade and sealing of Maria River Road. This analysis has included consideration of:

- Review of existing animal strike data along Maria River Road, as well as Point Plomer Road, as an example of a nearby unsealed road that was recently sealed (Section 3).
- Existing travel patterns between Crescent Head and Port Macquarie, using Journey to Work data collected from the 2021 census (Section 3.2).
- Traffic volume and speeds (existing and projected), through the collection of traffic surveys along the corridor, inclusive of both sealed and unsealed portions (Section 3.3).
- Travel time and costs between Crescent Head and Port Macquarie along the Pacific Highway and Maria River Road (Section 3.4).
- Operating times and capacities of the Hibbard and Settlement Point ferries, for onward connectivity to Port Macquarie (Section 3.5).
- Potential traffic diversion scenarios (to Maria River Road) following the sealing of Maria River Road, considering existing travel patterns, travel time and costs and the operating capacity of existing ferries (Section 4).
- The condition and design of the existing “unsealed” Maria River Road, as compared to an upgraded and “sealed” Maria River Road (Section 4.2).
- Other potential changes to the road environment as a result of the road’s upgrade (Section 4.3).

From this, a qualitative risk assessment has been developed to consider each element as it may impact on the potential increased risk of animal strikes., there are limitations in this assessment, of which recommendations on the monitoring of traffic conditions following the sealing of Maria River Road has been provided.

2.2 Assumptions

The following assumptions have been made during the assessment of the potential traffic impacts:

- The design features of Maria River Road 100% Detail Design will be retained including advisory speed limits, speed signage, etc.
- Crash data sourced from publicly available data and PMHC information provides a record of incidents of the road network along the proposed upgrade.
- Ferry data and traffic numbers (and speeds) provided by PMHC to be adopted and accurately reflect the existing conditions and traffic of the local road network.
- Due to the existing zoning restrictions (environmental and rural zoning), as well as large areas along the southern extent of Maria River Road being subject to PMHC’s flood planning area, further development and associated traffic growth in the immediate area is expected to be low, with any potential growth in movements along Maria River Road, likely being associated with movements between established centres.

2.3 Limitations

This report: has been prepared by GHD for Port Macquarie Hastings Council and Kempsey Shire Council and may only be used and relied on by Port Macquarie Hastings Council and Kempsey Shire Council for the purpose agreed between GHD and Port Macquarie Hastings Council and Kempsey Shire Council as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Port Macquarie Hastings Council and Kempsey Shire Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 1 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

3. Analysis

3.1 Animal sightings

3.1.1 Maria River Road animal sightings

Animal (including Koala) sightings inclusive of road kill, over the 10 year period 1 January 2013 to 30 November 2023 (present), along Maria River Road was sourced from the NSW Government NSW BioNet Atlas (see detailed methodology in Appendix A).

The search covered the extents of Maria River Road, from the intersection of Crescent Head Road (in the north) to the intersection of Shoreline Drive (in the south), including a 100 metre buffer.

A summary of the animal observation records for the last five years (from 2018) and the last 10 years (from 2013) are shown below in Table 3.1, and graphically for the 10 year period in Figure 3.1 (which notes the existing sealed and unsealed portions of Maria River Road).

Table 3.1 Animal observation record summary near Maria River Road

Observation Type	2018 – Present	2013 – Present
Koala vehicle collisions	3	5
Other koala sightings	38	71
Other animal vehicle collisions	11 (Majority kangaroos & wallabies)	25 (Majority kangaroos & wallabies)

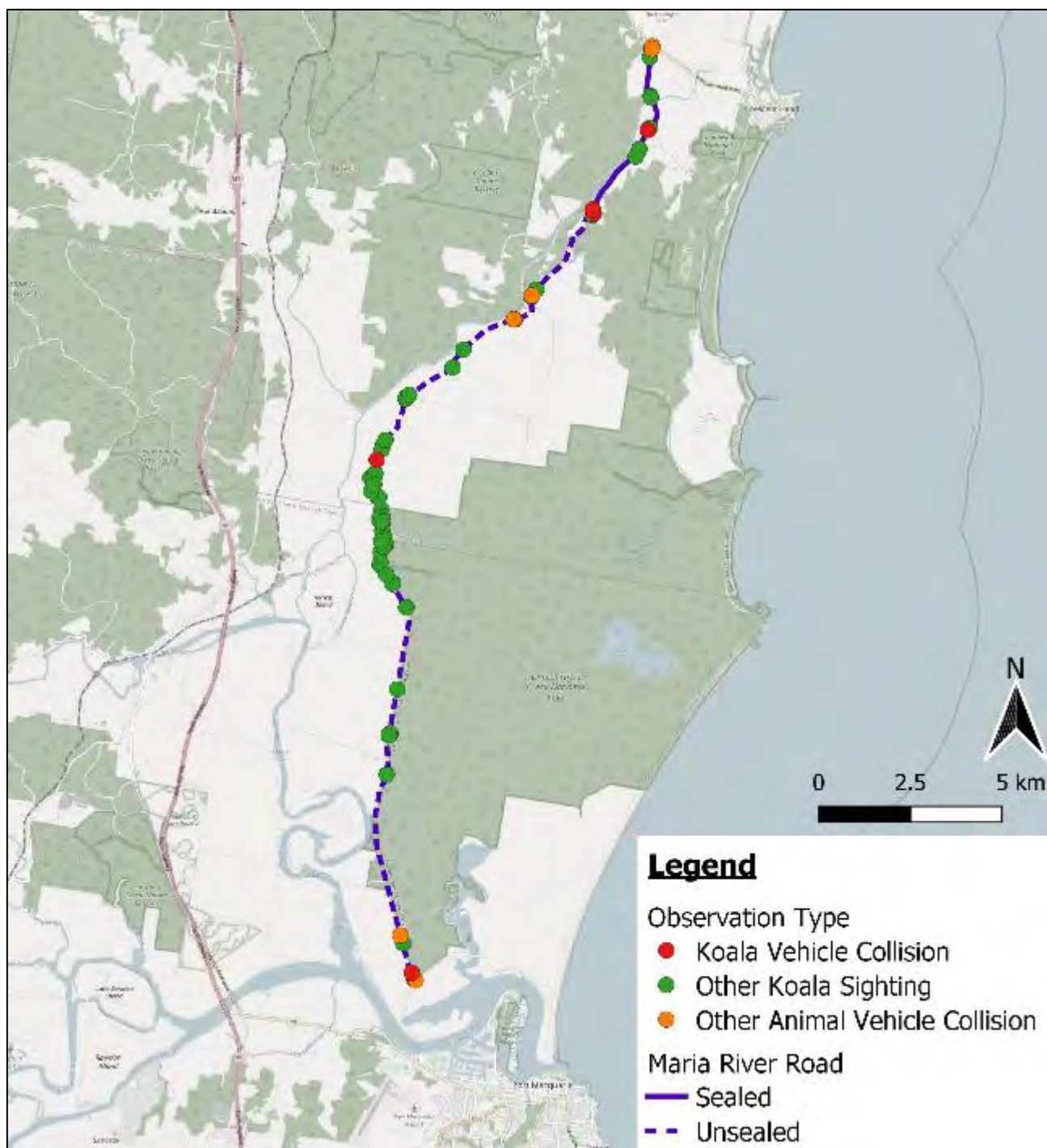


Figure 3.1 Maria River Rd animal and koala sighting (including collisions) 1 January 2013 to 30 November 2023

From Table 3.1 and Figure 3.1, three reported koala strikes have occurred on the northern and sealed extents of Maria River Road (within Kempsey Shire Council), including one koala vehicle collision in the last five years, and two between five to ten years ago. In the unsealed section of Maria River Road, two koala strikes have been reported, both during the past five years.

Further, there have been multiple reported sightings of Koala along the corridor, however there is an increased density of koala sightings near the north-western boundary of Limeburners Creek National Park, particularly in the vicinity of the Northern Boundary Trail. Aerial imagery appears to show a potential fauna movement corridor here, associated with vegetation connectivity across the Maria River Road.

Figure 3.1 also shows that significant extents of Maria River Road form the western boundary of Limeburners Creek National Park, and as such, fauna from the National Park may interact with significant extents of Maria River Road, particularly near fauna movement corridors.

3.1.2 Point Plomer Road animal sightings

The potential impact of animal strikes following the sealing of a road has been considered for Maria River Road, whereby unsealed portions of Point Plomer Road have recently been sealed, between Big Hill and Goolawah Bush Retreat (completed in December 2021). This location was used as it presents a similar road upgrade in the nearby area which was recently completed. However, it is noted that traffic volumes on Point Plomer Road (approximately 2,000 vehicles per day) are much higher than Maria River Road.

Similar to the assessment for Maria River Road, animal sightings were sourced from the NSW Government, NSW BioNet Atlas for the 10 year period 1 January 2013 to 30 November 2023 (present), inclusive of a 100 metre buffer around the road corridor.

A summary of the animal observation records before (2013 to 2020), during (2021) and after (from 2022) the recent sealing works are shown below in Table 3.2 ,and graphically for the 10 year period in Figure 3.2 (which notes the recently sealed portions of Point Plomer Road).

Table 3.2 *Animal observation record summary near Point Plomer Road*

Observation Type	Before Recent Sealing (2013 – 2020)	During Recent Sealing (2021)	After Recent Sealing (2022 – 2023)
Koala vehicle collisions	1	-	1
Other koala sightings	4	-	4
Other animal vehicle collisions	6	2	1



Figure 3.2 Point Plomer Rd animal and koala sighting (including collisions) 1 January 2013 to 30 November 2023

From Table 3.2 and Figure 3.2, only two koala strikes have been reported along this section of Point Plomer Road in the past 10 years. The northernmost koala strike occurred in 2022, after sealing of this section of road, whilst the remaining koala strikes occurred on sections of Point Plomer Road which have already been sealed.

Overall, the number of reported animal strikes (including koalas) over the 10-year period is sporadic, ranging from 0 to 3 strikes per year. On average, both periods before and after sealing have an animal strike rate of approximately 1 per year. Given this and the recency in which Point Plomer Road was sealed, no conclusion can be made on whether the sealing of this section has increased the rate of animal strikes.

3.2 Existing journey analysis (Port Macquarie – Crescent Head)

The upgrade and sealing of Maria River Road would provide an alternate sealed road connection to the Pacific Highway (and to a lesser extent Plomer Road), for travel between Crescent Head and Port Macquarie.

Currently, approximately 25 kilometres of the 30 kilometre extent of Maria River Road is unsealed, with only the northern five kilometre extent (south of Crescent Head Road) sealed.

Due to the largely un-sealed nature of the Maria River Road, travel between Crescent Head and Port Macquarie (assumed at 100 percent) would use the established sealed road connection, inclusive of Crescent Head Road, Macleay Valley Way, and the Pacific Highway (via the South Kempsey interchange), before accessing Port Macquarie, likely through Hastings River Drive (via the Blackmans Point interchange).

The project would seal the remaining 25 kilometres of Maria River Road, providing an alternate and shorter sealed road connection between Crescent Head and Port Macquarie.

To assess the potential attractiveness of Maria River Road (post sealing) for travel between Crescent Head and Port Macquarie (in both directions), weekday trips between the origin/destination pair has been estimated using Census 2021 Journey to Work data, as well as household travel surveys from a nearby regional area.

3.2.1 Journey to work analysis – Census 2021

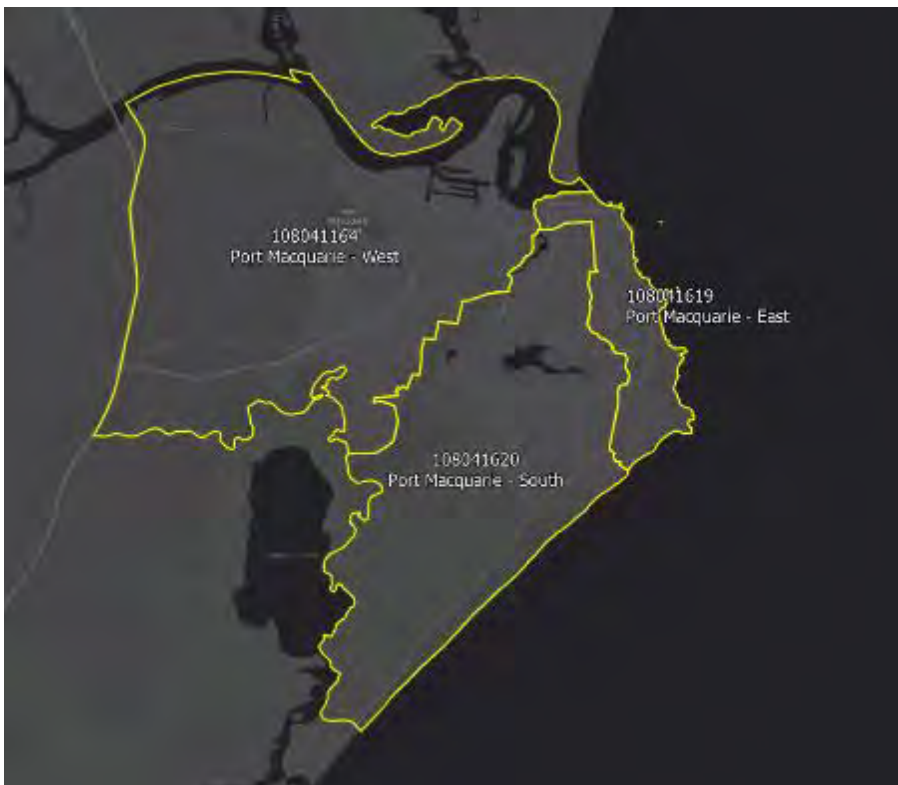
The number of weekday trips between Crescent Head and Port Macquarie has been estimated by analysing Journey to Work (JTW) data from the 2021 Census. The 2021 Census 'employment, income and education' dataset contains information on census respondent's residence, work, and travel methods.

The following variables from this dataset were tabulated and extracted for zones representing Crescent Head and Port Macquarie:

- Geographical Area of Usual Residence
- Geographical Area of Place of Work
- Method of Travel to Work

Destination zones (including maps) used for the analysis of Crescent Head and Port Macquarie are shown below in Table 3.3. While the exact journey to work trip numbers should not be relied upon, the magnitude of trip numbers provides an indication of the volume of trips and methods of travel between Crescent Head and Port Macquarie.

Table 3.3 Census 2021 destination zone maps and destination zones

Census 2021 Destination Zone maps (Crescent Head and Port Macquarie)	Destination Zones
	– Destination zones (DZN) for Crescent Head: • SA1 Zone 10802115613 • SA1 Zone 10802115614 • SA1 Zone 10802115615 • SA1 Zone 10802115616 • SA1 Zone 10802115623
	– Destination zones Port Macquarie: • SA2 Zone 108041164 Port Macquarie – West • SA2 Zone 108041619 Port Macquarie – East • SA2 Zone 108041620 Port Macquarie – South

The resulting journey to work analysis of trips (by mode) between Crescent Head and Port Macquarie is shown below in Table 3.4.

Table 3.4 Journey to Work data from the 2021 Census (Port Macquarie to Crescent Head)

Method of Travel to Work	Crescent Head to Port Macquarie	Port Macquarie to Crescent Head	Total
Public Transport	3	-	3
Vehicle	22	9	31
Worked at home or did not go to work	10	-	10
Total	35	9	44

Note: These numbers are not exact and have been adjusted by the ABS to avoid the release of confidential data.

From Table 3.4, there were approximately 31 weekday trips (in both directions) using vehicle (car) as the mode of transport between Port Macquarie and Crescent Head, which given the existing condition of Maria River Road, would be assumed as using the Pacific Highway corridor.

3.2.2 Household travel surveys

Due to the limitations of JTW data (typically commuter trips to places of employment), an expansion of those trips was applied to consider non-commuter based trips such as shopping or education related trips. The proposed expansion was based on the Hunter Region household travel survey (HTS) undertaken in 2018/2019, which is summarised below in Table 3.5, including commuter and other trips.

Table 3.5 Hunter region (2018/2019) household travel survey results

Travel by purpose (Hunter 2018/19)	% of Total Trips
Commute	15.6
Work related business	5.4
Education/childcare	7.3
Shopping	19.5
Personal business	8.2
Social recreation	23.5
Serve passenger	19
Other	1.5
Total	100

Source: Household Travel Survey, Hunter Region 2018/2019 (Transport for NSW)

From Table 3.5, commuter (or journey to work) trips accounted for approximately 1 in 6 trips, as such, the total number of trips between Port Macquarie and Crescent Head (on a weekday) could be considered in the order of 200 trips per day. Assuming these trips are solely by private vehicle (and a vehicle occupancy of 1.7 persons per vehicle), this would equate to 120 vehicle trips per weekday (rounded up from 117 trips). Based on the existing condition of Maria River Road, it is assumed all these trips (100 percent) would use the Pacific Highway.

3.3 Traffic analysis

To inform a traffic analysis of the study, Port Macquarie-Hastings Council commissioned traffic volume surveys (30 July 2023 – 8 Aug 2023) at six locations along Maria River Road, from 4.75 km south of Crescent Head Road (along the sealed portion), to 25.7 km south of Crescent Head Road (un-sealed portion). One of the six locations was along a sealed portion of Maria River Road, with the remaining five sites along unsealed portions of Maria River Road.

The location of traffic surveys is shown in Figure 3.3 (including sealed and unsealed portions of Maria River Road), together with the location of ferries (Hibbard and Settlement Point) and the existing road connection between Crescent Head and Port Macquarie (via Pacific Highway). Traffic survey data is provided in Appendix C.



Figure 3.3 Location of traffic surveys along Maria River Road and existing road network between Crescent Head and Port Macquarie

3.3.1 Traffic volume analysis

Existing average daily weekday traffic (ADWT) volumes, peak (AM and PM) and night-time (7:00 pm – 7:00 am) for each of the six traffic survey locations are shown below in Table 3.6.

Table 3.6 Average weekday traffic volumes on Maria River Road (2023)

Location (km sth of Crescent Head Rd)	ADWT	Night-time (7:00 pm – 7:00 am)	AM Peak (7:00 – 9:00 am)			PM Peak (4:00 – 6:00 pm)		
		Both directions	Northbound	Southbound	Total *	Northbound	Southbound	Total *
4.75 km	204	17	23	7	30	9	25	36
6.95 km	196	14	20	6	26	8	22	32
8.82 km	100	9	10	3	13	3	10	15
14.95 km	101	18	4	9	14	11	5	16
18.4 km	106	17	4	8	12	12	5	17
21.2 km	110	16	3	11	15	14	4	18
25.7 km	115	16	4	13	16	15	4	19

Note *: Rounding errors

Source: Traffic surveys supplied by Port Macquarie Hastings Council (2023)

From Table 3.6, weekday traffic volumes ranged from in excess of 200 vehicles per day towards Crescent Head Road, to just over 100 vehicles per day towards Shoreline Drive. Peak hour volumes similarly varied, with 36 vehicles per hour (northbound and southbound) in the PM peak towards Crescent Head Road, to 16 vehicles in the AM peak towards Shoreline Drive.

There is a minor northbound trend in the AM peak towards Crescent Head Road in the northern extent of the Maria River Road (23 northbound vehicles to seven southbound vehicles), with the reverse occurring in the southern extent of Maria River Road (13 southbound vehicles to four northbound vehicles).

The trend is reversed in the PM peak, with vehicles typically travelling south in the PM peak near Crescent Head Road and travelling north near Shoreline Drive. These counts indicate Crescent Head and Kempsey as being the dominant centres in the study area, with most trips appearing to have morning destinations toward Crescent Head and/or Kempsey, with returning journeys to residences along the Maria River Road corridor in the afternoon peak.

Night-time volumes are generally low for the extent of the corridor from 7:00 pm to 7:00 am, ranging from nine to 18 vehicles over the period, reflecting the general rural land use along the corridor.

When considering the low volumes along Maria River Road (approximately 100 vehicles per day) to the indicative traffic generation rates of 7.4 trips per dwelling in regional areas (Transport for NSW, Guide to Traffic Generating Developments, 2013), this would equate to the traffic generation associated with approximately 13 dwellings, reflective the generally rural nature of the corridor.

Due to the existing zoning restrictions (environmental and rural zoning), as well as large areas along the southern extent of Maria River Road being subject to PMHC's flood planning area, further development and associated traffic growth in the immediate area is expected to be low, with any potential growth in movements along Maria River Road, likely being associated with movements between established centres (e.g. through trips between Crescent Head and Port Macquarie shifted from the Pacific Highway), or potentially induced "drive tourism" trips associated with the increased accessibility of the area following the upgrade and sealing of Maria River Road.

3.3.2 Speed analysis

3.3.2.1 Existing speed

Existing 85th percentile speeds for each of the seven traffic survey locations (as per Figure 3.3 above) are shown below in Table 3.7, together with the indicative road standards and conditions at the traffic survey locations. Further to the seven traffic volume surveys (discussed in Section 3.3.1), PMHC also commissioned additional traffic volume surveys (September 2023) at two locations along the unsealed portions of Maria River Road following a grading, to assess any potential changes in travelling speed along the corridor following road grading.

Table 3.7 Average 85 percentile speed (km/h) along Maria River Road including road condition

				Pre-Grading	Post-Grading
Location (km south of Crescent Head Rd)	Road curvature condition	Road verge condition	Road surface condition	85 Speed (km/h)	85 th Speed (km/h)
4.75 km	On straight with curves on approaches	Heavily vegetated road verge including large trees	Sealed	87.2	N/A
6.95 km	On straight	Transects farming land with few trees in verge	Gravel road	67.4	N/A
8.82 km	On straight with curves on approaches	Transects farming land with large trees on one side of the road	Gravel road	69.9	74.4
14.95 km	On straight with curves on approaches	Transects farming land with large trees on one side of the road	Gravel road	74.7	81.0
18.4 km	On straight	Large trees on both sides of the road	Gravel road	84.5	N/A
21.2 km	On straight	Cleared farming land	Gravel road	94.2	N/A
25.7 km	On straight	Large trees on both sides of the road	Gravel road	92.3	N/A

Notes: ¹ Initial traffic volume surveys were undertaken in July 2023 (reflecting a pre-grading condition of Maria River Road).

² Additional traffic volume surveys were undertaken in September 2023, reflecting a post-grading condition of Maria River Road (within the section managed by Port Macquarie Hastings Council).

From Table 3.7, the following is noted:

- Existing 85th percentile speeds on gravel sections of Maria River Road vary from 67.4 km/h to 94.2 km/h, with average speeds varying with road curvature condition, road width, verge, and road surface condition.
- The sealed portion of Maria River Road (4.75 km south of Crescent Head Road) illustrates an 85th percentile speed of 87.2 km/h.
- When considering the impact of road grading on gravel portions of Maria River Road, grading appears to have a positive impact on vehicle speeds (based on the 85th percentile speeds), with vehicles travelling up to 6 km/hr faster following road grading.

3.3.2.2 Future speed

In order to estimate future speed associated with the widened and upgraded Maria River Road, the operating speed model tool (developed by the Queensland Department of Transport and Main Roads) was applied for the upgraded Maria River Road, to predict the projected 85th percentile speed. The results from the operating speed model (85 percentile speed) as against the 85th percentile speeds from traffic surveys are shown below in Table 3.8.

Table 3.8 Pre-grading, post-grading, and operating speed model 85th percentile speeds

Location (km south of Crescent Head Rd)	Road curvature condition	Road surface condition	85 th percentile speed (km/h)		
			Pre-Grading (existing road)	Post-Grading (existing road)	Operating speed model (upgraded road)
4.75 km	On straight with curves on approaches	Sealed	87.2	85.0	N/A
6.95 km	On straight	Gravel road	67.4	N/A	80
8.82 km	On straight with curves on approaches	Gravel road	69.9	74.4	71
14.95 km	On straight with curves on approaches	Gravel road	74.7	81.0	80
18.4 km	On straight	Gravel road	84.5	N/A	100
21.2 km	On straight	Gravel road	94.2	N/A	100
25.7 km	On straight	Gravel road	92.3	N/A	100

From Table 3.8, the expected operating speed from the upgrade and sealing of Maria River Road is expected to increase, pending on the location. In order to consider the expected overall changes in operating speed, the average 85th percentile speed from the four traffic loggers on the gravel portion of Maria River Road, was compared against the weighted average operating speed on the upgraded Maria River Road, considering the posted speed limit of the southern (100 km/hr) and northern (80 km/h) portions, and is shown below in Table 3.9 (for the pre-graded Maria River Road condition).

Table 3.9 Average 85th percentile speed for existing and projected condition on Maria River Road

Road Chainage (Maria River Road Upgrade) 3	Speed Limit	85 th percentile speed (km/h)		
		Pre-Grading (existing road) 1	Operating speed model (upgraded road) 2	Difference
0 – 11.2	100 km/h	93.3	98.8	5.6
11.2 – 24.3	80 km/h	74.1	77.5	3.4

Notes: ¹ Average 85th percentile speed from the traffic surveys for each of the future 80 km/h and 100 km/h speed zones.

² Predicted weighted average 85th percentile speed from the operating speed model for each of the 80 km/h and 100 km/h zones.

³ Noted that road chainage used for the Maria River Road upgrade commences north of the intersection with Shoreline Drive.

From Table 3.9, the expected increase in operating speed ranges from 3.4 km/h in the future 80 km/h zone, to 5.6 km/h in the future 100 km/h zone.

3.3.3 Crash analysis

A review of crash data provided from the Transport for NSW (TfNSW) Centre for Road Safety website has been undertaken for Maria River Road. The review is based on the five-year period 2017 to 2021, from the intersection of Crescent Head Road (in the north) to the intersection of Shoreline Drive (in the south), as illustrated in Figure 3.4 below. The data indicates:

- Two casualty crashes (serious injury) were reported on Maria River Road, attributable to a loss of control (left), approximately 9 km south of Crescent Head Road, on the unsealed portion of Maria River Road.
- There have been no reported crashes at the intersections of Maria River Road/Crescent Head Road and Maria River Road/Shoreline Drive.



Figure 3.4 Location of casualty crashes for Maria River Road (2017 – 2021)

It is also noted that in addition to reported crashes, residents have advised PMHC of a significant number of un-reported (particularly single vehicle crashes) along the unsealed portions of Maria River Road.

3.4 Travel time and cost

To assess the potential attractiveness of an upgraded (sealed) Maria River Road, an assessment of road travel costs (inclusive of the ferry fare) has been assessed for one-way travel between Crescent Head and Port Macquarie.

Travel costs between Crescent Head and Port Macquarie would comprise travel time costs, vehicle operating costs and the ferry fare (Hibbard Ferry or Settlement Point Ferry). Unit travel costs have been derived from the TfNSW, Economic Parameter Values (2022) and indexed to a 2023 cost, with the ferry fare adopted from PMHC's ferry website. The assumed unit travel costs are shown in Table 3.10.

Table 3.10 Unit travel costs (2023) for travel between Crescent Head and Port Macquarie

Distance	Unit costs (2023)
Vehicle occupant travel time cost (\$/hr) – car: – Assumes 1.7 occupants / car – Assumes 12% business use (88% non-business travel)	\$39 / hour
Assumed vehicle operating cost (@ 80 km/hr) – medium car	Sealed: 29.8 cents/kilometre Unsealed: 36.1 cents/kilometre
One-way ferry fare (Hibbard and Settlement point Ferry)	\$8

Source: Transport for NSW (2022), Port Macquarie Hastings Council (2023).

The unit costs shown in Table 3.10 have been used for the purpose of estimating the existing travel costs between Port Macquarie and Crescent Head (either via the Pacific Highway or the unsealed Maria River Road) as compared to the scenario of travel on a sealed Maria River Road.

The indicative one-way vehicle operating costs for travel on the Pacific Highway, Maria River Road (unsealed) and Maria River Road (sealed) is provided below in Table 3.11.

Table 3.11 Port Macquarie to Crescent Head one-way vehicle operating costs (\$)

	Via Pacific Highway (\$)	Via Maria River Road (unsealed) & Hibbard Ferry (\$)	Via Maria River Road (sealed) & Hibbard Ferry (\$)
Sealed	63.3	14.9	39.3
Unsealed		24.4	-
Total	63.3	39.3	39.3
Vehicle operating cost (\$)	\$20.2	\$13.2	\$12.5

From Table 3.11, the additional travel distance along the Pacific Highway results in a higher vehicle operating cost (one-way), whilst the sealing of the Maria River Road is expected to result in a reduction of vehicle operating costs for vehicles operating on Maria River Road, associated with reduced wear and tear following the road's upgrade (sealing).

With respect to travel time improvements, the upgraded road (refer Section 4.2) will be designed for a posted speed of 100 km/h for 11.2 kilometres north of Shoreline Drive, before a reduced speed limit of 80 km/h for a 13.1 kilometre section to the end of works. For the purpose of this assessment, the upgraded average speeds will be assumed as 5 km/h lower than the 85th percentile speeds derived from the operating speed model (as shown in Table 3.9), typical of a speed profile for similar rural roads to allow for a "like for like" comparison of travel speeds along Maria River Road.

The resulting travel times and average speeds for Maria River Road (existing and future) are shown below in Table 3.12.

Table 3.12 Maria River Road average travel speeds (existing and future)

Maria River Road section (km)	Distance (km)	Posted speed condition (post upgrade)	Maria River Road existing Travel time ¹	Maria River Road future Travel time ²	Difference
0 km (Shoreline Drive) to 11.2 km	11.2	100 km/h	10 minutes (67.2 km/h)	7 minutes (93.8 km/h) – avg speed	3 minutes
11.2 km to 24.3 km	13.1	80 km/h	15 minutes (52.8 km/hr)	11 minutes (72.5 km/h) – avg speed	4 minutes
24.3 km to 29.7 km (Crescent Head Road)	5.4	N/A (existing)	5 minutes (64.8 km/h)	5 minutes (64.8 km/h)	Nil
Total	29.7				7 minutes

Note: ¹ Based on Google travel time data (assumed as average travel time).

² Based on a 5 km/h reduction in the 85th percentile speed as derived from the operating speed model.

From Table 3.12, sealing of Maria River Road is expected to reduce one-way travel times by around seven minutes.

The indicative one-way travel time costs for travel on the Pacific Highway, Maria River Road (unsealed) and Maria River Road (sealed) is provided below in Table 3.13 for travel between Crescent Head and Port Macquarie.

Table 3.13 Port Macquarie to Crescent Head one-way travel time costs (\$)

	Via Pacific Highway	Via Maria River Road (unsealed) & Hibbard Ferry	Via Maria River Road (sealed) & Hibbard Ferry
Time (minutes) ¹	48	57	50
Time difference (minutes)		9	2
Cost (\$)	\$31.2	\$37.1	\$32.6

Note: ¹ Based on Google travel time data from Crescent Head (intersection of East Street and Pacific Street) and Port Macquarie (intersection of Ocean Drive/Hastings River Drive/Gordon Street). For the corridor using Maria River Road, this includes average ferry travel and wait times which are in the order of 15 minutes.

From Table 3.13, travel on the Pacific Highway is approximately nine minutes faster than Maria River Road (unsealed), resulting in a lower travel time cost. One-way travel time is expected to reduce following the sealing of Maria River Road, resulting in similar travel time costs.

Total travel costs between Port Macquarie and Crescent Head, including vehicle operating costs, travel time costs and the ferry fare are summarised in Table 3.14.

Table 3.14 *Total one-way travel costs (\$) between Port Macquarie and Crescent Head*

	Via Pacific Highway (\$)	Via Maria River Road (unsealed) & Hibbard Ferry	Via Maria River Road (sealed) & Hibbard Ferry
Vehicle operating cost	20.2	13.2	12.5
Travel time cost	31.2	37.1	32.6
Ferry fare	0.0	8.0	8.0
Total	51.4	58.3	53.1
Difference		\$6.9	\$1.7

From Table 3.14, the sealing of Maria River Road would indicatively reduce one-way travel costs from \$58.1 to \$52.9 (a saving of \$5), largely due to a decrease in travel time associated with increased travel speeds (seven minutes faster travel time) from sealing Maria River Road.

Comparing Table 3.13 and Table 3.14, travel time and travel time costs between the Pacific Highway and the sealed Maria River Road scenario are increasingly similar, suggesting that the sealing of Maria River Road may encourage a potential minor shift from the Pacific Highway to Maria River Road, for movements between Crescent Head and Port Macquarie.

Potential factors which may temper this shift include the travel time reliability associated with the Hibbard Ferry (including wait time, flooding, poor weather, etc), the limited operating times of the Hibbard Ferry (existing operating times are for an extended AM and PM peak only), as well as the higher amenity provided by the Pacific Highway, particularly for night time travel. Further, when the Hibbard Ferry is not in operation (or in planned maintenance), commuters would be required to travel further to access the Settlement Point Ferry. Further, regular commuters may be unwilling to pay for a weekly ferry fare of \$45 (or \$8 one-way fare) on an ongoing basis. As such, regular commuters may not be inclined to rely on the ferry connection (via Maria River Road), due to variabilities in ferry travel time, whereas tourist traffic may be less influenced by ferry travel time reliability.

Assuming weekday vehicle trips between Crescent Head and Port Macquarie of 120 (refer Section 3.2.2), and the potential that some vehicles may “shift” to an upgraded Maria River Road due to the improved travel conditions, a conservative estimate of 25%¹ of these trips shifting to Maria River Road (noting the limitations in the Census 2021 JTW data) has been assumed for this assessment, which would equate to a potential increase of through traffic volume of approximately 30 vehicles per day.

Referring to Section 3.3.1 (Traffic Volume Analysis), this would equate to a 14 percent increase in traffic volumes (from 211 to 241) in the northern extents of the study area (near Crescent Head Road), and a 26 percent increase in traffic volumes (from 115 to 145) towards the southern extents of the study area (near Shoreline Drive).

With respect to night-time travel, it is expected through trips would remain on the Pacific Highway, given the increased amenity (and safety) of the corridor as well as the reliance on the Settlement Point Ferry, which would require further travel (and travel time).

¹ The 25% conservative estimate has been made whilst considering the findings of both travel time and costs outlined above. Although there is time and cost savings for continued travel using the Pacific Highway, it is assumed some commuters would opt to use the upgraded Maria River Road. It is recommended that this assumption be reviewed through collection of post opening traffic surveys.

3.5 Ferry capacity

Connectivity of Maria River Road within the broader Port Macquarie urban area is reliant upon two car ferries operated by Port Macquarie Hastings Council, being the Hibbard and the Settlement Point ferry.

The Hibbard Ferry is located off Riverside Drive (approximately 6.8 kilometres from the mouth of the Hastings River) and provides connectivity to Boundary Street. The Settlement Point Ferry is located 3.1 kilometres from the mouth of the Hastings River, connecting Settlement Point Road with Shoreline Drive. The capacity, operating times and assumed wait times for each of the Hibbard and Settlement Point ferries is shown below in Table 3.15.

Table 3.15 Port Macquarie Hastings Council ferry capacities and operating hours

Ferry	Capacity	Operating times	Assumed wait time
Settlement Point ferry	21 cars	24 hours / 7 days	15 minutes
Hibbard Ferry	15 cars	Monday – Friday: 6:00 am – 9:50 am 2:00 pm – 6:50 pm Weekends and Public Holidays: 8:00 am – 6:50 pm	15 minutes

Source: Port Macquarie Hastings Council (2023)

From Table 3.15, the Settlement Point ferry has a larger capacity and operates on a 24 hours per day, seven days per week, whereas the Hibbard ferry largely operates during an extended morning and afternoon peak (weekdays) and for a longer duration on weekends and public holidays. Outside the operating hours of the Hibbard Ferry, commuters would rely on the Settlement Point ferry.

PMHC has provided boarding data for each of the two ferries over 2022, with average weekday boardings (December) and holiday boardings (December school holidays) provided below in Table 3.16 to Table 3.19 for each of the Settlement Point and Hibbard ferries. To simplify the analysis, capacity (boarding) and remaining capacity has been averaged on an hourly basis, together with the average services per hour also estimated for each ferry. Cars left on bank (LOB) has also been provided on an hourly basis, indicating potential capacity constraints with the existing ferries.

Table 3.16 Settlement Point Ferry boardings (December 2022 - weekdays)

	December - Weekdays													
	Northbound							Southbound						
Time	Hourly Service Frequency	Avg Cars	% of capacity	% capacity remaining	Avg Remaining Car Capacity	Hourly Remaining Capacity (Car Vols)	Hourly vehs LOB	Hourly Service Frequency	Avg Cars	% of capacity	% capacity remaining	Avg Remaining Car Capacity	Hourly Remaining Capacity (Car Vols)	Hourly vehs LOB
12:00 am - 1:00 am	1.6	1.0	5%	95%	20.0	32	0.0	1.3	0.2	1%	99%	20.8	27	0.0
1:00 am - 2:00 am	1.1	0.6	3%	97%	20.4	22	0.0	1.3	0.4	2%	98%	20.6	27	0.0
2:00 am - 3:00 am	1.6	0.4	2%	98%	20.6	33	0.0	1.7	0.8	4%	96%	20.2	34	0.0
3:00 am - 4:00 am	1.2	0.8	4%	96%	20.2	24	0.0	1.4	0.5	2%	98%	20.5	29	0.0
4:00 am - 5:00 am	4.5	0.4	2%	98%	20.6	93	0.0	4.8	1.7	8%	92%	19.3	93	0.0
5:00 am - 6:00 am	5.2	1.5	7%	93%	19.5	101	0.0	4.8	4.2	20%	80%	16.8	81	0.0
6:00 am - 7:00 am	4.2	3.7	18%	82%	17.3	73	0.0	4.5	8.4	40%	60%	12.6	57	0.1
7:00 am - 8:00 am	3.8	7.4	35%	65%	13.6	52	0.0	3.6	10.4	50%	50%	10.6	38	0.2
8:00 am - 9:00 am	3.7	7.6	36%	64%	13.4	49	0.5	3.5	14.8	70%	30%	6.2	22	0.5
9:00 am - 10:00 am	3.8	6.1	29%	71%	14.9	57	0.0	4.2	9.8	47%	53%	11.2	47	0.0
10:00 am - 11:00 am	3.6	12.8	61%	39%	8.2	30	3.0	3.0	13.7	65%	35%	7.3	22	1.8
11:00 am - 12:00 pm	3.0	14.7	70%	30%	6.3	19	2.9	3.6	14.8	70%	30%	6.2	22	2.8
12:00 pm - 1:00 pm	3.3	15.3	73%	27%	5.7	19	7.6	3.2	13.1	63%	37%	7.9	25	2.5
1:00 pm - 2:00 pm	3.4	14.4	68%	32%	6.6	23	2.2	3.3	13.3	63%	37%	7.7	25	3.8
2:00 pm - 3:00 pm	3.8	10.5	50%	50%	10.5	40	1.2	3.5	10.4	49%	51%	10.6	37	1.8
3:00 pm - 4:00 pm	3.9	10.5	50%	50%	10.5	41	0.0	4.3	7.8	37%	63%	13.2	57	0.0
4:00 pm - 5:00 pm	4.1	12.8	61%	39%	8.2	33	0.8	3.9	6.8	33%	67%	14.2	55	0.0
5:00 pm - 6:00 pm	4.5	9.1	43%	57%	11.9	53	0.0	4.5	4.4	21%	79%	16.6	75	0.0
6:00 pm - 7:00 pm	4.8	5.5	26%	74%	15.5	75	0.0	4.7	3.3	16%	84%	17.7	83	0.0
7:00 pm - 8:00 pm	4.8	4.2	20%	80%	16.8	80	0.0	5.1	2.1	10%	90%	18.9	96	0.0
8:00 pm - 9:00 pm	5.1	4.3	20%	80%	16.7	85	0.0	5.0	1.6	8%	92%	19.4	97	0.0
9:00 pm - 10:00 pm	5.1	2.5	12%	88%	18.5	94	0.0	4.8	0.9	4%	96%	20.1	97	0.0
10:00 pm - 11:00 pm	4.2	1.9	9%	91%	19.1	80	0.0	4.4	0.7	3%	97%	20.3	90	0.0
11:00 pm - 12:00 am	2.7	1.3	6%	94%	19.7	53	0.0	2.4	0.5	2%	98%	20.5	49	0.0

Table 3.17 Settlement Point Ferry boardings (December 2022 – holiday periods)

	December - Holiday Periods													
	Northbound							Southbound						
Time	Hourly Service Frequency	Avg Cars	% of capacity	% capacity remaining	Avg Remaining Car Capacity	Hourly Remaining Capacity (Car Vols)	Hourly vehs LOB	Hourly Service Frequency	Avg Cars	% of capacity	% capacity remaining	Avg Remaining Car Capacity	Hourly Remaining Capacity (Car Vols)	Hourly vehs LOB
12:00 am - 1:00 am	2.8	0.9	4%	96%	20.1	57	0.7	2.9	0.3	2%	98%	20.7	60	0.0
1:00 am - 2:00 am	1.8	0.6	3%	97%	20.4	37	0.0	1.7	0.4	2%	98%	20.6	36	0.0
2:00 am - 3:00 am	1.5	0.3	1%	99%	20.8	30	0.0	1.3	0.9	4%	96%	20.1	26	0.0
3:00 am - 4:00 am	1.5	0.5	3%	97%	20.5	32	0.0	1.7	0.4	2%	98%	20.6	36	0.0
4:00 am - 5:00 am	3.4	0.4	2%	98%	20.6	69	0.0	3.5	1.3	6%	94%	19.7	70	0.0
5:00 am - 6:00 am	5.1	0.8	4%	96%	20.2	103	0.0	5.2	2.3	11%	89%	18.7	97	0.0
6:00 am - 7:00 am	5.0	1.9	9%	91%	19.1	96	0.0	4.8	4.0	19%	81%	17.0	82	0.0
7:00 am - 8:00 am	4.4	3.2	15%	85%	17.8	78	0.0	4.7	6.5	31%	69%	14.5	69	0.5
8:00 am - 9:00 am	4.1	5.9	28%	72%	15.1	62	0.0	3.9	9.6	46%	54%	11.4	44	0.0
9:00 am - 10:00 am	3.6	8.4	40%	60%	12.6	46	0.8	3.6	10.9	52%	48%	10.1	37	1.9
10:00 am - 11:00 am	3.1	13.4	64%	36%	7.6	23	3.1	2.9	13.9	66%	34%	7.1	21	4.7
11:00 am - 12:00 pm	2.6	16.0	76%	24%	5.0	13	6.8	2.7	14.1	67%	33%	6.9	19	4.0
12:00 pm - 1:00 pm	2.7	14.4	68%	32%	6.6	18	7.9	2.9	12.2	58%	42%	8.8	26	3.5
1:00 pm - 2:00 pm	3.5	13.3	64%	36%	7.7	26	8.3	3.2	9.8	47%	53%	11.2	36	1.8
2:00 pm - 3:00 pm	3.6	9.9	47%	53%	11.1	40	5.6	3.5	9.3	44%	56%	11.7	42	4.0
3:00 pm - 4:00 pm	3.6	11.8	56%	44%	9.2	34	11.4	3.6	8.8	42%	58%	12.2	44	1.8
4:00 pm - 5:00 pm	4.0	11.5	55%	45%	9.5	38	2.5	3.9	7.1	34%	66%	13.9	54	0.8
5:00 pm - 6:00 pm	4.1	8.9	42%	58%	12.1	50	2.8	4.1	6.0	28%	72%	15.0	61	0.0
6:00 pm - 7:00 pm	4.4	6.5	31%	69%	14.5	63	0.0	4.4	4.9	24%	76%	16.1	70	0.0
7:00 pm - 8:00 pm	4.3	5.8	28%	72%	15.2	65	0.7	4.5	3.6	17%	83%	17.4	77	0.0
8:00 pm - 9:00 pm	4.8	3.8	18%	82%	17.2	83	0.0	4.8	3.0	14%	86%	18.0	87	0.0
9:00 pm - 10:00 pm	4.9	3.4	16%	84%	17.6	86	0.0	4.6	2.4	11%	89%	18.6	86	0.0
10:00 pm - 11:00 pm	4.6	2.6	12%	88%	18.4	85	0.1	5.0	1.1	5%	95%	19.9	99	0.0
11:00 pm - 12:00 am	4.0	1.2	6%	94%	19.8	79	0.0	3.6	0.9	4%	96%	20.2	73	0.0

Table 3.18 Hibbard Ferry boardings (December 2022 – weekday periods)

	December - Weekdays													
	Northbound							Southbound						
Time	Hourly Service Frequency	Avg Cars	% of capacity	% capacity remaining	Avg Remaining Car Capacity	Hourly Remaining Capacity (Car Vols)	Hourly vehs LOB	Hourly Service Frequency	Avg Cars	% of capacity	% capacity remaining	Avg Remaining Car Capacity	Hourly Remaining Capacity (Car Vols)	Hourly vehs LOB
12:00 am - 1:00 am														
1:00 am - 2:00 am														
2:00 am - 3:00 am														
3:00 am - 4:00 am														
4:00 am - 5:00 am														
5:00 am - 6:00 am														
6:00 am - 7:00 am	4.6	2.4	16%	84%	12.6	58	0.0	4.0	4.6	31%	69%	10.4	42	0.0
7:00 am - 8:00 am	3.4	3.3	22%	78%	11.7	40	0.0	3.9	7.1	48%	52%	7.9	31	0.0
8:00 am - 9:00 am	3.9	3.8	26%	74%	11.2	44	0.0	3.9	8.7	58%	42%	6.3	25	1.1
9:00 am - 10:00 am	3.8	3.8	25%	75%	11.2	43	0.0	3.8	6.2	41%	59%	8.8	33	0.0
10:00 am - 11:00 am								0.3	8.0	53%	47%	7.0	2	0.0
11:00 am - 12:00 pm														
12:00 pm - 1:00 pm														
1:00 pm - 2:00 pm														
2:00 pm - 3:00 pm	3.9	4.4	29%	71%	10.6	41	0.0	4.0	6.6	44%	56%	8.4	34	0.4
3:00 pm - 4:00 pm	3.9	7.1	48%	52%	7.9	31	0.3	3.5	5.3	35%	65%	9.7	34	0.0
4:00 pm - 5:00 pm	3.6	8.4	56%	44%	6.6	24	1.4	3.9	3.6	24%	76%	11.4	45	0.0
5:00 pm - 6:00 pm	4.2	6.9	46%	54%	8.1	34	0.5	3.9	2.3	15%	85%	12.7	50	0.0
6:00 pm - 7:00 pm	4.2	3.1	21%	79%	11.9	50	0.0	4.4	1.4	9%	91%	13.6	60	0.0
7:00 pm - 8:00 pm								0.2	0.0	0%	100%	15.0	3	0.0
8:00 pm - 9:00 pm														
9:00 pm - 10:00 pm														
10:00 pm - 11:00 pm														
11:00 pm - 12:00 am														

Table 3.19 Hibbard Ferry boardings (December 2022 – holiday periods)

	December - Holiday Periods													
	Northbound							Southbound						
Time	Hourly Service Frequency	Avg Cars	% of capacity	% capacity remaining	Avg Remaining Car Capacity	Hourly Remaining Capacity (Car Vols)	Hourly vehs LOB	Hourly Service Frequency	Avg Cars	% of capacity	% capacity remaining	Avg Remaining Car Capacity	Hourly Remaining Capacity (Car Vols)	Hourly vehs LOB
12:00 am - 1:00 am														
1:00 am - 2:00 am														
2:00 am - 3:00 am														
3:00 am - 4:00 am														
4:00 am - 5:00 am														
5:00 am - 6:00 am														
6:00 am - 7:00 am	2.5	2.3	15%	85%	12.7	31	0.0	2.2	3.4	23%	77%	11.6	25	0.0
7:00 am - 8:00 am	2.1	2.9	19%	81%	12.1	25	0.0	2.4	5.7	38%	62%	9.3	22	0.0
8:00 am - 9:00 am	3.9	2.8	19%	81%	12.2	48	0.0	3.5	5.3	35%	65%	9.7	34	0.5
9:00 am - 10:00 am	3.5	4.4	30%	70%	10.6	37	0.0	3.3	6.5	43%	57%	8.5	28	0.7
10:00 am - 11:00 am	2.8	5.0	34%	66%	10.0	28	0.5	3.1	7.7	51%	49%	7.3	23	4.6
11:00 am - 12:00 pm	2.9	6.7	45%	55%	8.3	24	0.5	3.1	8.1	54%	46%	6.9	21	5.5
12:00 pm - 1:00 pm	3.3	6.7	45%	55%	8.3	27	1.3	3.1	5.9	39%	61%	9.1	28	7.3
1:00 pm - 2:00 pm	3.4	6.3	42%	58%	8.7	29	0.5	3.3	5.5	37%	63%	9.5	31	3.6
2:00 pm - 3:00 pm	3.5	6.7	45%	55%	8.3	29	1.4	3.5	4.1	27%	73%	10.9	38	0.0
3:00 pm - 4:00 pm	3.5	6.3	42%	58%	8.7	30	0.1	3.5	4.2	28%	72%	10.8	38	0.2
4:00 pm - 5:00 pm	3.7	6.4	43%	57%	8.6	32	0.4	3.5	3.9	26%	74%	11.1	38	0.1
5:00 pm - 6:00 pm	3.6	4.4	29%	71%	10.6	39	0.0	3.9	2.8	19%	81%	12.2	48	0.0
6:00 pm - 7:00 pm	3.7	3.0	20%	80%	12.0	45	0.0	3.5	1.9	13%	87%	13.1	45	0.0
7:00 pm - 8:00 pm								0.5	1.4	9%	91%	13.6	6	0.0
8:00 pm - 9:00 pm														
9:00 pm - 10:00 pm														
10:00 pm - 11:00 pm														
11:00 pm - 12:00 am														

The analysis in Table 3.16 to Table 3.19 indicated the following for the respective peak hour movements for each of the Settlement Point and Hibbard ferries:

- Settlement Point ferry:
 - Weekdays - southbound: Peak movements between 8:00 am – 9:00 am, and 10:00 am – 2:00 pm (ranging from 63 percent to 70 percent of ferry capacity).
 - Weekdays - northbound: Peak movements between 11:00 am – 2:00 pm (ranging from 68 percent to 73 percent of ferry capacity).
 - Holiday periods – southbound: Peak movements between 10:00 am – 12:00 pm (ranging from 66 percent to 67 percent of ferry capacity).
 - Holiday periods - northbound: Peak movements between 10:00 am – 12:00 pm (ranging from 66 percent to 67 percent of ferry capacity).
- Hibbard ferry:
 - Weekdays - southbound: Peak movements between 8:00 am – 9:00 am (58 percent of ferry capacity).
 - Weekdays - northbound: Peak movements between 4:00 – 5:00 pm (56 percent of ferry capacity).
 - Holiday periods – southbound: Peak movements between 10:00 am – 12:00 pm (ranging from 51 percent to 54 percent of ferry capacity).
 - Holiday periods - northbound: Peak movements between 11:00 am – 5:00 pm (ranging from 42 percent to 45 percent of ferry capacity).

The analysis also enabled an estimation of hourly “remaining ferry capacity”, of which additional vehicles could notionally be accommodated on the ferries, for onward travel along an upgraded Maria River Road (for travel between Port Macquarie and Crescent Head). A figure showing remaining ferry capacity is provided below in Table 3.20.

Table 3.20 Combined ferry capacity based on December 2022 patronage levels (Weekday and Holiday periods)

	December Weekday		December Holidays	
	Northbound	Southbound	Northbound	Southbound
	Hourly Remaining Capacity (Car Vols)			
12:00 am - 1:00 am	32	27	57	60
1:00 am - 2:00 am	22	27	37	36
2:00 am - 3:00 am	33	34	30	26
3:00 am - 4:00 am	24	29	32	36
4:00 am - 5:00 am	93	93	69	70
5:00 am - 6:00 am	101	81	103	97
6:00 am - 7:00 am	131	98	127	107
7:00 am - 8:00 am	91	69	103	91
8:00 am - 9:00 am	93	46	109	78
9:00 am - 10:00 am	99	80	83	64
10:00 am - 11:00 am	30	24	52	43
11:00 am - 12:00 pm	19	22	37	40
12:00 pm - 1:00 pm	19	25	45	54
1:00 pm - 2:00 pm	23	25	56	67
2:00 pm - 3:00 pm	81	71	69	79
3:00 pm - 4:00 pm	71	91	64	83
4:00 pm - 5:00 pm	57	100	70	92
5:00 pm - 6:00 pm	88	124	88	109
6:00 pm - 7:00 pm	125	143	108	115
7:00 pm - 8:00 pm	80	99	65	84
8:00 pm - 9:00 pm	85	97	83	87
9:00 pm - 10:00 pm	94	97	86	86
10:00 pm - 11:00 pm	80	90	85	99
11:00 pm - 12:00 am	53	49	79	73

From Table 3.20, a maximum hourly volume of 46 vehicles an hour during weekdays could be accommodated during a southbound AM peak between 8:00 am and 9:00 am (predominantly via the Hibbard Ferry), and 22 to 25 vehicles per hour via the Settlement Point ferry between 10:00 am and 2:00 pm. In the reverse northbound direction, 57 vehicles per hour could be accommodated in the PM peak between 4:00 pm and 5:00 pm (predominantly on the Hibbard Ferry), and between 19 and 30 vehicles during 10:00 am and 2:00 pm (via the Settlement Point Ferry).

With respect to weekday night-time traffic (e.g., 11:00 pm to 7:00 am), there is excess capacity available on the Settlement Point Ferry, however it is noted that the ferry largely operates on a demand basis, with typically one vehicle per hour travelling in either direction.

With respect to holiday periods, there is increased capacity available during each respective peak, with 78 vehicles per hour for the southbound AM peak from 8:00 am to 9:00 am, and 70 vehicles per hour for the northbound PM peak from 4:00 pm to 5:00 pm. Further, there is also additional hourly capacity for the 10:00 am to 2:00 pm peaks in each direction during holiday periods, from a low of 37 vehicles per hour northbound, to 67 vehicles per hour southbound.

The ferry capacity analysis identifies some “remaining” capacity which could accommodate additional movements along Maria River Road.

4. Potential impacts

4.1 Traffic diversion scenarios for Maria River Road

To estimate the potential increase in traffic volumes on Maria River Road associated with its upgrade, the impact of a potential 25% diversion (refer Section 3.4) was considered from the Pacific Highway, which also included consideration of the remaining capacity on the Hibbard and Settlement Point ferries

Table 4.1 illustrates remaining ferry capacity in the AM and PM peak hours, as well the potential impact of a 25% diversion of traffic volumes from the Pacific Highway to Maria River Road, under the assumption that 120 vehicles per weekday travel between Crescent Head and Port Macquarie (in either direction), and an assumed peak hour volume of 12.5 percent (of total daily traffic volumes).

Table 4.1 Traffic diversion scenarios for Maria River Road (weekday peak hours)

Peak hour	Hibbard Ferry - Remaining Hourly Capacity	Hibbard and Settlement Point Ferry - Remaining Hourly Capacity	25% Diversion from Pacific Highway
Southbound PM peak hour – 4:00 – 5:00 pm	24	57	4
Northbound AM peak hour – 8:00 – 9:00	25	46	4

From Table 4.1, average hourly increases of four vehicles in the peak hour may use Maria River Road, from a remaining ferry capacity of between 24 and 57 vehicles per hour for a given weekday.

With respect to weekend and/or holiday periods, the upgrade of Maria River Road is expected to increase opportunities for drive tourism, associated with the increased accessibility provided by a sealed road. Under this scenario, the remaining capacity of car ferries during the weekend/holiday peak of 11:00 am to 12:00 pm ranges from 21 to 40 vehicles per hour (refer Table 4.2).

Table 4.2 Traffic diversion scenarios for Maria River Road (holiday periods peak hours)

	Hibbard Ferry - Remaining Hourly Capacity	Hibbard and Settlement Point Ferry - Remaining Hourly Capacity
Southbound PM peak hour – 11:00 am – 12:00 pm	21	40
Northbound AM peak hour – 11:00 am – 12:00 pm	24	37

From Table 4.1 (weekdays) and Table 4.2 (weekends/holiday periods), these are upper limits to the additional traffic volumes which could use the sealed Maria River Road, based on either the existing movements between Crescent Head and Port Macquarie, as well as the operating and infrastructure constraints of the existing ferries across the Hastings River.

As a conservative assumption, an additional 8 vehicles per hour (assumed as 33% remaining capacity of Hibbard Ferry) may use Maria River Road (and the ferries) for travel between Crescent Head and Port Macquarie, for day time drive tourism purposes during weekend/holiday periods.

4.2 Road design analysis

An analysis of road design features associated with the upgrade and sealing of Maria River Road was undertaken, as it may impact on the risk of animal strikes. Key attributes considered comprised:

- Stopping sight distance.

- Delineation.
- Cross sectional upgrade.

4.2.1 Stopping sight distance

The upgraded Maria River Road will be designed to Austroads standards for an indicative posted speed of 100 km/hr for chainages 0 m to 11200 m (from north of Shoreline Drive), and 80 km/h for chainages 11,200 m until the end of works (to the existing sealed portion of Maria River Road). As part of these works, the upgrade is anticipated to improve the horizontal and vertical geometry inclusive of the following work types:

- Vertical grading.
- Adding superelevation to some horizontal curves. Speed advisory signage to be incorporated for curvature where required.
- Minor curve widening.
- Minor vegetation clearing of table drains / road verge.

The cumulative impact of the works is anticipated to provide improved sight distances on sections of straights and curves.

Appreciating the existing variable nature and standard of Maria River Road, an indicative summary of anticipated stopping distance improvements associated with an upgrade of Maria River Road has been provided below in Table 4.3, for sections of straight (100 km/h for chainages 0 m to 11200 m and 80 km/h for chainage 11200 m till end of works) and sections in curve (60 and 80 km/h advisory curves), considering sections both on grade (0%) and in fall (-2%).

Table 4.3 Maria River Road – road design parameters

Grade (%)	Signposted speed	Coefficient of deceleration, d (unsealed/sealed) ¹	Indicative existing stopping distance (m)	Indicative future stopping distance (m)	Stopping distance improvement (m)	Stopping distance improvement (%)
Flat grade (0%)	100 km/h	0.24 / 0.36	259.6	193.4	66.2	34.2
	80 km/h	0.24 / 0.36	182.9	138.6	44.3	32.0
	60 km/h	0.26 / 0.36	113.1	92.5	20.6	22.3
Down grade (-2%)	100 km/h	0.24 / 0.36	277.6	201.2	76.4	38.0
	80 km/h	0.24 / 0.36	195.0	143.8	51.2	35.6
	60 km/h	0.26 / 0.36	119.3	95.6	23.6	24.7

Note: ¹ The value of a coefficient of deceleration for a sealed road is based on a wet surface. With respect to the coefficient of deceleration for an unsealed road, the value is irrespective of wet/dry conditions, and it is noted that very little research is available, reflecting the highly variable nature of unsealed road surfaces.

The stopping sight distance is defined by Austroads as the “distance to enable a normally alert driver, travelling at the design speed on wet pavement, to perceive, react and brake to a stop before reaching a hazard on the road ahead.” Stopping sight distance (SSD) has been calculated using Equation 1 from Austroads Guide to Road Design Part 3: Geometric Design 2021 (AGRD03 2021). The equation measures the distance between the driver’s eye height of 1.1 m and an object of height 0.2 m. This object height has been considered suitable to represent a small animal, such as a koala, that is on the road.

The meaning of the stopping sight distance as defined by Austroads can be visualised from the schematic in Figure 4.1. This image shows that a vehicle (red car) driving on road conditions associated with a shorter stopping sight distance (e.g. obscured by vegetation on the inside of a curve), reacts to a hazard later than a driver (blue car) on road conditions with a longer stopping sight distance (e.g. with improved sight lines through the inside of a curve due to vegetation clearing).

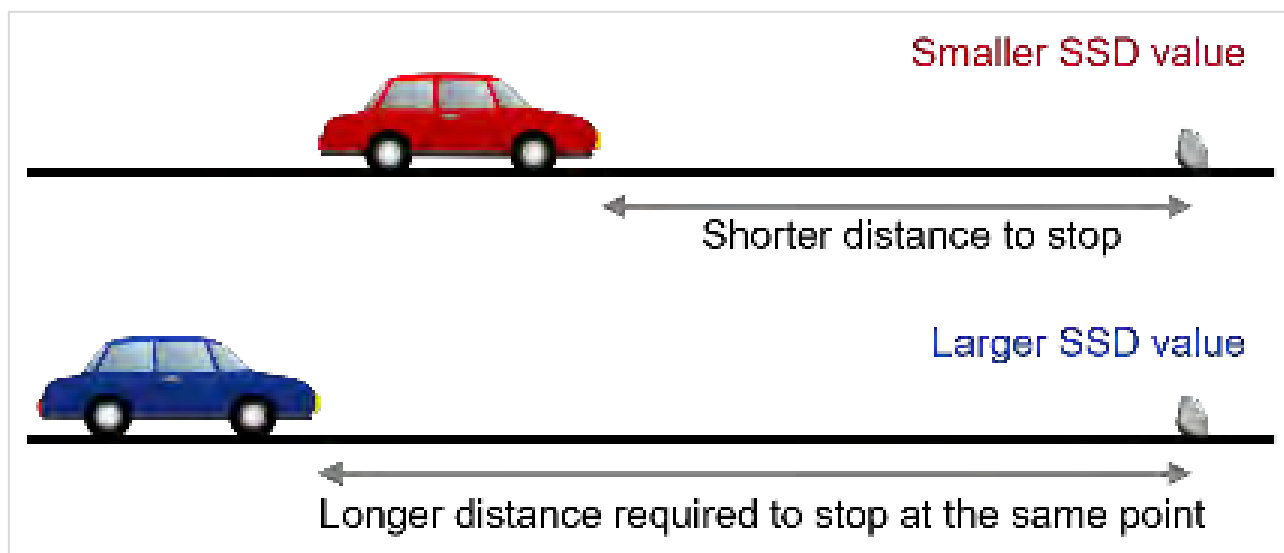


Figure 4.1 Schematic diagram of the concept of stopping sight distance (SSD)

In the context of animals on the road or road verge, a road with increased stopping sight distance, reduces the risk of vehicle strikes on animals.

Referring to Table 4.3, it should be noted that for a design speed of 110 km/h, a deceleration coefficient is not provided in AGRD03 2021 or the ARRB Unsealed Roads Manual: Guidelines to good practice 2009 (ARRB 2009) and this value was assumed as the same as for a design speed of 90 km/h. Maria River Road is predominantly level with increases of up to approximately 2% grade for short lengths.

From Table 3.10, the expected increase in operating speed ranges from 3.4 km/h in the future 80 km/h zone, to 5.6 km/h in the future 100 km/h zone (for the 85th percentile speed).

The existing and projected future average 85th percentile speeds, and the resulting stopping distances are shown below in Table 4.4.

Table 4.4 Maria River Road – road design parameters (stopping sight distances)

Maria River Road section (km)	Existing average 85 th percentile speed (km/h) on unsealed road	Existing stopping distance (m)	Future average 85 th percentile speed (km/h) on sealed road	Future stopping distance (m)	Difference in stopping distance (m)	Difference in stopping distance (%)
0 km (Shoreline Drive) to 11.2 km (100 km/h zone)	93.3 km/h	194.6	98.8 km/h	161.6 m	- 33.0 m	- 16.9 %
11.2 km to 24.3 km (80 km/ zone)	74.1 km/h	131.2 m	77.5 km/h	108.7 m	- 22.5 m	- 17.1 %

From Table 4.4, the sealing of Maria River Road is expected to reduce stopping distance (due to the improved friction provided by a sealed road), despite the minor increase in average travel speeds, with stopping distances expected to decrease by 17 percent in both the 80 km/h and 100 km/h zones.

4.2.2 Sight distance

The upgrade of Maria River Road is anticipated to provide improved sight distance, associated with minor horizontal curve improvements inclusive of sight distance clearing. Figure 4.2 gives a comparison of the increase in sight distance that is anticipated to be achieved for some horizontal curves as part of the upgrade.

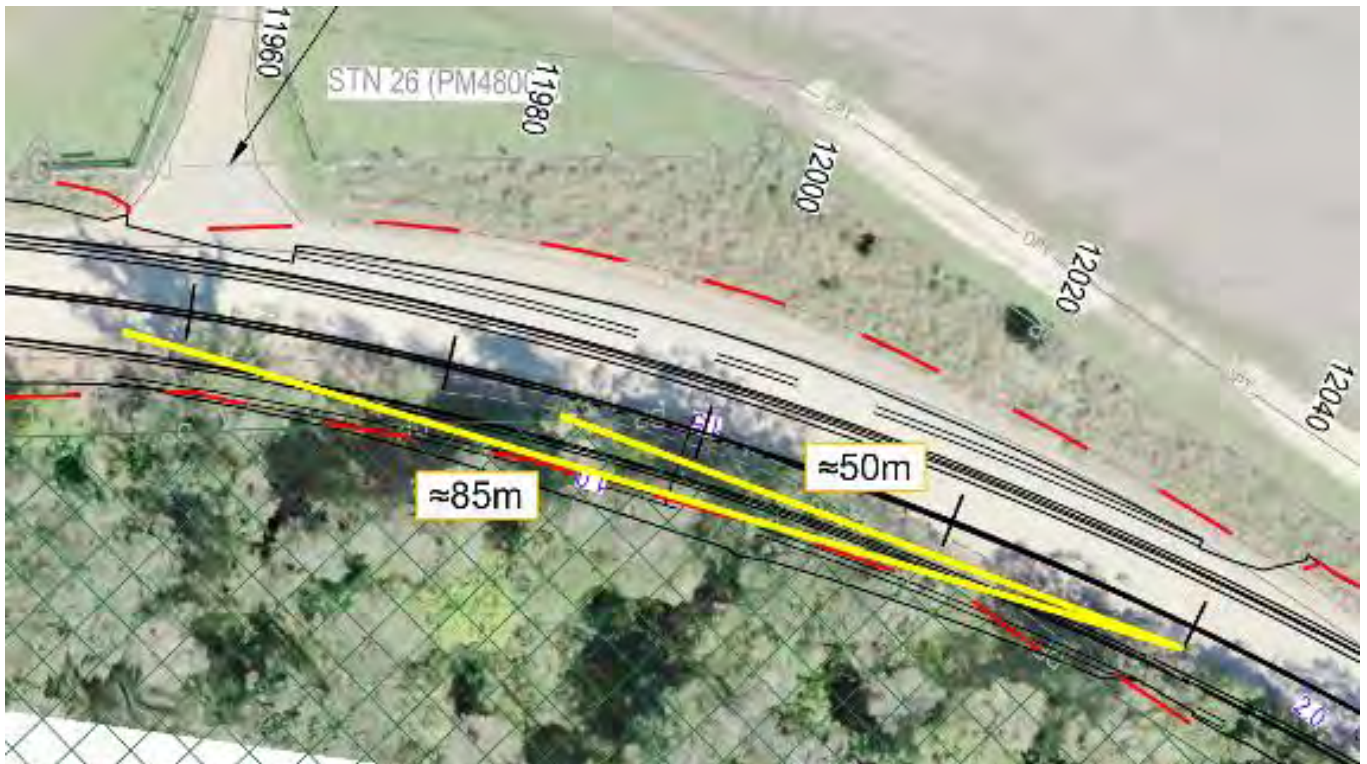


Figure 4.2 Comparison of sight distance on horizontal curve before and after upgrades at approximately chainage 12000m

In the example provided above (Figure 4.2), the upgrade is anticipated to result in an increased sight distance of approximately 35 metres (or 70 percent) which will in turn increase the sight distance to potential animals on the road corridor, or road verge.

The addition of curve widening and superelevation to a number of the curves is anticipated to also improve vehicle handling when navigating these curves along the length of the upgraded Maria River Road.

4.2.3 Cross sectional upgrade

The upgrades to Maria River Road will include a cross-sectional upgrade for the full chainage length in conjunction with the sealing of the road. The cross-sectional upgrade will include superelevation and/or lane widening for some curves, improvements of existing drainage (and allow improved maintenance of table drains), moving of existing safety barriers and installation of new barriers. The proposed road design including cross-section has been designed to comply with Austroads guidelines.

Figure 4.3 shows typical sections for straight (top image) and curved (bottom image) road sections and includes the existing road width and proposed upgrade widths. For these two specific cases, the upgraded cross-section of the straight section includes travel lanes with shoulders included on both edges as well as 1 in 4 batters. The typical section for the curved section of road includes lane widening for both lanes, shoulders on both sides and a verge on the outside of the curve, as well as superelevation has been applied to the cross-sectional grade.

For both typical sections, the existing cross-section is given by the dashed line.

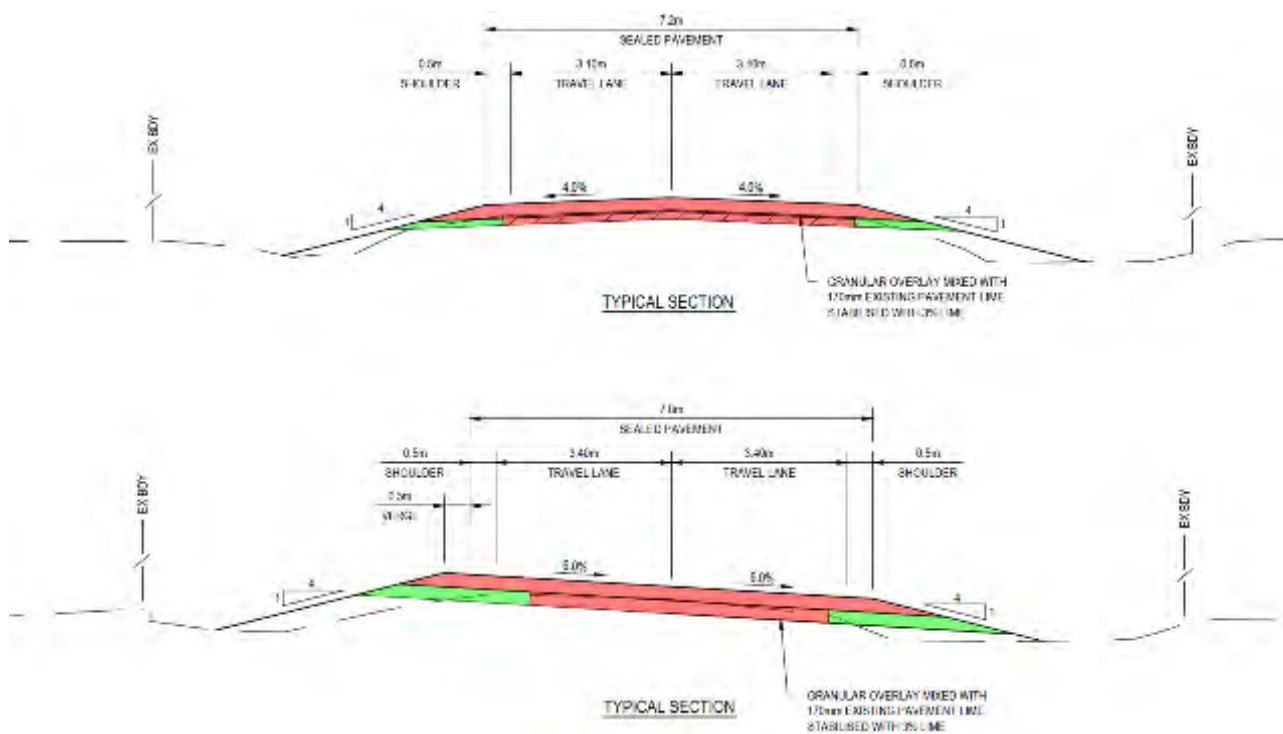


Figure 4.3 Typical Sections for a straight (top) and superelevation curve (bottom) sections

The cross-sectional design for Maria River Road has considered the respective guidelines to ensure the upgrades follow Austroads' Safe System approach of "a road system that is designed to reduce the incidence and severity of crashes". This Safe System approach was involved in the selecting of values for lane width, shoulders, superelevation grades and various other parameters by adopting values from Austroads ARGD03 2021 as well as other relevant guidelines. The upgrades to Maria River Road of road widening, sealing, and superelevation among others are anticipated to improve driver safety and reduce the likelihood and severity of animal collisions.

4.2.4 Delineation and maintenance practices

The sealing and upgrade of Maria River Road is anticipated to provide enhanced delineation of the road consistent with AS1742.2 and RMS & RTA delineation guidelines. These enhancements include signs for curve warning, speed advisory signage, chevron alignment markers (CAMs), line marking for centreline based on overtaking sight distance requirements, raised pavement markers (RPMs) for associated line marking type and guideposts.

To provide context of the existing delineation standard of the corridor, Figure 4.4 illustrates the typical delineation condition along Maria River Road along sections of straight and on curve.



Figure 4.4 Typical existing delineation condition of Maria River Road on straights and on curves

From Figure 4.4, delineation is typically limited to guideposts to identify culverts, and is absent on some road curves.

A summary of the existing and proposed delineation on Maria River Road is provided below in Table 4.5.

Table 4.5 Existing and proposed delineation condition for Maria River Road

Delineation Type		Existing Delineation	Proposed Delineation
Line marking (centreline types, edge, intersections)		No line markings	Longitudinal line marking in accordance with RTA Delineation: Section 4 Longitudinal Markings. Transverse line marking in accordance with RTA Delineation: Section 6 Transverse Markings.
Signage	Curve warning	No curve warning signage currently used	Signage in accordance with RTA Delineation: Section 17 Alignment signs and markers, Part 17.4.1.
	Speed advisory	No speed advisory signage currently used	Signage in accordance with RTA Delineation: Section 17 Alignment signs and markers, Part 17.4.2.
Chevron alignment markers (CAMs)		No chevron alignment markers currently used	Signage in accordance with RTA Delineation: Section 17 Alignment signs and markers, Part 17.5.
Raised pavement markers (RPMs)		No raised pavement markers currently used	Colours of markers and spacing in accordance with RTA Delineation: Section 15 Raised pavement markers, Table 15.1 and Table 15.2, and Figures 15.8 to 15.11.
Guideposts (spacing)		Guide posts are installed inconsistently along the road.	Spacing in accordance with RTA Delineation: Section 16 Guideposts & delineation of safety barriers, Table 16.1.

Comparing Figure 4.4 to Table 4.5, the upgrade of Maria River Road will include major delineation improvements for the corridor and is anticipated to provide significant improvement in the demarcation of the road to road users, particularly for sections on curve.

The use of separation and barrier line marking types will enforce restrictions on overtaking vehicles, where locations along Maria River Road have been strategically chosen as the safest locations for vehicles to overtake.

The implementation of guideposts, line marking, chevron alignment markers, and raised pavement markers are all anticipated to improve visibility of the road, allowing drivers to distinguish upcoming curves and crests in the road alignment more easily. These delineation practices are particularly important when driving at night or with poor visibility, such as during rain, as they are predicted to help ensure drivers can more easily follow and remain within their lane.

Further, the improved (and consistent) delineation of the road is also likely to allow drivers to focus, and more readily identify animals on the road or road verge.

4.3 Other benefits

The upgrade and sealing of Maria River Road will also provide other benefits that are anticipated to improve the visibility and demarcation of the road, including for animals on the corridor. These include:

- Improved visibility associated with reduced dust emissions.
- Potential increased contrast (visibility) of animals on a consistent sealed road as against a gravel road of variable condition.
- Improved maintenance of the road verge (e.g. slashing of vegetation and clearing of table drains) will likely reduce attractiveness of the road verge to animals, as well as improve sight distance.

4.4 Road safety benefits

The upgrade of Maria River Road is expected to provide a safer road environment associated with the road's upgrade and sealing, upgraded clear zones, minor upgrades to the road's geometry (to achieve a posted speed of 80 km/h and 100 km/h) as well as upgraded delineation (refer Section 4.2.3).

A summary of indicative crash reduction rates associated with some of these road improvements are shown in Table 4.6.

Table 4.6 Crash reduction rates (%) for road safety improvements along Maria River Road

Road safety improvements	Crash type	Crash reduction (%)
Install new seal on unsealed surface	Single vehicle crashes (incl. on object)	10
Mark barrier line	Head-on	15
	Overtake: turning vehicle/same direction	20
	Off right on straight (incl. hit object)	10
	Out of control on straight	5
	Out of control on bend	5
Mark road edge lines	Head-on	5
	Single vehicle crashes (incl. on object)	5-10 (pending crash type)
Chevron alignment markers (CAMS)	Head-on	15
	Single vehicle crashes (incl. on object)	20 (pending crash type)
Curve and advisory speed signs	Head-on	15
	Single vehicle crashes (incl. on object)	20 (pending crash type)
Install guideposts with reflectors	Head-on	10
	Single vehicle crashes (incl. on object)	10
Install retro reflective markers (RRPMs) on centre or edge lines (night-time crashes only)	Head-on	15
	Overtake: turning vehicle/same direction	5
	Single vehicle crashes (incl. on object)	15

Source: Transport for NSW (Road Safety Project Nomination Form – Crash Reduction Rates)

The cumulative crash reduction rate of proposed road safety improvements for key crash types for a rural road (similar to Maria River Road) are provided below:

- Head-on crashes: 47 percent.
- Single vehicle run off road (day time): 58 percent.
- Single vehicle run off road (night time): 64 percent.

It is noted that the cumulative crash reduction rates are considered conservative, as potential additional crash reductions associated with clear zone and road geometry improvements haven't been considered. Nonetheless, the upgrade of Maria River Road is expected to provide a significantly safer road environment. This is particularly relevant for the two serious injury crashes along Maria River Road which occurred within the unsealed portion of the corridor in the Kempsey Shire Council local government area in 2017 and 2020.

5. Measures to reduce risk of animal strikes

In addition to the current proposed design, delineation, and mitigation practices discussed in Sections 4.2.1 and Section 4.2.2, there are various additional mitigation strategies that could be explored to reduce the risk of vehicle collisions with koalas and other wildlife (discussed further in Appendix B). These include:

- Signage: Additional animal or koala signage (refer further in 5.1), with potential options for these to be upgraded to flashing or vehicle-activated dynamic signs to increase driver awareness. Signage could also be provided notifying drivers of emergency contact details for injured wildlife or road-kill events.
- Pavement marking: Road surface markings (e.g. “Koala Zone”) could be used to highlight koala vehicle strike hotspots for drivers and can be used alongside signage.
- Wildlife fencing: Wildlife fencing can be used to help direct and funnel animals to areas that are considered the most ideal place to cross, ensuring vehicles in either direction will have a suitable sight distance and stopping time.
- Virtual fences: Virtual fences consist of short, roadside posts positioned at intervals along both sides of the road with a small, electronic device mounted to the top of each post. These devices are activated by the headlights of approaching vehicles which causes the device to emit a high-pitched sound and flash a blue light.
- Reduced speed limits: Reducing speed limits is a well-established mitigation measure of reducing the incidence of animal strikes. A 20 km/h reduction in speed limit from 100 km/h to 80 km/h can reduce hit animal crashes by 35 percent (discussed further in Appendix B).

5.1 Active signs trial Port Macquarie

Dynamic vehicle-activated signs were recently installed at a number of locations across Port Macquarie and West Haven in 2023 (see Figure 5.1). Testing of these signs were conducted in September to November 2023, where signs were covered and subsequently uncovered over a period of time to understand their influence on vehicle speeds.



Figure 5.1 Activated koala road signs

Radar logs providing a summary of average speeds and vehicle counts in 15-minute blocks both before and after the uncovering of the signs have been provided by PMHC for analysis. The locations for which the activated signs have been deployed include:

- Multiple sections of Ocean Drive, including:
 - North of Henry Kendall Drive in West Haven
 - Near Port Macquarie Golf Club
 - Near Clearwater Crescent in Port Macquarie
- Lake Road, west of Ocean Drive
- Kennedy Drive between Allunga Avenue and Pacific Drive
- Lord Street near Macquarie Nature Reserve

The periods chosen for the assessment were selected such that speed and count data was available at all locations provided. These periods included:

- Before sign uncovering – 16 September 2023 to 25 September 2023.
- After sign uncovering – 27 September 2023 to 20 November 2023.

Across the assessed days (and for the analysis), speeds were averaged for the day and night-time periods, as indicated in Figure 5.2. Over this period, sunrise ranged from 5:45 am to 6:30 am, whilst sunset ranged from 5:45 pm to 7:30 pm, noting that daylight savings started on 1 October 2023 (shifting time one hour forward as reflected in the graph).

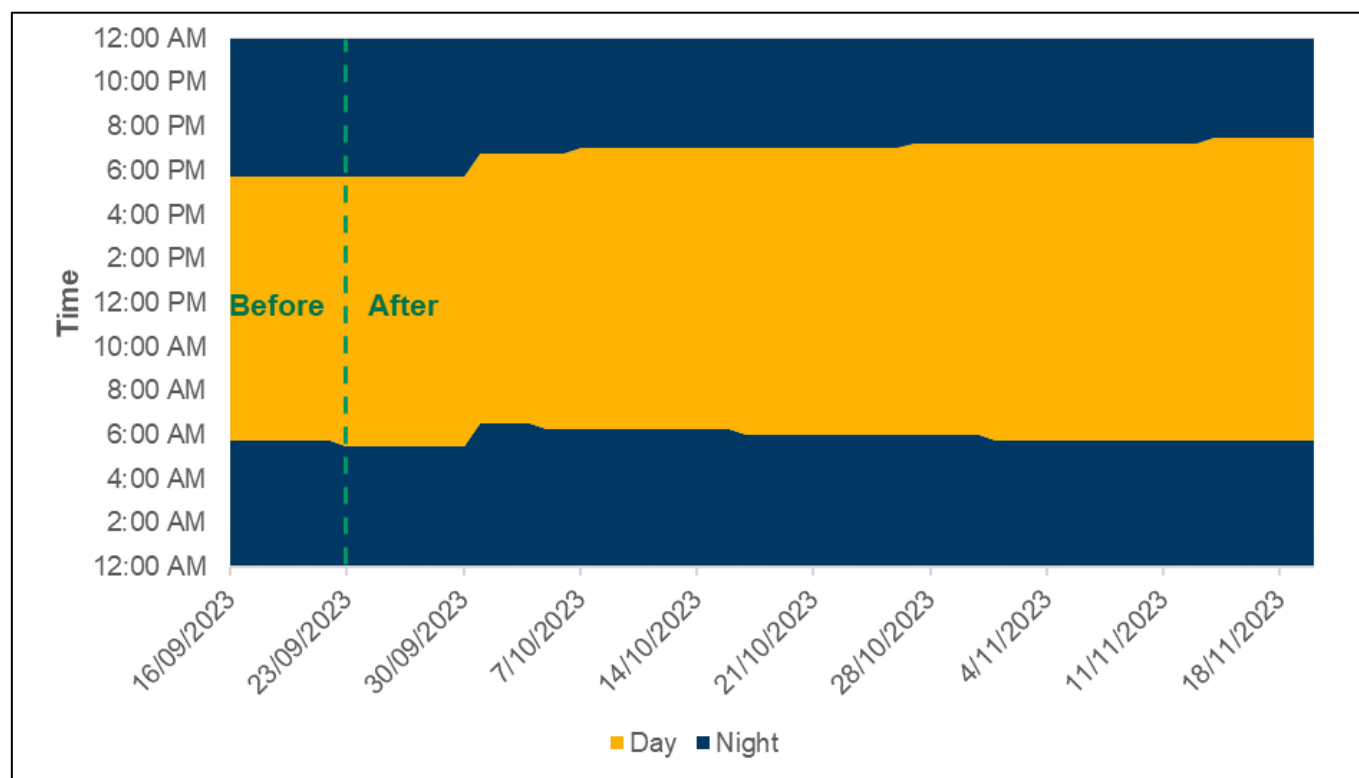


Figure 5.2 Day and night periods assessed before and after activated sign uncovering

The daytime and night-time average speeds before and after the activated sign were “uncovered” are shown in Figure 5.3 and Figure 5.4, with Table 5.1 summarising the speed reductions across all locations.

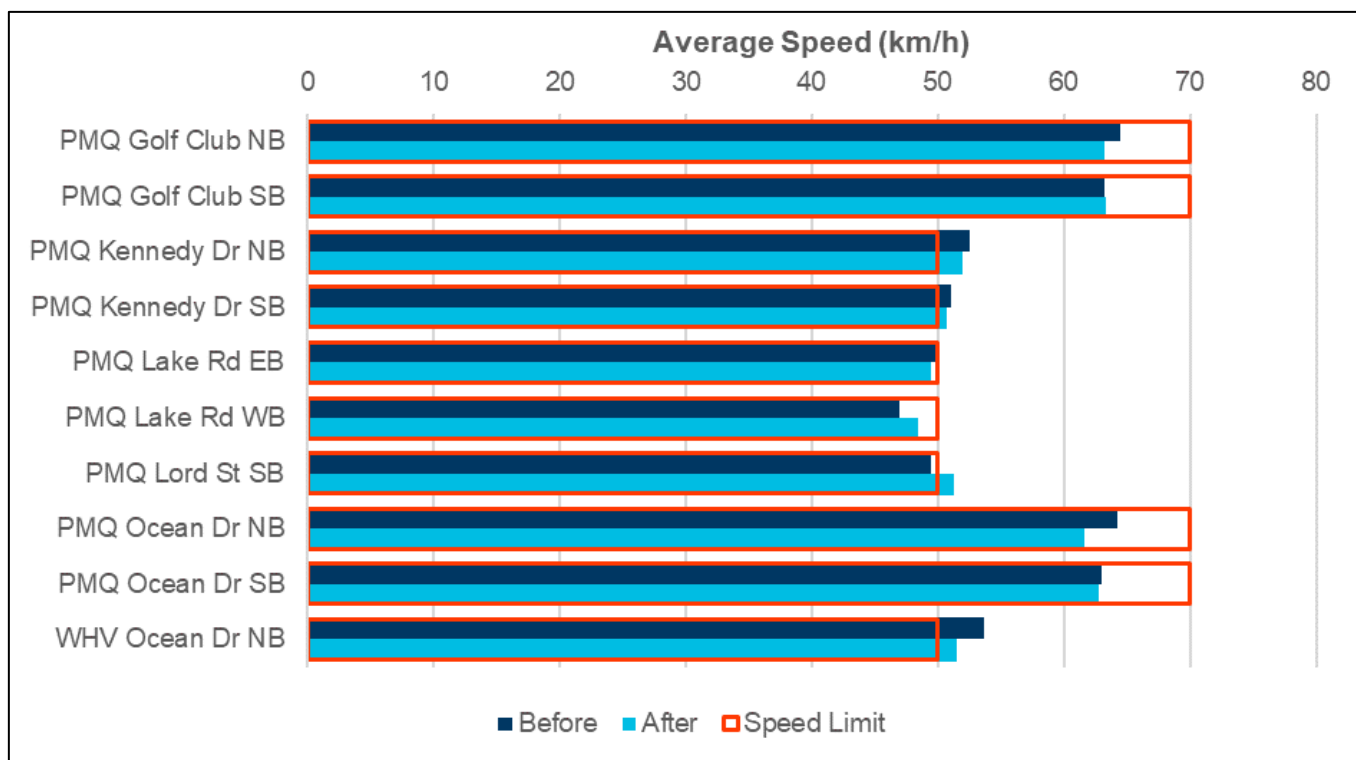


Figure 5.3 Daytime average speeds before and after activated sign uncovering

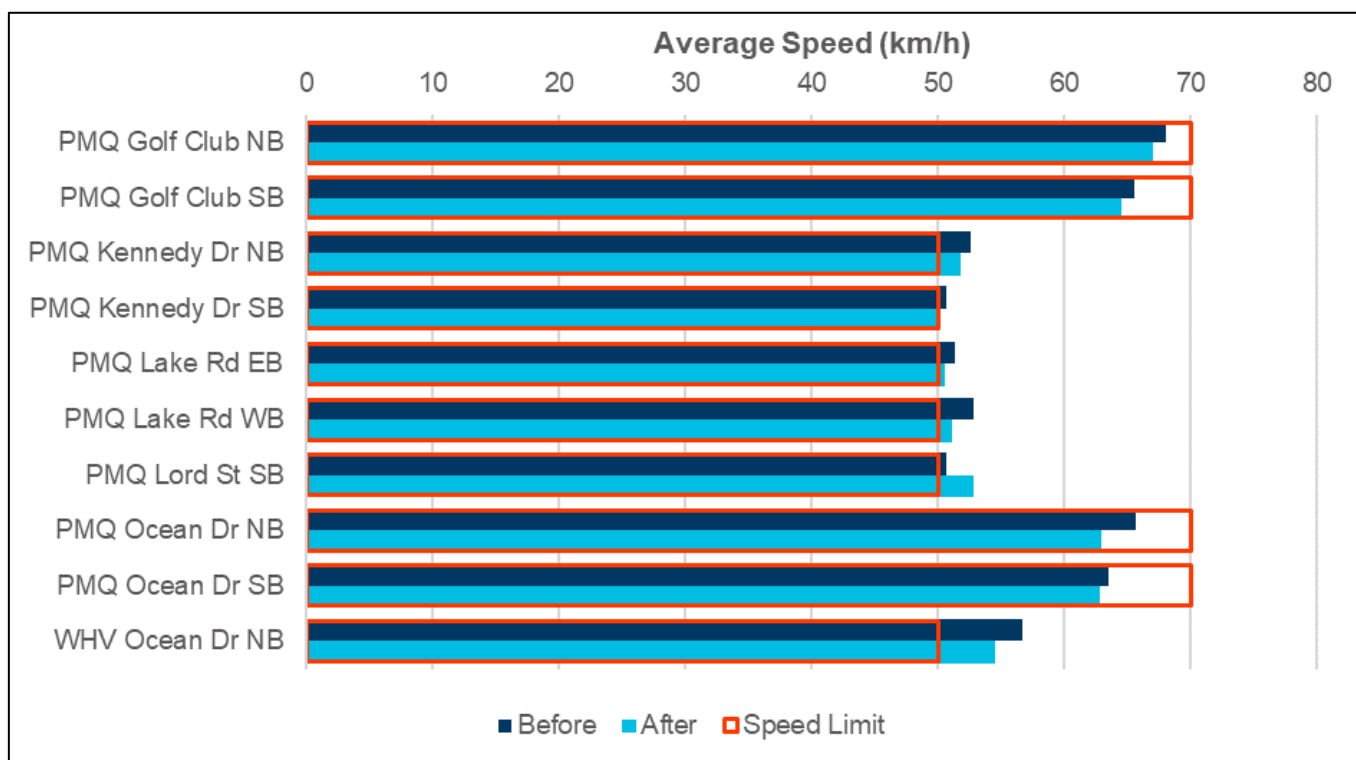


Figure 5.4 Night-time average speeds before and after activated sign uncovering

Table 5.1 *Average speed reduction summary before and after activated sign uncovering*

Period	Reduction in Average Speed Across All Locations	
	Average Reduction (km/h)	Largest Reduction (km/h)
Daytime	0.4	2.6
Nighttime	1.0	2.7

As shown in Figure 5.3 and Figure 5.4, most locations experience a slight reduction in average speeds, with notable exceptions at Lake Road westbound and Lord Street southbound. The reductions are observed at Ocean Drive southbound, near Clearwater Crescent, with average speed reductions of 2.6 km/h during the day and 2.7 km/h at night, as reported in Table 5.1. Across all locations, the average speed reductions tend to be larger during night-time.

Should activated signs be considered for Maria River Road (as part of the upgrade and sealing of the road, such as in the vicinity of fauna movement corridors), activated signs could realise average speed reductions of up to 3 km/h, with a larger reduction at night.

6. Conclusion

The upgrade and sealing of the Maria River Road has the potential to provide an alternate route for travel between Crescent Head and Port Macquarie. The upgrade would significantly improve accessibility along the Maria River Road corridor (noting the reliance on the existing ferry capacity and services across Hastings River), allowing for more reliable travel including during adverse (wet) weather conditions.

A summary of the expected changes in traffic conditions, including whether these are expected to result in negative, negligible, or positive impact on the risk of animal strikes (particularly Koalas) is provided in Table 6.1, inclusive of the relative “confidence” in the assessment (noting the limitations of the study).

Table 6.1 Summary risk assessment of animal strikes following the sealing of Maria River Road

Criteria	Comment	Impact (positive or negative)	Estimated difference	Confidence
Traffic volumes - daytimes, weekdays	An upgraded Maria River Road will likely see a minor increase in daytime volumes	Minor negative	Additional 4 vehicles in the peak hour under a 25% diversion scenario from Pacific Highway (from 13 to 17)	Low/Medium
Traffic volumes - daytimes, weekends/holidays	An upgraded Maria River Road will likely see a minor increase in daytime weekend/holiday period traffic	Minor negative	Additional 8 vehicles per hour (from 10 to 18)	Low/Medium
Traffic volumes - night-time	An upgraded Maria River Road will likely see a negligible increase in night-time volumes	Negligible	No change, and/or negligible	Medium/High
Stopping distance improvement	Sealing of Maria River Road will decrease stopping sight distance	Positive	17%	High
Delineation	An upgraded Maria River Road will be provided with improved delineation.	Positive	25%	High
Other benefits	Reduced dust emissions, improved perception of animals on sealed road, improved maintenance of the road verge	Positive	25%	High

The following key findings are noted from Table 6.1:

- The proposal (upgrade and sealing of Maria River Road) is expected to see a minor increase in day time traffic volumes (noting the generally low existing traffic volumes), due to the increased accessibility provided by the upgraded road. This increase is expected to be higher during holiday periods, where road users undertake day trips to/from Port Macquarie.
- With respect to night-time travel (noting the increased nocturnal movement of Koalas), there is expected to be a negligible increase in night time traffic volumes, due to the increased amenity and safety of the Pacific Highway for through movements.
- With respect to travel speeds and stopping distance, the upgrade and sealing of Maria River Road is expected to realise a minor increase in speeds, but result in a reduced stopping distance, due to the improved road friction provided by a sealed road.
- Other benefits of the upgrade such as improved delineation, reduced dust emissions and improved maintenance of the road verge are expected to also be expected to realise a decreased risk of animal strikes.

The net impact of the sealing and upgrading of Maria River Road (in absence of any further mitigation measures such as additional signage or reduced speeds) appears to be either a negligible or minor reduction in the risk of animal strikes.

Should it be considered appropriate, additional mitigation measures could be considered including activated koala road signs, or potentially other measures such as virtual fencing. Such measures would further reduce the risk of fauna (including koala) strikes. Additional detail regarding the potential koala strike impact of the sealing of Maria River Road is provided in the Flora and Fauna Impact Assessment (Niche 2024) and the Review of Environmental Factors (GHD 2024).

The upgrade of Maria River Road is also expected to provide a significantly safer road environment. This is particularly relevant for the two serious injury crashes along Maria River Road, which occurred within the unsealed portion of the corridor in the KSC local government area in 2017 and 2020, as well as numerous “un-reported” crashes that are believed to have occurred on the corridor.

6.1 Recommendation

Noting the limitations in the assessment and the potential for increased travel following the upgrade, it is recommended that post construction, a period of traffic volume surveys be undertaken for traffic using Maria River Road over six years, to confirm traffic volumes and speeds of vehicles using Maria River Road.

The traffic survey would be designed in consultation with the project ecologist to determine frequency and to coordinate collection of data on fauna strikes. These surveys will also include a monitoring to record Koala activity along the road and record Koala activity post-construction. These are described in further detail in the in the Flora and Fauna Impact Assessment (Niche 2024) and the Review of Environmental Factors (GHD 2024).

An annual report collating survey data will be submitted to the PMHC’s Environmental and Sustainability Team for a duration of six years post construction. The purpose of the report will be to evaluate the effectiveness of the project's mitigation measures in reducing wildlife-vehicle collisions and preserving the local koala population. The findings in the report will be used to inform future strategic planning documents such as Koala Action Plan and will be used to inform future design works for transport upgrade projects.

Appendices

Appendix A

BioNet Atlas search methodology

The following steps were undertaken to produce maps and analysis of koala sightings and animal collisions near Maria River Road:

1. Data was sourced from **NSW BioNet Atlas**, a biodiversity repository managed by the Department of Planning and Environment.
2. All valid animal sightings were extracted from the database for the Port Macquarie-Hastings and Kempsey LGAs.
3. A 100 metre buffer from the Maria River Road corridor was applied to identify activity relevant for this study.
4. The Sighting Notes were reviewed to identify vehicle collision records which were not recorded as such in the Observation Type. These records were reclassified to vehicle collisions for the purpose of this analysis.
5. The following categories were mapped for 2013 to present (10 years), and 2018 to present (5 years).
 - **Koala vehicle collision** – consisting of the following codes for koala observations:
 - R – Road kill
 - RI – Road Injured
 - Any other records noted in Step 3 above
 - **Other koala sighting** – consisting of the following codes for koala observations:
 - B – Burnt
 - D – Dog kill
 - M – Miscellaneous (many of these records include sighting notes which suggest in-person observations)
 - O – Seen
 - WR – Wildlife Rehabilitation Record
 - **Other animal vehicle collision** – consisting of the following codes for non-koala observations:
 - R – Road kill
 - RI – Road Injured
 - Any other records noted in Step 3 above

Appendix B

Additional koala mitigation strategies

In addition to the current proposed design, delineation, and mitigation practices discussed in Sections 4.2.1 and 4.2.2, the following are potential mitigation strategies that could be implemented in the attempt to reduce the risk of vehicle collisions with koalas and other wildlife. These strategies have been sourced from the NSW Department of Planning and Environment series of Koala Vehicle Strike fact sheets (published June 2020) and Port Macquarie Hastings Council, with considerations to the relevant Australian Standards.

Additional signage

Signage, in addition to the already proposed warning signs such as for curves and intersections, can be used to provide visual reminders to drivers of the road conditions. Warning signage with an image of koala (Figure B.6.1, A) or text “Wild Animals” (Figure B.6.1, B) can be implemented roadside, ensuring signs are placed where koala and other wildlife activity is most likely to occur. Drivers can become accustomed to static signage and therefore, by using both koala and wild animal signage, this may increase the likelihood of drivers becoming less habitual with this signage. The use of these two warning signs is to encourage drivers to use additional caution. From Australian Standards 1742.2 (AS1742.2), distance plates showing the text “Next __ km” (Figure B.6.1, C) or “Next __ m” (Figure B.6.1, D), can be used in conjunction with an animal warning sign but should only be used for short distances over which wildlife activity is known to be continuous.

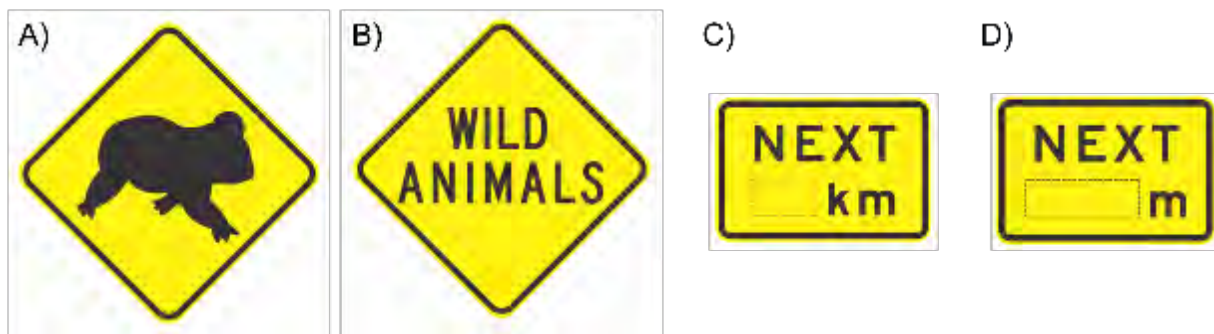


Figure B.6.1 Options for warning signage of A) Koalas, B) Wild Animals, C) Next __km, and D) Next __m that can be implemented.

To improve driver awareness of koala and wild animal signage, the use of flashing lights on warning signs can also be implemented following the guidelines in Appendix E of AS1742.2, examples of this signage type are shown in Figure B.6.2. At locations where increased koala crossings are likely, based on the koala sightings shown in Figure 3.1, a flashing warning sign could be placed at each end of these high koala activity areas to increase awareness with the inclusion of a distance plate on the flashing sign. This type of signage is best used sparingly to ensure it can attract special attention at locations with the highest perceived risk of collisions between vehicles and wildlife.



Figure B.6.2 Examples of warning signs with flashing lights from AS1742.2

Other signage that can be considered is dynamic vehicle-activated signage, such as that shown in Figure B.6.3 which is a product supplied by Australian manufacturer, Voxson. This signage is solar powered and records the speed of an oncoming vehicle, before displaying a message dependent on whether they are above or below the speed limit. This type of signage is more likely to be noticed by drivers than static signage (those shown in Figure B.6.1) as it produces an instantaneous response to the driver’s speed, reminding them to show additional caution for wildlife.



Figure B.6.3 Dynamic vehicle-activated signage supplied by Voxson

The inclusion of signage with the contact number for the Port Macquarie Koala Hospital is also highly recommended, particularly with the W5-47 koala signage. Figure B.6.4 is an example of this signage, which was initially proposed by the Port Macquarie Hastings Council (PMHC) in their Koala Management Plan for Gravel Tip Road, Dunbogan in 2014. This signage will provide drivers with emergency contact details if a wildlife incident were to occur and also aims to encourage reporting of injured wildlife and road kill events.



Figure B.6.4 Proposed koala signage with contact details for Port Macquarie Koala Hospital (Source: PMHC)

A signage design similar to the one shown Figure B.6.5 can be considered with a tally of wildlife injuries, deaths, or both. The aim of this signage is to illustrate to drivers the risks of wildlife injury and death when travelling through an area with a considerable amount of wildlife, and prompt drivers to show additional caution.



Figure B.6.5 Example of a wildlife deaths tally signage (Source: Daily Telegraph)

The advantage of warning signs is that they generally have a relatively low cost, low maintenance, and can easily be relocated if changes to koala and wildlife movements occur. However, there is the risk of drivers becoming habituated to these signs and thus, reducing their effectiveness over time, thus making the inclusion of dynamic signage highly recommended.

Pavement markings

“Koala Zone” road surface markings can be used to highlight koala vehicle strike hotspots for drivers and can be used alongside warning signage. These pavement markings consist of a green background with a gold border, and white text reading “Koala Zone”. The Port Macquarie Hastings Council (PMHC) has recently installed seven of these pavement markings at various locations across Port Macquarie and Laurieton as part of their Koala Recovery Strategy, with an example shown by Figure B.6.6. Therefore, drivers who have seen these newly installed markings across the PMHC area would be familiar with the concept and meaning of these markings to signify koala hotspots if they were to be installed along Maria River Road.



Figure B.6.6 “Koala Zone” pavement marking along Ocean Drive in the PMHC area (Source: Port Macquarie News)

The pavement markings will be created following the guidelines specified in Section 5.5.2 of AS1742.2 with consideration that the signposted speed will be at least 80 km/h, which will impact the required length of the letters.

The implementation of these pavement markings can reinforce other treatment methods such as warning signs and alert drivers of key locations for collisions with koalas and wildlife. The downside is the required periodic reapplication of the markings due to road wear.

Wildlife fencing

Wildlife fencing can be used to help direct and funnel animals to areas that are considered the most ideal place to cross based on the vertical and horizontal alignment. This is to ensure vehicles in either direction will have a suitable sight distance that will allow them adequate stopping time. This type of fencing is designed to be anti-climbing, to ensure wildlife such as koalas cannot climb over the fencing. 'Floppy top' wildlife fencing and 1.5 metre high chain mesh fence with metal flashing are two types of fencing that have commonly been installed along major road upgrades in NSW to prevent koalas getting onto roads, with images of these fencing types in Figure B.6.7. Past data in the Tweed and Byron LGAs showed an increase in koala vehicle strikes near fence ends and road interchanges. Taking this into consideration, if wildlife fencing were incorporated into the Maria River Road Upgrade, then the use of additional signage could be included where unavoidable gaps in the fence exist to warn drivers of the likely locations for wildlife to cross the road.



Figure B.6.7 A) 'Floppy top' wildlife fencing and B) 1.5 m high chain mesh fencing with metal flashing (Source: Sandpiper Ecological)

A drawback of wildlife fencing is the ongoing maintenance required to keep them clear from vegetation growth and fallen branches, particularly for 'floppy top' fencing. Also, there is the potential to block and disrupt wildlife movement to habitats on either side of the road, but this could be limited by allocating safe locations for koalas and wildlife to cross to ensure movement can still occur.

Virtual fences

Virtual fencing consists of short, roadside posts positioned at intervals of 25 metres along both sides of the road with a small, electronic device mounted to the top of each post. These devices are activated by the headlights of approaching vehicles which causes the device to emit a high-pitched sound and flash a blue light with the aim of alerting and repelling animals from approaching the road. These devices cannot be used in urban or peri-urban habitat due to the potential of light sources other than vehicles, such as streetlights, activating the devices. However, the regional nature of Maria River Road makes it suitable for these devices.

Considering data as of June 2020, there was doubt surrounding the effectiveness of virtual fences due to the limited trials that had been completed, as described in the Koala Vehicle Strike fact sheets. However, a current, ongoing trial by the Eurobodalla Shire Council (ESC) on the NSW South Coast for a one-kilometre length of road has reported a total of five roadkill incidents since the installation of the virtual fence in October 2022. Prior to the trial, the ESC stated they were required to attend up to five incidents a week for this road. Figure B.6.8 shows one of the devices used in the ESC trial.



Figure B.6.8 Eurobodalla Shire Council's virtual fence trial consisting of electronic devices attached to roadside posts

A potential disadvantage of a virtual fence is that it works best for speeds up to 80 km/h, where the upgrade to Maria River Road will result in signposted speeds of 80 km/h and 100 km/h. However, the degree to which the effectiveness decreases is unclear. There is also minimal data as to whether the technology is more effective for certain types of wildlife and thus, its effectiveness to deter koalas from approaching the road will likely require further inquiry. The upfront cost of a virtual fence is considered expensive regarding some of the other mitigation options discussed, however, after installation there is minimal maintenance required.

Reduced speed limit

The Transport for NSW, Road Safety Project Nomination Form – Crash Reduction Rates, provides indicative crash reduction rates for hit animal crashes. The nomination form identifies reducing speeds as a key factor in reducing the risk of hit animal crashes, with crash reduction rates for reductions in the posted speed limit of 10 km/h and 20 km/h from posted speeds of 90 km/h (or greater) to 60 km/h (or less). A summary of the crash reduction rates by speed reduction (and posted speeds) is provided below Table B.6.2.

Table B.6.2 Crash reduction rates (%) for hit animal crashes

Treatment Type	Crash type	Reduction (%)
Reduce speed limit by 10 km/hr:	Hit animal	
– 60 km/h or less		30
– 70 – 80 km/h		25
– 90 km/h or greater		15
Reduce speed limit by 20 km/h:	Hit animal	
– 60 km/h or less		55
– 70 – 80 km/h		45
– 90 km/h or greater		35

Source: Transport for NSW (Road Safety Project Nomination Form – Crash Reduction Rates)

In considering the stopping sight distances improvements with an upgraded and sealed road for the same posted speed limit (refer Section 4.2.1), the benefit of sealing is the equivalent of reducing the speed limit by 20 km/h for a speed limit of 100 km/h, and more than 10 km/h for an 80 km/h speed limit.

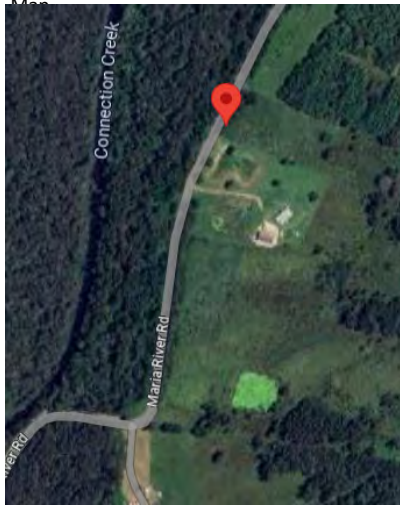
Appendix C

Traffic surveys

MARIA RIVER RD_dup_9866936

MARIA RIVER RD - 880001 - 4750m SOUTH OF
CRESCENT HEAD RD <100>

[GPS Coordinates\(-31.212142, 152.926404\)](#)



Data Summary

9 days data in total contribute to the report,
which include:

2023: 9 days, From 2023-07-30 to 2023-08-07

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
South	95	105	87	88.49km/h	76.82km/h	87.84km/h	75.89km/h	89.78km/h	78.77km/h
North	99	112	83	85.07km/h	72.43km/h	84.20km/h	71.78km/h	87.08km/h	73.98km/h
Both directions	193	211	169	87.23km/h	74.56km/h	86.22km/h	73.73km/h	87.88km/h	76.43km/h

Virtual Day Summary Table(2023)

	Both directions				South		North	
	Weekday		Weekend		Weekday	Weekend	Weekday	Weekend
All day (0-24)	204	100.00%	162	100.00%	101	82	105	81
Daytime [7-19]	187	91.67%	145	89.51%	92	73	93	72
Evening [19-23]	7	3.43%	8	4.94%	6	4	3	4
Night [23-7]	10	4.90%	9	5.56%	3	5	9	5
2 Hours Morning Peak [7-9]	30	14.71%	15	9.26%	7	5	23	10
2 Hour Afternoon Peak [16-18]	36	17.65%	18	11.11%	25	10	9	8

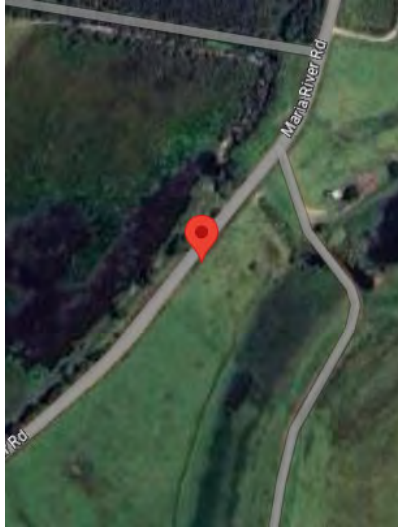
Virtual Day Detail Table(2023)

Time Range			Both directions				South		North	
			Weekday		Weekend		Weekday	Weekend	Weekday	Weekend
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01:00	-	02:00	0	0.00%	0	0.00%	0	0	0	0
02:00	-	03:00	0	0.00%	0	0.00%	0	0	0	0
03:00	-	04:00	0	0.00%	1	0.62%	0	0	0	1
04:00	-	05:00	1	0.49%	0	0.00%	0	0	1	0
05:00	-	06:00	1	0.49%	1	0.62%	1	0	2	1
06:00	-	07:00	6	2.94%	3	1.85%	1	1	5	3
07:00	-	08:00	14	6.86%	5	3.09%	3	1	11	4
08:00	-	09:00	16	7.84%	10	6.17%	4	4	12	6
09:00	-	10:00	15	7.35%	13	8.02%	7	4	8	8
10:00	-	11:00	17	8.33%	19	11.73%	7	8	10	11
11:00	-	12:00	18	8.82%	20	12.35%	10	9	8	11
12:00	-	13:00	21	10.29%	16	9.88%	9	6	12	10
13:00	-	14:00	14	6.86%	15	9.26%	7	10	7	5
14:00	-	15:00	15	7.35%	13	8.02%	7	10	7	3
15:00	-	16:00	16	7.84%	10	6.17%	9	6	7	4
16:00	-	17:00	20	9.80%	10	6.17%	14	4	5	6
17:00	-	18:00	16	7.84%	8	4.94%	11	6	4	2
18:00	-	19:00	5	2.45%	6	3.70%	4	5	2	2
19:00	-	20:00	2	0.98%	3	1.85%	2	2	1	1
20:00	-	21:00	2	0.98%	3	1.85%	2	1	1	2
21:00	-	22:00	2	0.98%	0	0.00%	1	0	1	0
22:00	-	23:00	1	0.49%	2	1.23%	1	1	0	1
23:00	-	00:00	1	0.49%	3	1.85%	0	3	1	0

MARIA RIVER RD_dup_3004713

MARIA RIVER RD - 880001 - 6950m SOUTH OF
CRESCENT HEAD RD <100>

[GPS Coordinates\(-31.227944, 152.916278\)](#)



Data Summary

9 days data in total contribute to the report,
which include:

2023: 9 days, From 2023-07-30 to 2023-08-07

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
South	88	96	81	64.62km/h	50.51km/h	63.58km/h	49.39km/h	67.00km/h	52.81km/h
North	92	104	80	69.41km/h	54.86km/h	69.08km/h	54.43km/h	69.98km/h	55.94km/h
Both directions	180	196	158	67.43km/h	52.78km/h	66.82km/h	52.06km/h	68.62km/h	54.36km/h

Virtual Day Summary Table(2023)

	Both directions				South		North	
	Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
All day (0-24)	187	100.00%	154	100.00%	90	75	97	76
Daytime [7-19]	173	92.51%	138	89.61%	83	67	86	67
Evening [19-23]	6	3.21%	7	4.55%	6	4	3	4
Night [23-7]	8	4.28%	9	5.84%	1	4	8	5
2 Hours Morning Peak [7-9]	26	13.90%	11	7.14%	6	4	20	7
2 Hour Afternoon Peak [16-18]	32	17.11%	17	11.04%	22	9	8	6

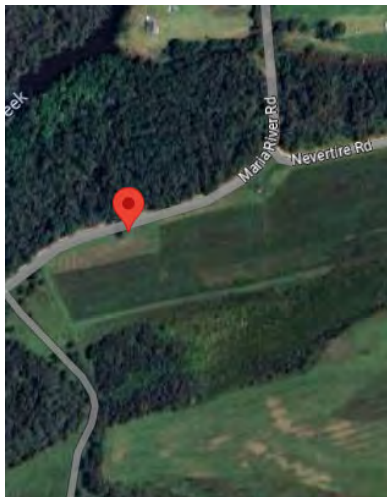
Virtual Day Detail Table(2023)

Time Range			Both directions				South		North	
			Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
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01:00	-	02:00	0	0.00%	0	0.00%	0	0	0	0
02:00	-	03:00	0	0.00%	0	0.00%	0	0	0	0
03:00	-	04:00	0	0.00%	1	0.65%	0	0	0	1
04:00	-	05:00	1	0.53%	0	0.00%	0	0	1	0
05:00	-	06:00	2	1.07%	1	0.65%	0	0	2	1
06:00	-	07:00	5	2.67%	3	1.95%	1	0	5	3
07:00	-	08:00	11	5.88%	4	2.60%	2	1	9	3
08:00	-	09:00	15	8.02%	7	4.55%	4	3	11	4
09:00	-	10:00	15	8.02%	13	8.44%	6	4	8	8
10:00	-	11:00	16	8.56%	20	12.99%	6	8	9	12
11:00	-	12:00	17	9.09%	20	12.99%	8	8	9	12
12:00	-	13:00	20	10.70%	16	10.39%	9	7	11	9
13:00	-	14:00	13	6.95%	14	9.09%	6	9	7	4
14:00	-	15:00	13	6.95%	13	8.44%	7	9	6	4
15:00	-	16:00	16	8.56%	9	5.84%	9	5	7	3
16:00	-	17:00	19	10.16%	9	5.84%	13	3	5	5
17:00	-	18:00	13	6.95%	8	5.19%	9	6	3	1
18:00	-	19:00	5	2.67%	5	3.25%	4	4	1	2
19:00	-	20:00	2	1.07%	2	1.30%	2	2	1	1
20:00	-	21:00	2	1.07%	3	1.95%	2	1	1	2
21:00	-	22:00	1	0.53%	0	0.00%	1	0	1	0
22:00	-	23:00	1	0.53%	2	1.30%	1	1	0	1
23:00	-	00:00	0	0.00%	3	1.95%	0	3	0	0

MARIA RIVER RD_dup_2416697

MARIA RIVER RD - 880001 - 8820m SOUTH OF
CRESCENT HEAD RD <100>

[GPS Coordinates\(-31.240791, 152.905690\)](#)



Data Summary

9 days data in total contribute to the report,
which include:

2023: 9 days, From 2023-07-30 to 2023-08-07

Data Quality Check

Some traffic data files contribute to this report
may have problems, the list is as below:

File: scheme_14_MARIA_RIVER_RD_0_-
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07_1050.EC1, Reason: Volume Threshold,
Maximum daily volume too low;

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
South	49	50	54	68.65km/h	57.17km/h	68.51km/h	56.88km/h	69.05km/h	57.64km/h
North	52	55	55	71.42km/h	59.47km/h	71.21km/h	59.47km/h	71.68km/h	59.51km/h
Both directions	99	100	106	69.91km/h	58.36km/h	69.70km/h	58.28km/h	70.56km/h	58.54km/h

Virtual Day Summary Table(2023)

	Both directions				South		North	
	Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
All day (0-24)	94	100.00%	104	100.00%	45	50	50	53
Daytime [7-19]	85	90.43%	92	88.46%	40	45	44	46
Evening [19-23]	4	4.26%	7	6.73%	3	2	2	5
Night [23-7]	5	5.32%	5	4.81%	2	3	4	2
2 Hours Morning Peak [7-9]	13	13.83%	7	6.73%	5	3	10	4
2 Hour Afternoon Peak [16-18]	15	15.96%	9	8.65%	10	5	3	3

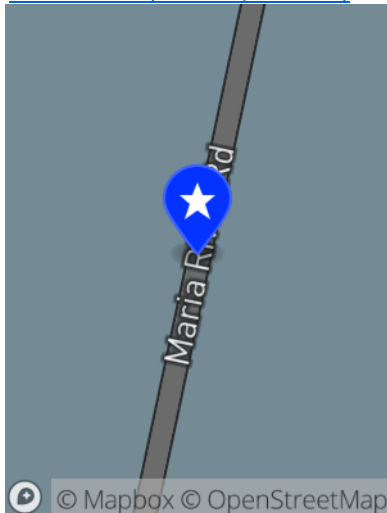
Virtual Day Detail Table(2023)

Time Range			Both directions				South		North	
			Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
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01:00	-	02:00	0	0.00%	0	0.00%	0	0	0	0
02:00	-	03:00	0	0.00%	0	0.00%	0	0	0	0
03:00	-	04:00	0	0.00%	0	0.00%	0	0	0	0
04:00	-	05:00	1	1.06%	0	0.00%	0	0	1	0
05:00	-	06:00	1	1.06%	2	1.92%	0	0	1	2
06:00	-	07:00	2	2.13%	0	0.00%	1	0	2	0
07:00	-	08:00	6	6.38%	3	2.88%	2	1	5	2
08:00	-	09:00	7	7.45%	4	3.85%	3	2	5	2
09:00	-	10:00	7	7.45%	10	9.62%	3	4	4	6
10:00	-	11:00	8	8.51%	15	14.42%	3	6	5	9
11:00	-	12:00	7	7.45%	13	12.50%	2	5	4	8
12:00	-	13:00	11	11.70%	12	11.54%	5	6	6	6
13:00	-	14:00	6	6.38%	9	8.65%	3	6	3	2
14:00	-	15:00	7	7.45%	9	8.65%	3	5	3	3
15:00	-	16:00	8	8.51%	5	4.81%	4	3	4	3
16:00	-	17:00	9	9.57%	5	4.81%	6	2	2	2
17:00	-	18:00	6	6.38%	4	3.85%	4	3	1	1
18:00	-	19:00	3	3.19%	3	2.88%	2	2	2	2
19:00	-	20:00	2	2.13%	2	1.92%	2	1	1	1
20:00	-	21:00	1	1.06%	3	2.88%	1	0	0	3
21:00	-	22:00	1	1.06%	0	0.00%	0	0	1	0
22:00	-	23:00	0	0.00%	2	1.92%	0	1	0	1
23:00	-	00:00	1	1.06%	2	1.92%	1	2	0	0

MARIA RIVER RD_dup_1224391

MARIA RIVER RD - 880001 - 14950m SOUTH OF
CRESCENT HEAD RD <100>

[GPS Coordinates\(-31.277366, 152.863192\)](#)



Data Summary

9 days data in total contribute to the report,
which include:

2023: 9 days, From 2023-08-13 to 2023-08-21

Data Quality Check

Some traffic data files contribute to this report
may have problems, the list is as below:

File: scheme_14_MARIA_RIVER_RD_0_-
31.2773661_152.863192_2023-08-
21_0749.EC1, Reason: Volume Threshold,
Maximum daily volume too low;

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
South	46	56	43	73.04km/h	58.25km/h	72.18km/h	58.50km/h	74.81km/h	57.71km/h
North	49	54	44	76.75km/h	59.36km/h	78.80km/h	60.95km/h	71.06km/h	56.12km/h
Both directions	91	101	83	74.74km/h	58.82km/h	75.20km/h	59.76km/h	73.58km/h	56.92km/h

Virtual Day Summary Table(2023)

	Both directions				South		North	
	Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
All day (0-24)	94	100.00%	77	100.00%	50	39	47	40
Daytime [7-19]	76	80.85%	72	93.51%	35	35	39	38
Evening [19-23]	7	7.45%	2	2.60%	6	1	5	1
Night [23-7]	11	11.70%	3	3.90%	9	3	3	1
2 Hours Morning Peak [7-9]	14	14.89%	8	10.39%	9	4	4	3
2 Hour Afternoon Peak [16-18]	16	17.02%	10	12.99%	5	5	11	6

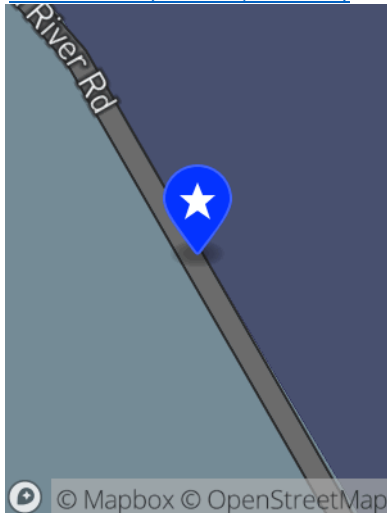
Virtual Day Detail Table(2023)

Time Range			Both directions				South		North	
			Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
00:00	-	01:00	2	2.13%	0	0.00%	2	0	0	0
01:00	-	02:00	0	0.00%	0	0.00%	0	0	0	0
02:00	-	03:00	0	0.00%	1	1.30%	0	1	0	0
03:00	-	04:00	1	1.06%	0	0.00%	1	0	1	0
04:00	-	05:00	1	1.06%	0	0.00%	1	0	0	0
05:00	-	06:00	1	1.06%	1	1.30%	1	1	0	0
06:00	-	07:00	4	4.26%	1	1.30%	3	1	1	1
07:00	-	08:00	6	6.38%	5	6.49%	4	3	2	1
08:00	-	09:00	8	8.51%	3	3.90%	5	1	2	2
09:00	-	10:00	5	5.32%	6	7.79%	3	4	2	3
10:00	-	11:00	8	8.51%	9	11.69%	4	3	4	5
11:00	-	12:00	5	5.32%	7	9.09%	2	3	2	4
12:00	-	13:00	5	5.32%	8	10.39%	3	4	2	4
13:00	-	14:00	6	6.38%	9	11.69%	3	3	2	6
14:00	-	15:00	8	8.51%	7	9.09%	3	4	6	3
15:00	-	16:00	5	5.32%	7	9.09%	2	4	3	3
16:00	-	17:00	9	9.57%	7	9.09%	3	4	6	3
17:00	-	18:00	7	7.45%	3	3.90%	2	1	5	3
18:00	-	19:00	4	4.26%	1	1.30%	1	1	3	1
19:00	-	20:00	3	3.19%	0	0.00%	1	0	2	0
20:00	-	21:00	1	1.06%	1	1.30%	1	1	1	0
21:00	-	22:00	2	2.13%	0	0.00%	2	0	1	0
22:00	-	23:00	1	1.06%	1	1.30%	2	0	1	1
23:00	-	00:00	2	2.13%	0	0.00%	1	0	1	0

MARIA RIVER RD_dup_0009544

MARIA RIVER RD - 880001 - 18429m SOUTH OF
CRESCENT HEAD RD <100>

[GPS Coordinates\(-31.306080, 152.866865\)](#)



Data Summary

9 days data in total contribute to the report,
which include:

2023: 9 days, From 2023-08-13 to 2023-08-21

Data Quality Check

Some traffic data files contribute to this report
may have problems, the list is as below:

File: scheme_14_MARIA_RIVER_RD_0_-
31.306080_152.866865_2023-08-
21_0944.ECO, Reason: Volume Threshold,
Maximum daily volume too low;

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
South	47	57	44	83.81km/h	70.09km/h	83.99km/h	70.56km/h	83.63km/h	69.12km/h
North	52	59	45	86.36km/h	73.44km/h	87.95km/h	74.66km/h	83.99km/h	70.78km/h
Both directions	95	106	84	84.49km/h	71.82km/h	85.07km/h	72.65km/h	83.77km/h	69.98km/h

Virtual Day Summary Table(2023)

	Both directions				South		North	
	Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
All day (0-24)	97	100.00%	80	100.00%	52	40	52	41
Daytime [7-19]	80	82.47%	74	92.50%	37	36	44	39
Evening [19-23]	6	6.19%	2	2.50%	6	1	5	1
Night [23-7]	11	11.34%	4	5.00%	9	3	3	1
2 Hours Morning Peak [7-9]	12	12.37%	7	8.75%	8	4	4	3
2 Hour Afternoon Peak [16-18]	17	17.53%	11	13.75%	5	5	12	8

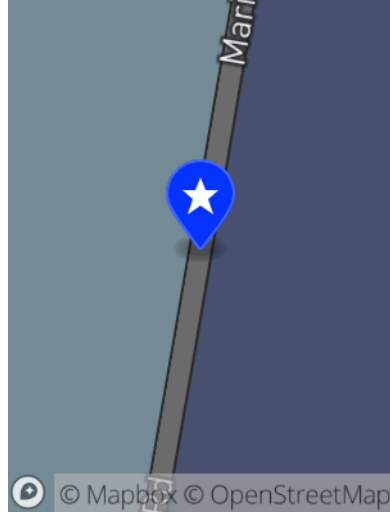
Virtual Day Detail Table(2023)

Time Range			Both directions				South		North	
			Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
00:00	-	01:00	2	2.06%	0	0.00%	2	0	0	0
01:00	-	02:00	0	0.00%	0	0.00%	0	0	0	0
02:00	-	03:00	0	0.00%	1	1.25%	0	1	0	0
03:00	-	04:00	1	1.03%	0	0.00%	1	0	1	0
04:00	-	05:00	1	1.03%	0	0.00%	1	0	0	0
05:00	-	06:00	1	1.03%	1	1.25%	1	0	0	1
06:00	-	07:00	4	4.12%	2	2.50%	3	2	1	0
07:00	-	08:00	6	6.19%	4	5.00%	4	3	1	1
08:00	-	09:00	6	6.19%	3	3.75%	4	1	3	2
09:00	-	10:00	5	5.15%	6	7.50%	2	4	3	2
10:00	-	11:00	9	9.28%	8	10.00%	5	4	4	5
11:00	-	12:00	4	4.12%	7	8.75%	2	4	2	3
12:00	-	13:00	7	7.22%	8	10.00%	4	3	3	4
13:00	-	14:00	7	7.22%	10	12.50%	4	3	4	7
14:00	-	15:00	9	9.28%	7	8.75%	3	4	6	2
15:00	-	16:00	6	6.19%	9	11.25%	2	4	4	4
16:00	-	17:00	10	10.31%	7	8.75%	3	3	6	4
17:00	-	18:00	7	7.22%	4	5.00%	2	2	6	4
18:00	-	19:00	4	4.12%	1	1.25%	2	1	2	1
19:00	-	20:00	3	3.09%	0	0.00%	1	0	2	0
20:00	-	21:00	1	1.03%	1	1.25%	1	1	1	0
21:00	-	22:00	1	1.03%	0	0.00%	2	0	1	0
22:00	-	23:00	1	1.03%	1	1.25%	2	0	1	1
23:00	-	00:00	2	2.06%	0	0.00%	1	0	1	0

MARIA RIVER RD_dup_3411512

MARIA RIVER RD - 80001 - 21243m SOUTH OF
CRESCENT HEAD RD <100>

[GPS Coordinates\(-31.329892, 152.869381\)](#)



Data Summary

9 days data in total contribute to the report,
which include:

2023: 9 days, From 2023-08-13 to 2023-08-21

Data Quality Check

Some traffic data files contribute to this report
may have problems, the list is as below:

File: scheme_14_MARIA_RIVER_RD_0_-
31.329892_152.869381_2023-08-
21_0947.ECO, Reason: Volume Threshold,
Maximum daily volume too low;

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
South	52	58	51	93.46km/h	79.74km/h	91.69km/h	79.88km/h	94.28km/h	79.45km/h
North	56	63	50	95.65km/h	80.93km/h	95.98km/h	81.97km/h	94.25km/h	78.77km/h
Both directions	102	110	94	94.21km/h	80.35km/h	93.89km/h	80.93km/h	94.28km/h	79.13km/h

Virtual Day Summary Table(2023)

	Both directions				South		North	
	Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
All day (0-24)	102	100.00%	89	100.00%	50	47	58	45
Daytime [7-19]	86	84.31%	84	94.38%	37	44	48	42
Evening [19-23]	6	5.88%	2	2.25%	5	1	6	1
Night [23-7]	10	9.80%	3	3.37%	8	2	4	2
2 Hours Morning Peak [7-9]	15	14.71%	11	12.36%	11	6	3	4
2 Hour Afternoon Peak [16-18]	18	17.65%	12	13.48%	4	6	14	9

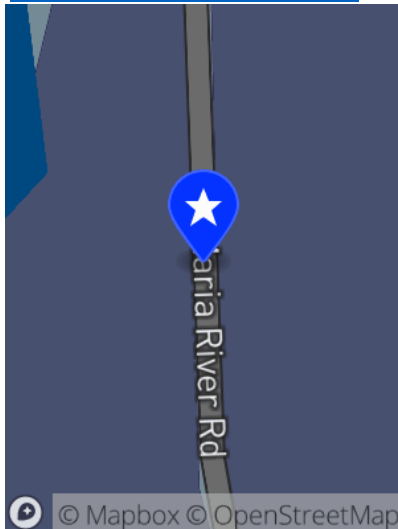
Virtual Day Detail Table(2023)

Time Range			Both directions				South		North	
			Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
00:00	-	01:00	0	0.00%	0	0.00%	0	0	0	0
01:00	-	02:00	0	0.00%	0	0.00%	0	0	0	0
02:00	-	03:00	0	0.00%	0	0.00%	0	0	0	0
03:00	-	04:00	1	0.98%	0	0.00%	1	0	1	0
04:00	-	05:00	1	0.98%	0	0.00%	1	0	1	0
05:00	-	06:00	1	0.98%	1	1.12%	1	0	0	1
06:00	-	07:00	5	4.90%	2	2.25%	4	2	1	1
07:00	-	08:00	7	6.86%	5	5.62%	6	3	1	1
08:00	-	09:00	8	7.84%	6	6.74%	5	3	2	3
09:00	-	10:00	6	5.88%	7	7.87%	2	5	3	2
10:00	-	11:00	8	7.84%	9	10.11%	4	6	4	5
11:00	-	12:00	5	4.90%	9	10.11%	2	4	3	4
12:00	-	13:00	6	5.88%	8	8.99%	3	4	3	4
13:00	-	14:00	7	6.86%	10	11.24%	5	3	4	6
14:00	-	15:00	10	9.80%	7	7.87%	3	4	7	2
15:00	-	16:00	7	6.86%	10	11.24%	2	5	4	5
16:00	-	17:00	10	9.80%	8	8.99%	2	4	7	4
17:00	-	18:00	8	7.84%	4	4.49%	2	2	7	5
18:00	-	19:00	4	3.92%	1	1.12%	1	1	3	1
19:00	-	20:00	2	1.96%	0	0.00%	1	0	2	0
20:00	-	21:00	1	0.98%	1	1.12%	1	1	1	0
21:00	-	22:00	1	0.98%	0	0.00%	1	0	1	0
22:00	-	23:00	2	1.96%	1	1.12%	2	0	2	1
23:00	-	00:00	2	1.96%	0	0.00%	1	0	1	0

MARIA RIVER RD_dup_4267943

MARIA RIVER RD - 80001 - 25714m SOUTH OF
CRESCENT HEAD RD <100>

[GPS Coordinates\(-31.369363, 152.862716\)](#)



Data Summary

9 days data in total contribute to the report,
which include:

2023: 9 days, From 2023-08-12 to 2023-08-20

Data Quality Check

Some traffic data files contribute to this report
may have problems, the list is as below:

File: scheme_14_MARIA_RIVER_RD_0__-
31.369363__152.862716__2023-08-
21_0946.ECO, Reason: Volume Threshold,
Maximum daily volume too low;

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
South	58	65	56	91.44km/h	79.96km/h	91.51km/h	81.04km/h	90.40km/h	78.23km/h
North	56	60	58	92.88km/h	80.14km/h	92.63km/h	80.89km/h	93.02km/h	79.02km/h
Both directions	108	115	107	92.30km/h	80.03km/h	92.27km/h	80.96km/h	92.30km/h	78.62km/h

Virtual Day Summary Table(2023)

	Both directions				South		North	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
All day (0-24)	106	100.00%	101	100.00%	59	52	54	53
Daytime [7-19]	90	84.91%	89	88.12%	49	43	41	48
Evening [19-23]	7	6.60%	8	7.92%	6	6	5	3
Night [23-7]	9	8.49%	4	3.96%	4	3	8	2
2 Hours Morning Peak [7-9]	16	15.09%	12	11.88%	4	4	13	8
2 Hour Afternoon Peak [16-18]	19	17.92%	11	10.89%	15	7	4	5

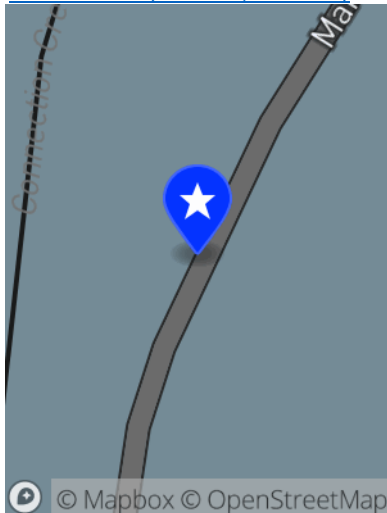
Virtual Day Detail Table(2023)

Time Range	Both directions				South		North	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
00:00 - 01:00	0	0.00%	0	0.00%	0	0	0	0
01:00 - 02:00	0	0.00%	0	0.00%	0	0	0	0
02:00 - 03:00	0	0.00%	0	0.00%	0	0	0	0
03:00 - 04:00	1	0.94%	0	0.00%	1	0	1	0
04:00 - 05:00	1	0.94%	0	0.00%	1	0	1	0
05:00 - 06:00	1	0.94%	1	0.99%	0	1	1	0
06:00 - 07:00	4	3.77%	2	1.98%	1	1	4	2
07:00 - 08:00	8	7.55%	5	4.95%	1	1	7	3
08:00 - 09:00	8	7.55%	7	6.93%	3	3	6	5
09:00 - 10:00	6	5.66%	7	6.93%	3	2	3	6
10:00 - 11:00	8	7.55%	10	9.90%	5	5	4	6
11:00 - 12:00	5	4.72%	10	9.90%	3	5	3	4
12:00 - 13:00	6	5.66%	9	8.91%	2	4	3	4
13:00 - 14:00	9	8.49%	10	9.90%	4	6	4	4
14:00 - 15:00	10	9.43%	10	9.90%	6	5	3	5
15:00 - 16:00	7	6.60%	9	8.91%	4	4	3	5
16:00 - 17:00	11	10.38%	8	7.92%	8	4	2	4
17:00 - 18:00	8	7.55%	3	2.97%	7	3	2	1
18:00 - 19:00	4	3.77%	1	0.99%	3	1	1	1
19:00 - 20:00	3	2.83%	4	3.96%	2	3	1	1
20:00 - 21:00	1	0.94%	1	0.99%	1	0	1	1
21:00 - 22:00	1	0.94%	1	0.99%	1	1	1	0
22:00 - 23:00	2	1.89%	2	1.98%	2	2	2	1
23:00 - 00:00	2	1.89%	1	0.99%	1	1	1	0

MARIA RIVER RD_dup_9739642

MARIA RIVER RD - 880001 - 4750m SOUTH OF
CRESCENT HEAD RD <100>

GPS Coordinates(-31.212116, 152.926360)



Data Summary

8 days data in total contribute to the report,
which include:

2023: 8 days, From 2023-09-19 to 2023-09-26

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
South	101	112	88	86.90km/h	74.41km/h	87.80km/h	74.38km/h	84.74km/h	74.59km/h
North	105	116	84	83.12km/h	71.10km/h	83.88km/h	71.46km/h	80.35km/h	69.80km/h
Both directions	204	221	171	85.00km/h	72.72km/h	85.61km/h	72.86km/h	83.38km/h	72.25km/h

Virtual Day Summary Table(2023)

	Both directions				South		North	
	Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
All day (0-24)	214	100.00%	168	100.00%	106	83	110	81
Daytime [7-19]	186	86.92%	149	88.69%	89	74	91	73
Evening [19-23]	9	4.21%	12	7.14%	9	8	4	3
Night [23-7]	19	8.88%	7	4.17%	8	1	15	5
2 Hours Morning Peak [7-9]	30	14.02%	13	7.74%	8	4	20	8
2 Hour Afternoon Peak [16-18]	31	14.49%	23	13.69%	19	12	11	11

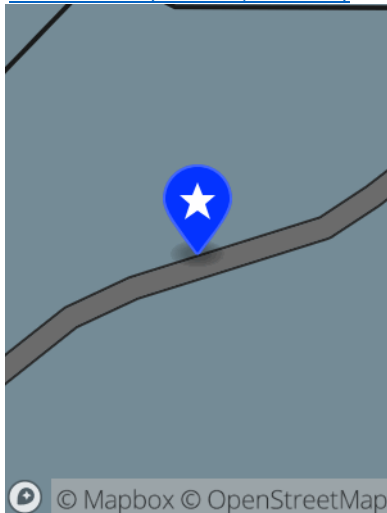
Virtual Day Detail Table(2023)

Time Range			Both directions				South		North	
			Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
00:00	-	01:00	1	0.47%	0	0.00%	1	0	0	0
01:00	-	02:00	1	0.47%	0	0.00%	1	0	1	0
02:00	-	03:00	0	0.00%	0	0.00%	0	0	0	0
03:00	-	04:00	1	0.47%	1	0.60%	0	0	1	1
04:00	-	05:00	1	0.47%	1	0.60%	1	0	1	1
05:00	-	06:00	5	2.34%	2	1.19%	1	0	5	2
06:00	-	07:00	9	4.21%	3	1.79%	3	1	6	1
07:00	-	08:00	15	7.01%	4	2.38%	3	2	11	2
08:00	-	09:00	15	7.01%	9	5.36%	5	2	9	6
09:00	-	10:00	15	7.01%	16	9.52%	6	6	9	10
10:00	-	11:00	15	7.01%	18	10.71%	7	6	7	12
11:00	-	12:00	18	8.41%	21	12.50%	8	13	9	8
12:00	-	13:00	16	7.48%	12	7.14%	8	6	8	6
13:00	-	14:00	16	7.48%	15	8.93%	8	9	7	6
14:00	-	15:00	19	8.88%	15	8.93%	9	10	10	5
15:00	-	16:00	18	8.41%	13	7.74%	12	6	6	6
16:00	-	17:00	18	8.41%	13	7.74%	11	6	6	7
17:00	-	18:00	13	6.07%	10	5.95%	8	6	5	4
18:00	-	19:00	8	3.74%	3	1.79%	4	2	4	1
19:00	-	20:00	4	1.87%	4	2.38%	3	1	2	2
20:00	-	21:00	2	0.93%	3	1.79%	2	2	1	1
21:00	-	22:00	2	0.93%	2	1.19%	3	2	1	0
22:00	-	23:00	1	0.47%	3	1.79%	1	3	0	0
23:00	-	00:00	1	0.47%	0	0.00%	1	0	1	0

MARIA RIVER RD_dup_7271283

MARIA RIVER RD - 880001 - 8820m SOUTH OF
CRESCENT HEAD RD <100>

[GPS Coordinates\(-31.240772, 152.905694\)](#)



Data Summary

8 days data in total contribute to the report,
which include:

2023: 8 days, From 2023-09-19 to 2023-09-26

Data Quality Check

Some traffic data files contribute to this report
may have problems, the list is as below:

File: scheme_14_MARIA_RIVER_RD_0_-
31.240772_152.9056943_2023-09-
26_1319.EC1, Reason: Volume Threshold,
Maximum daily volume too low;

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
South	56	63	54	70.42km/h	60.30km/h	70.74km/h	60.52km/h	69.55km/h	59.69km/h
North	59	66	49	76.46km/h	65.56km/h	76.39km/h	65.52km/h	76.64km/h	65.81km/h
Both directions	110	123	98	74.41km/h	63.04km/h	74.59km/h	63.14km/h	74.09km/h	62.64km/h

Virtual Day Summary Table(2023)

	Both directions				South		North	
	Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
All day (0-24)	116	100.00%	93	100.00%	57	51	62	47
Daytime [7-19]	95	81.90%	82	88.17%	45	45	49	41
Evening [19-23]	7	6.03%	8	8.60%	6	5	4	3
Night [23-7]	14	12.07%	3	3.23%	6	1	9	3
2 Hours Morning Peak [7-9]	14	12.07%	6	6.45%	4	6	8	4
2 Hour Afternoon Peak [16-18]	17	14.66%	10	10.75%	9	6	8	4

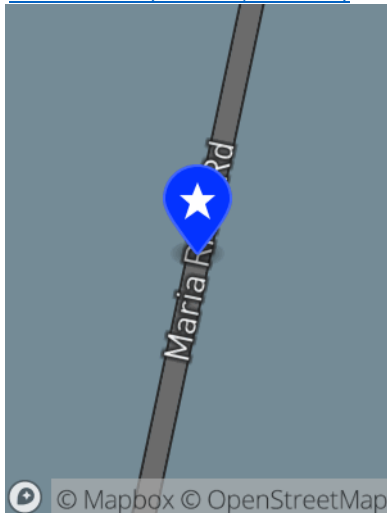
Virtual Day Detail Table(2023)

Time Range			Both directions				South		North	
			Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
00:00	-	01:00	1	0.86%	0	0.00%	1	0	0	0
01:00	-	02:00	2	1.72%	0	0.00%	1	0	1	0
02:00	-	03:00	0	0.00%	0	0.00%	0	0	0	0
03:00	-	04:00	1	0.86%	0	0.00%	0	0	1	0
04:00	-	05:00	1	0.86%	0	0.00%	1	0	1	0
05:00	-	06:00	3	2.59%	2	2.15%	1	0	2	2
06:00	-	07:00	5	4.31%	1	1.08%	1	1	3	1
07:00	-	08:00	7	6.03%	2	2.15%	1	3	5	1
08:00	-	09:00	7	6.03%	4	4.30%	3	3	3	3
09:00	-	10:00	8	6.90%	8	8.60%	4	3	4	4
10:00	-	11:00	8	6.90%	10	10.75%	4	4	5	6
11:00	-	12:00	9	7.76%	12	12.90%	4	6	5	6
12:00	-	13:00	8	6.90%	8	8.60%	4	3	4	5
13:00	-	14:00	8	6.90%	7	7.53%	4	5	4	2
14:00	-	15:00	9	7.76%	10	10.75%	4	6	5	4
15:00	-	16:00	9	7.76%	9	9.68%	6	4	3	5
16:00	-	17:00	10	8.62%	7	7.53%	5	3	5	3
17:00	-	18:00	7	6.03%	3	3.23%	4	3	3	1
18:00	-	19:00	5	4.31%	2	2.15%	2	2	3	1
19:00	-	20:00	4	3.45%	4	4.30%	2	2	2	2
20:00	-	21:00	1	0.86%	2	2.15%	1	1	1	1
21:00	-	22:00	1	0.86%	1	1.08%	2	1	1	0
22:00	-	23:00	1	0.86%	1	1.08%	1	1	0	0
23:00	-	00:00	1	0.86%	0	0.00%	1	0	1	0

MARIA RIVER RD_dup_0516646

MARIA RIVER RD - 880001 -14950m SOUTH OF
CRESCENT HEAD RD <100>

[GPS Coordinates\(-31.277396, 152.863193\)](#)



Data Summary

8 days data in total contribute to the report,
which include:

2023: 8 days, From 2023-09-19 to 2023-09-26

Data Quality Check

Some traffic data files contribute to this report
may have problems, the list is as below:

File: scheme_14_MARIA_RIVER_RD_0_-
31.2773962_152.863193_2023-09-
26_1333.EC0, Reason: Volume Threshold,
Maximum daily volume too low;

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
South	52	56	49	82.48km/h	68.72km/h	82.80km/h	69.55km/h	79.67km/h	66.13km/h
North	56	66	51	79.24km/h	66.92km/h	79.45km/h	67.50km/h	78.62km/h	65.23km/h
Both directions	106	112	97	81.00km/h	67.82km/h	81.14km/h	68.51km/h	79.24km/h	65.66km/h

Virtual Day Summary Table(2023)

	Both directions				South		North	
	Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
All day (0-24)	103	100.00%	95	100.00%	48	45	60	47
Daytime [7-19]	88	85.44%	82	86.32%	38	38	45	40
Evening [19-23]	5	4.85%	8	8.42%	3	3	5	5
Night [23-7]	10	9.71%	5	5.26%	7	4	10	2
2 Hours Morning Peak [7-9]	12	11.65%	9	9.47%	8	6	3	3
2 Hour Afternoon Peak [16-18]	17	16.50%	12	12.63%	5	4	11	7

Virtual Day Detail Table(2023)

Time Range			Both directions				South		North	
			Weekday	Weekend			Weekday	Weekend	Weekday	Weekend
00:00	-	01:00	1	0.97%	0	0.00%	1	0	1	0
01:00	-	02:00	0	0.00%	0	0.00%	0	0	0	0
02:00	-	03:00	0	0.00%	0	0.00%	0	0	0	0
03:00	-	04:00	1	0.97%	0	0.00%	1	0	0	0
04:00	-	05:00	1	0.97%	0	0.00%	1	0	0	0
05:00	-	06:00	2	1.94%	2	2.11%	1	1	7	1
06:00	-	07:00	5	4.85%	3	3.16%	3	3	2	1
07:00	-	08:00	5	4.85%	4	4.21%	3	3	2	1
08:00	-	09:00	7	6.80%	5	5.26%	5	3	1	2
09:00	-	10:00	8	7.77%	7	7.37%	5	4	3	2
10:00	-	11:00	7	6.80%	6	6.32%	4	4	3	2
11:00	-	12:00	8	7.77%	10	10.53%	3	4	4	5
12:00	-	13:00	9	8.74%	9	9.47%	3	3	5	6
13:00	-	14:00	7	6.80%	8	8.42%	3	3	4	4
14:00	-	15:00	8	7.77%	6	6.32%	2	3	5	3
15:00	-	16:00	8	7.77%	12	12.63%	3	6	5	6
16:00	-	17:00	11	10.68%	8	8.42%	3	2	7	5
17:00	-	18:00	6	5.83%	4	4.21%	2	2	4	2
18:00	-	19:00	4	3.88%	3	3.16%	2	1	2	2
19:00	-	20:00	2	1.94%	2	2.11%	1	1	2	1
20:00	-	21:00	1	0.97%	2	2.11%	1	0	1	2
21:00	-	22:00	1	0.97%	3	3.16%	1	1	1	2
22:00	-	23:00	1	0.97%	1	1.05%	0	1	1	0
23:00	-	00:00	0	0.00%	0	0.00%	0	0	0	0



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→ **The Power of Commitment**