



INFRASTRUCTURE AND LIVEABILITY ADVISORY COMMITTEE MEETING

To be held at 5pm on

Tuesday 9 April 2024

Council Chambers, 11 Manning Street, KIAMA NSW 2533

Order of Business

- 1 Apologies
- 2 Acknowledgement of Traditional owners
- 3 Confirmation of Minutes of Previous Meeting
- 4 Business Arising From The Minutes
- 5 Discussion Items
- 6 Report of the Director Infrastructure & Liveability
- 7 General Business
- 8 Closure

Members

Cr Mark Croxford
Cr Stuart Larkins
Dr Tony Gilmour
Dr Fiona Mackie
Roy Rogers
Jennifer Wulff
Michael Malone | Director
Infrastructure and Liveability

3 April 2024

To the Chair and Members:

**NOTICE OF
INFRASTRUCTURE AND LIVEABILITY ADVISORY COMMITTEE MEETING**

You are respectfully requested to attend an **Infrastructure and Liveability Advisory Committee Meeting**, to be held in the **Council Chambers, 11 Manning Street, KIAMA NSW 2533** on **Tuesday 9 April 2024** commencing at **5pm** for the consideration of the undermentioned business.

Yours faithfully

Michael Malone

Director Infrastructure and Liveability

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**AGENDA FOR THE
INFRASTRUCTURE AND LIVEABILITY ADVISORY COMMITTEE
TUESDAY 9 APRIL 2024**

1 APOLOGIES

2 ACKNOWLEDGEMENT OF TRADITIONAL OWNERS

“I would like to acknowledge the traditional owners of the land on which we meet, the Wadi Wadi people of the Dharawal nation, and pay my respect to Elders past, present and emerging.”

Confirmation of Minutes of Previous Meeting

3 CONFIRMATION OF MINUTES OF PREVIOUS MEETING

3.1 Infrastructure and Liveability Advisory Committee Meeting on 13 March 2024

Attachments

- 1 Minutes - Infrastructure and Liveability Committee Meeting - 13 03 24 - PDF

Enclosures

Nil

RECOMMENDED

That the Minutes of the Infrastructure and Liveability Advisory Committee meeting held on 13 March 2024 be received and accepted.

Item 3.1



**MINUTES OF THE
INFRASTRUCTURE AND LIVEABILITY
ADVISORY COMMITTEE MEETING**

commencing at 5pm on

WEDNESDAY 13 MARCH 2024

Council Chambers, 11 Manning Street, KIAMA NSW 2533

MINUTES OF THE INFRASTRUCTURE AND LIVEABILITY ADVISORY COMMITTEE **13 MARCH 2024**

MINUTES OF THE INFRASTRUCTURE AND LIVEABILITY ADVISORY COMMITTEE

**HELD AT KIAMA MUNICIPAL COUNCIL
ON WEDNESDAY 13 MARCH 2024 AT 5PM**

PRESENT: Cr Stuart Larkins
Dr Tony Gilmour
Dr Fiona Mackie
Roy Rogers
Michael Malone | Director Infrastructure and Liveability
Claire Doble | Manager Communications
Berbel Franse | Community Engagement Officer
Cr Karen Renkema-Lang (Observer)

1 APOLOGIES

Cr Mark Croxford
Jennifer Wulff

2 ACKNOWLEDGEMENT OF TRADITIONAL OWNERS

The Chair declared the meeting open and acknowledged the traditional owners:

"I would like to acknowledge the traditional owners of the Land on which we meet, the Wadi Wadi people of the Dharawal nation, and pay my respect to Elders past, present and emerging."

3 CONFIRMATION OF MINUTES OF PREVIOUS MEETING

3.1 Infrastructure and Liveability Committee Meeting on 14 February 2024

24/003IALAC

Resolved that the Minutes of the Infrastructure and Liveability Committee meeting held on 14 February 2024 be received and accepted.

TG advised that there has been some discussion regarding the minutes not reflecting what the Chair had asked for at the last meeting. There was no information or differences provided by TG. AH left the meeting to double check that requested updates from the Chair were made , and it was found that they were.

**MINUTES OF THE INFRASTRUCTURE AND LIVEABILITY ADVISORY
COMMITTEE** **13 MARCH 2024**

(Members Gilmour and Mackie)

4 BUSINESS ARISING FROM THE MINUTES

Nil

5 DISCUSSION ITEMS

5.1 Transport Strategy

FM advised that she is unsure how to provide useful consumer information on plans without having reports or questions that Council would like her to comment on. FM added that at the last meeting, she raised the Disability Inclusion Action Plan (DIAP), however noted that there was no specific budget or funding to implement this plan.

Also FM spoke about the Town Centre Plan at the last meeting, where MM had advised that there is a traffic and parking review available. MM advised that he is currently trying to determine if there is a copyright issue, and if he can distribute it to the Committee. FM requested that if Council would like input on this review, to please circulate it to the Committee at least a week before the meeting.

FM advised that she has looked at the Priority Assessment Grid, that was circulated previously by MM. FM questioned MM about the scoring system and MM explained how this system worked.

FM asked MM for direction on what the Committee can contribute to the Transport Strategy. RR added that he would also like some direction on what the Committee is needed for. He found the review scoring system to be complex, and he feels like the Committee is not adding any value.

5.2 Council Land Review

RR advised that he received some information from MM, regarding the assessment model that was presented to Council last August. MM advised that it is a course assessment process, however this is required as it is supposed to help Council to prioritise and make obvious decisions in an efficient and effective way. TG added that he has concerns over people's personal opinions and views coming through in the scoring system. SL advised that the reviews will come through Council. TG requested an explanation as to why something gets a particular score, and suggested a 'Column G' with the extra information, and also for more positive language used. MM advised that the language used is guided by how Council has resolved to take that project forward i.e. assessment of divestment opportunities.

TG also asked how each category will be weighted against each other. MM advised that we firstly score on what we already know, based on the facts and obvious uses and are not weighted.

RR asked what the next steps are, and how he can assist. MM asked that if the Committee could complete reviewing the scoring sheet, and provide collective

**MINUTES OF THE INFRASTRUCTURE AND LIVEABILITY ADVISORY
COMMITTEE**

13 MARCH 2024

advice from the Committee advising if they would like to suggest or provide feedback including potential for weightings on the criteria.

5.3 Promote Innovation

As JW was an apology, this subject was held over. SL noted with the Committee that there is a new "Electrify 2533 Movement" group in Kiama, and that he will be meeting up with these community members shortly.

KRL reminded the Committee that Kiama Council was part of a pilot for Electric Vehicle Charge Stations, and there was a feasibility study for where they could be located. KRL suggested that the Committee chases this up.

5.4 Communication - Community Engagement Strategy

CD presented the Council Community Engagement Strategy to the Committee. CD advised that there is a co-design asking stakeholders and community members to speak to Council staff at workshops, various pop-ups and online surveys. The Council Communications team would like to understand what issues are important to the community.

CD went over engagement requirements and the Local Government Act 1993, as well as core values for best practice engagement. CD also discussed issues and considerations, barriers and unheard voices, as well as ways to address these barriers and issues.

CD then went over the next steps with the process for the final strategy. CD discussed some questions for the Committee to consider, regarding engaging on the Community Engagement Strategy.

Action: Copy of the presentation to be distributed to the Committee members. **CD**

6 REPORTS FOR INFORMATION

Nil

7 GENERAL BUSINESS

7.1 Updated Terms of Reference

TG asked why the Terms of Reference has changed, and if it is being imposed on the Committee. SL confirmed that the changes to the Conflicts of Interest Section and Meeting Administration section were resolved by Council, so yes it has been imposed on all Committees.

TG advised that there are three different lots of incorrect information in the Terms of Reference, as follows:

1. **Purpose:** 'review and monitor the implementation of strategies as outlined in Pillar 4 of the Kiama Community Strategic Plan 2022-2032'.

MINUTES OF THE INFRASTRUCTURE AND LIVEABILITY ADVISORY COMMITTEE **13 MARCH 2024**

TG advised that this should state 'review and monitor the implementation of strategies, as outlined in Pillar 4 of the Kiama Community Strategic Plan 2022-2032, except housing', as Pillar 4 includes housing, however it has been decided that the Sustainable Communities Advisory Committee is looking after housing.

2. **Committee Meetings:** 'Meetings are held every second month on the fourth Wednesday of the month.'

TG advised that this should state 'Meetings are to be held every month, on the second Tuesday of every month'.

3. **Membership:** '3 x community representatives'.

TG advised that this should state '4 community representatives'

24/004IALAC

It was moved and resolved that the Committee notes the current update from Council, also noting that there are three other errors to be updated and sent back to Council for endorsement.

(Councillor Larkins and Member Mackie)

8 CLOSURE

There being no further business the meeting closed at 6.15pm

These Minutes were confirmed at the Ordinary Meeting of Council held on 9 April 2024

.....
Chair

4 BUSINESS ARISING FROM THE MINUTES

5 DISCUSSION ITEMS

5.1 Updated Terms of Reference

Jennifer Wulff

Note: Committee to advise if they are happy for the updated Terms of Reference to go to Council for endorsement.

Attachments

- 1 Terms of Reference - Infrastructure & Liveability Advisory Committee - latest update - pdf

Enclosures

Nil



Terms of Reference

Committee:	Infrastructure and Liveability Advisory Committee
Status:	Committee of Council <input type="checkbox"/> Statutory committee <input type="checkbox"/> Advisory committee <input checked="" type="checkbox"/> (end date: September 2024, the end of the current term of Council)
Purpose:	Role of the Committee is to: <ul style="list-style-type: none"> act in an advisory capacity to council on matters relating to the development of strategies as outlined in Pillar 4 of the Kiama Community Strategic Plan 2022-2032. review and monitor the implementation of strategies, as outlined in Pillar 4 of the Kiama Community Strategic Plan 2022-2032, except housing.
Objectives:	Objectives of the Committee are to: <ul style="list-style-type: none"> act as a conduit between the community and Council on Committee matters provide expert advice and make recommendations to Council on the development of specific strategies.
Committee Meetings:	Meetings are held every month on the second Tuesday of the month.
Venue:	Meetings will be held at the Kiama Council Chambers, other suitable venues as required or online.
Membership:	<ul style="list-style-type: none"> 2 x Councillors 4 x community representatives 1 x executive member Subject matter experts, such as rangers, engineers, waste officers etc., should attend meetings to discuss any reports that they prepare. However, it is not recommended that these staff members be members of the Advisory Committee. All Councillors can attend meetings as an observer.
Term of membership	Non-Councillor membership of the Advisory Committee will be for the length of a Council term. NB: a specified term does not preclude an incumbent from reapplying to serve on consecutive terms.
Chairperson	Appointed by the Committee annually.
Meeting quorum:	A Quorum will be deemed to have been met under the following criteria: <ol style="list-style-type: none"> minimum of 50% of the voting members plus 1 or per statutory requirements (if required).
Meeting administration:	<ul style="list-style-type: none"> Meetings are to be chaired by a non-Councillor Committee member as elected by the committee and endorsed by Council.

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Committee:	Infrastructure and Liveability Advisory Committee
	<ul style="list-style-type: none"> • The agenda and business papers will be circulated no less than five days prior to a scheduled meeting. • Minutes will be taken by a representative of Council. • Minutes are to be brief and focused on action items and advice. • Minutes shall be approved by the Chair and circulated to each member and to Councillors within two weeks of the meeting being held. • Minutes are required to be submitted to the next Ordinary Meeting of Council, immediately following the committee meeting, to be received and noted. • Recommendations from the meeting that require Council endorsement will be reported separately to the next Ordinary Meeting of Council.
Selection of members	<p>When positions become vacant the selection of new committee members will be undertaken:</p> <ol style="list-style-type: none"> 1. through a public invitation for EOI by applicants 2. by consideration of applications by Council 3. by Council approval of successful applicants. <p>The following factors will be taken into consideration when determining members:</p> <ol style="list-style-type: none"> 1. the persons relevant experience and expertise 2. whether the person is a resident of the Kiama Local Government Area 3. there is a gender balance 4. there is representation from across the full Kiama geographical area 5. cultural and age diversity is represented 6. committee members are able to demonstrate that they are connected and representative” of the community.
Responsibility	<p>Committee members will:</p> <ol style="list-style-type: none"> 1. provide expert advice on the development of strategies as outlined in Pillar 4 of the Kiama Community Strategic Plan 2022-2032, including, but not limited to: <ol style="list-style-type: none"> a Plans of management b Asset management plans c Major projects d Sport and recreation plans. 2. review and monitor the implementation of strategies as outlined in Pillar 4 of the Kiama Community Strategic Plan 2022-2032. <p>This committee has the authority to form, and call for nominations for membership of, project reference groups for specific advice on projects related to Pillar 4 of the Kiama Community Strategic Plan 2022-2032.</p>

Item 5.1

Attachment 1

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3

Committee:	Infrastructure and Liveability Advisory Committee
Code of Conduct	<ol style="list-style-type: none"> 1. at all times committee members must comply with Council's Code of Conduct for Council committee members, delegates of Council and Council advisers 2. at all times contribute in a positive and respectful manner 3. at all times avoid disruption, contrary conduct or being wasteful of time and resources.
Conflicts of interest	<p>Conflicts of Interest are to be called as a matter of process.</p> <p>Committee members must declare any conflicts of interest at the start of each meeting or before discussion of a relevant agenda item or topic. Details of any conflicts of interest shall be appropriately noted.</p> <p>Committee members must complete a declaration of interest form.</p> <p>Where members or invitees at Committee meetings are deemed to have a real or perceived conflict of interest, it may be appropriate they be excused from Committee deliberations on the issue where the conflict of interest may exist.</p> <p>Where there is a conflict, Council's Code of Conduct will be adhered.</p>
Termination of membership	<p>Non-Councillor member positions will be declared vacant/terminated when a member:</p> <ol style="list-style-type: none"> 1. completes their designated term and retires from the committee 2. completes their term and is not re appointed 3. resigns their membership, in writing, to the Chairperson 4. fails to attend more than 75% of meetings scheduled in a 12-month period unless granted special leave of absence by the Chairperson 5. acts in a way that is contrary to their responsibility as outlined (above). <p>NOTE: Council on the recommendation of the committee chairperson reserves the right to terminate appointments in instances where behaviour is considered excessively disruptive and contrary, is a breach of the Code of Conduct, is deemed inappropriate or is regarded as failing to provide productive and valued input.</p>
Process for termination of membership	<p>Where a (non-Councillor or staff) committee member's behaviour is considered unsatisfactory and contrary to their responsibilities (identified above), the Chairperson will draw this to the attention of the relevant committee member and reinforce the required level of conduct. The Chairperson will make a written record of this and provide to a relevant council officer for recording. The committee member will be able to sight and sign the written record.</p> <p>Where there is re-occurrence of unsatisfactory behaviour the committee member will be warned formally in writing by the Chairperson. Counselling (to be provided by the General Manager or Public Officer) will reinforce the standard of conduct expected as well as the implications of the behaviour on the committee members and Council. In addition counselling will reinforce potential for termination from the committee should the behaviour</p>

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4

Committee:	Infrastructure and Liveability Advisory Committee
	<p>continue. A written record shall be kept of the formal warning and counselling.</p> <p>If the committee member's behaviour does not improve after the formal warning and counselling, the committee member's appointment may, on the recommendation of the Chairperson, be terminated by Council resolution.</p>

Item 5.1

Attachment 1

Discussion Items

5.2 Council Land Review

Roy Rogers

Attachments

Nil

Enclosures

Nil

Item 5.2

Discussion Items

5.3 Promote Innovation

Jennifer Wulff

Attachments

Nil

Enclosures

Nil

Item 5.3

6 REPORT OF THE DIRECTOR INFRASTRUCTURE & LIVEABILITY

6.1 Kiama Town Centre Traffic & Parking Strategy

CSP Objective: Outcome 1.1: We want a strong sense of community and belonging, where social and cultural life can flourish; and our families, friends and visitors feel welcome and included.

CSP Strategy: 1.1.1 Provide spaces, services and initiatives that foster a proud, inclusive, and connected community for all.

Delivery Program: 1.1.1.4 Improving the liveability of Kiama for those with diverse backgrounds and abilities.

Summary

The Committee which to contribute to the finalization of the Kiama Town Centre Traffic & Parking Strategy

Financial implication

None for this report

Risk implication

None for this report

Policy

Infrastructure & Liveability Terms of Reference

Consultation (internal)

N/A

Communication/Community engagement

The purpose of this report

Attachments

- 1 Exhibited Draft Kiama Traffic & Parking Strategy Part A
- 2 Exhibited Draft Kiama Traffic & Parking Strategy - Part B Modelling Report
- 3 Exhibited Draft Kiama Traffic & Parking Strategy Part C - alternative transport review

Enclosures

Nil

RECOMMENDATION

That the Committee discuss the background information, discuss the opportunities for input and recommend a way forward for Council.

Report of the Director Infrastructure & Liveability

6.1 Kiama Town Centre Traffic & Parking Strategy (cont)

Background

Council undertook the Traffic & Parking Strategy development project in 2021 and undertook community consultation on the draft Strategy and supporting data reports in 2022. The exhibited draft documents are attached and a summary of the community feedback – copies previously supplied via hyperlink to the website.

A number of internal concerns were raised regarding the report and the potential impacts on the existing and planned community including the validity of traffic modelling due to COVID related traffic reductions and the efficacy and deliverability of the proposed infrastructure changes.

As a result a supplementary peer review was also undertaken – see attachment 5.

Subsequently, Council has also resolved to consider the application of a paid parking regime as a part of managing both parking and the costs of high car-based visitation to the Kiama Town Centre on assets and services e.g. weekend public bin and public toilet servicing.

The Committee could consider providing additional input and review to Council to enable the adoption of a Strategy or series of Strategies or Plans.

Areas for potential discussion and/or input could include:

- i. Over all intentions of the draft Strategy
- ii. Accuracy of underlying data/assumptions e.g. estimates of private and public parking versus that under development or proposed since the draft Strategy
- iii. Deliverability and efficacy of proposed road network changes
- iv. Other options and priority for exploiting distributed public parking or high demand locations e.g. investigation of a shuttle bus or similar
- v. Concept for identifying and detailing a possible paid parking regime (perimeter, rationale etc)
- vi. A format for adoption of a Strategy(s) for recommendations covered by the draft Strategy.



Kiama Traffic and Parking Study

Part A: Assessment of Town Centre Study (TCS) Traffic Proposals

Kiama Municipal Council

01 June 2021

Item 6.1

Attachment 1



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Document Issue History

Report File Name	Prepared	Reviewed	Issued	Date	Issued to
P4582.001R Kiama Traffic and Parking Study Report - DRAFT	M. Hearne	SP. Power	M. Hearne	28/08/2020	Mark Biondich E: markb@kiama.nsw.gov.au
P4582.002R Kiama Traffic and Parking Study Report - DRAFT	M. Hearne	SP. Power D. Bitzios	M. Hearne	13/10/2020	Mark Biondich E: markb@kiama.nsw.gov.au
P4582.003R Kiama Traffic and Parking Study Report - DRAFT	M. Hearne	SP. Power	M. Hearne	21/01/2021	Mark Biondich E: markb@kiama.nsw.gov.au
P4582.004R Kiama Traffic and Parking Study Report	M. Hearne	SP. Power	M. Hearne	25/03/2021	Mark Biondich E: markb@kiama.nsw.gov.au
P4582.005R Kiama Traffic and Parking Study Report	M. Hearne	A. Eke	A. Eke	01/06/2021	Mark Biondich E: markb@kiama.nsw.gov.au



EXECUTIVE SUMMARY

Overview

The Kiama Town Centre Study (TCS) was completed in 2018 and recommended a number of traffic and parking improvement proposals. Bitzios Consulting has been commissioned by Kiama Municipal Council (Council) to complete a three-part assessment of the TCS proposals. This Part A report reviews the following four proposals:

- **Proposal 1:** Implementation of a permanent “Pedestrian Friendly Zone” on Terralong Street between Collins Street and Shoalhaven Street
- **Proposal 2:** Temporarily closing Terralong Street between Railway Street and Manning Street during the *Summer Streets Program*
- **Proposal 3:** Narrowing and lane realignment of Terralong Street between Railway Street and Manning Street
- **Proposal 4:** Implementation of seven intersection reconfigurations.

Inputs into the Review

Traffic and parking surveys were undertaken during the NSW mid-year school holiday period. Average queue length surveys were also undertaken at each intersection. Site visits were also undertaken at this time. The weekend peak hour recorded the highest traffic volumes out of the three surveyed periods.

The TCS summarised feedback submitted by the public in relation to traffic and parking. Key issues raised included:

- Poor traffic flow through the town centre in summer
- Complaints about ‘rumble strips’ along Terralong Street and Manning Street
- Parking issues around the town centre
- “Dangerous” pedestrian movements around Kiama Public School
- The area around Kiama Railway Station needing access improvements to surrounding streets and to the town centre.

These submissions were considered during the evaluation of the four proposals.

Proposal 1: Pedestrian Friendly Zone on Terralong Street between Collins Street and Shoalhaven Street

This proposal is to convert the section of Terralong Street between Collins Street and Shoalhaven Street into a pedestrian-friendly zone. This area was assessed against TfNSW pedestrian crossing and shared zone warrants using the Saturday peak pedestrian and traffic volume data from the traffic surveys. The assessment found that while the area does not meet the TfNSW warrants for a shared zone, it does meet the warrants for pedestrian crossings.

It is recommended that one of the “rumble strip crossings” in this section of Terralong Street be removed and replaced by a new raised zebra crossing (wombat crossing). This would improve pedestrian access between Hindmarsh Park and the shops along Terralong Street, while also reducing traffic speeds. This would also result in the loss of 8 parking spaces. The remaining rumble strip to the east of the intersection of Terralong Street and Shoalhaven Street is recommended to be removed to be consistent with the other recommendations along Terralong Street. The existing kerb buildouts at the rumble strips are to be retained for dining space.

This proposal was deemed to be viable.



Proposal 2: Temporary closure of Terralong Street

This proposal is to temporarily close Terralong Street between Railway Parade and Manning Street to vehicles during the Summer Streets Program. SIDRA modelling analysis for 2021 and 2031 suggests that with the inclusion of this arrangement all intersections, with the exception of Intersection 1, will continue to operate within acceptable levels of service, with moderate increases to delays and queues on some approaches. Intersection 1 has decreased levels of service.

Based on the modelling outputs this proposal was deemed to be viable.

A traffic management plan should be prepared to accommodate emergency vehicles and event vehicles.

Proposal 3: Narrowing and lane realignment of Terralong Street

This proposal involves modifying the configuration of the Terralong Street / Railway Parade intersection to give priority to turning movements between Terralong Street and Railway Parade. It also involves lane realignment and narrowing of Terralong Street on the eastern approach.

Supporting traffic calming measures should be installed in Terralong Street eastern approach to reinforce driver awareness of this pedestrianised zone. The configuration is shown in Figure 8.2.

Local Area Traffic Management (LATM) schemes such as kerb realignment, landscaping, and entry treatments can further improve safety for all users of the intersection.

The proposal was found to maintain acceptable traffic performance at the intersection and is deemed to be viable.

Proposal 4: Seven intersection reconfigurations

The proposal consisted of seven key intersection upgrades in the town centre area.

Intersection modelling using SIDRA software was undertaken for each intersection, for scenarios with and without the inclusion of a temporary closure of Terralong Street between Railway Parade and Manning Street as per Proposal 2. The upgrades are summarised in Table E1.

Table E1: Intersection Upgrades

Number	TCS reference	Intersection	Intersection Type	Proposed Changes	Findings and Determination
4-001	W06	Collins Street / Terralong Street	Roundabout	Pedestrian crossings across all legs of the roundabout	Intersection performance worsened by inclusion of crossings with significant queuing back along Collins Street. The appropriate treatment to address pedestrian crossings while maintaining traffic capacity at this location would need to include traffic signals.
4-002	W07	Collins Street / Akuna Street	Give way	Kerb build-outs, blisters, removal of parking, pedestrian crossing north of Akuna Street	Implement wombat crossing with additional safety treatments such as speed humps and approach linemarking. Loss of 13 parking spaces expected.
4-003	W08	Collins Street / Bong Bong Street	Stop-controlled	Convert to roundabout	Not viable to implement roundabout due excessive approach gradients. Implement raised platform on intersection to reduce vehicle speeds.



Number	TCS reference	Intersection	Intersection Type	Proposed Changes	Findings and Determination
4-004 (same as proposal 3)	H10	Railway Parade / Terralong Street	Give way	Change traffic lane arrangement and reduce traffic lane widths	Viable as per Proposal 3
4-005	H14	Shoalhaven Street / Bong Bong Street	Give way	Convert to roundabout	Substantial civil works would be required to implement a roundabout. LATM measures installed after the TCS release are likely to have already reduced vehicle speeds. Recommend to retain existing conditions and monitor vehicle speeds. If further action necessary, implement raised platform similar to Collins Street / Bong Bong Street intersection.
4-006	H07	Terralong Street / Blowhole Point Road	Give way	Realign kerbs and change priority to Terralong Street / Blowhole Point Road	Viable. This would improve traffic flow at this intersection due to removal of current turn conflicts. Loss of 9 parking spaces.
4-007	S01	Bong Bong Street / Railway Parade	Stop-controlled	Convert to traffic signals	Does not achieve signalised intersection warrants. Provide additional speed hump on crest of rail overpass to further reduce vehicle speed and improve pedestrian safety. Vehicle speed reductions through LATM measures implemented after TCS should be quantified through vehicle speed surveys. Also consider raised platform similar to other intersection and include pedestrian crossing facilities on eastern leg.

The SIDRA modelling assessed the opening year (2021) and future year scenario (2031) for the intersection improvements and route reconfigurations. The combined impact of the proposals to network capacity was assessed and found to be worse due to the pedestrian crossings at the Terralong Street / Collins Street roundabout, which fails by the year 2031.

Some safety concerns were noted, and site-specific recommendations made where necessary.



Parking Assessment

Parking surveys were undertaken for the same time periods as the traffic surveys. They indicated that peak occupancy was on the Saturday between 12:00PM and 1:00PM. Parking along Terralong Street was near or at capacity for most of the weekend survey period, with the surrounding residential streets to the west of the precinct underutilised.

The proposals would result in the loss in the following parking spaces:

- Proposal 1: Loss of 8 spaces
- Proposal 2: Temporary loss of 26 2P, 3 accessible, and 2 police parking spaces
- Proposal 3: Loss of 5 spaces
- Proposal 4: Total loss of 29 spaces.

The result is an overall reduction in permanent parking availability from 1441 parking spaces across the study area to 1399 spaces, and temporarily to 1373 spaces during the *Summer Streets program*. The lost parking spaces are some of the most highly utilised in the precinct.

A levy on residential developments outside the Kiama Town Centre is recommended to fund parking and transport infrastructure in the town centre. This would be in line with Kiama's strategic economic documentation.

The proposed LEP modifications were also assessed with no major parking implications identified. A number of short- and long-term recommendations were also included, such as:

- **Increasing parking wayfinding signage.** Currently, there is no signage directing drivers on Terralong Street to the off-street car parks on Akuna Street. By providing further signage, parking across the town centre will be better balanced as these car parks are currently underutilised
- **Designating RV parking areas.** Currently there are no designated RV parking areas in the town centre. Shoalhaven Street has areas that are suitable for use as RV parking, as these areas have generally low occupancy but are not too far from the town centre to be undesirable. This would be supported with further signage as per the above recommendation
- **Ensuring that any future developments on existing public car parks retain public access.** One proposal for the town centre was for a new supermarket which would include a multi-level car park, located on the existing car park on the northern side of Akuna Street. While this development has not been approved, any car park upgrades should retain public access to parking
- **Periodic monitoring of parking.** Having high quality parking data is imperative to developing long-term parking strategies and to observe yearly trends. Regular parking surveys should be undertaken throughout the year to better understand how underutilisation affects different parts of the town centre.

All recommended actions in this study are shown in Figure E.1.





Aerial image sourced from Nearmap

Figure E.1: Recommended Actions



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1. INTRODUCTION

1.1 Background

Kiama Municipal Council (Council) commissioned the Kiama Town Centre Study (TCS) in 2018 with the aim of accommodating growth in the Kiama Town Centre while maintaining, respecting and supporting the existing character of the town. The TCS recommended a number of traffic and parking improvement proposals. Council has engaged Bitzios Consulting to undertake a traffic and parking study of the town centre, investigating the existing traffic and parking issues and reviewing the feasibility of the proposals in the TCS.

This report is for Part A of the three-part study. Part A summarises the existing traffic and transport features of the town centre and details the observations made during site investigations as well as additional data that has been collected for this study.

This report focuses on the following four key proposals raised in the 2018 TCS relating to traffic and parking issues in the town centre:

- **Proposal 1 (TCS Chapter 3):** A permanent pedestrian friendly zone on Terralong Street, between Collins Street and Shoalhaven Street
- **Proposal 2 (TCS Initiative H11):** Closing Terralong Street between Railway Street and Manning Street to vehicle traffic during the Summer Streets Program
- **Proposal 3 (TCS Initiative H10):** Narrowing of the trafficable area on Terralong Street between Railway Street and Manning Street, realignment of traffic lanes, reductions in lane width and removal of parking
- **Proposal 4 (TCS Figure 6):** Implementation of seven intersection reconfigurations.

This report also assesses the current parking situation in the town centre, identifies the parking implications of each proposal, and discusses the impacts of the proposed modifications to the Kiama Local Environmental Plan (LEP).

Community submissions on the TCS relating to traffic, pedestrian, and parking issues have also been reviewed to provide further context for the assessment of these proposals.

Part B of the project is a wider review and includes the assessment of key intersections outside of the town centre. More detailed modelling was undertaken in SIDRA and using the TRACKS model for the region to assess regional growth effects on the town centre and surrounds over the next 10 years. Part B is documented in a separate report.

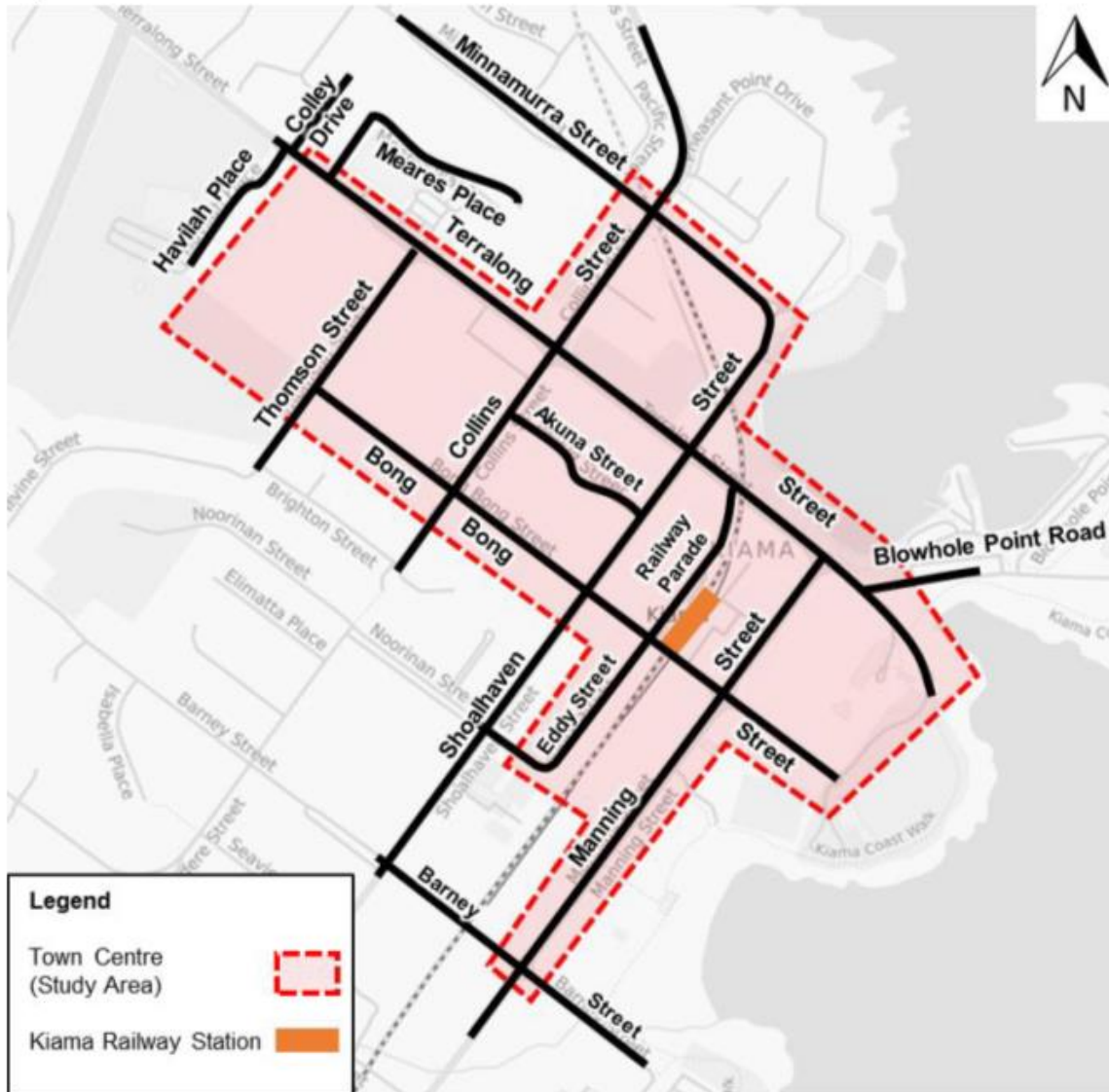
Part C includes an assessment and analysis of public and active transport routes in the Kiama area.

The data collection and site observations for this project were undertaken during the COVID-19 pandemic. Given the largely 'within' NSW visitor market for Kiama, the impacts at the time of the study would be expected to be minimal.



1.2 Study Area

The study area for Part A is the town centre shown in Figure 1.1. The study area does not include Barney Street, Havilah Place or Colley Drive, which are shown in the figure for reference purposes only.



Source: OpenStreet Map

Figure 1.1: Town Centre Study Area



There are eleven (11) key intersections within the study area that are the focus of the intersection assessment in Part A. These intersections are listed in Table 1.1 and shown in Figure 1.2.

Table 1.1: Study Area Intersections

I.D.	Intersection	Intersection Control
001	Collins Street / Terralong Street	Roundabout
002	Collins Street / Akuna Street	Give way
003	Collins Street / Bong Bong Street	Stop-controlled
004	Railway Parade / Terralong Street	Give way
005	Shoalhaven Street / Bong Bong Street	Give way
006	Terralong Street / Blowhole Point Road	Give way
007	Bong Bong Street / Railway Parade	Stop-controlled
008	Terralong Street / Shoalhaven Street	Stop-controlled
009	Terralong Street / Manning Street	Roundabout
010	Manning Street / Bong Bong Street	Roundabout
021	Shoalhaven Street / Akuna Street	Give way



Source: OpenStreet Map

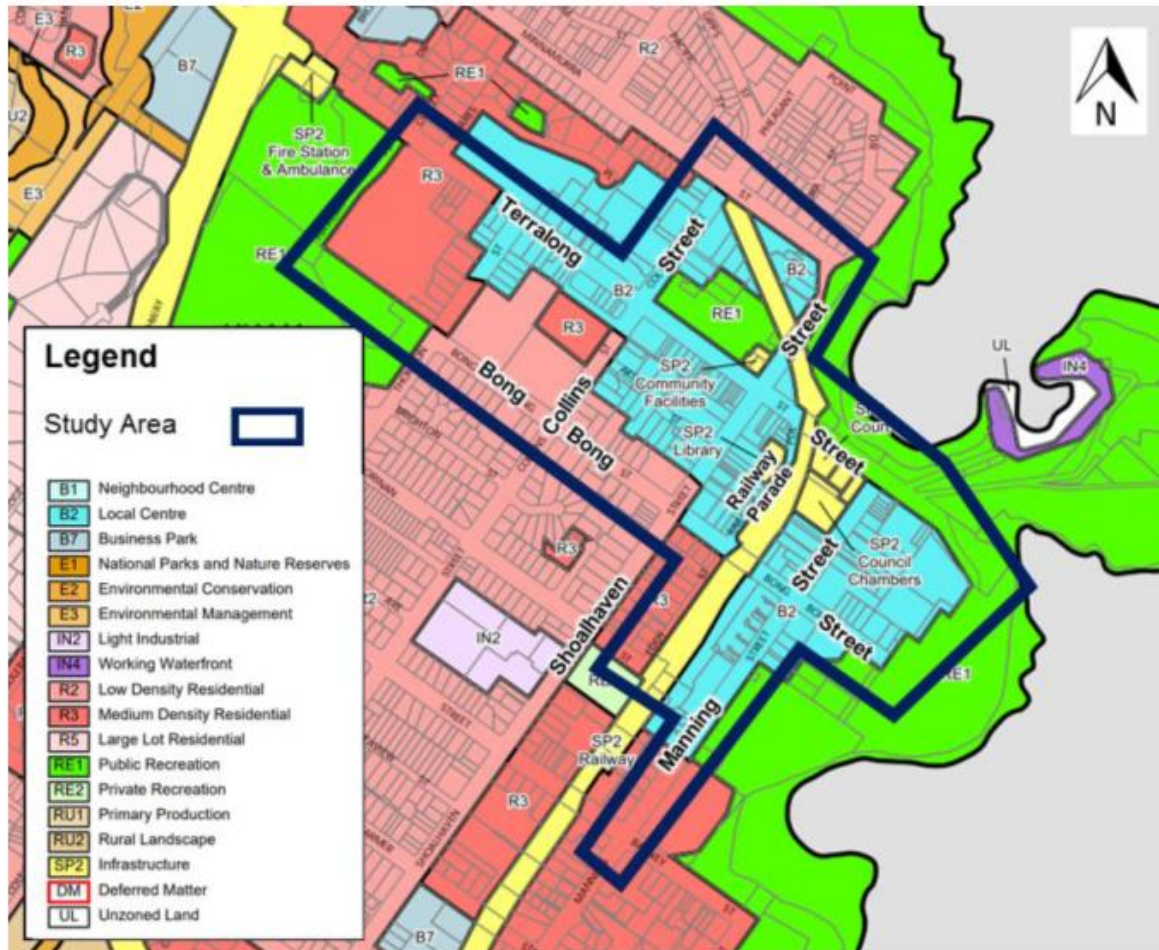
Figure 1.2: Study Area Intersections



2. EXISTING CONDITIONS

2.1 Land Use

The current land uses within Kiama Town Centre are predominantly retail and commercial (B2), public recreation spaces (RE1) and low or medium residential (R2 and R3) as shown Figure 2.1.



Source: NSW Legislation

Figure 2.1: Existing Land Use Map

The retail and commercial land uses are located mainly along and surrounding Terralong Street and Manning Street with the residential uses located along and surrounding Bong Bong Street west of Railway Parade and Eddy Street.

The largest non-coastal public recreation space within the town centre is Hindmarsh Park, bordered by Collins Street, Terralong Street, and Shoalhaven Street. Other recreation spaces are located by the coast near the Kiama Blowhole and the Kiama Showgrounds.

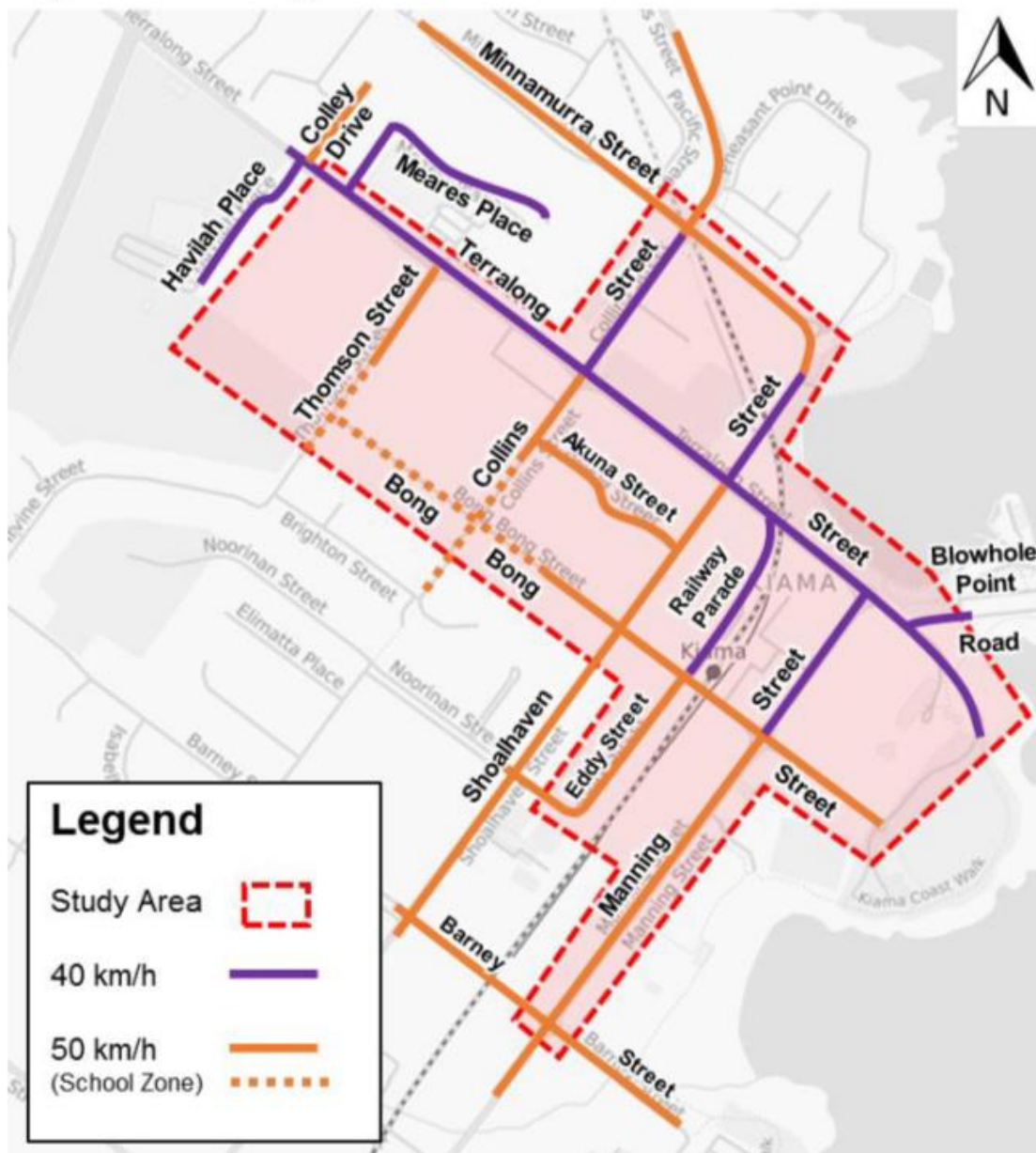
Kiama Public School is bounded by Thomson Street, Bong Bong Street, and Collins Street.



2.2 Road Network Description

2.2.1 Speed Limits

Terralong Street, just west of its intersection with Havilah Place is designated as a High Pedestrian Activity Area (HPAA) and has a posted speed limit of 40 km/h. Railway Parade, Blowhole Point Road, Meares Place, Havilah Place and some sections of Collins Street, Shoalhaven Street and Manning Street also have posted speed limits of 40 km/h. All other roads within the study area have posted speed limits of 50 km/h. School zones are located around Kiama Public School along Thomson Street, Bong Bong Street, and Collins Street. The posted speed limits of roads within the study area are shown in Figure 2.2.



Source: OpenStreet Map

Figure 2.2: Speed Limits



2.2.2 Key Streets

Descriptions of the key streets within the study area are summarised in Table 2.1.

Table 2.1: Key Streets

Road	Description
Terralong Street	Retail / commercial strip. Commercial core of town centre. Main thoroughfare through the town centre. Angled parking on both sides of the road.
Manning Street	Retail / commercial strip. Main route between Kiama Town Centre and Kiama South. Angled parking on both sides of the road.
Railway Parade	Local road fronting the library and Kiama railway station. Parking available at library carpark and on-street. Station bus stops located outside and opposite the station entrance.
Blowhole Point Road	Road leading to the cliffs and Kiama Blowhole, a key tourist attraction. Angled parking and car parks on the northern side of the road near Terralong Street.
Collins Street	Primary link from vehicles approaching from the north along Princes Highway to the Kiama Town Centre. Angled parking on both sides of the road north of Akuna Street. Local road south of Akuna Street.
Bong Bong Street	Local residential road parallel to Terralong Street
Shoalhaven Street	Local road perpendicular to Terralong and Bong Bong Streets. Angled parking on some sections of the road.
Akuna Street	Local road between Collins and Shoalhaven Streets. Public carpark north of Akuna Street.
Eddy Street	Local residential road with perpendicular parking (commuter parking) on the eastern side.
Minnamurra Street	Local residential road.
Meares Place	Local residential road.
Thomson Street	Local residential road.



2.3 Public Transport

2.3.1 Railway Station

Kiama Railway Station is located at the corner of Railway Parade and Bong Bong Street with its sole entrance on Railway Parade. Located on the South Coast Line, train services run towards Sydney and Wollongong in the north and towards Bomaderry in the south. The electrification of the South Coast Line ends at Kiama Station and services between Kiama and Bomaderry require passengers to transfer to diesel trains at Kiama Railway Station.

Services between Kiama, Sydney, and Bomaderry operate hourly during weekday peak periods. Outside of peak hours and on weekends, services to and from Sydney operate hourly, while services to and from Bomaderry operate every two hours with bus service 737 supplementing the rail service between Kiama and Bomaderry on weekdays only.

The departure and arrival times of South Coast Line services to and from Sydney / Wollongong during the AM, PM and weekend mid-day peaks are shown in Table 2.2.

Table 2.2: Departure and Arrival Times at Kiama Station To / From Sydney or Wollongong

Peak	Departure Times	Arrival Times
Weekday AM	5:56, 6:37, 7:13, 7:56, 8:16, 8:56 AM	5:55, 6:20, 7:03, 7:55, 8:39 AM
Weekday PM	3:55, 4:55, 5:50, 6:38, 6:54 PM	4:37, 5:37, 6:14, 6:34 PM
Weekend mid-day	9:56, 11:05, 11:56 AM, 1:05 PM	10:52, 11:47 AM, 12:52 PM

Source: Transport Info NSW

2.3.2 Bus Network

All bus routes in Kiama operate on weekdays and Saturdays, with no bus services operating on Sundays. All bus routes shown in Table 2.3 stop along Railway Parade outside Kiama Station.

Table 2.3: Bus Routes

Route Number	Destinations	Roads Used	Frequency (Weekday daily trips per direction)
71	Kiama to Shellharbour	Manning Street, Bong Bong Street, Railway Parade, Terralong Street, Collins Street, Havilah Place	8 to 9
125	Kiama to Jamberoo and Minnamurra Falls	Railway Parade, Bong Bong Street, Manning Street, Terralong Street, Havilah Place	4
126	Kiama to Gerroa via Gerringong	Havilah Place, Terralong, Railway Parade, Bong Bong Street, Manning Street	5
737 (rail supplement)	Kiama to Bomaderry	Manning Street, Terralong Street, Railway Parade, Bong Bong Street	5

Source: Transport Info NSW

The bus network and bus stops within the study area is shown in Figure 2.3. There are no bus stops along Terralong Street between Collins Street and Manning Street.



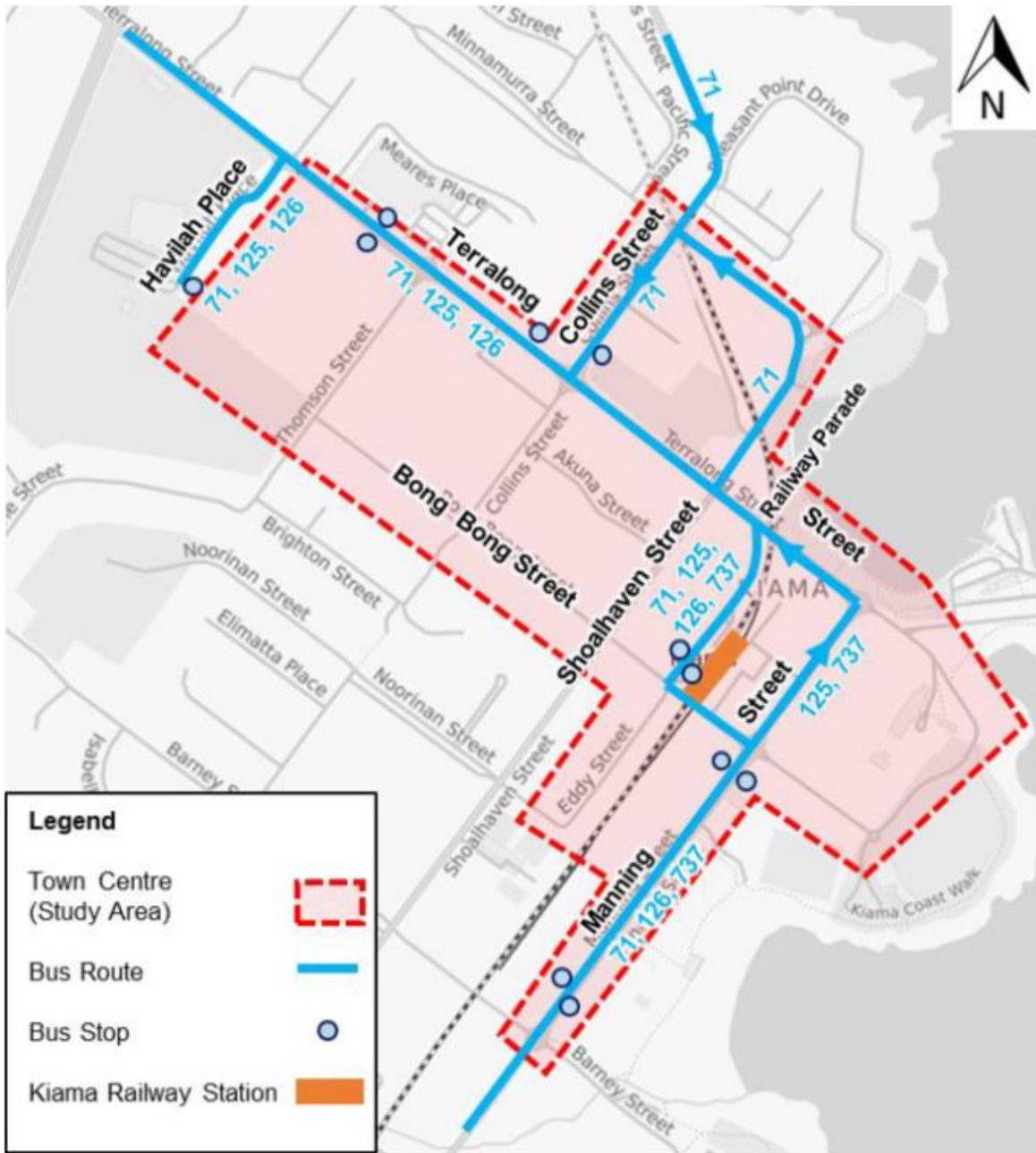


Figure 2.3: Bus Network



3. SITE OBSERVATIONS AND DATA COLLECTION

3.1 General Observations

A daytime site visit was undertaken on Thursday 16 July 2020 on the same day as the traffic and parking surveys.



The following general observations of the study area were made during the site visit:

- The most traffic activity was observed to be around midday. There were significantly higher traffic volumes during this time, with the main destinations appearing to be towards Blowhole Point Road as well as to the food and retail outlets on the southern side of Terralong Street
- Queues were observed along Terralong Street when vehicles interrupted the flow to undertake parking manoeuvres. These queues extended from Collins Street to Railway Parade at peak times (from 10:30AM onwards)
- By 11:00 AM, angled parking spaces along Terralong Street were fully occupied and vehicles were observed to be stopped in the middle of the road for some time waiting for a space to be vacated, causing additional queuing and delays
- High parking turnover was observed throughout the day along Terralong Street and Manning Street
- Most vehicles along Terralong Street were observed to give way to pedestrians crossing at the raised platforms even though there are no formal pedestrian crossing markings.






3.2 Location-Specific Observations

General observations of each of the 11 key intersections shown in Figure 1.2 are summarised in Table 3.1.

Table 3.1: Site Visit Observations - Key Intersections

Number	Intersection / Road	Observations	Site Photo
001	Collins Street / Terralong Street roundabout	<ul style="list-style-type: none"> ▪ There is a steep downhill approach from the south towards the roundabout ▪ Vehicles were observed to accelerate up the steep gradient at the southbound exit. 	
002	Collins Street / Akuna Street T-intersection	<ul style="list-style-type: none"> ▪ There is a steep downhill approach from the south on Collins Street ▪ There are no formal pedestrian crossing points across Collins Street ▪ Traffic calming devices along Collins Street are limited to kerb blisters, a refuge island and a slow point south of Akuna Street ▪ There is a "Gross Load Limit 5t" restriction with signage along Collins Street between Akuna Street and Bong Bong Street. 	



Number	Intersection / Road	Observations	Site Photo
003	Collins Street / Bong Bong Street 4-way intersection	<ul style="list-style-type: none"> ▪ There is a steep downhill approach from the south on Collins Street ▪ No kerb ramps are provided on the northern leg of the intersection ▪ There is poor pedestrian accessibility on the eastern leg with stairs only and no ramp ▪ East-west traffic volumes are prominent. 	
004	Railway Parade / Terralong Street T intersection	<ul style="list-style-type: none"> ▪ There are no pedestrian crossing facilities at the intersection which is an issue considering its proximity to Kiama Station ▪ At 10:30 AM, queues from Collins Street intersection extended back through this intersection. 	
005	Shoalhaven Street / Bong Bong Street 4-way intersection	<ul style="list-style-type: none"> ▪ There are limited pedestrian facilities at the intersection ▪ Kerb blisters and linemarking have recently been implemented for traffic calming purposes. 	
006	Terralong Street / Blowhole Point Road T intersection	<ul style="list-style-type: none"> ▪ No pedestrian facilities are provided at the intersection ▪ The primary traffic movements are between the west and the north ▪ Vehicles on the northern approaches (Blowhole Point Road) were observed to approach the give-way line cautiously and stop, regardless of any conflicting movements. 	
007	Bong Bong Street / Railway Parade 4-way intersection	<ul style="list-style-type: none"> ▪ No pedestrian connectivity is provided along the southern leg of the intersection ▪ Speed humps were installed in 2020 on both Bong Bong Street approaches to the intersection ▪ A zebra crossing is provided north of the Station entrance on Railway Parade ▪ There is a strong pedestrian desire line between the commuter parking on Eddy Street and Kiama Railway Station, but no formal pedestrian crossing is provided across Bong Bong Street. 	



Number	Intersection / Road	Observations	Site Photo
008	Terralong Street / Shoalhaven Street 4-way intersection	<ul style="list-style-type: none"> ▪ No general traffic issues were observed at this low speed location ▪ A zebra crossing is on Terralong Street about 20m west of the centre of the intersection. 	
009	Terralong Street / Manning Street 3 - Leg roundabout	<ul style="list-style-type: none"> ▪ No general traffic issues were observed at this low speed location ▪ Pedestrian refuges are provided across all 3 legs approximately 6m back from the give way line. 	
010	Manning Street / Bong Bong Street 4 - Leg roundabout	<ul style="list-style-type: none"> ▪ No general traffic issues were observed at this single lane roundabout ▪ Pedestrian refuges are provided across all 4 legs, about 6m from the give-way line. 	
021	Shoalhaven Street / Akuna Street T intersection	<ul style="list-style-type: none"> ▪ Low turn movements were observed at this intersection ▪ Akuna Street primarily services the town centre off street car parks. 	



4. TRAFFIC COUNTS

Intersection counts were undertaken at the key intersections shown in Figure 1.2.

The traffic surveys were undertaken during the July 2020 NSW school holiday period to capture the peak holiday traffic period experienced in Kiama. The surveys dates and time periods are shown in Table 4.1.

Table 4.1: Intersection Count Survey Periods

Date	Day	Survey Time	Peak Period
16 July 2020	Thursday (AM)	6:00 AM - 9:00 AM	8:00 AM - 9:00 AM
16 July 2020	Thursday (PM)	4:00 PM - 7:00 PM	4:15 PM - 5:15 PM
18 July 2020	Saturday (Weekend)	10:00 AM - 1:00 PM	11:45 AM - 12:45 PM

The highest traffic volumes were along Terralong Street and along Manning Street, as well as Blowhole Point Road.

Traffic volumes peaked on Saturday around midday, which is expected due to the characteristics of the town centre.

Traffic volume diagrams for these peak periods are available in **Appendix A**.

4.1 Typical Traffic Volumes

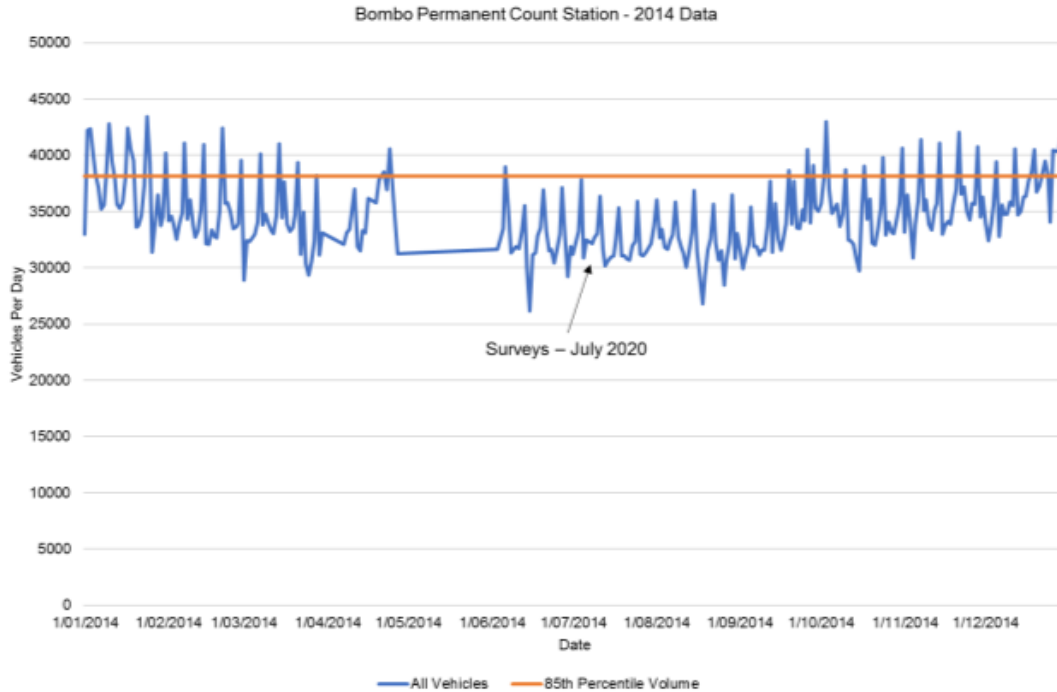
Kiama draws high tourist visitation which varies throughout the year. Given the surveys were undertaken during the winter holiday period, an assessment was undertaken to review the survey data and derive an 85th percentile traffic volume data set for analysis.

The goal of this analysis was to identify the time of year and day of week for the 85th percentile traffic volumes and assess how the data recorded for this project relates to this. Once determined, a scaling factor can be applied to our surveyed volumes and the SIDRA models re-processed.

An analysis of a Transport for NSW permanent count station was undertaken to observe month-by-month trends in traffic volumes in the area. A Transport for NSW permanent count station was previously located just north of Kiama near Bombo Station on the Princes Highway.



The last full year of data this station recorded was in 2014, and while the volumes are not indicative of current traffic flows, the yearly distribution of traffic is still considered relevant for the purpose of a seasonality review. The yearly distribution of traffic volumes is shown in Figure 4.1.



Source: Adapted from Transport for NSW Traffic Volume Viewer

Figure 4.1: Bombo Count Station Yearly Distribution

The traffic data indicated that of the 85th+ percentile days, 63% of these occurred on a Friday. This indicates that a Friday is generally the busiest day for the region.

The traffic volumes used in this study were undertaken in July, which is one of the lower points of the yearly traffic distribution. To bring the traffic volumes in line with 85th percentile (typical) volumes, a scale factor of 1.23 was applied. The modelling results are summarised in Table 4.2 – Table 4.4.



Table 4.2: Existing Condition Intersection Capacity Scaled Results: Thursday AM Peak

Intersection	2021				2031			
	DoS	Delay (s)	LoS	Queue (veh)	DoS	Delay (s)	LoS	Queue (veh)
1. Terralong Street / Collins Street	0.490 (0.07)	4.5 (5.2)	A (A)	3.7 (0.3)	0.575 (0.084)	5.0 (5.7)	A (A)	4.9 (0.4)
2. Collins Street / Akuna Street	0.105 (0.015)	1.2 (5.8)	A (A)	0.1 (0.1)	0.119 (0.018)	1.3 (5.9)	A (A)	0.1 (0.1)
3. Collins Street / Bong Bong Street	0.127 (0.019)	6.2 (8.3)	A (A)	0.5 (0.1)	0.147 (0.023)	6.3 (8.4)	A (A)	0.6 (0.1)
4. Terralong Street / Railway Parade	0.243 (0.025)	0.9 (5.3)	A (A)	0.6 (0.1)	0.281 (0.031)	1.0 (5.7)	A (A)	0.8 (0.1)
5. Shoalhaven Street / Bong Bong Street	0.119 (0.100)	5.1 (9.0)	A (A)	0.5 (0.5)	0.140 (0.119)	5.2 (9.2)	A (A)	0.6 (0.6)
6. Terralong Street / Blowhole Point Road	0.125 (0.125)	2.7 (3.5)	A (A)	0.4 (0.4)	0.145 (0.145)	2.7 (3.6)	A (A)	0.5 (0.5)
7. Bong Bong Street / Railway Parade / Eddy Street	0.081 (0.019)	2.8 (8.6)	A (A)	0.3 (0.1)	0.092 (0.023)	2.9 (8.8)	A (A)	0.4 (0.1)
8. Terralong Street / Shoalhaven Street	0.230 (0.092)	3.0 (9.2)	A (A)	0.7 (0.3)	0.265 (0.113)	3.2 (9.5)	A (A)	0.9 (0.3)
9. Terralong Street / Manning Street	0.316 (0.316)	4.5 (5.2)	A (A)	2.1 (2.1)	0.366 (0.366)	4.7 (5.3)	A (A)	2.5 (2.5)
10. Manning Street / Bong Bong Street	0.297 (0.157)	4.6 (7.3)	A (A)	1.8 (0.7)	0.343 (0.186)	4.8 (7.5)	A (A)	2.2 (0.9)
21. Shoalhaven Street / Akuna Street	0.055 (0.020)	1.3 (5.3)	A (A)	0.1 (0.1)	0.063 (0.023)	1.3 (5.4)	A (A)	0.1 (0.1)

* Note: The first value in each cell is the average across the intersection. Values in brackets represent the movement for each intersection which has the highest delay



Table 4.3: Existing Condition Intersection Capacity Scaled Results: Thursday PM Peak

Intersection	2021				2031			
	DoS	Delay (s)	LoS	Queue (veh)	DoS	Delay (s)	LoS	Queue (veh)
1. Terralong Street / Collins Street	0.743 (0.743)	8.4 (11.1)	A (A)	10.0 (10.0)	0.898 (0.898)	14.6 (21.9)	B (B)	20.6 (20.6)
2. Collins Street / Akuna Street	0.163 (0.045)	0.8 (6.1)	A (A)	0.1 (0.1)	0.186 (0.054)	0.8 (6.4)	A (A)	0.2 (0.2)
3. Collins Street / Bong Bong Street	0.279 (0.087)	7.0 (9.7)	A (A)	1.2 (0.3)	0.330 (0.105)	7.1 (10.0)	A (A)	1.4 (0.4)
4. Terralong Street / Railway Parade	0.360 (0.060)	1.1 (6.1)	A (A)	1.1 (0.2)	0.418 (0.074)	1.4 (6.9)	A (A)	1.7 (0.2)
5. Shoalhaven Street / Bong Bong Street	0.207 (0.145)	4.7 (11.7)	A (A)	1.1 (0.6)	0.240 (0.187)	4.9 (12.8)	A (A)	1.3 (0.8)
6. Terralong Street / Blowhole Point Road	0.394 (0.394)	3.4 (4.6)	A (A)	1.9 (1.9)	0.465 (0.465)	3.7 (5.3)	A (A)	2.8 (2.8)
7. Bong Bong Street / Railway Parade / Eddy Street	0.139 (0.021)	2.4 (9.0)	A (A)	0.4 (0.1)	0.160 (0.025)	2.5 (9.3)	A (A)	0.5 (0.1)
8. Terralong Street / Shoalhaven Street	0.321 (0.146)	3.3 (10.6)	A (A)	1.0 (0.4)	0.373 (0.292)	3.8 (11.8)	A (A)	1.5 (1.5)
9. Terralong Street / Manning Street	0.489 (0.350)	5.1 (5.3)	A (A)	4.0 (2.3)	0.590 (0.590)	6.0 (7.1)	A (A)	5.6 (5.6)
10. Manning Street / Bong Bong Street	0.490 (0.211)	4.8 (8.3)	A (A)	3.4 (1.0)	0.573 (0.113)	5.1 (8.7)	A (A)	4.4 (0.6)
21. Shoalhaven Street / Akuna Street	0.050 (0.019)	1.2 (4.9)	A (A)	0.1 (0.1)	0.056 (0.022)	1.2 (4.9)	A (A)	0.1 (0.1)

* Note: The first value in each cell is the average across the intersection. Values in brackets represent the movement for each intersection which has the highest delay



Table 4.4: Existing Condition Intersection Capacity Scaled Results: Saturday Midday Peak

Intersection	2021				2031			
	DoS	Delay (s)	LoS	Queue (veh)	DoS	Delay (s)	LoS	Queue (veh)
1. Terralong Street / Collins Street	0.832 (0.832)	9.9 (14.0)	A (A)	15.0 (15.0)	1.009 (1.009)	27.4 (52.9)	B (D)	46.9 (46.9)
2. Collins Street / Akuna Street	0.176 (0.064)	1.2 (6.2)	A (A)	0.2 (0.2)	0.200 (0.077)	1.3 (6.6)	A (A)	0.3 (0.3)
3. Collins Street / Bong Bong Street	0.298 (0.146)	7.2 (9.5)	A (A)	1.3 (0.6)	0.353 (0.176)	7.5 (9.8)	A (A)	1.7 (0.7)
4. Terralong Street / Railway Parade	0.468 (0.050)	1.4 (5.7)	A (A)	2.1 (0.2)	0.544 (0.061)	1.9 (6.5)	A (A)	3.1 (0.2)
5. Shoalhaven Street / Bong Bong Street	0.224 (0.224)	5.3 (11.6)	A (A)	1.0 (1.0)	0.286 (0.286)	5.7 (13.1)	A (A)	1.4 (1.4)
6. Terralong Street / Blowhole Point Road	0.393 (0.393)	3.5 (5.4)	A (A)	2.0 (2.0)	0.473 (0.473)	3.9 (6.4)	A (A)	2.8 (2.8)
7. Bong Bong Street / Railway Parade / Eddy Street	0.183 (0.029)	3.1 (9.9)	A (A)	0.8 (0.1)	0.226 (0.226)	3.3 (10.4)	A (A)	0.9 (0.9)
8. Terralong Street / Shoalhaven Street	0.423 (0.423)	4.5 (13.2)	A (A)	2.6 (2.6)	0.551 (0.551)	5.6 (16.4)	A (B)	3.9 (3.9)
9. Terralong Street / Manning Street	0.624 (0.427)	5.1 (5.5)	A (A)	6.2 (3.0)	0.728 (0.541)	6.0 (6.2)	A (A)	9.0 (4.7)
10. Manning Street / Bong Bong Street	0.480 (0.348)	5.3 (8.1)	A (A)	3.3 (1.9)	0.568 (0.087)	5.9 (8.7)	A (A)	4.6 (0.5)
21. Shoalhaven Street / Akuna Street	0.088 (0.058)	2.0 (5.1)	A (A)	0.2 (0.2)	0.101 (0.067)	2.1 (5.1)	A (A)	0.2 (0.2)

* Note: The first value in each cell is the average across the intersection. Values in brackets represent the movement for each intersection which has the highest delay

Item 6.1

Attachment 1



5. COMMUNITY FEEDBACK ON THE TCS

Community feedback was previously sought by Council in relation to the TCS. A total of 13 issues and 14 suggestions relating to access and movement around the town centre were received and listed in the TCS report. These issues and suggestions have been categorised and summarised in Table 5.1 and mapped in Figure 5.1. Responses to each issue and suggestion have been provided based on the findings in Part A of the study.

Table 5.1: Community Feedback relevant to Traffic and Parking

Issue Raised	Suggestion Given	Relevance to TCS Proposals 1 to 4	Response
Kiama Town Centre - Traffic			
Traffic flow in Kiama Town Centre during summer is bad	<ul style="list-style-type: none"> Improve traffic flow on Terralong Street Consider making Terralong Street a one-way street 	Proposals 1 to 3	<p>Terralong Street has been identified as one of the key streets in the Kiama Town Centre road network and traffic modelling has been undertaken to assess existing operations and potential future upgrades.</p> <p>Converting Terralong Street to one-way would logically increase flows on Bong Bong Street and Thompson Street impacting several sensitive land uses, including the school as well as a number of 4-way give-way intersections, which is undesirable.</p>
The rumble strips to encourage cars to slow down are in fact a hazard for cyclists, noisy and confuse visitors	-	-	The rumble strips on Terralong Street have been assessed in this study and have been recommended for removal.
Service vehicle access	No service trucks on the main street - use back laneways for services	-	It is understood that some of the shops along Terralong Street do not have rear vehicle access and their loading operations are efficiently undertaken on Terralong Street in designated loading zones usually outside of peak parking hours.
<p>Key traffic jams in Kiama:</p> <ul style="list-style-type: none"> Mon-Fri around Kiama Public School Terralong Street near Leisure Centre Sat-Sun (people leaving Kiama) Terralong Street in summer Gipps Street traffic build up on Markets days 	-	-	<p>Traffic surveys and intersection analysis have been undertaken in this study to examine typical traffic conditions and impacts associated with the transport proposals outlined in the TCS. Recommendations have been provided.</p> <p>An on-site visit was undertaken at school pick-up time. It was observed that congestion around the school at this time was due to illegal and poor driver behaviour, bus timetabling and student finishing times not being staggered.</p>



Issue Raised	Suggestion Given	Relevance to TCS Proposals 1 to 4	Response
Kiama Town Centre - Parking			
<p>Parking issues particularly along Terralong Street, at the library, Woolworths, Post Office, and during events/markets</p>	<p>- Develop a parking strategy with parking (surface & structure) around the edges and shuttle buses to connect to the town centre & key destinations</p>	<p>-</p>	<p>Parking along Terralong Street in the town centre is a key focus of this study. These matters have been considered in the preparation of this report.</p> <p>The shuttle bus idea has been contemplated in several smaller 'summer peak' centres before. To be justifiable, parking overflow needs to be so extensive, that people would need to park at least 20-30 minutes' walk away, to compete with the time to wait for and ride the bus to their town centre destination.</p>
<p>Parking in front of Hindmarsh Park obscures the park</p>	<p>-</p>	<p>-</p>	<p>Noted, however, this parking area experiences some of the highest demand in Kiama and provides the most direct access to shops, restaurants, and cafes in Kiama's commercial core.</p>
<p>Patrons of the Kiama Markets park outside surrounding shops and medical services causing inconvenience to customers and patients</p>	<p>-</p>	<p>-</p>	<p>Publicly available parking spaces are free to use for patrons of the markets or any other business or activity in Kiama.</p>
Kiama Town Centre – Pedestrian and Cycling Accessibility			
<p>Lack of cycle facilities in town centre - Cycleway into town stops at Collins Street; disconnected from harbour</p>	<p>Create a better bicycle plan - marked routes, cycle parking and amenities in town centre and safe routes to schools and key destinations</p>	<p>-</p>	<p>Cycling infrastructure has been considered in Part B of the study.</p>
<p>Dangerous pedestrian environment on streets around Kiama Public School</p>	<p>Provide additional pedestrian crossings near Kiama Public School</p>	<p>Proposal 4-002: Pedestrian crossing near Akuna Street</p>	<p>A new wombat crossing with supporting traffic calming measures has been recommended at the intersection of Collins Street and Akuna Street. A pedestrian crossing treatment at the intersection of Collins Street and Bong Bong Street has also been assessed.</p>
<p>Make shopfronts accessible for all</p>	<p>Make Terralong St and Manning Street more pedestrian friendly</p>	<p>Proposal 1: Permanent Pedestrian Friendly Zone along Terralong Street</p>	<p>Terralong Street and Manning Street have been assessed as part of this study and recommendations have been made to improve pedestrian amenity.</p>



Issue Raised	Suggestion Given	Relevance to TCS Proposals 1 to 4	Response
Wayfinding signage	Area around the train station needs improvement: better access to town centre and beach; improved signage to orient visitors and more parking	Proposal 4: Intersection configurations	Parking, traffic, and pedestrian activity around the railway station has been addressed in this report. The need for wayfinding signage is addressed in Part B of the study.
Pedestrian accessibility	Create and identify laneways that can form key connections in town centre developing them as eat streets and public spaces		The potential for active laneways and improved pedestrian permeability throughout the town centre is agreed in principle. The ability to create new connections is mostly dependent on redevelopment occurring to provide these connections. The need for these connections could certainly be reinforced in the LEP.
General Kiama Traffic			
Gateways into town need to be defined - no sense of arrival	Establish gateways at entry points into the town to create a sense of arrival		This is an urban design issue for Council consideration and outside of the scope of this study.
Make Kiama Recreational Vehicles (RV) friendly - many tourists with campers come into Kiama	Provide RV parking along the fringes with accessible paths into the centre		RV parking areas have been investigated with a number of recommendations specific to RVs made in this report.
General Kiama Traffic – Other Issues of Suggestions			
Pedestrian Accessibility	Upgrade Showground Precinct to link to Terralong Street		This issue is considered in Part B of the study.



Figure 5.1: Map of Issues and Suggestions within Town Centre



6. PROPOSAL 1: PEDESTRIAN FRIENDLY ZONE

6.1 Description

This intention of this proposal is to improve pedestrian accessibility and safety along Terralong Street, between Collins Street and Shoalhaven Street. The TCS proposal was to designate this section as a 'permanent' pedestrian friendly zone. Examples of measures to achieve this were suggested in the TCS and include:

- Wider footpaths
- Ensuring footpaths are level, clear of obstruction, and are easily traversable by people with reduced mobility
- Providing pedestrians with safe crossing points
- Reducing vehicular speeds
- Paving pedestrian walking areas
- Implementation of a central, landscaped median to guide pedestrians to fewer, safer crossing locations.

The TCS states that the two existing rumble strips along Terralong Street implemented as "flat top" road humps with contrasting pavements/colour (example shown in Figure 6.1) are easily confused for formal pedestrian crossings. Also, their uneven ramp edge treatments are a challenge for cyclists, the elderly, people with prams and wheelchairs and people with reduced mobility. Pedestrians are expected to give way to vehicles at these locations, but vehicle priority was observed to be disregarded by some drivers and some pedestrians, leading to confusion and unpredictability. For example, a vehicle travelling in one direction gives way to a crossing pedestrian but a vehicle travelling in the opposite direction at the same time does not.



Figure 6.1: Rumble Strips along Terralong Street

The TCS improvements proposed involves the removal of the rumble strips and the implementation of formal raised crossings. The proposal also suggests the removal of some on-street parking with the idea that this parking loss can be absorbed in off-street carparks.

6.2 Existing Conditions

6.2.1 Crossing Points

While pedestrians do cross along the entire length of Terralong Street, there are four popular crossing points as follows:

- On the eastern leg of the Collins Street roundabout with a pedestrian refuge
- One rumble strip with localised kerb extensions outside 104 Terralong Street
- One rumble strip with localised kerb extensions outside 84 Terralong Street
- One zebra crossing with rumble strips adjacent to Shoalhaven Street. This is the only crossing point where pedestrian right-of-way has been formalised.

These locations are shown in Figure 6.2.

Additionally, there is one rumble strip south-east of the Terralong Street / Shoalhaven Street intersection that falls outside the scope of this TCS proposal. Given its proximity, it was considered as part of the evaluation of this proposal.



Source: Google Maps

Figure 6.2: Crossing Points along Terralong Street

6.2.2 Site Observations

The following relevant observations were made for this area during the site visit:

- Queues on Terralong Street are intermittent and generated mostly by parking manoeuvres with traffic otherwise typically being free flowing



- Some vehicles give way to pedestrians at the rumble strips despite vehicles having priority. The uncertainty surrounding priority poses a risk to pedestrians. It was also noted that the delays caused by vehicles giving way to pedestrians created gaps for parked vehicles to reverse out of their spaces
- There are a significant number of reversing movements due to parked cars exiting parking spaces. These vehicles often have poor sight lines to oncoming vehicles
- Vehicle speeds along this section of Terralong Street are relatively low, potentially due to the drivers searching for parking spaces, the narrow roadway, the usually constrained driving environment, and the existing 40km/h HPAA area designation.

6.3 Proposal 1 Assessment

6.3.1 Types of Pedestrian Friendly Main Street Treatment Options

There are a wide range of mechanisms available to make a street more pedestrian friendly ranging from closures to traffic to improved crossing facilities. The three options considered in this report are:

- Full closure to traffic
- 10 km/h shared zone
- Multiple wombat crossings.

An example of each arrangement is shown below.

6.3.2 Full Closure to Traffic

An example of full closure to traffic is shown in Figure 6.3.



Figure 6.3: Full Closure to Traffic (The Corso, Manly)

The closure of Terralong Street to all traffic (with the possible exception of after-hours deliveries) between Collins Street and Shoalhaven Street will introduce a number of traffic-related challenges, such as:

- Diversion of through traffic to Collins Street, Bong Bong Street, and Manning Street past residential properties and sensitive local uses and through a number of give-way controlled intersections

- No access to the parking along Terralong Street, requiring this parking to be provided elsewhere
- Reliance on foot traffic to access the shops along Terralong Street with a potential impact on these shops
- A reduction in passive surveillance for pedestrians, particularly at night
- Service delivery complexities for several shops with no rear access.

Full closure will certainly maximise pedestrian safety however much of the pedestrian activity in the street is due to the on-street parking and removing it may lead to significantly reduced demands to local shops.

Accordingly, the full closure to traffic option has been discarded based on its impacts significantly outweighing its potential benefits.

6.3.3 Shared Zone

Transport for NSW (TfNSW) Shared Zone Policy (SS/12/01) provides a set of criteria for implementing shared zones. The proposal area was assessed against the criteria, shown in Table 6.1.

Table 6.1: Shared Zone Criteria Assessment – Proposal 1

Features	Shared Zone Criteria	Terralong Street between Collins and Shoalhaven Streets	Meets Criteria?
Current traffic flows	≤ 100 vehicles per hour and ≤ 1000 vehicles per day	Up to 500 vehicles per hour, up to 1500 vehicles during a three-hour period on a Saturday	No
Current speed limit	≤50 km/h	40 km/h	Yes
Length of proposed Shared Zone	≤400 metres	Around 230 metres	Yes
Current speed limit of adjoining roads	≤50km/h	There are no adjoining roads in this section. There are only driveway accesses whose speed limit is < 50 km/h	Yes
Current Carriageway width	Minimum traffic width of 2.8 metres	Kerb-to-kerb width 20 metres, current traffic width around 8 metres	Yes
Route Access	Must not be located along bus routes or heavy vehicle routes except delivery or garbage trucks	Terralong Street has three bus routes and the main heavy vehicle route through the town centre	No
Streets with narrow or no footpaths	Where pedestrians are forced to use the road	Footpaths are provided on both sides of Terralong Street. The southern footpath is occupied with restaurants and café tables and seating during the daytime.	No
Kerbs	Kerbs must be removed unless approved by RMS / Transport for NSW	Removal of kerbs is possible	Yes



The shared zone criterion assessment demonstrated that the traffic volumes along this section of Terralong Street are too high to convert into a shared zone. Also, as the main street in Kiama, buses and heavy vehicles travel along Terralong Street. The existing wide footpaths on both sides of Terralong Street also mean that pedestrians are not as likely to walk (or need to walk) along a shared zone roadway.

A shared zone is not suitable in this location as the traffic volumes are too high.

6.3.4 Pedestrian Crossings Warrant Assessment

The proposal area was assessed against TfNSW's warrants for pedestrian crossings listed in its Roads and Maritime - *Supplement to Austroads Guide to Traffic Management Part 10: Traffic Control and Communication Devices*. The warrants state that in each of three separate one-hour periods in a typical day:

- Pedestrian flow (P) per hour is ≥ 30
- Vehicular flow (V) is ≥ 500
- The product of Pedestrian and Vehicle flow (PV) is $\geq 60,000$.

The vehicular volumes in both directions on the eastern leg of the Terralong Street and Collins Street roundabout were combined and used as the vehicular flow for the warrant assessment. The average of the pedestrian volumes at the crossing just east of Collins Street point and the crossing just west of Shoalhaven Street were used for the assessment. This is based on the rationale that if a crossing is installed at a mid-block location, some of the pedestrian traffic from both crossing points will be diverted to the new crossing.

The assessment against the TfNSW pedestrian crossing warrants is shown in Table 6.2.

Table 6.2: Pedestrian Crossing Warrants Assessment

Criteria		Flow (or Product of Flows)	Meets Criteria?
Weekend 1000-1100			
Pedestrian flow (P) per hour	≥ 30	Collins: 50, Shoalhaven: 168, Average: 109	Yes
Vehicular flow (V) per hour	≥ 500	EB: 548, WB: 469, Total: 1017	Yes
The product of PV	$\geq 60,000$	110,853	Yes
All three criteria met			Yes
Weekend 1100-1200			
Pedestrian flow (P) per hour	≥ 30	Collins: 126, Shoalhaven: 230, Average: 178	Yes
Vehicular flow (V) per hour	≥ 500	EB: 633, WB: 481, Total: 1114	Yes
The product of PV	$\geq 60,000$	198,292	Yes
All three criteria met			Yes
Weekend 1200-1300			
Pedestrian flow (P) per hour	≥ 30	Collins: 159, Shoalhaven: 220, Average: 190	Yes
Vehicular flow (V) per hour	≥ 500	EB: 619, WB: 487, Total: 1106	Yes
The product of PV	$\geq 60,000$	177,610	Yes
All three criteria met			Yes
Warrants met			Yes



6.3.5 No Stopping Restriction Requirements

Under the Roads and Maritime Supplement to AS1742.10-2009: Manual of Uniform Traffic Control Devices - Part 10: Pedestrian control and protection – Version 3, 20m of “No Stopping” restrictions must be provided on the approaches to a crossing for safe sight distance. Additionally, if angle parking is on the approach, as is the case along Terralong Street, the No Stopping restriction should be increased by a further 20m to maintain safe sight distance. This distance may be reduced using kerb extensions. If the kerb extension is greater than 2.5m, the no stopping distance may be reduced to 7.5m on the approach. The minimum distance for the no stopping on the departure is 10m.

These requirements would result in the loss of approximately 14 parking spaces if a space were to be implemented on Terralong Street, using existing kerb extensions.

6.3.6 Crossing Types

There are two possible pedestrian crossings types; an at-grade zebra crossing or a raised wombat crossing. The wombat crossing provides a vertical deflection to the roadway, forcing vehicles to slow down, raising driver awareness of the potential presence of a pedestrian.

As each traffic lane is approximately 4m wide, the 3.5m minimum lane width stipulated in the NSW Government State Transit Bus Infrastructure Guide should buses need to use this section of Terralong Street, is met.

6.3.7 Crossing Locations and Existing Crossing Facilities

The primary desire line is between the northern and southern sides of Terralong Street, to allow people to travel between the park and shops. Locating the crossing mid-block is considered sufficient to satisfy the pedestrian desire lines and hence increase pedestrian usage and compliance. The location of the existing rumble strip has kerb buildouts and would only require minor expansion of the kerb buildouts to be suitable for a wombat crossing, with the rumble strips removed. This would result in only a minor loss in parking.

A wombat crossing with rumble strips already exists just west of the intersection of Terralong Street with Shoalhaven Street. The facility could be retained but the rumble strips replaced to overcome the pedestrian and cyclist safety issues identified with this treatment.

Also, as part of Proposal 4, pedestrian crossings are also proposed across all legs of the Terralong Street and Collins Street roundabout. The assessment of this proposal is provided in Section 9.3. In particular, the proposed zebra crossing on the eastern leg of the intersection would provide easier pedestrian connections between Hindmarsh Park and the shops along Terralong Street.



6.4 Recommended Works

It is recommended that TCS Proposal 1 for making Terralong Street between Collins Street and Shoalhaven Street 'pedestrian friendly' be implemented by:

- Removing the rumble strip-raised platform crossing east of Shoalhaven Street for consistency in ensuring right of way is clearly defined
- Re-configuring the rumble strip zebra crossing west of Shoalhaven Street and replace the rumble strip ramps with conventional asphalt ramps
- Replacing the rumble strip-raised platform crossing at 84 Terralong street with a wombat crossing
- Removing the rumble strip raised platform crossing at 104 Terralong street, retaining the kerb buildout.

Figure 6.4 shows these recommendations and Figure 6.5 shows a typical wombat crossing example.



Source: Google Maps

Figure 6.4: TCS Proposal 1 Recommendation





Figure 6.5: Example of Typical Wombat Crossing (Darling Street, Balmain)



7. PROPOSAL 2: PARTIAL CLOSURE OF TERRALONG STREET DURING SUMMER

7.1 Description

Under this TCS proposal, Terralong Street between Railway Parade and Manning Street is proposed to be closed during the summer season and converted into a pedestrian plaza. The exact duration of the closure was not defined in the TCS but would be expected to involve shorter duration closures over weekends/school holidays or involve a long-term closure such as across multiple months.

As Terralong Street is one of the most heavily trafficked roads in Kiama, the primary impact would be the redirection of traffic onto alternative routes introducing capacity, safety, and amenity considerations on those routes.

The following site observations are relevant to the assessment of Proposal 2:

- Continuous traffic flow along Terralong Street makes it difficult to cross the road via the two existing crossing points along the proposal area
- One of the crossing points is located outside the police station, and the other is located at the Manning Street roundabout. There are no crossing points near the railway bridge.

7.2 Issues for Consideration

Key reasons for consideration when assessing this proposal include:

- The highest traffic flow in the town centre is the east-west movement along Terralong Street at its intersection with Railway Parade. The most direct detour route for these vehicles would be via Railway Parade, Bong Bong Street and Manning Street
- Vehicles heading to and from Blowhole Point Road will have to detour an additional 600m
- The intersections of Bong Bong Street / Railway Parade, Terralong Street / Manning Street, and Manning Street / Bong Bong Street will be affected by diverted traffic. The Bong Bong Street / Railway Parade intersection is proposed to be upgraded to a signalised intersection as part of Proposal 4 (see *Proposal 4-007 in Section 9.9*)
- The proposal will result in the temporary removal of 26 on-street parking spaces between Railway Parade and Manning Street during the summer months as part of the *Summer Streets* program. This will also affect the accessible parking and police station parking along this road section.

Figure 7.1 shows the likely volume of traffic diverted onto the diversion route with the closure in the AM closure shown as an example.





Aerial image sourced from Nearmap

Figure 7.1: Traffic Diversion under Proposal 2 (2021)

7.3 Intersection Impacts

With the closure of Terralong Street between Railway Parade and Manning Street, traffic volumes were primarily redistributed around the closure via Bong Bong Street / Railway Parade, and Bong Bong Street / Manning Street. Other streets assigned with redistributed volumes also included Shoalhaven Street and Collins Street.

A comparison of the 2021 and 2031 intersection capacity modelling results are summarised in Table 7.1 – Table 7.3.



Table 7.1: Proposal 2 Intersection Capacity Scaled Results: Thursday AM Peak

Intersection	2021				2031			
	DoS	Delay (s)	LoS	Queue (veh)	DoS	Delay (s)	LoS	Queue (veh)
1. Terralong Street / Collins Street	0.490 (0.282)	4.7 (5.1)	A (A)	3.7 (1.6)	0.577 (0.577)	5.1 (5.6)	A (A)	4.9 (4.9)
2. Collins Street / Akuna Street	0.130 (0.017)	0.9 (6.3)	A (A)	0.1 (0.1)	0.148 (0.021)	0.9 (6.6)	A (A)	0.1 (0.1)
3. Collins Street / Bong Bong Street	0.206 (0.02)	6.5 (8.5)	A (A)	0.8 (0.1)	0.240 (0.024)	6.6 (8.7)	A (A)	1.0 (0.1)
4. Terralong Street / Railway Parade	0.182 (0.107)	3.5 (3.5)	A (A)	0.0 (0.0)	0.208 (0.122)	3.5 (3.5)	A (A)	0.0 (0.0)
5. Shoalhaven Street / Bong Bong Street	0.165 (0.165)	5.0 (9.7)	A (A)	0.8 (0.8)	0.202 (0.202)	5.2 (10.2)	A (A)	1.0 (1.0)
6. Terralong Street / Blowhole Point Road	0.125 (0.125)	2.7 (3.5)	A (A)	0.4 (0.4)	0.145 (0.145)	2.7 (3.6)	A (A)	0.5 (0.5)
7. Bong Bong Street / Railway Parade / Eddy Street	0.341 (0.049)	4.5 (15.2)	A (B)	1.8 (0.2)	0.412 (0.07)	4.9 (17.8)	A (B)	2.7 (0.2)
8. Terralong Street / Shoalhaven Street	0.161 (0.100)	3.7 (8.0)	A (A)	0.6 (0.3)	0.235 (0.154)	4.0 (8.4)	A (A)	1.0 (0.5)
9. Terralong Street / Manning Street	0.158 (0.158)	4.5 (5.8)	A (A)	0.6 (0.0)	0.180 (0.180)	4.5 (5.8)	A (A)	0.7 (0.0)
10. Manning Street / Bong Bong Street	0.444 (0.042)	6.2 (7.8)	A (A)	2.9 (0.2)	0.516 (0.051)	6.5 (8.3)	A (A)	3.6 (0.2)
21. Shoalhaven Street / Akuna Street	0.090 (0.022)	0.9 (5.7)	A (A)	0.1 (0.1)	0.102 (0.026)	0.9 (5.9)	A (A)	0.1 (0.1)

* Note: The first value in each cell is the average across the intersection. Values in brackets represent the movement for each intersection which has the highest delay



Table 7.2: Proposal 2 Intersection Capacity Scaled Results: Thursday PM Peak

Intersection	2021				2031			
	DoS	Delay (s)	LoS	Queue (veh)	DoS	Delay (s)	LoS	Queue (veh)
1. Terralong Street / Collins Street	0.744 (0.744)	8.4 (11.2)	A (A)	10.1 (10.1)	0.899 (0.899)	14.3 (22.2)	A (B)	20.7 (20.7)
2. Collins Street / Akuna Street	0.219 (0.057)	0.6 (7.4)	A (A)	0.2 (0.2)	0.250 (0.072)	0.7 (8.1)	A (A)	0.2 (0.2)
3. Collins Street / Bong Bong Street	0.460 (0.101)	7.8 (10.6)	A (A)	2.9 (0.4)	0.551 (0.551)	8.5 (11.7)	A (A)	4.1 (4.1)
4. Terralong Street / Railway Parade	0.228 (0.228)	3.5 (3.5)	A (A)	0.0 (0.0)	0.260 (0.260)	3.5 (3.5)	A (A)	0.0 (0.0)
5. Shoalhaven Street / Bong Bong Street	0.362 (0.362)	5.6 (14.7)	A (B)	2.1 (2.1)	0.500 (0.500)	6.8 (19.9)	A (B)	3.5 (3.5)
6. Terralong Street / Blowhole Point Road	0.394 (0.394)	3.4 (4.6)	A (A)	1.9 (1.9)	0.465 (0.465)	3.7 (5.3)	A (A)	2.8 (2.8)
7. Bong Bong Street / Railway Parade / Eddy Street	0.585 (0.071)	6.2 (19.7)	A (B)	5.1 (0.2)	0.777 (0.120)	8.9 (26.5)	A (B)	9.8 (0.3)
8. Terralong Street / Shoalhaven Street	0.273 (0.204)	4.2 (8.6)	A (A)	1.4 (0.7)	0.317 (0.246)	4.4 (8.9)	A (A)	1.7 (0.8)
9. Terralong Street / Manning Street	0.316 (0.231)	3.9 (5.7)	A (A)	1.9 (0.0)	0.363 (0.264)	3.9 (5.7)	A (A)	2.3 (0.0)
10. Manning Street / Bong Bong Street	0.650 (0.120)	8.1 (10.9)	A (A)	5.9 (0.7)	0.778 (0.778)	11.0 (16.5)	A (B)	10.2 (10.2)
21. Shoalhaven Street / Akuna Street	0.111 (0.022)	0.6 (5.4)	A (A)	0.1 (0.1)	0.126 (0.026)	0.6 (5.6)	A (A)	0.1 (0.1)

* Note: The first value in each cell is the average across the intersection. Values in brackets represent the movement for each intersection which has the highest delay



Table 7.3: Proposal 2 Intersection Capacity Scaled Results: Saturday Midday Peak

Intersection	2021				2031			
	DoS	Delay (s)	LoS	Queue (veh)	DoS	Delay (s)	LoS	Queue (veh)
1. Terralong Street / Collins Street	0.833 (0.833)	9.9 (14.1)	A (A)	15.1 (15.1)	1.164 (1.164)	73 (168.1)	F (F)	105.3 (105.3)
2. Collins Street / Akuna Street	0.242 (0.083)	1.0 (7.7)	A (A)	0.3 (0.3)	0.252 (0.097)	1.0 (8.1)	A (A)	0.3 (0.3)
3. Collins Street / Bong Bong Street	0.495 (0.495)	8.3 (11.2)	A (A)	3.3 (3.3)	0.577 (0.577)	8.9 (12.5)	A (A)	4.5 (4.5)
4. Terralong Street / Railway Parade	0.325 (0.325)	3.5 (3.5)	A (A)	0.0 (0.0)	0.330 (0.330)	3.5 (3.5)	A (A)	19.3 (19.3)
5. Shoalhaven Street / Bong Bong Street	0.536 (0.536)	7.3 (18.9)	A (B)	4.1 (4.1)	0.657 (0.657)	8.8 (24.7)	A (B)	5.9 (5.9)
6. Terralong Street / Blowhole Point Road	0.392 (0.392)	3.5 (5.4)	A (A)	2.0 (2.0)	0.450 (0.450)	3.7 (5.8)	A (A)	2.6 (2.6)
7. Bong Bong Street / Railway Parade / Eddy Street	1.017 (1.017)	25.2 (72.3)	B (F)	34.7 (34.7)	1.311 (1.311)	96.8 (306.9)	F (F)	80.8 (80.8)
8. Terralong Street / Shoalhaven Street	0.334 (0.208)	4.6 (9.1)	A (A)	1.8 (0.7)	0.651 (0.651)	5.6 (12.3)	A (A)	8.2 (3.2)
9. Terralong Street / Manning Street	0.367 (0.367)	4.5 (5.7)	A (A)	1.8 (0.0)	0.363 (0.363)	4.4 (5.7)	A (A)	2.2 (0.0)
10. Manning Street / Bong Bong Street	0.838 (0.650)	8.4 (11.6)	A (A)	12.7 (6.6)	0.831 (0.714)	9.7 (12.9)	A (A)	12.8 (8.2)
21. Shoalhaven Street / Akuna Street	0.162 (0.068)	1.3 (5.7)	A (A)	0.2 (0.2)	0.173 (0.075)	1.4 (5.9)	A (A)	0.3 (0.3)

* Note: The first value in each cell is the average across the intersection. Values in brackets represent the movement for each intersection which has the highest delay

The modelling shows that the largest impacts to average delays and queues occurred during the weekend peak. Intersections 4 and 9 operate with lower average delays and queues due to the reduction of conflicting movements from the approach with the closure. Intersections 1 and 7 experience significant impacts to LoS between 2021 and 2031 and fail in the latter year.

The modelling also indicated that two intersections fail with the 85th percentile traffic volumes during a Saturday midday peak. The priority intersection at Bong Bong Street / Railway Parade fails by the opening year 2021, and the roundabout at Terralong Street / Collins Street fails by the year 2031. All other intersections provide sufficient capacity for the proposed configuration. Network upgrades will be identified and tested in Part B of this study.

More specifically, the intersection impacts due to the proposed summer time closure and the redistributed traffic are summarised as follows:

- Terralong Street / Railway Parade
 - Intersection performs with lower average delays on all approaches in 2021
 - Operates with satisfactory levels of service in 2031 in the AM and PM models, but the Saturday models is LoS F. This is mostly due to the northern approach.
- Bong Bong Street / Railway Parade:
 - Increased average delays and queues on the north-eastern approach and minimal impacts to other approaches
 - Satisfactory in 2021 but fails by 2031. The priority intersection configuration cannot support the additional traffic flow.



- Terralong Street / Manning Street:
 - Intersection performs with lower average delays on all approaches
 - Operates with satisfactory levels of service.
- Manning Street / Bong Bong Street:
 - The north-western approach has longer queues but shows lower average delays and there are minimal impacts on the other approaches
 - Minimal impacts to the average delays on all approaches
 - Operates with satisfactory levels of service.

The modelling shows that the network does not have sufficient capacity to support the proposed summer period closures by 2031 should Proposal 2 be implemented.

For Proposal 2, it is recommended that a Traffic Management Plan be developed that closes the south-western and north-western routes to vehicles during the Summer Streets Program. Bong Bong Street, between Railway Street and Shoalhaven Street, and Eddy Street, between Bong Bong Street and Noorinan Street would only be accessible for residents and people using the commuter car park.

This would resolve the issues with the increased delays at Intersection 7.

7.4 Safety and Amenity Considerations

This section of Terralong Street currently has no areas where pedestrians have right of way when crossing the road, and so conflicts between pedestrians and vehicles are at an elevated risk. The closure of Terralong Street would result in no vehicles travelling through this area, aside from event vehicles and emergency vehicles. Event vehicles would be required to enter and exit the area outside of peak hours and should be managed under a site-specific traffic management plan. Emergency vehicle operators would need to be briefed on the closure of the road so that they are aware of the necessary detours or procedures should they need to address an emergency inside the closure area.

These measures would effectively eliminate the existing pedestrian/vehicle conflict.

7.5 Local Parking and Servicing Impacts

The proposal will result in the temporary removal of 26 standard parking spaces, 2 accessible spaces, and 3 police spaces. The impact of the parking loss is assessed in Section 10.

Police vehicles do not have alternative access points and are limited to using Terralong Street. The police should be consulted on the loss of the on-street parking and the proposed closure dates. They may have operational needs that require some on-street parking to be retained. These requirements would be captured within the TMP.

There are no loading zones or commercial/retail loading facilities located in this section of Terralong Street. Service vehicles that would usually take this route would instead follow the standard detour route via Bong Bong Street.

7.6 Recommendations

From a traffic perspective, it was found that this proposal would mostly have negligible overall impact on road network performance. The Terralong Street / Collins Street intersection experiences significant delays in the Saturday 2031 scenario. Introducing this as a trial may be appropriate. An additional scenario to model this as a signalised intersection has been included in Part B of this project. It is considered acceptable for implementation without requiring additional mitigation measures.

It is recommended that a traffic/pedestrian management plan to accommodate and brief emergency vehicle and event vehicle operators be prepared prior to the temporary closure of the road.



8. PROPOSAL 3: NARROWING AND REALIGNMENT OF TERRALONG STREET

8.1 Description

Under this proposal, the intersection of Terralong Street and Railway Parade will be realigned, and its priority movements changed. The through movements between Terralong Street (west) and Railway Parade (south) would have priority over other movements. The Terralong Street carriageway between Railway Parade and Manning Street is proposed to be shifted to its southern side (i.e. south of the central railway bridge piers) with on-street parking on the northern side removed. The changes allow for a wider pedestrian area along the foreshore.

The TCS states that the aim of the proposal is to “highlight the pedestrian environment, reduce traffic volumes along Terralong Street in the east, and enable the potential reduction of visual clutter”. These items would need to be approved by Railcorp and would likely require reinstatement of the yellow steel protection frames, signage and the warning lights on the bridge in accordance with the new road alignment. Vehicles which are taller than the 3.4m bridge clearance will continue to detour via Railway Parade.

An artist's impression of the proposal is shown in Figure 8.1.



5Source: Kiama Town Centre Study

Figure 8.1: Artist's Impression of Proposal 3 - Narrowing Terralong Street

8.2 Site Observations and Issues for Consideration

Key site observations at the Terralong Street and Railway Parade intersection include:

- There are poor sightlines for eastbound traffic along Terralong Street to oncoming westbound traffic when approaching a right turn in to Railway Parade due to the obstructing bridge pillars. The proposal would remove this issue as the right turn movement would be the priority movement after intersection reconfiguration
- The wide shoulder on the southern side of Terralong Street provides enough space to maintain two-way traffic flows on the southern side of Terralong Street

- The primary traffic movement is the east-west direction along Terralong Street and there are significantly lower movements between Terralong Street and Railway Parade. The proposal provides an arrangement that is contrary to the prevailing dominant traffic flows
- Due to the railway bridge structural supporting pillars, there is no room to realign the Terralong Road eastern approach to the intersection and there are some potential safety issues. These issues could be mitigated by:
 - Speed humps to reduce vehicle approach speeds
 - A change in road texture or a pavement treatment to highlight the change in road conditions
 - Landscaping to provide guidance on vehicle direction, as shown in Figure 8.1.
- Traffic calming devices on Terralong Street east of Railway Parade such as entry thresholds and slow points will assist in encouraging drivers to use Railway Parade instead of the 'pedestrianised' Terralong Street east
- The proposal will result in the removal of five parking spaces between Railway Parade and Manning Street to allow for the realignment of the intersection. Furthermore, all parking in this area will be removed during the *Summer Streets* program as assessed in Proposal 2. The impact of this parking is assessed in Section 10
- A primary route into and out of the CBD is via Terralong Street and Manning Street. This proposal 'elevates' Railway Parade and Bong Bong Street as the primary route which would become Terralong Street - Railway Parade - Bong Bong Street - Manning Street. These changes would increase turning movements at Railway Parade/Bong Bong Street and at the Bong Bong Street/Manning Street roundabout. The implications of additional traffic on these street sections and intersection is discussed under Proposal 4 in Section 9.

8.3 Intersection Modelling

Intersection modelling of this proposal was undertaken in conjunction with the Proposal 4 investigations. Key findings at the intersection of Terralong Street and Railway Parade with the proposed configuration were:

- An increase in average delays and queue lengths on the Terralong Street westbound due to its change from a priority to a give way movement
- Reduced average delays and queue lengths on Terralong Street eastbound due to right turning vehicles no longer giving way to through traffic with the change of priority
- Reduced average delays and queue lengths on the Railway Parade approach
- Overall, the intersection level of service was shown to be acceptable with or without the proposal.

8.4 Recommendation

The proposal maintains acceptable traffic performance at the intersection of Terralong Street/Railway Parade. The pedestrian benefits of modifying Terralong Street east outweigh the impact of the resultant parking loss.

Supporting traffic calming measures should be installed in Terralong Street east to reinforce driver awareness of this pedestrian friendly zone. The indicative intersection configuration is shown in Figure 8.2.





Aerial image sourced from Google Maps

Figure 8.2: Proposal 3 Indicative Intersection Configuration



9. PROPOSAL 4: INTERSECTION UPGRADES AND RECONFIGURATIONS

9.1 Description

Proposal 4 involves the reconfiguration or upgrade of seven (7) intersections as shown in Table 9.1. They are numbered 4-001 to 4-007, in line with the intersection numbers listed in Table 1.1. These upgrades are also shown in Figure 9.1

Table 9.1: Proposal 4 Items

Number	TCS ref	Intersection	Current Intersection Type	Proposed Changes	Rationale as stated in the Kiama Town Centre Study
4-001	W06	Collins Street / Terralong Street	Roundabout	Pedestrian crossings across all legs of the roundabout	Community feedback has identified that there can be considerable pedestrian and vehicular conflicts at this intersection, particularly at busy times of year and that pedestrian crossings may encourage pedestrian access and signal to drivers that they are entering a high pedestrian zone.
4-002	W07	Collins Street / Akuna Street	Give way	Kerb build outs, blisters, removal of parking, pedestrian crossing north of Akuna Street	Community feedback has indicated the intersection can be dangerous for pedestrians. The approach gradient encourages vehicles to pick-up speed towards the intersection. Current angled parking on the western side of Collins Street causes conflicting vehicle movements near the intersection. The redevelopment of the Council-owned carpark further east will result in an increase in pedestrian and vehicular traffic in the area. The proposed configuration will visually narrow Collins Street, and manage speeds.



Number	TCS ref	Intersection	Current Intersection Type	Proposed Changes	Rationale as stated in the Kiama Town Centre Study
4-003	W08	Collins Street / Bong Bong Street	Stop-controlled	Convert to roundabout	In part due to the gradient, vehicles on Collins Street tend to speed when travelling northbound through the intersection. The proposed roundabout could operate as a speed management device whilst enabling crossing points for pedestrians (refuge islands or pedestrian crossings); creating a safer environment for school children walking to/from Kiama Public School.
4-004	H10	Railway Parade / Terralong Street	Give way	Changed intersection priority and reduced traffic lane widths	Same as Proposal 3 (see Section 8.1)
4-005	H14	Shoalhaven Street / Bong Bong Street	Give way	Convert Give Way arrangement to roundabout	Community feedback has identified that the intersection is dangerous for all road users; particularly pedestrians. This is due to the steep downhill gradient of Bong Bong Street towards Manning Street, causing vehicles to pick up speed through the intersection. The proposed roundabout will be a speed management device, slowing traffic speeds and breaking up the 'downhill run'.
4-006	H07	Terralong Street / Blowhole Point Road	Give way	Realign kerbs and change priority to Terralong Street / Blowhole Point Road	The width of Terralong Street beyond the turn-off currently signals to drivers to follow Terralong Street towards the Showgrounds instead of guiding them towards the popular blowhole and lighthouse. The proposed configuration will improve wayfinding to the blowhole and lighthouse.



Number	TCS ref	Intersection	Current Intersection Type	Proposed Changes	Rationale as stated in the Kiama Town Centre Study
4-007	S01	Bong Bong Street / Railway Parade	Stop-controlled	Convert to traffic signals	Strong community feedback has identified that the intersection is dangerous for all road users; particularly pedestrians. This is due to the steep downhill gradient of Bong Bong Street towards Manning Street, causing vehicles to speed through the intersection; as well as the close proximity of the bus bay to the intersection. A signalised intersection will allow pedestrians to cross safely and access the station. A redesign of the bus bay is also suggested, so that buses and taxis exit further away from the intersection.

Each intersection modification proposed in the TCS is shown in Figure 9.1 below.



Aerial image sourced from NSW ePlanning Spatial Viewer

Figure 9.1: TCS Proposed Intersection Modifications



9.2 Intersection Modelling Results

The 11 intersections listed in Section 1.2 were modelled as a “network” using SIDRA software with the existing and proposed configurations, to evaluate the situation where all proposed configurations were implemented in year 2021.

The modelling shows that the Saturday peak has the most noticeable effects on intersection performance due to its higher traffic volumes. The results highlight that the proposed reconfigurations of the 11 intersections described previously in this chapter have minimal impact on the network performance in 2021. The modelling outcomes are summarised in Table 9.2.

Table 9.2: Intersection Modelling Outcomes Summary

Intersection	Upgrade Proposal	Key Outcomes with Proposal Changes
Terralong Street / Collins Street	Road-surface level zebra crossings on roundabout legs	<ul style="list-style-type: none"> Undesirable impacts to average delays and queues by 2031. Drops to level of service F by 2031.
Collins Street / Akuna Street	Installation of zebra crossings	<ul style="list-style-type: none"> Negligible impacts to average delays. Maintains a high level of service.
Bong Bong Street / Collins Street	Conversion roundabout	<ul style="list-style-type: none"> Minimal impacts to average delays and queues. Maintains a high level of service.
Terralong Street / Railway Parade	Reprioritisation of intersection	<ul style="list-style-type: none"> Some impact to the average delays and queues on the eastern approach due to the change in priority to give way control. Slightly reduced average delays and queues on the western and southern approaches with the change of priority. Maintains a high level of service.
Shoalhaven Street / Bong Bong Street	Conversion roundabout	<ul style="list-style-type: none"> Minimal changes to average delays and queues on all approaches, with the exception of the northern approach having slightly lower average delays and queues. Maintains a high level of service.
Terralong Street / Blowhole Point Road	Reprioritisation of intersection	<ul style="list-style-type: none"> Minimal changes to average delays and queues on the northern approach, and slightly lower average delays on the eastern approach. Maintains a high level of service.
Bong Bong Street / Railway Parade	Conversion signalised intersection	<ul style="list-style-type: none"> Small increases to average delays and queues on all approaches, expected due to the traffic signals which hold up traffic, with the greatest impacts to the Bong Bong Street approaches. Maintains a high level of service.
Terralong Street / Shoalhaven Street	No upgrade	<ul style="list-style-type: none"> No impacts to intersection performance. Maintains a high level of service.
Terralong Street / Manning Street	No upgrade	<ul style="list-style-type: none"> No impacts to intersection performance. Maintains a high level of service.

Intersection	Upgrade Proposal	Key Outcomes with Proposal Changes
Manning Street / Bong Bong Street	No upgrade	<ul style="list-style-type: none"> Negligible impacts to average delays and queues on all approaches. Maintains a high level of service.
Shoalhaven Street / Akuna Street	No upgrade	<ul style="list-style-type: none"> No impacts to intersection performance. Maintains a high level of service

Overall, the modelling shows that the network has sufficient capacity to support the implementation of all proposed intersection reconfigurations in 2021.

Additionally, a future 2031 year model was undertaken to assess a 10 year design life of the proposed changes. A comparison of the 2021 and 2031 model results are summarised in Table 9.3 to Table 9.5.

Table 9.3: Proposal 4 Model Scaled Results: Thursday AM Peak

Intersection	2021				2031			
	DoS	Delay (s)	LoS	Queue (veh)	DoS	Delay (s)	LoS	Queue (veh)
1. Terralong Street / Collins Street	0.551 (0.080)	5.0 (5.6)	A (A)	4.4 (0.4)	0.651 (0.651)	6.0 (7.4)	A (A)	6.7 (6.7)
2. Collins Street / Akuna Street	0.117 (0.015)	1.3 (5.9)	A (A)	0.1 (0.1)	0.133 (0.018)	1.3 (6.1)	A (A)	0.1 (0.1)
3. Collins Street / Bong Bong Street	0.106 (0.011)	4.6 (6.0)	A (A)	0.7 (0.1)	0.121 (0.013)	4.6 (6.1)	A (A)	0.8 (0.1)
4. Terralong Street / Railway Parade	0.313 (0.030)	2.0 (4.6)	A (A)	1.4 (0.1)	0.373 (0.035)	2.3 (4.9)	A (A)	1.9 (0.1)
5. Shoalhaven Street / Bong Bong Street	0.120 (0.120)	4.6 (5.4)	A (A)	0.6 (0.6)	0.138 (0.138)	4.7 (5.4)	A (A)	0.8 (0.8)
6. Terralong Street / Blowhole Point Road	0.127 (0.029)	2.9 (3.1)	A (A)	0.6 (0.1)	0.146 (0.034)	3.0 (3.2)	A (A)	0.7 (0.1)
7. Bong Bong Street / Railway Parade / Eddy Street	0.232 (0.207)	9.5 (13.3)	A (A)	1.5 (0.9)	0.266 (0.236)	9.6 (13.4)	A (A)	1.8 (1.0)
8. Terralong Street / Shoalhaven Street	0.230 (0.092)	3.0 (9.2)	A (A)	0.7 (0.3)	0.265 (0.113)	3.2 (9.5)	A (A)	0.9 (0.3)
9. Terralong Street / Manning Street	0.316 (0.316)	4.5 (5.2)	A (A)	2.1 (2.1)	0.366 (0.366)	4.7 (5.3)	A (A)	2.5 (2.5)
10. Manning Street / Bong Bong Street	0.297 (0.157)	4.6 (7.3)	A (A)	1.8 (0.6)	0.343 (0.046)	4.8 (7.5)	A (A)	2.2 (0.2)
21. Shoalhaven Street / Akuna Street	0.055 (0.020)	1.3 (5.3)	A (A)	0.1 (0.1)	0.063 (0.023)	1.3 (5.4)	A (A)	0.1 (0.1)

* Note: Values in brackets represent the critical movement which have the highest average delay



Table 9.4: Proposal 4 Model Scaled Results: Thursday PM Peak

Intersection	2021				2031			
	DoS	Delay (s)	LoS	Queue (veh)	DoS	Delay (s)	LoS	Queue (veh)
1. Terralong Street / Collins Street	0.853 (0.853)	12.2 (17.9)	A (B)	15.6 (15.6)	1.036 (1.036)	38.2 (73.0)	C (F)	50.1 (50.1)
2. Collins Street / Akuna Street	0.182 (0.045)	0.8 (6.3)	A (A)	0.1 (0.1)	0.204 (0.054)	0.9 (6.6)	A (A)	0.2 (0.2)
3. Collins Street / Bong Bong Street	0.232 (0.011)	4.8 (7.4)	A (A)	1.6 (0.1)	0.263 (0.013)	4.9 (7.5)	A (A)	1.9 (0.1)
4. Terralong Street / Railway Parade	0.590 (0.590)	3.4 (7.2)	A (A)	4.8 (4.8)	0.717 (0.717)	4.5 (9.8)	A (A)	7.3 (7.3)
5. Shoalhaven Street / Bong Bong Street	0.245 (0.245)	5.5 (6.0)	A (A)	1.5 (1.5)	0.277 (0.277)	5.6 (6.1)	A (A)	1.8 (1.8)
6. Terralong Street / Blowhole Point Road	0.200 (0.102)	3.5 (4.1)	A (A)	0.8 (0.3)	0.232 (0.124)	3.8 (4.5)	A (A)	1.0 (0.4)
7. Bong Bong Street / Railway Parade / Eddy Street	0.371 (0.263)	9.2 (15.2)	A (B)	2.7 (1.0)	0.427 (0.297)	9.3 (15.3)	A (B)	3.2 (1.1)
8. Terralong Street / Shoalhaven Street	0.321 (0.146)	3.3 (10.6)	A (A)	1.0 (0.4)	0.366 (0.288)	3.8 (11.6)	A (A)	1.4 (1.4)
9. Terralong Street / Manning Street	0.489 (0.35)	5.1 (5.3)	A (A)	4.0 (2.3)	0.587 (0.587)	6.0 (7.0)	A (A)	5.5 (5.5)
10. Manning Street / Bong Bong Street	0.483 (0.211)	4.8 (8.3)	A (A)	3.6 (0.9)	0.559 (0.112)	5.1 (8.9)	A (A)	4.6 (0.7)
21. Shoalhaven Street / Akuna Street	0.050 (0.019)	1.2 (4.9)	A (A)	0.1 (0.1)	0.056 (0.022)	1.2 (4.9)	A (A)	0.1 (0.1)

* Note: Values in brackets represent the critical movement which have the highest average delay



Table 9.5: Proposal 4 Model Scaled Results: Saturday Midday Peak

Intersection	2021				2031			
	DoS	Delay (s)	LoS	Queue (veh)	DoS	Delay (s)	LoS	Queue (veh)
1. Terralong Street / Collins Street	0.961 (0.961)	18.9 (33.6)	B (C)	30.7 (30.7)	1.172 (1.172)	78.7 (176.5)	F (F)	110.4 (110.4)
2. Collins Street / Akuna Street	0.196 (0.064)	1.3 (6.4)	A (A)	0.2 (0.2)	0.210 (0.074)	1.3 (6.6)	A (A)	0.2 (0.2)
3. Collins Street / Bong Bong Street	0.248 (0.017)	5.2 (8.0)	A (A)	1.7 (0.1)	0.271 (0.021)	5.4 (8.2)	A (A)	1.9 (0.1)
4. Terralong Street / Railway Parade	0.718 (0.718)	4.3 (10.1)	A (A)	7.2 (7.2)	0.855 (0.855)	6.6 (15.5)	A (B)	12.5 (12.5)
5. Shoalhaven Street / Bong Bong Street	0.280 (0.180)	5.2 (5.5)	A (A)	1.8 (0.8)	0.310 (0.207)	5.4 (5.6)	A (A)	2.1 (1.0)
6. Terralong Street / Blowhole Point Road	0.322 (0.322)	3.9 (4.4)	A (A)	1.8 (1.8)	0.361 (0.361)	4.3 (5.1)	A (A)	2.4 (2.4)
7. Bong Bong Street / Railway Parade / Eddy Street	0.442 (0.077)	9.6 (15.4)	A (B)	3.1 (0.3)	0.483 (0.088)	9.8 (15.5)	A (B)	3.5 (0.3)
8. Terralong Street / Shoalhaven Street	0.423 (0.423)	4.5 (13.2)	A (A)	2.6 (2.6)	0.499 (0.499)	5.1 (14.5)	A (A)	3.4 (3.4)
9. Terralong Street / Manning Street	0.624 (0.427)	5.1 (5.5)	A (A)	6.2 (3.0)	0.689 (0.505)	5.7 (5.9)	A (A)	7.5 (3.8)
10. Manning Street / Bong Bong Street	0.470 (0.068)	5.4 (8.1)	A (A)	3.5 (0.4)	0.531 (0.084)	5.7 (8.8)	A (A)	4.3 (0.5)
21. Shoalhaven Street / Akuna Street	0.088 (0.058)	2.0 (5.1)	A (A)	0.2 (0.2)	0.097 (0.063)	2.1 (5.1)	A (A)	0.2 (0.2)

* Note: Values in brackets represent the critical movement which have the highest average delay

The modelling shows that the network of intersections mostly has sufficient capacity with the nominated proposals to support 10 years of traffic growth, with only intersection 1, Terralong Street and Collins Street, failing by the opening year 2021 during the Saturday midday peak.

All other intersections within the network have capacity to support the proposed configurations.

As stated in Section 9.3, the benefits to pedestrian amenity in the area can justify the reduced intersection performance. This proposal included a recommendation to install the pedestrian crossings as a short-term trial in order to assess any negligible operational impacts and gauge public perception. A more detailed intersection capacity analysis will be undertaken in Part B of the study. This will identify recommended upgrades where necessary.

All other intersections within the network have capacity to support the proposed configurations within a 10-year design horizon.



9.3 Proposal 4-001: Terralong Street / Collins Street

9.3.1 Site Observations

The existing site layout is shown in Figure 9.2.



Aerial image sourced from Nearmap

Figure 9.2: Terralong Street/Collins Street Existing Conditions

Key site observations relevant to the proposed reconfiguration are:

- There is a steep downhill approach from the south with vehicles accelerating downhill towards the roundabout
- Southbound vehicles were observed accelerating up the steep gradient departing the intersection to the south as the speed limit changes from 40 km/h to 50 km/h
- There is a raised landscaped area on the north-eastern corner of the roundabout. A pedestrian crossing on the northern leg may have to be located further north on Collins Street which deviates from prevailing desire lines at the intersection
- The raised landscaped area in the centre of the roundabout obstructs sight lines through the roundabout including the sight lines of vehicles on the southern approach to the pedestrian crossing of the northern leg
- The angled parking on the southern departure lane of the intersection is close to the pedestrian crossing point and to the roundabout. Vehicles were observed to reverse from these spaces and encroach on the crossing point highlighting safety concerns.

The excerpt from the TCS for this item is shown below.

W06 Collins/ Terralong Intersection

This intersection is located in the heart of the town centre and links key destinations including the Leagues Club and Hindmarsh Park. Community feedback has identified that there can be considerable pedestrian and vehicular conflicts at this intersection, particularly at busy times of year.

To encourage pedestrian access and signal to drivers that they are entering a high pedestrian zone the provision of pedestrian crossings across Collins Street and preferable Terralong Street should be explored (subject to traffic advice).



Figure 9.3: TCS Proposal for Bong Bong Street/Shoalhaven Street Intersection

9.3.2 Pedestrian Crossing Warrants Assessment

All legs of the Terralong Street and Collins Street roundabout were assessed against the TfNSW pedestrian crossing warrants as summarised in shown in Table 9.6. The highest volumes which occurred on a Saturday were used for the assessment.

Table 9.6: Pedestrian Crossing Warrants Assessment (using scaled volumes)

Criteria	Northern Leg		Eastern Leg		Southern Leg		Western Leg		
	Flow	Y/N	Flow	Y/N	Flow	Y/N	Flow	Y/N	
Saturday 1000-1100									
P ≥ 30	102	Y	50	Y	156	Y	40	Y	
V ≥ 500	900	Y	1017	Y	456	N	1117	Y	
PV ≥ 60,000	91800	Y	50850	N	71136	Y	44680	N	
Criteria met	Y		N		N		N		
Saturday 1100-1200									
P ≥ 30	131	Y	126	Y	288	Y	76	Y	
V ≥ 500	1010	Y	1114	Y	483	N	1161	Y	
PV ≥ 60,000	132310	Y	140364	Y	139104	Y	88236	Y	
Criteria met	Y		Y		N		Y		
Saturday 1200-1300									
P ≥ 30	167	Y	159	Y	274	Y	64	Y	
V ≥ 500	982	Y	1106	Y	515	Y	1075	Y	
PV ≥ 60,000	163994	Y	175854	Y	141110	Y	68800	Y	
Criteria met	Y		Y		N		N		
Warrants met	Y		N		N		N		



Within the three one-hour periods between 10:00 AM and 1:00 PM on the Saturday, all legs have sufficient pedestrian volumes to meet the TfNSW crossing warrants. However, with the exception of the southern leg, the three other legs have sufficient vehicular volumes to meet the TfNSW crossing warrants. In combination though only the northern leg satisfies the combined warrants for all three hours.

The southern leg is unique in that it has the highest pedestrian volumes and the lowest vehicular volumes in all three one-hour periods. Other elements of Proposal 4 will divert traffic into Collins Street which may change this finding and bring the intersection closer to meeting the warrants.

Also, there is a special warrant for circumstances where $PV \geq 45,000$ (but less than 60,000), $P \geq 30$ and $V \geq 500$, however, assessment against these warrants would not result in any of the intersection legs meeting the warrants requirements. No other special warrants under the TfNSW scheme such as children's crossing warrants are applicable in this situation.

It is important to note that the Saturday survey period was limited to 10:00 AM to 1:00 PM. It is possible that there are higher volumes in later periods of the day, and it is possible that there are other one-hour periods that meet the pedestrian crossing criteria for each roundabout leg. Further survey data would be needed to confirm this.

9.3.3 Issues to Consider

9.3.3.1 Crossing Location

The proposed crossing locations will likely be at the existing refuge locations. Kerb ramps and refuge island gaps may need to be widened to the standard width of 3.6m for a zebra crossing.

The existing northern leg crossing point is 10m north of the roundabout and a flower bed currently forms a barrier to force pedestrians to cross at this crossing point. This arrangement should remain if a zebra crossing is to be installed at this location.

9.3.3.2 No Stopping Restriction

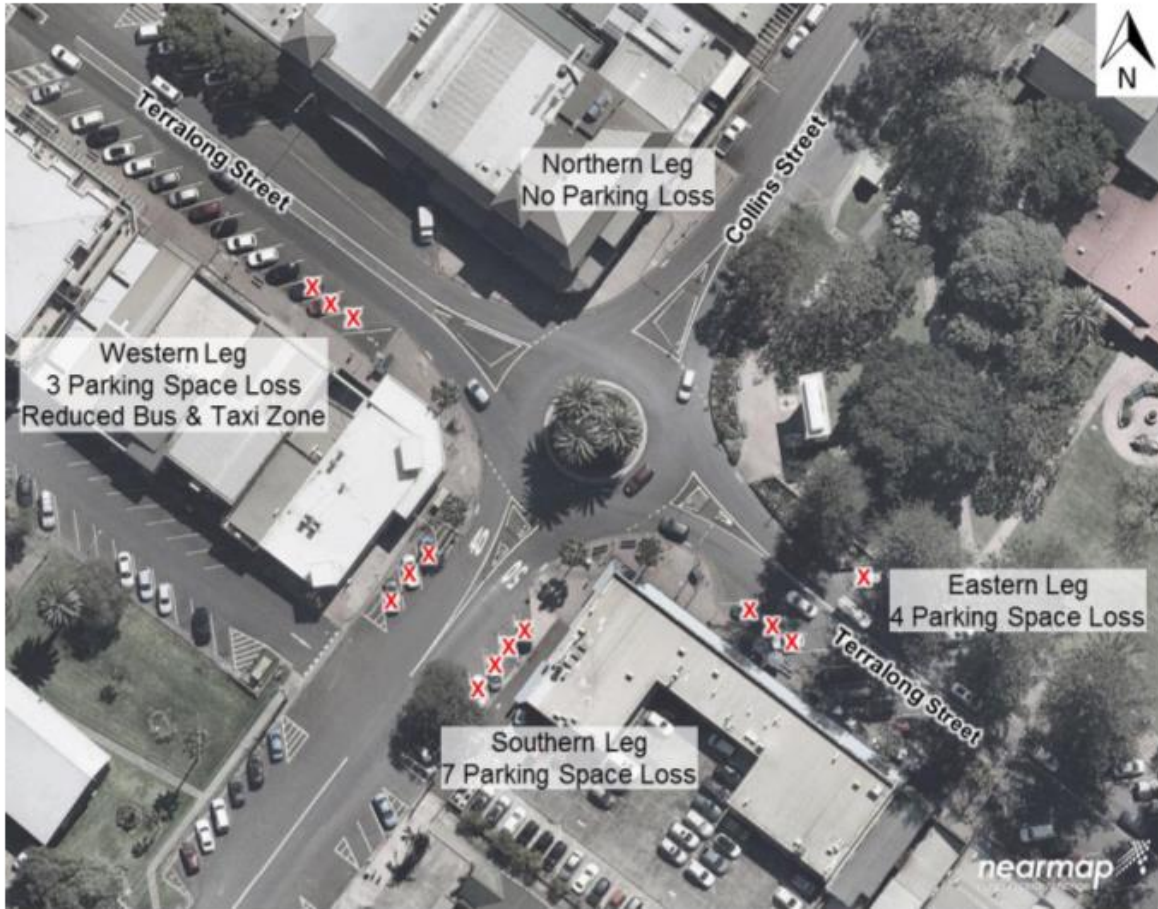
In accordance with the Roads and Maritime Supplement to AS1742.10-2009: Manual of Uniform Traffic Control Devices – Part 10: Pedestrian control and protection – Version 3, 20m of mandatory no stopping restrictions must be provided on the approaches to a crossing for safe sight distance. Additionally, if there is angle parking on the approach, the No Stopping restriction should be increased by a further 20m to maintain safe sight distance. Parking may be reduced through the use of kerb extensions.

For this intersection, parking spaces will have to be removed on the southern and eastern legs to implement the 20m no stopping restrictions. There are currently indented bus zones and no angled parking on the northern and western legs within 20m of the proposed crossing locations. Sight distances are likely to be adequate despite the bus zones located within 20m of the proposed crossing locations.

The parking spaces lost due to the mandatory no stopping restrictions, after implementing kerb extensions, to utilise the reduced no stopping distance, are shown in Figure 9.4.

It should be noted that the loss of parking on the eastern side of the southern leg should be removed regardless of whether a crossing is implemented here or not due to reversing vehicles encroaching on the pedestrian refuge.





Aerial image sourced from NSW ePlanning Spatial Viewer

Figure 9.4: Parking Removal due to No Stopping Restrictions near Zebra Crossings

9.3.3.3 Crossing Type

As Terralong Street and the northern leg of Collins Street are serviced by buses, it is recommended that road surface-level zebra crossings be installed at all legs. A wombat crossing could be installed at the southern leg as it is not serviced by any bus routes. The wombat crossing will also slow vehicles driving downhill from the south.



9.3.3.4 Sight Lines

The vegetation in the centre of the roundabout should be trimmed or replaced to allow greater visibility across the roundabout in order to improve sight lines to crossing pedestrians. Roads and Maritime Services' *Design guideline to improve the quality, safety and cost effectiveness of green infrastructure in road corridors* Section 3.3.4 outlines suitable vegetation types and safety implications for various road infrastructure items. For roundabouts and intersections in semi-urban or urban areas, it specifically recommends *ground cover and low shrubs* as this type can maintain safe sight distances. The large trees, bushes and shrubs currently on the roundabout are not in accordance with these guidelines. These sight line issues are shown in Figure 9.5.



Figure 9.5: Sight Line Issues due to Roundabout Vegetation



9.3.3.5 Vehicle Approach Gradient

Vehicles approaching from the south along Collins Street experience a -15% to -20% grade towards the roundabout. This results in vehicles having to brake heavily on approach to the roundabout. If a pedestrian crossing was placed on this leg then vehicles would have to come to a stop on the steep grade rather than at the lesser grade at the roundabout. The risks associated with a vehicle failing to stop result in this location require additional supporting measures such as a speed cushion, warning signage and linemarking. This would be a similar arrangement to the proposal in Section 9.4.5

This steep approach gradient on Collins Street is shown in Figure 9.6.



Figure 9.6: Collins Street Southern Approach Gradient to Roundabout

9.3.4 Movement and Place

Under Austroads Integrating Safe System with Movement and Place for Vulnerable Road Users, the Terralong Street zone would fall into the *Activity Streets and Boulevards* classification, which “provide access to shops and services by all modes”. These areas have high demand for movement alongside place and these need to be balanced to maximise the experience for all users.

A key recommended treatment from Austroads in this environment is the use of roundabouts with wombat crossings, which are reported to lower injury severity as well as crash likelihood.

For this scenario, the benefit of installing pedestrian crossings would complement the desired pedestrian priority/place experience in this area. The proposed arrangement is aligned with an “activity street and boulevard” despite current conflicting volumes not strictly meeting the required TfNSW warrant volumes for pedestrian crossings.

9.3.5 Recommendation

The zebra crossings at each leg of the roundabout have severe negative impacts on traffic flow through the intersection. The impacts to traffic are too severe to be compensated by benefits to pedestrians from a safety and accessibility perspective. Intersection analysis results presented Section 9.2 show that during the 2031 Saturday peak the intersection will operate at an overall LoS C, with the northern leg operating at LoS F with long queues estimated to occur under the 2031 volume scenario, compared to the future base case LoS B.

Part B of the report investigates alternative solutions including partial traffic diversions and installation of traffic signals in this area.



The traffic modelling indicates that the roundabout should perform at a reasonable level in 2031 in the "Do Nothing" scenario. It is therefore recommended to install signals only if pedestrian amenity is deemed to necessitate it.

9.4 Proposal 4-002: Collins Street / Akuna Street

9.4.1 Site Observations

The existing site arrangement is shown in Figure 9.9.



Aerial image sourced from Nearmap

Figure 9.7: Collins Street/Akuna Street Existing Conditions

The following site observations are relevant to the assessment of this proposal.

- Parking spaces on the western leg are indented and the removal of these spaces to add kerb blisters will not significantly change travel lane widths
- There are no pedestrian crossing points across Collins Street at the intersection
- Collins Street has a steep downhill gradient of 15%-20% towards the intersection
- Traffic calming devices along Collins Street are limited to kerb blisters, a refuge island and a slow point south of Akuna Street
- There is a "Gross Load Limit 5t" restriction with signage along Collins Street between Akuna Street and Bong Bong Street.

In the TCS report, a member of the public provided feedback that heavy trucks have previously attempted to drive up the hill on Collins Street, south of Akuna Street, but get stuck due to its steep gradient.



The excerpt from the TCS for this item is shown below in Figure 9.8.

W07 Collins/ Akuna Intersection

Community feedback has indicated that this T-intersection can be dangerous for pedestrians. Collins Street slopes down towards Terralong Street causing vehicles to pick-up speed. Current on-street parking on the western side of Collins Street opposite the intersection further adds to complex vehicle movements.

This initiative proposes removing parking spaces on the western side and increasing landscaping and blister treatments to visually narrow Collins Street. A redesign of this intersection will be particularly important once the redevelopment of the Council-owned carpark further east (see Initiative H04) is realised, as pedestrian and vehicular traffic in this area will increase.



Figure 9.8: TCS Proposal for Collins Street/Akuna Street Intersection

9.4.2 Pedestrian Crossing Warrants Assessment

While the TCS proposed the crossing to be north of Akuna Street, this assessment has considered both the northern and southern legs of the intersection against the TfNSW pedestrian crossing warrants as shown in Table 9.7.

Saturday volumes were used as these pedestrian and vehicular volumes were the highest. The assessment is based on having one crossing only, either across the northern or southern legs. Accordingly, the pedestrian volumes on the northern and southern legs have been added and used in both the northern and southern leg assessments.



Table 9.7: Pedestrian Crossing Warrants Assessment - Collins Street and Akuna Street

Criteria	Northern Leg		Southern Leg		
	Flow	Y/N	Flow	Y/N	
Saturday 1000-1100					
P	≥ 30	6	N	6	N
V	≥ 500	342	N	274	N
PV	≥ 60,000	2052	N	1644	N
Criteria met	N		N		
Saturday 1100-1200					
P	≥ 30	3	N	3	N
V	≥ 500	336	N	281	N
PV	≥ 60,000	1008	N	843	N
Criteria met	N				
Saturday 1200-1300					
P	≥ 30	17	N	17	N
V	≥ 500	364	N	285	N
PV	≥ 60,000	6188	N	4845	N
Criteria met	N		N		
Warrants met	N		N		

Overall, the pedestrian crossing volumes are well below the levels required to justify crossing facilities.

9.4.3 Alternative Pedestrian Crossing Warrants Assessment

Due to its location near Kiama Public School, it is reasonable to test the alternative reduced TfNSW warrant. This warrant is specifically for locations predominantly used by children but are not intended to be a school crossing (i.e. a crossing with red flags and a supervisor). The warrant states that, in two counts of one-hour duration immediately before and after school hours:

- Pedestrian flow (P) per hour is ≥ 30
- Vehicular flow (V) is ≥ 200 .

The total vehicular flows used for the assessment were taken from the Thursday AM and PM peak periods from the scaled traffic surveys, at 8:00 AM – 9:00 AM and 4:00 PM – 5:00PM.

Three groups of 10 – 15 school children were observed crossing the road on Thursday 15th October 2020 within the hour from 2:45 PM. This is a total of 30 – 45 pedestrians.

It is expected that these additional volumes would be present on a typical school day.

The alternative pedestrians crossing warrants assessment is summarised in Table 9.8.



Table 9.8: Alternative Pedestrian Crossing Warrants Assessment - Collins Street and Akuna Street

Criteria		Northern Leg		Southern Leg	
		Flow	Y/N	Flow	Y/N
Thursday 0800-0900					
P*	≥ 30	30*	Y	30*	Y
V	≥ 200	191	N	145	N
Criteria met		N		N	
Thursday 1600-1700					
P*	≥ 30	30*	Y	30*	Y
V	≥ 200	322	Y	277	Y
Criteria met		Y			
Warrants met		N		N	

* It is expected that these volumes would be present on a typical school day based on site observations

The alternative pedestrian crossing warrants assessment show that the vehicular volumes for the northern leg do not meet the warrants by 9 vehicles. It is expected that these additional volumes would be present on a typical school day, thereby meeting the alternative pedestrian crossing warrants for the northern leg.

The vehicular volumes for the southern leg during the AM peak are well below the required levels to justify crossing facilities.

9.4.4 Other Issues for Consideration

9.4.4.1 Crossing Location

The TCS proposal for the crossing on the northern leg of the intersection identified that seven angled parking spaces are to be removed to provide the kerb extensions with the purpose of slowing down approaching traffic and reducing the crossing distance required for pedestrians. This parking would need to be removed regardless in order to satisfy the statutory 20m No Stopping area in proximity to the pedestrian crossing as stipulated by the TfNSW guideline. This can be reduced to 7.5m if kerb buildouts similar to that in Proposal 1 are implemented.

It is noted that an additional four parking spaces on the western side and two spaces on the eastern side would also have to be removed. Kerb extensions should be installed on both sides of the road to narrow the roadway and reduce the pedestrian crossing distance. Drainage pits would have to be relocated to install standard width ramps and kerb extensions.

The proposed crossing location as per the TCS proposal will result in a total loss of 13 spaces as shown in Figure 9.9.





Aerial image sourced from Nearmap

Figure 9.9: Parking Removal for Collins Street/Akuna Street Zebra Crossing

9.4.4.2 Vehicle Approach Gradient

Northbound vehicles approaching Akuna Street from Collins Street experience a 15% to 20% grade towards the proposed crossing location as shown in Figure 9.10. Similar to Proposal 1, vehicles may be approaching the proposed pedestrian crossing at higher speeds. While there are no TfNSW or AustRoads limitations on road gradients at pedestrian crossings there is a prevailing concern about stopping quickly on steep down grades.





Figure 9.10: Collins Street Steep Down Hill Approach to the Proposed Crossing

9.4.5 Alternative or Additional Measures

9.4.5.1 Traffic Calming Devices

There are benefits in reducing traffic speed on approach to the intersection. Traffic calming devices such as slow points, kerb blisters, kerb extensions or some form of road narrowing measures could be installed at the northern leg, similar to the southern leg, to provide a horizontal deflection and slow traffic down.

9.4.5.2 Additional Load Limit Signage

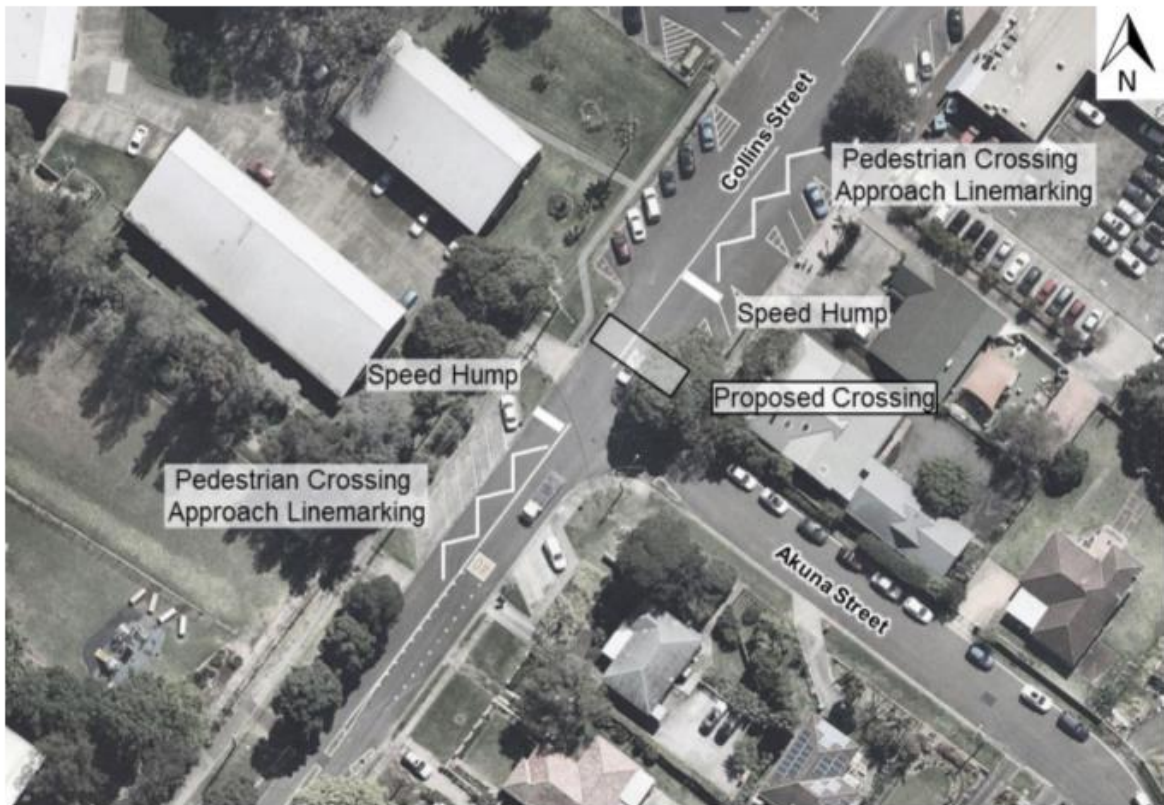
Additional load limit signage could be placed south of Terralong Street to warn heavy vehicle drivers of the upcoming load limit ahead. This will inform drivers to take alternative routes and not attempt to drive up Collins Street.

9.4.6 Recommendation

Site observations showed that the proposed crossing meets the “alternative warrants” threshold on a typical school day. With the lack of pedestrian crossings available for pedestrians near the school, the proposed crossing is supported from a safety perspective also. The proposal should be supported by a number of traffic calming measures, including speed humps, warning signage, and pavement line marking on both approaches to the crossing to slow down approaching vehicles.

Furthermore, a wombat crossing would be the most suitable pedestrian crossing type as this would further reduce vehicle approach speeds.

These recommendations are shown in Figure 9.11.



[†] Subject to alternative warrants assessment based on school period volumes.
Aerial image sourced from Google Maps

Figure 9.11: Recommendations for Collins Street/Akuna Street Pedestrian Crossing

9.5 Proposal 4-003: Collins Street / Bong Bong Street

9.5.1 Site Observations

The following site observations are relevant to the proposed reconfiguration:

- Traffic volumes are higher for Bong Bong Street (east-west) movements despite Collins Street (north-south) having priority at the intersection
- The intersection is located at the crest of a 15-20% grade on Collins Street
- Stop lines are in place for the east-west movement. This is most likely due to the poor sight lines to vehicles on the steep approaches and over the crest on the Collins Street approaches. A roundabout would be faced with similar issues
- The only pedestrian crossing facilities are two kerb blisters with kerb ramps on the Bong Bong Street western approach
- A pedestrian refuge is located on Collins Street 65m north-east of the intersection.

The issues raised in the TCS were verified by observed traffic behaviour on site and the intersection proposal was assessed for suitability to address these safety issues. No pedestrian conflicts were observed. School kids were supervised when crossing the western side of Bong Bong Street from north to south.

The excerpt from the TCS for this item is shown below in Figure 9.12.



W08 Collins/ Bong Bong Intersection

Vehicles on Bong Bong Street currently need to give way to traffic on Collins Street. In part due to the significant slope, cars on Collins Street tend to speed when travelling northbound.

One of the options may be to create a roundabout in this location (subject to traffic advice) which could operate as an effective traffic calming device and enable crossing points for pedestrians (traffic island 'stepping stones' or zebra crossing). This may also assist in creating a safer environment for school children walking to/ from Kiama Public School to the west.



Figure 9.12: TCS Proposal for Collins Street/Bong Bong Street Intersection

9.5.2 Design Limitations and Issues for Consideration

AustRoads Guide to Road Design Part 4B: Roundabouts Section 4.10.2 stipulates that the maximum approach grade of a roundabout should be limited to 3% - 4% and should not exceed 6%. The northern approach on Collins Street is at an upwards grade of 15-20%, and the southern approach has a similar gradient, except in a downward direction. Figure 9.13 shows the approach grades at Collins Street / Bong Bong Road intersection.

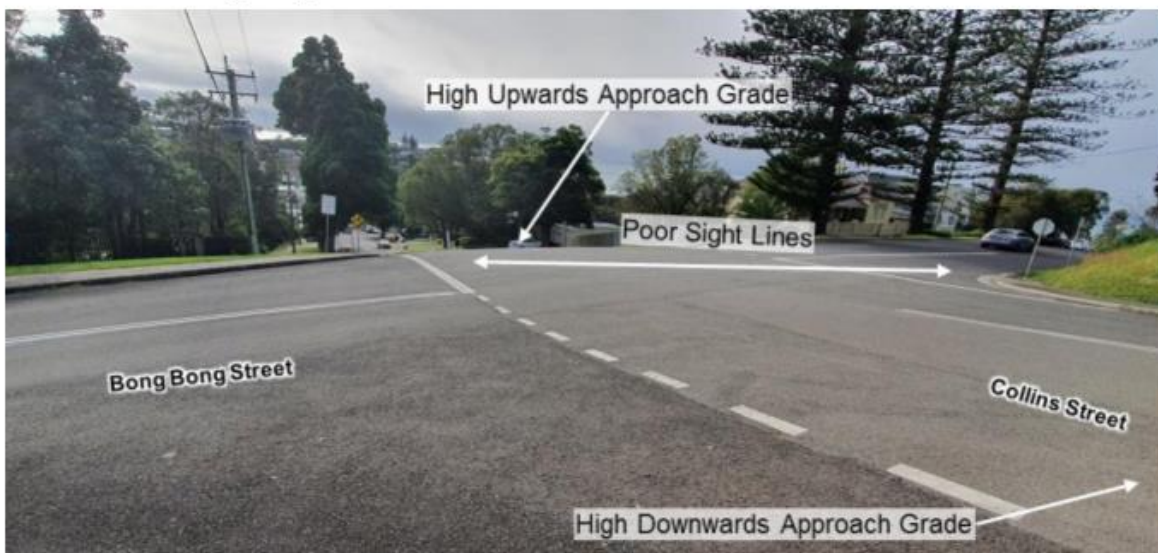


Figure 9.13: Collins Street/Bong Bong Street Approach Grades (Looking North)

A compliant roundabout design at this location is not achievable without major roadworks to address the road grades on approach and through the intersection. These works would have major impacts to adjacent land parcels and be extremely expensive.



Other issues include:

- Southbound traffic will have to wait on a slope when giving way to traffic already on the roundabout with the potential for rolling back on the steep grade
- It is unlikely that associated pedestrian facilities could be safely provided
- The grades on approach to the intersection as well as crossfall through the intersection may not be acceptable to accommodate a roundabout intersection
- The roundabout configuration may need to cater for additional diverted traffic as a result of the implementation of all of the intersection upgrades which form Proposal 4
- Bong Bong Street is a bus route for school buses servicing Kiama Public School. Implementation of a roundabout could impose a risk of buses overturning when traversing the roundabout.

The existing pedestrian refuge on Collins Street, between Bong Bong Street and Akuna Street is considered to be sufficiently separated from the intersection to allow for pedestrians to view turning traffic from Bong Bong Street at the intersection.

Community responses have indicated that the highest concentration of vehicle movements at the intersection are during school pick-up and drop-off hours, with queues spilling into nearby streets. Site observations have revealed that outside these times there are no queuing and congestion issues. Localised congestion was observed during school pick up on October 15th 2020 from 2:45 PM. Queues were observed from Bong Bong Street, fronting the school, and extending west to Thompson Street and north towards Terralong Street. Queuing was observed to dissipate within 15 minutes, coinciding with the completion of the school pick up activities.

9.5.3 Recommendation

Due to two of the approach grades being substantially over the maximum allowable grade for roundabouts as per AustRoads guidelines, a roundabout is not recommended for implementation at the intersection of Collins Street and Bong Bong Street.

To address vehicle speed concerns along Collins Street, particularly from the southern approach the recommended solution is to install a "low-impact" intersection-wide raised platform. An example of this treatment at an intersection with high approach grades is shown in Figure 9.14.





Image sourced from Google Streetview

Figure 9.14: Example of Low Impact Raised Platform, Dutton Street/Ballow Street, Coolangatta

Kerb blisters on the southern approach would help to reduce vehicle approach speeds travelling down the steep grade. The final proposed arrangement with kerb blister and platform is shown in Figure 9.15.



Aerial image adapted from Nearmap

Figure 9.15: Collins Street / Bong Bong Street Intersection Proposal



9.6 Proposal 4-004: Railway Parade / Terralong Street

This proposal is the same as Proposal 3. See Section 8.2 and Section 8.4 for its assessment.

9.7 Proposal 4-005: Shoalhaven Street / Bong Bong Street

9.7.1 Site Observations

The site observations relevant to the assessment of the proposed reconfiguration are listed below and shown in Figure 9.16 and Figure 9.17:

- The intersection currently operates as Stop-sign controlled with Bong Bong Street having priority in the east-west direction
- The northern approach from Shoalhaven Street is a moderate upwards grade of around 10%
- There have been a number of recent changes to the intersection, some of which were recommendations from a PAMP for the area completed in 2018. These are:
 - Kerb blisters and kerb ramps on the Shoalhaven Street northern approach
 - Kerb blisters and kerb ramps on the Bong Bong Street eastern approach which connects to existing footpaths
 - Kerb blisters on the Bong Bong Street western approach and departure lanes with directional arrow signage
 - A short, narrow median on the eastern approach on Bong Bong Street with statutory "Keep Left" signage
 - Both Shoalhaven Street approaches have a small painted median separating the approach and departure lanes.
- Unrestricted on-street parking is available on each approach leg of the intersection, except for along the western side of the Shoalhaven Street southern approach
- The Shoalhaven Street southern approach does not have any pedestrian crossing facilities or associated footpaths.



Figure 9.16: Bong Bong Street/Shoalhaven Street Existing Conditions (Looking North)



Figure 9.17: Bong Bong Street/Shoalhaven Street Existing Conditions (Shoalhaven Street Northern Approach)

The excerpt from the Kiama TCS for this item is shown below in Figure 9.18.

H14 Shoalhaven Intersection

Community feedback has identified that the intersection of Shoalhaven Street and Bong Bong Street is dangerous for all road users, in particular pedestrians. This is mainly due to the steep downhill gradient of Bong Bong Street towards Manning Street which causes vehicles to pick up speed.

This initiative proposes improving the safety of this intersection possibly through the provision of a roundabout (subject to traffic investigation) to act as a traffic calming device, slowing traffic speeds and breaking the 'downhill run'. Central landscaping and/or tree planting would further narrow the perceived width of the road and enhance this effect.



Figure 9.18: TCS Proposal for Bong Bong Street/Shoalhaven Street Intersection



9.7.2 Design Limitations and Issues for Consideration

AustRoads Guide to Road Design Part 4B: Roundabouts Section 4.10.2 stipulates that the maximum approach grade of a roundabout should be limited to 3-4% and should not exceed 6%. The northern approach on Shoalhaven Street is at an upwards grade of around 10%. Substantial earthworks would be required to “level off” the top of the approach to the intersection to allow vehicles to wait at the roundabout on a grade of less than 6%.

Other issues include:

- Removal of existing kerb ramps and kerb blisters would be needed for a roundabout
- There is opportunity to provide pedestrian refuge islands at crossing points across each approach. Currently, pedestrians need to cross both directions of traffic in one movement
- Some parking spaces will need to be removed to ensure a 20m No Stopping restriction on all approaches
- Without significant re-profiling, the crest at the intersection will obstruct sight lines across the roundabout, especially to the Shoalhaven Street approaches which is a key safety issue.

9.7.3 Recommendation

The intersection of Bong Bong Street and Shoalhaven Street was observed to be operating with no significant delays. Significant civil works would be required to achieve the maximum 6% grades on each approach to allow implementation of a roundabout.

Furthermore, vehicle speed issues identified in the TCS are likely to have already been partially resolved with the new LATM items identified in Section 9.7.1. These items were installed at the intersection after the final TCS was released in April 2019. It is recommended that vehicle speed surveys are undertaken to assess if these treatments have been successful at reducing vehicle approach speeds from the western approach on Bong Bong Street.

To address any further vehicle speed concerns along this section of Bong Bong Street, a recommended solution is to install a “low-impact” intersection-wide raised platform. An example of this treatment at an intersection with high approach grades is shown in Figure 9.14.

The 2031 intersection modelling results show Level of Service A for the existing stop-sign configuration, indicating that the roundabout serves no benefit to improve intersection operations. Therefore from a traffic operations perspective there is no basis to further consider a roundabout at this location.

9.8 Proposal 4-006: Terralong Street / Blowhole Point Road

9.8.1 Site Observations

The following site observations are relevant to the assessment of this intersection:

- The primary movements are between the west (town centre) and north (blowhole), suggesting that a change of priority would align with the primary movements hence an effective treatment.
- Vehicles intending to turn right from Blowhole Point Road to Terralong Street currently give way to Terralong Street through movements. It was observed that some vehicles on the west approach would indicate left very late causing additional delay to Blowhole Point Road. Changing the movement priority would reduce these delays. This interaction is shown in Figure 9.10.
- There are poor footpath connections between the town centre and the blowhole from this part of Terralong Street.





Figure 9.19: Terralong Street/Blowhole Point Road Traffic Priority Observation

The excerpt from the TCS for this item is shown in Figure 9.20.

H07 Destination Blowhole Point

In order to improve wayfinding, the turn-off onto Blowhole Point Road from Terralong Street requires redesign. The width of Terralong Street beyond the turn-off currently signals to drivers to follow Terralong Street towards the Showgrounds instead of naturally turning them towards the popular blowhole and lighthouse.

Improved signage would further help to guide visitors. The pedestrian connections between the Blowhole and the Town Centre are convoluted and are not conducive to drawing people between the two destinations. Improved signage, more direct paths, more trees to improve shade and protection and public art or heritage information to make the journey interesting would significantly increase movement along this key desire line.

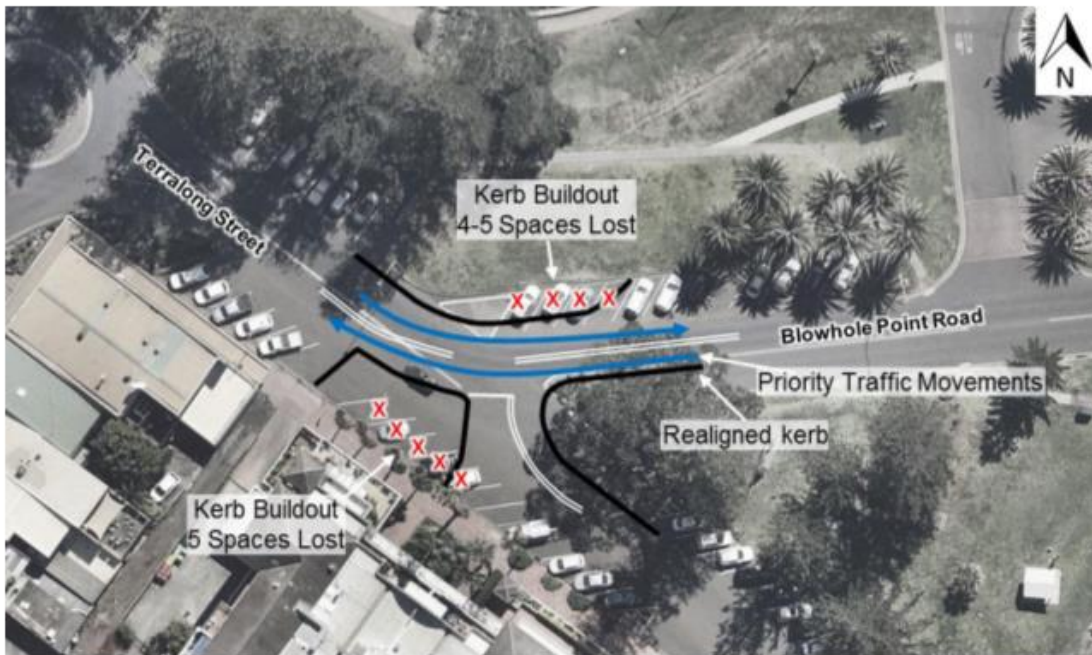


Figure 9.20: TCS Proposal for Terralong Street/Blowhole Point Road Intersection

9.8.2 Proposal Impacts

A loss of five parking spaces can be expected due to the kerb buildout on the south-western side of Terralong Street. A further four spaces would be lost on the northern leg of the intersection. The proposed configuration is shown in Figure 9.21.





Aerial image sourced from Google Maps

Figure 9.21: Terralong Street/Blowhole Point Road Parking Loss and New Priority

9.8.3 Recommendations

The reconfiguration of the intersection is recommended given that the majority of traffic in this area travels between Blowhole Point Road and Terralong Street.

The intersection modelling results for both 2021 and 2031 indicate that both the existing arrangement and the reconfigured intersection operate with good levels of service.

The change in movement priority would also resolve the identified operational issues, as vehicles exiting Blowhole Point Road would have priority and would no longer need to identify a gap in the through traffic.

9.9 Proposal 4-007: Bong Bong Street / Railway Parade

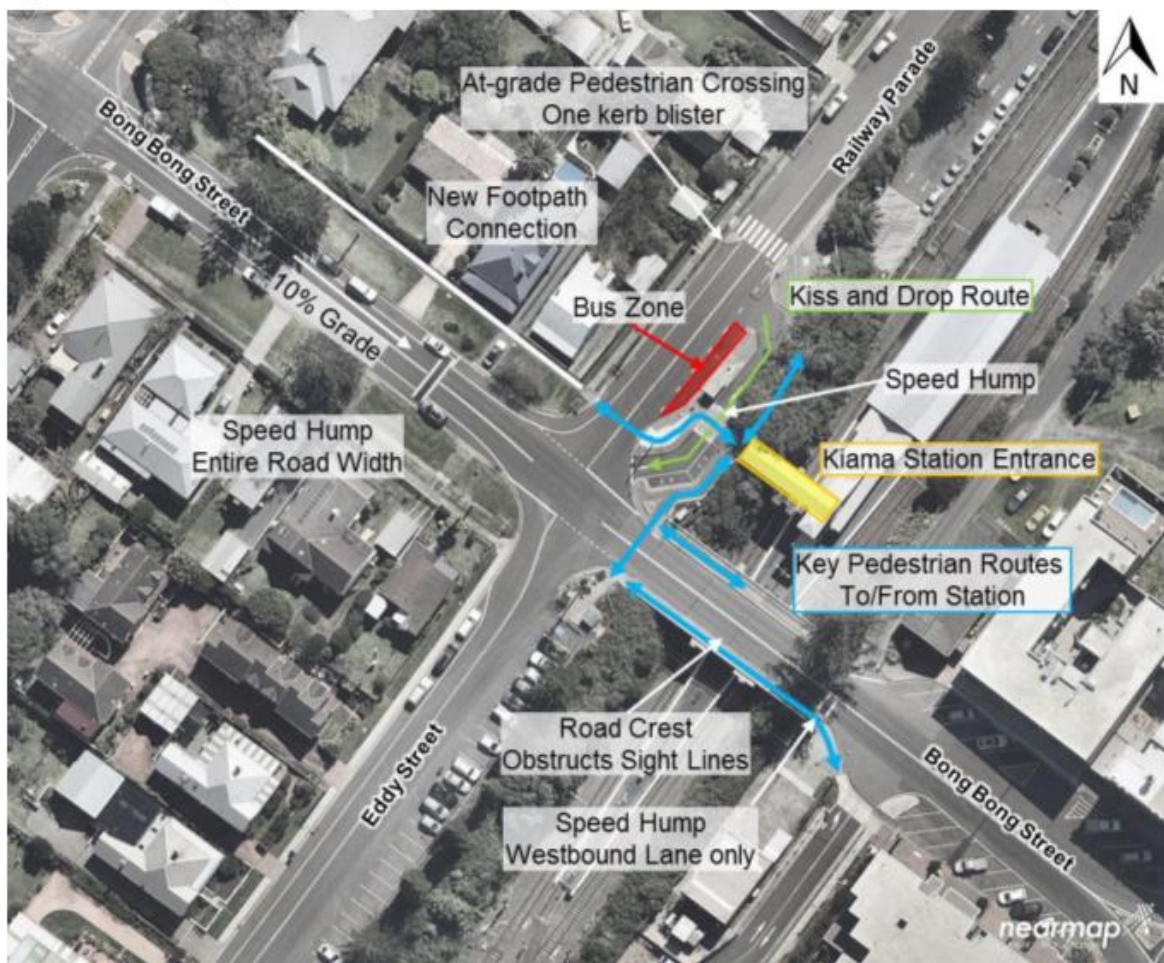
9.9.1 Site Observations

The following site observations are relevant to the assessment of the proposed reconfiguration:

- The intersection is controlled by Stop-signs on the Railway Parade and Eddy Street approaches. The Bong Bong Street movements have priority
- A small flat top road hump spans the single kiss and drop lane outside the station and functions as a pedestrian crossing to the eastbound bus stop at the station. This may cause confusion between pedestrians and vehicles as to who has right of way
- Platoons of pedestrian are typically present at train arrival and departure times
- The Bong Bong Street western approach has an approximate 10% downwards grade to the intersection
- A crest in the rail overpass bridge at the Bong Bong Street eastern approach obstructs sight lines over the bridge, especially to one of the key pedestrian movements to / from the commuter car park

- There is commuter parking along Eddy Street, requiring commuters to cross Bong Bong Street between the station entrance and this parking area.
- A 2018 PAMP included this intersection and recommended a number of traffic calming treatments which have not yet been installed
- Council has recently installed two speed humps on the Bong Bong Street approaches:
 - One is on the western approach across the entire road width and aims to slow vehicles approaching from the 10% grade
 - One is on the eastern approach in the westbound lane only which aims to slow vehicles travelling over the crest where sightlines are poor.
- Council has identified that bus and truck turning paths could not be achieved with the addition of any kerb extensions or medians at the intersection.

Figure 9.22 and Figure 9.23 illustrate the above site conditions.



Aerial image sourced from NSW ePlanner Spatial Viewer

Figure 9.22: Bong Bong Street / Railway Parade / Eddy Street Site Observations





Figure 9.23: Western Approach to Bong Bong Street / Railway Parade (Looking North)

The excerpt from the TCS for this item is shown below in Figure 9.24.

S01 Railway Parade Intersection

Strong community feedback has identified that the intersection of Railway Parade and Bong Bong Street is dangerous for all road users, in particular pedestrians. This is mainly due to the steep downhill gradient of Bong Bong Street towards Manning Street, which causes vehicles to pick up speed, combined with the close proximity of the bus bay exit to the intersection.

This initiative suggests a signalised intersection (subject to traffic advice), allowing pedestrians to cross safely and access the station. A redesign of the bus bay is also suggested, so that buses and taxis exit further away from the intersection, and the creation of a station forecourt would provide landscaping, shelter and seating.



Figure 9.24: TCS Proposal for Terralong Street/Blowhole Point Road Intersection

9.9.2 Issues for Consideration

The proposal to signalise this intersection introduces the following issues:

- Some parking spaces will be lost to enhance TfNSW mandatory no stopping areas
- The changes proposed at Terralong Street / Railway Parade (Proposal 3 and Proposal 4-004) will direct more traffic to this intersection
- The pick-up/drop off bay and the bus stop outside the station entrance will have to be relocated to provide the required no stopping distance.



9.9.3 Traffic Signal Warrants Assessment

9.9.3.1 Existing Volumes

The intersection was assessed against Transport for NSW's *Traffic signal design Section 2 - Warrants*. There are two potential warrants that may apply to the intersection based on each of four one-hour periods of an average day:

- Warrant 1: Traffic demand
 - The major road flow exceeds 600 vehicles/hour in each direction
 - The minor road flow exceeds 200 vehicles/hour in one direction.
- Warrant 2: Pedestrian safety
 - The pedestrian flow crossing the major road exceeds 150 persons/hour
 - The major road flow exceeds 600 vehicles/hour in each direction or, where there is a central median of at least 1.2m wide, 1000 vehicles/hour in each direction.

As the Saturday surveys were limited to three hours, the Thursday survey volumes were used in the warrant assessment. The assessment against the traffic demand warrant is shown in Table 9.9.

Major flows refer to the largest of the approach or exit volumes along Bong Bong Street (major road) in each direction and Minor flows refer to the largest of the approach or exit volumes at Railway Parade or Eddy Street.

The assessment against the pedestrian safety warrant is shown in Table 9.10. The pedestrian flow is the sum of pedestrian volumes across Bong Bong Street (i.e. western and eastern legs) and is assumed to be the combined pedestrian demand across Bong Bong Street.

Table 9.9: Signals Traffic Demand Warrants Assessment - Thursday

Time Period	Major Road Flow				Minor Road Flow			
	Criteria	Eastbound (Eastern Leg)		Westbound (Eastern Leg)		Criteria	Southbound (Railway Parade)	
		Flow	Criteria Met?	Flow	Criteria Met?		Flow	Criteria Met?
AM Peak								
6:00 - 7:00	> 600	31	N	33	N	> 200	14	N
7:00 - 8:00		59	N	74	N		33	N
8:00 - 9:00		138	N	123	N		52	N
PM Peak								
4:00 - 5:00	> 600	185	N	229	N	> 200	62	N
5:00 - 6:00		161	N	182	N		77	N
6:00 - 7:00		98	N	101	N		49	N
Warrants Met	No							



Table 9.10: Signals Pedestrian Safety Warrants Assessment - Thursday

Time Period	Major Road Flow					Pedestrian Flow		
	Criteria	Eastbound (Eastern Leg)		Westbound (Eastern Leg)		Criteria	North-South	
		Flow	Criteria Met?	Flow	Criteria Met?		Flow	Criteria Met?
AM Peak								
6:00 – 7:00	> 600	31	N	33	N	> 150	6	N
7:00 – 8:00		59	N	74	N		15	N
8:00 – 9:00		138	N	123	N		10	N
PM Peak								
4:00 – 5:00	> 600	185	N	229	N	> 150	25	N
5:00 – 6:00		161	N	182	N		8	N
6:00 – 7:00		98	N	101	N		8	N
Warrants Met	No							

From the warrant assessments, it is clear that the pedestrian and vehicular flows are significantly below the minimum volumes to warrant new traffic signals. Different one-hour periods are not expected to alter the flows significantly.

Even though only three hours of data was available, an assessment was completed using the Saturday volumes as shown in Table 9.11 and Table 9.12 respectively.

Table 9.11: Signals Traffic Demand Warrants Assessment - Saturday

Time Period	Major Road Flow					Minor Road Flow		
	Criteria	Eastbound (Eastern Leg)		Westbound (Eastern Leg)		Criteria	Southbound (Railway Parade)	
		Flow	Criteria Met?	Flow	Criteria Met?		Flow	Criteria Met?
10:00 – 11:00 AM	> 600	200	N	185	N	> 200	22	N
11:00 AM – 12:00 PM		257	N	221	N		106	N
12:00 – 1:00 PM		271	N	159	N		65	N

Table 9.12: Signals Pedestrian Safety Warrants Assessment - Saturday

Time Period	Major Road Flow					Pedestrian Flow		
	Criteria	Eastbound (Eastern Leg)		Westbound (Eastern Leg)		Criteria	North-South	
		Flow	Criteria Met?	Flow	Criteria Met?		Flow	Criteria Met?
10:00 – 11:00 AM	> 600	200	N	185	N	> 150	19	N
11:00 AM – 12:00 PM		257	N	221	N		20	N
12:00 – 1:00 PM		271	N	159	N		30	N

Even on the 'peak' Saturday period, the vehicular and pedestrian flows are significantly below the required flows and may not satisfy the warrants even with a longer survey period (e.g. 12-hour period on Saturday) or even during the summer period.



A pedestrian crossing was also considered for the Bong Bong Street eastern approach, however, the highest hourly pedestrian count in the survey period was 27, which does not pass the TfNSW (RMS) pedestrian crossing warrant threshold.

9.9.3.2 Redistributed Traffic Volumes

In conjunction with Proposal 2, if all eastbound through traffic along Terralong Street is diverted onto Railway Parade, this will increase the amount of traffic passing through the Railway Parade / Bong Bong Street intersection. The eastbound through traffic flows for the three 1-hour periods at the Terralong Street / Railway Parade intersection are shown in Table 9.13, which are added to the left turn from Railway Parade to Bong Bong Street eastbound. The westbound through traffic flows for the three 1-hour periods at the Terralong Street / Railway Parade intersection are also shown in Table 9.13, which are added to the right turn from Bong Bong Street westbound to Railway Parade.

Table 9.13: Intersection Volumes with Diverted Traffic (Thursday)

Time Period	Eastbound Through	Westbound Through
AM Peak		
6:00 – 7:00	139	93
7:00 – 8:00	221	150
8:00 – 9:00	349	276
PM Peak		
4:00 – 5:00	541	429
5:00 – 6:00	440	354
6:00 – 7:00	231	204
Added to	Left turn from Railway Parade to Bong Bong Street eastbound	Right turn from Bong Bong Street westbound to Railway Parade

The Bong Bong Street and Railway Parade intersection was assessed against the traffic demand warrants with the new increased traffic, as shown in Table 9.14. It is assumed the pedestrian demands or flows do not change. As such, no assessment against the pedestrian safety warrants were done as the pedestrian flows will still fail the warrants.

Table 9.14: Signals Traffic Demand Warrants Assessment, With Diverted Traffic, Thursday

Time Period	Major Road Flow					Minor Road Flow		
	Criteria	Eastbound (Eastern Leg)		Westbound (Eastern Leg)		Criteria	Southbound (Railway Parade)	
		Flow	Criteria Met?	Flow	Criteria Met?		Flow	Criteria Met?
AM Peak								
6:00 – 7:00	> 600	170	N	127	N	> 200	153	N
7:00 – 8:00		280	N	224	N		255	Y
8:00 – 9:00		487	N	399	N		401	Y
PM Peak								
4:00 – 5:00	> 600	726	Y	658	Y	> 200	603	Y
5:00 – 6:00		601	Y	536	N		518	Y
6:00 – 7:00		330	N	305	N		280	Y
Warrants Met	No							

Even with the increased traffic due to the proposed closure of Terralong Street, the higher volumes still are not close to meeting traffic demand warrants.

The Saturday volumes were also redistributed using the same method as shown in Table 9.15. The redistributed volumes were then assessed against the warrant as shown in Table 9.16.

Table 9.15: Intersection Volumes with Diverted Traffic (Saturday)

Time Period	Eastbound Through	Westbound Through
10:00 – 11:00 AM	541	419
11:00 AM – 12:00 PM	645	445
12:00 – 1:00 PM	715	476
Added to	Left turn from Railway Parade to Bong Bong Street eastbound	Right turn from Bong Bong Street westbound to Railway Parade

Table 9.16: Signals Traffic Demand Warrants Assessment, With Diverted Traffic, Saturday

Time Period	Major Road Flow					Minor Road Flow		
	Criteria	Eastbound (Eastern Leg)		Westbound (Eastern Leg)		Criteria	Southbound (Railway Parade)	
		Flow	Criteria Met?	Flow	Criteria Met?		Flow	Criteria Met?
10:00 AM – 11:00 AM	> 600	742	Y	604	Y	> 200	488	600
11:00 AM – 12:00 PM		902	Y	667	Y		610	750
12:00 PM – 1:00 PM		985	Y	635	Y		664	817

With the diverted and scaled traffic volumes, the intersection meets the traffic demand warrants. All flow on Bong Bong Street and the Railway Parade exceeded the required flows in all time periods. Therefore, during the summer periods with the expected increase in traffic volumes, there is potential for the westbound flow to be more than 600 veh/hr and hence satisfying the traffic signals warrants.



9.9.4 Alternative Measures

As the basis of the proposed signalised intersection is to improve pedestrian safety and connectivity around the station, alternative crossings such as pedestrian crossings (zebra) have also been considered.

From the survey data, pedestrian volumes were highest across the eastern leg of the intersection on Saturday. The leg was assessed against the pedestrian crossing warrants as shown in Table 9.17. The pedestrian flow is the sum of pedestrian volumes across Bong Bong Street (i.e. western and eastern legs) assuming only one crossing is provided and everyone will use it.

Table 9.17: Pedestrian Crossing Warrants Assessment, Saturday

Criteria		Eastern Leg	Meets Criteria?
Weekend 1000-1100			
P	≥ 30	19	N
V	≥ 500	385	N
PV	≥ 60,000	7315	N
All three criteria met			N
Weekend 1100-1200			
P	≥ 30	20	N
V	≥ 500	478	N
PV	≥ 60,000	9569	N
All three criteria met			N
Weekend 1200-1300			
P	≥ 30	30	Y
V	≥ 500	429	N
PV	≥ 60,000	12878	N
All three criteria met			N
Warrants Met			N

The pedestrian and vehicular volumes are not high enough to meet the pedestrian crossing warrants.

The Bong Bong Street and Railway Parade intersection was assessed against the pedestrian crossing warrants with the increased traffic due to the diversions under Proposal 2. The results are shown in Table 9.18.



Table 9.18: Pedestrian Crossing Warrants Assessment, With Diverted Traffic, Saturday

Criteria		Eastern Leg	Meets Criteria?
Weekend 1000-1100			
P	≥ 30	19	N
V	≥ 500	1290	Y
PV	≥ 60,000	25,567	N
All three criteria met			N
Weekend 1100-1200			
P	≥ 30	20	N
V	≥ 500	1568	Y
PV	≥ 60,000	31,365	N
All three criteria met			N
Weekend 1200-1300			
P	≥ 30	30	Y
V	≥ 500	1620	Y
PV	≥ 60,000	48,597	N
All three criteria met			N
Warrants Met			N

Even with the increased traffic, the intersection still does not meet the pedestrian crossing warrants, primarily due to its low pedestrian demand.

9.9.5 Recommendation

The vehicle approach speed issue identified in the TCS appears to have been improved through the introduction of the LATM measures such as the speed humps on both Bong Bong Street approaches. It is recommended that vehicle speed surveys be undertaken to quantify the impact of these measures.

Despite the intersection not meeting the warrants for traffic signals or pedestrian crossings, with or without the additional diverted traffic, pedestrian safety and amenity would be improved by providing a connection between the commuter car park on Eddy Street and the railway station. This approach would also be consistent with the *Movement and Place* approach discussed in Section 9.3.4. A wombat crossing would have been an appropriate treatment, despite not meeting the pedestrian crossing warrants.

Traffic calming in the form of an additional speed hump on the crest of the rail bridge would reduce traffic speeds further and give pedestrians additional time to cross Bong Bong Street.

Should further improvements to pedestrian amenity and reduction in vehicle speed be required, it is recommended that a raised platform similar to what was recommended for the Collins Street/Bong Bong Street intersection be installed. This would also include a pedestrian crossing at the same level as the platform on the eastern leg.

The proposed configuration is shown in Figure 9.25.





Figure 9.25: Railway Parade / Bong Bong Street Intersection Proposal



9.10 Recommendations Summary

Table 9.19 summaries the recommendations for the proposed upgrades under Proposal 4.:

Table 9.19: Proposal 4 Findings Summary

Number	TCS Ref	Intersection	Intersection Type	Proposed Changes	Recommendations
4-001	W06	Collins Street / Terralong Street	Roundabout	Pedestrian crossings across all legs of the roundabout	Retain existing arrangement. Install traffic signals if additional pedestrian amenity is required. Refer to Part B report for more detailed analysis.
4-002	W07	Collins Street / Akuna Street	Give way	Kerb build outs, blisters, removal of parking, pedestrian crossing north of Akuna Street	Implement zebra crossing with additional safety items such as speed humps. Site observations support the alternative warrants assessment for provision of a zebra crossing.
4-003	W08	Collins Street / Bong Bong Street	Stop-controlled	Convert to roundabout	Roundabout is not feasible due to excessive approach grades. Recommend a raised platform treatment instead with a kerb blister on southern approach.
4-004 (same as proposal 3)	H10	Railway Parade / Terralong Street	Give way	Change traffic lane arrangement and reduce traffic lane widths	Implement as per Proposal 3 recommendations.
4-005	H14	Shoalhaven Street / Bong Bong Street	Stop-controlled	Convert stop sign arrangement to roundabout	Roundabout is not feasible due to excessive approach grades.
4-006	H07	Terralong Street / Blowhole Point Road	Give way	Realign kerbs and change priority to Terralong Street / Blowhole Point Road	This proposal is supported however pedestrian treatments require further consideration.
4-007	S01	Bong Bong Street / Railway Parade	Stop-controlled	Convert to traffic signals	Not warranted. Speed hump on eastern approach instead to slow traffic approach speeds for pedestrians crossing.



10. PARKING ANALYSIS

10.1 Existing Parking Supply

10.1.1 General Conditions

Kiama Town Centre draws significant numbers of tourist visitors throughout the year, with peaks experienced during summer. The main attractions within the town centre are located along the south-eastern end of Terralong Street. The angled parking adjacent to the shopfronts attracts the highest demand. The town centre itself primarily consists of short (1/2P) to moderate (2P) duration timed restrictions. There are no paid parking areas in the Kiama Town Centre area.

Terralong Street acts as a boundary between the unrestricted parking areas to the south which are primarily used by residents, and Kiama's commercial hub, focused on Terralong Street and the roads immediately to the north, west and east, where the majority of shops, cafes, and restaurants are located. This area contains a large number of time restricted parking, with 1/2P, 2P, and 4P areas.

Furthermore, the main shopping strip on Terralong Street consists of a significant number of marked angled parking bays, compared to the mostly unmarked parking to the east.

There are no dedicated parking areas for recreational vehicles (RVs), caravans, or other large tourist vehicles.

The composition of the parking restrictions in the Kiama Town Centre area is shown in Figure 10.1 below. For a higher quality image, refer to Appendix B.



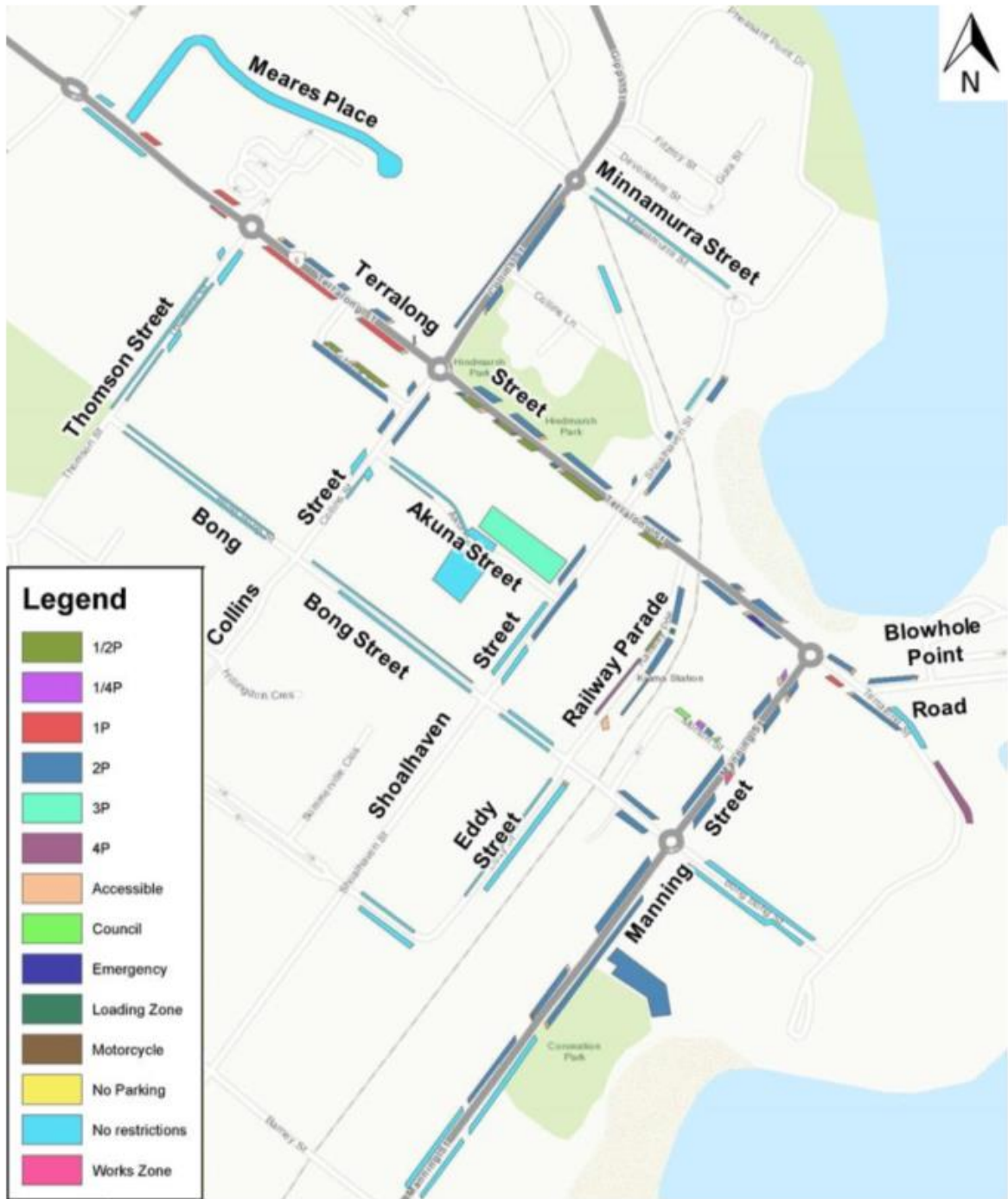


Figure 10.1: Parking Restrictions in Kiama Town Centre

Item 6.1

Attachment 1



10.1.2 Accessible Parking

There is a total of 26 accessible parking spaces within the study area, listed in Table 10.1 below:

Table 10.1: Accessible Parking Spaces

Street	Between	Number of Spaces	Side
Bong Bong Street	Showground & Manning Street	One (1)	South-western
Collins Street	Minnamurra Street and Terralong Street	Two (2)	South-eastern
Eddy Street	Bong Bong Street & Noorinan Street	One (1)	South-eastern
Manning Street	Bong Bong Street & Barney Street	Two (2)	South-eastern
	Morton Street & Terralong Street	One (1)	North-western
	Terralong Street & Bong Bong Street	Two (2)	South-eastern
Railway Parade	Terralong Street and Bong Bong Street	Two (2)	South-eastern
Rosebank Place	Terralong Street & Collins Street	One (1)	North-eastern
Shoalhaven Street	Pheasant Point Drive & Terralong Street	Two (2)	South-eastern
Terralong Street	Collins Street & Shoalhaven Street	One (1)	North-eastern
		Two (2)	South-eastern
	Collins Street & Thomson Street	One (1)	South-western
		Two (2)	North-eastern
	Manning Street & Blowhole Point Road	One (1)	North-western
	Manning Street & Railway Parade	One (1)	South-western
		Two (2)	North-western
	Railway Parade & Shoalhaven Street	One (1)	South-western
Showground & Manning Street	One (1)	South-western	
Total		26	

It is noted that the scope of this parking study does not include an audit of these parking spaces with regards to accessibility requirements and standards.

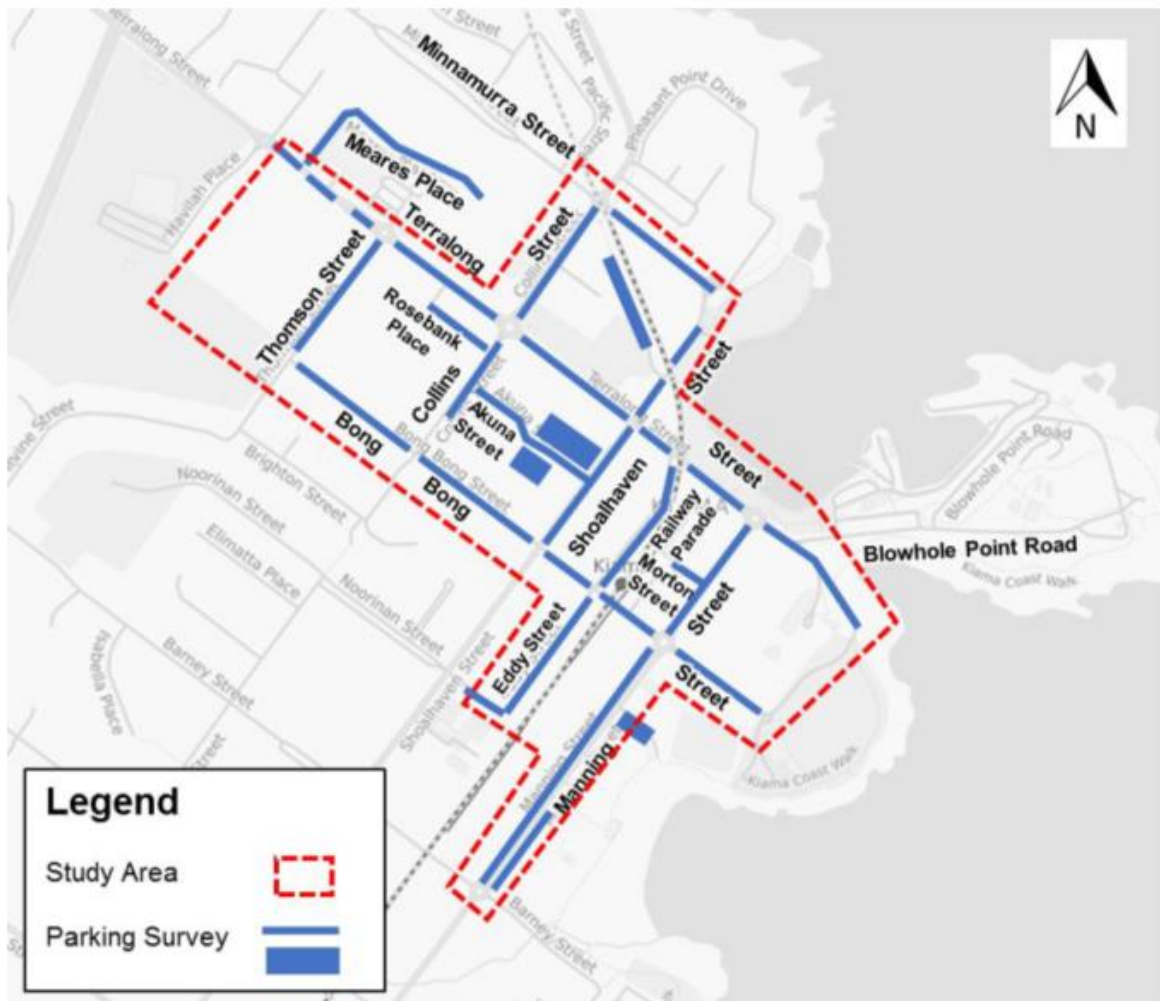


10.2 Existing Parking Demand

10.2.1 Parking Surveys

Parking surveys at hourly intervals and a parking inventory were undertaken for all public, Council-operated carparks and on-street parking within the study area. This includes the two off-street car parks on Akuna Street, and the off-street car park on Manning Street, adjacent to Coronation Park. The inventory noted the parking restrictions and supply at the time of the surveys. Each parking area was disaggregated based on parking restrictions and the number of parking spaces was recorded. The parking occupancy survey methodology was to undertake a single “run” of data collection per each of the 3 x 1-hour survey periods.

The locations of the parking surveys are shown in Figure 10.2.



Source: OpenStreet Map

Figure 10.2: Parking Survey Area



The surveys were undertaken for the dates and time periods shown in Table 10.2.

Table 10.2: Parking Survey Periods

Date	Day	Survey Time (hourly intervals)
16 July 2020	Thursday (AM)	6:00 AM to 9:00 AM
16 July 2020	Thursday (PM)	4:00 PM to 7:00 PM
18 July 2020	Saturday (Weekend)	10:00 AM to 1:00 PM

10.2.2 Parking Demand

The surveyed parking occupancy is shown in Figure 10.3 below. This shows that parking demand is highest on the Saturday, with lower usage during AM and PM peaks on weekdays. The weekday parking survey shows that the peak demand occurs between 4:00-5:00 PM. During this period, the area-wide parking occupancy is 26%. As such, there is ample parking supply in the overall parking area to accommodate weekday peak period demand.

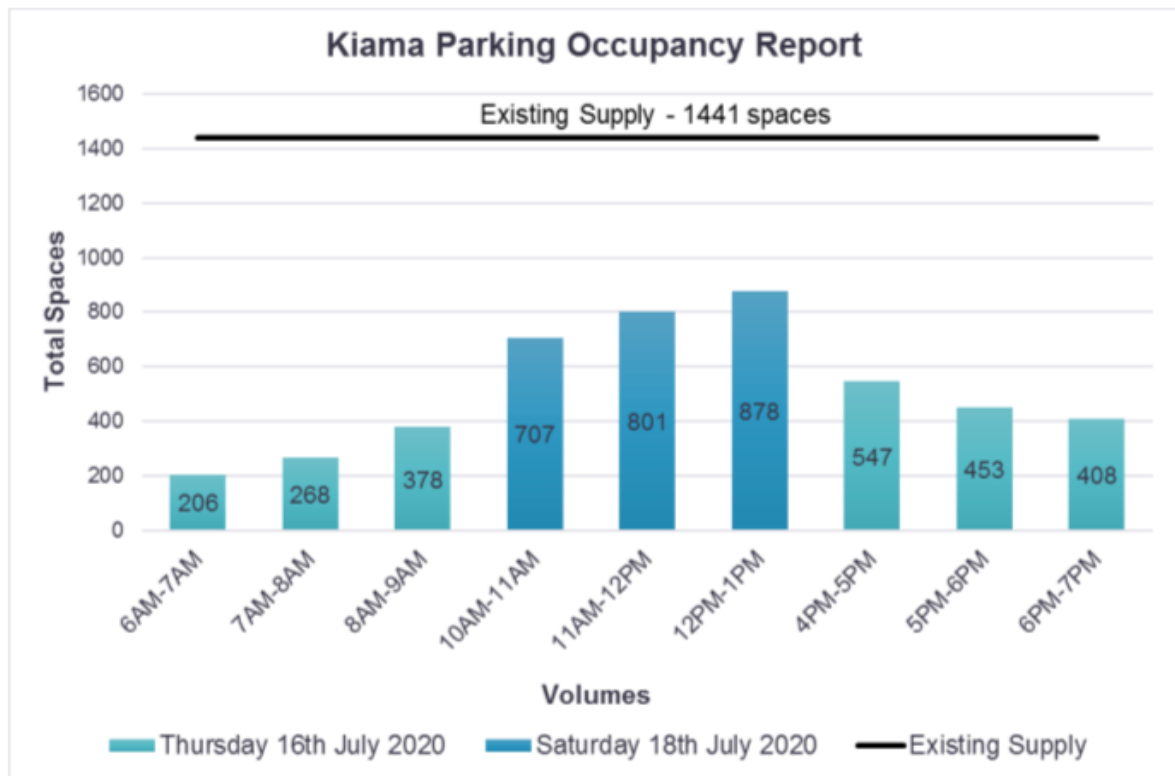


Figure 10.3: Kiama Town Centre Parking Occupancy

The maximum parking occupancy over the study area was recorded at 61% on the Saturday at 12:00PM. This indicates that there is potential to target improving the parking situation at Kiama by improved balancing and spread of parking across the town centre area.

The parking data was processed and mapped using ArcGIS. Maps of each hour of the survey were created to identify hotspots of parking occupancy. Figure 10.4 shows the parking occupancy for the peak one-hour period on Saturday.





Figure 10.4: Parking Occupancy Map Example – Saturday 12:00 PM to 1:00 PM

Item 6.1

Attachment 1



This demonstrates the primary issue of the parking situation in Kiama, where Terralong Street experiences very high parking occupancy, however there is significant parking availability in nearby streets, including the off-street car parks. There are a number of reasons for this:

- Kiama draws large tourist numbers who are unfamiliar with the area, and so default to highly visible parking areas along Terralong Street
- Terralong Street is the closest parking area to their destination of the shops, cafes, parks, and beaches
- Signage directing drivers to alternative parking areas is limited, noticeable by low usage of Akuna Street car parks
- Steep gradients make it less desirable the walk to/from parked vehicles south-west of Terralong Street
- Lack of quality connections (laneways and footpaths) between the Akuna Street Car Park and Terralong Street.

The high demand parking along Terralong Street between Collins Street and Shoalhaven Street also leads to increased delays on the road network, as the mandated front-in angled parking results in drivers reversing out of parking spaces.

The parking spaces within the commercial hub at all areas of Terralong Street experience low usage throughout the AM peak, with key areas of Terralong Street between Collins Street and Shoalhaven Street peaking at 50% occupancy. This is likely due to many of the day visitors not yet arriving to the Kiama area. The PM peak sees higher visitation, with the same parking areas reaching between 60% and 100% occupancy. The PM peak reached capacity on Terralong Street between Thomson Street and Collins Street.

Residential streets west of Terralong Street are not heavily utilised throughout a typical weekday. These parking spaces are not believed to service the commercial hub of the study area and are primarily utilised by residents.

The TCS separates the Kiama area into the Westend, Harbourside, and Surf Beach precincts. The parking surveys indicated that the highest levels of parking demand were predominantly located in the Harbourside Precinct.

This is likely due to the area covering the most popular section of Terralong Street where the majority of the shops are located, along with parks and beaches access points. Other key areas of focus are the sections of Terralong Street in the Westend Precinct, and parking areas near Coronation Park and Surf Beach.

These are shown in Figure 10.5.



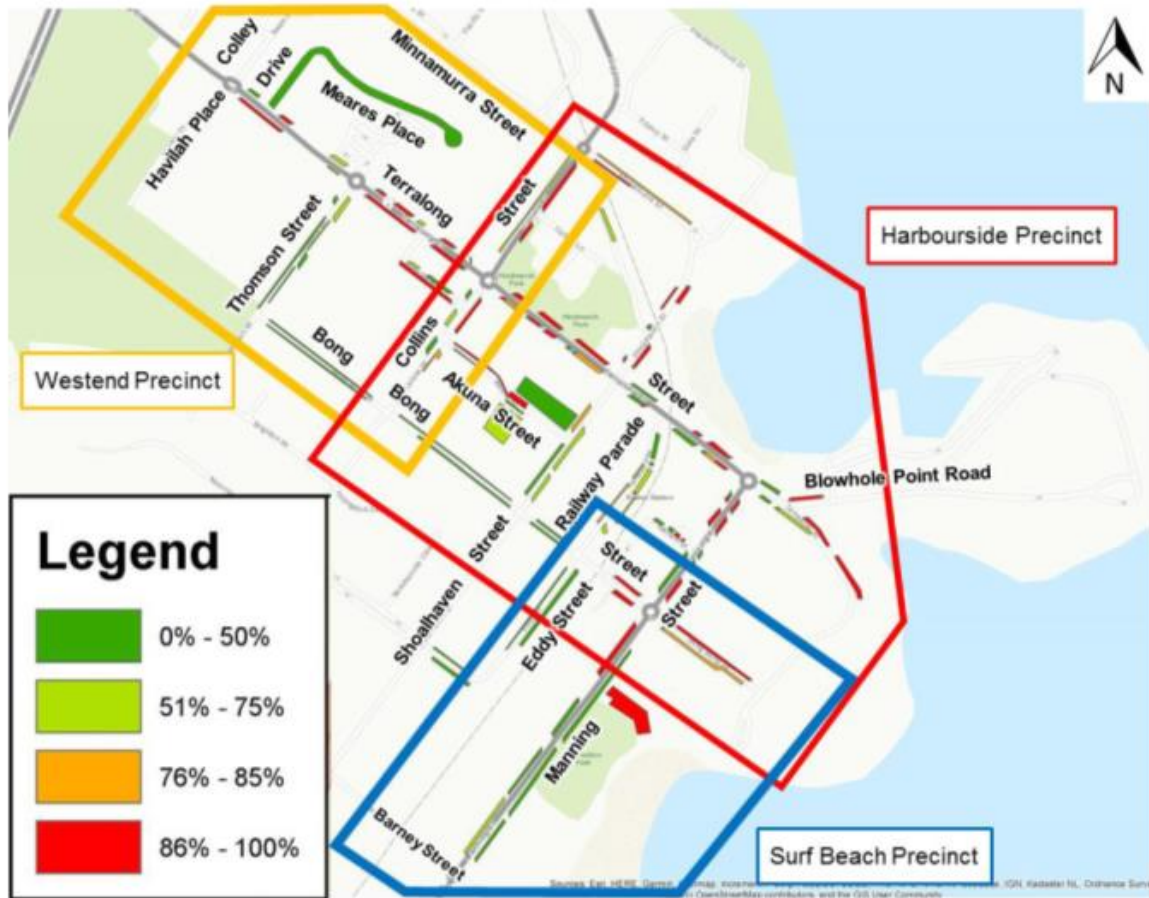


Figure 10.5: Kiama Parking Precincts – Saturday 12:00 PM to 1:00 PM

Areas of particular high/low occupancy during the peak visitation period of Saturday 12:00 PM - 1:00 PM:

- Westend Precinct:
 - High occupancy of Terralong Street
 - Low occupancy on surrounding residential streets such as Thomson Street.
- Harbourside Precinct:
 - Very high occupancy of Terralong Street, Collins Street, Minnamurra Street and Shoalhaven Street north of Terralong Street
 - Low occupancy of the two off-street car parks in Akuna Street
 - Low occupancy of Shoalhaven Street south of Terralong Street
 - Low occupancy of Bong Bong Street.
- Surf Beach Precinct:
 - High occupancy at Terralong Street near Blowhole Point Road
 - High occupancy of car park near Coronation Park, but low occupancy of surrounding on-street parking despite having same restrictions as car park.

All parking maps are available in **Appendix B**.

The data also reveals that during peak demand, spill over parking mostly occurs to the north and south-east, but not west, despite these areas operating at 2P restrictions and the western areas being mostly unrestricted. Likely reasons include:



- The flatter geography of the northern and south-eastern areas is more desirable for walking compared to the hilly sections west of Terralong Street
- The south-eastern area is located near beaches, and has walking paths up to the Kiama Blowhole
- Drivers exiting the Princes Highway onto Gipps Street will naturally pass parking areas on Collins Street as they approach the town centre, showing them the additional parking option.

Weekend parking is overall higher across the town centre precinct, especially along Terralong Street where many of the 2P and 4P areas reach 100% occupancy across multiple survey hours. This also leads to parking spill over into surrounding streets which does not experience the same level of parking occupancy during the weekday. Residential streets further away from the commercial centre still recorded low occupancy.

The two public car parks on Akuna Street experienced lower than expected occupancy both during the weekday and weekend surveys, peaking at 29% occupancy during the weekday survey and at 52% on the Saturday. This is surprising given the close proximity to the town centre. It was noted that there is little wayfinding signage from Terralong Street to the car parks, so tourists and people unfamiliar with the area are unlikely to know about the car park.

10.2.3 Kiama Railway Station

Kiama Railway Station is serviced by three main parking areas. Two are on-street parking areas on Eddy Street providing a total of around 70 unrestricted parking spaces which also are used by nearby residences. A commuter car park, opened in early 2014, is located on Bong Bong Street, south of the rail overpass bridge. This provides around 44 spaces and is free to use for commuters, and for a fee for other uses. Parking areas on Railway Parade north-west of Bong Bong Street are all time restricted to either 2P and 4P during weekdays and Saturdays and are therefore not used by commuters. These parking areas are shown in Figure 10.6.

Some commuters also park on Bong Bong Street outside residential properties. Additional parking is available on Noorinan Street, outside the Kiama Bowling and Recreation Club, around 230 m from the station. It is expected that this would only be used should other parking areas be at capacity, which according to parking surveys is not observed.

Historical aerial images were analysed as part of this study. For further detail, refer to Section 10.3. While the analysis showed that in general the parking hotspots were common between the surveys and the historical images, however, the parking occupancy in the commuter car parking areas was significantly higher in the aerial images. Of the 7 historical images analysed, three of the dates were above 98% occupancy on the south-eastern side of Eddy Street, and the north-western side were above 75%. The surveys recorded an occupancy 38% on the weekday and 34% on the weekend survey respectively for the angled parking. This suggests that there is a large number of people who would usually have commuted to other parts of NSW for work via train are working from home due to the COVID-19 pandemic. The high parking occupancy was observed to also have a minor spill-over effect onto Bong Bong Street, with some historical images recording 60-70% occupancy.

Noorinan Street consistently had low occupancy during both the historical analysis and surveys, despite being around 250m from the train station. It may be useful to designate this is an overflow commuter parking area as it is unlikely that the peak times of commuter parking demand would overlap with time of parking demand for the Kiama Bowling and Recreation Club.

It should be noted that the off-street commuter car park was not captured within the parking surveys.

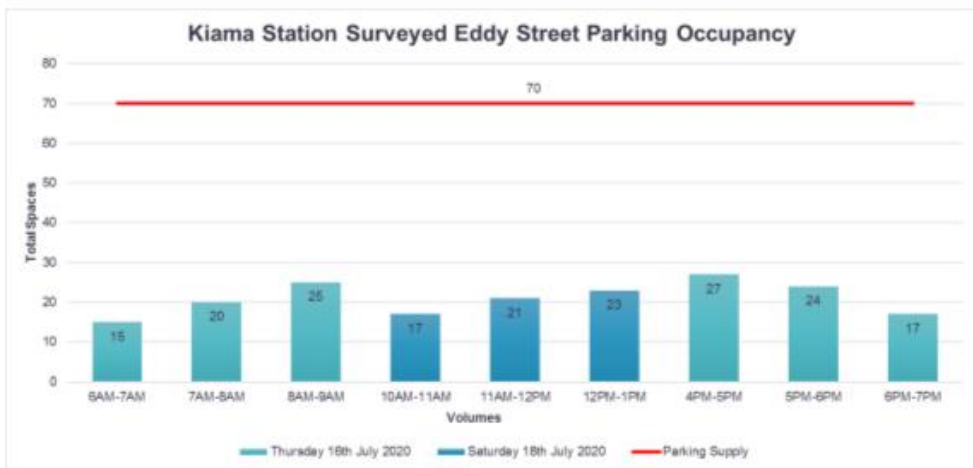




Aerial image sourced from NSW Spatial Map Viewer

Figure 10.6: Kiama Railway Station Commuter Car Parking

The surveyed parking occupancy for the on-street commuter parking areas on Eddy Street is shown in Figure 10.7.



Aerial image sourced from NSW Spatial Map Viewer

Figure 10.7: Kiama Railway Station Car Parking Occupancy



The parking surveys indicate that the on-street parking occupancy at Kiama Railway Station is generally lower than the rest of the study area, however, the historical analysis indicated that there is substantial demand for commuter parking. It is recommended that off-street commuter car park be restricted to commuters only.

10.3 Historical Parking Analysis

In order to determine if the parking surveys were an accurate representation of standard occupancy, historical aerial images were sourced from Nearmap and analysed to assess parking occupancy throughout the year. Furthermore, this allowed a greater understanding of the impact of the COVID-19 pandemic on traffic and parking issues. Aerial images were obtained for the following dates

- Monday 3 December 2018
- Friday 25 January 2019
- Friday 29 March 2019
- Tuesday 21 May 2019
- Sunday 21 July 2019
- Tuesday 15 October 2019
- Tuesday 19 November 2019.

Each aerial was disaggregated into separate parking areas using the same grouping as the parking surveys.

On many of the aerial images, some parking areas were obstructed by trees and foliage. Where this occurred, these areas were omitted from overall parking occupancy analysis. The only data points considered were ones where the parking view was unobstructed on every aerial image.

Table 10.3: Aerial Parking Images and Surveyed Data

Date	Aerial Images							Survey	
	3/12/18	25/01/19	29/03/19	21/05/19	21/07/19 ^T	15/10/19	19/11/19	16/06/20	18/07/20 ^T
% Occupied	57%	47%	61%	60%	49%	27%	62%	37%	56%

^T = Weekend Date

The aerial images show that the weekday surveys are consistently higher than the surveyed weekday date, with the aerial images indicating peak occupancy of 62%, whereas the surveyed weekday was 37%. There are number of reasons as to why this is the case:

- The parking survey ended at 9 AM, but the highest parking activity on-site was observed to be around midday
- Trips to Kiama were reduced due to the COVID-19 pandemic
- The parking surveys were undertaken in winter which has been observed to be on the lower end of visitation.

The weekend surveys were similar in occupancy, with 49% from the aerial image and 56% from the survey. It should be noted that the aerial image was recorded on a Sunday, whereas the survey was a Saturday.

A limitation of this approach is that the hour of the day of the aerial image is not provided when capturing the images. This can cause usual data points, for example, the 15/10/19 aerial image recorded 27% occupancy, but long shadows were visible indicating it was late in the day when most of the day trip visitors would have already departed the area.



It is therefore considered necessary to scale our weekday parking volumes to reach the 62% occupancy of on the aerial image captured on 19/11/2019. This would involve increasing the surveyed data by 70%. This analysis is captured in Section 10.5.4 Sensitivity Analysis.

10.4 Parking Policy Considerations

10.4.1 Target Occupancy Levels

Applying a typical parking hierarchy as seen in Figure 10.8, many of the parking areas along Terralong Street are above the >85% and >90% parking occupancy levels, indicating significant overutilisation. While the standard action for this area in isolation is to reduce time limits, the existing restrictions along Terralong Street are already at 1/2P or 2P and any further reduction in parking time allowance would most likely impact on the surrounding restaurants and businesses as patrons would not have sufficient time to visit the shops while also enjoying the parks, beaches and other attractions near Kiama town centre. As some parking areas were recorded with less than 45% occupancy despite having no parking restrictions, the goal instead will be to balance the parking across the precinct as there are other areas with substantially lower occupancy.

Parking Management Strategies which put less emphasis on increasing supply and focus on managing existing parking provisions and promoting the use of alternative transport modes that reduce parking demands are considered to be essential for the future sustainability of the Kiama Town Centre.

The parking hierarchy should be reviewed in the future taking into consideration future potential parking strategies. Parking hierarchies should be simplified if possible and not split within parking facilities. Future installation of technologies such as gated systems and potential pay parking requirements may need to be considered. Duration of Stay surveys can be used to assess parking hierarchies to determine the most effective and efficient use of the parking areas as well as identify levels of compliance.

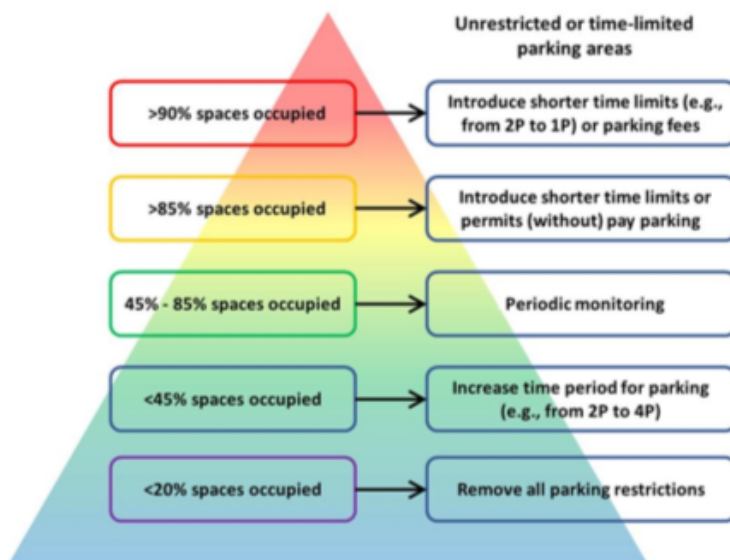


Figure 10.8: Typical Parking Hierarchy



10.4.2 LEP Modifications

Section 4 of the Kiama TCS includes a number of changes to the Kiama Local Environmental Plan (LEP) that may have implications on the parking situation in the area. The changes, impacts and mitigation measures are detailed in Table 10.4 below:

Table 10.4: Parking Impacts due to LEP Modifications

LEP Change	Location	Change	Potential Impact	Mitigation
Rezoning	Court House. Post Office. Police Station. Cottage.	SP2 Infrastructure to SP3 Tourist	SP3 does not exist in Kiama, however, in Sutherland Shire, a wide variety of land uses are permitted under this zoning. These facilities generally require parking on-site. Parking impacts manageable through DA process.	None required, parking impacts to be addressed through impacts of individual developments in this zoning.
	Council Chambers Terralong Street, between Havilah Place and Thomson Street Rosebank Place	SP2 Infrastructure to B2 Local Centre	This zoning will increase commercial space in the Kiama Town Centre, and as a result will bring in additional trips to these areas from employees and people using the business services. These trips will require additional parking.	Enforce Kiama DCP parking requirements for each development in the rezoned areas to ensure that each business results in no net worsening of parking occupancy of on-street parking.
	Bowling Club	RE2 Private Recreation to R3 Medium Density, includes relocation of Bowling Club to proposed Leagues Club carpark site	R3 Medium Density will have its own off-street parking for residents and visitors. The impacts of the Bowling Club relocation should be assessed by its own project.	Enforce Kiama DCP parking requirements to ensure that the medium density residential developments provide sufficient parking to result in no net worsening of off-street parking. Ensure Bowling Club parking demands are captured within their private off-street parking areas at their new location.
Building Height	Bong Bong Street / Shoalhaven Street intersection. Terralong Street between Havilah Place and Thomson Street. Rosebank Place.	Increase R2 Local Centre to 11m (3 storeys)	Additional residents over the same area, resulting in an increase in the number of resident and visitor vehicle trips. Can lead to parking overflows onto surrounding streets.	Ensure all proposed developments are in compliance with Kiama DCP, so all increases in vehicle trips are captured within on-site parking. If this is carefully managed through the development process, there should not be parking
	Car Park off Akuna Street Council Chambers.	Increase to 13.5m-19m (4 storeys)		



LEP Change	Location	Change	Potential Impact	Mitigation
Floor Space Ratio	Eddy Street	Increase to 11m (3 storeys)		spillover onto on-street parking spaces.
	Havilah place	Increase to 23.5m (7 storeys)		
	Eddy Street	Increase to 1:1		
	Thomson Street, between Terralong Street and Bong Bong Street.	Increase to 1.5:1		
	Terralong Street, between Havilah Place and Thomson Street.			
	Rosebank Place.			
Bowling Club	Increase to 1:1	Increase in vehicle trips. Depending on detailed site testing.	Ensure the development is in line with Kiama DCP.	
Havilah Place	Increase, subject to detailed site testing			

Therefore, the proposed LEP changes are deemed to be manageable within the context of the Kiama DCP. All proposed developments should capture the increase in parking within their off-street parking supply.

10.5 Future Parking Demand and Impacts

10.5.1 TCS Proposal Impacts

The four proposals assessed in Sections 6 to 9 will result in an overall permanent reduction in parking supply of 42 spaces in the Kiama Town Centre area as follows:

- Proposal 1: Loss of 8 spaces to provide TfNSW-compliant no stopping area for installation of wombat crossing on Terralong Street, between Collins Street and Shoalhaven Street
- Proposal 3: Loss of 5 spaces for intersection realignment at Terralong Street / Railway Parade. It is noted that while the *Summer Streets Program* is in operation, these spaces would be removed anyway
- Proposal 4: Loss of a total of 29 spaces, separated as follows
 - 7 spaces to install zebra crossings at three legs of Terralong Street / Collins Street roundabout (Section 9.3)
 - 13 spaces to install wombat crossing at Collins Street / Akuna Street intersection (Section 9.3.3.2)
 - 9 spaces for intersection reprioritisation at Terralong Street / Blowhole Point Road intersection (Section 9.8).

During the *Summer Streets Program* that forms Proposal 2, there will be a temporary loss of 26 2P, 3 accessible, and 2 police parking spaces from existing supply on Terralong Street between Railway Parade and Manning Street. This includes the 5 spaces lost for Proposal 3, so the net reduction in spaces across all proposals would be 68.

The result is an overall reduction in permanent parking availability from 1441 parking spaces across the study area 1399 spaces, and temporarily to 1373 spaces during the *Summer Streets program*.

Figure 10.9 shows the proposed parking that is to be removed to accommodate the local traffic changes.



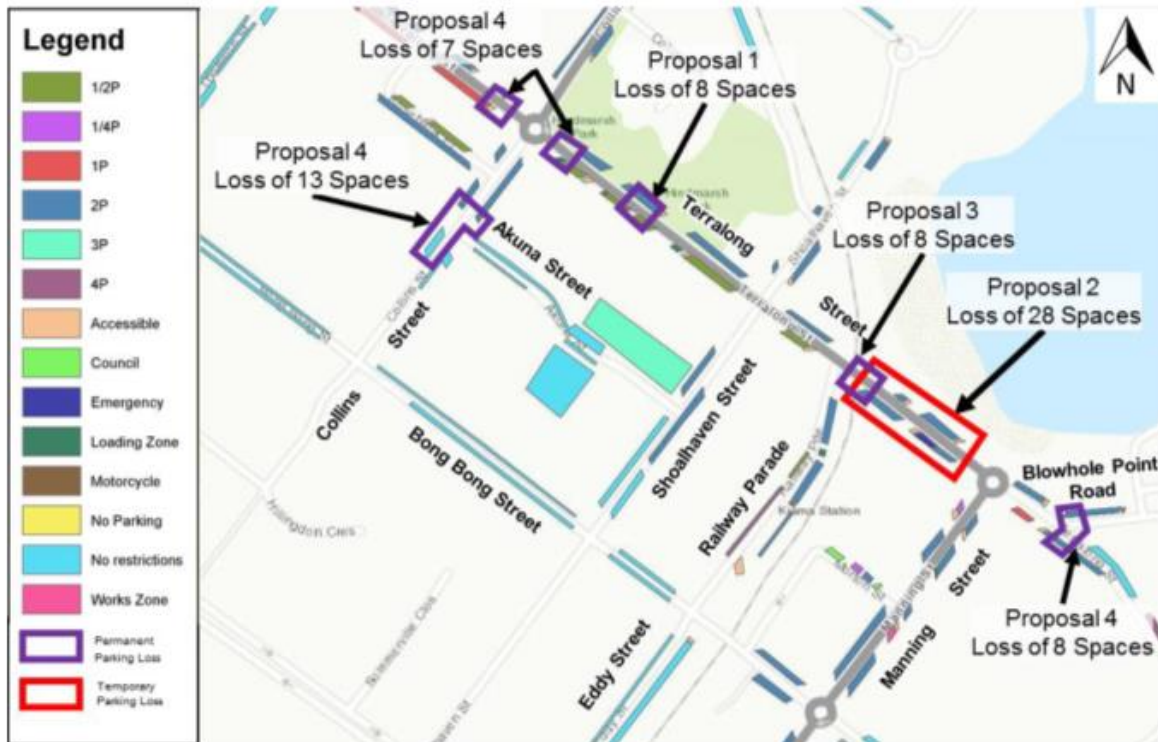


Figure 10.9: Removed Parking due to Proposal Actions

Surveys indicated that the parking areas that are to be removed for the *Summer Streets* program experience some of the highest levels of demand in the entire town centre area, consistently reaching 100% occupancy during the Saturday survey. As an area of high parking occupancy, this loss of parking will need to be accommodated elsewhere in the precinct or other high-demand parking areas along Terralong Street will experience further utilisation and pressure.

The most likely areas that this displaced parking demand would redistribute to would be Railway Parade and Manning Street, as Terralong Street east of the closure area is generally at capacity at the same time. Parking on Railway parade was recorded at being in the 0%-75% ranges so some of the additional demand can be accommodated here. Additionally, parking on Eddy Street was also recorded below 50% and can capture the remainder of the demand. This parking area is around 300m from the *Summer Streets* closure area, so falls within the typical 400m walking distance limit.

It should be noted that this parking redistribution has not been manually undertaken as the parking surveys indicate there is already sufficient parking availability in nearby parking areas to absorb the parking loss.



10.5.2 Kiama Developments

It is understood that a number of key developments are proposed for the Kiama area that have implications for the parking situation in the town centre. These include a mixed-use development on the north-western side of Akuna Street, a subdivision and residential development at Spring Creek, and the Kiama Arts Precinct.

Akuna Street Mixed-use Development

These include a mixed-use development consisting of retail shops, commercial premises, and 98 units located on the north-western side of Akuna Street.

This area includes one of the public off-street car parks on Akuna Street. It is understood that the purchase of this area from Council is still being negotiated. Kiama TCS Action H04 – Central Retail Attractor directly addresses this item.

It states that it may be a suitable location for a supermarket, along with expanded off-street parking potentially in the form of a multi-level car park. Such a facility would draw a large number of additional visitors to the area, who would desire to park on-site. Once the plans for the development of this site are further progressed, traffic modelling is recommended to quantify the impacts and determine if surrounding road upgrades are necessary to service the facility as part of the standard application process for a development of this nature.

It is critical that any future development at this site include parking for the new supermarket in line with Council's DCP in addition to the existing parking supply in the car park. Given that this car park currently services the Kiama commercial hub on Terralong Street in general, it is recommended that this parking area be kept open for use by the general public, even if they are not using the proposed retail facilities. Restricting the use of parking to shop users only would result in further parking pressure on the surrounding areas which already operate near or at capacity.

Part B of the KTCS has identified the development as unlikely to go ahead, but the proposed additional parking would be a substantial benefit to the Kiama Town Centre.

Spring Creek Subdivision

The other main proposed development is a subdivision and residential development at Spring Creek, accessed via Dido Street and Ridell Street near Bombo Railway Station. This would consist of a number of new residences, which would have their own off-street parking facilities. These residences are approximately 1.5km from the Kiama Town Centre which is likely to be outside the standard walking distance for residents for regular trips such as grocery shopping. The highly undulating nature of Kiama makes it less likely that these residents would walk to the town centre.

Kiama Arts Precinct

The Kiama Arts Precinct is a proposed development that would be located adjacent to the old fire station building on the northern corner of the Terralong Street / Shoalhaven Street intersection. This would include an art centre, refurbished community centre with artist working spaces, an outdoor stage. Design plans released in July 2020 show a two-storey plan which includes a large performance space, studio workshops, a restaurant, galleries, a social space and ancillary storage and office areas. The site plans only include 10 standard and two accessible parking spaces, so all parking impacts from this development would be captured in nearby public on- and off-street parking. The total area of the site is expected to be around 1560m² and would include around 200 seats in the main stage seating area. While the Kiama DCP does not have a stipulated parking rate for a development of this nature, Sutherland Shire Council stipulates a rate of 1 space per 3 seats for an auditorium attached to a registered club or nightclub. Applying this rate to the art precinct would result in a 67 parking spaces required for the auditorium area.



Additional parking would also be needed for the gallery and restaurant sections, as well as staff and performers, potentially being up to 100 spaces required in total. With 12 spaces supplied, this results in a shortfall of 88 spaces that will need to be captured by existing parking areas in Kiama.

Figure 10.10 shows a 400-metre distance surrounding the proposed art precinct, indicating the limits of walking distance for most patrons. The parking surveys indicate that most of these parking areas are already near capacity. Furthermore, many of them are short-term, 2P parking areas which may not be suitable for longer-form productions at the art precinct. Patrons are likely to either circulate Terralong Street and Shoalhaven Street looking for parking, or be forced to park further away on Bong Bong Street or Akuna Street. Additional parking facilities are considered to be necessary for this development.



Aerial image sourced from NSW Spatial Map Viewer

Figure 10.10: Kiama Arts Precinct Walking Distance



A number of pending developments in the KTCS Part B include:

- Kiama Fair: Extension of the centre to include an additional supermarket, specialty stores, and double-deck car park
- 47 Thomson Street: Demolition of existing building and construction of multi residential building consisting of 12 units
- 10 Bong Bong Street: Demolition of existing motel, construction of 9 serviced apartments, 10 residential units, 2 shops & 21 lot strata subdivision.

Approved developments in the area include:

- 23 Meares / 33 Collins Street: 55 independent living units, 3 caretakers apartments, 1 shop, 78 parking spaces over two levels
- 23 Manning Street: Ground level commercial with 5 units of shop-top housing
- 44 Manning Street: Demolition of existing building and construction of 3 storey mixed-use development consisting of ground floor commercial/retail space, 17 shop-top dwellings and associated parking.

Each of these developments is centrally located to the Kiama Town Centre and should be expected to capture all of its DCP parking requirements on-site. Parking around these sites is at a premium, and any shortfall in parking should have been captured in developer contributions.

A number of other strategic opportunities proposed in the TCS such as the Kiama Visitor Information Centre, Fish Markets, and Surf Live Saving Club fall outside the scope of this project.

These developments are shown in Figure 10.11 below.



Figure 10.11: Proposed Developments Near Kiama



It is considered justifiable by Council to implement contribution requirements for all new residential developments within a reasonable travel distance to the Kiama Town Centre (excluding the town centre itself). This acknowledges that there are two ends to a trip as the majority of residents in the broader Kiama area and surrounding towns/villages that use parking facilities within the town centre. An example of such a development is the residential subdivision north of Kiama, where large numbers of residents will drive between their house and the Kiama Town Centre on a daily basis. This will increase the parking demand in the area and may push some areas past desirable occupancy levels.

As developments such as this are large areas to levy upon, it would provide a significant opportunity to obtain the necessary funds to assist with provisioning additional parking in the CBD. It has the potential to fund 50% of the costs of providing additional parking in the town centre, and in effect providing commercial/retail developers with a 50% discount on the current cost of levying for parking in the Kiama Town Centre.

This action would be in line with the *Kiama Economic Development Strategy (2014)*, which suggested an “increased supply of commercial development potential through a review of existing planning controls”. It also addressed that “residential infill development sensitive towards community concerns of overdevelopment and loss of valued village character”. By having these large residential developments outside of the Kiama Town Centre supported with appropriate planning controls, the character can be retained while providing additional infrastructure partially funded by the levies.

In consideration of future sustainability of the town centre, it is recommended to consider reduced retail and commercial rates for the Kiama Town Centre to promote new businesses that are required to provide contributions in lieu of parking while outside the town centre.

An infrastructure levy could be considered for Kiama to increase funding for future parking facilities which would ideally be introduced to all new developments (including residential dwellings) within Kiama.

10.5.3 Kiama Growth Analysis

A trend analysis of the population data of Kiama sourced from profile.id, which sources data from the Census, shows that population is increasing at 1.4% growth per year. The impacts of these developments are captured within this growth rate. Applying this as yearly growth over a 10-year period over the surveyed occupancy is shown below in Figure 10.12.

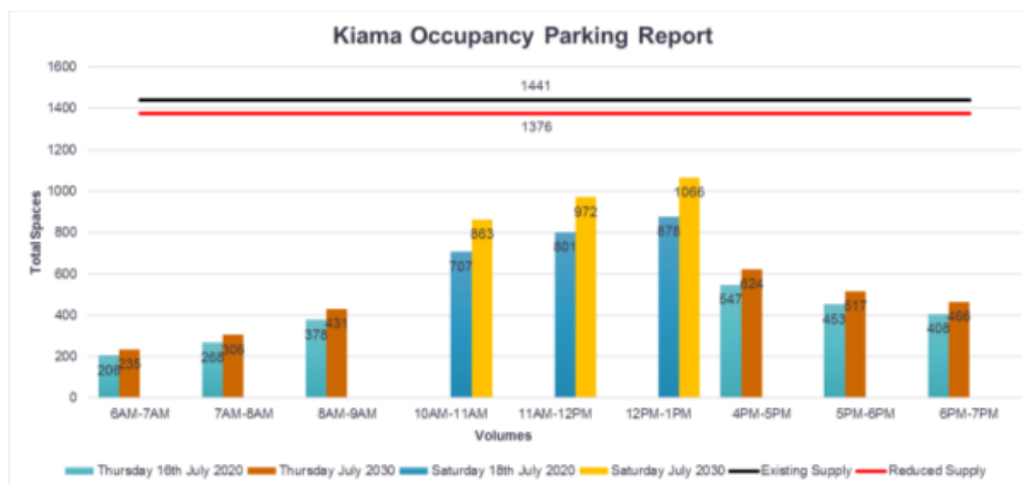


Figure 10.12: Projected 10-year Parking Growth

Figure 10.12 indicates that there is still sufficient parking supply available across the Kiama Town Centre precinct even with the removal of parking spaces outlined in Section 10.5.1.



10.5.4 Sensitivity Analysis

Sensitivity analysis was undertaken to assess the parking supply against potential fluctuations in demand, such as special events, with the goal to observe potential parking impacts. While no seasonal or month-by-month tourist visitation data was available for this assessment, the sensitivity analysis would provide an understanding of the impact of any non-typical increased demands on parking. The number of parking spaces occupied for the surveyed time periods was increased by 25%, 50%, and 75% to capture a wide range of parking situations. These are shown in Figure 10.13 below.

The data indicates that even scaling the weekday peak surveyed occupancy by 75%, the total is only slightly higher than the peak surveyed weekend occupancy.

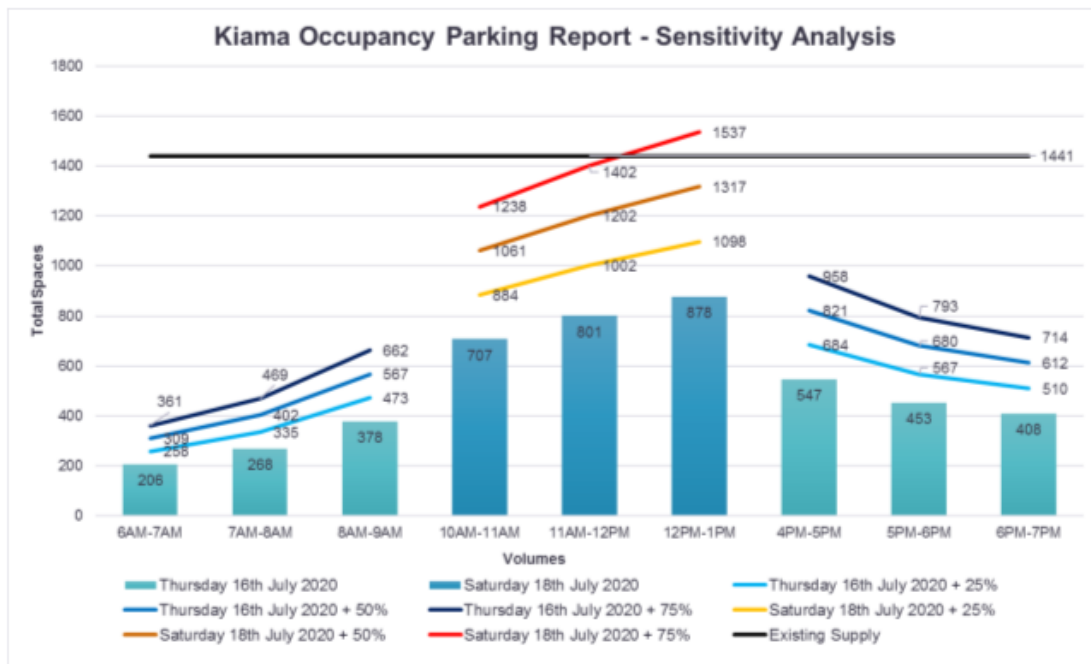


Figure 10.13: Parking Occupancy Sensitivity Analysis

This data is tabulated in Table 10.5 below.



Table 10.5: Projected Summer Parking Occupancy – Spaces Occupied

Day	Time	Survey	Survey + 25%	Survey + 50%	Survey + 75%
Thursday	6:00AM	15%	18%	22%	26%
	7:00AM	19%	24%	29%	34%
	8:00AM	27%	34%	41%	47%
	4:00PM	39%	49%	59%	68%
	5:00PM	32%	41%	49%	57%
	6:00PM	29%	36%	44%	51%
Saturday	10:00AM	51%	63%	76%	88%
	11:00AM	57%	72%	86%	100%
	12:00PM	63%	78%	94%	110%
Parking Supply		1441			

This indicates that for most situations there are still a number of parking spaces available and that the area may be under substantially more pressure in terms of parking during the summer months.

For the worst-case scenario (survey+75%), the parking space demand exceeds the entire parking supply of the Kiama Town Centre, however, it is considered highly unlikely that the parking occupancy would reach this level in usual circumstances and designing the parking supply to accommodate this level of demand would not be an efficient use of resources.

10.6 Recommended Parking Actions

A number of recommendations to be implemented in the short-term and long-term are described below and illustrated in Figure 10.14.



Figure 10.14: Parking Recommendations Map



10.6.1 Short Term

Increased Parking Wayfinding Signage

The parking occupancy surveys indicated that the Akuna Street off-street car parks are underutilised relative to the rest of the town centre. Currently, the only signage leading to these car parks is located at the intersections of Akuna Street with Collins Street, and Shoalhaven Street. As most tourist drivers will approach Kiama from the Princes Highway, either from the north using Collins Street or the south using Manning Street, they would naturally search for parking along Terralong Street. As a result, they are unlikely to find the parking facilities on Akuna Street. It is recommended that parking wayfinding signage is included on these approaches to inform tourists who are unfamiliar with the area where they can find parking.

Improve Connections to Off-street Car Parks

Providing high quality pedestrian connections between the Akuna Street car parks and Terralong Street would encourage more customers to use these car parks, reducing demands on higher occupancy areas.

Designated RV Parking Areas

There are no designated RV parking areas in Kiama, so any large tourist vehicles often have to find space to park on side streets. A section of Shoalhaven Street near Bong Bong Street is suitable for RV parking due to the width of the road. This area is currently angled parking and would result in the overall loss of a few existing parking spaces as RV spaces are larger in size than standard vehicle spaces.

10.6.2 Long Term

Retain Public Access to Future Car Parks

Due to the hilly geography of Kiama, drivers are less likely to want to walk from their parking space to their destination. This leads to higher occupancy rates at the town centre and poor distribution and an imbalance across the rest of the area. The proposed expansion of public off-street car parking at the Akuna Street development would provide higher levels of parking availability. Furthermore, this would reduce traffic on Terralong Street as drivers do not need to use this road to reach this car park. Drivers would also spend less time searching for a space.

Once the Akuna Street development is operational, it is recommended that continued periodic monitoring is undertaken for the other off-street car park on Akuna Street to understand if further parking expansion is necessary.

Periodic Monitoring

To continue to monitor parking demands, it is recommended that a further parking survey is undertaken in five (5) years. This will assist in determining any required changes to parking demand management caused by new land uses or the growth of the Kiama Town Centre area.

It is expected that the expansion of the Akuna Street parking and corresponding parking wayfinding signage would result in a parking occupancy level in the 45%-85% range, which in accordance with the hierarchy in Figure 10.8 would justify periodic monitoring.



11. CONCLUSION

This study aimed to assess the traffic and parking impacts of several proposals which formed part of the Kiama Town Centre Study.

Proposals 1, 2, and 3 were deemed to be viable with a number of proposal-specific recommendations made to improve traffic flow and overall safety. The combined impact to network capacity was assessed using SIDRA modelling software and found to be negligible in 2021. Some safety concerns were noted and site-specific recommendations were included.

The SIDRA modelling assessed the opening year of opening (2021) and future year (2031) for the intersection improvements and route reconfigurations. The findings were that in general, all proposed road network and intersection modifications would operate with satisfactory levels of service, aside from the installation of pedestrian crossings at the roundabout at Terralong Street/Collins Street which reaches capacity by 2031. A concurrent study is being undertaken which includes more detailed traffic modelling using input from TRACKS modelling software.

Specifically, the findings and recommendations are:

Proposal One - Pedestrian Friendly Area on Terralong Street

This was found to be a viable modification and would generally improve pedestrian safety and mobility around the Kiama commercial centre. It is recommended that a wombat crossing be implemented to replace one of the existing rumble strips, with the other rumble strips being removed for consistency and to reduce confusion between drivers and pedestrians.

Recommendation: Remove existing rumble strips, implement wombat crossing.

Proposal Two - Partial Closure of Terralong Street

This proposal would facilitate a significant increase in pedestrian activity on Terralong Street. Opening year and future year SIDRA modelling demonstrated that the existing road network as well as proposed upgrades could both handle the redistributed traffic with negligible impacts to queuing and delays. The impacts from the redistributed traffic are manageable, especially when combined with intersection upgrades from Proposal Four.

Recommendation: Temporary closure is viable.

Proposal Three - Narrowing and Realignment of Terralong Street

This is similar to Proposal Two, and it was found that changing the priority movements would have a negligible impact on the traffic performance and would improve safety due to better sight lines between conflicting vehicles. A number of LATM measures were proposed to better facilitate the new configuration.

Recommendation: Realignment and modified priority should be implemented alongside supporting LATM measures.

Proposal Four - Intersection Upgrades

SIDRA intersection models were created for each intersection, with an overall network model created covering key intersections in the town centre. Although all proposals were modelled, not all upgrades were deemed viable, as some are limited by existing topography, and others do not meet RMS warrant requirements. The proposed signalisation of the intersection of Railway Parade and Bong Bong Street did not meet the traffic signal warrants due to low vehicle volumes.



Recommendations:

- Collins Street / Terralong Street: Implement zebra crossings on all legs, with additional supporting LATM infrastructure at southern leg
- Collins Street / Akuna Street: Implement wombat crossing and supporting LATM infrastructure
- Collins Street / Bong Bong Street: Implement raised platform across intersection
- Railway Parade / Terralong Street: Implement realignment and modified priority as per Proposal 3
- Shoalhaven Street / Bong Bong Street: Retain existing conditions or implement raised platform across intersection
- Terralong Street / Blowhole Point Road: Modify intersection priority to movements between Terralong Street and Blowhole Point Road
- Bong Bong Street / Railway Parade: Implement additional speed hump near crest of rail overpass.

At the intersection of Collins Street and Terralong Street it is recommended to implement zebra crossings across all legs on a 12-week trial basis to quantify in a real-world environment the benefit to pedestrian amenity and safety compared to the impacts to intersection performance. Additional LATM safety measures on the southern approach would be required.

Parking Analysis

The parking study found that there is a substantial parking imbalance between parking areas along Terralong Street compared with side streets nearby the town centre. This was deemed to be due tourists being unaware of alternative parking areas due to poor wayfinding signage as well as local topography issues.

The existing parking restrictions in key areas such as Terralong Street were deemed suitable for surrounding land uses. As such, balancing the existing parking demand across the precinct is the recommended approach.

It was also identified that any parking impacts generated from proposed LEP changes can be sufficiently managed through application of the Kiama Development Control Plan to ensure sufficient on-site parking is provided for any affected land.

A levy on residential developments outside the Kiama Town Centre is recommended to fund parking and transport infrastructure in the town centre. This would be in line with Kiama strategic economic documentation.

Recommendations:

- Short term: Increased parking wayfinding signage and dedicated RV parking spaces,
- Long term: Implementation of the proposed Akuna Street development at the existing off-street car park location and periodic monitoring
- Proposed LEP changes would not have negative impact.

All recommended actions in this study are shown in Figure 11.1.





Aerial image sourced from Nearmap

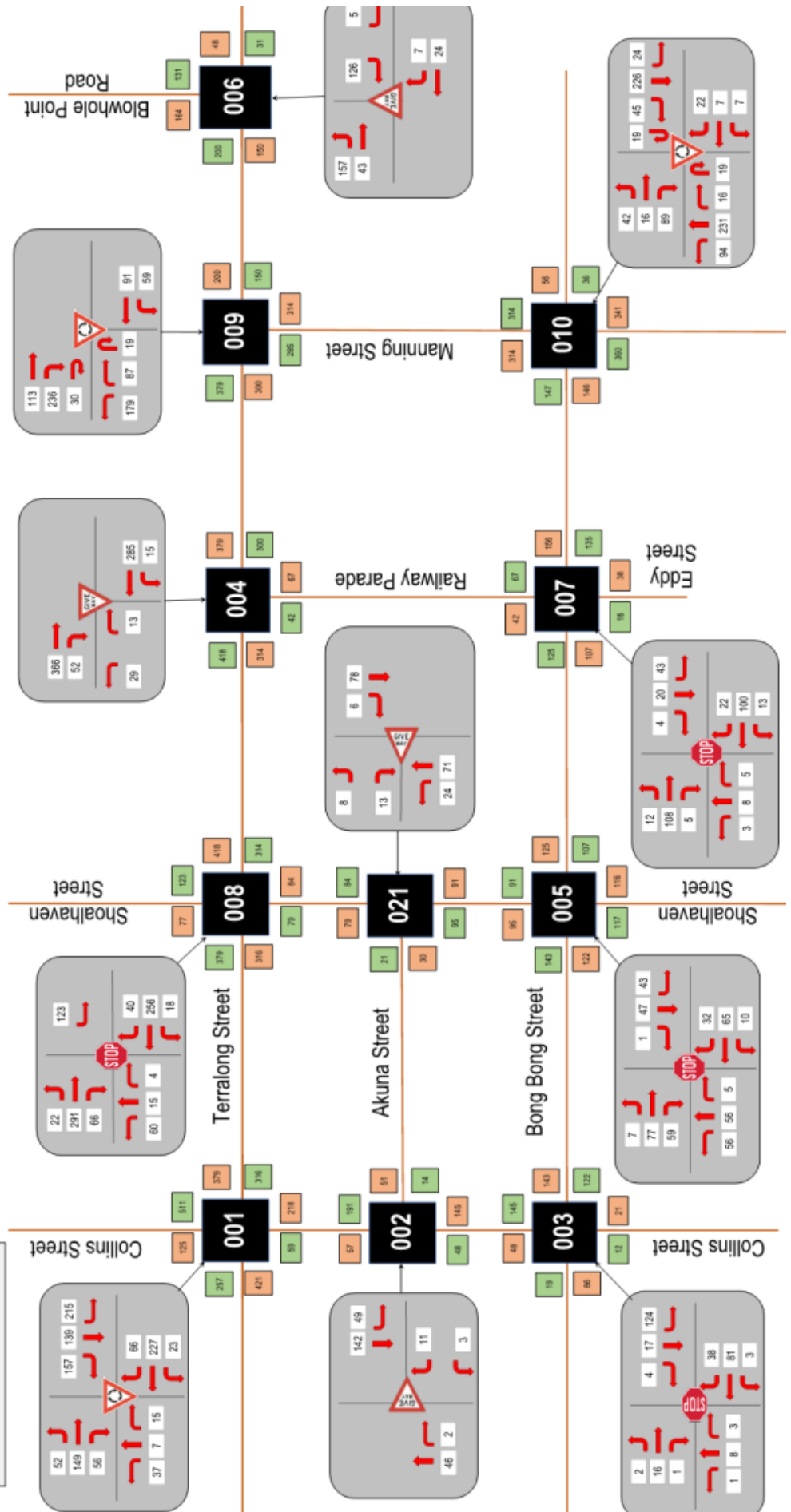
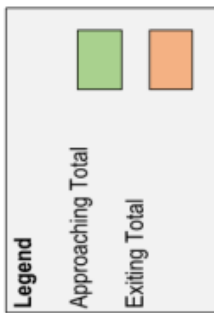
Figure 11.1: Recommended Actions



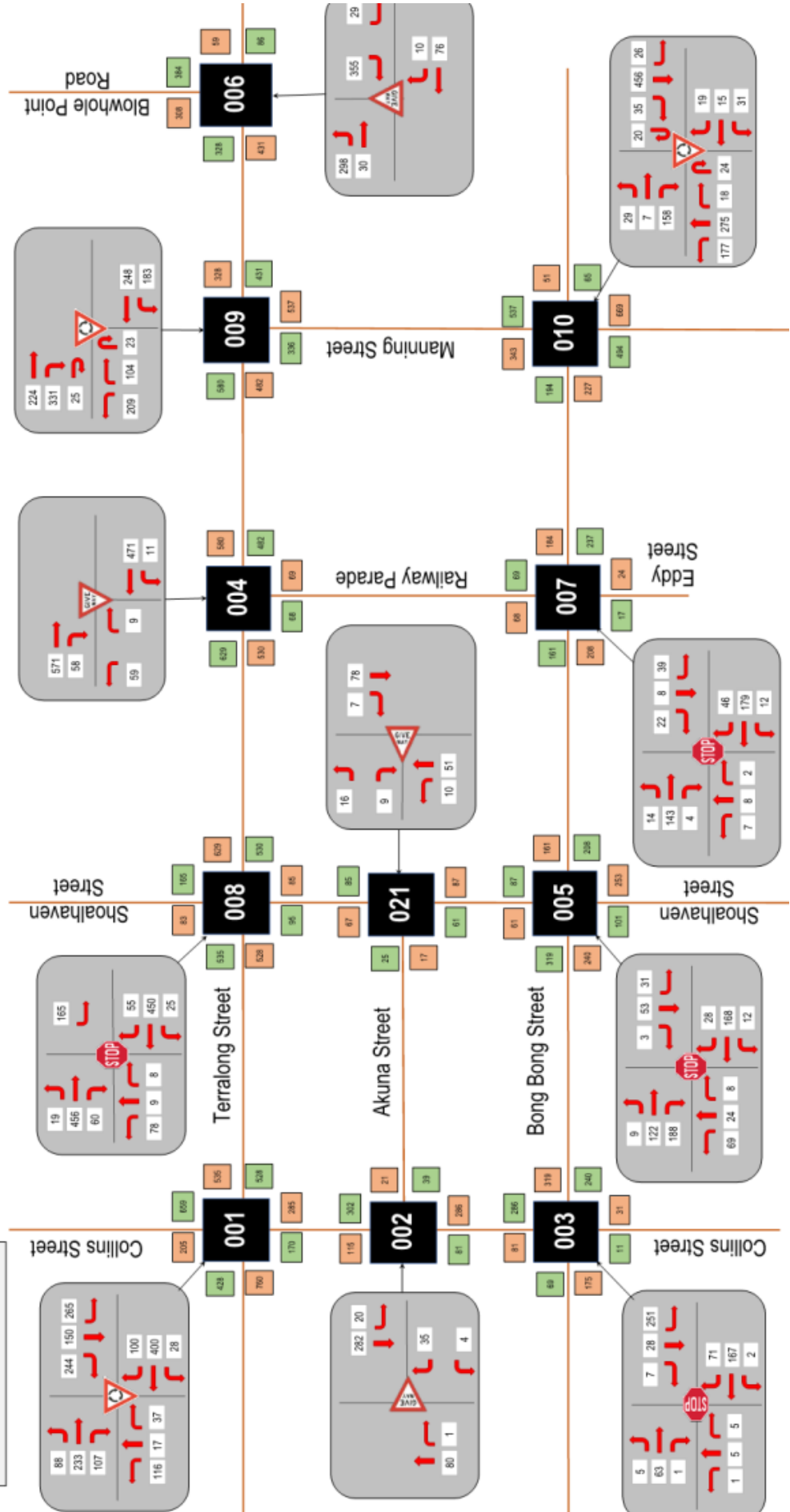
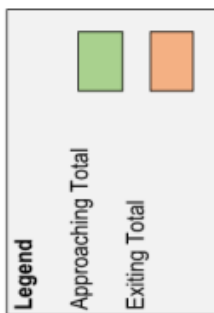


Appendix A: Traffic Volume Diagrams

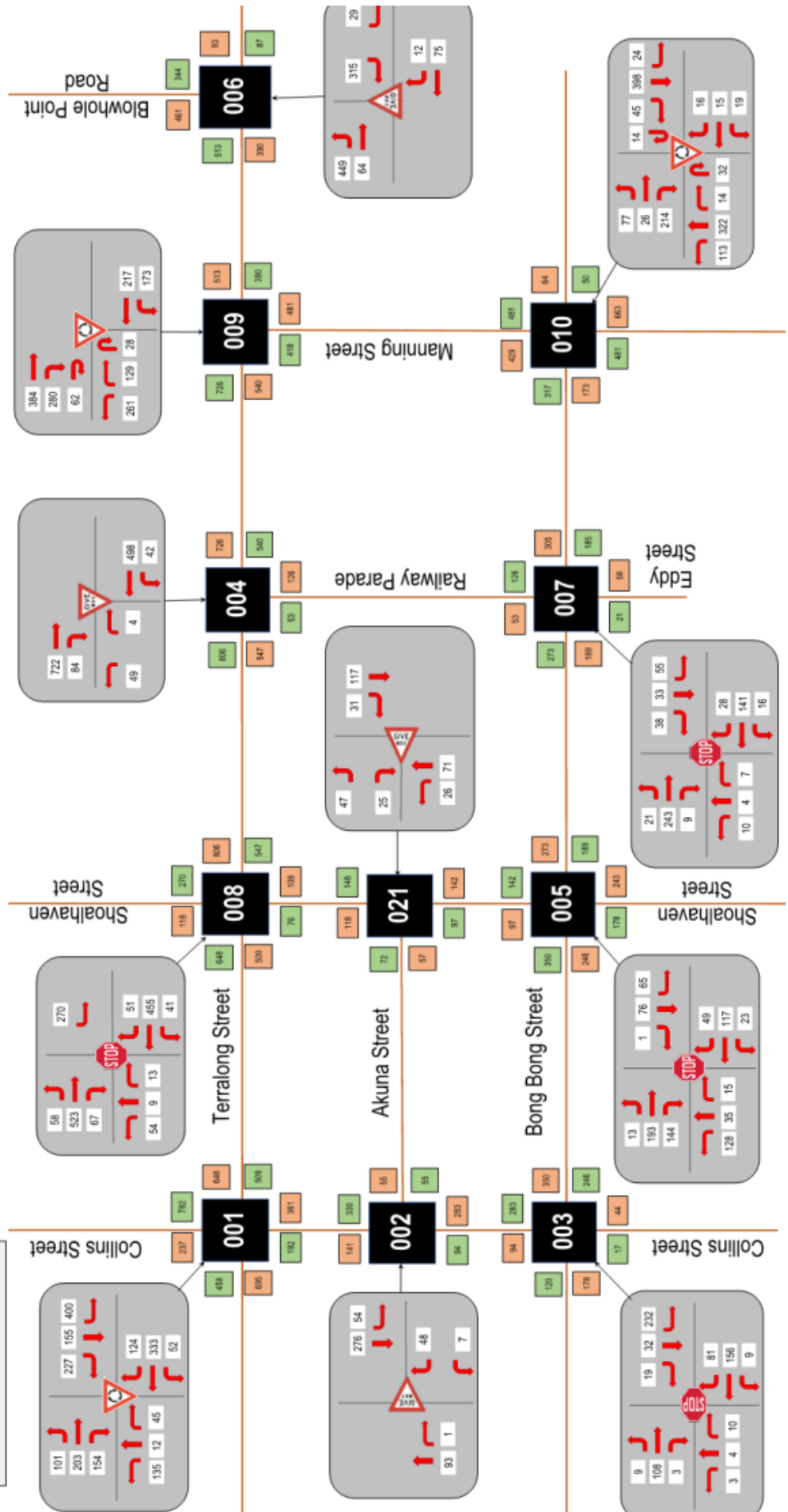
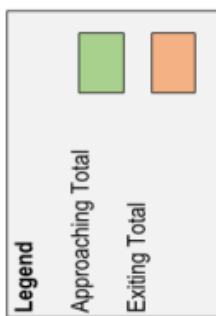
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 Traffic Survey Data Analysis - Scaled Traffic Volumes
 08:00 - 09:00 AM Peak - All Vehicles - 2021



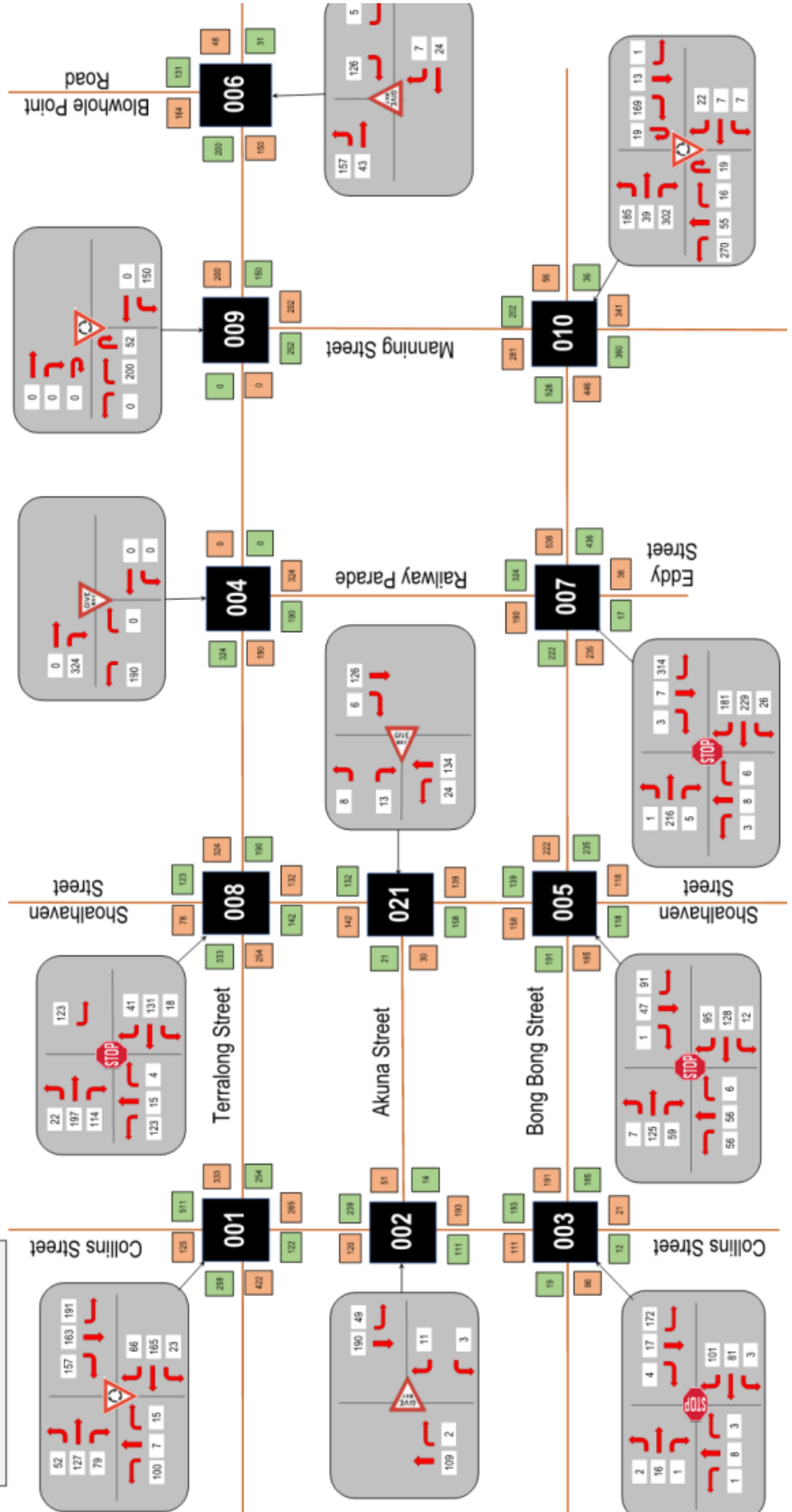
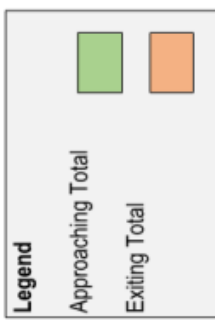
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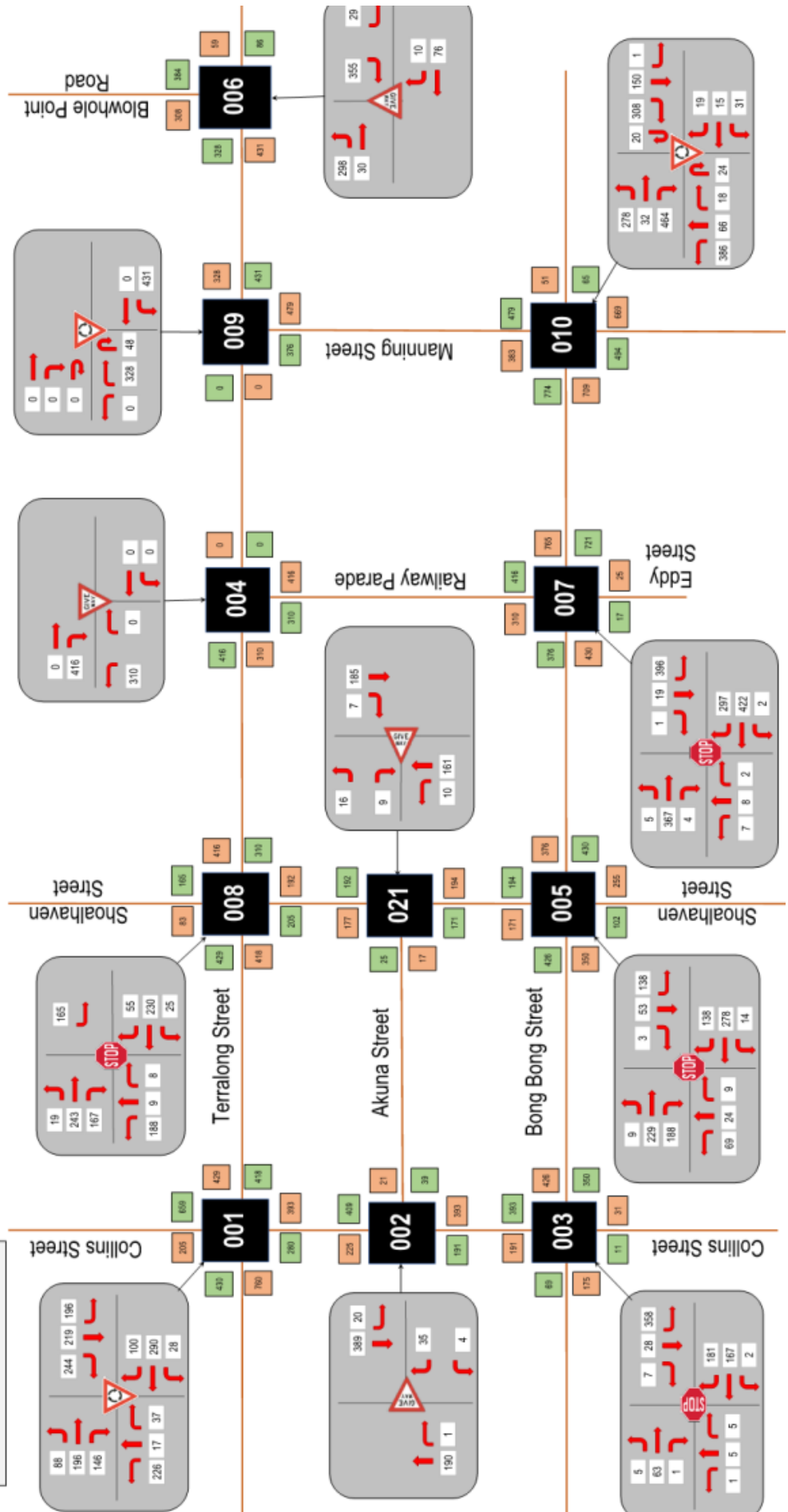
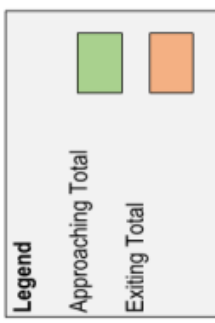
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 Traffic Survey Data Analysis - Scaled Traffic Volumes
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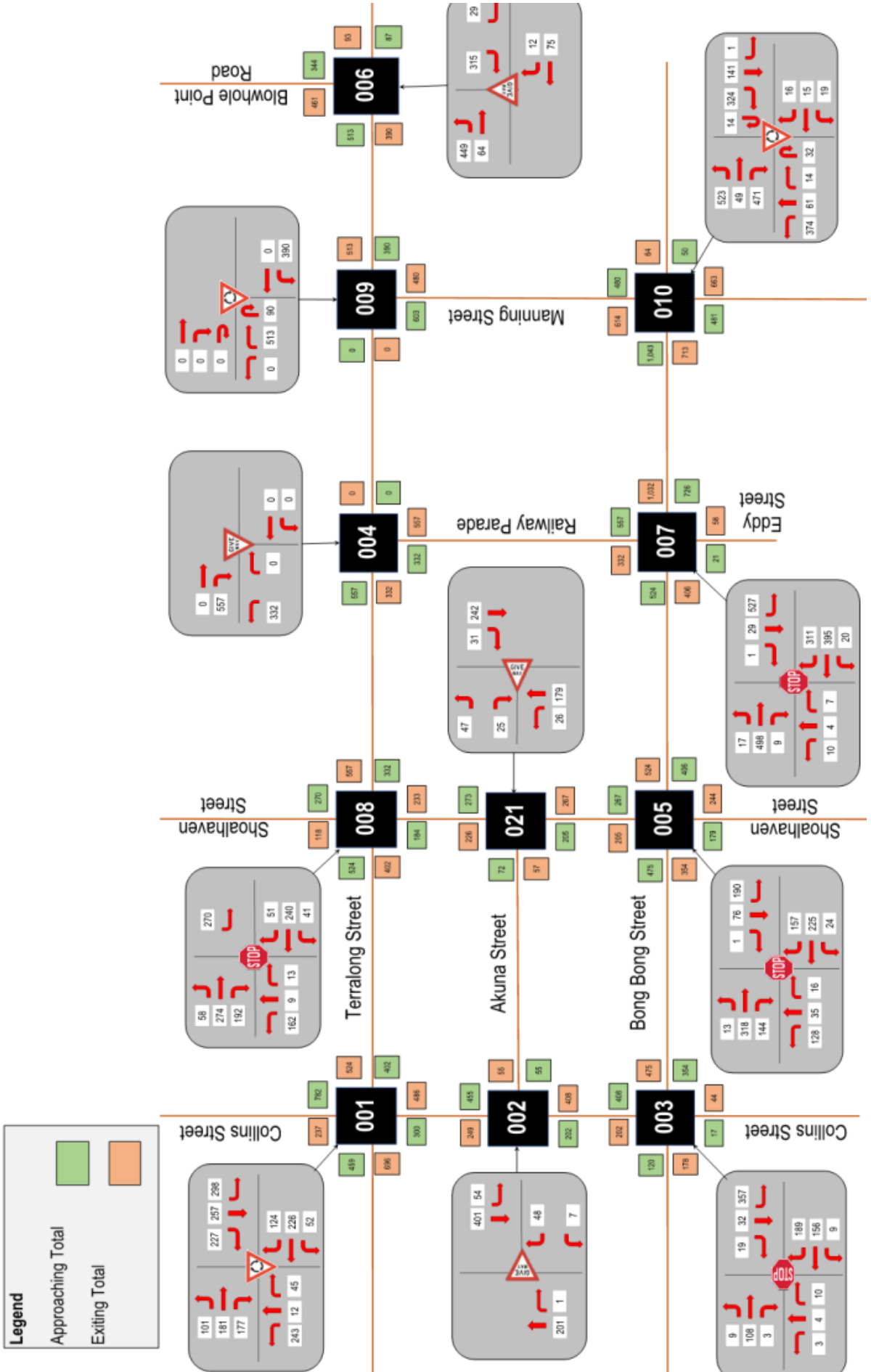
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Traffic Survey Data Analysis - Scaled Traffic Volumes
08:00 - 09:00 AM Peak - All Vehicles - 2021



P4582 Kiama Traffic and Parking Study - Proposal 2
Traffic Survey Data Analysis - Scaled Traffic Volumes
16:15 - 17:15 PM Peak - All Vehicles - 2021

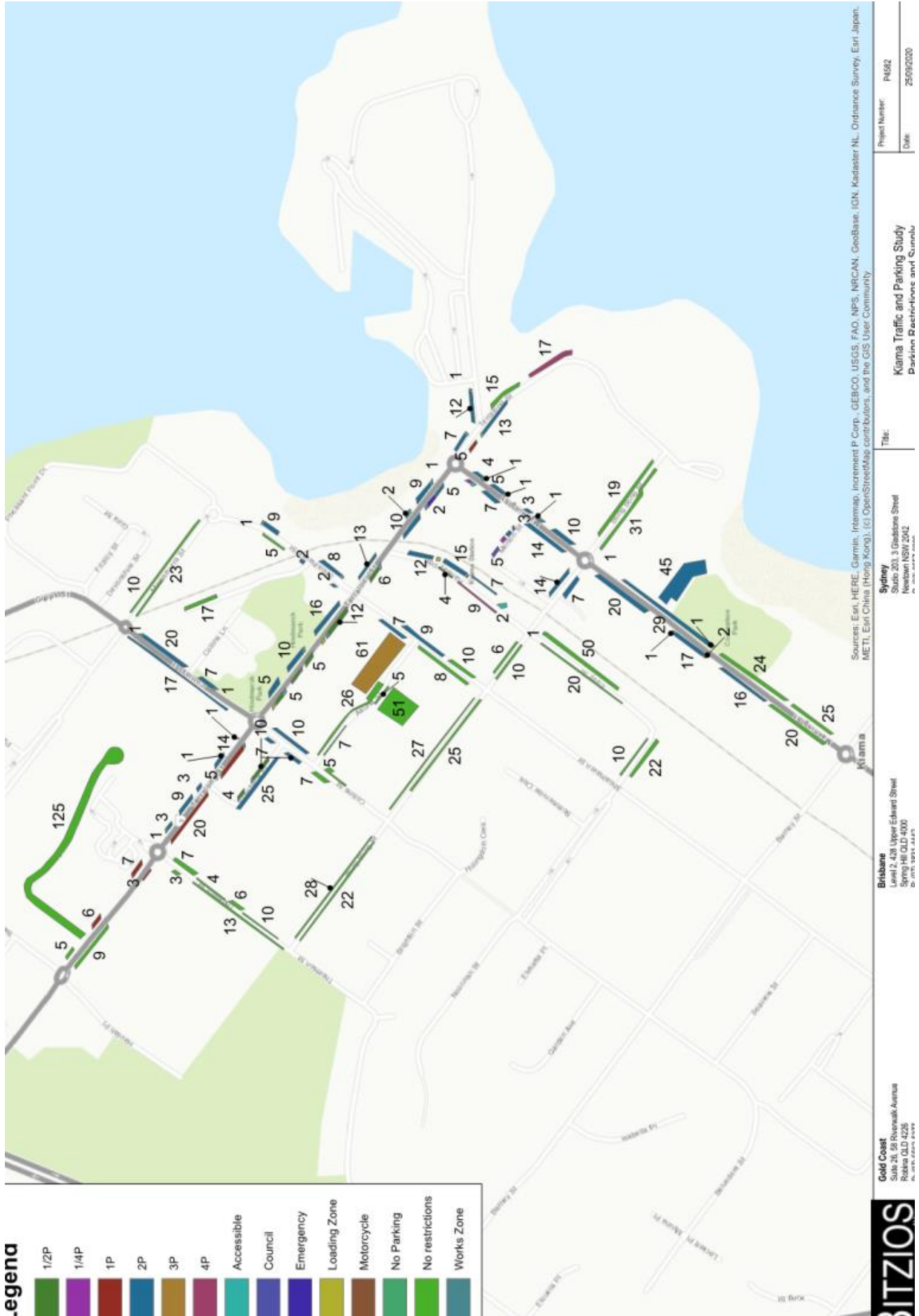


P4582 Kiama Traffic and Parking Study - Proposal 2
Traffic Survey Data Analysis - Scaled Traffic Volumes
11:45 - 12:45 Weekend Peak - All Vehicles - 2021





Appendix B: Parking Maps



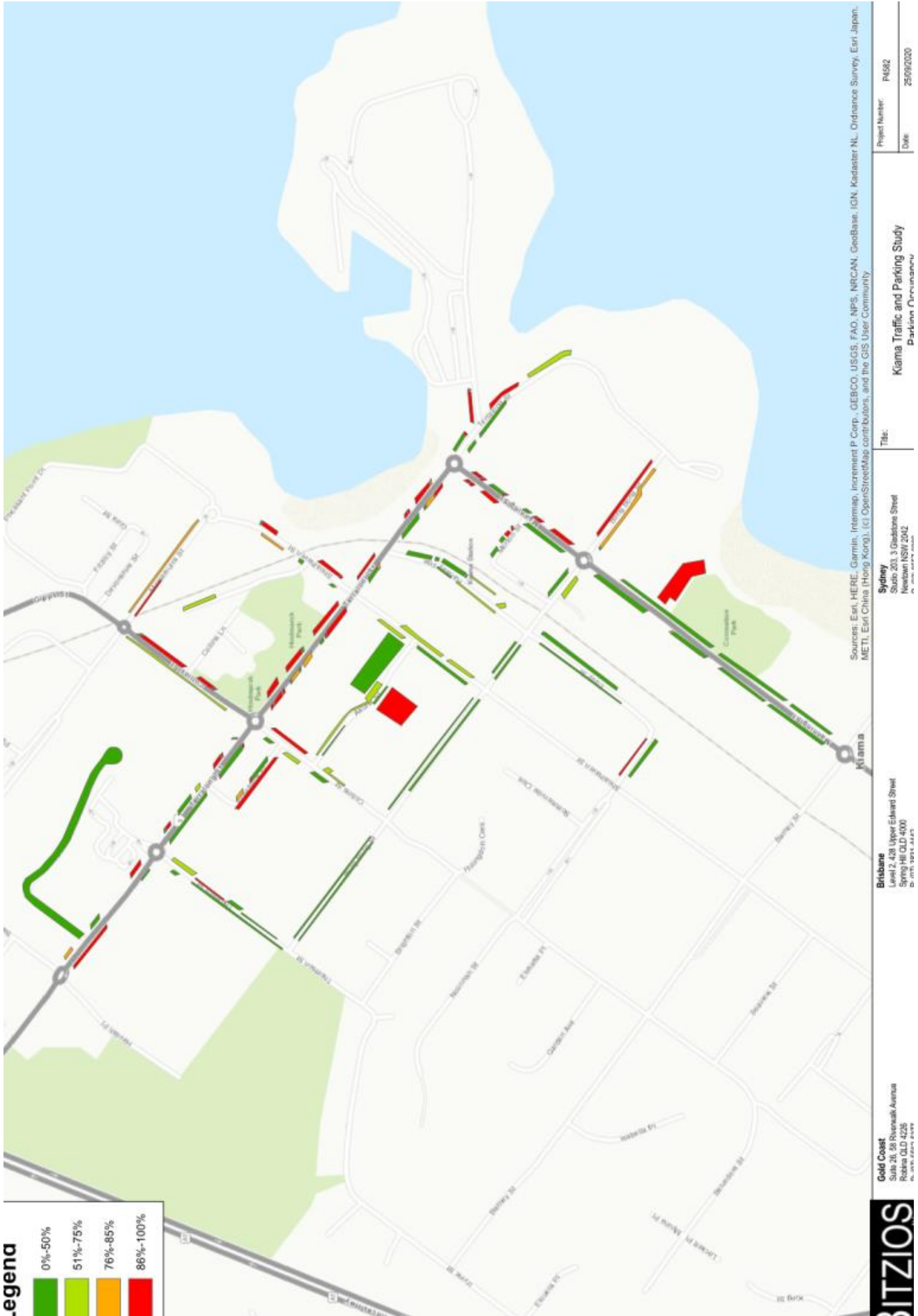




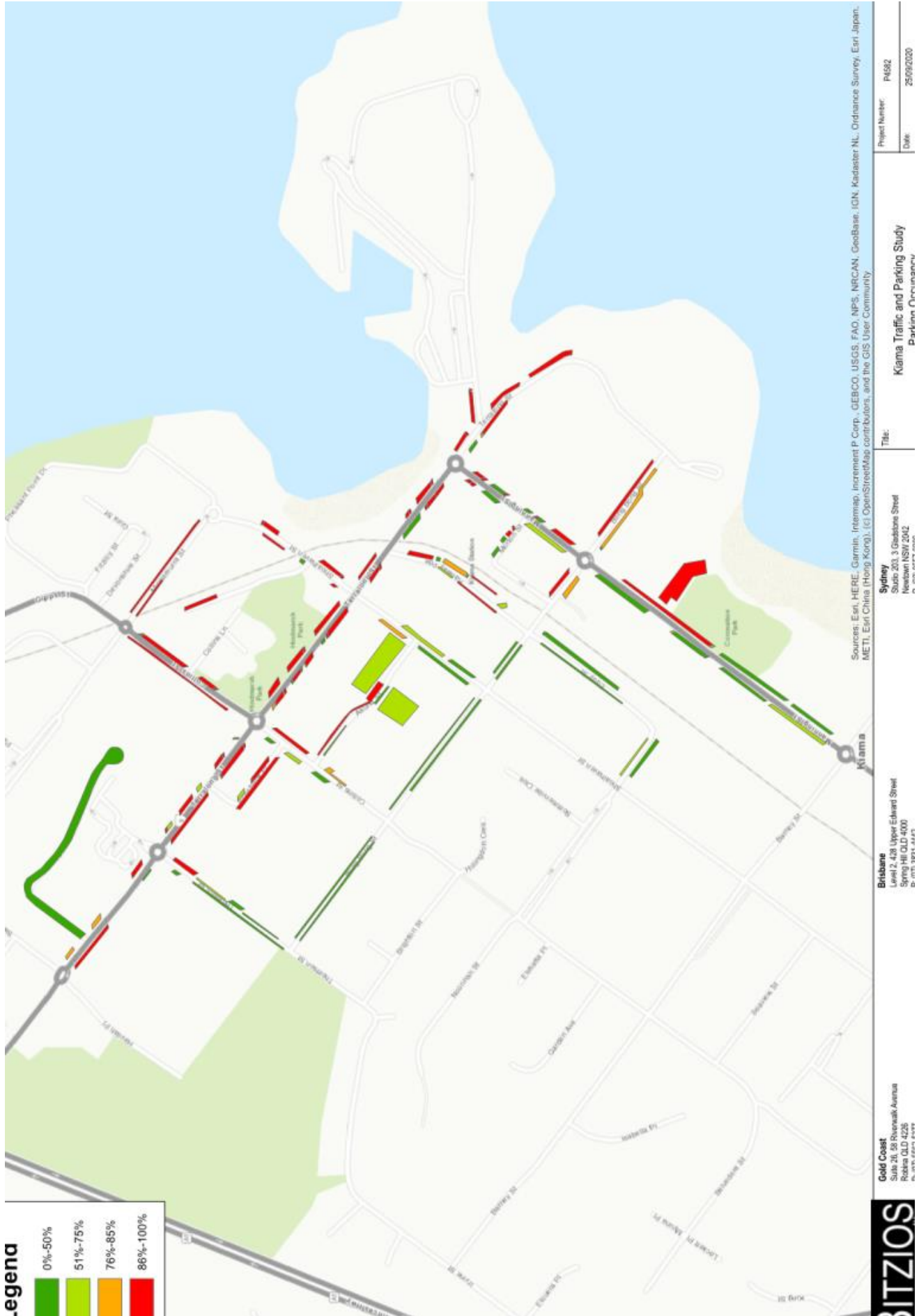


Attachment 1 Item 6.1













Kiama Traffic and Parking Study

Part B – Modelling Report



Kiama Municipal Council

02 June 2021

Item 6.1

Attachment 2



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1. INTRODUCTION

1.1 Background

Kiama Municipal Council (Council) commissioned a Town Centre Study (TCS) in 2018 with the aim of accommodating growth in the Kiama Town Centre while maintaining, respecting and supporting the existing character of the town. The TCS recommended several traffic and parking improvement proposals. Council has engaged Bitzios Consulting to undertake a traffic and parking study of the town centre, investigating the existing traffic and parking issues and reviewing the feasibility of the TCS proposals.

This report is for **Part B** of the three-part study. Part A summarises the existing traffic and transport features of the Town Centre, evaluates the TCS proposals, details the observations made during site investigations as well as additional data that has been collected for this study. Part A is documented in a separate report. Part C analyses active and public transport routes and identified potential improvements.

Part B of the project is a wider review and includes the assessment of additional key intersections outside of the town centre. More detailed modelling was undertaken in SIDRA and using the TRACKS model for the region to assess growth effects on the town centre and surrounds over the next 10 years.

This report then focuses on four key proposals raised in the 2018 TCS relating to traffic and parking issues in the town centre:

- **Proposal 1 (TCS Chapter 3):** A permanent pedestrian friendly zone on Terralong Street, between Collins Street and Shoalhaven Street
- **Proposal 2 (TCS Initiative H11):** Closing Terralong Street between Railway Parade and Manning Street to vehicle traffic during summer
- **Proposal 3 (TCS Initiative H10):** Narrowing of the trafficable area on Terralong Street between Railway Parade and Manning Street, realignment of traffic lanes, reductions in lane width and removal of parking
- **Proposal 4 (TCS Figure 6):** Implementation of seven intersection reconfigurations.

This report will explain our modelling methodology for both the SIDRA and TRACKS components and how they were integrated to provide the modelling results.

The data collection and site observations for this project were undertaken in July 2020, and interstate travel restrictions were in place due to COVID-19. The data collection and site observations for this project were undertaken during the COVID-19 pandemic. Given the largely 'within' NSW visitor market for Kiama, the impacts at the time of the study would be expected to be minimal.

1.2 Relation to Part A

Part A focused on Kiama Town Centre, including the intersections indicated in Figure 1.1. For Part B, modelling was also undertaken for intersections outside of the Part A study area, providing for further options testing and proposed scenarios.



1.3 Study Area

There are 25 intersections modelled in this project. The intersections are detailed in Table 1.1 and are shown in Figure 1.1.

Table 1.1: Modelled Intersections

Number	Intersection	Intersection Type
001	Collins Street / Terralong Street	Roundabout
002	Collins Street / Akuna Street	Give way
003	Collins Street / Bong Bong Street	Stop-controlled
004	Railway Parade / Terralong Street	Give way
005	Shoalhaven Street / Bong Bong Street	Stop-controlled
006	Terralong Street / Blowhole Point Road	Give way
007	Bong Bong Street / Railway Parade / Eddy Street	Stop-controlled
008	Terralong Street / Shoalhaven Street	Stop-controlled
009	Terralong Street / Manning Street	Roundabout
010	Manning Street / Bong Bong Street	Roundabout
011	Jamberoo Road / Dido Street	Stop-controlled
012	Jamberoo Road / Terralong Street / Spring Creek Drive	Give way
013	Princes Highway / Gipps Street	Separated slip lane
014	Gipps Street / Brown Street	Give way
015	Gipps Street / Collins Street / Minnamurra Street	Roundabout
016	Terralong Street / Brown Street	Give way
017	Terralong Street / Havilah Place / Colley Drive	Roundabout
018	Terralong Street / Meares Place	Give way
019	Terralong Street / Thomson Street	Roundabout
020	Bong Bong Street / Thomson Street	Stop-controlled
021	Shoalhaven Street / Akuna Street	Give way
022	Manning Street / Barney Street	Roundabout
023	Manning Street / Farmer Street	Stop-controlled
024	Manning Street / Bonaira Street / Henley Avenue	Roundabout
025	South Kiama Drive / Saddleback Mountain Road	Give way





Aerial image sourced from OpenStreetMap

Figure 1.1 Study Area Intersections

1.4 Modelling Process Overview

The SIDRA modelling was undertaken in four (4) stages, as outlined in Figure 1.2.

- Stage 1: Traffic surveys and observations were undertaken on-site during both weekend and weekday peak conditions. Growth factors were determined through a study of the Shoalhaven Kiama TRACKS model and the Informed Decisions website (Profile.id). The reduction of observed traffic due to seasonal variation was also estimated using historic traffic counts from a permanent counting station
- Stage 2: The 2020 base SIDRA model was developed and calibrated using intersection geometry and traffic volume surveys, and then validated using observed queue lengths
- Stage 3: The 2021 and 2031 'do nothing' SIDRA models were developed with traffic volumes adjusted using the seasonal variation factor and future growth factor. Year of failure assessments were undertaken for intersections over-capacity in 2031
- Stage 4: The SIDRA models and traffic network flows diagrams were modified to assess the impact of the various proposals raised in the 2018 TCS for the 2031 design year. The proposals were assessed in isolation and then assessed on the basis that all proposals were implemented.

SIDRA 8.0 software was used for all intersection modelling, and 11 intersections within the town centre were assessed as a network as per Figure 1.1. Full details of the modelling process are provided in the P4582.001T Kiama Traffic and Parking Study SIDRA Technical Note.



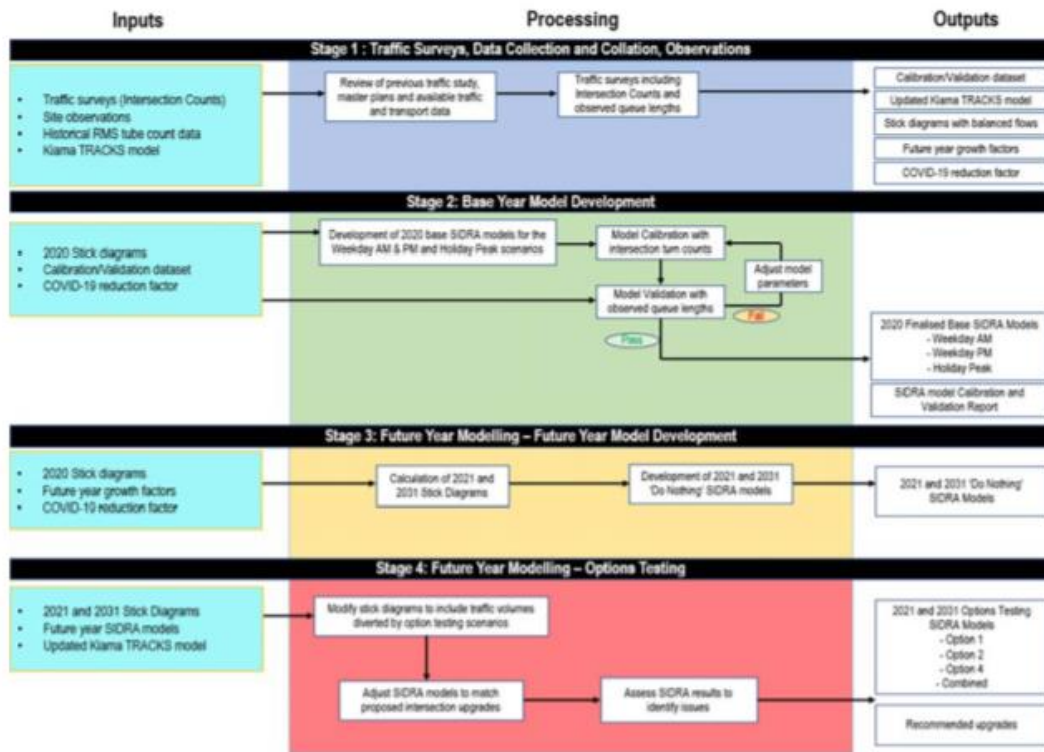


Figure 1.2: Modelling Process Overview

Item 6.1

Attachment 2



2. EXISTING CONDITIONS

2.1 Land Use

The current land uses within Kiama Town Centre are predominantly retail and commercial (B2), public recreation spaces (RE1) and low or medium residential (R2 and R3) as shown Figure 2.1.



Source: NSW ePlanning Spatial Viewer

Figure 2.1: Existing Land Use Map

The retail and commercial land uses are located mainly along and surrounding Terralong Street and Manning Street with the residential uses located along and surrounding Bong Bong Street west of Railway Parade and Eddy Street.

The largest non-coastal public recreation space within the town centre is Hindmarsh Park bordered by Collins Street, Terralong Street and Shoalhaven Street. Other recreation spaces are located by the coast near the Kiama Blowhole and the Kiama Showgrounds.

Kiama Public School is bounded by Thomson Street, Bong Bong Street and Collins Street.

Outside of the town centre, most areas are zoned as either low or medium density residential, mixed with a handful of business park and light industrial zones.

Most of the coastline is zoned as public recreation area.



2.2 Road Network Description

Table 2.1 summarises main characteristics of key roads in the study area:

Table 2.1: Key Roads in Study

Road Name	Jurisdiction	Hierarchy	Number of Lanes	Speed Limit
Princes Highway	TfNSW	State	2 lanes each direction	100 km/h
Terralong Street	Council	Local	1 lane each direction	50km/h 40km/h High Pedestrian Activity Area (HPAA)
Gipps Road	Council	Local	1 lane each direction	50km/h
Bong Bong Street	Council	Local	1 lane each direction	50km/h 40km/h School Zone
Shoalhaven Street	Council	Local	1 lane each direction	50km/h 40km/h HPAA
Manning Street	Council	Local	1 lane each direction	50km/h 40km/h HPAA
Saddleback Mountain Road	Council	Local	1 lane each direction	50km/h 40km/h School Zone



3. PROPOSALS ASSESSED

3.1 Proposal 1 – Terralong Street Mid-Block Crossing

Proposal 1 involves the implementation of a new wombat crossing along Terralong Street between Collins Street and Shoalhaven Street, between sites 1 and 8. SIDRA models were developed to assess the impacts to the surrounding network due to the addition of a mid-block crossing. The SIDRA models were assessed as a network of the town centre, sites 1 to 10 and 21.

3.2 Proposal 2 – Terralong Street Closure

Proposal 2 involves the closure of Terralong Street between Railway Parade and Manning Street, between sites 4 and 9. SIDRA models were developed to assess the impacts of this closure, including the redistribution of traffic. The SIDRA models were assessed as a network of the town centre, sites 1 to 10 and 21.

3.3 Proposal 3 – Terralong Street Pedestrian Zone

Proposal 3 involves the conversion of the travel lane to a pedestrian zone on the northern side of the rail bridge pillar on Terralong Street between Railway Parade and Manning Street, resulting in the reduction of travel lane widths on the southern side. The impacts of the intersection reconfiguration overlap with Proposal 4 and are assessed within its corresponding modelling.

3.4 Proposal 4 – Town Centre Intersection Upgrades

Proposal 4 involves the reconfiguration of 7 intersections, including new traffic signals at Bong Bong Street / Railway Parade / Eddy Street (site 7). The proposed intersection configurations are summarised in Table 3.1. SIDRA models were developed to assess the impacts of these changes. The SIDRA models were assessed as a network of the town centre, sites 1 to 10 and 21.

Table 3.1: Proposal 4 Items

Intersection Number	TCS ref.	Intersection	Current Intersection Type	Proposed Changes
001	W06	Collins Street / Terralong Street	Roundabout	Pedestrian crossings across all legs of the roundabout
002	W07	Collins Street / Akuna Street	Give way	Kerb build outs, blisters, removal of parking, pedestrian crossing north of Akuna Street
003	W08	Collins Street / Bong Bong Street	Stop-controlled	Convert to roundabout
004	H10	Railway Parade / Terralong Street	Give way	Changed intersection priority and reduced traffic lane widths
005	H14	Shoalhaven Street / Bong Bong Street	Give way	Convert Give Way arrangement to roundabout
006	H07	Terralong Street / Blowhole Point Road	Give way	Realign kerbs and change priority to Terralong Street / Blowhole Point Road
007	S01	Bong Bong Street / Railway Parade	Stop-controlled	Convert to traffic signals



3.5 Combined Assessment

The accumulative effects of all proposals were assessed through a combined SIDRA model which represents a scenario where all proposals are implemented. The SIDRA models were assessed as a network of the town centre, sites 1 to 10 and 21.

Additionally, an analysis within SIDRA was undertaken to find the optimal layout required for the traffic signals at site 7, Bong Bong Street / Railway Parade.

Furthermore, a sensitivity analysis was undertaken within SIDRA to assess the year of failure for the proposed impacts on the Town Centre network through the application of volume growth by annual increments.



4. SIDRA BASE CASE MODELLING

4.1 Traffic Model

The base case model layouts reflected the existing conditions and driver behaviour, which were determined through a desktop review and a site investigation undertaken on Thursday 16 July 2020. The 2020 base case model was validated with traffic surveys undertaken on Thursday 16 and Saturday 18 July 2020.

The validated 2020 base model was further developed into 2021 and 2031 Do Nothing models, for an opening year and 10-year design horizon, representing the scenarios where no upgrades or intersection reconfigurations are implemented.

4.2 Modelled Years

The model assessed the following years:

- 2020 – Base year
- 2021 – Opening year
- 2031 – 10-year design horizon.

4.3 Modelled Periods

Three one-hour traffic peaks were modelled and are summarised in Table 4.1.

Table 4.1: Modelled Periods

Peak	Day Type	Period
AM	Weekday	8:00 AM - 9:00 AM
PM	Weekday	4:15 PM - 5:15 PM
WE	Weekend	11:45 AM - 12:45 PM

4.4 Modelled Demand and Network

Traffic surveys informed the volume demand at each modelled intersection within the 2020 base year.

To calculate 2021 and 2031 volumes, annual growth factors were identified from both the Shoalhaven Kiama TRACKS model and Profile.id, which draws from Census data. The annual growth factor of 1.4% was adopted from Profile.id as it was higher and therefore more conservative than the growth identified in the TRACKS model.

Historical traffic data from permanent traffic counters near Kiama were used to check the suitability of the annual growth factor. A counter on Princes Highway north of Bombo Railway Station recorded an average growth factor of approximately 3%, while a counter on Jamberoo Road west of Dido Street recorded an average growth factor of approximately 1%. The traffic on Jamberoo Road would be more indicative of local traffic within Kiama than the counter on Princes Highway, which includes traffic travelling past Kiama. As such, the historical traffic data supports the adopted annual growth factor of 1.4%.

Sites 1 to 10, and 21 were identified to be within the town centre study area and were modelled as a network. Slight adjustments were made to the volumes of the town centre network model to balance network flows.

Traffic volume diagrams are provided within **Appendix A**.



The modelled network is detailed in Figure 4.1.

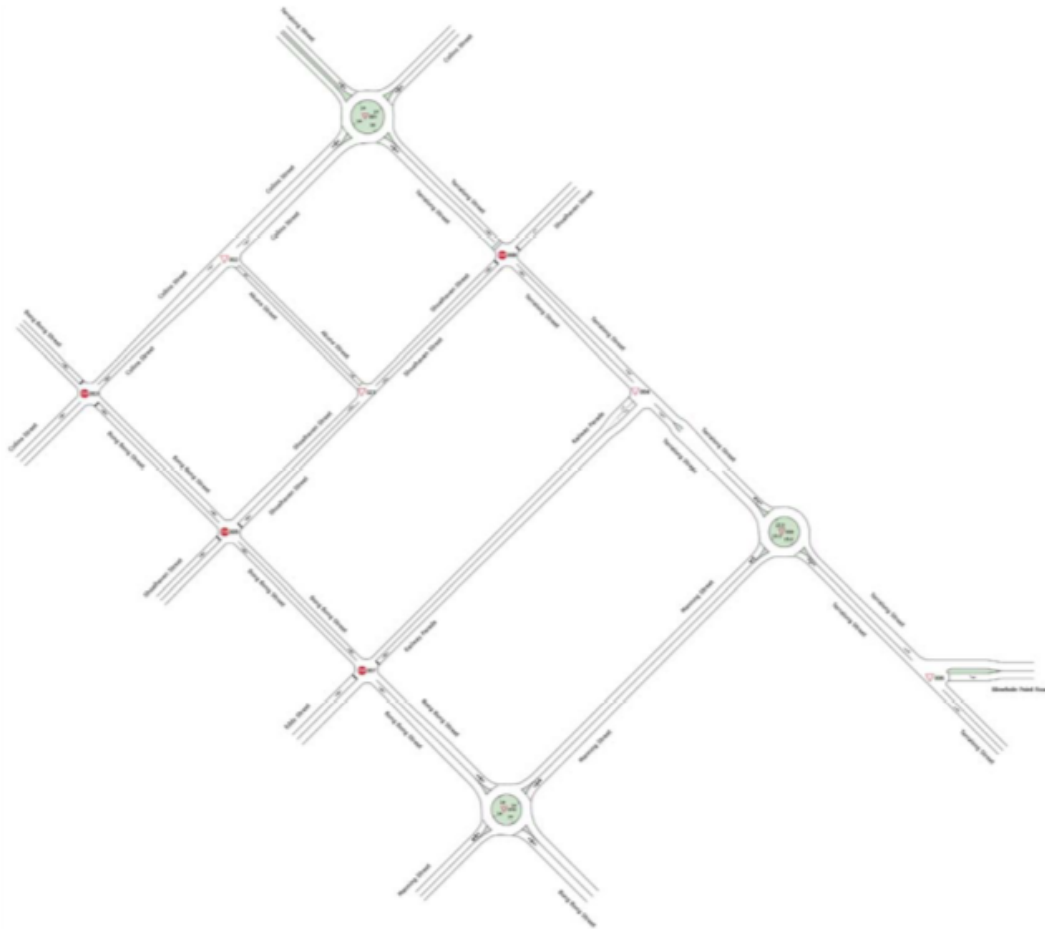


Figure 4.1: Modelled Base SIDRA Network

4.5 Modelling Assumptions and Limitations

The data collection and site observations for this project were undertaken during the COVID-19 pandemic. Given the largely 'within' NSW visitor market for Kiama, the impacts at the time of the study would be expected to be minimal. Data from a permanent traffic counter located on the Princes Highway approximately 1km north of Kiama was used to estimate the overall traffic reduction due to undertaking the traffic surveys in July, which is one of the lowest traffic volume months of the year for the region. To scale the surveyed traffic volumes to be the 85% percentile traffic volumes, a scale factor of 23% was used to increase all observed volumes to represent more typical base volumes.

The difference between the 2020 base year and 2021 opening year scenarios was the adopted annual 1.4% increase in overall traffic volumes which did not result in any significant differences in intersection performance. As such, the 2021 Do Nothing scenarios will be considered as the point of comparison.

To represent a more conservative assessment, the model assumes that there is variance in volumes between sites within the network model due to kerbside parking, hence, a high turnover.



Furthermore, the site investigation observed an abundance of reverse parking manoeuvres along Terralong Street, due to the angled parking arrangement within the town centre. These manoeuvres would often halt or slow traffic given the two-way one lane arrangement. This caused artificially higher vehicle queues which could propagate through multiple intersections and were identified to be isolated incidences. While this was considered within the validation of the model, it is noted that these temporary impacts are not well represented within SIDRA modelling.

4.6 Base Case Modelling Results (SIDRA)

The validation of the 2020 base case model and results are discussed in the *P4582.001T Kiama Traffic and Parking Study SIDRA Technical Note*.

The SIDRA overall intersection performance results for the 2021 and 2031 Do Nothing scenarios are summarised in Table 4.2 to Table 4.4. The Level of Service ratings are the overall ratings for the intersections. Individual intersection approaches may have different ratings.

The SIDRA output tables are attached within **Appendix B**.



Table 4.2: Do Nothing Intersection Capacity Results, Weekday Peak - AM

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	1203	0.490	4.5	A	1372	0.575	5.0	A
2. Collins Street / Akuna Street	266	0.105	1.2	A	304	0.119	1.3	A
3. Collins Street / Bong Bong Street	314	0.127	6.2	A	358	0.147	6.3	A
4. Terralong Street / Railway Parade	800	0.243	0.9	A	912	0.281	1.0	A
5. Shoalhaven Street / Bong Bong Street	482	0.119	5.1	A	550	0.140	5.2	A
6. Terralong Street / Blowhole Point Road	381	0.125	2.7	A	434	0.145	2.7	A
7. Bong Bong Street / Railway Parade / Eddy Street	361	0.081	2.8	A	412	0.092	2.9	A
8. Terralong Street / Shoalhaven Street	942	0.230	3.0	A	1074	0.265	3.2	A
9. Terralong Street / Manning Street	857	0.316	4.5	A	977	0.366	4.7	A
10. Manning Street / Bong Bong Street	902	0.297	4.6	A	1028	0.343	4.8	A
11. Jamberoo Road / Dido Street	258	0.047	2.4	A	294	0.054	2.4	A
12. Jamberoo Road / Terralong Street / Spring Creek Drive	832	0.227	4.3	A	948	0.266	4.5	A
13. Princes Highway / Gipps Street	1871	0.407	3.7	A	2132	0.464	3.7	A
14. Gipps Street / Brown Street	156	0.049	2.7	A	178	0.056	2.7	A
15. Gipps Street / Collins Street / Minnamurra Street	769	0.416	4.5	A	877	0.478	4.6	A
16. Terralong Street / Brown Street	792	0.222	1.1	A	902	0.253	1.2	A
17. Terralong Street / Havilah Place / Colley Drive	881	0.342	4.3	A	1004	0.395	4.4	A
18. Terralong Street / Meares Place	783	0.239	0.3	A	893	0.273	0.3	A
19. Terralong Street / Thomson Street	945	0.286	3.8	A	1078	0.330	4.0	A
20. Bong Bong Street / Thomson Street	225	0.082	3.3	A	257	0.095	3.4	A
21. Shoalhaven Street / Akuna Street	211	0.055	1.3	A	240	0.063	1.3	A
22. Manning Street / Barney Street	852	0.308	4.9	A	971	0.356	5.1	A
23. Manning Street / Farmer Street	983	0.318	2.8	A	1121	0.363	3.2	A
24. Manning Street / Bonaira Street / Henley Avenue	989	0.419	6.5	A	1128	0.496	6.8	A
25. South Kiama Drive / Saddleback Mountain Road	637	0.215	4.7	A	726	0.246	4.7	A



Table 4.3: Do Nothing Intersection Capacity Results, Weekday Peak - PM

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	1879	0.743	8.4	A	2142	0.898	14.6	B
2. Collins Street / Akuna Street	444	0.163	0.8	A	506	0.186	0.8	A
3. Collins Street / Bong Bong Street	638	0.279	7.0	A	727	0.330	7.1	A
4. Terralong Street / Railway Parade	1241	0.360	1.1	A	1415	0.418	1.4	A
5. Shoalhaven Street / Bong Bong Street	753	0.207	4.7	A	858	0.240	4.9	A
6. Terralong Street / Blowhole Point Road	840	0.394	3.4	A	958	0.465	3.7	A
7. Bong Bong Street / Railway Parade / Eddy Street	509	0.139	2.4	A	581	0.160	2.5	A
8. Terralong Street / Shoalhaven Street	1395	0.321	3.3	A	1590	0.373	3.8	A
9. Terralong Street / Manning Street	1418	0.489	5.1	A	1616	0.590	6.0	A
10. Manning Street / Bong Bong Street	1358	0.490	4.8	A	1548	0.573	5.1	A
11. Jamberoo Road / Dido Street	345	0.066	1.8	A	394	0.076	1.8	A
12. Jamberoo Road / Terralong Street / Spring Creek Drive	1359	0.485	5.2	A	1549	0.574	6.1	A
13. Princes Highway / Gipps Street	2417	0.46	3.3	A	2755	0.524	3.4	A
14. Gipps Street / Brown Street	232	0.074	2.6	A	264	0.085	2.6	A
15. Gipps Street / Collins Street / Minnamurra Street	954	0.5	4.7	A	1087	0.576	4.9	A
16. Terralong Street / Brown Street	1377	0.452	2.3	A	1570	0.693	4.3	A
17. Terralong Street / Havilah Place / Colley Drive	1454	0.682	5.3	A	1657	0.794	6.5	A
18. Terralong Street / Meares Place	1267	0.45	0.4	A	1445	0.513	0.5	A
19. Terralong Street / Thomson Street	1780	0.653	6.6	A	2029	0.777	9.7	A
20. Bong Bong Street / Thomson Street	422	0.187	4.2	A	481	0.222	4.3	A
21. Shoalhaven Street / Akuna Street	180	0.050	1.2	A	205	0.056	1.2	A
22. Manning Street / Barney Street	1418	0.526	5.3	A	1616	0.611	5.7	A
23. Manning Street / Farmer Street	1431	0.464	4.0	A	1631	0.851	8.4	A
24. Manning Street / Bonaira Street / Henley Avenue	1387	0.490	7.2	A	1582	0.590	8.1	A
25. South Kiama Drive / Saddleback Mountain Road	808	0.219	4.6	A	922	0.250	4.7	A



Table 4.4: Do Nothing Intersection Capacity Results, Weekend Peak - WE

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	2043	0.832	9.9	A	2329	1.009	27.4	B*
2. Collins Street / Akuna Street	504	0.176	1.2	A	575	0.200	1.3	A
3. Collins Street / Bong Bong Street	701	0.298	7.2	A	799	0.353	7.5	A
4. Terralong Street / Railway Parade	1473	0.468	1.4	A	1679	0.544	1.9	A
5. Shoalhaven Street / Bong Bong Street	904	0.224	5.3	A	1031	0.286	5.7	A
6. Terralong Street / Blowhole Point Road	994	0.393	3.5	A	1133	0.473	3.9	A
7. Bong Bong Street / Railway Parade / Eddy Street	637	0.183	3.1	A	726	0.226	3.3	A
8. Terralong Street / Shoalhaven Street	1622	0.423	4.5	A	1849	0.551	5.6	A
9. Terralong Street / Manning Street	1615	0.624	5.1	A	1841	0.728	6.0	A
10. Manning Street / Bong Bong Street	1399	0.480	5.3	A	1595	0.568	5.9	A
11. Jamberoo Road / Dido Street	509	0.133	0.8	A	581	0.152	0.8	A
12. Jamberoo Road / Terralong Street / Spring Creek Drive	1431	0.498	5.6	A	1631	0.599	6.7	A
13. Princes Highway / Gipps Street	2980	0.621	3.7	A	3397	0.708	3.7	A
14. Gipps Street / Brown Street	244	0.071	2.3	A	278	0.081	2.3	A
15. Gipps Street / Collins Street / Minnamurra Street	1347	0.76	5.8	A	1536	0.883	8.8	A
16. Terralong Street / Brown Street	1418	0.452	1.7	A	1616	0.536	2.7	A
17. Terralong Street / Havilah Place / Colley Drive	1685	0.743	7.2	A	1921	0.876	11.3	A
18. Terralong Street / Meares Place	1428	0.456	0.5	A	1628	0.518	0.6	A
19. Terralong Street / Thomson Street	2028	1.047	20.6	B	2311	1.001	25.8	B
20. Bong Bong Street / Thomson Street	483	0.207	4.4	A	551	0.246	4.6	A
21. Shoalhaven Street / Akuna Street	334	0.088	2.0	A	380	0.101	2.1	A
22. Manning Street / Barney Street	1457	0.577	5.8	A	1661	0.675	6.3	A
23. Manning Street / Farmer Street	1419	0.529	4.0	A	1618	1.008	11.1	A
24. Manning Street / Bonaira Street / Henley Avenue	1464	0.526	7.2	A	1669	0.629	8.2	A
25. South Kiama Drive / Saddleback Mountain Road	989	0.264	4.7	A	1128	0.301	4.8	A

* Discussed in Section 4.7



4.7 Base Case Modelling Results Discussion

The modelling results show that most intersections within the study area have substantial additional capacity within a 10-year design horizon without any intersection modifications.

Two intersections are expected to exceed capacity in the 2031 weekend scenario.

Site 1 – Terralong Street / Collins Street

The Terralong Street / Collins Street intersection (site 1) is expected to operate at 101% saturation in the 2031 weekend scenario. Overall, the intersection operates in LoS B, however, the north-east Collins Street approach operated with an average delay of 53s which corresponds to Level of Service (LoS) D, and 95th percentile back of queue length of 333m. The poor performance of the north-east approach can be attributed to the high volume of traffic on that approach and comparatively low volumes on movements opposing the north-west Terralong Street approach.

The results from the 2031 weekend model are shown in Table 4.5.

Table 4.5: Site 1 – Terralong Street / Collins Street WE 2031 Results

Approach	DoS	Average Delay	LoS	Queue (veh)	Demand Flows
Northeast	1.009	52.9	LOS D	46.9	938.0
Southeast	0.804	15.6	LOS B	11.5	611.0
Southwest	0.371	8.4	LOS A	2.6	230.0
Northwest	0.492	4.9	LOS A	4.1	550.0
Overall	1.009	27.4	LOS B	46.9	2329.0

It is expected that the operational capacity at the intersection of 90% saturation would be reached in 2025. The 95th percentile queue at the Collins Street southbound approach can be contained within the section between Terralong Street and Minnamurra Street until 2027.

Site 23 – Manning Street / Farmer Street

The Manning Street / Farmer Street intersection (site 23) is expected to operate at 101% saturation in the 2031 weekend scenario. The longest delays are expected at the north-west Farmer Street approach, with an average delay of 262s which corresponds to LoS F. The poor performance of the north-west approach can be attributed to a combination of the stop control and steep uphill gradient which has been considered in SIDRA.

It is expected that the operational capacity at the intersection of 90% saturation would be reached in 2030. However, the delay at the Farmer Street eastbound approach is expected to be approximately 98s in 2021.

Table 4.6: Site 23 – Manning Street / Farmer Street WE 2031 Results

Approach	DoS	Average Delay	LoS	Queue	Queue Length
Northeast	0.366	0.6	NA	0.2	1.5
Southeast	0.253	36.4	LOS C	0.8	5.4
Southwest	0.416	1.6	NA	0.4	3.0
Northwest	1.008	262.0	LOS F	7.0	51.5
Overall	1.008	11.1	NA	7.0	51.5



5. PROPOSAL 1 – TERRALONG STREET MID-BLOCK CROSSING

5.1 Traffic Model

The proposal 1 model assesses the additional mid-block wombat crossing within the Town Centre network as a 'dummy' site between sites 1 and 8.

5.2 Modelled Demand and Network

The entry and exit flows from sites 1 and 8 were adopted for the 'dummy' site.

The pedestrian volumes were adopted from the assessment of pedestrian warrants discussed in Part A within *P4582.002R Kiama Traffic and Parking Study Report*.

5.3 Modelling Assumptions and Limitations

As per assessment within Part A, half of the pedestrian volume accessing the existing pedestrian crossings at Collins Street and Shoalhaven Street, sites 1 and 8, are expected to be redistributed to the new crossing.

The traffic volumes within the network remain the same as the base case.

5.4 Proposal 1 Modelling Results (SIDRA)

The SIDRA overall intersection performance results for the 2021 and 2031 Proposal 1 scenarios are summarised in Table 5.1 to Table 5.3.

The SIDRA output tables are attached within **Appendix B**.

Table 5.1: Proposal 1 Intersection Capacity Results, Weekday Peak - AM

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	1203	0.490	4.5	A	1372	0.575	5.0	A
2. Collins Street / Akuna Street	266	0.105	1.2	A	304	0.119	1.3	A
3. Collins Street / Bong Bong Street	314	0.127	6.2	A	358	0.147	6.3	A
4. Terralong Street / Railway Parade	800	0.243	0.9	A	912	0.281	1.0	A
5. Shoalhaven Street / Bong Bong Street	482	0.119	5.1	A	550	0.140	5.2	A
6. Terralong Street / Blowhole Point Road	381	0.125	2.7	A	434	0.145	2.7	A
7. Bong Bong Street / Railway Parade / Eddy Street	361	0.081	2.8	A	412	0.092	2.9	A
8. Terralong Street / Shoalhaven Street	942	0.230	3.0	A	1074	0.265	3.2	A
9. Terralong Street / Manning Street	857	0.316	4.5	A	977	0.366	4.7	A
10. Manning Street / Bong Bong Street	902	0.297	4.6	A	1028	0.343	4.8	A
21. Shoalhaven Street / Akuna Street	211	0.055	1.3	A	240	0.063	1.3	A



Table 5.2: Proposal 1 Intersection Capacity Results, Weekday Peak - PM

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	1879	0.743	8.4	A	2142	0.898	14.6	B
2. Collins Street / Akuna Street	444	0.163	0.8	A	506	0.186	0.8	A
3. Collins Street / Bong Bong Street	638	0.279	7.0	A	727	0.330	7.1	A
4. Terralong Street / Railway Parade	1241	0.360	1.1	A	1415	0.418	1.4	A
5. Shoalhaven Street / Bong Bong Street	753	0.207	4.7	A	858	0.240	4.9	A
6. Terralong Street / Blowhole Point Road	840	0.394	3.4	A	958	0.465	3.7	A
7. Bong Bong Street / Railway Parade / Eddy Street	509	0.139	2.4	A	581	0.160	2.5	A
8. Terralong Street / Shoalhaven Street	1395	0.321	3.3	A	1590	0.373	3.8	A
9. Terralong Street / Manning Street	1418	0.489	5.1	A	1616	0.590	6.0	A
10. Manning Street / Bong Bong Street	1358	0.490	4.8	A	1548	0.573	5.1	A
21. Shoalhaven Street / Akuna Street	180	0.050	1.2	A	205	0.056	1.2	A

Table 5.3: Proposal 1 Intersection Capacity Results, Weekend Peak - WE

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	2043	0.893	11.7	A	2329	1.165	73.2	F
2. Collins Street / Akuna Street	504	0.176	1.2	A	575	0.188	1.3	A
3. Collins Street / Bong Bong Street	701	0.298	7.2	A	799	0.346	7.5	A
4. Terralong Street / Railway Parade	1473	0.468	1.4	A	1679	0.514	1.7	A
5. Shoalhaven Street / Bong Bong Street	904	0.224	5.3	A	1031	0.266	5.6	A
6. Terralong Street / Blowhole Point Road	994	0.393	3.5	A	1133	0.466	3.8	A
7. Bong Bong Street / Railway Parade / Eddy Street	637	0.183	3.1	A	726	0.212	3.2	A
8. Terralong Street / Shoalhaven Street	1622	0.423	4.5	A	1849	0.501	5.2	A
9. Terralong Street / Manning Street	1615	0.624	5.1	A	1841	0.689	5.7	A
10. Manning Street / Bong Bong Street	1399	0.480	5.3	A	1595	0.543	5.7	A
21. Shoalhaven Street / Akuna Street	334	0.088	2.0	A	380	0.096	2.1	A

Item 6.1

Attachment 2



5.5 Proposal 1 Modelling Results Discussion

The modelling results show that most intersections within the town centre have additional capacity within a 10-year design horizon with the implementation of a new mid-block crossing at Terralong Street between Collins Street and Shoalhaven Street.

The only major impact on intersection performance occurs at site 1, Terralong Street / Collins Street in the 2031 weekend scenario, which is expected to operate at LoS F. The north-east Collins Street approach is expected to have a 117% degree of saturation, average delay of 169s and 95th percentile queue of 750m. This queue would reach the intersection of Gipps Street / Hothersal Street.

A comparison between the 2031 'do nothing' Scenario and the Proposal 1 scenario is detailed in Table 5.4.

Table 5.4: Proposal 1 Comparison – Collins Street / Terralong Street

Approach	DoS	Delay (s)	LoS	95 th ile Queue (m)
Weekend 2031 Do Nothing				
Collins Street SB	1.009	53	D	333
Overall	1.009	27	B	333
Weekend 2031 with Proposal 1				
Collins Street SB	1.165	169	F	750
Overall	1.165	73	F	750

Proposal 1 would result in intolerable increases in delays and queue lengths at the intersection. The extended queuing would extend through multiple upstream intersections and reduce sight lines to pedestrians at those intersections. As such, further traffic management measures need to be considered before the implementation of Proposal 1.



6. PROPOSAL 2 – TERRALONG STREET TEMPORARY CLOSURE

6.1 Traffic Model

The proposal 2 model assesses the closure of Terralong Street between Railway Parade and Manning Street within the network of the Town Centre.

6.2 Modelled Demand and Network

The traffic volumes travelling on Terralong Street between Railway Parade and Manning Street were redistributed along the following detour routes:

- Terralong Street <> Railway Parade <> Bong Bong Street <> Manning Street
- Terralong Street <> Shoalhaven Street <> Bong Bong Street <> Manning Street
- Terralong Street <> Collins Street <> Bong Bong Street <> Manning Street

It is assumed that approximately 50% of traffic would use the Railway Parade detour, and both the Shoalhaven Street and Collins Street detour would be used by 25% of traffic.

Traffic volume diagrams are provided within **Appendix A**.

6.3 Modelling Assumptions and Limitations

The detailed assumptions of each turn movement are discussed within *P4582.001T Kiama Traffic and Parking Study SIDRA Technical Note*.

The primary limitation of the assessment as a static model is the lack of directionality of vehicle movements due to an absence of origin or destination. As such, vehicles which could be likely to make turn movements through the closure for parking purposes were also assumed to be redirected through the proposed detours. The TRACKS model was used to identify feasible detour routes for this scenario.

6.4 Proposal 2 Modelling Results (SIDRA)

The SIDRA overall intersection performance results for the 2021 and 2031 Proposal 2 scenarios are summarised in Table 5.1 to Table 5.3.

The SIDRA output tables are attached within **Appendix B**.



Table 6.1: Proposal 2 Intersection Capacity Results, Weekday Peak - AM

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	1205	0.490	4.7	A	1374	0.577	5.1	A
2. Collins Street / Akuna Street	383	0.130	0.9	A	437	0.148	0.9	A
3. Collins Street / Bong Bong Street	431	0.206	6.5	A	491	0.240	6.6	A
4. Terralong Street / Railway Parade	541	0.182	3.5	A	617	0.208	3.5	A
5. Shoalhaven Street / Bong Bong Street	719	0.165	5.0	A	820	0.202	5.2	A
6. Terralong Street / Blowhole Point Road	381	0.125	2.7	A	434	0.145	2.7	A
7. Bong Bong Street / Railway Parade / Eddy Street	1052	0.341	4.5	A	1199	0.412	4.9	A
8. Terralong Street / Shoalhaven Street	663	0.161	3.7	A	946	0.235	4.0	A
9. Terralong Street / Manning Street	423	0.158	4.5	A	482	0.180	4.5	A
10. Manning Street / Bong Bong Street	1183	0.444	6.2	A	1349	0.516	6.5	A
21. Shoalhaven Street / Akuna Street	327	0.090	0.9	A	373	0.102	0.9	A

Table 6.2: Proposal 2 Intersection Capacity Results, Weekday Peak - PM

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	1881	0.744	8.4	A	2144	0.899	14.3	A
2. Collins Street / Akuna Street	673	0.219	0.6	A	767	0.250	0.7	A
3. Collins Street / Bong Bong Street	866	0.460	7.8	A	988	0.551	8.5	A
4. Terralong Street / Railway Parade	764	0.228	3.5	A	871	0.260	3.5	A
5. Shoalhaven Street / Bong Bong Street	1213	0.362	5.6	A	1382	0.500	6.8	A
6. Terralong Street / Blowhole Point Road	840	0.394	3.4	A	958	0.465	3.7	A
7. Bong Bong Street / Railway Parade / Eddy Street	1611	0.585	6.2	A	1836	0.777	8.9	A
8. Terralong Street / Shoalhaven Street	1167	0.273	4.2	A	1331	0.317	4.4	A
9. Terralong Street / Manning Street	849	0.316	3.9	A	968	0.363	3.9	A
10. Manning Street / Bong Bong Street	1907	0.650	8.1	A	2174	0.778	11.0	A
21. Shoalhaven Street / Akuna Street	408	0.111	0.6	A	466	0.126	0.6	A



Table 6.3: Proposal 2 Intersection Capacity Results, Weekend Peak - WE

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	2045	0.833	9.9	A	2332	1.164	73.0	F
2. Collins Street / Akuna Street	749	0.242	1.0	A	854	0.252	1.0	A
3. Collins Street / Bong Bong Street	946	0.495	8.3	A	1079	0.577	8.9	A
4. Terralong Street / Railway Parade	936	0.325	3.5	A	1067	0.330	3.5	A
5. Shoalhaven Street / Bong Bong Street	1397	0.536	7.3	A	1592	0.657	8.8	A
6. Terralong Street / Blowhole Point Road	994	0.392	3.5	A	1133	0.450	3.7	A
7. Bong Bong Street / Railway Parade / Eddy Street	1924	1.017	25.2	B	2194	1.311	96.8	F
8. Terralong Street / Shoalhaven Street	1379	0.334	4.6	A	1572	0.651	5.6	A
9. Terralong Street / Manning Street	1045	0.367	4.5	A	1192	0.363	4.4	A
10. Manning Street / Bong Bong Street	2162	0.838	8.4	A	2465	0.831	9.7	A
21. Shoalhaven Street / Akuna Street	579	0.162	1.3	A	660	0.173	1.4	A

6.5 Proposal 2 Modelling Results Discussion

The modelling results show that the closure of Terralong Street between Railway Parade and Manning Street would result in the intersection of Bong Bong Street / Railway Parade / Eddy Street (site 7) becoming over-capacity in the 2021 weekend scenario. In particular, the Railway Parade approach is expected to reach 102% saturation, with an average delay of 72s and a 95th percentile queue of 245m, which would extend onto Terralong Street.

In the 2031 weekend scenario, it is expected that the average delay is 307s and the average 95th percentile queue is 572m.

This is due to the increased volume of traffic directed onto Railway Parade due to the closure, and the increase in eastbound traffic on Bong Bong Street due to the Shoalhaven Street and Collins Street detour routes.

The Terralong Street / Collins Street roundabout (site 1) is also expected to perform worse in the 2031 weekend scenario compared to 'do nothing' scenario, with the north-east Collins Street approach expecting an average delay of 168s and a 95th percentile queue of 748m.

A comparison between the 2031 'do nothing' Scenario and the Proposal 2 for the Terralong Street / Collins Street roundabout scenario is detailed in Table 6.4.



Table 6.4: Proposal 2 Comparison – Collins Street / Terralong Street

Approach	DoS	Delay (s)	LoS	95%ile Queue (m)
Weekend 2031 Do Nothing				
Collins Street SB	1.009	53	D	333
Overall	1.009	27	B	333
Weekend with Proposal 2				
Collins Street SB	1.164	168	F	748
Overall	1.164	73	F	748

Proposal 2 would result in intolerable increases in delays and queue lengths at the intersection. The extended queuing would extend through multiple upstream intersections and reduce sight lines to pedestrians at those intersections. As such, further traffic management measures need to be considered before the implementation of Proposal 2.



7. PROPOSAL 3 – NARROWING AND REALIGNMENT OF TERRALONG STREET

7.1 Overview

As per Section 3.3, the impacts of the intersection reconfiguration overlap with Proposal 4 and are assessed within its corresponding modelling. A qualitative assessment of Proposal 3 is included within the **Part A** report.



8. PROPOSAL 4 MODELLING

8.1 Traffic Model

The Proposal 4 model assesses the 7 intersection reconfigurations within the network of the Town Centre. This modelling was initially undertaken in the Part A report.

8.2 Modelled Demand and Network

The traffic volumes within the network remain the same as the base case.

Traffic volume diagrams are provided within **Appendix A**.

8.3 Modelling Assumptions and Limitations

SIDRA cannot model full pedestrian crossings at roundabouts, which was a limitation to the modelling development of the proposed changes to site 1, Terralong Street / Collins Street. To artificially create delays due to pedestrian movement, a 10% Environment Factor was added to each approach. It should be noted that this 10% factor was identified through previous experience using SIDRA modelling.

The details on each intersection modification within the model and assumptions are discussed within *P4582.001T Kiama Traffic and Parking Study SIDRA Technical Note*.

It is noted that the assessment of Proposal 3 is included within the assessment of Proposal 4 site 4. The impacts due to the reduction of lane widths is not accurately represented within SIDRA. The qualitative assessment of Proposal 3 is discussed within Part A.

8.4 Proposal 4 Modelling Results (SIDRA)

The SIDRA overall intersection performance results for the 2021 and 2031 Proposal 4 scenarios are summarised in Table 5.1 to Table 5.3.

The SIDRA output tables are attached within **Appendix B**.



Table 8.1: Proposal 4 Intersection Capacity Results, Weekday Peak - AM

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	1203	0.551	5.0	A	1372	0.651	6.0	A
2. Collins Street / Akuna Street	266	0.117	1.3	A	304	0.133	1.3	A
3. Collins Street / Bong Bong Street	314	0.106	4.6	A	358	0.121	4.6	A
4. Terralong Street / Railway Parade	800	0.313	2.0	A	912	0.373	2.3	A
5. Shoalhaven Street / Bong Bong Street	482	0.120	4.6	A	550	0.138	4.7	A
6. Terralong Street / Blowhole Point Road	381	0.127	2.9	A	434	0.146	3.0	A
7. Bong Bong Street / Railway Parade / Eddy Street	361	0.232	9.5	A	412	0.266	9.6	A
8. Terralong Street / Shoalhaven Street	942	0.230	3.0	A	1074	0.265	3.2	A
9. Terralong Street / Manning Street	857	0.316	4.5	A	977	0.366	4.7	A
10. Manning Street / Bong Bong Street	902	0.297	4.6	A	1028	0.343	4.8	A
21. Shoalhaven Street / Akuna Street	211	0.055	1.3	A	240	0.063	1.3	A

Table 8.2: Proposal 4 Intersection Capacity Results, Weekday Peak - PM

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	1879	0.853	12.2	A	2142	1.036	38.2	C
2. Collins Street / Akuna Street	444	0.182	0.8	A	506	0.204	0.9	A
3. Collins Street / Bong Bong Street	638	0.232	4.8	A	727	0.263	4.9	A
4. Terralong Street / Railway Parade	1241	0.590	3.4	A	1415	0.717	4.5	A
5. Shoalhaven Street / Bong Bong Street	753	0.245	5.5	A	858	0.277	5.6	A
6. Terralong Street / Blowhole Point Road	840	0.200	3.5	A	958	0.232	3.8	A
7. Bong Bong Street / Railway Parade / Eddy Street	509	0.371	9.2	A	581	0.427	9.3	A
8. Terralong Street / Shoalhaven Street	1395	0.321	3.3	A	1590	0.366	3.8	A
9. Terralong Street / Manning Street	1418	0.489	5.1	A	1616	0.587	6.0	A
10. Manning Street / Bong Bong Street	1358	0.483	4.8	A	1548	0.559	5.1	A
21. Shoalhaven Street / Akuna Street	180	0.050	1.2	A	205	0.056	1.2	A



Table 8.3: Proposal 4 Intersection Capacity Results, Weekend Peak - WE

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	2043	0.961	18.9	B	2329	1.172	78.7	F
2. Collins Street / Akuna Street	504	0.196	1.3	A	575	0.210	1.3	A
3. Collins Street / Bong Bong Street	701	0.248	5.2	A	799	0.271	5.4	A
4. Terralong Street / Railway Parade	1473	0.718	4.3	A	1679	0.855	6.6	A
5. Shoalhaven Street / Bong Bong Street	904	0.280	5.2	A	1031	0.310	5.4	A
6. Terralong Street / Blowhole Point Road	994	0.322	3.9	A	1133	0.361	4.3	A
7. Bong Bong Street / Railway Parade / Eddy Street	637	0.442	9.6	A	726	0.483	9.8	A
8. Terralong Street / Shoalhaven Street	1622	0.423	4.5	A	1849	0.499	5.1	A
9. Terralong Street / Manning Street	1615	0.624	5.1	A	1841	0.689	5.7	A
10. Manning Street / Bong Bong Street	1399	0.470	5.4	A	1595	0.531	5.7	A
21. Shoalhaven Street / Akuna Street	334	0.088	2.0	A	380	0.097	2.1	A

8.5 Proposal 4 Modelling Results Discussion

The modelling results show that all intersections within the study area have additional capacity within a 10-year design horizon to support the proposed modifications to all intersections, except for the proposed zebra crossings at the Terralong Street / Collins Street roundabout (site 1). It is expected that site 1 will be over-capacity in the 2031 PM peak and weekend scenarios.

In the PM peak, the north-east Collins Street approach is expected to have a 104% degree of saturation, 73s average delay, and 361m 95th percentile queue. In the weekend scenario, the approach is expected to have a 117% degree of saturation, 177s average delay and 784m 95th percentile queue.

The addition of pedestrian crossing facilities on all sides of the roundabout will result in additional queues for an intersection that is already above capacity in the 2031 weekend 'do nothing' scenario.

A comparison between the 2031 'do nothing' Scenario and the Proposal 4 scenario is detailed in Table 6.4.

Table 8.4: Proposal 4 Comparison – Collins Street / Terralong Street

Approach	DoS	Delay (s)	LoS	95 th ile Queue (m)
Weekend 2031 Do Nothing				
Collins Street SB	1.009	53	D	333
Overall	1.009	27	B	333
Weekend with Proposal 4				
Collins Street SB	1.172	177	F	784
Overall	1.172	79	F	784



Proposal 4 would result in intolerable increases in delays and queue lengths at the intersection. The extended queuing would extend through multiple upstream intersections and reduce sight lines to pedestrians at those intersections. As such, further traffic management measures need to be considered before the implementation of Proposal 4.



9. SIDRA COMBINED CASE MODELLING

9.1 Traffic Model

The combined model assesses the implementation of all proposals within the network of the Town Centre. The proposal changes across multiple models were combined through the model layouts, volumes and parameters.

9.2 Modelled Demand and Network

The redistributed traffic volumes from Proposal 2 were adopted for the combined assessment.

Traffic network volume diagrams are provided within **Appendix A**.

9.3 Modelling Assumptions and Limitations

The detailed assumptions of the combining process are discussed within *P4582.001T Kiama Traffic and Parking Study SIDRA Technical Note*.

9.4 Combined Case Modelling Results (SIDRA)

The SIDRA overall intersection performance results for the 2021 and 2031 Proposal 2 scenarios are summarised in Table 5.1 to Table 5.3.

The SIDRA output tables are attached within **Appendix B**.

Table 9.1: Combined Case Intersection Capacity Results, Weekday Peak - AM

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	1205	0.552	5.1	A	1374	0.652	6.1	A
2. Collins Street / Akuna Street	383	0.145	0.9	A	437	0.166	0.9	A
3. Collins Street / Bong Bong Street	431	0.138	5.0	A	491	0.158	5.0	A
4. Terralong Street / Railway Parade	541	0.182	3.5	A	617	0.208	3.5	A
5. Shoalhaven Street / Bong Bong Street	719	0.197	5.0	A	820	0.228	5.2	A
6. Terralong Street / Blowhole Point Road	381	0.127	2.9	A	434	0.146	3.0	A
7. Bong Bong Street / Railway Parade / Eddy Street	1052	0.786	16.7	B	1199	0.806	21.6	B
8. Terralong Street / Shoalhaven Street	829	0.204	3.9	A	946	0.235	4.0	A
9. Terralong Street / Manning Street	423	0.158	4.5	A	482	0.180	4.5	A
10. Manning Street / Bong Bong Street	1183	0.444	6.3	A	1349	0.516	6.6	A
21. Shoalhaven Street / Akuna Street	327	0.09	0.9	A	373	0.102	0.9	A



Table 9.2: Combined Case Intersection Capacity Results, Weekday Peak - PM

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	1881	0.855	12.0	A	2144	1.03	33.0	C
2. Collins Street / Akuna Street	673	0.245	0.6	A	767	0.273	0.7	A
3. Collins Street / Bong Bong Street	866	0.312	5.2	A	988	0.352	5.3	A
4. Terralong Street / Railway Parade	764	0.273	3.5	A	871	0.257	3.5	A
5. Shoalhaven Street / Bong Bong Street	1213	0.413	6.2	A	1382	0.505	6.4	A
6. Terralong Street / Blowhole Point Road	840	0.200	3.5	A	958	0.228	3.7	A
7. Bong Bong Street / Railway Parade / Eddy Street	1611	0.972	62.0	E	1836	1.083	111.5	F
8. Terralong Street / Shoalhaven Street	1167	0.273	4.2	A	1331	0.305	4.3	A
9. Terralong Street / Manning Street	849	0.316	3.9	A	968	0.468	3.9	A
10. Manning Street / Bong Bong Street	1907	1.024	32.5	C	2174	1.184	98.9	F
21. Shoalhaven Street / Akuna Street	408	0.111	0.6	A	466	0.122	0.6	A

Table 9.3: Combined Case Intersection Capacity Results, Weekend Peak - WE

Intersection	2021				2031			
	Demand (veh)	DoS	Delay (s)	LoS	Demand (veh)	DoS	Delay (s)	LoS
1. Terralong Street / Collins Street	2045	1.308	127.3	F	2332	1.583	239.5	F
2. Collins Street / Akuna Street	749	0.262	0.9	A	854	0.261	0.9	A
3. Collins Street / Bong Bong Street	946	0.344	5.6	A	1079	0.355	5.7	A
4. Terralong Street / Railway Parade	936	0.298	3.5	A	1067	0.315	3.5	A
5. Shoalhaven Street / Bong Bong Street	1397	0.676	6.2	A	1592	0.713	6.4	A
6. Terralong Street / Blowhole Point Road	994	0.302	3.8	A	1133	0.321	4.1	A
7. Bong Bong Street / Railway Parade / Eddy Street	1924	1.22	180.0	F	2194	1.357	258.6	F
8. Terralong Street / Shoalhaven Street	1379	0.547	4.9	A	1572	0.619	5.4	A
9. Terralong Street / Manning Street	1045	0.346	4.4	A	1192	0.395	4.3	A
10. Manning Street / Bong Bong Street	2162	0.987	25.0	B	2465	1.154	76.9	F
21. Shoalhaven Street / Akuna Street	579	0.154	1.3	A	660	0.153	1.4	A



9.5 Combined Case Modelling Results Discussion

The modelling results show that not all intersections within the study area will have spare capacity within a 10-year design horizon to support the implementation of all proposals. The critical intersections are sites 1, 7 and 10, which will be over capacity on weekends within the 10-year period.

Site 1 – Terralong Street / Collins Street

The Terralong Street / Collins Street roundabout is expected to perform at LoS F during the 2021 weekend scenario with the implementation of pedestrian crossings on all sides.

The worst approach will be the north-east Collins Street approach, which is expected to operate at 158% saturation, with average delays of 538s and 95th percentile queue of 1,653m. This would reach well onto the Princes Highway.

In this scenario, the Collins Street approach is at 101% saturation and a queue length of 47m without any modifications, so the addition of pedestrian crossings will only further exacerbate delays and queues.

Site 7 – Bong Bong Street / Railway Parade / Eddy Street

The new traffic signals at Bong Bong Street / Railway Parade cause the intersection to operate at LoS F during the 2021 weekend scenario. The worst approach is the south-east Bong Bong Street approach, which is expected to operate at 122% saturation, with average delays of 272s and 95th percentile queue of 180m. The north-east Railway Parade approach is also poor, with a 115% degree of saturation, 215s delays and 95th percentile queue of 315m.

The intersection does not have sufficient capacity with its existing layout to support a 10-year design horizon of new traffic signals, and the poor performance is likely due to the large number of vehicles being redirected through this site due to the closure from Proposal 2.

Site 10 – Manning Street / Bong Bong Street

The Manning Street / Bong Bong Street will operate at LoS F in the PM peak during the 2031 PM peak and weekend scenario. During the 2031 weekend scenario, the worst approach is the south-west Manning Street approach, which is expected to operate at 115% saturation, with average delays of 162m, and 95th percentile queue of 441m. The north-east Manning Street approach is also poor, with a 110% degree of saturation, 127s delays, and 95th percentile queue of 356m.

The poor performance of the intersection is likely due to the large number of redirected vehicles required to access this site due to the closure from Proposal 2.



10. NETWORK DEFICIENCIES AND OPTIONS ASSESSMENT

10.1 Overview

The SIDRA modelling indicates that if no changes to the road network are implemented, then the following intersections are expected to be over capacity by 2031:

- Collins Street / Terralong Street
- Farmer Street / Manning Street.

The closure of Terralong Street between Railway Parade and Manning Street (Proposal 2) would result in the Railway Parade / Bong Bong Street / Eddy Street intersection becoming over capacity due to the large increase in demand.

The combined implementation of traffic signals at the Railway Parade / Bong Bong Street / Eddy Street intersection (Proposal 4) and Proposal 2 would result in the Bong Bong Street / Manning Street becoming over capacity.

These details are summarised in Table 10.1.

Table 10.1: Over-Capacity Intersections by Scenario

Scenario	Town Centre Network	Outer Intersections
Do Nothing	Collins Street / Terralong Street	Terralong Street / Thomson Street Farmer Street / Manning Street
Proposal 1	Collins Street / Terralong Street	
Proposal 2	Collins Street / Terralong Street Railway Parade / Bong Bong Street / Eddy Street	
Proposal 3+4	Collins Street / Terralong Street	
Combined	Collins Street / Terralong Street Railway Parade / Bong Bong Street / Eddy Street Bong Bong Street / Manning Street	

The following sections will discuss the traffic issues at each intersection and potential treatment options.



10.2 Terralong Street / Collins Street

The Collins Street / Terralong Street roundabout is expected to perform poorly in the 2031 weekend scenario, with the Collins Street southbound approach expected to see 53s average delay and 333m 95th percentile queue lengths, which would extend through the Collins Street / Minnamurra Street roundabout. The options tested were based on the combined options scenario, which includes pedestrian crossings on all legs of the roundabout and a pedestrian crossing between Collins Street and Shoalhaven Street.

Additional approach lanes can be provided to improve the capacity of the intersection but requires converting the existing roundabout to traffic signals. The signalised intersection would also provide pedestrian crossings on all sides of the intersection and provide more pedestrian protection than a roundabout. The traffic signals layout tested in SIDRA is detailed in Figure 10.1.

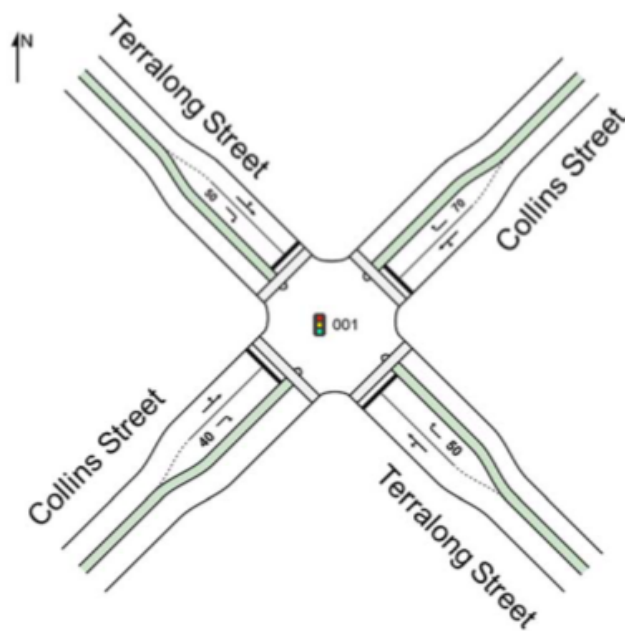


Figure 10.1: Terralong Street / Collins Street Traffic Signals

It is expected that some of the left turn traffic at the roundabout may divert via Minnamurra Street and Shoalhaven Street to avoid using the traffic signals, with these vehicles travelling further south to turn left from Shoalhaven Street to Terralong Street. The SIDRA model option testing assumed zero traffic would detour along this route, and this model is therefore considered to be a more conservative estimate of traffic volumes using the intersection.



10.2.1 Traffic Signals Warrants Assessment

The intersection was assessed against Transport for NSW's *Traffic Signal design Section 2 – Warrants*. There are two potential warrants that may apply to the intersection based on each of four one-hour periods of an average day:

- Warrant 1: Traffic Demand
 - The major road flow exceeds 600 vehicles/hour in each direction
 - The minor road flow exceeds 200 vehicles/hour in one direction
- Warrant 2: Pedestrian Safety
 - The pedestrian flow crossing the major road exceeds 150 persons/hour
 - The major flow exceeds 600 vehicles/hour in each direction or, where there is a central median of at least 1.2m wide, 1000 vehicles/hour in each direction

It is assumed that the major flow of traffic is along Collins Street north of the intersection and Terralong Street east of the intersection. The pedestrian counts are also assumed to be the sum of pedestrians crossing the above legs of the intersection. The surveyed traffic counts and pedestrian counts have been adjusted as per Section 4.5 to account for seasonal variation.

The assessment against the traffic demand warrant is presented in Table 10.2.



Table 10.2: Terralong Street / Collins Street Signal Warrant Assessment

Category	Major Road		Minor Road	Pedestrian
Criteria	>600	>600	>200	>150
	Collins Street Southbound	Terralong Street Westbound	Terralong Street Eastbound	Pedestrians Crossing Major Road
2020 AM Survey				
6:00 – 7:00	183	100	58	14
7:00 – 8:00	260	138	116	19
8:00 – 9:00	405	302	202	36
2020 PM Survey				
16:00 – 17:00	509	410	309	99
17:00 – 18:00	483	322	322	47
18:00 – 19:00	287	205	209	21
2020 Weekend Survey				
10:00 – 11:00	581	382	330	152
11:00 – 12:00	619	394	364	257
12:00 – 13:00	619	402	348	326
2021 AM (Volumes adjusted for seasonal variation)				
6:00 – 7:00	228	125	72	17
7:00 – 8:00	324	172	145	24
8:00 – 9:00	505	377	252	45
2021 PM (Volumes adjusted for seasonal variation)				
16:00 – 17:00	635	511	385	123
17:00 – 18:00	602	402	402	59
18:00 – 19:00	358	256	261	26
2021 Weekend (Volumes adjusted for seasonal variation)				
10:00 – 11:00	725	476	412	190
11:00 – 12:00	772	491	454	321
12:00 – 13:00	772	501	432	407
2031 AM				
6:00 – 7:00	262	143	83	20
7:00 – 8:00	373	198	166	27
8:00 – 9:00	580	433	290	52
2031 PM				
16:00 – 17:00	730	588	443	142
17:00 – 18:00	692	492	462	67
18:00 – 19:00	411	294	300	30
2031 Weekend				
10:00 – 11:00	833	548	473	218
11:00 – 12:00	887	565	522	368
12:00 – 13:00	887	576	499	467



The intersection does not currently meet the signal warrant for either traffic demand or pedestrian safety during weekdays or weekends because the major road flow does not exceed 600 vehicles in both directions. The intersection is also not expected to meet the signal warrants in 2031 based on a background traffic growth of 1.4% per annum.

It is however noted that by 2031, the intersections traffic and pedestrian volumes are close to meeting the warrants for signalisation and given the network implications associated with the operations of the intersection, the installation of traffic signals at Collins Street / Terralong Street intersection should be considered for future years.

10.2.2 Results

A comparison of the SIDRA results for the above options are detailed in Table 10.3.

Table 10.3: Terralong Street / Collins Street Upgrade Performance Comparison

Approach	Demand (veh)	DoS	Delay (s)	LoS	95%ile Queue (m)
Weekend 2031 Do Nothing					
Collins Street SB	938	1.009	53	D	333
Overall	2329	1.009	27	B	333
Weekend 2031 with Combined Proposals					
Collins Street SB	938	1.583	538	F	1653
Overall	2139	1.583	240	F	1653
Traffic Signals with Combined Proposals					
Collins Street SB	938	0.713	17	B	112
Overall	2332	0.805	20	B	112

The modelling indicates that if the existing roundabout intersection form is maintained with existing pedestrian refuge crossings, the intersection will operate at an overall LoS B, with the Collins Street SB approach exhibiting a LoS D. The delays on the other approaches will be similar if signals are introduced, with only the Collins Street SB approach exhibiting a significant improvement.

The introductions of traffic signals at this intersection will significantly improve pedestrian crossing amenity, without compromising the traffic network operations or extend vehicle queueing back along Collins Street.

As identified in Section 10.2.1, Collins Street / Terralong Street does not meet all warrants for signalisation during weekday or weekend periods. However, signals will effectively manage competing traffic and pedestrian volumes during weekends in the future years. The challenge in future years therefore relates to providing an appropriate intersection treatment that balances the needs attributed to weekday operations, without compromising the safety or efficiency of the road network during weekend peak operations.

While upgrading Collins Street / Terralong Street intersection to traffic signals is considered an appropriate treatment to improve traffic operations and pedestrian crossing amenity for future years, installing traffic signals into Kiama would also be a major step for Council and the community as a whole. A range of factors will also need to be further considered when deciding if traffic signals are appropriate for this location in the future including:

- Detailed design considerations, particularly relating to downward grades on approach to the intersection from Collins Street NB approach



- Potential loss of parking in proximity to the intersection
- Removal of u-turn movements from the intersection
- Council's position with introducing a signalised intersection at the primary "gateway" intersection to the town centre.

10.3 Farmer Street / Manning Street

The eastbound Farmer Street approach is expected to be over-capacity in the weekend 2031 base scenario due to long wait times for the right turn and through movements. Two options were tested to improve the intersection.

10.3.1 Farmer Street Lane Duplication

The first option involves duplicating the eastbound Farmer Street approach to allow for a right turn lane and a left turn / through lane. The upgrade layout is shown in Figure 10.2.

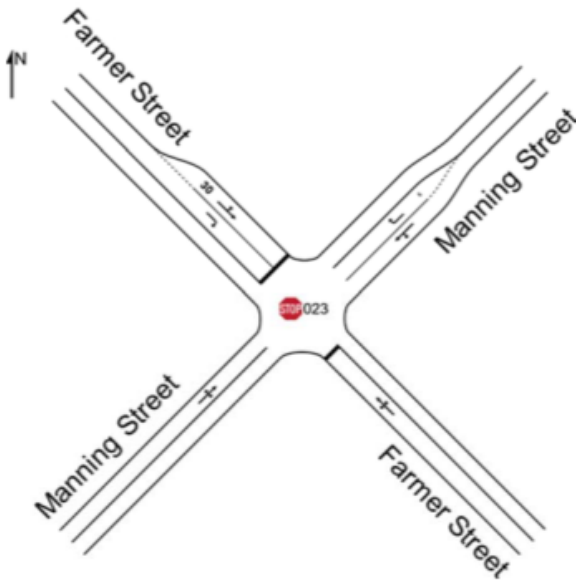


Figure 10.2: Farmer Street Lane Duplication SIDRA Layout

10.3.2 Manning Street Median

The second option is to install a median along Manning Street at the intersection, effectively banning the right turn and through movements from both approaches of Farmer Street. Traffic crossing Manning Street would be redirected instead to either the Manning Street / Barney Street roundabout to the north or the Manning Street / Saddleback Mountain Road roundabout to the south.



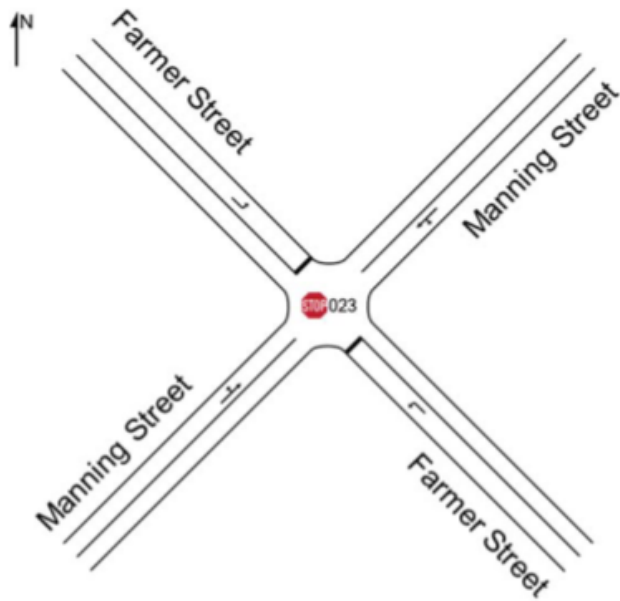


Figure 10.3: Manning Street Median SIDRA Layout

10.3.3 Results

A comparison of the SIDRA results for the above upgrade options are detailed in Table 10.4.

Table 10.4: Manning Street / Farmer Street Upgrade Performance Comparison

Approach	Demand (veh)	DoS	Delay (s)	LoS	95 th ile Queue (m)
Weekend 2031 Do Nothing					
Overall	1618	1.008	11	A	52
Farmer Street EB	58	1.008	262	F	52
Farmer Street Lane Duplication					
Overall	1618	0.898	8	A	29
Farmer Street EB	58	0.898	161	F	29
Manning Street Median					
Overall	1680	0.443	1	A	3
Farmer Street EB	54	0.089	12.4	A	3

The lane duplication results in a minor improvement of the Farmer Street approach, but the right turn remains poor, with an average delay of 161s and a 95th percentile queue of 29m. This option also results in a two-lane approach to a stop sign, which reduces sight lines if two vehicles are stopped simultaneously.

The installation of the median greatly improves the Farmer Street approach, resulting in an average delay of 12s and 95th percentile queue of 3m.



An assessment was undertaken of the impact of the redirected traffic on the adjacent roundabouts on Manning Street, and the results are detailed in Table 10.5.

Table 10.5: Manning Street / Farmer Street Performance Comparison

Scenario	Demand (veh)	DoS	Delay (s)	LoS	95%ile Queue (m)
Manning Street / Barney Street (Weekend 2031)					
Do Nothing	1661	0.675	6	A	53
With Median	1775	0.754	8	A	77
Manning Street / Saddleback Mountain Road / Bonaira Street / Henley Avenue (Weekend 2031)					
Do Nothing	1669	0.629	8	A	47
With Median	1735	0.676	9	A	56

The results demonstrate that the redirection of traffic from the Manning Street / Farmer Street intersection will only result in a small impact on the adjacent roundabouts.

As such, the installation of the median on Manning Street will greatly improve the performance of the intersection with limited impacts on the surrounding road network. The typical detour route via Shoalhaven Street would result in an extra travel distance of approximately 450m in the worst case, so the median would not greatly inconvenience existing users of the intersection. However, the Manning Street / Barney Street roundabout may need to be converted to a mountable roundabout to allow right turns for heavy vehicles.

10.4 Bong Bong Street / Railway Parade / Eddy Street

The closure of Terralong Street between Railway Parade and Manning Street (Proposal 2) would result in the Bong Bong Street / Railway Parade / Eddy Street intersection becoming over capacity, with queues that extend through upstream intersections. As such, a special event traffic management plan should be prepared for any temporary closures, which would identify measures to reduce delays and queuing caused by the greatly increased traffic demand at this intersection.

The signalisation of this intersection as part of Proposal 4 is not recommended as the intersection performs adequately under normal conditions (i.e., without Proposal 2), and will not improve intersection performance with the implementation of Proposal 2, as demonstrated by the combined scenario.



11. TRACKS MODELLING

11.1 TRACKS Model Review

Council provided Shoalhaven Kiama TRACKS model to Bitzios Consulting to estimate future projected traffic within the study area. As part of this study, a review of the TRACKS model was undertaken to understand how the model compares to existing traffic conditions. This section summarised the key findings of the TRACKS model review and use in the study.

11.1.1 Background

The original TRACKS model was developed in 2011. The 2011 base model was used to develop the "Do Minimum" future models in 5-year increments to 2041. These are:

- 2016 Base Model
- 2021 Base Model
- 2026 Base Model
- 2031 Base Model
- 2036 Base Model
- 2041 Base Model.

As part of this study traffic turn count surveys were carried out at 25 key intersections within the study area as shown in Figure 11.1. The surveys were carried out on Thursday 16 July and Saturday 18 July 2020 during the NSW school holiday period. For this study, the 2021 TRACKS model was identified as the closest to the base 2020. The outputs (turn and link flows) from the 2021 TRACKS model were compared with the turn count survey data to check the suitability of the TRACKS model. For this comparison, the 2020 survey flows were not factored to 2021 flows.



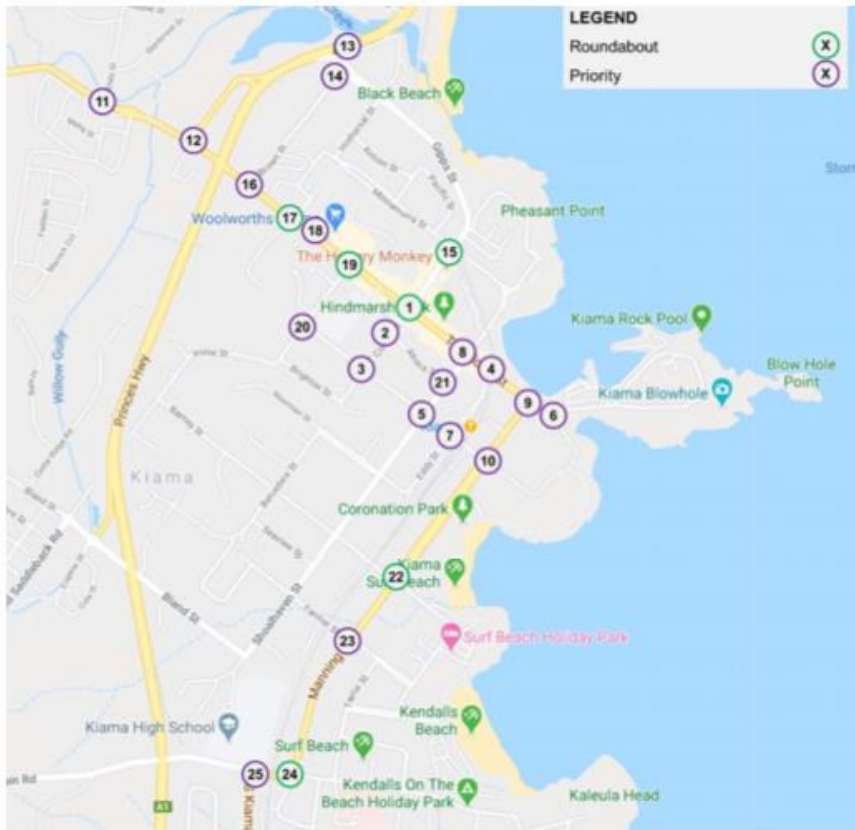


Figure 11.1: Study Area and Turn Count Data Collection

The model used was the Kiama & Shoalhaven TRACKS model, which included 2021 AM and PM peak models for two different traffic scenarios:

- 100th Highest Hourly School Traffic
- Average Annual School Traffic (AAST).

The Kiama & Shoalhaven TRACKS model does not include a weekend period, therefore weekend modelling was unable to be undertaken using this process. For each of the two scenarios three network scenario models were developed as summarised in Table 11.1.

Table 11.1: Scenario Models

Scenarios	100th Traffic	Average Annual School Traffic (AAST)
Do Min	√	√
wFLandBypass	√	√
wFutureLinks	√	√

A high-level review of the various models shows that within the study area there are no significant differences between "Do minimum", "with Future Land Bypass" and "with Future Links" network scenario models. However, as expected, there are substantial differences in traffic flows between the 100th and AAST traffic flows scenario models. For this study, the AAST Do Minimum scenario was adopted for further analysis.



11.1.2 Findings

The 2021 TRACKS model was checked for the followings:

- Network Coding within the study area only
- Calibration.

11.1.2.1 Network Coding

The study area road and intersection coding and TRACKS zoning system were checked for consistency and appropriateness. The key findings include:

- Generally, the study area network and intersections are coded adequately in the TRACKS model
- Generally, the TRACKS model zones are well disaggregated
- The Kiama Blowhole which attracts a substantial number of tourist traffic was not included as a zone/subzone (see Figure 11.2). The provided model did not have any centroids or connectors connected to the blow hole area. To rectify this issue, this area was connected with the adjacent centroid/zone.
- A few key areas which generate and attract traffic are not connected to any zones. This has resulted in low or zero traffic flows on some key study area roads (examples included in Figure 11.2)



Figure 11.2: TRACKS Model Network Coding Issues



11.1.2.2 Calibration Criteria

The turn survey volumes were compared with the TRACKS modelled volumes using the Geoffrey E. Havers (GEH) Statistic which is an industry standard measure of variance between the observed count and modelled count, expressed by the following:

$$GEH = \sqrt{\frac{2(M - C)^2}{M + C}}$$

Where M is the Modelled Volume and C is the Observed Volume.

The TfNSW Traffic Modelling Guidelines 2013 (Table 10.3) uses the GEH Statistic as the main measurement of variance in modelling and sets out the following requirements for calibration to turning movements and link volumes:

- 95% of individual link with a GEH ≤ 5.0
- 85% of individual turns with a GEH ≤ 5.0
- All individual link and turn volumes should have GEH ≤ 10.0.

11.1.2.3 Calibration

The GEH results for the AM and PM peaks models in relation to the turn flow calibration criteria are summarised Table 11.2.

Table 11.2: GEH Summary for Link and Turn Flows

GEH Criteria	AM	PM
Link Volumes % of GEH <10	71.2%	70.3%
Link Volumes % of GEH <5	52.3%	45.9%
Turn Volumes % of GEH <10	78.0%	81.3%
Turn Volumes % of GEH <5	56.4%	52.6%

The key observations included that:

- The GEH summary suggested that the model requires further calibration against the observed data, with link volumes showing 70% are within GEH value of 10
- Several key intersections differ greatly from the observed data in both the AM and PM peaks with the individual turn movements summary shows around 80% are within GEH value of 10 with almost half of them below GEH value of 5
- The AM and PM peak summary of the individual intersection total flow differences is presented in Figure 11.3 and Figure 11.4 and detailed in Table 11.3. The key observations include:
 - In AM peak, 17 intersections showed (68%) significantly higher flows and 6 intersections showed significantly lower flow in the TRACKS model. Only 2 intersections showed similar overall flow in the TRACKS model
 - In PM peak, 6 intersections showed significantly higher flows (40%) and 11 intersections showed significantly lower flow in the TRACKS model. The remaining eight (8) intersections showed similar overall flow in TRACKS model
 - Generally, intersections located on the western side of study area have higher flows in TRACKS



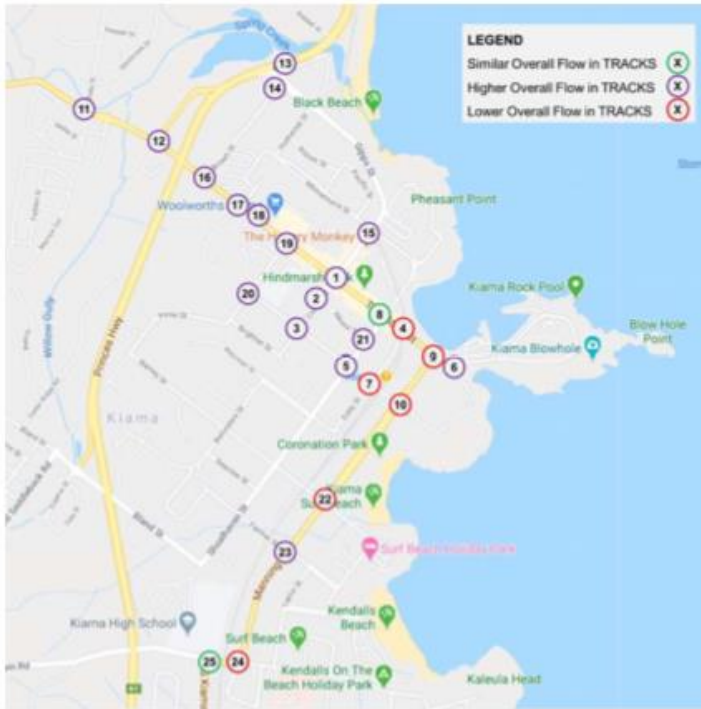


Figure 11.3: Comparison of Flows between Observed and TRACKS model at AM Peak

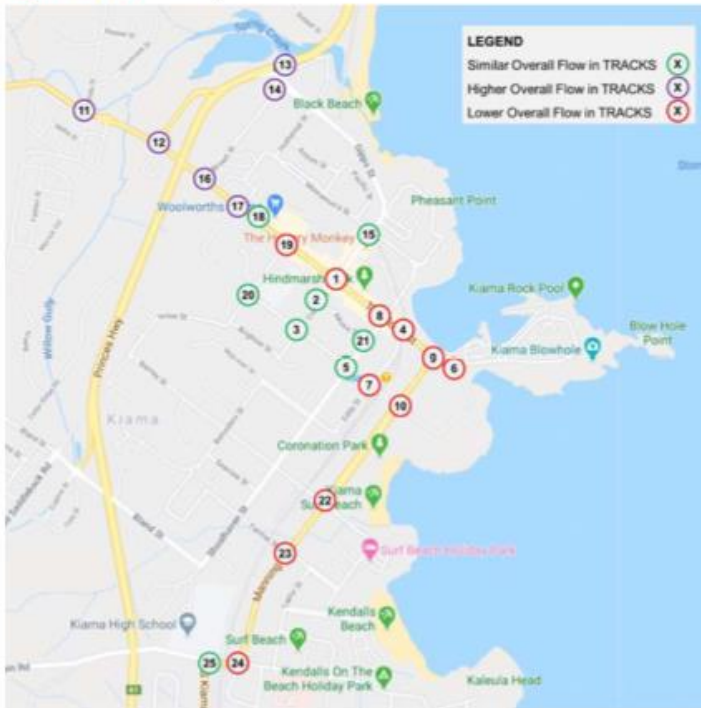


Figure 11.4: Comparison of Flows between Observed and TRACKS model at PM Peak



Table 11.3: TRACKS Model (2021) Intersection Volume Comparison

Intersection Number	Observed Volume		TRACKS Volume		Difference (%)	
	AM	PM	AM	PM	AM	PM
1	906	1421	1183	1142	31%	-20%
2	194	335	271	407	40%	21%
3	228	477	375	518	64%	9%
4	604	939	394	314	-35%	-67%
5	354	564	434	478	23%	-15%
6	287	636	394	311	37%	-51%
7	267	379	87	165	-67%	-56%
8	710	1054	655	499	-8%	-53%
9	648	1075	394	311	-39%	-71%
10	682	1025	185	294	-73%	-71%
11	193	257	693	809	259%	215%
12	629	1030	1413	1887	125%	83%
13	1423	1838	2385	2524	68%	37%
14	686	823	1539	1163	124%	41%
15	579	718	901	719	56%	0%
16	599	1044	1215	1688	103%	62%
17	661	1101	1116	1380	69%	25%
18	593	962	778	920	31%	-4%
19	712	1349	1183	1142	66%	-15%
20	168	318	440	349	162%	10%
21	154	133	235	195	53%	47%
22	642	1075	180	249	-72%	-77%
23	743	1082	1016	945	37%	-13%
24	747	1049	292	580	-61%	-45%
25	481	613	536	567	11%	-8%

11.1.2.4 Calibration Check for 2016 Models

The observed traffic flows were also compared with the TRACKS 2016 Do Minimum Model outputs. The GEH results for the AM and PM peaks models in relation to the turn flow calibration criteria are summarised in Table 11.4.

Table 11.4: GEH Summary for Link and Turn Flows for TRACKS 2016 Do Minimum Models

GEH Criteria	AM	PM
Link Volumes % of GEH <10	73.0%	72.1%
Link Volumes % of GEH <5	52.3%	43.2%
Turn Volumes % of GEH <10	78.4%	82.5%
Turn Volumes % of GEH <5	55.2%	54.2%



The findings show that, like the 2021 model, the 2016 model also does not validate well against 2020 observed data. The AM and PM peak observed and TRACKS individual intersection total flow are compared in Table 11.5. The key findings include:

- Generally, TRACKS flows are substantially higher than the observed flows
- Observed flows at intersections 11, 12, 13, 14 and 16 located close to Princes Highway are substantially lower than TRACKS flows with differences as high as 350 veh/hr to 950 veh/hr as shown in Table 11.5.
- The traffic surveys were undertaken during the expected seasonal “slow period” of tourist visitation to Kiama. However, TRACKS model presents the Average Annual School Traffic (AAST) traffic. This may be attributed to higher TRACKS flows.

Table 11.5: TRACKS Model (2016) Intersection Volume Comparison

Intersection Number	Observed Volume		TRACKS Volume		Difference (%)	
	AM	PM	AM	PM	AM	PM
1	906	1421	1138	1086	26%	-24%
2	194	335	257	379	32%	13%
3	228	477	358	485	57%	2%
4	604	939	380	303	-37%	-68%
5	354	564	418	454	18%	-20%
6	287	636	380	300	32%	-53%
7	267	379	83	152	-69%	-60%
8	710	1054	626	479	-12%	-55%
9	648	1075	380	300	-41%	-72%
10	682	1025	180	280	-74%	-73%
11	193	257	640	750	232%	192%
12	629	1030	1334	1791	112%	74%
13	1423	1838	2244	2381	58%	30%
14	686	823	1466	1098	114%	33%
15	579	718	865	678	49%	-6%
16	599	1044	1154	1609	93%	54%
17	661	1101	1055	1320	60%	20%
18	593	962	733	877	24%	-9%
19	712	1349	1138	1086	60%	-19%
20	168	318	413	323	146%	2%
21	154	133	222	185	44%	39%
22	642	1075	175	236	-73%	-78%
23	743	1082	963	905	30%	-16%
24	747	1049	270	554	-64%	-47%
25	481	613	506	541	5%	-12%



11.1.3 TRACKS Model Updates

The TRACKS model was updated to include some important links including the Kiama blow hole area. The changes are as follows:

- New centroid connectors were added for zone 471, and 472.
- Zone 473 was split into two zones, one for the Kiama Blow Hole (zone 827) and the other one is in the existing position (zone 473)
 - The land use assumptions were also changed for zone 473. The number of jobs is reduced to 250 from 663 (413 less jobs).
 - Kiama Blow Hole (zone 827) is assumed to have 413 jobs.
- These changes do not improve the calibration much. However, the TRACKS model now shows traffic on the links which did not show traffic previously.

11.1.4 Limitations

Within the study area, the 2021 and 2016 TRACKS models outputs do not show good correlation with the 2020 observed turn and link flows. This is expected as the TRACKS base model was validated to 2011 traffic surveys and forecast years may be overestimated or underestimated for a number of reasons, for example development levels are more or less than anticipated at the time. For this reason the TRACKS model outputs were not used to estimate future traffic demands.

11.2 Urban Expansion Traffic Generation and Distribution

TRACKS model uses the zonal land use assumptions (number of households and number of jobs) to calculate the traffic generation and distribution in the network. Table 11.6 shows the zonal land use assumptions for 2021 and 2031 models. The zone locations of the TRACKS model are provided in Figure 11.5.

Table 11.6 shows that TRACKS model assumes that in 2031, the number of household and the number of jobs will be increased by 14% and 10% respectively.



Table 11.6: TRACKS Model (2016) Intersection Volume Comparison

Zone Number	Number of Household			Number of Jobs		
	2021	2031	% Difference	2021	2031	% Difference
466	75	89	19%	70	77	10%
467	125	137	10%	66	73	11%
468	154	170	10%	334	368	10%
469	290	319	10%	339	375	11%
470	147	162	10%	71	78	10%
471	200	249	25%	226	250	11%
472	131	145	11%	359	397	11%
473	63	70	11%	663	732	10%
474	213	253	19%	55	61	11%
475	146	184	26%	57	63	11%
476	291	339	16%	150	166	11%
477	162	197	22%	52	57	10%
478	152	174	14%	106	117	10%
479	159	175	10%	47	52	11%
480	188	218	16%	60	66	10%
481	207	231	12%	67	74	10%
482	92	101	10%	27	29	7%
483	165	181	10%	426	471	11%
484	186	215	16%	57	63	11%
485	166	181	9%	50	55	10%
486	32	37	16%	34	38	12%
525	96	106	10%	77	85	10%
Overall	3440	3933	14%	3393	3747	10%



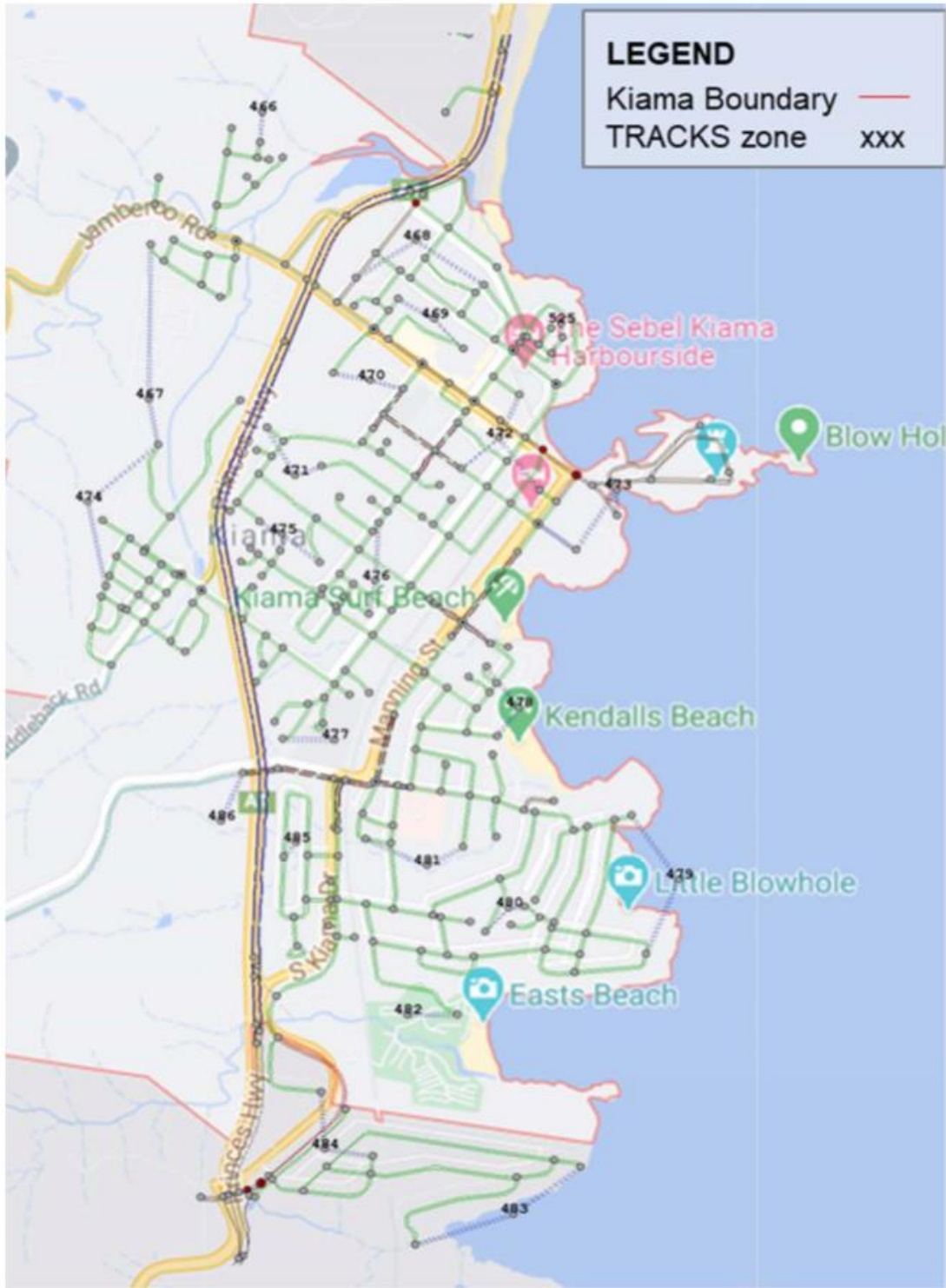


Figure 11.5: Location of TRACKS Model Zones

Item 6.1

Attachment 2



11.3 TRACKS Future Network Coding

The TRACKS network used for 2031 scenario is the same as 2021 scenario. There are no major road or network improvements in the Kiama area identified for the future. However, Proposal 2 for this study was identified as a future change. In this scenario, a section of Terralong Street will be closed in the peak tourist season. A separate TRACKS model was coded to evaluate this network change.

11.4 Future Traffic Demand

As discussed previously, the TRACKS models' turning movements cannot be used directly as these models require further adjustment. However, a global growth rate between the models can be used as these models assumed the future land use and employment growth. Future traffic demand for 2021 and 2031 was estimated as follows:

- Run the 2016, 2021 and 2031 AM and PM peak models for AAST Do Minimum scenarios
- Extract TRACKS model outputs for the turning volumes for the 25 study intersections
- Calculate the total traffic flows (total of all the intersections)
- Calculate and annual growth rates for 2016 to 2021 and 2021 to 2031
- Apply the annual growth rates to the observed traffic count

The growth rate analysis is presented in Table 11.7. The annual growth rate is found between 1.07 and 1.15 (considering both peak hours). However, as a conservative approach we consider an overall traffic growth of 1.2% for both AM and PM peak.

It should be noted that the SIDRA modelling used a 1.4% population growth sourced from the Profile.ID Census data as this was a more conservative factor.

Table 11.7: Future Traffic Growth

	AM Peak			PM Peak		
	2016	2021	2031	2016	2021	2031
Total Traffic	17197	18117	20135	18278	19317	21529
Traffic Growth		920	2018		1039	2212
Annual Traffic Growth %		1.07%	1.11%		1.14%	1.15%

11.5 TRACKS Model Route Choice for Proposal 2

TRACKS model was used to observe the route choice behaviour for the network changes in Proposal 2. Select link analysis was performed for the base case and for Proposal 2 separately. The select link analysis of TRACKS model is an indicative assessment and care should be taken to use the results as TRACKS model is not a microsimulation model and does not consider driving behaviour.

For example, select link analysis of the link on Terralong Road, between Manning Street and Blow Hole Access are shown in Figure 11.6 to Figure 11.9. Key findings are as follows:

- In the base scenario (Figure 11.6), from Princes Highway North, TRACKS model showed two routes to go to the Kiama Blow Hole. Major route is via Collins Street and Terralong Street and the minor one is via Shoalhaven Street and Terralong Street.
- In the Proposal 2 scenario (Figure 11.7) from Princes Highway North, as there is a detour, TRACKS model showed different routes to go to the Kiama Blow Hole. The major route is via Collins Street and Bong Bong Street. One of the minor routes is via Shoalhaven Street, Railway Parade and Bong Bong Street.



- In the base scenario (Figure 11.8), from Kiama Blow Hole, TRACKS model showed only one route to go to Princes Highway North which is via Terralong Street.
- In the Proposal 2 scenario (Figure 11.9) from Kiama Blow Hole, as there is a detour, TRACKS model showed different routes to go to Princes Highway North. The major route is via Bong Bong Street, Thomson Street and Terralong Street. The minor route is via Bong Bong Street, Collins Street, and Terralong Street.

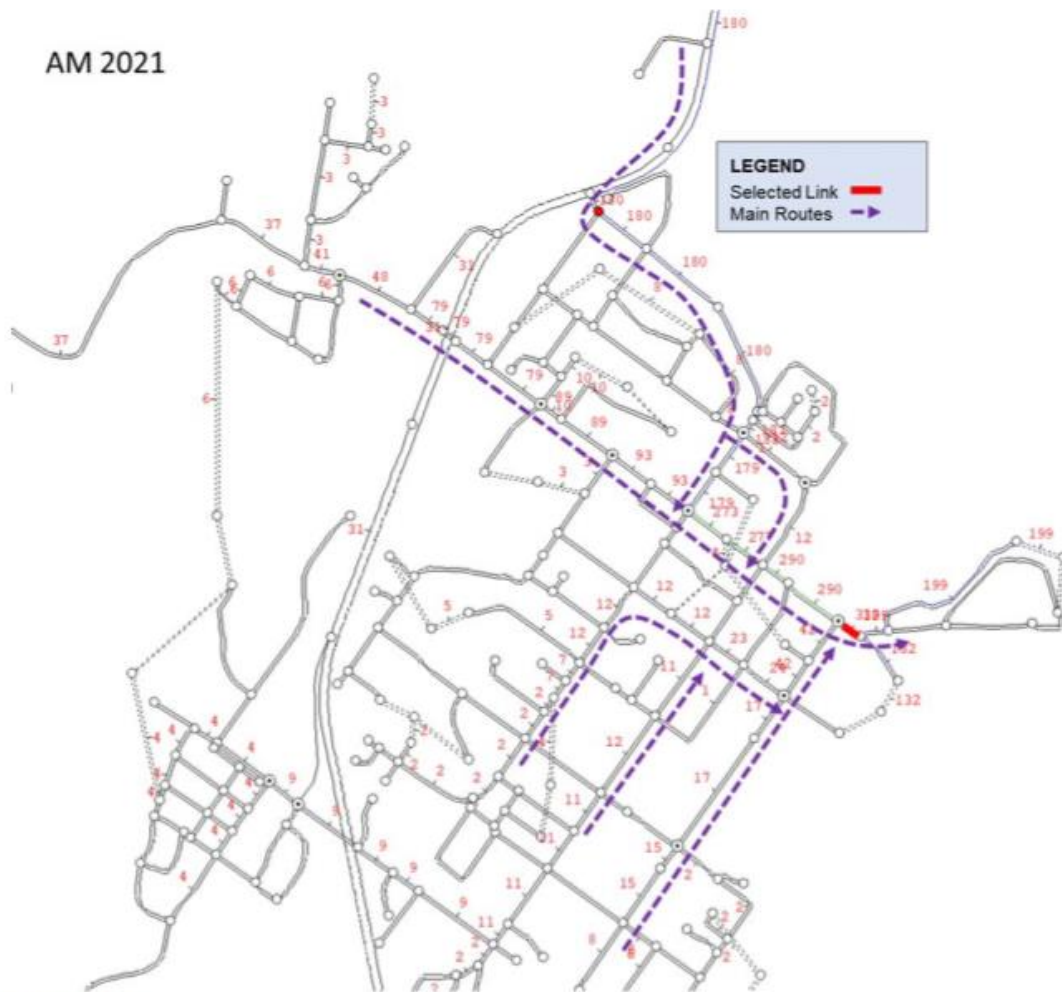


Figure 11.6: Select Link Analysis - Terralong Road, between Manning Street and Blow Hole Access – East bound AM Peak 2021 Base Scenario

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Attachment 2



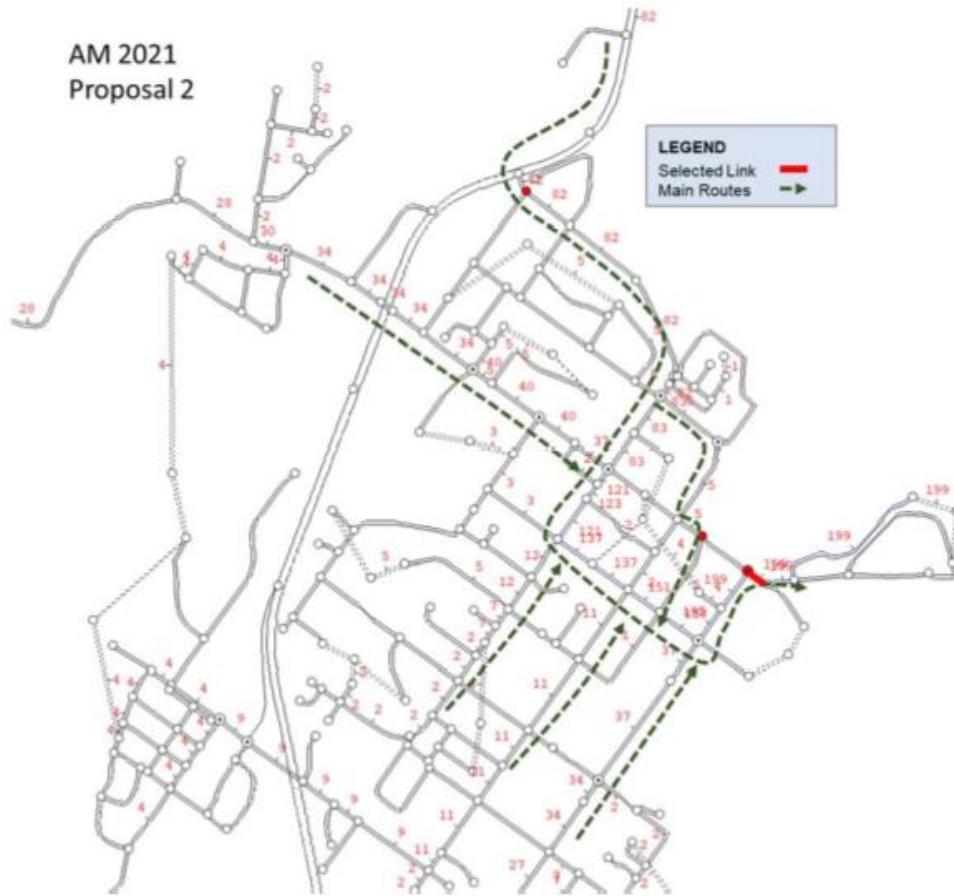


Figure 11.7: Select Link Analysis - Terralong Road, between Manning Street and Blow Hole Access – East bound AM Peak 2021 Proposal 2 Scenario

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Attachment 2





Figure 11.8: Select Link Analysis - Terralong Road, between Manning Street and Blow Hole Access – Westbound PM Peak 2021 Base Scenario

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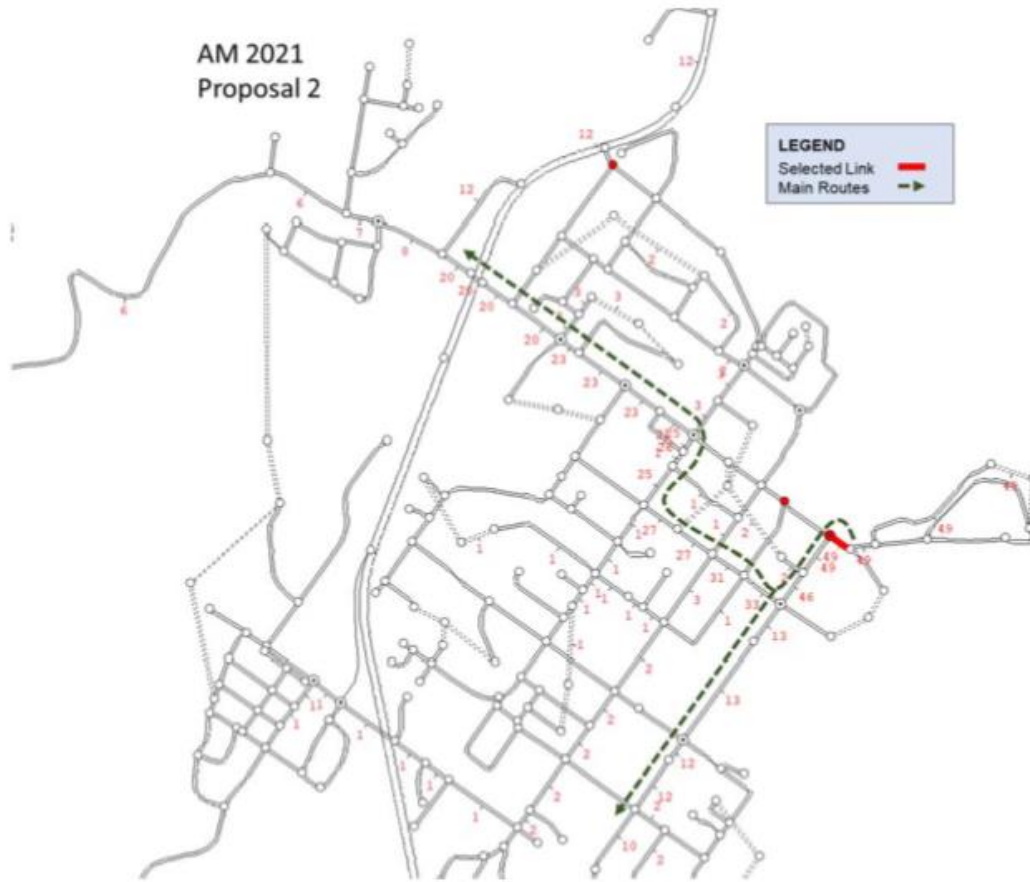


Figure 11.9: Select Link Analysis - Terralong Road, between Manning Street and Blow Hole Access – Westbound PM Peak 2021 Proposal 2 Scenario

Item 6.1

Attachment 2



12. CONCLUSIONS

The recommendations for each intersection are detailed in Table 12.1 and illustrated in Figure 12.1.

Table 12.1: Recommendations Summary

Intersection	Recommendation
1. Terralong Street / Collins Street	Consider traffic signals to improve traffic capacity and pedestrian crossing amenity (<i>subject to further investigations</i>)
23. Manning Street / Farmer Street	Install median along Manning Street
7. Bong Bong Street / Railway Parade / Eddy Street	Design and implement special event traffic management plan during closure of Terralong Street

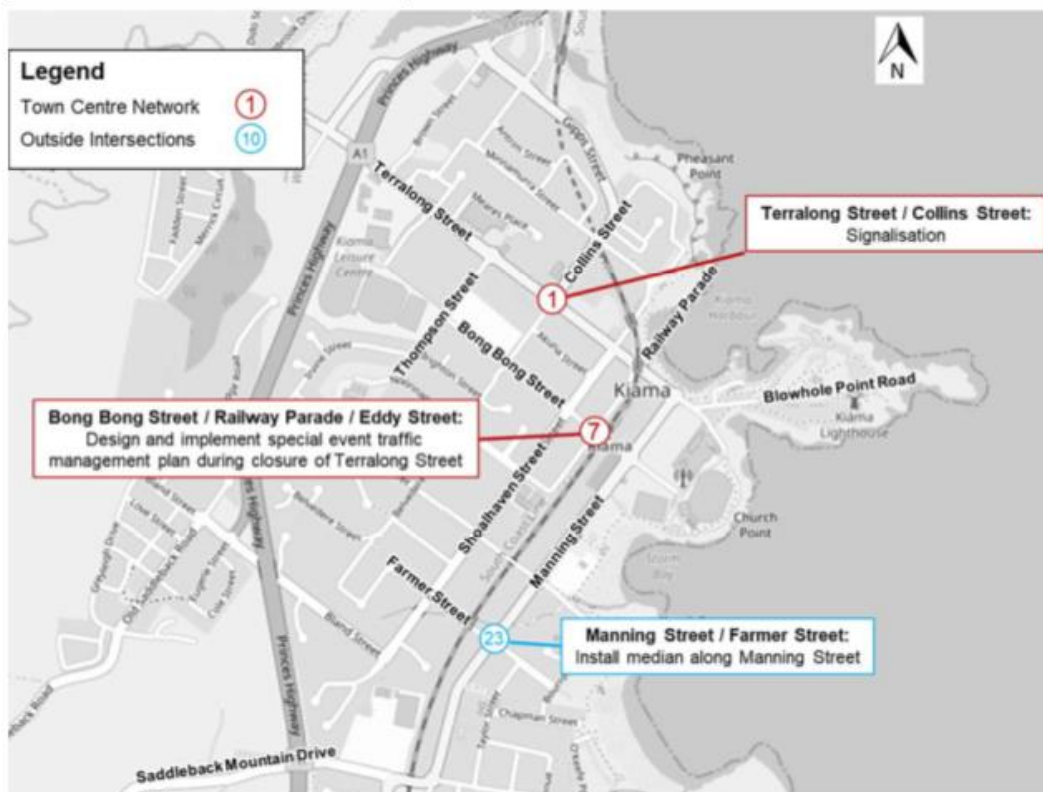


Figure 12.1: Recommendations Summary

The key findings of the traffic modelling for the Kiama Town Centre traffic and parking study are summarised as follows:

- A SIDRA network model of the Kiama Town Centre was developed, calibrated, and validated based on traffic surveys undertaken in July 2020. The surveyed traffic volumes were scaled by 23% to bring the surveyed volumes in line with 85th percentile traffic volumes. The network model consisted of 11 intersections within the town centre and 14 standalone intersections surrounding the town centre
- The modelling indicated that all existing intersections performed adequately in 2021. However, the following two intersections were expected to have long delays and queues in 2031:



- Terralong Street / Collins Street (southbound Collins Street worst approach)
- Manning Street / Farmer Street (eastbound Farmer Street worst approach)
- Three (3) proposals outlined in the Kiama Town Centre Study were also assessed to determine their traffic impacts. The Part A report provides greater detail into the assessment of each:
 - **Proposal 1:** A wombat crossing on Terralong Street between Collins Street and Shoalhaven Street resulted in the worsening of the Terralong Street / Collins Street roundabout, with delays increasing from 56s to 169s. This proposal is only recommended if the roundabout is not upgraded with crossing facilities.
 - **Proposal 2:** The closure of Terralong Street between Railway Parade and Manning Street resulted in large increases in delays and queues at the Railway Parade / Bong Bong Street / Eddy Street intersection due to the high amount of traffic redirected through the intersection. The traffic redistribution was also found to significantly worsen the Terralong Street / Collins Street roundabout. This closure is only recommended as a short-term closure and will need a traffic management plan to mitigate the resultant traffic issues.
 - **Proposal 4:** The reconfiguration of seven (7) intersections within the town centre resulted in no significant impacts apart from the worsening of the Terralong Street / Collins Street roundabout
 - The proposals were tested together in a combined scenario, and the results demonstrated that the Bong Bong Street / Railway Parade / Eddy Street intersection would not be improved by the implementation of signals if Proposal 2 were implemented, and that the Manning Street / Bong Bong Street roundabout would also be negatively affected by queues from the signals. The proposed traffic signals at Bong Bong / Railway also require widening of the railway bridge to provide the required operational capacity and signalisation of Bong Bong Street / Manning Street roundabout. This option is not considered feasible and therefore not recommended.
- The following options were developed to address the network capacity issues identified from the future year scenario without upgrades to the road network i.e. "Do Nothing" scenario.
- The upgrade of Collins Street / Terralong Street from a roundabout to traffic signals would reduce queues and delays at the intersection, while also improving pedestrian crossing facilities and safety. While upgrading Collins Street / Terralong Street intersection to traffic signals is considered an appropriate treatment to improve future capacity and safety, installing traffic signals into Kiama would also be a major step for Council and the community as no traffic signals are currently installed across Kiama town centre. A range of factors will also need to be further considered including detailed design considerations, potential loss of parking and traffic circulation.
- Two (2) options were tested for the Manning Street / Farmer Street intersection
 - Duplication of the eastbound Farmer Street approach
 - Installing a median along Manning Street, preventing right turn and through movements from Farmer Street
- The results indicated that the lane duplication would only slightly improve the eastbound Farmer Street approach. The installation of the median, converting Farmer Street to a left-in left-out arrangement would result in minimal impacts on the surrounding intersections and only short detours for existing users of the intersection. The installation of a central median on Manning Street at Farmer Street is the recommended treatment to address future operational issues at this intersection. It is noted that this option has minimal impact on the two adjacent roundabouts on Manning Street.
- The Bong Bong Street / Railway Parade / Eddy Street intersection would only be affected by the implementation of Proposal 2. As such, a special events traffic management plan should be prepared to manage the traffic impacts of the road closure. If Terralong Street is temporarily closed between Railway Parade and Manning Street alternative priority arrangements or closures at the intersection of Bong Bong Street / Railway Parade / Eddy Street should be considered. The signalisation of this intersection is not recommended as the intersection performs adequately under normal weekday and weekend conditions.
- The combined impacts of all proposals was severely impacted by the proposed pedestrian crossings at the Terralong Street / Collins Street roundabout, where poor performance there was



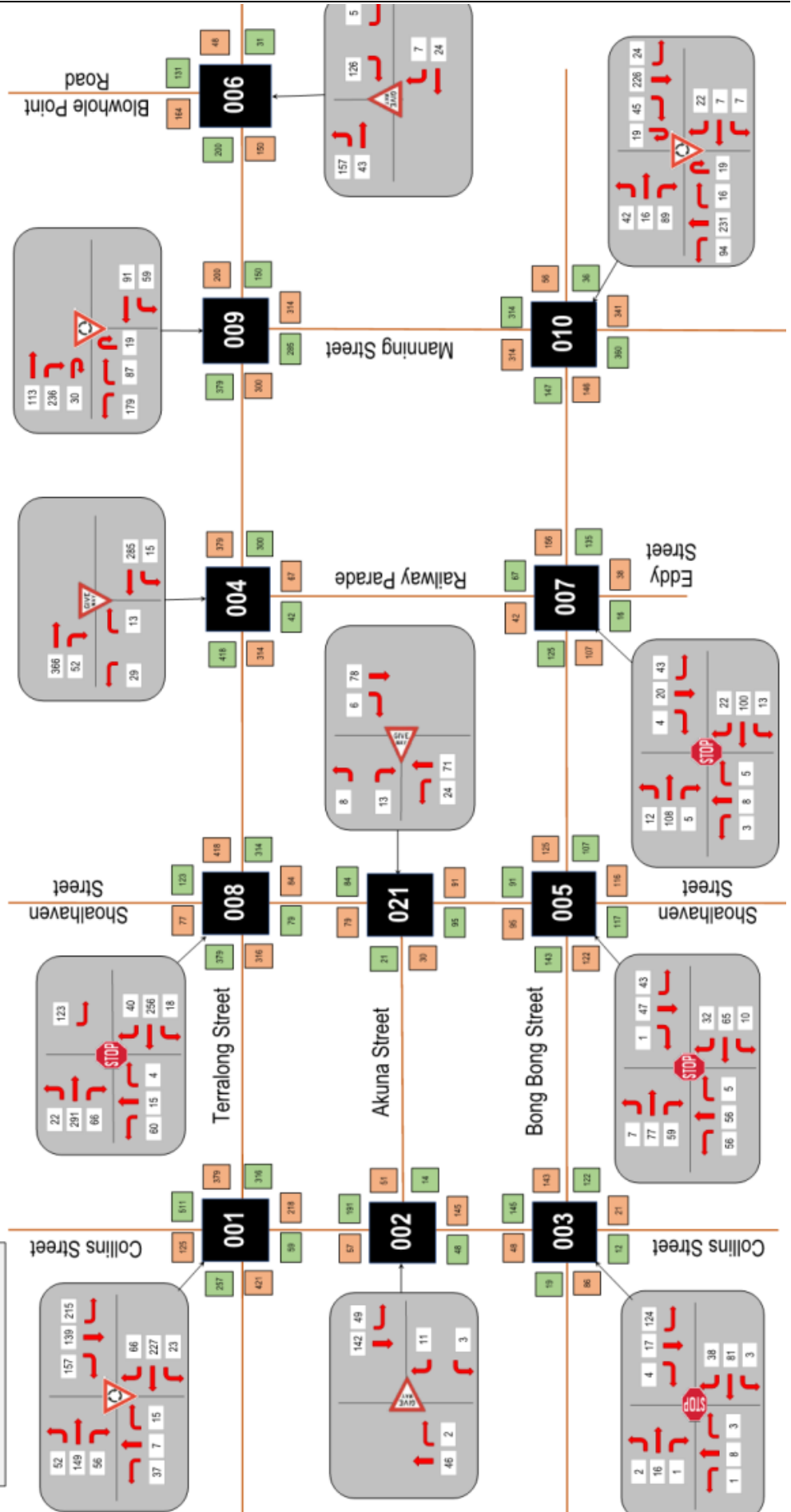
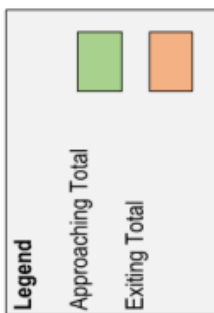
felt at other intersections in the network. SIDRA modelling of signalisations of this intersection indicated that the overall network performance was substantially improved.



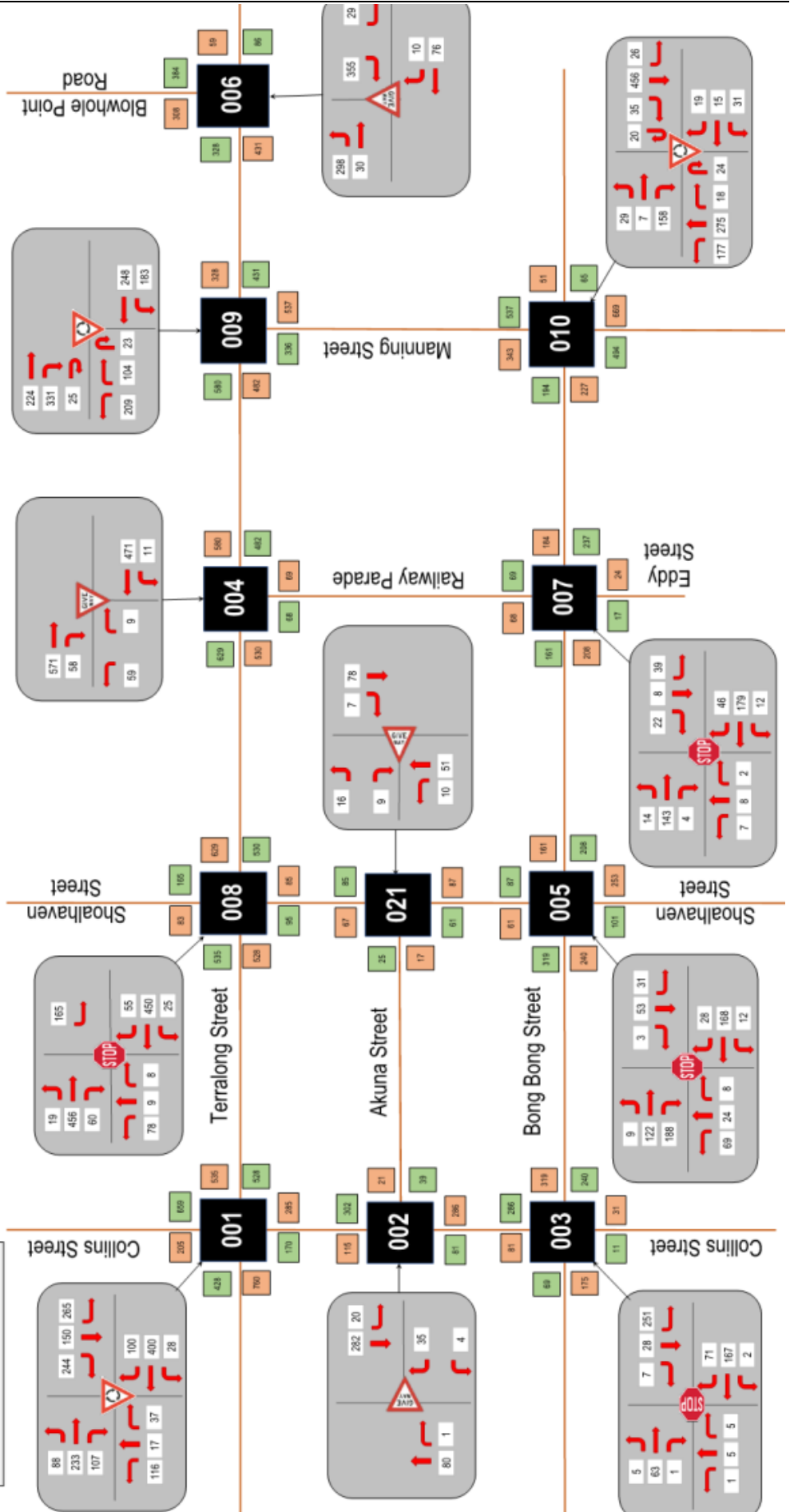
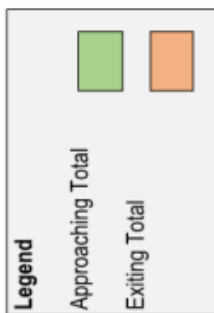


Appendix A: Traffic Volume Diagrams

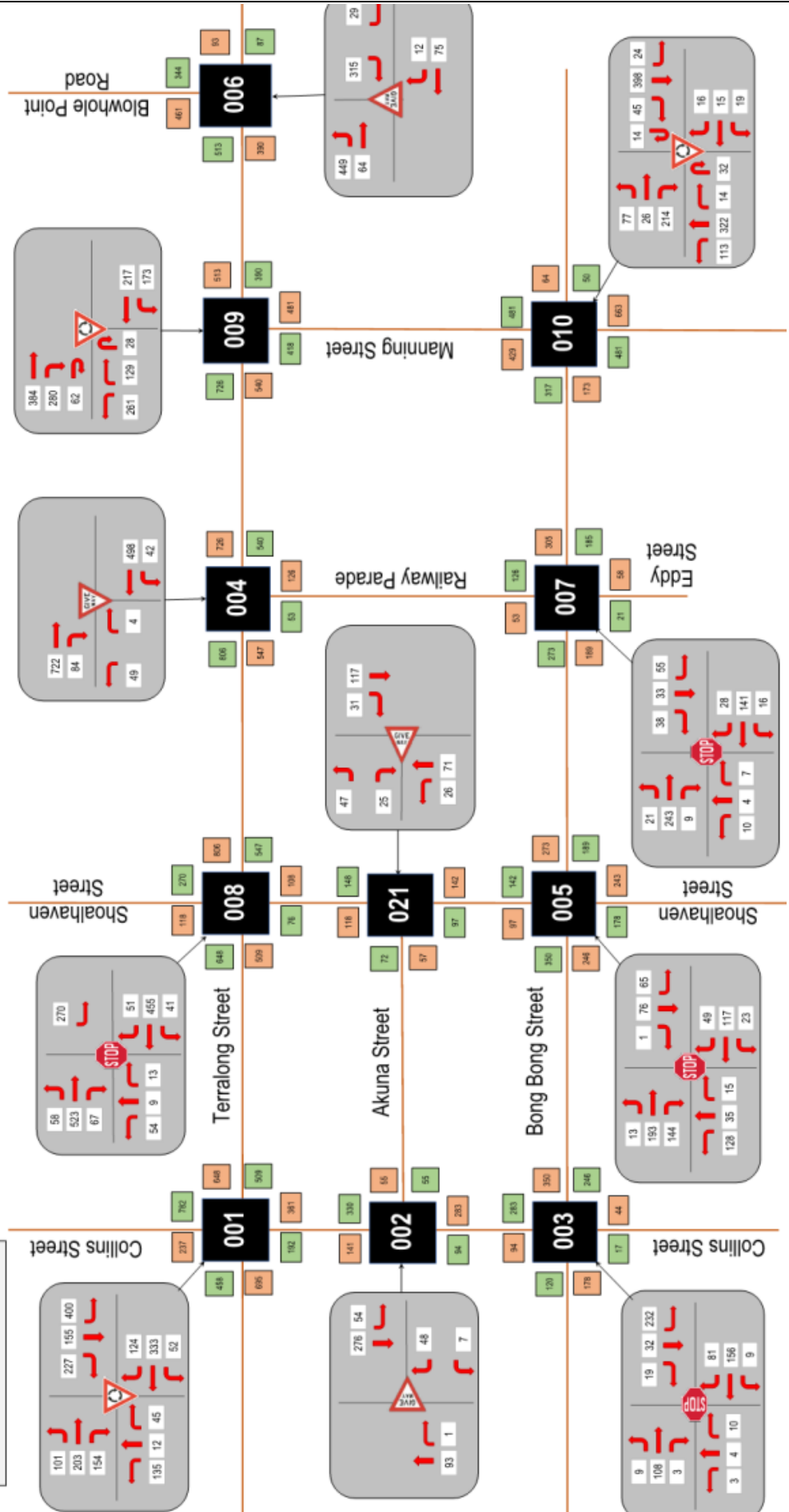
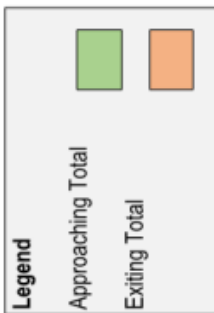
P4582 Kiama Traffic and Parking Study - Do Nothing
 Traffic Survey Data Analysis - Scaled Traffic Volumes
 08:00 - 09:00 AM Peak - All Vehicles - 2021



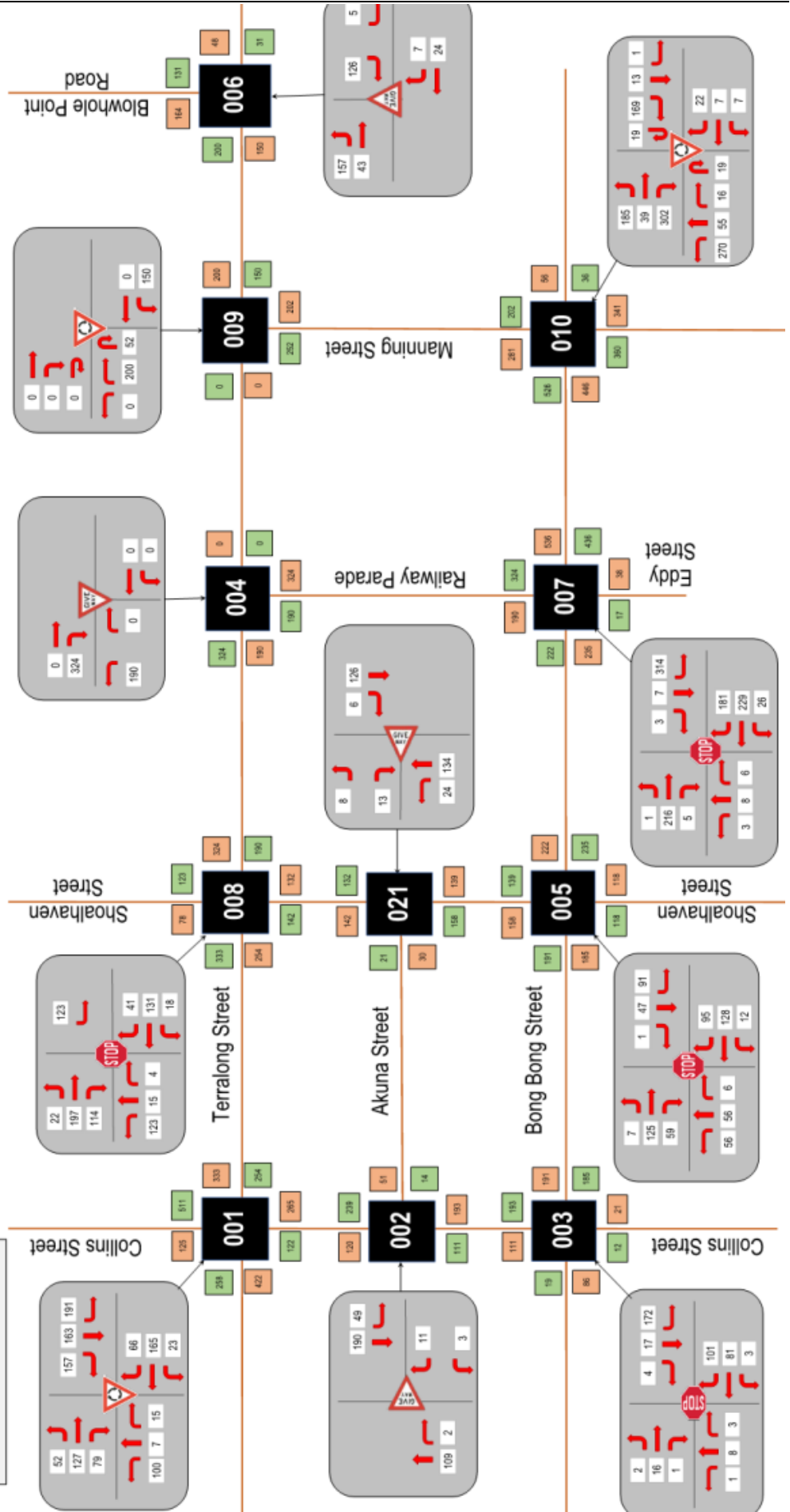
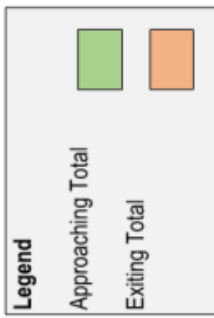
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 Traffic Survey Data Analysis - Scaled Traffic Volumes
 16:15 - 17:15 PM Peak - All Vehicles - 2021



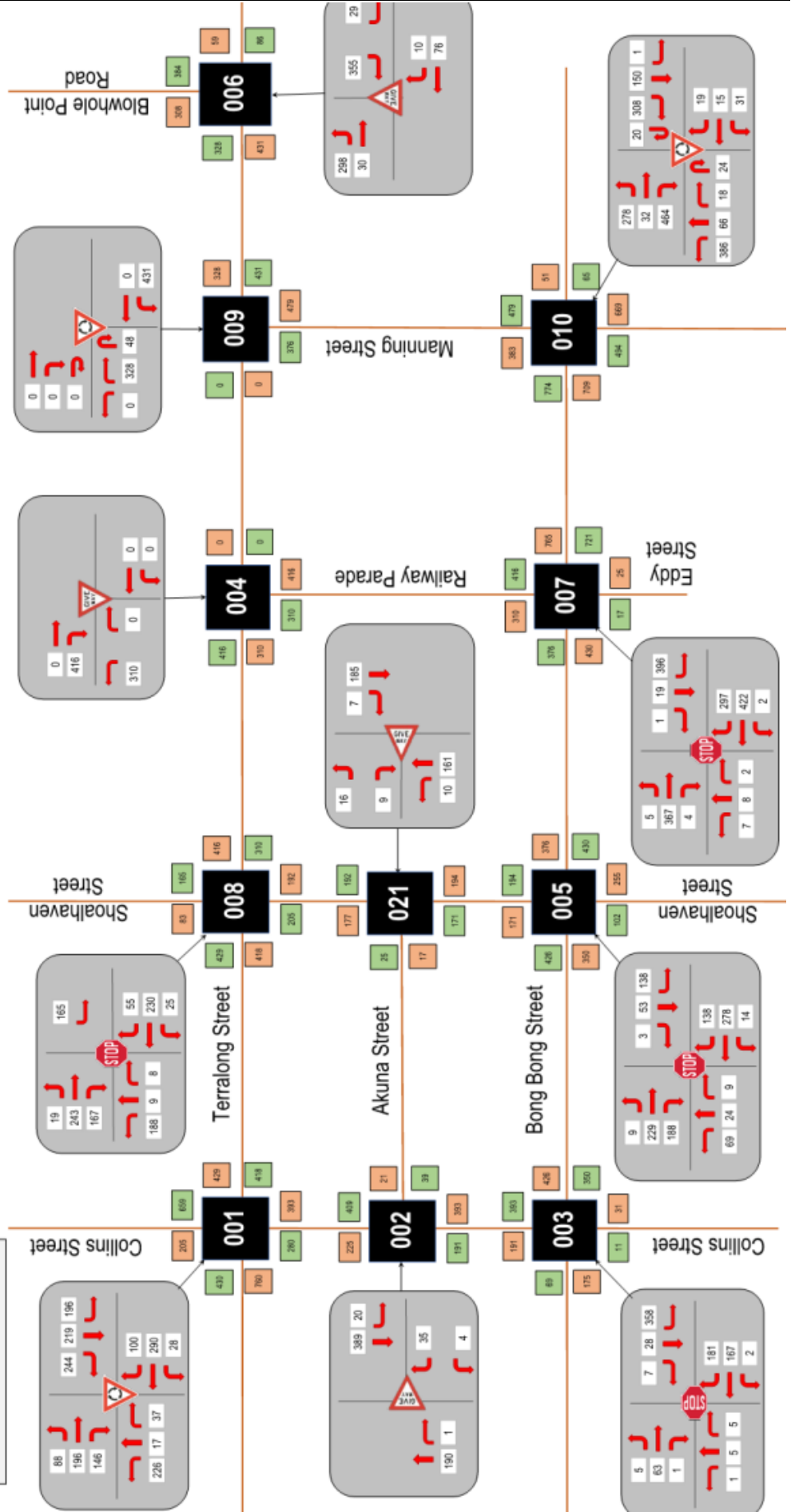
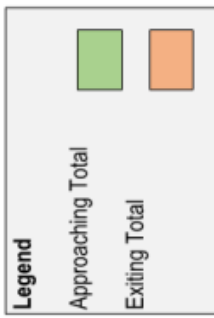
P4582 Kiama Traffic and Parking Study - Do Nothing
Traffic Survey Data Analysis - Scaled Traffic Volumes
11:45 - 12:45 Weekend Peak - All Vehicles - 2021



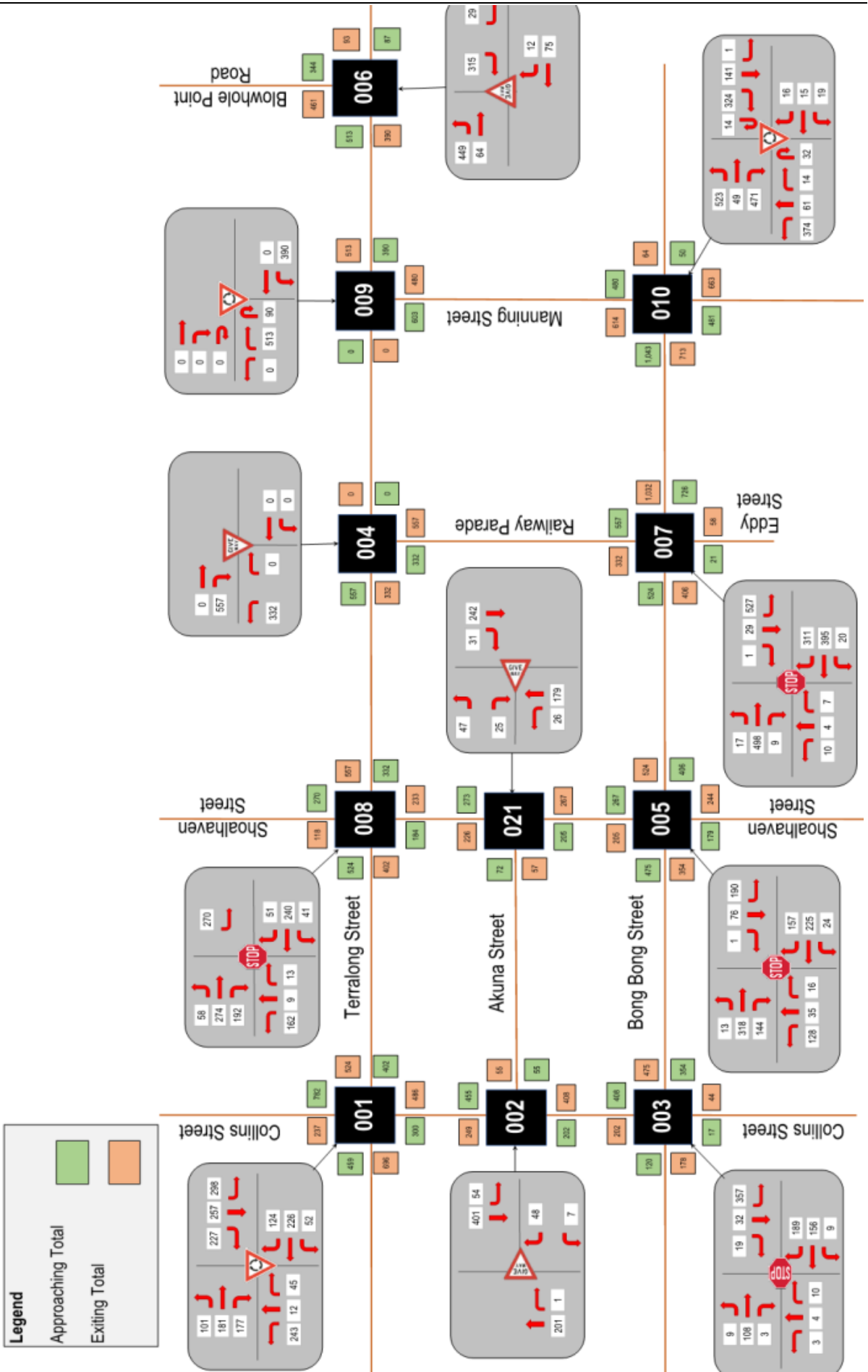
P4582 Kiama Traffic and Parking Study - Proposal 2
Traffic Survey Data Analysis - Scaled Traffic Volumes
08:00 - 09:00 AM Peak - All Vehicles - 2021



P4582 Kiama Traffic and Parking Study - Proposal 2
Traffic Survey Data Analysis - Scaled Traffic Volumes
16:15 - 17:15 PM Peak - All Vehicles - 2021



P4582 Kiama Traffic and Parking Study - Proposal 2
Traffic Survey Data Analysis - Scaled Traffic Volumes
11:45 - 12:45 Weekend Peak - All Vehicles - 2021





Appendix B: SIDRA Results

DO NOTHING - 2021

Scenario	Year	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Annual Total
Scenario 1: No Changes	2021	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2022	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2023	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2024	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2025	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2026	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2027	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2028	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2029	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2030	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
Scenario 2: Parking Changes	2021	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2022	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2023	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2024	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2025	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2026	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2027	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2028	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2029	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2030	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
Scenario 3: Traffic Changes	2021	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2022	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2023	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2024	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2025	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2026	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2027	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2028	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2029	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000
	2030	10,000	10,000	10,000	10,000	10,000	10,000	10,000	70,000

Scenario	Scenario Description	Scenario Type	Scenario Color	Scenario Summary
Scenario 1	Scenario 1 Description	Scenario 1 Type	Scenario 1 Color	Scenario 1 Summary
Scenario 2	Scenario 2 Description	Scenario 2 Type	Scenario 2 Color	Scenario 2 Summary
Scenario 3	Scenario 3 Description	Scenario 3 Type	Scenario 3 Color	Scenario 3 Summary
Scenario 4	Scenario 4 Description	Scenario 4 Type	Scenario 4 Color	Scenario 4 Summary
Scenario 5	Scenario 5 Description	Scenario 5 Type	Scenario 5 Color	Scenario 5 Summary
Scenario 6	Scenario 6 Description	Scenario 6 Type	Scenario 6 Color	Scenario 6 Summary
Scenario 7	Scenario 7 Description	Scenario 7 Type	Scenario 7 Color	Scenario 7 Summary
Scenario 8	Scenario 8 Description	Scenario 8 Type	Scenario 8 Color	Scenario 8 Summary
Scenario 9	Scenario 9 Description	Scenario 9 Type	Scenario 9 Color	Scenario 9 Summary
Scenario 10	Scenario 10 Description	Scenario 10 Type	Scenario 10 Color	Scenario 10 Summary
Scenario 11	Scenario 11 Description	Scenario 11 Type	Scenario 11 Color	Scenario 11 Summary
Scenario 12	Scenario 12 Description	Scenario 12 Type	Scenario 12 Color	Scenario 12 Summary
Scenario 13	Scenario 13 Description	Scenario 13 Type	Scenario 13 Color	Scenario 13 Summary
Scenario 14	Scenario 14 Description	Scenario 14 Type	Scenario 14 Color	Scenario 14 Summary
Scenario 15	Scenario 15 Description	Scenario 15 Type	Scenario 15 Color	Scenario 15 Summary
Scenario 16	Scenario 16 Description	Scenario 16 Type	Scenario 16 Color	Scenario 16 Summary
Scenario 17	Scenario 17 Description	Scenario 17 Type	Scenario 17 Color	Scenario 17 Summary
Scenario 18	Scenario 18 Description	Scenario 18 Type	Scenario 18 Color	Scenario 18 Summary
Scenario 19	Scenario 19 Description	Scenario 19 Type	Scenario 19 Color	Scenario 19 Summary
Scenario 20	Scenario 20 Description	Scenario 20 Type	Scenario 20 Color	Scenario 20 Summary

Scenario	Year	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Scenario 1: Baseline	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	4	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	6	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	7	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	8	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Scenario 2: ...	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	4	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	6	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	7	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	8	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Scenario 3: ...	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	3	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	4	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	6	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	7	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	8	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

88 - Morning Peak - Morning Peak												
Scenario	Year	Time	Direction	Flow	Capacity	Delay	Queue	Stop	Stop	Stop	Stop	
Scenario 1	2025	07:00 - 08:00	Northbound	1	100	100	0.0	0	0.0	0.0	0.0	0.0
				2	100	100	0.0	0	0.0	0.0	0.0	0.0
				3	100	100	0.0	0	0.0	0.0	0.0	0.0
				4	100	100	0.0	0	0.0	0.0	0.0	0.0
				5	100	100	0.0	0	0.0	0.0	0.0	0.0
				6	100	100	0.0	0	0.0	0.0	0.0	0.0
				7	100	100	0.0	0	0.0	0.0	0.0	0.0
				8	100	100	0.0	0	0.0	0.0	0.0	0.0
				9	100	100	0.0	0	0.0	0.0	0.0	0.0
				10	100	100	0.0	0	0.0	0.0	0.0	0.0
Scenario 2												
Scenario 3												
Scenario 4												
Scenario 5												
Scenario 6												
Scenario 7												
Scenario 8												
Scenario 9												
Scenario 10												
Scenario 11												
Scenario 12												
Scenario 13												
Scenario 14												
Scenario 15												
Scenario 16												
Scenario 17												
Scenario 18												
Scenario 19												
Scenario 20												
Scenario 21												
Scenario 22												
Scenario 23												
Scenario 24												
Scenario 25												
Scenario 26												
Scenario 27												
Scenario 28												
Scenario 29												
Scenario 30												
Scenario 31												
Scenario 32												
Scenario 33												
Scenario 34												
Scenario 35												
Scenario 36												
Scenario 37												
Scenario 38												
Scenario 39												
Scenario 40												
Scenario 41												
Scenario 42												
Scenario 43												
Scenario 44												
Scenario 45												
Scenario 46												
Scenario 47												
Scenario 48												
Scenario 49												
Scenario 50												

Scenario	Year	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
Scenario 1: Base Case	2022	100	100	100	100	100	100	100	700
	2023	100	100	100	100	100	100	100	700
	2024	100	100	100	100	100	100	100	700
	2025	100	100	100	100	100	100	100	700
	2026	100	100	100	100	100	100	100	700
	2027	100	100	100	100	100	100	100	700
	2028	100	100	100	100	100	100	100	700
	2029	100	100	100	100	100	100	100	700
	2030	100	100	100	100	100	100	100	700
	2031	100	100	100	100	100	100	100	700
2032	100	100	100	100	100	100	100	700	
2033	100	100	100	100	100	100	100	700	
2034	100	100	100	100	100	100	100	700	
2035	100	100	100	100	100	100	100	700	
2036	100	100	100	100	100	100	100	700	
2037	100	100	100	100	100	100	100	700	
2038	100	100	100	100	100	100	100	700	
2039	100	100	100	100	100	100	100	700	
2040	100	100	100	100	100	100	100	700	
2041	100	100	100	100	100	100	100	700	
2042	100	100	100	100	100	100	100	700	
2043	100	100	100	100	100	100	100	700	
2044	100	100	100	100	100	100	100	700	
2045	100	100	100	100	100	100	100	700	
2046	100	100	100	100	100	100	100	700	
2047	100	100	100	100	100	100	100	700	
2048	100	100	100	100	100	100	100	700	
2049	100	100	100	100	100	100	100	700	
2050	100	100	100	100	100	100	100	700	
2051	100	100	100	100	100	100	100	700	
2052	100	100	100	100	100	100	100	700	
2053	100	100	100	100	100	100	100	700	
2054	100	100	100	100	100	100	100	700	
2055	100	100	100	100	100	100	100	700	
2056	100	100	100	100	100	100	100	700	
2057	100	100	100	100	100	100	100	700	
2058	100	100	100	100	100	100	100	700	
2059	100	100	100	100	100	100	100	700	
2060	100	100	100	100	100	100	100	700	
2061	100	100	100	100	100	100	100	700	
2062	100	100	100	100	100	100	100	700	
2063	100	100	100	100	100	100	100	700	
2064	100	100	100	100	100	100	100	700	
2065	100	100	100	100	100	100	100	700	
2066	100	100	100	100	100	100	100	700	
2067	100	100	100	100	100	100	100	700	
2068	100	100	100	100	100	100	100	700	
2069	100	100	100	100	100	100	100	700	
2070	100	100	100	100	100	100	100	700	
2071	100	100	100	100	100	100	100	700	
2072	100	100	100	100	100	100	100	700	
2073	100	100	100	100	100	100	100	700	
2074	100	100	100	100	100	100	100	700	
2075	100	100	100	100	100	100	100	700	
2076	100	100	100	100	100	100	100	700	
2077	100	100	100	100	100	100	100	700	
2078	100	100	100	100	100	100	100	700	
2079	100	100	100	100	100	100	100	700	
2080	100	100	100	100	100	100	100	700	
2081	100	100	100	100	100	100	100	700	
2082	100	100	100	100	100	100	100	700	
2083	100	100	100	100	100	100	100	700	
2084	100	100	100	100	100	100	100	700	
2085	100	100	100	100	100	100	100	700	
2086	100	100	100	100	100	100	100	700	
2087	100	100	100	100	100	100	100	700	
2088	100	100	100	100	100	100	100	700	
2089	100	100	100	100	100	100	100	700	
2090	100	100	100	100	100	100	100	700	
2091	100	100	100	100	100	100	100	700	
2092	100	100	100	100	100	100	100	700	
2093	100	100	100	100	100	100	100	700	
2094	100	100	100	100	100	100	100	700	
2095	100	100	100	100	100	100	100	700	
2096	100	100	100	100	100	100	100	700	
2097	100	100	100	100	100	100	100	700	
2098	100	100	100	100	100	100	100	700	
2099	100	100	100	100	100	100	100	700	
2100	100	100	100	100	100	100	100	700	

PROPOSAL 2 - 2021

Scenario	AM	PM	PM
Scenario	AM	PM	PM
Scenario	AM	PM	PM
Scenario 1: Baseline	1000	1000	1000
Scenario 2: Proposed	1050	1050	1050
Scenario 3: Alternative	1100	1100	1100
Scenario 4: Another	1150	1150	1150
Scenario 5: Further	1200	1200	1200
Scenario 6: More	1250	1250	1250
Scenario 7: Even	1300	1300	1300
Scenario 8: Still	1350	1350	1350
Scenario 9: More	1400	1400	1400
Scenario 10: Even	1450	1450	1450
Scenario 11: More	1500	1500	1500
Scenario 12: Even	1550	1550	1550
Scenario 13: More	1600	1600	1600
Scenario 14: Even	1650	1650	1650
Scenario 15: More	1700	1700	1700
Scenario 16: Even	1750	1750	1750
Scenario 17: More	1800	1800	1800
Scenario 18: Even	1850	1850	1850
Scenario 19: More	1900	1900	1900
Scenario 20: Even	1950	1950	1950
Scenario 21: More	2000	2000	2000
Scenario 22: Even	2050	2050	2050
Scenario 23: More	2100	2100	2100
Scenario 24: Even	2150	2150	2150
Scenario 25: More	2200	2200	2200
Scenario 26: Even	2250	2250	2250
Scenario 27: More	2300	2300	2300
Scenario 28: Even	2350	2350	2350
Scenario 29: More	2400	2400	2400
Scenario 30: Even	2450	2450	2450
Scenario 31: More	2500	2500	2500
Scenario 32: Even	2550	2550	2550
Scenario 33: More	2600	2600	2600
Scenario 34: Even	2650	2650	2650
Scenario 35: More	2700	2700	2700
Scenario 36: Even	2750	2750	2750
Scenario 37: More	2800	2800	2800
Scenario 38: Even	2850	2850	2850
Scenario 39: More	2900	2900	2900
Scenario 40: Even	2950	2950	2950
Scenario 41: More	3000	3000	3000
Scenario 42: Even	3050	3050	3050
Scenario 43: More	3100	3100	3100
Scenario 44: Even	3150	3150	3150
Scenario 45: More	3200	3200	3200
Scenario 46: Even	3250	3250	3250
Scenario 47: More	3300	3300	3300
Scenario 48: Even	3350	3350	3350
Scenario 49: More	3400	3400	3400
Scenario 50: Even	3450	3450	3450
Scenario 51: More	3500	3500	3500
Scenario 52: Even	3550	3550	3550
Scenario 53: More	3600	3600	3600
Scenario 54: Even	3650	3650	3650
Scenario 55: More	3700	3700	3700
Scenario 56: Even	3750	3750	3750
Scenario 57: More	3800	3800	3800
Scenario 58: Even	3850	3850	3850
Scenario 59: More	3900	3900	3900
Scenario 60: Even	3950	3950	3950
Scenario 61: More	4000	4000	4000
Scenario 62: Even	4050	4050	4050
Scenario 63: More	4100	4100	4100
Scenario 64: Even	4150	4150	4150
Scenario 65: More	4200	4200	4200
Scenario 66: Even	4250	4250	4250
Scenario 67: More	4300	4300	4300
Scenario 68: Even	4350	4350	4350
Scenario 69: More	4400	4400	4400
Scenario 70: Even	4450	4450	4450
Scenario 71: More	4500	4500	4500
Scenario 72: Even	4550	4550	4550
Scenario 73: More	4600	4600	4600
Scenario 74: Even	4650	4650	4650
Scenario 75: More	4700	4700	4700
Scenario 76: Even	4750	4750	4750
Scenario 77: More	4800	4800	4800
Scenario 78: Even	4850	4850	4850
Scenario 79: More	4900	4900	4900
Scenario 80: Even	4950	4950	4950
Scenario 81: More	5000	5000	5000
Scenario 82: Even	5050	5050	5050
Scenario 83: More	5100	5100	5100
Scenario 84: Even	5150	5150	5150
Scenario 85: More	5200	5200	5200
Scenario 86: Even	5250	5250	5250
Scenario 87: More	5300	5300	5300
Scenario 88: Even	5350	5350	5350
Scenario 89: More	5400	5400	5400
Scenario 90: Even	5450	5450	5450
Scenario 91: More	5500	5500	5500
Scenario 92: Even	5550	5550	5550
Scenario 93: More	5600	5600	5600
Scenario 94: Even	5650	5650	5650
Scenario 95: More	5700	5700	5700
Scenario 96: Even	5750	5750	5750
Scenario 97: More	5800	5800	5800
Scenario 98: Even	5850	5850	5850
Scenario 99: More	5900	5900	5900
Scenario 100: Even	5950	5950	5950

M1 - Kiama Town Centre - Morning Peak													
Scenario	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak
Scenario	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak
Scenario	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak
Scenario	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak	AM Peak

Scenario	Scenario Description	Scenario Type	Scenario Color	Scenario Summary
80 - Kiama Town Centre	Scenario Description: Kiama Town Centre	Scenario Type: Urban	Scenario Color: Green	Scenario Summary: Urban scenario for Kiama Town Centre, showing traffic and parking metrics.
81 - Kiama Town Centre	Scenario Description: Kiama Town Centre	Scenario Type: Urban	Scenario Color: Orange	Scenario Summary: Urban scenario for Kiama Town Centre, showing traffic and parking metrics.
82 - Kiama Town Centre	Scenario Description: Kiama Town Centre	Scenario Type: Urban	Scenario Color: Blue	Scenario Summary: Urban scenario for Kiama Town Centre, showing traffic and parking metrics.

80 - Major Road Network														
Year	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
2	1	2	3	4	5	6	7	8	9	10	11	12	13	14
3	1	2	3	4	5	6	7	8	9	10	11	12	13	14
4	1	2	3	4	5	6	7	8	9	10	11	12	13	14
5	1	2	3	4	5	6	7	8	9	10	11	12	13	14
6	1	2	3	4	5	6	7	8	9	10	11	12	13	14
7	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8	1	2	3	4	5	6	7	8	9	10	11	12	13	14
9	1	2	3	4	5	6	7	8	9	10	11	12	13	14
10	1	2	3	4	5	6	7	8	9	10	11	12	13	14
11	1	2	3	4	5	6	7	8	9	10	11	12	13	14
12	1	2	3	4	5	6	7	8	9	10	11	12	13	14
13	1	2	3	4	5	6	7	8	9	10	11	12	13	14
14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	1	2	3	4	5	6	7	8	9	10	11	12	13	14
16	1	2	3	4	5	6	7	8	9	10	11	12	13	14
17	1	2	3	4	5	6	7	8	9	10	11	12	13	14
18	1	2	3	4	5	6	7	8	9	10	11	12	13	14
19	1	2	3	4	5	6	7	8	9	10	11	12	13	14
20	1	2	3	4	5	6	7	8	9	10	11	12	13	14
21	1	2	3	4	5	6	7	8	9	10	11	12	13	14
22	1	2	3	4	5	6	7	8	9	10	11	12	13	14
23	1	2	3	4	5	6	7	8	9	10	11	12	13	14
24	1	2	3	4	5	6	7	8	9	10	11	12	13	14
25	1	2	3	4	5	6	7	8	9	10	11	12	13	14
26	1	2	3	4	5	6	7	8	9	10	11	12	13	14
27	1	2	3	4	5	6	7	8	9	10	11	12	13	14
28	1	2	3	4	5	6	7	8	9	10	11	12	13	14
29	1	2	3	4	5	6	7	8	9	10	11	12	13	14
30	1	2	3	4	5	6	7	8	9	10	11	12	13	14
31	1	2	3	4	5	6	7	8	9	10	11	12	13	14
32	1	2	3	4	5	6	7	8	9	10	11	12	13	14
33	1	2	3	4	5	6	7	8	9	10	11	12	13	14
34	1	2	3	4	5	6	7	8	9	10	11	12	13	14
35	1	2	3	4	5	6	7	8	9	10	11	12	13	14
36	1	2	3	4	5	6	7	8	9	10	11	12	13	14
37	1	2	3	4	5	6	7	8	9	10	11	12	13	14
38	1	2	3	4	5	6	7	8	9	10	11	12	13	14
39	1	2	3	4	5	6	7	8	9	10	11	12	13	14
40	1	2	3	4	5	6	7	8	9	10	11	12	13	14
41	1	2	3	4	5	6	7	8	9	10	11	12	13	14
42	1	2	3	4	5	6	7	8	9	10	11	12	13	14
43	1	2	3	4	5	6	7	8	9	10	11	12	13	14
44	1	2	3	4	5	6	7	8	9	10	11	12	13	14
45	1	2	3	4	5	6	7	8	9	10	11	12	13	14
46	1	2	3	4	5	6	7	8	9	10	11	12	13	14
47	1	2	3	4	5	6	7	8	9	10	11	12	13	14
48	1	2	3	4	5	6	7	8	9	10	11	12	13	14
49	1	2	3	4	5	6	7	8	9	10	11	12	13	14
50	1	2	3	4	5	6	7	8	9	10	11	12	13	14
51	1	2	3	4	5	6	7	8	9	10	11	12	13	14
52	1	2	3	4	5	6	7	8	9	10	11	12	13	14
53	1	2	3	4	5	6	7	8	9	10	11	12	13	14
54	1	2	3	4	5	6	7	8	9	10	11	12	13	14
55	1	2	3	4	5	6	7	8	9	10	11	12	13	14
56	1	2	3	4	5	6	7	8	9	10	11	12	13	14
57	1	2	3	4	5	6	7	8	9	10	11	12	13	14
58	1	2	3	4	5	6	7	8	9	10	11	12	13	14
59	1	2	3	4	5	6	7	8	9	10	11	12	13	14
60	1	2	3	4	5	6	7	8	9	10	11	12	13	14
61	1	2	3	4	5	6	7	8	9	10	11	12	13	14
62	1	2	3	4	5	6	7	8	9	10	11	12	13	14
63	1	2	3	4	5	6	7	8	9	10	11	12	13	14
64	1	2	3	4	5	6	7	8	9	10	11	12	13	14
65	1	2	3	4	5	6	7	8	9	10	11	12	13	14
66	1	2	3	4	5	6	7	8	9	10	11	12	13	14
67	1	2	3	4	5	6	7	8	9	10	11	12	13	14
68	1	2	3	4	5	6	7	8	9	10	11	12	13	14
69	1	2	3	4	5	6	7	8	9	10	11	12	13	14
70	1	2	3	4	5	6	7	8	9	10	11	12	13	14
71	1	2	3	4	5	6	7	8	9	10	11	12	13	14
72	1	2	3	4	5	6	7	8	9	10	11	12	13	14
73	1	2	3	4	5	6	7	8	9	10	11	12	13	14
74	1	2	3	4	5	6	7	8	9	10	11	12	13	14
75	1	2	3	4	5	6	7	8	9	10	11	12	13	14
76	1	2	3	4	5	6	7	8	9	10	11	12	13	14
77	1	2	3	4	5	6	7	8	9	10	11	12	13	14
78	1	2	3	4	5	6	7	8	9	10	11	12	13	14
79	1	2	3	4	5	6	7	8	9	10	11	12	13	14
80	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Scenario	Year	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Annual
Scenario 1: Baseline	2021	110	110	110	110	110	110	110	110
	2022	110	110	110	110	110	110	110	110
	2023	110	110	110	110	110	110	110	110
	2024	110	110	110	110	110	110	110	110
	2025	110	110	110	110	110	110	110	110
	2026	110	110	110	110	110	110	110	110
	2027	110	110	110	110	110	110	110	110
	2028	110	110	110	110	110	110	110	110
	2029	110	110	110	110	110	110	110	110
	2030	110	110	110	110	110	110	110	110
Scenario 2: Growth	2021	120	120	120	120	120	120	120	120
	2022	120	120	120	120	120	120	120	120
	2023	120	120	120	120	120	120	120	120
	2024	120	120	120	120	120	120	120	120
	2025	120	120	120	120	120	120	120	120
	2026	120	120	120	120	120	120	120	120
	2027	120	120	120	120	120	120	120	120
	2028	120	120	120	120	120	120	120	120
	2029	120	120	120	120	120	120	120	120
	2030	120	120	120	120	120	120	120	120
Scenario 3: High Growth	2021	130	130	130	130	130	130	130	130
	2022	130	130	130	130	130	130	130	130
	2023	130	130	130	130	130	130	130	130
	2024	130	130	130	130	130	130	130	130
	2025	130	130	130	130	130	130	130	130
	2026	130	130	130	130	130	130	130	130
	2027	130	130	130	130	130	130	130	130
	2028	130	130	130	130	130	130	130	130
	2029	130	130	130	130	130	130	130	130
	2030	130	130	130	130	130	130	130	130

80 - Morning Peak Morning Peak											
Scenario	1	2	3	4	5	6	7	8	9	10	11
Vehicle Type	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Light	11	11	11	11	11	11	11	11	11	11	11
Medium	11	11	11	11	11	11	11	11	11	11	11
Heavy	11	11	11	11	11	11	11	11	11	11	11
Aggregates	11	11	11	11	11	11	11	11	11	11	11
Light	11	11	11	11	11	11	11	11	11	11	11
Medium	11	11	11	11	11	11	11	11	11	11	11
Heavy	11	11	11	11	11	11	11	11	11	11	11
Aggregates	11	11	11	11	11	11	11	11	11	11	11

80 - Morning Peak Morning Peak											
Scenario	1	2	3	4	5	6	7	8	9	10	11
Vehicle Type	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Light	11	11	11	11	11	11	11	11	11	11	11
Medium	11	11	11	11	11	11	11	11	11	11	11
Heavy	11	11	11	11	11	11	11	11	11	11	11
Aggregates	11	11	11	11	11	11	11	11	11	11	11
Light	11	11	11	11	11	11	11	11	11	11	11
Medium	11	11	11	11	11	11	11	11	11	11	11
Heavy	11	11	11	11	11	11	11	11	11	11	11
Aggregates	11	11	11	11	11	11	11	11	11	11	11

80 - Morning Peak Morning Peak											
Scenario	1	2	3	4	5	6	7	8	9	10	11
Vehicle Type	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
Light	11	11	11	11	11	11	11	11	11	11	11
Medium	11	11	11	11	11	11	11	11	11	11	11
Heavy	11	11	11	11	11	11	11	11	11	11	11
Aggregates	11	11	11	11	11	11	11	11	11	11	11
Light	11	11	11	11	11	11	11	11	11	11	11
Medium	11	11	11	11	11	11	11	11	11	11	11
Heavy	11	11	11	11	11	11	11	11	11	11	11
Aggregates	11	11	11	11	11	11	11	11	11	11	11

COMBINED PROPOSALS - 2021

Scenario	Scenario Description	Scenario Type	Scenario Color
1	Scenario 1: Baseline	Baseline	Green
2	Scenario 2: Proposed	Proposed	Orange
3	Scenario 3: Alternative	Alternative	Blue

Scenario	Scenario Description	Scenario Type	Scenario Color
4	Scenario 4: Proposed with Parking	Proposed	Orange
5	Scenario 5: Alternative with Parking	Alternative	Blue
6	Scenario 6: Proposed with Parking and Signal	Proposed	Orange
7	Scenario 7: Alternative with Parking and Signal	Alternative	Blue

Scenario	Scenario Description	Scenario Type	Scenario Color
8	Scenario 8: Proposed with Parking and Signal	Proposed	Orange
9	Scenario 9: Alternative with Parking and Signal	Alternative	Blue
10	Scenario 10: Proposed with Parking and Signal	Proposed	Orange
11	Scenario 11: Alternative with Parking and Signal	Alternative	Blue

Scenario	Scenario Description	Scenario Type	Scenario Color
Scenario 1	Scenario 1 Description	Scenario 1 Type	Scenario 1 Color
Scenario 2	Scenario 2 Description	Scenario 2 Type	Scenario 2 Color
Scenario 3	Scenario 3 Description	Scenario 3 Type	Scenario 3 Color
Scenario 4	Scenario 4 Description	Scenario 4 Type	Scenario 4 Color
Scenario 5	Scenario 5 Description	Scenario 5 Type	Scenario 5 Color
Scenario 6	Scenario 6 Description	Scenario 6 Type	Scenario 6 Color
Scenario 7	Scenario 7 Description	Scenario 7 Type	Scenario 7 Color
Scenario 8	Scenario 8 Description	Scenario 8 Type	Scenario 8 Color
Scenario 9	Scenario 9 Description	Scenario 9 Type	Scenario 9 Color
Scenario 10	Scenario 10 Description	Scenario 10 Type	Scenario 10 Color
Scenario 11	Scenario 11 Description	Scenario 11 Type	Scenario 11 Color
Scenario 12	Scenario 12 Description	Scenario 12 Type	Scenario 12 Color
Scenario 13	Scenario 13 Description	Scenario 13 Type	Scenario 13 Color
Scenario 14	Scenario 14 Description	Scenario 14 Type	Scenario 14 Color
Scenario 15	Scenario 15 Description	Scenario 15 Type	Scenario 15 Color
Scenario 16	Scenario 16 Description	Scenario 16 Type	Scenario 16 Color
Scenario 17	Scenario 17 Description	Scenario 17 Type	Scenario 17 Color
Scenario 18	Scenario 18 Description	Scenario 18 Type	Scenario 18 Color
Scenario 19	Scenario 19 Description	Scenario 19 Type	Scenario 19 Color
Scenario 20	Scenario 20 Description	Scenario 20 Type	Scenario 20 Color

Scenario	Scenario Description	Scenario Type	Scenario Color
80 - 80% Green	80% Green Scenario	Green	Green
80 - 80% Orange	80% Orange Scenario	Orange	Orange
80 - 80% Blue	80% Blue Scenario	Blue	Blue

DO NOTHING - 2031

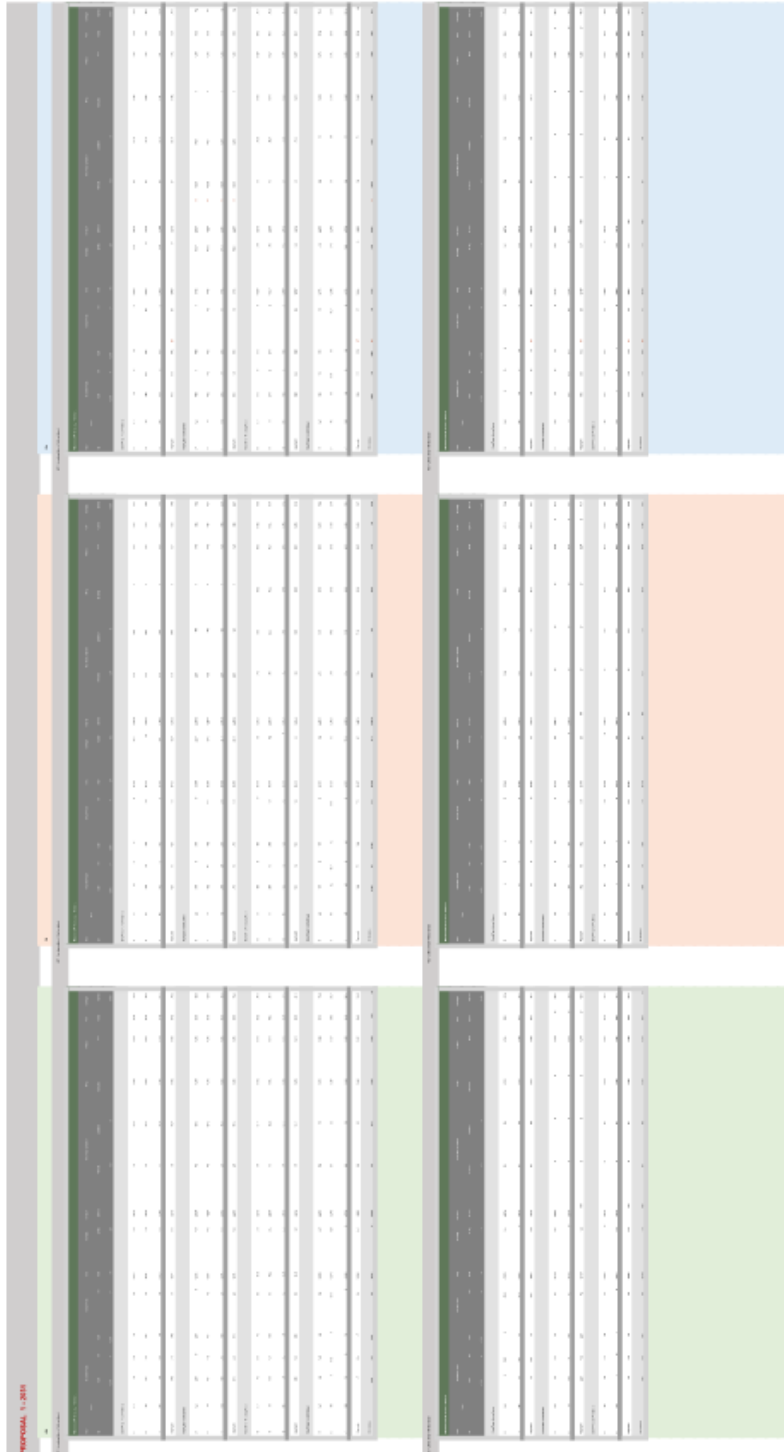
Scenario	Scenario Description	Scenario Type	Scenario Color	Scenario Summary
1	Scenario 1: Do Nothing - 2031	Scenario 1	Green	Scenario 1: Do Nothing - 2031
2	Scenario 2: Do Nothing - 2031	Scenario 2	Orange	Scenario 2: Do Nothing - 2031
3	Scenario 3: Do Nothing - 2031	Scenario 3	Blue	Scenario 3: Do Nothing - 2031

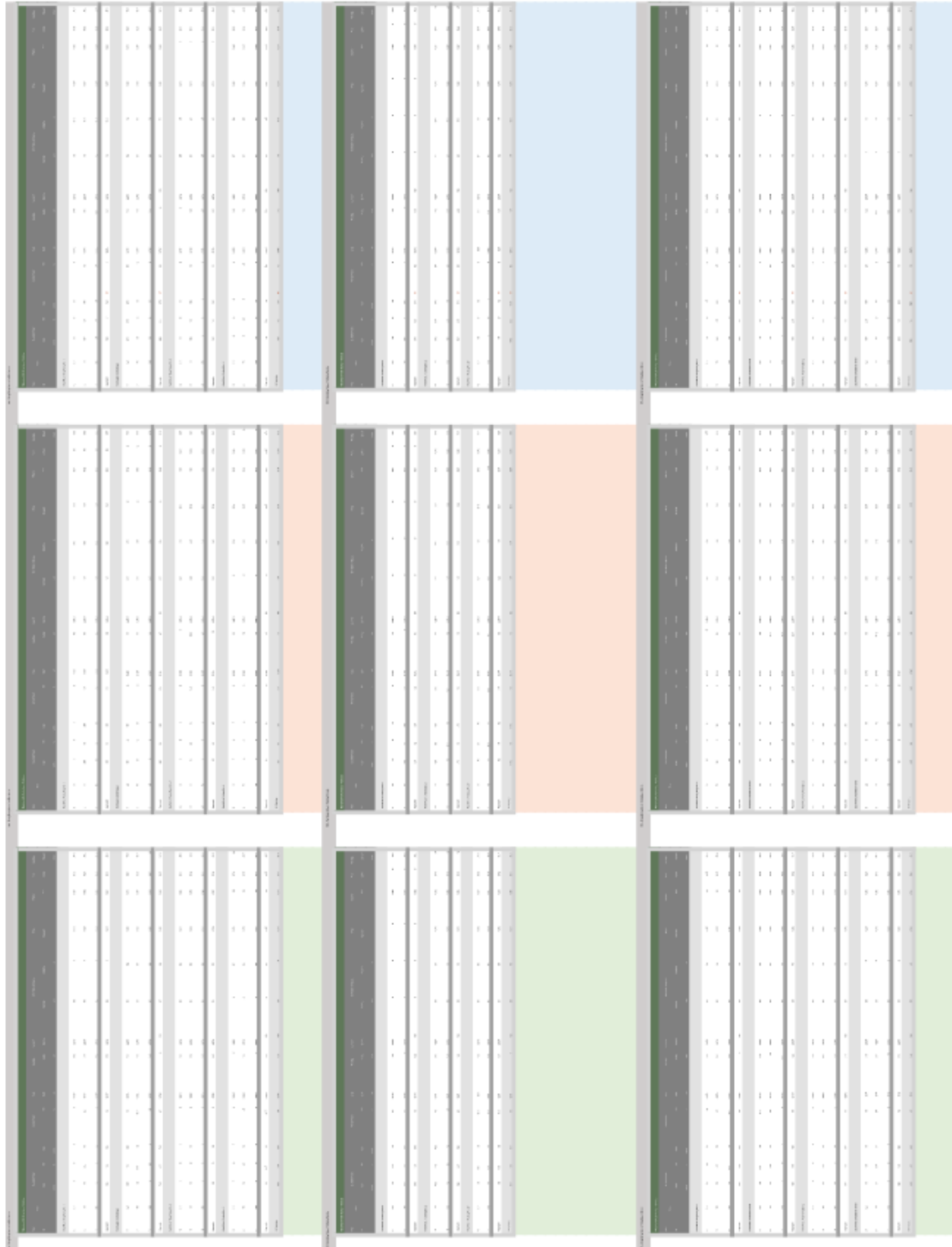
The table contains detailed traffic and parking data for each scenario, including metrics such as Average Daily Traffic (ADT), Peak Hour Traffic (PHV), and Parking Demand. The data is organized into columns for each scenario and rows for various traffic and parking metrics.

Scenario	Scenario Description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11	Scenario 12	Scenario 13	Scenario 14	Scenario 15	Scenario 16	Scenario 17	Scenario 18	Scenario 19	Scenario 20	Scenario 21	Scenario 22	Scenario 23	Scenario 24	Scenario 25	Scenario 26	Scenario 27	Scenario 28	Scenario 29	Scenario 30	Scenario 31	Scenario 32	Scenario 33	Scenario 34	Scenario 35	Scenario 36	Scenario 37	Scenario 38	Scenario 39	Scenario 40	Scenario 41	Scenario 42	Scenario 43	Scenario 44	Scenario 45	Scenario 46	Scenario 47	Scenario 48	Scenario 49	Scenario 50	Scenario 51	Scenario 52	Scenario 53	Scenario 54	Scenario 55	Scenario 56	Scenario 57	Scenario 58	Scenario 59	Scenario 60	Scenario 61	Scenario 62	Scenario 63	Scenario 64	Scenario 65	Scenario 66	Scenario 67	Scenario 68	Scenario 69	Scenario 70	Scenario 71	Scenario 72	Scenario 73	Scenario 74	Scenario 75	Scenario 76	Scenario 77	Scenario 78	Scenario 79	Scenario 80	Scenario 81	Scenario 82	Scenario 83	Scenario 84	Scenario 85	Scenario 86	Scenario 87	Scenario 88	Scenario 89	Scenario 90	Scenario 91	Scenario 92	Scenario 93	Scenario 94	Scenario 95	Scenario 96	Scenario 97	Scenario 98	Scenario 99	Scenario 100
Scenario 1	Scenario 1 Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Scenario 2	Scenario 2 Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Scenario 3	Scenario 3 Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Scenario 4	Scenario 4 Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

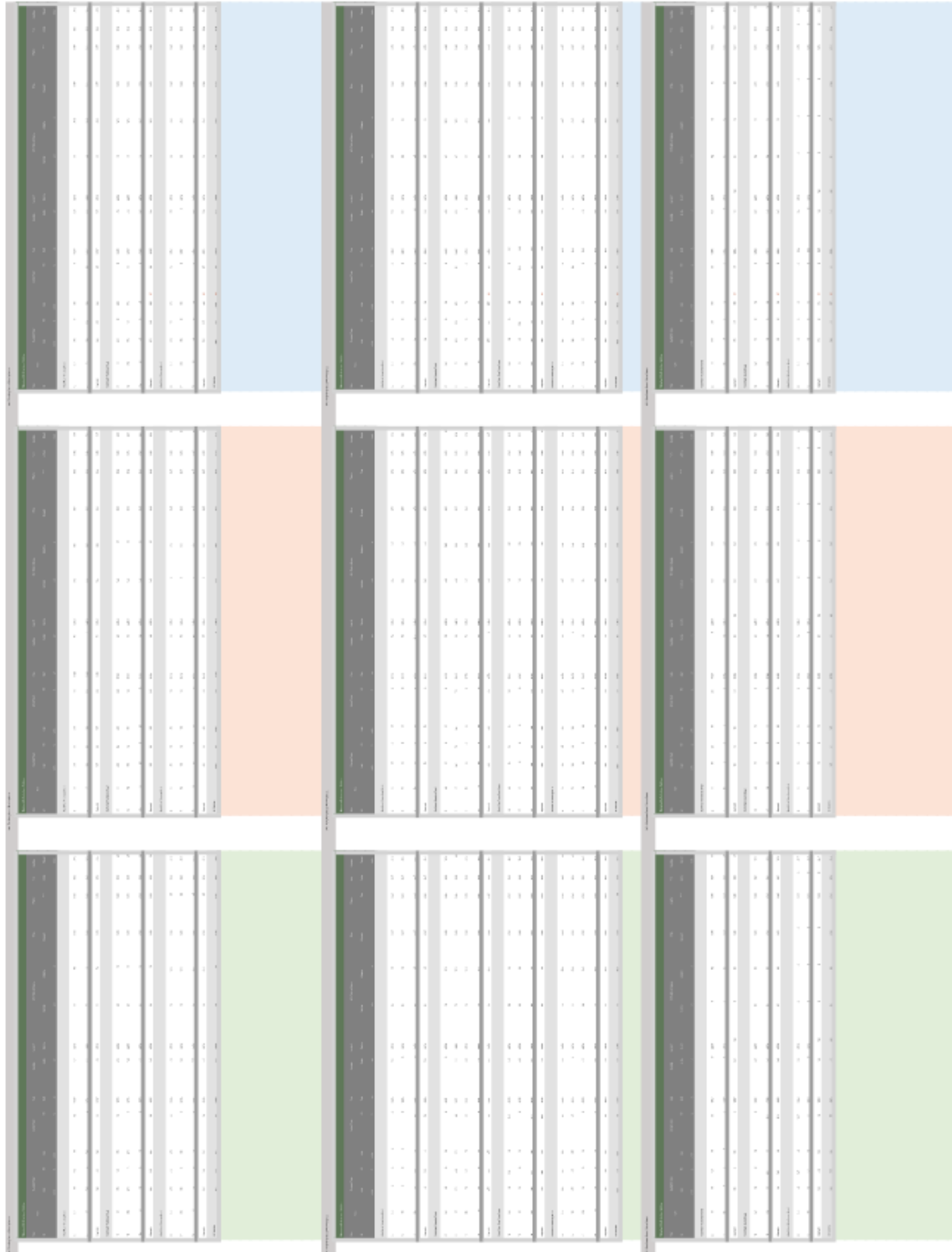
Scenario	Year	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Annual
Scenario 1: Baseline	2021	110	110	110	110	110	110	110	110
	2022	110	110	110	110	110	110	110	110
	2023	110	110	110	110	110	110	110	110
	2024	110	110	110	110	110	110	110	110
	2025	110	110	110	110	110	110	110	110
	2026	110	110	110	110	110	110	110	110
	2027	110	110	110	110	110	110	110	110
	2028	110	110	110	110	110	110	110	110
	2029	110	110	110	110	110	110	110	110
	2030	110	110	110	110	110	110	110	110
Scenario 2: Growth	2021	120	120	120	120	120	120	120	120
	2022	120	120	120	120	120	120	120	120
	2023	120	120	120	120	120	120	120	120
	2024	120	120	120	120	120	120	120	120
	2025	120	120	120	120	120	120	120	120
	2026	120	120	120	120	120	120	120	120
	2027	120	120	120	120	120	120	120	120
	2028	120	120	120	120	120	120	120	120
	2029	120	120	120	120	120	120	120	120
	2030	120	120	120	120	120	120	120	120
Scenario 3: High Growth	2021	130	130	130	130	130	130	130	130
	2022	130	130	130	130	130	130	130	130
	2023	130	130	130	130	130	130	130	130
	2024	130	130	130	130	130	130	130	130
	2025	130	130	130	130	130	130	130	130
	2026	130	130	130	130	130	130	130	130
	2027	130	130	130	130	130	130	130	130
	2028	130	130	130	130	130	130	130	130
	2029	130	130	130	130	130	130	130	130
	2030	130	130	130	130	130	130	130	130

80 - Morning Peak Morning Peak											
Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario
1	2	3	4	5	6	7	8	9	10	11	12
12	13	14	15	16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	31	32	33	34	35
36	37	38	39	40	41	42	43	44	45	46	47
48	49	50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69	70	71
72	73	74	75	76	77	78	79	80	81	82	83
84	85	86	87	88	89	90	91	92	93	94	95
96	97	98	99	100	101	102	103	104	105	106	107
108	109	110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	127	128	129	130	131
132	133	134	135	136	137	138	139	140	141	142	143
144	145	146	147	148	149	150	151	152	153	154	155
156	157	158	159	160	161	162	163	164	165	166	167
168	169	170	171	172	173	174	175	176	177	178	179
180	181	182	183	184	185	186	187	188	189	190	191
192	193	194	195	196	197	198	199	200	201	202	203
204	205	206	207	208	209	210	211	212	213	214	215
216	217	218	219	220	221	222	223	224	225	226	227
228	229	230	231	232	233	234	235	236	237	238	239
240	241	242	243	244	245	246	247	248	249	250	251
252	253	254	255	256	257	258	259	260	261	262	263
264	265	266	267	268	269	270	271	272	273	274	275
276	277	278	279	280	281	282	283	284	285	286	287
288	289	290	291	292	293	294	295	296	297	298	299
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312	313	314	315	316	317	318	319	320	321	322	323
324	325	326	327	328	329	330	331	332	333	334	335
336	337	338	339	340	341	342	343	344	345	346	347
348	349	350	351	352	353	354	355	356	357	358	359
360	361	362	363	364	365	366	367	368	369	370	371
372	373	374	375	376	377	378	379	380	381	382	383
384	385	386	387	388	389	390	391	392	393	394	395
396	397	398	399	400	401	402	403	404	405	406	407
408	409	410	411	412	413	414	415	416	417	418	419
420	421	422	423	424	425	426	427	428	429	430	431
432	433	434	435	436	437	438	439	440	441	442	443
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456	457	458	459	460	461	462	463	464	465	466	467
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480	481	482	483	484	485	486	487	488	489	490	491
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516	517	518	519	520	521	522	523	524	525	526	527
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672	673	674	675	676	677	678	679	680	681	682	683
684	685	686	687	688	689	690	691	692	693	694	695
696	697	698	699	700	701	702	703	704	705	706	707
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732	733	734	735	736	737	738	739	740	741	742	743
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1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127
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1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247
1248											





Scenario	Location	Vehicle Type	Volume	Percentage	Other Metrics
Scenario 1	Location 1	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 2	Location 2	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 3	Location 3	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 4	Location 4	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 5	Location 5	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 6	Location 6	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 7	Location 7	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 8	Location 8	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 9	Location 9	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 10	Location 10	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 11	Location 11	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...
Scenario 12	Location 12	Light Vehicle	100	80%	...
		Heavy Vehicle	20	16%	...
		Motorcycle	5	4%	...
		Tram	5	4%	...



Item 6.1

Attachment 2

PROPOSAL 2 - 2031

Scenario	Scenario Description	Scenario Type	Scenario Color	Scenario Summary
Scenario 1	Scenario 1 Description	Scenario 1 Type	Scenario 1 Color	Scenario 1 Summary
Scenario 2	Scenario 2 Description	Scenario 2 Type	Scenario 2 Color	Scenario 2 Summary
Scenario 3	Scenario 3 Description	Scenario 3 Type	Scenario 3 Color	Scenario 3 Summary
Scenario 4	Scenario 4 Description	Scenario 4 Type	Scenario 4 Color	Scenario 4 Summary
Scenario 5	Scenario 5 Description	Scenario 5 Type	Scenario 5 Color	Scenario 5 Summary
Scenario 6	Scenario 6 Description	Scenario 6 Type	Scenario 6 Color	Scenario 6 Summary
Scenario 7	Scenario 7 Description	Scenario 7 Type	Scenario 7 Color	Scenario 7 Summary
Scenario 8	Scenario 8 Description	Scenario 8 Type	Scenario 8 Color	Scenario 8 Summary
Scenario 9	Scenario 9 Description	Scenario 9 Type	Scenario 9 Color	Scenario 9 Summary
Scenario 10	Scenario 10 Description	Scenario 10 Type	Scenario 10 Color	Scenario 10 Summary
Scenario 11	Scenario 11 Description	Scenario 11 Type	Scenario 11 Color	Scenario 11 Summary
Scenario 12	Scenario 12 Description	Scenario 12 Type	Scenario 12 Color	Scenario 12 Summary
Scenario 13	Scenario 13 Description	Scenario 13 Type	Scenario 13 Color	Scenario 13 Summary
Scenario 14	Scenario 14 Description	Scenario 14 Type	Scenario 14 Color	Scenario 14 Summary
Scenario 15	Scenario 15 Description	Scenario 15 Type	Scenario 15 Color	Scenario 15 Summary
Scenario 16	Scenario 16 Description	Scenario 16 Type	Scenario 16 Color	Scenario 16 Summary
Scenario 17	Scenario 17 Description	Scenario 17 Type	Scenario 17 Color	Scenario 17 Summary
Scenario 18	Scenario 18 Description	Scenario 18 Type	Scenario 18 Color	Scenario 18 Summary
Scenario 19	Scenario 19 Description	Scenario 19 Type	Scenario 19 Color	Scenario 19 Summary
Scenario 20	Scenario 20 Description	Scenario 20 Type	Scenario 20 Color	Scenario 20 Summary

Scenario	Scenario Description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11	Scenario 12	Scenario 13	Scenario 14	Scenario 15	Scenario 16	Scenario 17	Scenario 18	Scenario 19	Scenario 20	Scenario 21	Scenario 22	Scenario 23	Scenario 24	Scenario 25	Scenario 26	Scenario 27	Scenario 28	Scenario 29	Scenario 30	Scenario 31	Scenario 32	Scenario 33	Scenario 34	Scenario 35	Scenario 36	Scenario 37	Scenario 38	Scenario 39	Scenario 40	Scenario 41	Scenario 42	Scenario 43	Scenario 44	Scenario 45	Scenario 46	Scenario 47	Scenario 48	Scenario 49	Scenario 50	Scenario 51	Scenario 52	Scenario 53	Scenario 54	Scenario 55	Scenario 56	Scenario 57	Scenario 58	Scenario 59	Scenario 60	Scenario 61	Scenario 62	Scenario 63	Scenario 64	Scenario 65	Scenario 66	Scenario 67	Scenario 68	Scenario 69	Scenario 70	Scenario 71	Scenario 72	Scenario 73	Scenario 74	Scenario 75	Scenario 76	Scenario 77	Scenario 78	Scenario 79	Scenario 80	Scenario 81	Scenario 82	Scenario 83	Scenario 84	Scenario 85	Scenario 86	Scenario 87	Scenario 88	Scenario 89	Scenario 90	Scenario 91	Scenario 92	Scenario 93	Scenario 94	Scenario 95	Scenario 96	Scenario 97	Scenario 98	Scenario 99	Scenario 100
Scenario 1	Scenario Description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11	Scenario 12	Scenario 13	Scenario 14	Scenario 15	Scenario 16	Scenario 17	Scenario 18	Scenario 19	Scenario 20	Scenario 21	Scenario 22	Scenario 23	Scenario 24	Scenario 25	Scenario 26	Scenario 27	Scenario 28	Scenario 29	Scenario 30	Scenario 31	Scenario 32	Scenario 33	Scenario 34	Scenario 35	Scenario 36	Scenario 37	Scenario 38	Scenario 39	Scenario 40	Scenario 41	Scenario 42	Scenario 43	Scenario 44	Scenario 45	Scenario 46	Scenario 47	Scenario 48	Scenario 49	Scenario 50	Scenario 51	Scenario 52	Scenario 53	Scenario 54	Scenario 55	Scenario 56	Scenario 57	Scenario 58	Scenario 59	Scenario 60	Scenario 61	Scenario 62	Scenario 63	Scenario 64	Scenario 65	Scenario 66	Scenario 67	Scenario 68	Scenario 69	Scenario 70	Scenario 71	Scenario 72	Scenario 73	Scenario 74	Scenario 75	Scenario 76	Scenario 77	Scenario 78	Scenario 79	Scenario 80	Scenario 81	Scenario 82	Scenario 83	Scenario 84	Scenario 85	Scenario 86	Scenario 87	Scenario 88	Scenario 89	Scenario 90	Scenario 91	Scenario 92	Scenario 93	Scenario 94	Scenario 95	Scenario 96	Scenario 97	Scenario 98	Scenario 99	Scenario 100

Scenario	Scenario Description	Scenario Type	Scenario Color	Scenario Summary
1	Scenario 1: Base Case	Scenario 1	Green	Summary of Scenario 1: Base Case. Includes metrics for traffic volume, parking demand, and environmental impact.
2	Scenario 2: Alternative A	Scenario 2	Orange	Summary of Scenario 2: Alternative A. Includes metrics for traffic volume, parking demand, and environmental impact.
3	Scenario 3: Alternative B	Scenario 3	Blue	Summary of Scenario 3: Alternative B. Includes metrics for traffic volume, parking demand, and environmental impact.
4	Scenario 4: Alternative C	Scenario 4	Yellow	Summary of Scenario 4: Alternative C. Includes metrics for traffic volume, parking demand, and environmental impact.
5	Scenario 5: Alternative D	Scenario 5	Purple	Summary of Scenario 5: Alternative D. Includes metrics for traffic volume, parking demand, and environmental impact.
6	Scenario 6: Alternative E	Scenario 6	Light Green	Summary of Scenario 6: Alternative E. Includes metrics for traffic volume, parking demand, and environmental impact.
7	Scenario 7: Alternative F	Scenario 7	Light Orange	Summary of Scenario 7: Alternative F. Includes metrics for traffic volume, parking demand, and environmental impact.
8	Scenario 8: Alternative G	Scenario 8	Light Blue	Summary of Scenario 8: Alternative G. Includes metrics for traffic volume, parking demand, and environmental impact.
9	Scenario 9: Alternative H	Scenario 9	Light Yellow	Summary of Scenario 9: Alternative H. Includes metrics for traffic volume, parking demand, and environmental impact.
10	Scenario 10: Alternative I	Scenario 10	Light Purple	Summary of Scenario 10: Alternative I. Includes metrics for traffic volume, parking demand, and environmental impact.
11	Scenario 11: Alternative J	Scenario 11	Light Green	Summary of Scenario 11: Alternative J. Includes metrics for traffic volume, parking demand, and environmental impact.
12	Scenario 12: Alternative K	Scenario 12	Light Orange	Summary of Scenario 12: Alternative K. Includes metrics for traffic volume, parking demand, and environmental impact.
13	Scenario 13: Alternative L	Scenario 13	Light Blue	Summary of Scenario 13: Alternative L. Includes metrics for traffic volume, parking demand, and environmental impact.
14	Scenario 14: Alternative M	Scenario 14	Light Yellow	Summary of Scenario 14: Alternative M. Includes metrics for traffic volume, parking demand, and environmental impact.
15	Scenario 15: Alternative N	Scenario 15	Light Purple	Summary of Scenario 15: Alternative N. Includes metrics for traffic volume, parking demand, and environmental impact.

The table is divided into four main sections, each with a colored header and a title. Each section contains a table with multiple columns and rows of numerical data.

- Section 1 (Green Header):** Title: "01 - Kiama Town Centre - Green". It contains data for various categories like "Traffic Volume" and "Parking Capacity" across different scenarios.
- Section 2 (Orange Header):** Title: "02 - Kiama Town Centre - Orange". It contains similar data to Section 1 but for a different scenario.
- Section 3 (Blue Header):** Title: "03 - Kiama Town Centre - Blue". It contains similar data to Section 1 but for a third scenario.
- Section 4 (Grey Header):** Title: "04 - Kiama Town Centre - Grey". It contains similar data to Section 1 but for a fourth scenario.

Each section's table includes columns for "Scenario", "Category", "Value", and "Units". The data is presented in a structured, grid-like format.

PROPOSAL 4 - 2031

Scenario	Scenario Description	Scenario Type	Scenario Color
Scenario 1	Scenario 1 Description	Scenario 1 Type	Scenario 1 Color
Scenario 2	Scenario 2 Description	Scenario 2 Type	Scenario 2 Color
Scenario 3	Scenario 3 Description	Scenario 3 Type	Scenario 3 Color
Scenario 4	Scenario 4 Description	Scenario 4 Type	Scenario 4 Color
Scenario 5	Scenario 5 Description	Scenario 5 Type	Scenario 5 Color
Scenario 6	Scenario 6 Description	Scenario 6 Type	Scenario 6 Color
Scenario 7	Scenario 7 Description	Scenario 7 Type	Scenario 7 Color
Scenario 8	Scenario 8 Description	Scenario 8 Type	Scenario 8 Color
Scenario 9	Scenario 9 Description	Scenario 9 Type	Scenario 9 Color
Scenario 10	Scenario 10 Description	Scenario 10 Type	Scenario 10 Color
Scenario 11	Scenario 11 Description	Scenario 11 Type	Scenario 11 Color
Scenario 12	Scenario 12 Description	Scenario 12 Type	Scenario 12 Color
Scenario 13	Scenario 13 Description	Scenario 13 Type	Scenario 13 Color
Scenario 14	Scenario 14 Description	Scenario 14 Type	Scenario 14 Color
Scenario 15	Scenario 15 Description	Scenario 15 Type	Scenario 15 Color
Scenario 16	Scenario 16 Description	Scenario 16 Type	Scenario 16 Color
Scenario 17	Scenario 17 Description	Scenario 17 Type	Scenario 17 Color
Scenario 18	Scenario 18 Description	Scenario 18 Type	Scenario 18 Color
Scenario 19	Scenario 19 Description	Scenario 19 Type	Scenario 19 Color
Scenario 20	Scenario 20 Description	Scenario 20 Type	Scenario 20 Color
Scenario 21	Scenario 21 Description	Scenario 21 Type	Scenario 21 Color
Scenario 22	Scenario 22 Description	Scenario 22 Type	Scenario 22 Color
Scenario 23	Scenario 23 Description	Scenario 23 Type	Scenario 23 Color
Scenario 24	Scenario 24 Description	Scenario 24 Type	Scenario 24 Color
Scenario 25	Scenario 25 Description	Scenario 25 Type	Scenario 25 Color
Scenario 26	Scenario 26 Description	Scenario 26 Type	Scenario 26 Color
Scenario 27	Scenario 27 Description	Scenario 27 Type	Scenario 27 Color
Scenario 28	Scenario 28 Description	Scenario 28 Type	Scenario 28 Color
Scenario 29	Scenario 29 Description	Scenario 29 Type	Scenario 29 Color
Scenario 30	Scenario 30 Description	Scenario 30 Type	Scenario 30 Color
Scenario 31	Scenario 31 Description	Scenario 31 Type	Scenario 31 Color
Scenario 32	Scenario 32 Description	Scenario 32 Type	Scenario 32 Color
Scenario 33	Scenario 33 Description	Scenario 33 Type	Scenario 33 Color
Scenario 34	Scenario 34 Description	Scenario 34 Type	Scenario 34 Color
Scenario 35	Scenario 35 Description	Scenario 35 Type	Scenario 35 Color
Scenario 36	Scenario 36 Description	Scenario 36 Type	Scenario 36 Color
Scenario 37	Scenario 37 Description	Scenario 37 Type	Scenario 37 Color
Scenario 38	Scenario 38 Description	Scenario 38 Type	Scenario 38 Color
Scenario 39	Scenario 39 Description	Scenario 39 Type	Scenario 39 Color
Scenario 40	Scenario 40 Description	Scenario 40 Type	Scenario 40 Color
Scenario 41	Scenario 41 Description	Scenario 41 Type	Scenario 41 Color
Scenario 42	Scenario 42 Description	Scenario 42 Type	Scenario 42 Color
Scenario 43	Scenario 43 Description	Scenario 43 Type	Scenario 43 Color
Scenario 44	Scenario 44 Description	Scenario 44 Type	Scenario 44 Color
Scenario 45	Scenario 45 Description	Scenario 45 Type	Scenario 45 Color
Scenario 46	Scenario 46 Description	Scenario 46 Type	Scenario 46 Color
Scenario 47	Scenario 47 Description	Scenario 47 Type	Scenario 47 Color
Scenario 48	Scenario 48 Description	Scenario 48 Type	Scenario 48 Color
Scenario 49	Scenario 49 Description	Scenario 49 Type	Scenario 49 Color
Scenario 50	Scenario 50 Description	Scenario 50 Type	Scenario 50 Color
Scenario 51	Scenario 51 Description	Scenario 51 Type	Scenario 51 Color
Scenario 52	Scenario 52 Description	Scenario 52 Type	Scenario 52 Color
Scenario 53	Scenario 53 Description	Scenario 53 Type	Scenario 53 Color
Scenario 54	Scenario 54 Description	Scenario 54 Type	Scenario 54 Color
Scenario 55	Scenario 55 Description	Scenario 55 Type	Scenario 55 Color
Scenario 56	Scenario 56 Description	Scenario 56 Type	Scenario 56 Color
Scenario 57	Scenario 57 Description	Scenario 57 Type	Scenario 57 Color
Scenario 58	Scenario 58 Description	Scenario 58 Type	Scenario 58 Color
Scenario 59	Scenario 59 Description	Scenario 59 Type	Scenario 59 Color
Scenario 60	Scenario 60 Description	Scenario 60 Type	Scenario 60 Color
Scenario 61	Scenario 61 Description	Scenario 61 Type	Scenario 61 Color
Scenario 62	Scenario 62 Description	Scenario 62 Type	Scenario 62 Color
Scenario 63	Scenario 63 Description	Scenario 63 Type	Scenario 63 Color
Scenario 64	Scenario 64 Description	Scenario 64 Type	Scenario 64 Color
Scenario 65	Scenario 65 Description	Scenario 65 Type	Scenario 65 Color
Scenario 66	Scenario 66 Description	Scenario 66 Type	Scenario 66 Color
Scenario 67	Scenario 67 Description	Scenario 67 Type	Scenario 67 Color
Scenario 68	Scenario 68 Description	Scenario 68 Type	Scenario 68 Color
Scenario 69	Scenario 69 Description	Scenario 69 Type	Scenario 69 Color
Scenario 70	Scenario 70 Description	Scenario 70 Type	Scenario 70 Color
Scenario 71	Scenario 71 Description	Scenario 71 Type	Scenario 71 Color
Scenario 72	Scenario 72 Description	Scenario 72 Type	Scenario 72 Color
Scenario 73	Scenario 73 Description	Scenario 73 Type	Scenario 73 Color
Scenario 74	Scenario 74 Description	Scenario 74 Type	Scenario 74 Color
Scenario 75	Scenario 75 Description	Scenario 75 Type	Scenario 75 Color
Scenario 76	Scenario 76 Description	Scenario 76 Type	Scenario 76 Color
Scenario 77	Scenario 77 Description	Scenario 77 Type	Scenario 77 Color
Scenario 78	Scenario 78 Description	Scenario 78 Type	Scenario 78 Color
Scenario 79	Scenario 79 Description	Scenario 79 Type	Scenario 79 Color
Scenario 80	Scenario 80 Description	Scenario 80 Type	Scenario 80 Color
Scenario 81	Scenario 81 Description	Scenario 81 Type	Scenario 81 Color
Scenario 82	Scenario 82 Description	Scenario 82 Type	Scenario 82 Color
Scenario 83	Scenario 83 Description	Scenario 83 Type	Scenario 83 Color
Scenario 84	Scenario 84 Description	Scenario 84 Type	Scenario 84 Color
Scenario 85	Scenario 85 Description	Scenario 85 Type	Scenario 85 Color
Scenario 86	Scenario 86 Description	Scenario 86 Type	Scenario 86 Color
Scenario 87	Scenario 87 Description	Scenario 87 Type	Scenario 87 Color
Scenario 88	Scenario 88 Description	Scenario 88 Type	Scenario 88 Color
Scenario 89	Scenario 89 Description	Scenario 89 Type	Scenario 89 Color
Scenario 90	Scenario 90 Description	Scenario 90 Type	Scenario 90 Color
Scenario 91	Scenario 91 Description	Scenario 91 Type	Scenario 91 Color
Scenario 92	Scenario 92 Description	Scenario 92 Type	Scenario 92 Color
Scenario 93	Scenario 93 Description	Scenario 93 Type	Scenario 93 Color
Scenario 94	Scenario 94 Description	Scenario 94 Type	Scenario 94 Color
Scenario 95	Scenario 95 Description	Scenario 95 Type	Scenario 95 Color
Scenario 96	Scenario 96 Description	Scenario 96 Type	Scenario 96 Color
Scenario 97	Scenario 97 Description	Scenario 97 Type	Scenario 97 Color
Scenario 98	Scenario 98 Description	Scenario 98 Type	Scenario 98 Color
Scenario 99	Scenario 99 Description	Scenario 99 Type	Scenario 99 Color
Scenario 100	Scenario 100 Description	Scenario 100 Type	Scenario 100 Color

M1 - Morning Peak - Monday Peak												
Scenario	Time	Vehicle	Person	Person	Person	Person	Person	Person	Person	Person	Person	Person
Scenario 1	07:00 - 08:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 2	08:00 - 09:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 3	09:00 - 10:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 4	10:00 - 11:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 5	11:00 - 12:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 6	12:00 - 13:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 7	13:00 - 14:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 8	14:00 - 15:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 9	15:00 - 16:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 10	16:00 - 17:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 11	17:00 - 18:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 12	18:00 - 19:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 13	19:00 - 20:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 14	20:00 - 21:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 15	21:00 - 22:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 16	22:00 - 23:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 17	23:00 - 24:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 18	24:00 - 25:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 19	25:00 - 26:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 20	26:00 - 27:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 21	27:00 - 28:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 22	28:00 - 29:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 23	29:00 - 30:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 24	30:00 - 31:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 25	31:00 - 32:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 26	32:00 - 33:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 27	33:00 - 34:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 28	34:00 - 35:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 29	35:00 - 36:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 30	36:00 - 37:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 31	37:00 - 38:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 32	38:00 - 39:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 33	39:00 - 40:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 34	40:00 - 41:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 35	41:00 - 42:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 36	42:00 - 43:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 37	43:00 - 44:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 38	44:00 - 45:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 39	45:00 - 46:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 40	46:00 - 47:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 41	47:00 - 48:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 42	48:00 - 49:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 43	49:00 - 50:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 44	50:00 - 51:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 45	51:00 - 52:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 46	52:00 - 53:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 47	53:00 - 54:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 48	54:00 - 55:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 49	55:00 - 56:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 50	56:00 - 57:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 51	57:00 - 58:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 52	58:00 - 59:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 53	59:00 - 60:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 54	60:00 - 61:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 55	61:00 - 62:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 56	62:00 - 63:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 57	63:00 - 64:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 58	64:00 - 65:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 59	65:00 - 66:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 60	66:00 - 67:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 61	67:00 - 68:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 62	68:00 - 69:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 63	69:00 - 70:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 64	70:00 - 71:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 65	71:00 - 72:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 66	72:00 - 73:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 67	73:00 - 74:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 68	74:00 - 75:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 69	75:00 - 76:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 70	76:00 - 77:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 71	77:00 - 78:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 72	78:00 - 79:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 73	79:00 - 80:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 74	80:00 - 81:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 75	81:00 - 82:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 76	82:00 - 83:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 77	83:00 - 84:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 78	84:00 - 85:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 79	85:00 - 86:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 80	86:00 - 87:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 81	87:00 - 88:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 82	88:00 - 89:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 83	89:00 - 90:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 84	90:00 - 91:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 85	91:00 - 92:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 86	92:00 - 93:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 87	93:00 - 94:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 88	94:00 - 95:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 89	95:00 - 96:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 90	96:00 - 97:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 91	97:00 - 98:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 92	98:00 - 99:00	10	10	10	10	10	10	10	10	10	10	10
Scenario 93	99:00 - 100:00	10	10	10	10	10	10	10	10	10	10	10

M1 - Morning Peak Morning Peak													
Scenario	Direction	Approach	Exit	Queue Length (m)	Queue Delay (s)	Queue Delay (h)	Queue Delay (min)	Queue Delay (sec)	Queue Delay (min)	Queue Delay (sec)	Queue Delay (min)	Queue Delay (sec)	Queue Delay (min)
Scenario 1	Approach	1	1	1	1	1	1	1	1	1	1	1	1
		2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3
		4	4	4	4	4	4	4	4	4	4	4	4
		5	5	5	5	5	5	5	5	5	5	5	5
Scenario 2	Approach	1	1	1	1	1	1	1	1	1	1	1	1
		2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3
		4	4	4	4	4	4	4	4	4	4	4	4
		5	5	5	5	5	5	5	5	5	5	5	5
Scenario 3	Approach	1	1	1	1	1	1	1	1	1	1	1	1
		2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3
		4	4	4	4	4	4	4	4	4	4	4	4
		5	5	5	5	5	5	5	5	5	5	5	5
Scenario 4	Approach	1	1	1	1	1	1	1	1	1	1	1	1
		2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3
		4	4	4	4	4	4	4	4	4	4	4	4
		5	5	5	5	5	5	5	5	5	5	5	5
Scenario 5	Approach	1	1	1	1	1	1	1	1	1	1	1	1
		2	2	2	2	2	2	2	2	2	2	2	2
		3	3	3	3	3	3	3	3	3	3	3	3
		4	4	4	4	4	4	4	4	4	4	4	4
		5	5	5	5	5	5	5	5	5	5	5	5

COMBINED PROPOSALS - 2031

Scenario	Scenario Description	Scenario Type	Scenario Color
1	Scenario 1: Base Case	Scenario 1	Green
2	Scenario 2: Proposed	Scenario 2	Orange
3	Scenario 3: Proposed + Parking	Scenario 3	Blue

The table contains detailed traffic and parking data for each scenario, including metrics such as Average Daily Traffic (ADT), Peak Hour Traffic, and Parking Demand. The data is organized into columns for each scenario and rows for various traffic and parking metrics.

Scenario	Scenario Description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11	Scenario 12	Scenario 13	Scenario 14	Scenario 15	Scenario 16	Scenario 17	Scenario 18	Scenario 19	Scenario 20	Scenario 21	Scenario 22	Scenario 23	Scenario 24	Scenario 25	Scenario 26	Scenario 27	Scenario 28	Scenario 29	Scenario 30	Scenario 31	Scenario 32	Scenario 33	Scenario 34	Scenario 35	Scenario 36	Scenario 37	Scenario 38	Scenario 39	Scenario 40	Scenario 41	Scenario 42	Scenario 43	Scenario 44	Scenario 45	Scenario 46	Scenario 47	Scenario 48	Scenario 49	Scenario 50	Scenario 51	Scenario 52	Scenario 53	Scenario 54	Scenario 55	Scenario 56	Scenario 57	Scenario 58	Scenario 59	Scenario 60	Scenario 61	Scenario 62	Scenario 63	Scenario 64	Scenario 65	Scenario 66	Scenario 67	Scenario 68	Scenario 69	Scenario 70	Scenario 71	Scenario 72	Scenario 73	Scenario 74	Scenario 75	Scenario 76	Scenario 77	Scenario 78	Scenario 79	Scenario 80	Scenario 81	Scenario 82	Scenario 83	Scenario 84	Scenario 85	Scenario 86	Scenario 87	Scenario 88	Scenario 89	Scenario 90	Scenario 91	Scenario 92	Scenario 93	Scenario 94	Scenario 95	Scenario 96	Scenario 97	Scenario 98	Scenario 99	Scenario 100
Scenario 1	Scenario Description	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11	Scenario 12	Scenario 13	Scenario 14	Scenario 15	Scenario 16	Scenario 17	Scenario 18	Scenario 19	Scenario 20	Scenario 21	Scenario 22	Scenario 23	Scenario 24	Scenario 25	Scenario 26	Scenario 27	Scenario 28	Scenario 29	Scenario 30	Scenario 31	Scenario 32	Scenario 33	Scenario 34	Scenario 35	Scenario 36	Scenario 37	Scenario 38	Scenario 39	Scenario 40	Scenario 41	Scenario 42	Scenario 43	Scenario 44	Scenario 45	Scenario 46	Scenario 47	Scenario 48	Scenario 49	Scenario 50	Scenario 51	Scenario 52	Scenario 53	Scenario 54	Scenario 55	Scenario 56	Scenario 57	Scenario 58	Scenario 59	Scenario 60	Scenario 61	Scenario 62	Scenario 63	Scenario 64	Scenario 65	Scenario 66	Scenario 67	Scenario 68	Scenario 69	Scenario 70	Scenario 71	Scenario 72	Scenario 73	Scenario 74	Scenario 75	Scenario 76	Scenario 77	Scenario 78	Scenario 79	Scenario 80	Scenario 81	Scenario 82	Scenario 83	Scenario 84	Scenario 85	Scenario 86	Scenario 87	Scenario 88	Scenario 89	Scenario 90	Scenario 91	Scenario 92	Scenario 93	Scenario 94	Scenario 95	Scenario 96	Scenario 97	Scenario 98	Scenario 99	Scenario 100

Scenario	Scenario Description	Scenario Type	Scenario Color	Scenario Summary
Scenario 1	Scenario 1 Description	Scenario 1 Type	Scenario 1 Color	Scenario 1 Summary
Scenario 2	Scenario 2 Description	Scenario 2 Type	Scenario 2 Color	Scenario 2 Summary
Scenario 3	Scenario 3 Description	Scenario 3 Type	Scenario 3 Color	Scenario 3 Summary
Scenario 4	Scenario 4 Description	Scenario 4 Type	Scenario 4 Color	Scenario 4 Summary
Scenario 5	Scenario 5 Description	Scenario 5 Type	Scenario 5 Color	Scenario 5 Summary
Scenario 6	Scenario 6 Description	Scenario 6 Type	Scenario 6 Color	Scenario 6 Summary
Scenario 7	Scenario 7 Description	Scenario 7 Type	Scenario 7 Color	Scenario 7 Summary
Scenario 8	Scenario 8 Description	Scenario 8 Type	Scenario 8 Color	Scenario 8 Summary
Scenario 9	Scenario 9 Description	Scenario 9 Type	Scenario 9 Color	Scenario 9 Summary
Scenario 10	Scenario 10 Description	Scenario 10 Type	Scenario 10 Color	Scenario 10 Summary

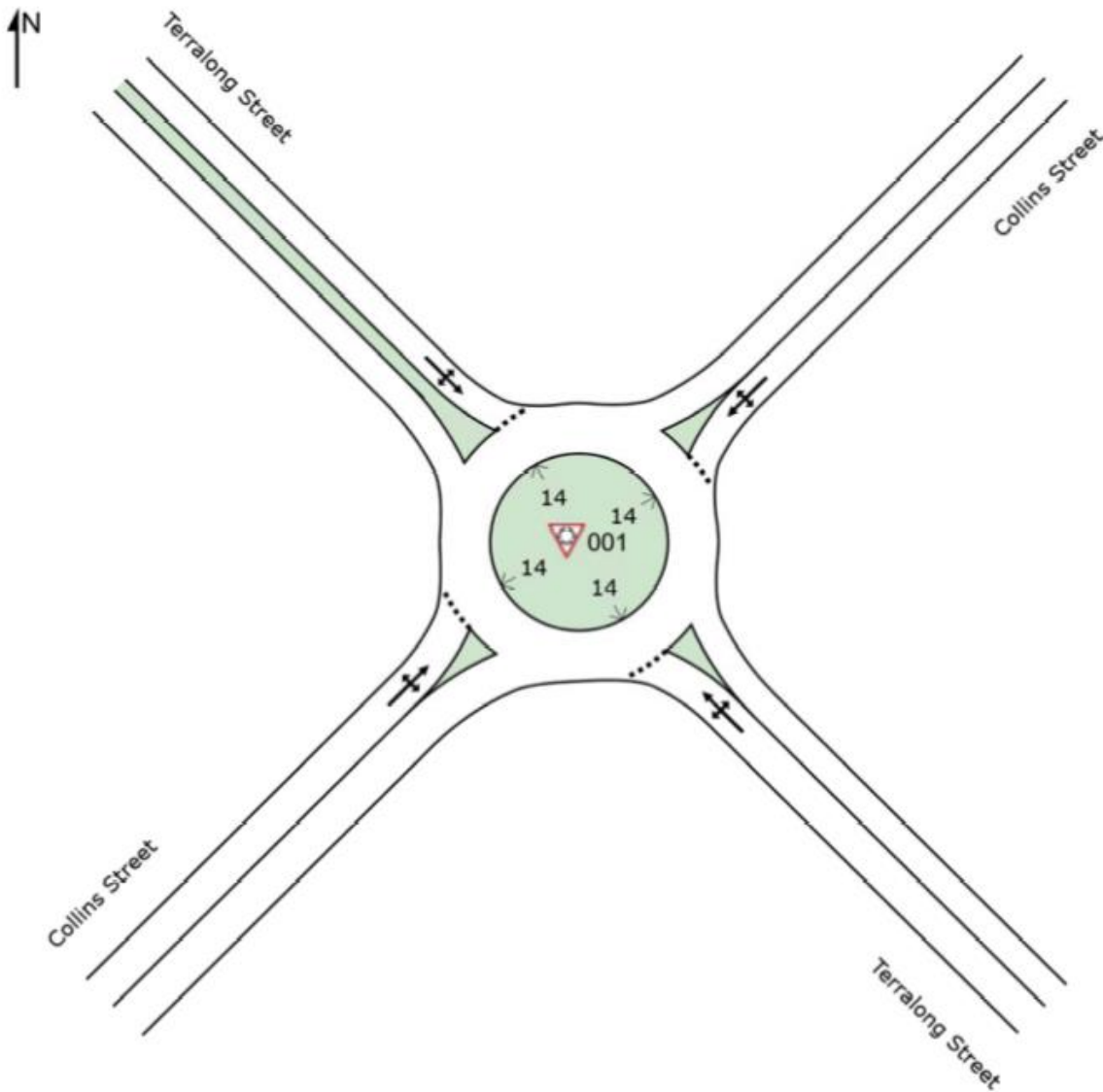


Appendix C: SIDRA Layouts

SITE LAYOUT

Site: 001 [2021_AM_001_Do Nothing]

Terralong Street / Collins Street
Site Category: (None)
Roundabout

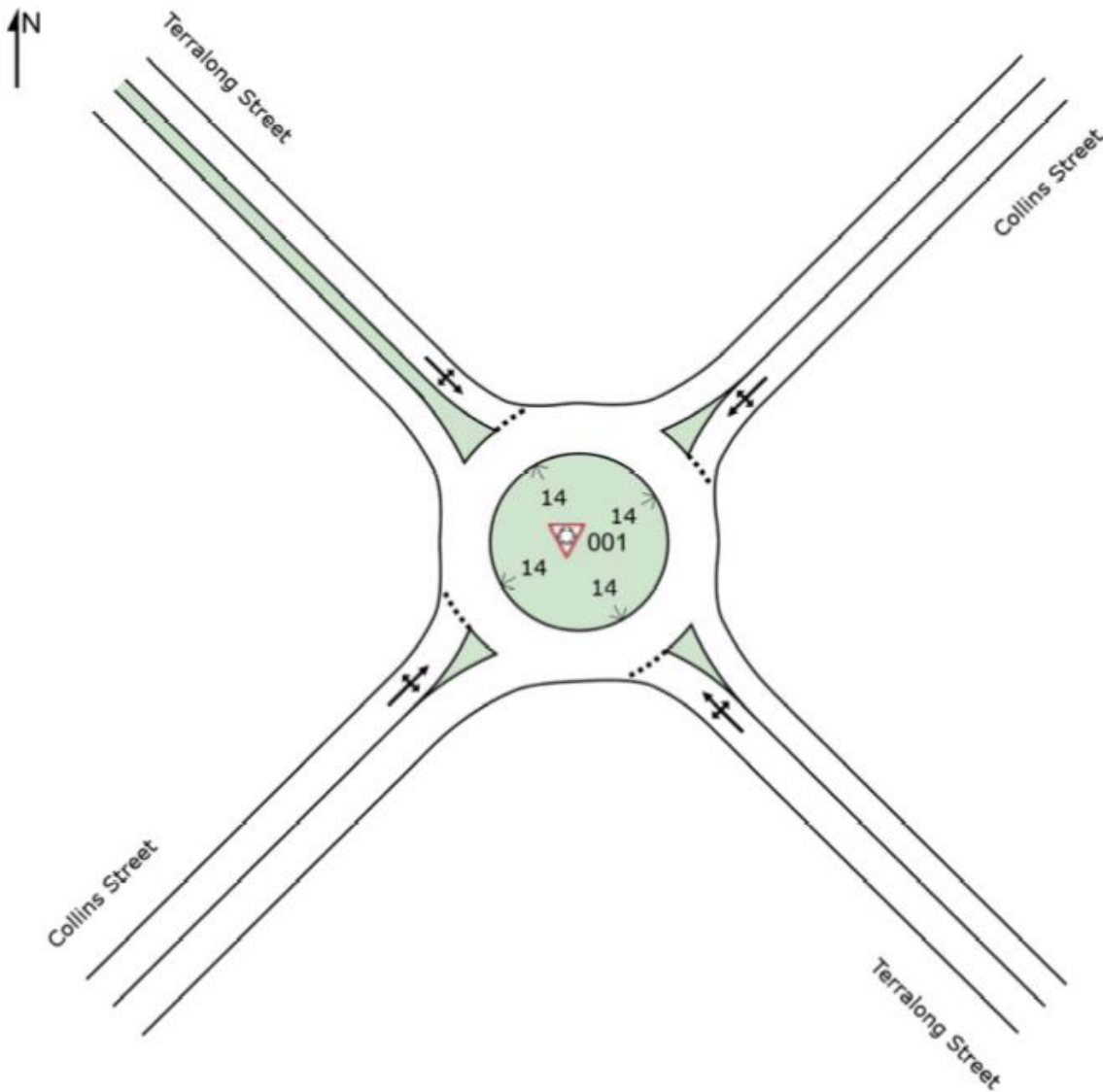


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SITE LAYOUT

Site: 001 [2021_AM_001_Option 4]

Terralong Street / Collins Street
Site Category: (None)
Roundabout

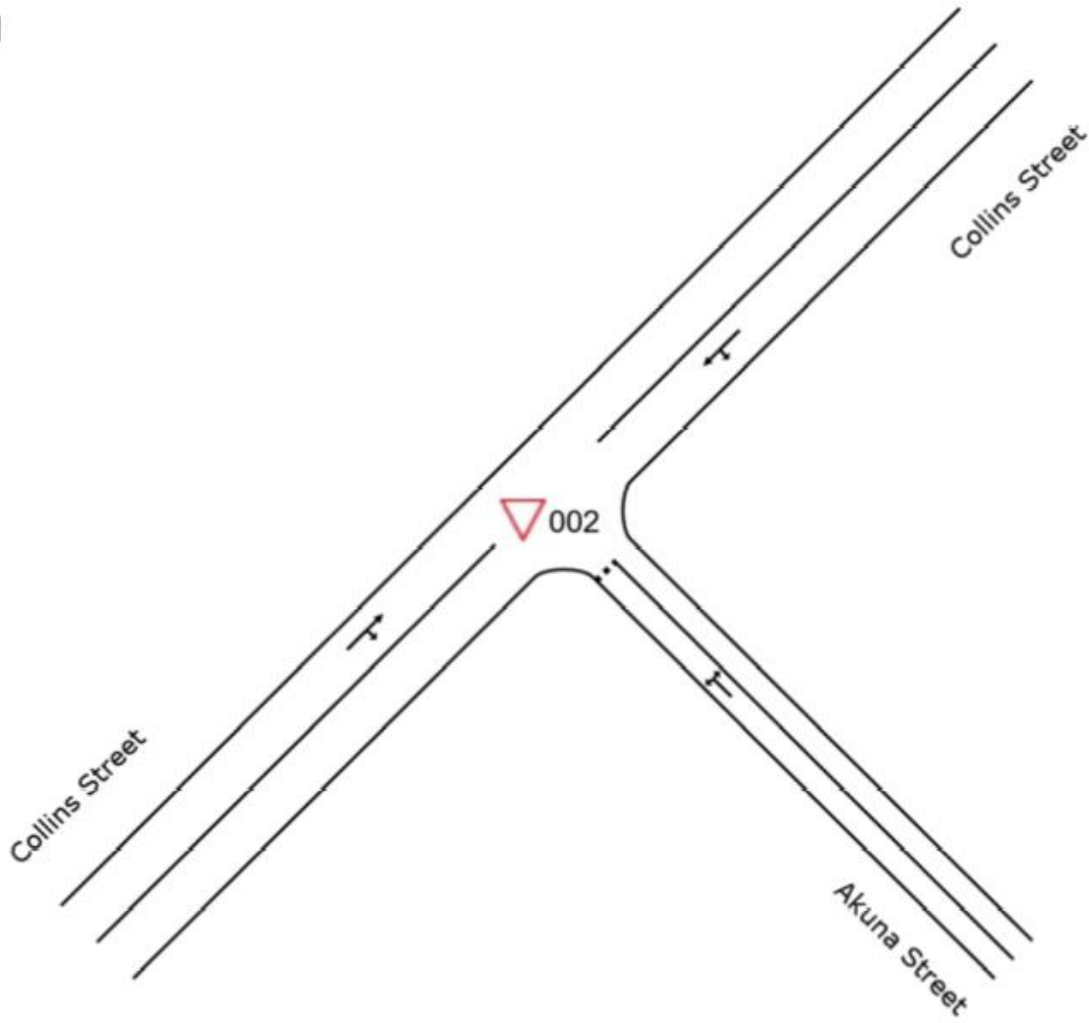


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SITE LAYOUT

▽ Site: 002 [2021_AM_002_Do Nothing]

Collins Street / Akuna Street
Site Category: (None)
Giveaway / Yield (Two-Way)

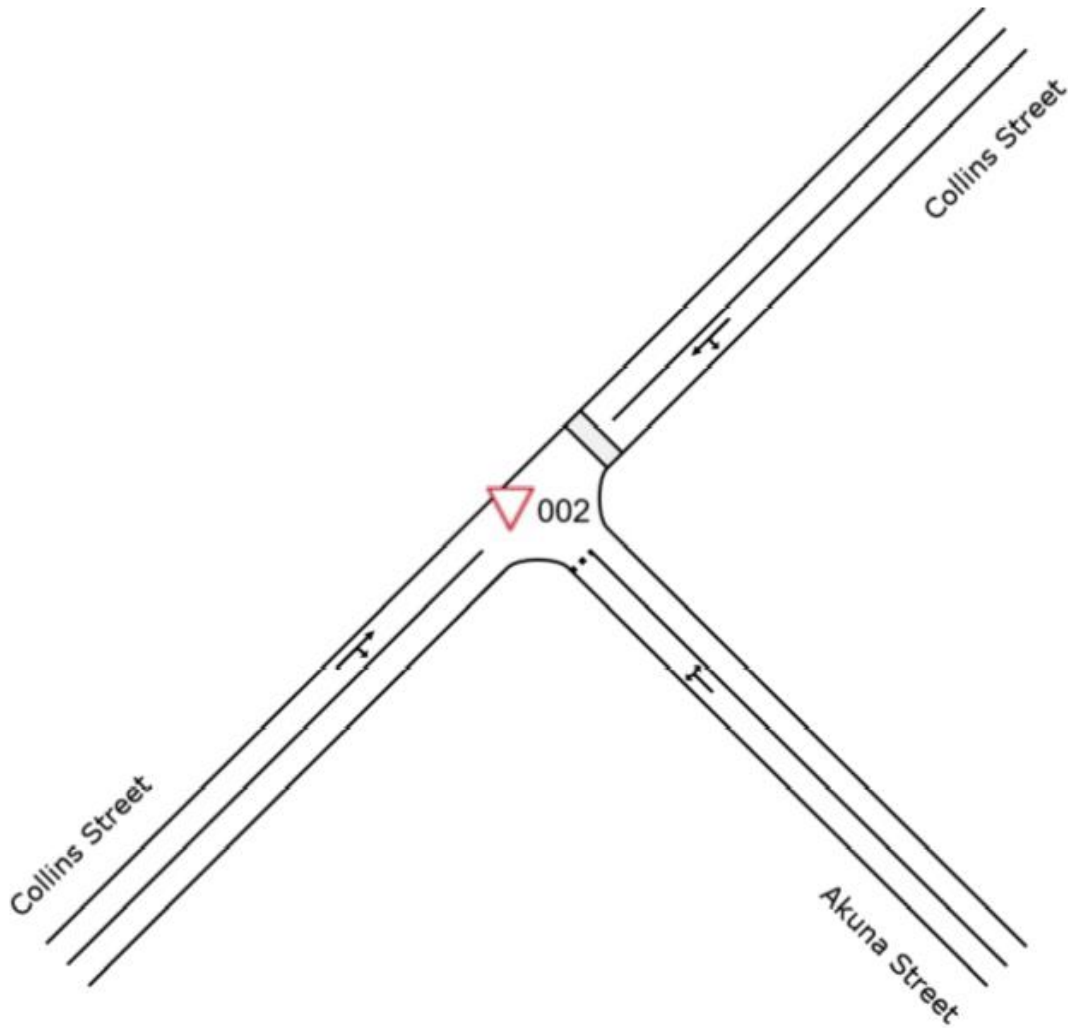


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SITE LAYOUT

▽ Site: 002 [2021_AM_002_Option 4]

Collins Street / Akuna Street
Site Category: (None)
Giveaway / Yield (Two-Way)

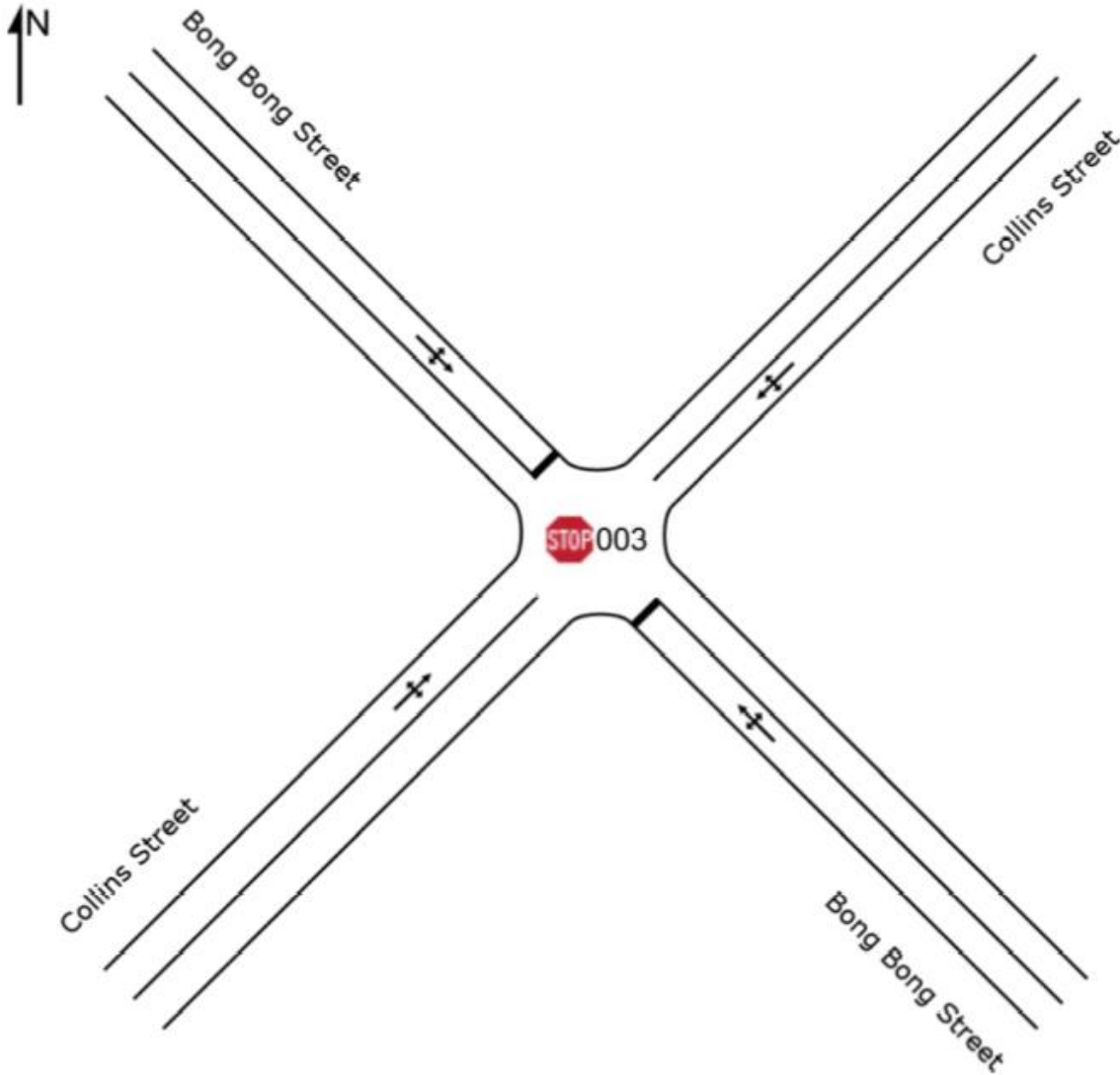


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SITE LAYOUT

 Site: 003 [2021_AM_003_Do Nothing]

Collins Street / Bong Bong Street
Site Category: (None)
Stop (Two-Way)

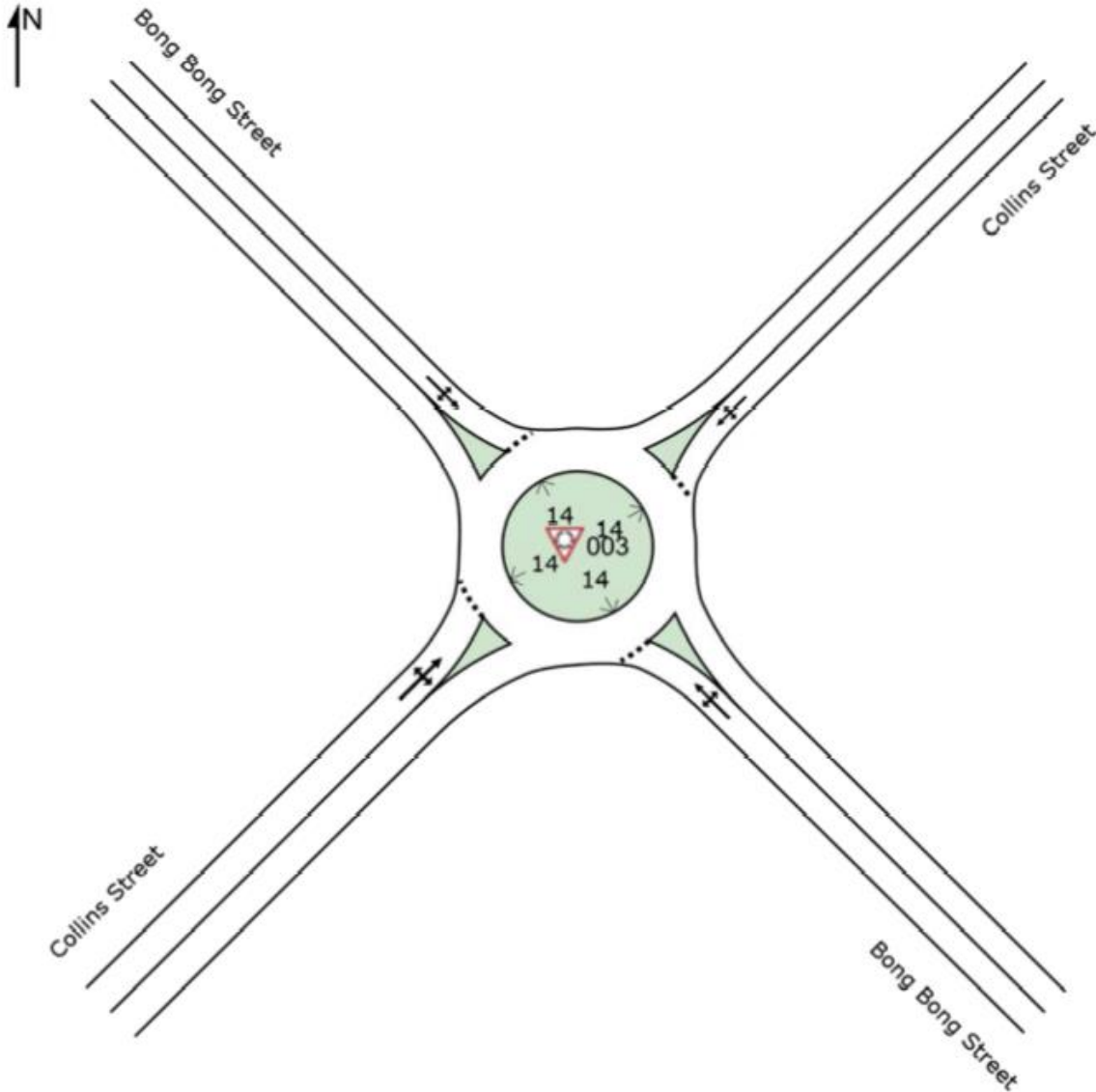


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SITE LAYOUT

Site: 003 [2021_AM_003_Option 4]

Collins Street / Bong Bong Street
Site Category: (None)
Roundabout

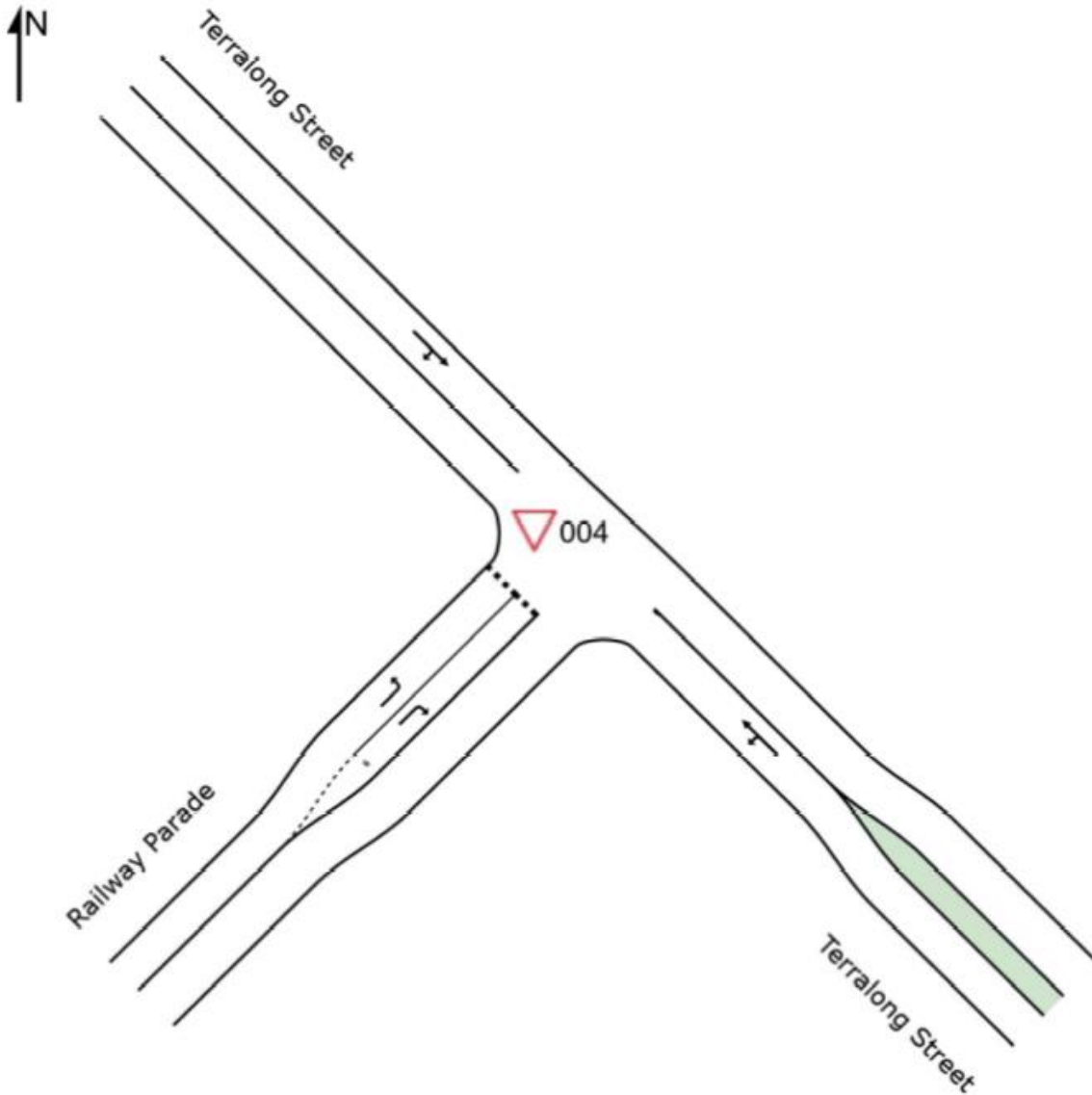


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SITE LAYOUT

▽ Site: 004 [2021_AM_004_Do Nothing]

Terralong Street / Railway Parade
Site Category: (None)
Giveaway / Yield (Two-Way)

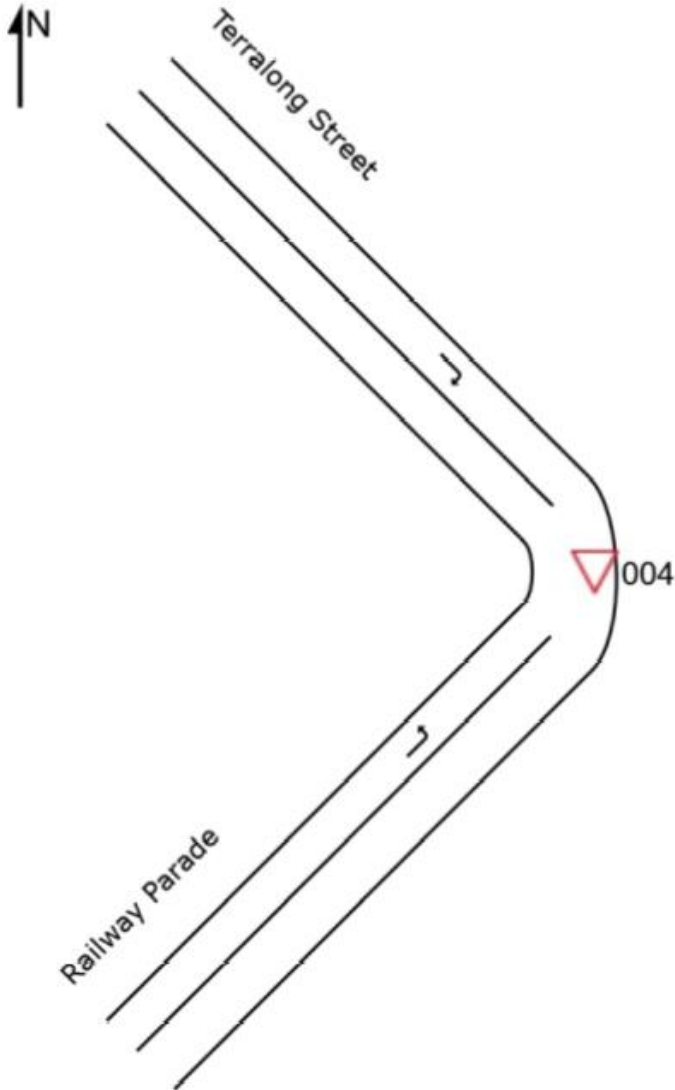


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SITE LAYOUT

▽ Site: 004 [2021_AM_004_Option 2]

Terralong Street / Railway Parade
Site Category: (None)
Giveaway / Yield (Two-Way)

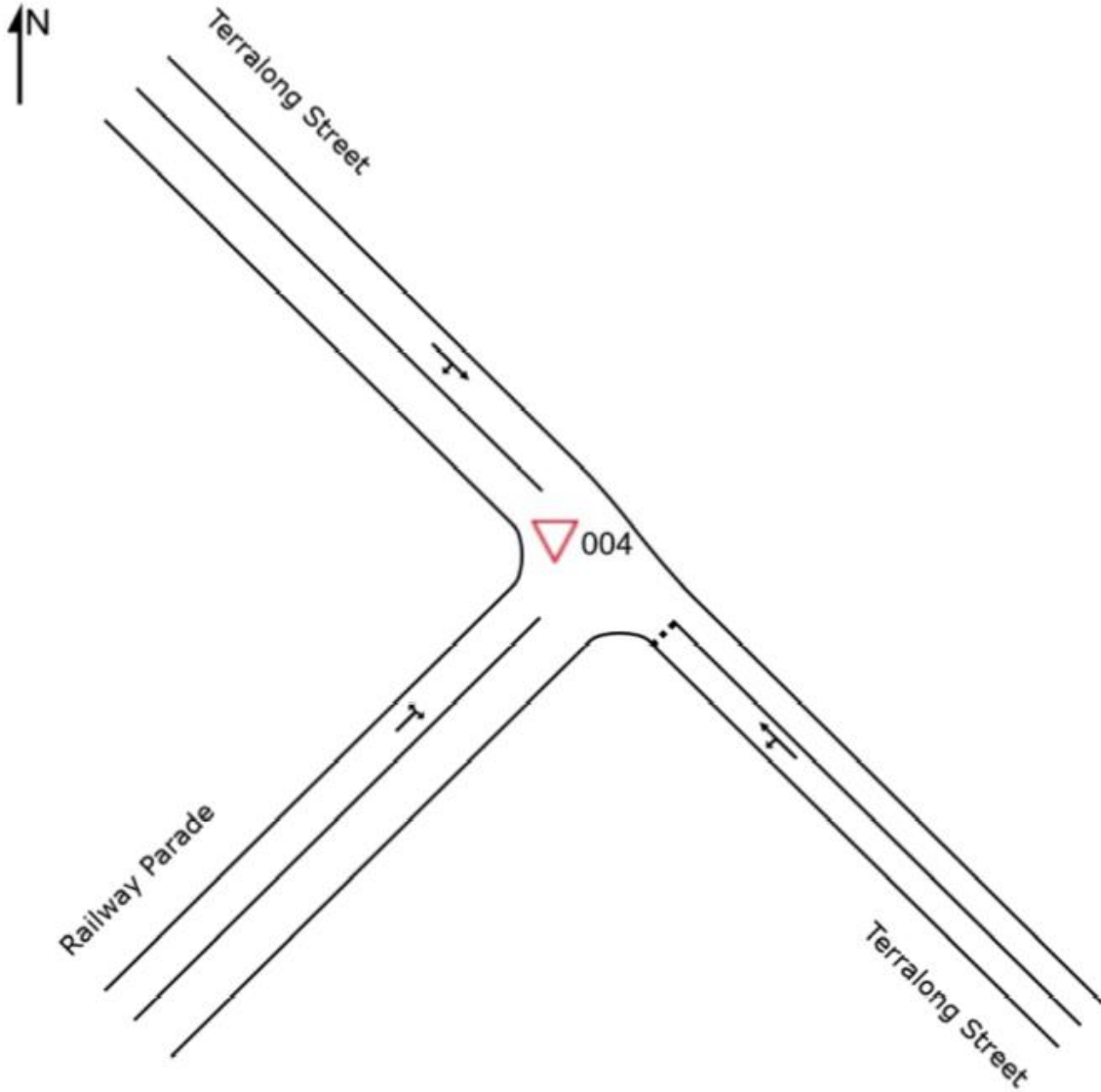


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SITE LAYOUT

▽ Site: 004 [2021_AM_004_Option 4]

Terralong Street / Railway Parade
Site Category: (None)
Giveaway / Yield (Two-Way)

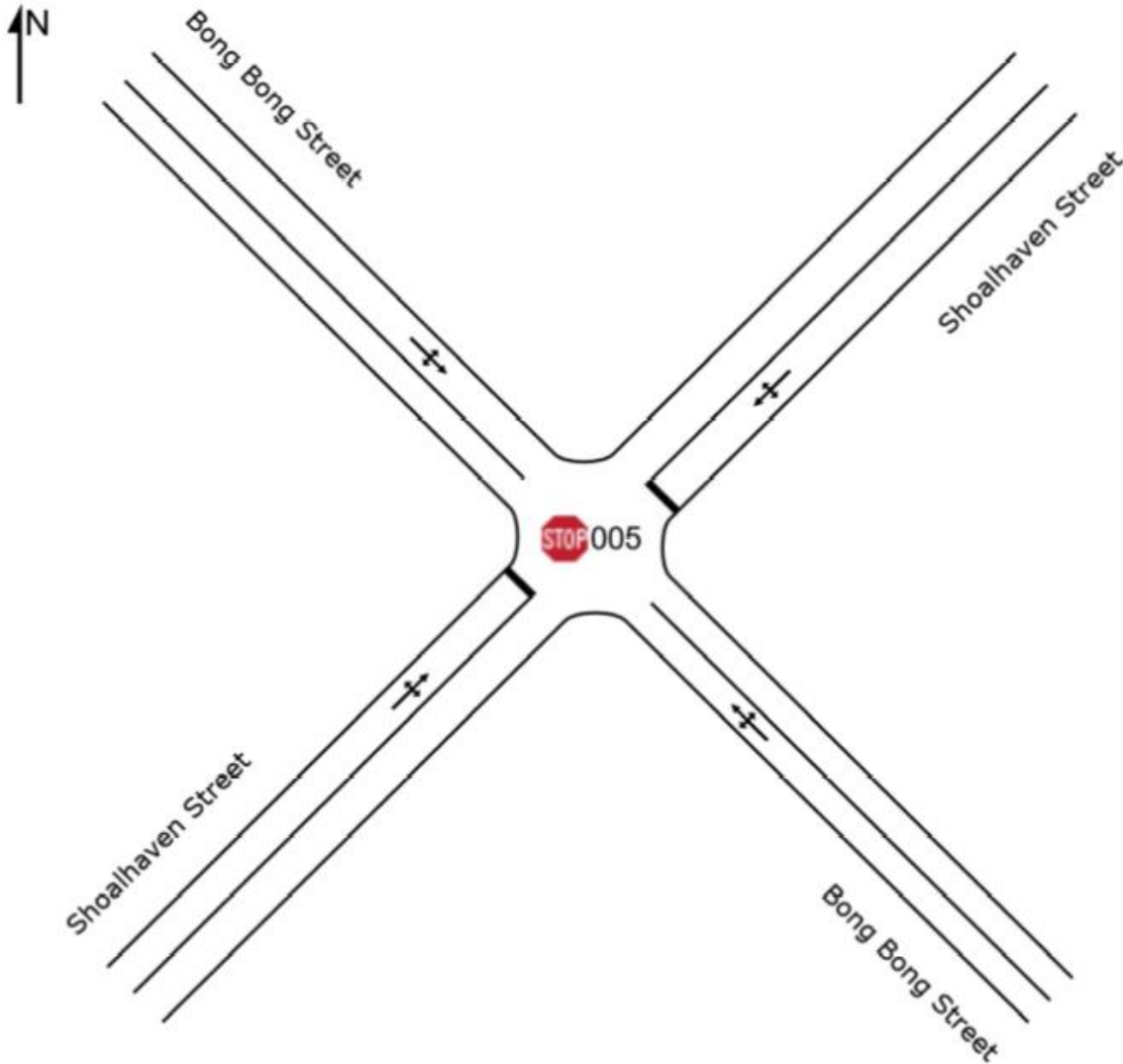


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SITE LAYOUT

 Site: 005 [2021_AM_005_Do Nothing]

Bong Bong Street / Shoalhaven Street
Site Category: (None)
Stop (Two-Way)

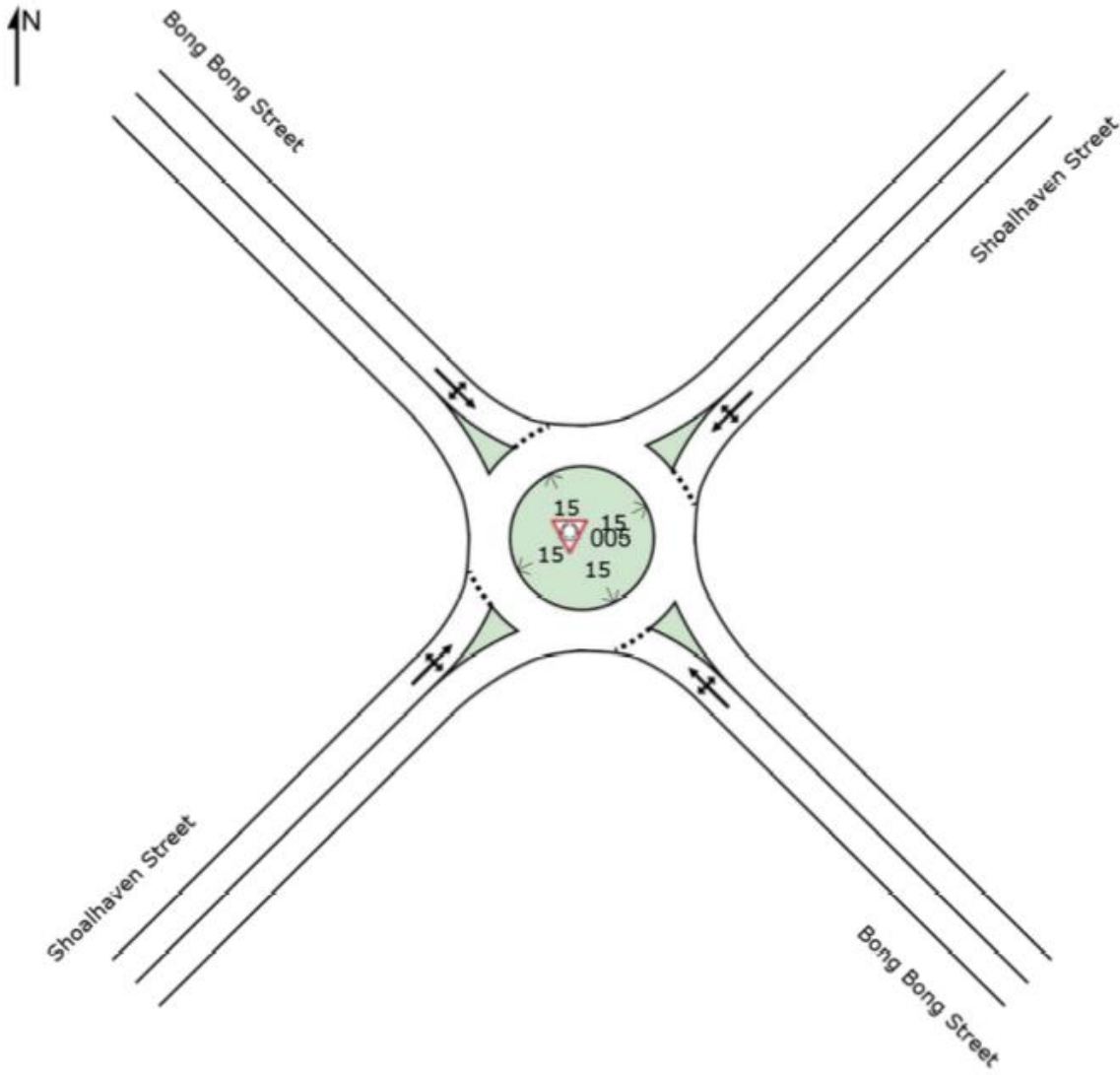


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SITE LAYOUT

Site: 005 [2021_AM_005_Option 4]

Bong Bong Street / Shoalhaven Street
Site Category: (None)
Roundabout



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Attachment 2

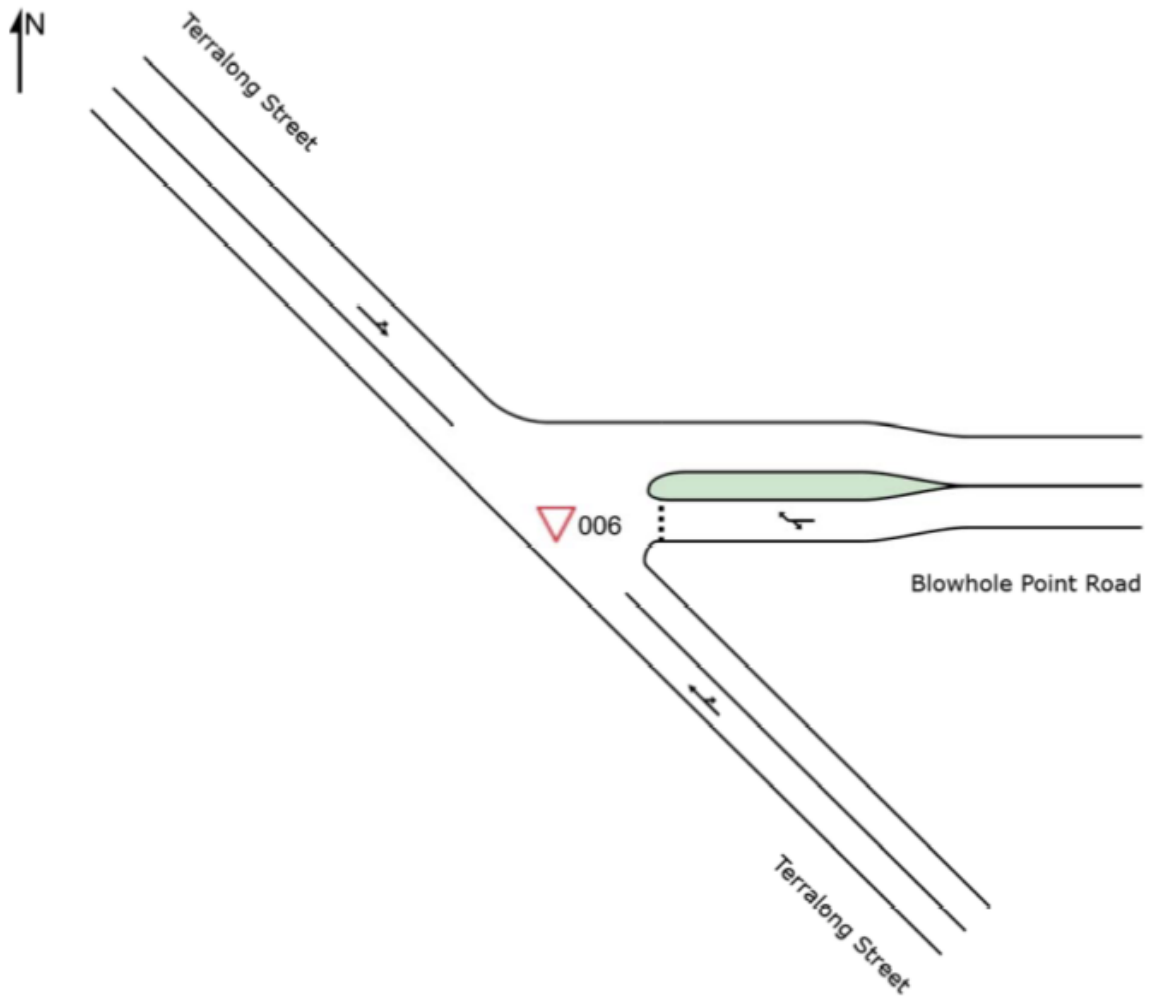
SITE LAYOUT

▽ Site: 006 [2021_AM_006_Do Nothing]

Terralong Street / Blowhole Point Road

Site Category: (None)

Giveaway / Yield (Two-Way)

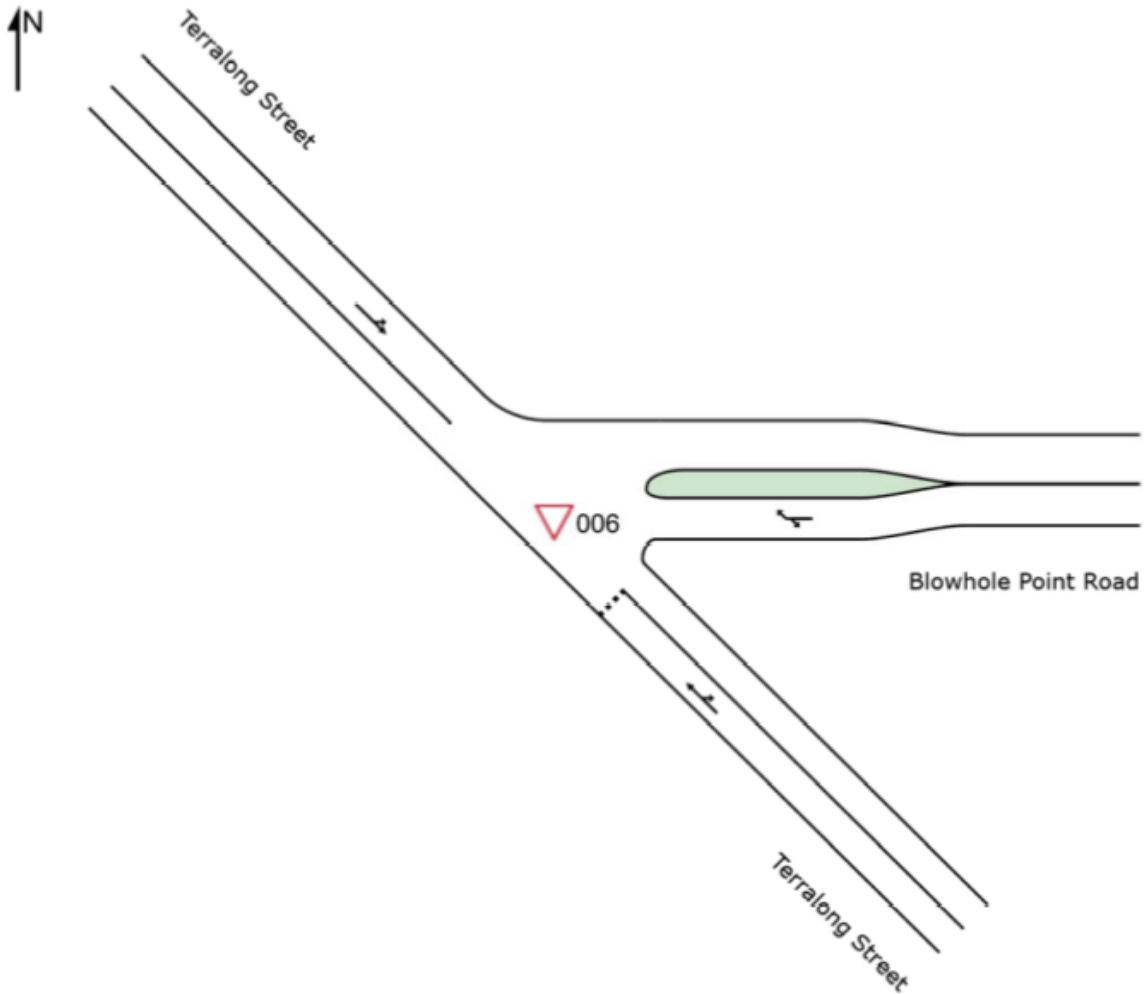


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SITE LAYOUT

▽ Site: 006 [2021_AM_006_Option 4]

Terralong Street / Blowhole Point Road
Site Category: (None)
Giveaway / Yield (Two-Way)



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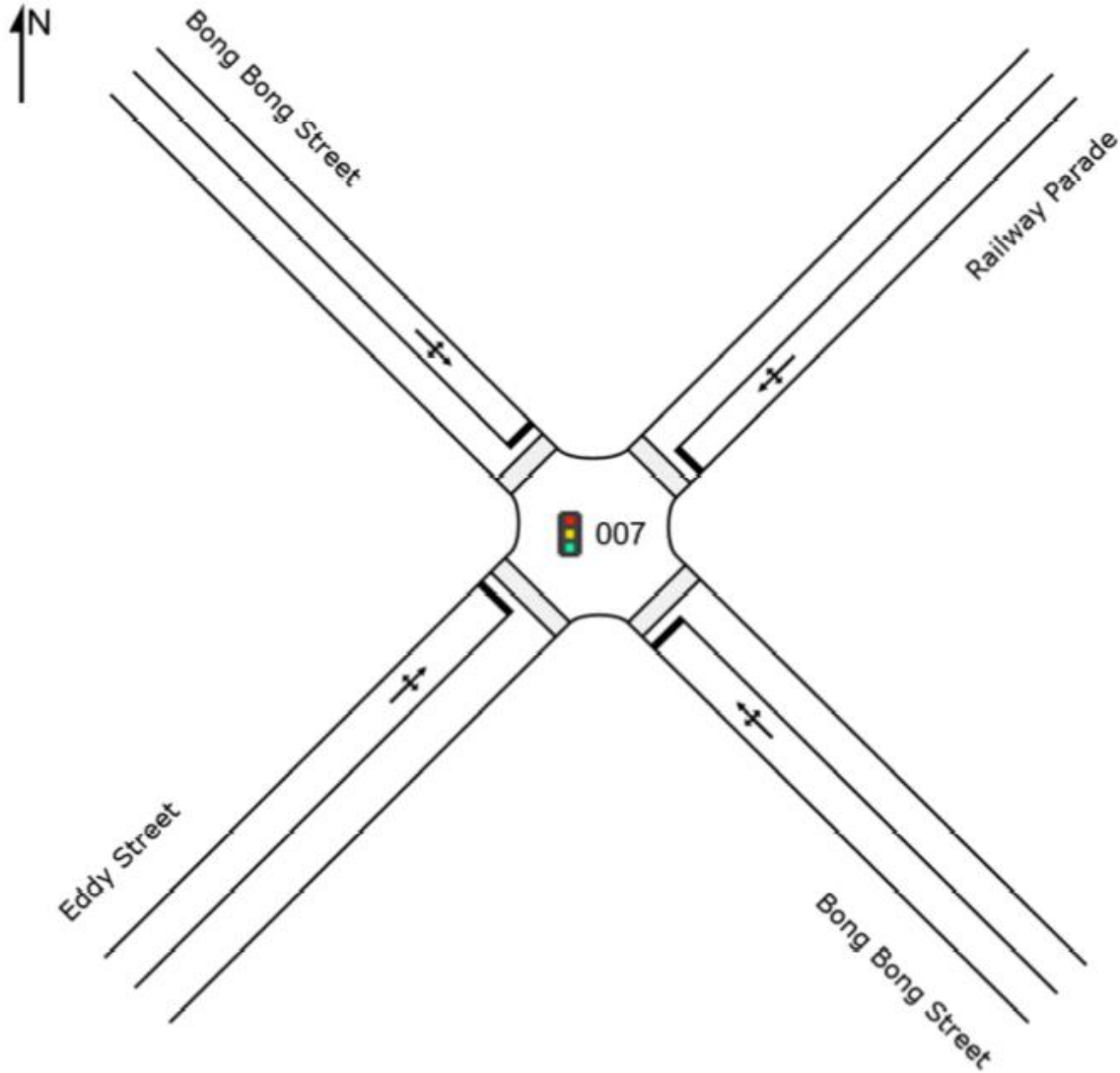
SITE LAYOUT

 Site: 007 [2021_AM_007_Combined]

Bong Bong Street / Railway Parade / Eddy Street

Site Category: (None)

Signals - Fixed Time Isolated



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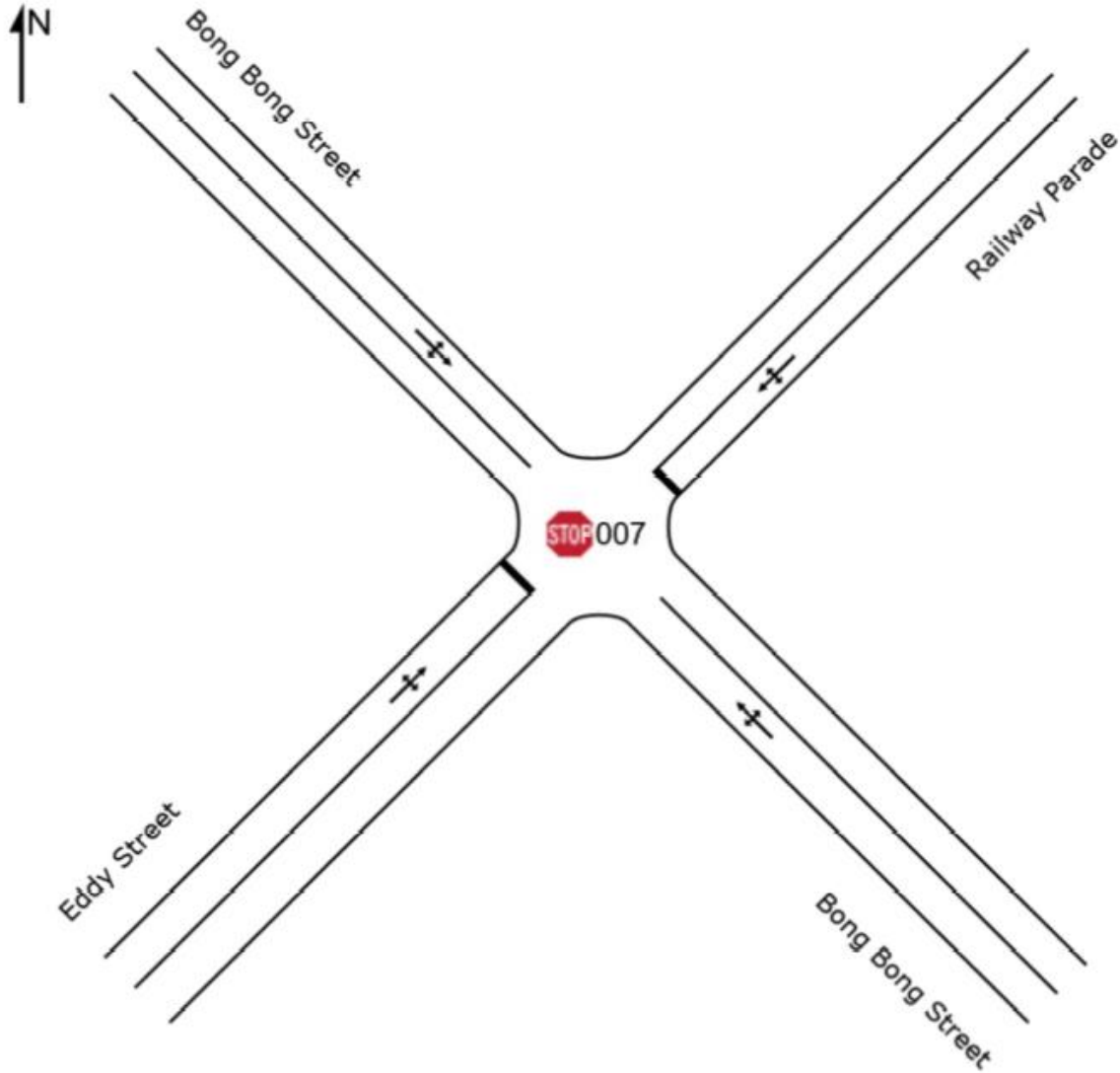
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Project: P:\P4582 Kiama Traffic and Parking Study\Technical Work\Models\SIDRA\P4582.003M 2021_Kiama Traffic and Parking Study Model - Town Centre.sip8

SITE LAYOUT

 Site: 007 [2021_AM_007_Do Nothing]

Bong Bong Street / Railway Parade / Eddy Street
Site Category: (None)
Stop (Two-Way)

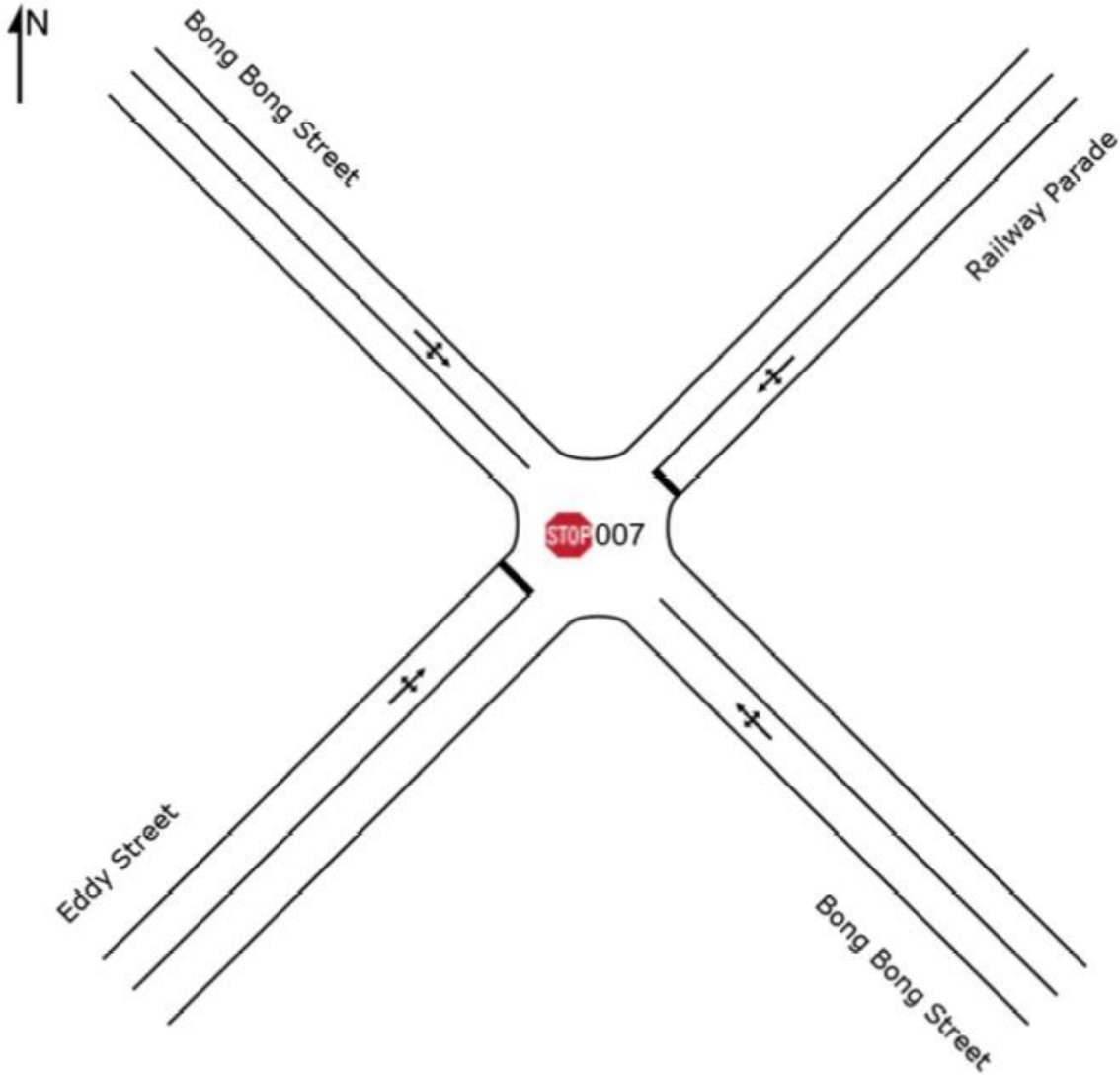


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SITE LAYOUT

 Site: 007 [2021_AM_007_Option 2]

Bong Bong Street / Railway Parade / Eddy Street
Site Category: (None)
Stop (Two-Way)



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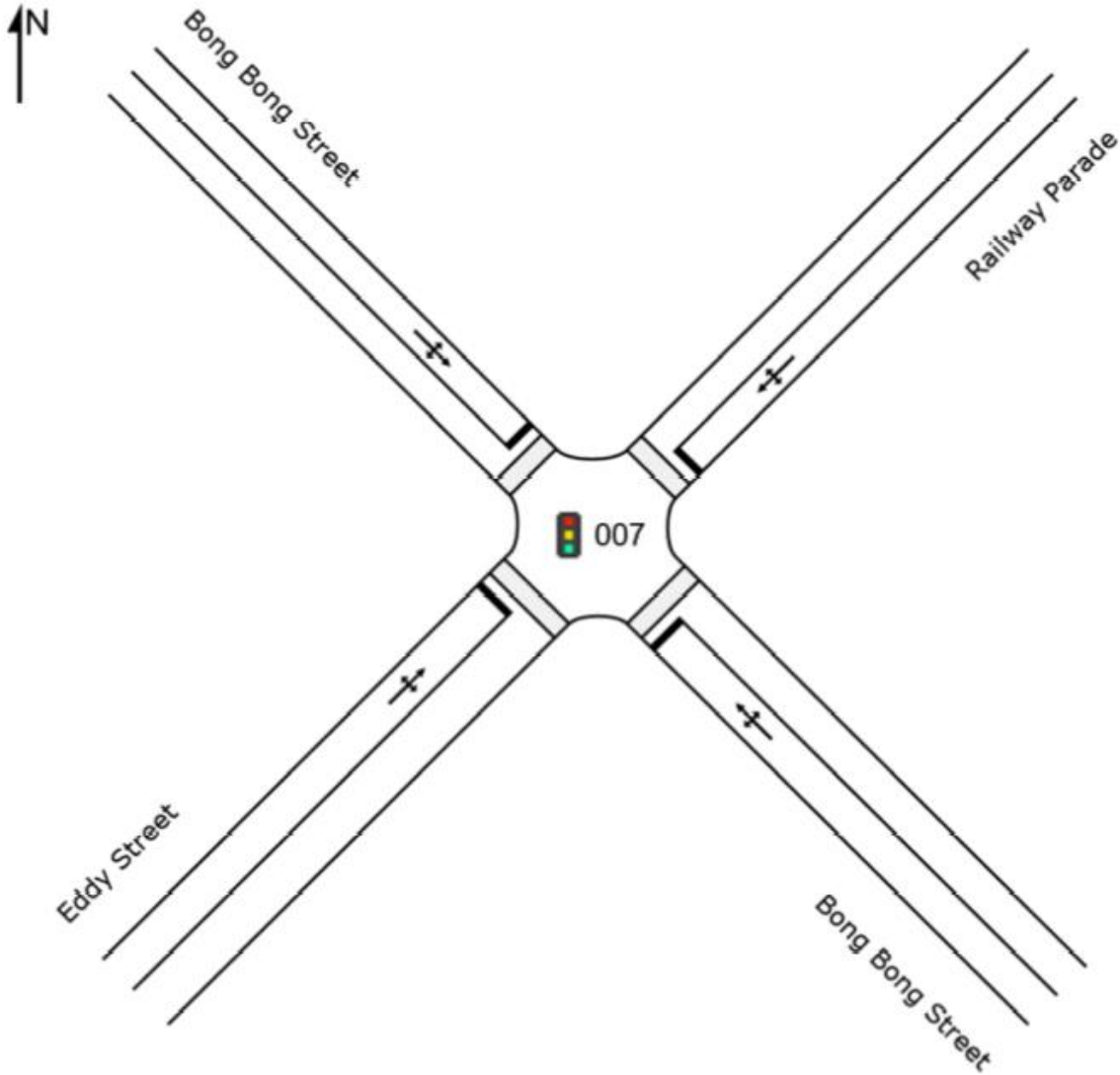
SITE LAYOUT

 Site: 007 [2021_AM_007_Option 4]

Bong Bong Street / Railway Parade / Eddy Street

Site Category: (None)

Signals - Fixed Time Isolated

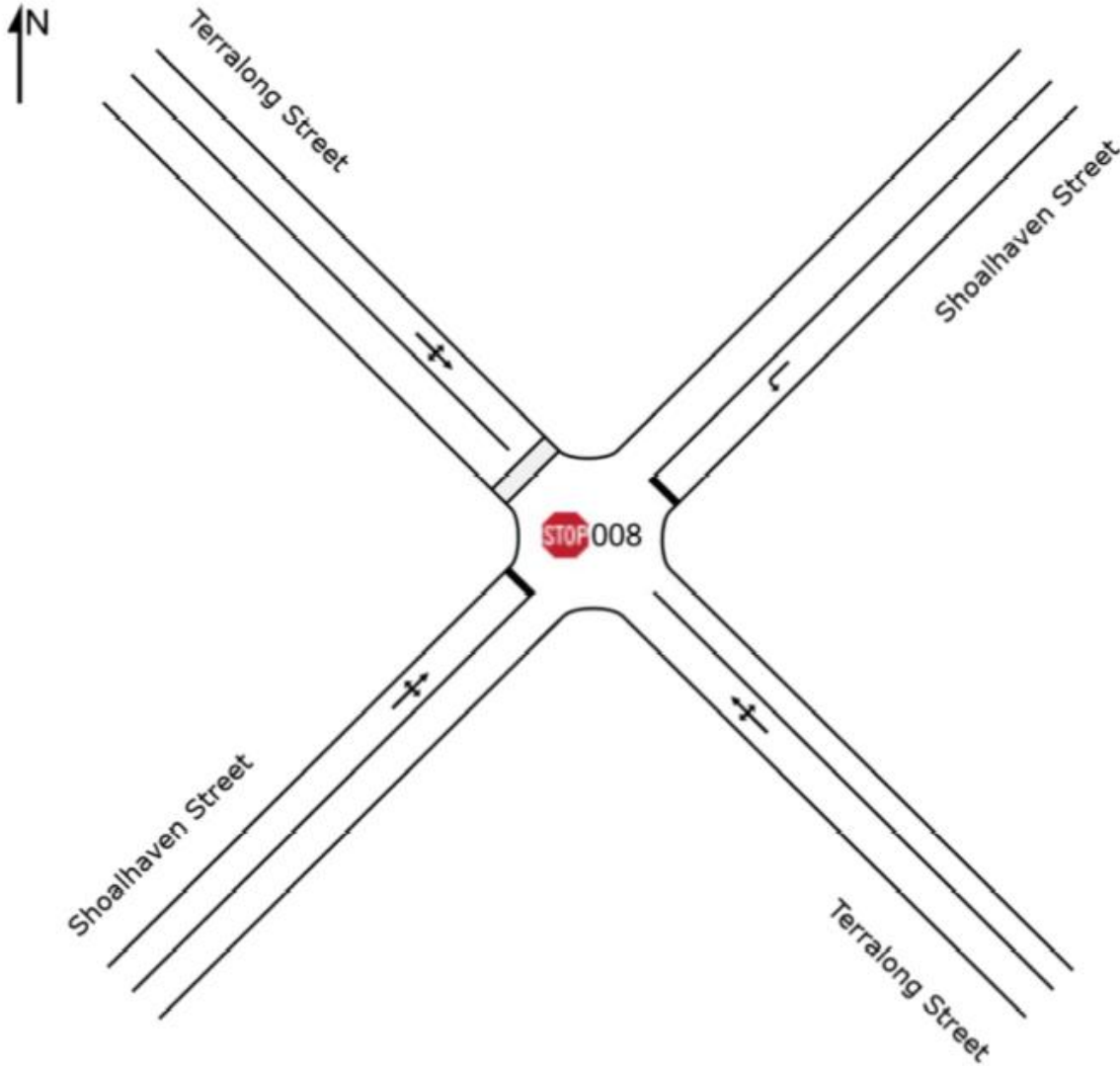


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SITE LAYOUT

 Site: 008 [2021_AM_008_Do Nothing]

Terralong Street / Shoalhaven Street
Site Category: (None)
Stop (Two-Way)

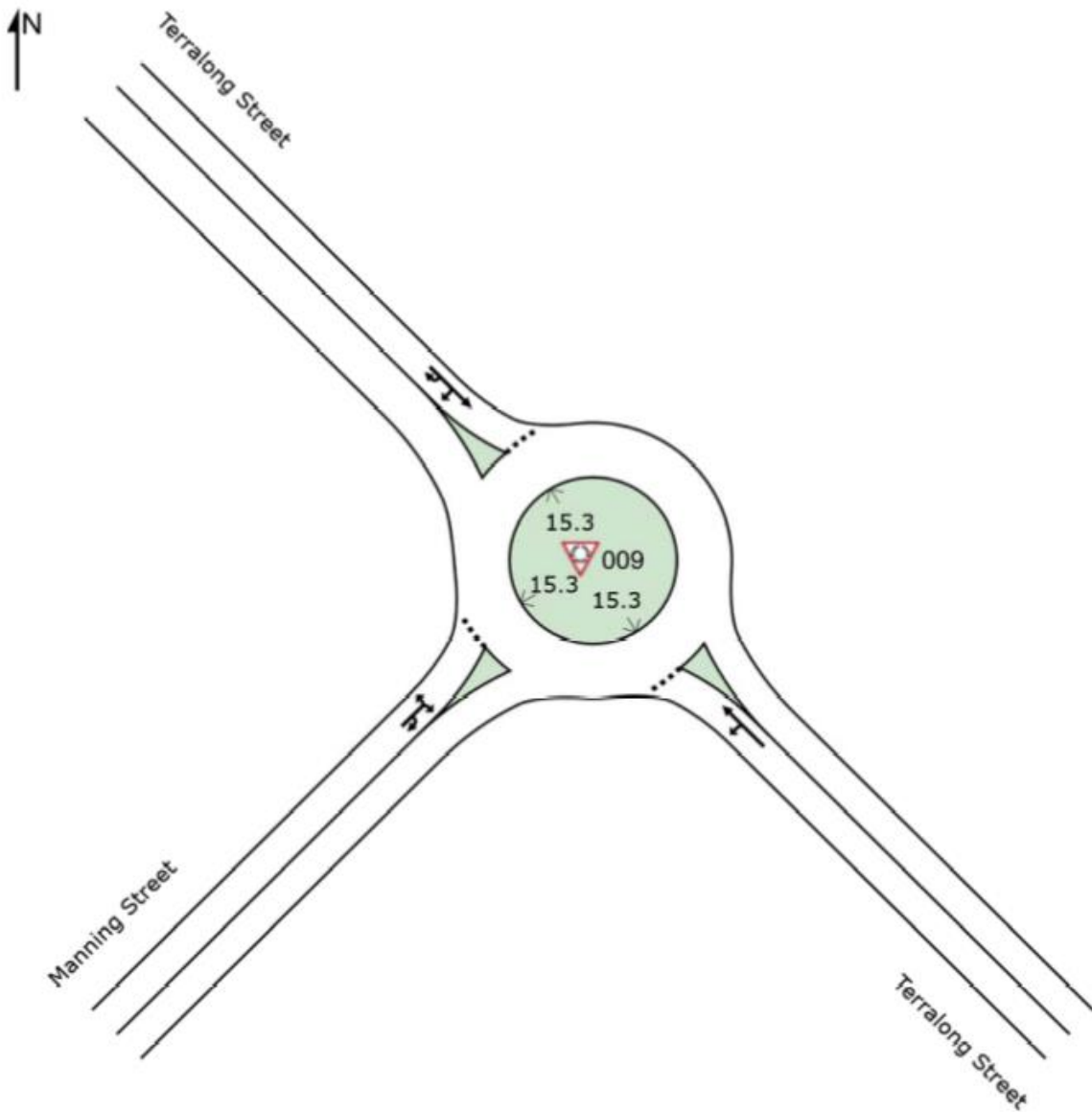


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SITE LAYOUT

Site: 009 [2021_AM_009_Do Nothing]

Terralong Street / Manning Street
Site Category: (None)
Roundabout



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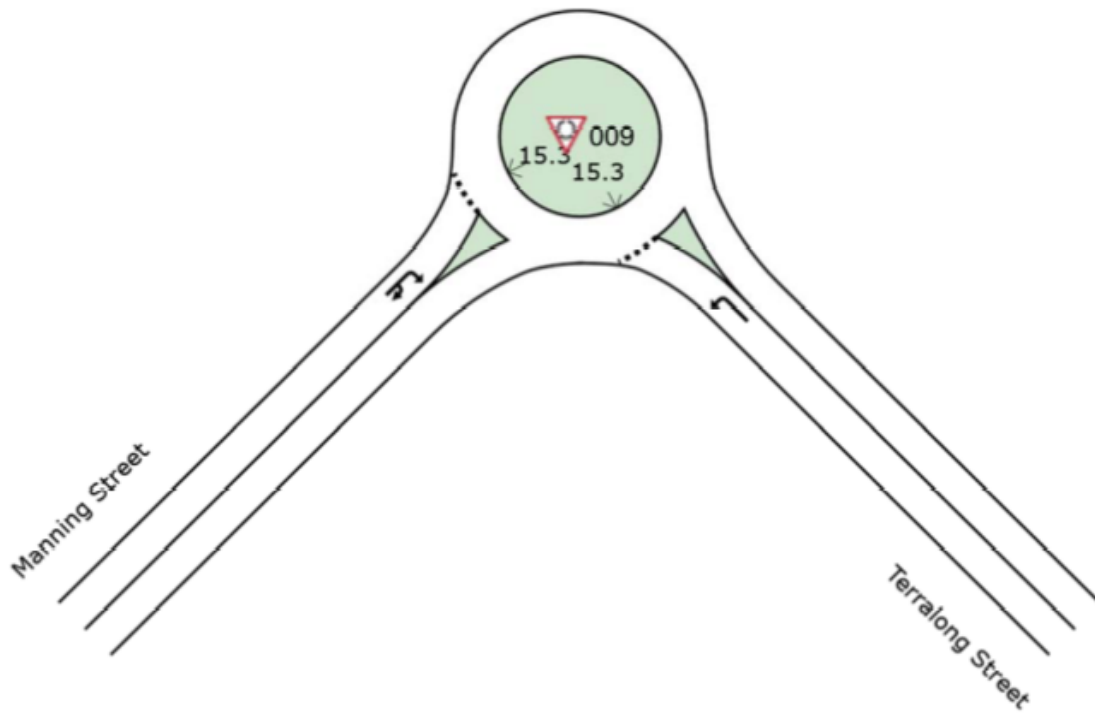
Item 6.1

Attachment 2

SITE LAYOUT

Site: 009 [2021_AM_009_Option 2]

Terralong Street / Manning Street
Site Category: (None)
Roundabout

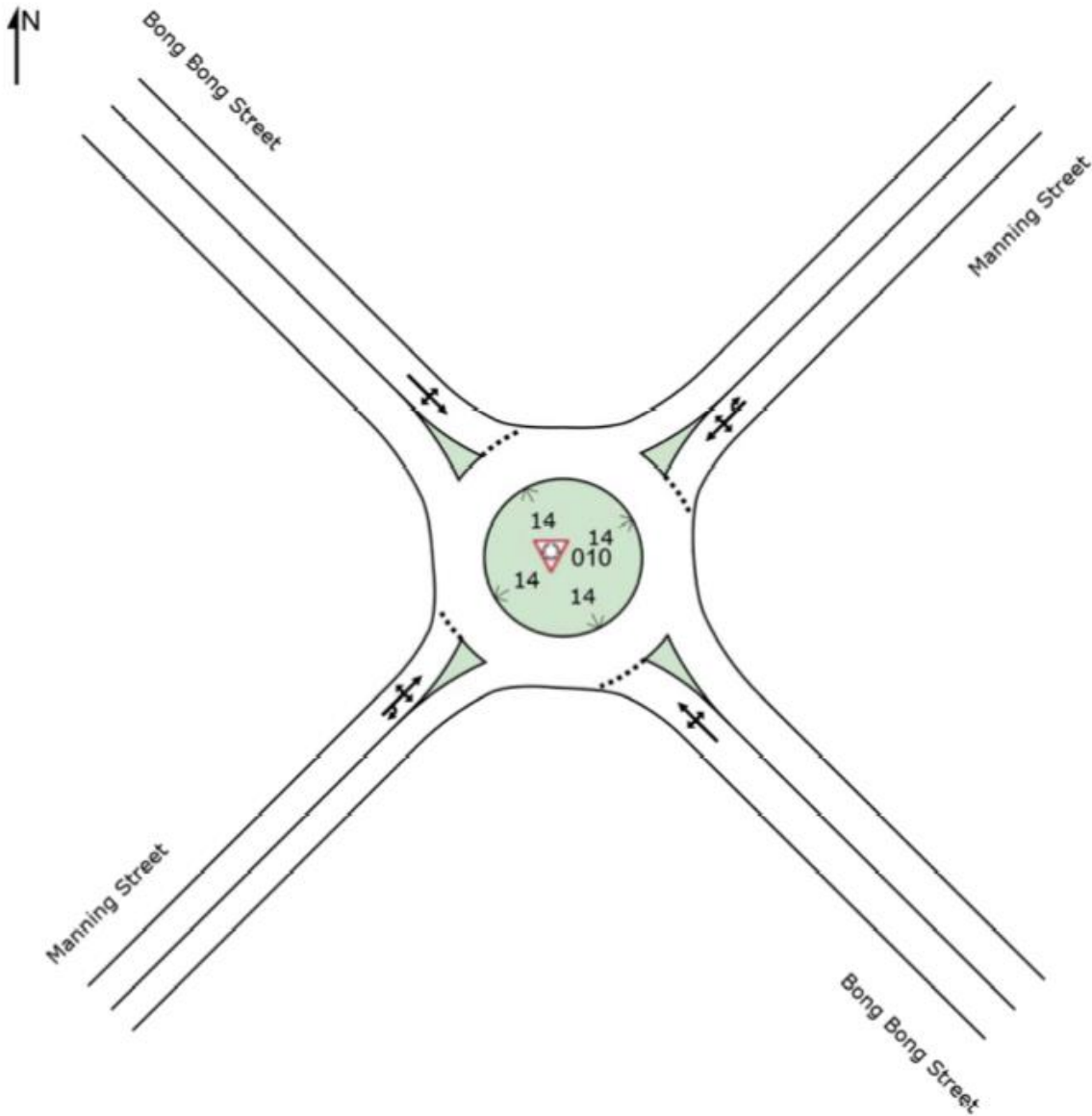


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SITE LAYOUT

Site: 010 [2021_AM_010_Do Nothing]

Bong Bong Street / Manning Street
Site Category: (None)
Roundabout

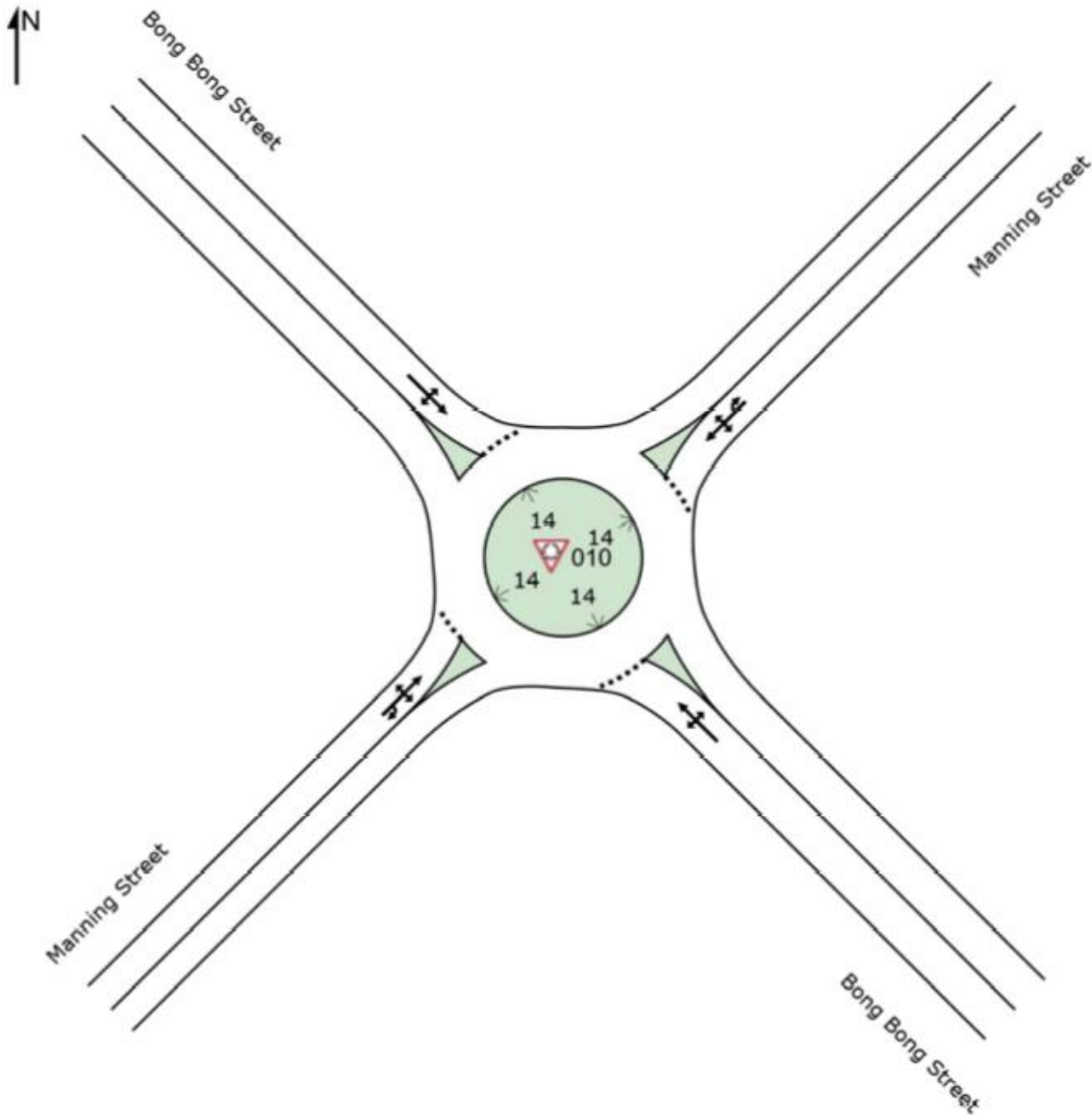


Project: P:\P4582 Kiama Traffic and Parking Study\Technical Work\Models\SIDRA\P4582.003M 2021_Kiama Traffic and Parking Study Model -
Town Centre.sip8

SITE LAYOUT

Site: 010 [2021_AM_010_Option 2]

Bong Bong Street / Manning Street
Site Category: (None)
Roundabout

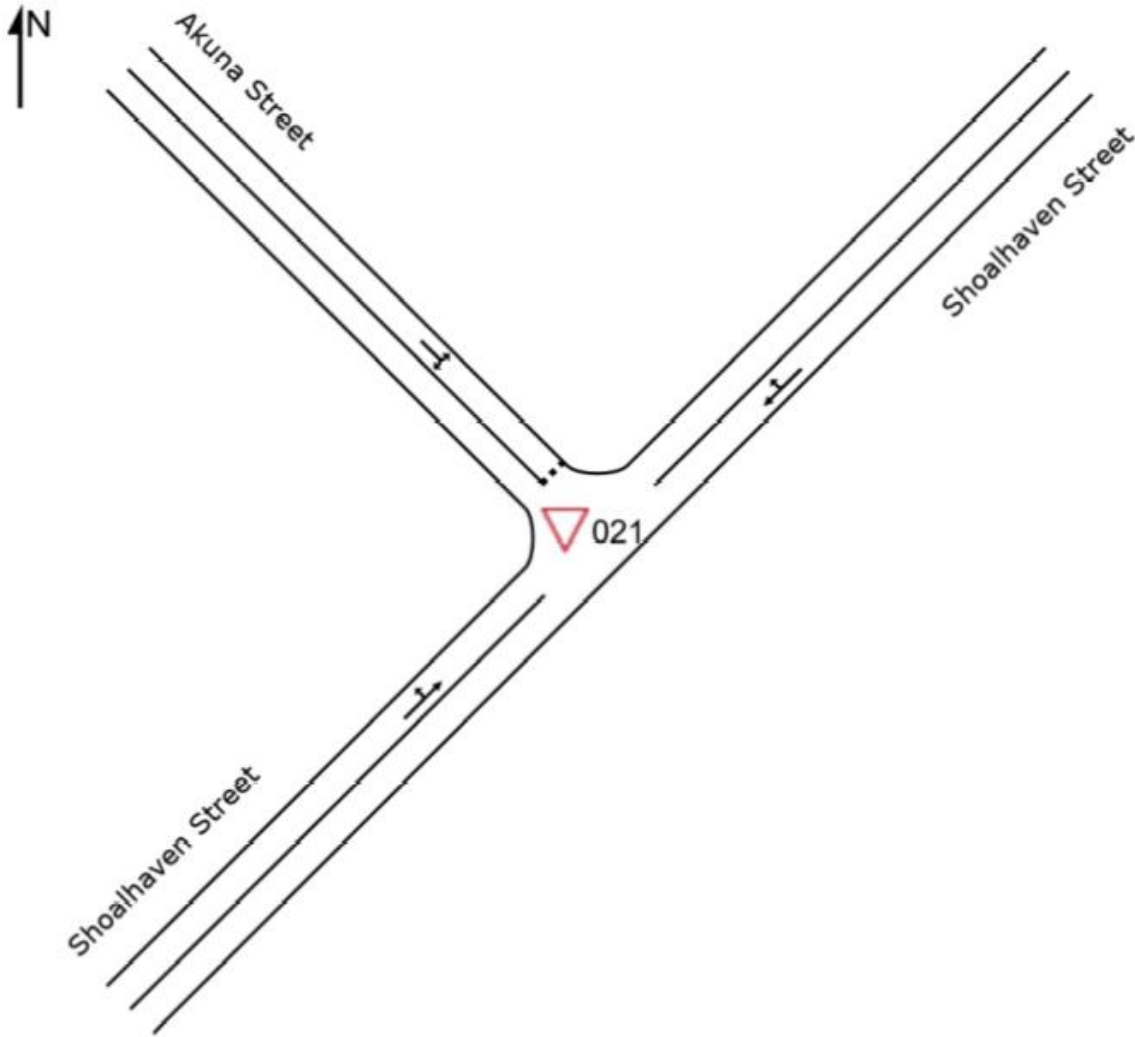


Project: P:\P4582 Kiama Traffic and Parking Study\Technical Work\Models\SIDRA\P4582.003M 2021_Kiama Traffic and Parking Study Model - Town Centre.sip8

SITE LAYOUT

▽ Site: 021 [2021_AM_021_Do Nothing]

Shoalhaven Street / Akuna Street
Site Category: (None)
Giveaway / Yield (Two-Way)

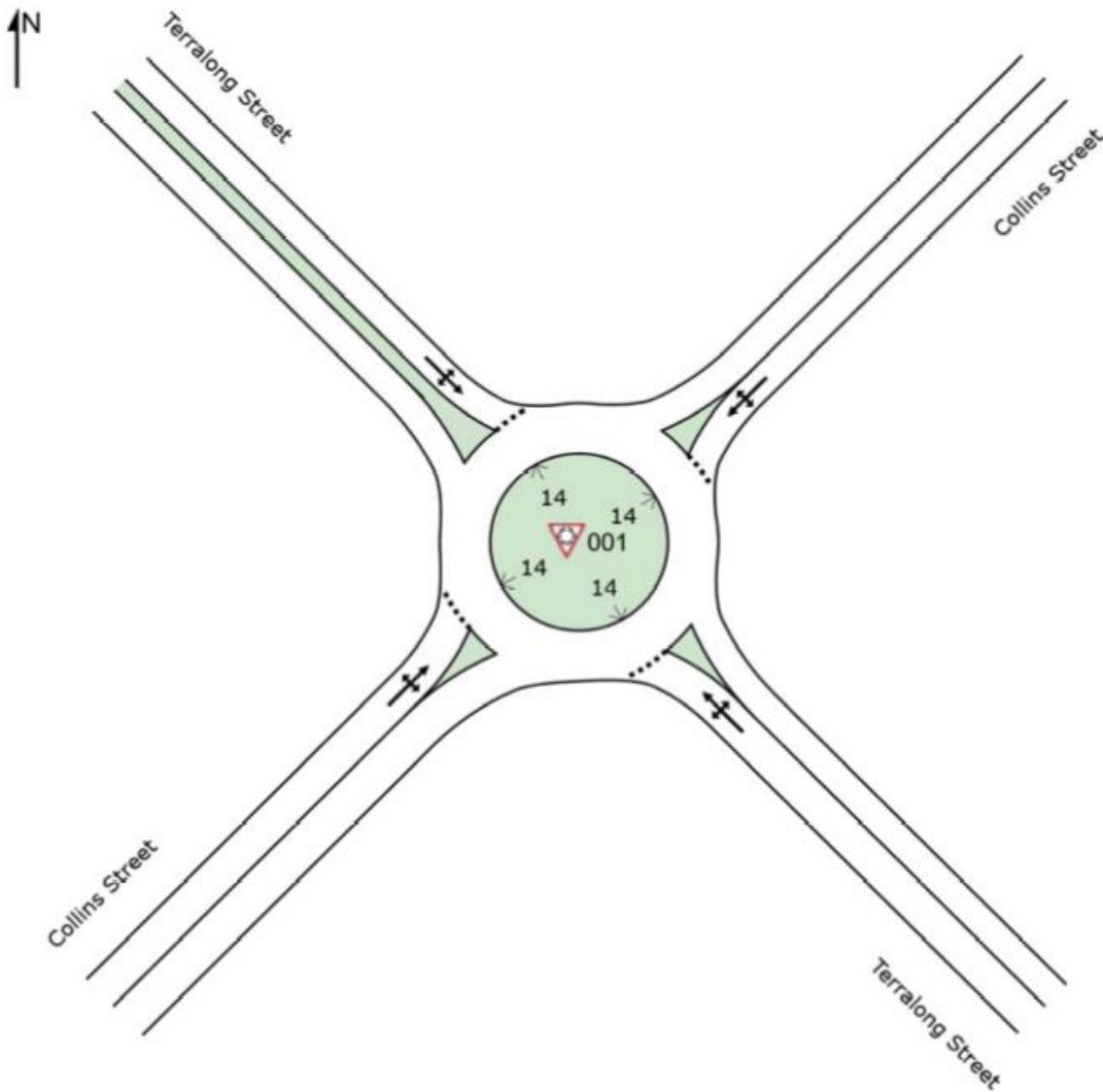


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SITE LAYOUT

Site: 001 [2021_PM_001_Combined]

Terralong Street / Collins Street
Site Category: (None)
Roundabout

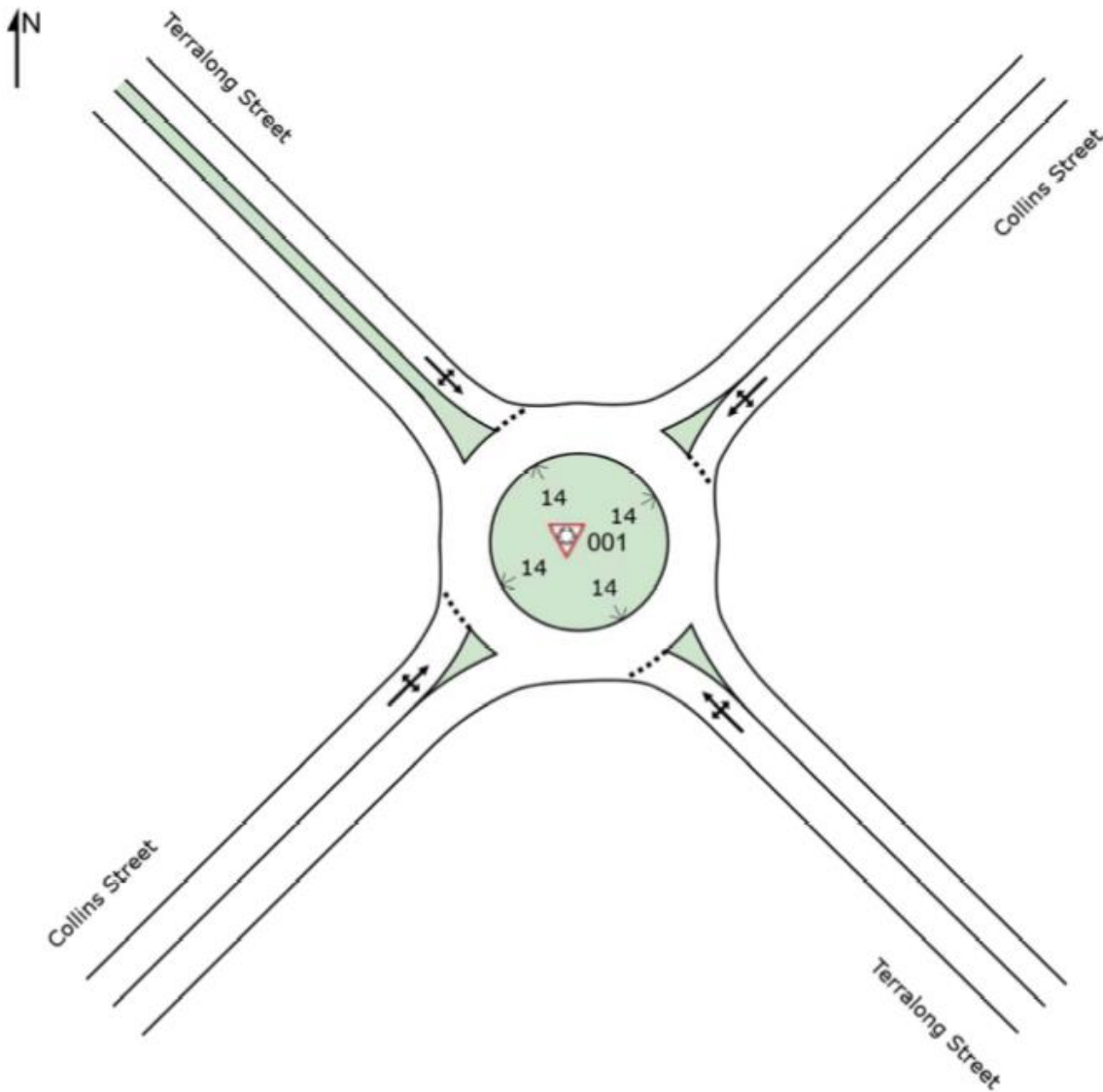


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SITE LAYOUT

Site: 001 [2021_PM_001_Option 4]

Terralong Street / Collins Street
Site Category: (None)
Roundabout

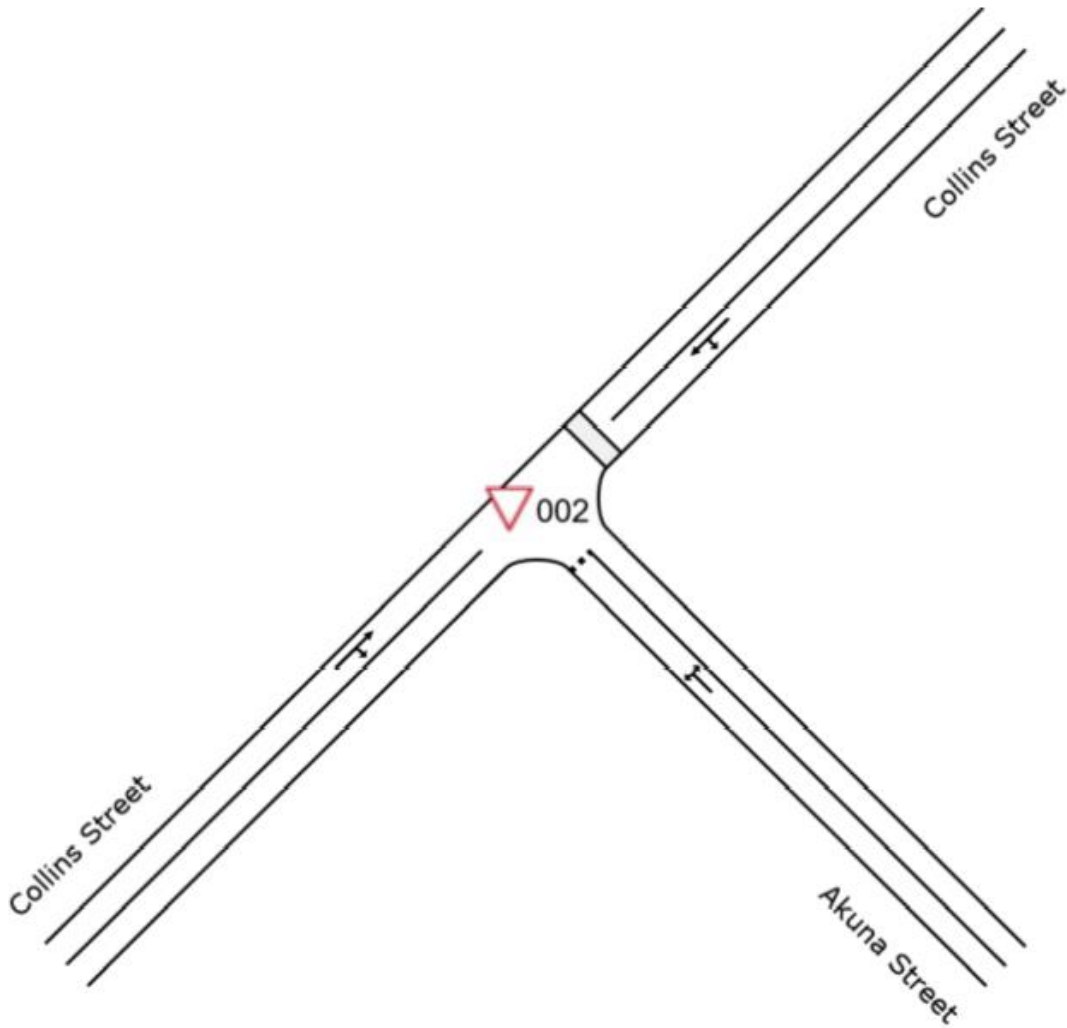


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SITE LAYOUT

▽ Site: 002 [2021_PM_002_Option 4]

Collins Street / Akuna Street
Site Category: (None)
Giveaway / Yield (Two-Way)

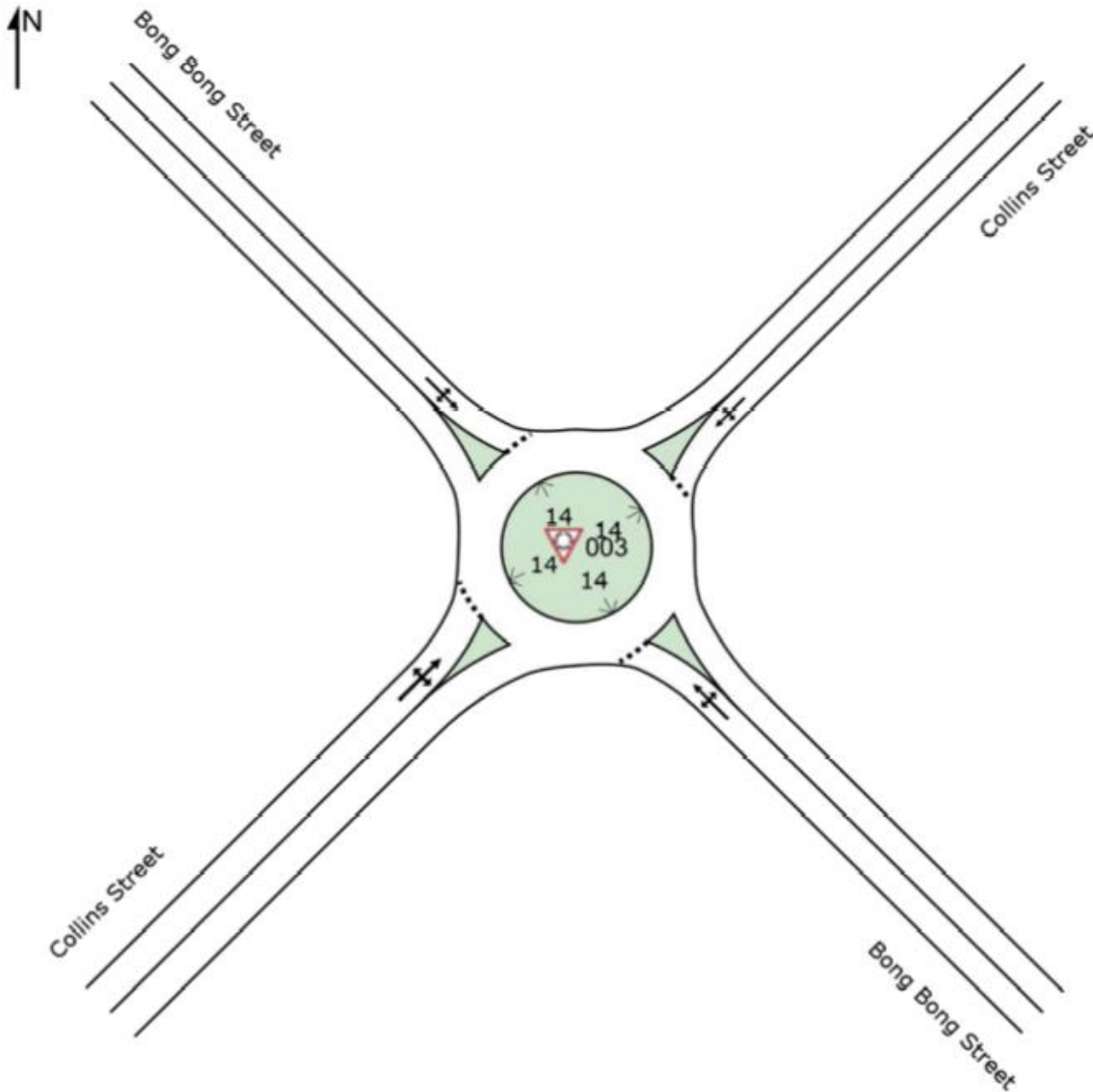


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SITE LAYOUT

Site: 003 [2021_PM_003_Option 4]

Collins Street / Bong Bong Street
Site Category: (None)
Roundabout

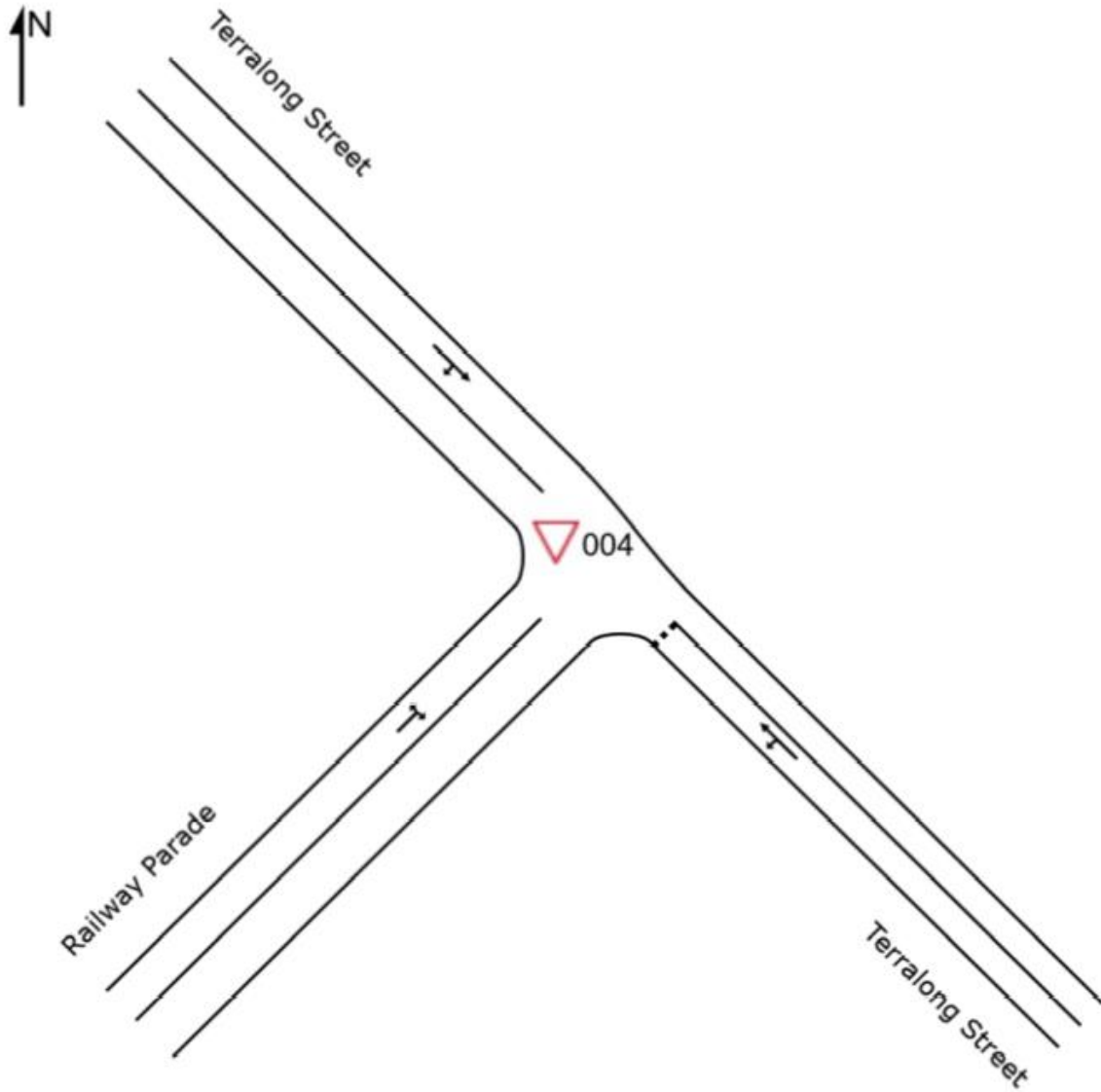


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SITE LAYOUT

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Terralong Street / Railway Parade
Site Category: (None)
Giveaway / Yield (Two-Way)

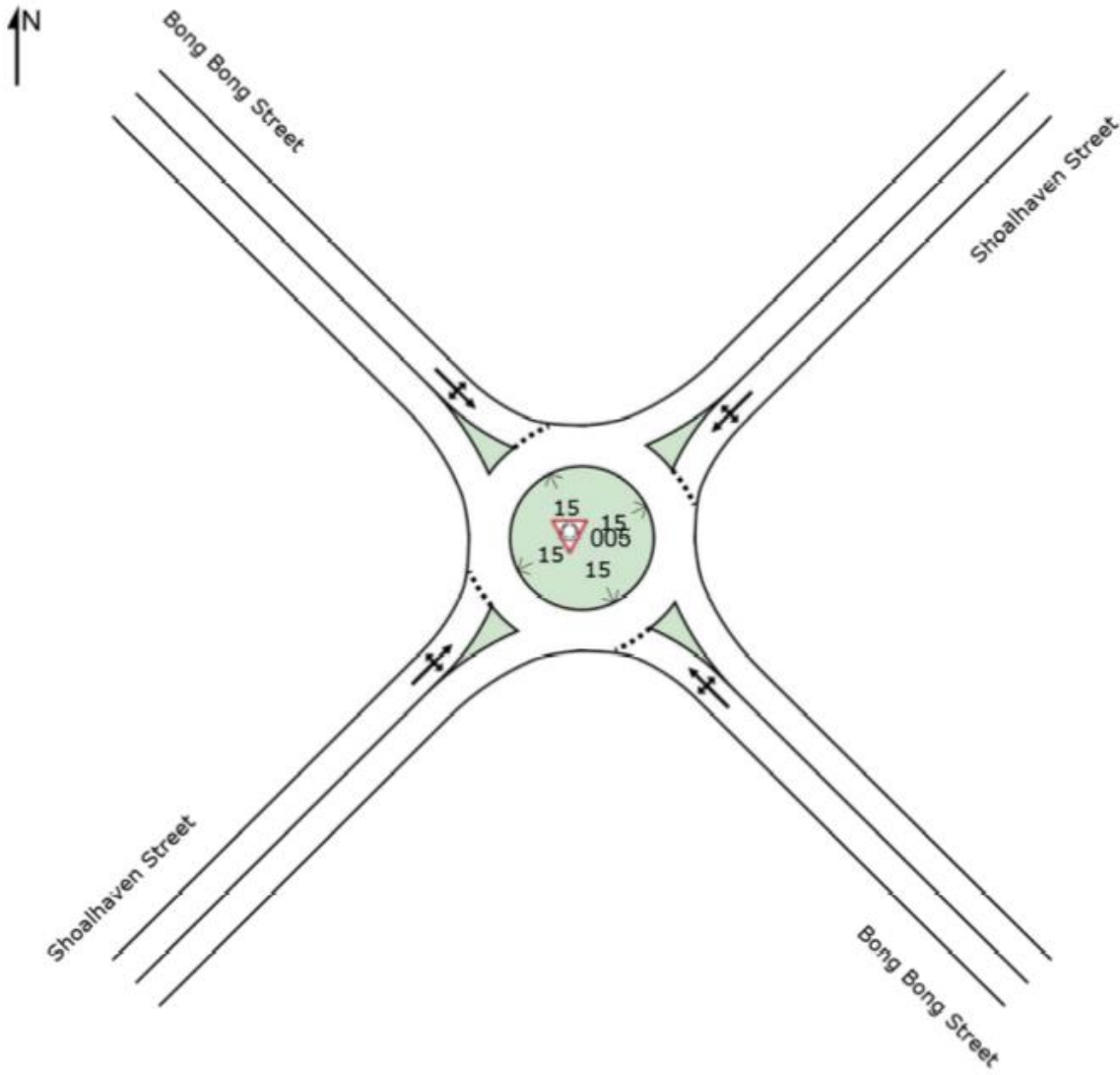


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SITE LAYOUT

Site: 005 [2021_PM_005_Option 4]

Bong Bong Street / Shoalhaven Street
Site Category: (None)
Roundabout

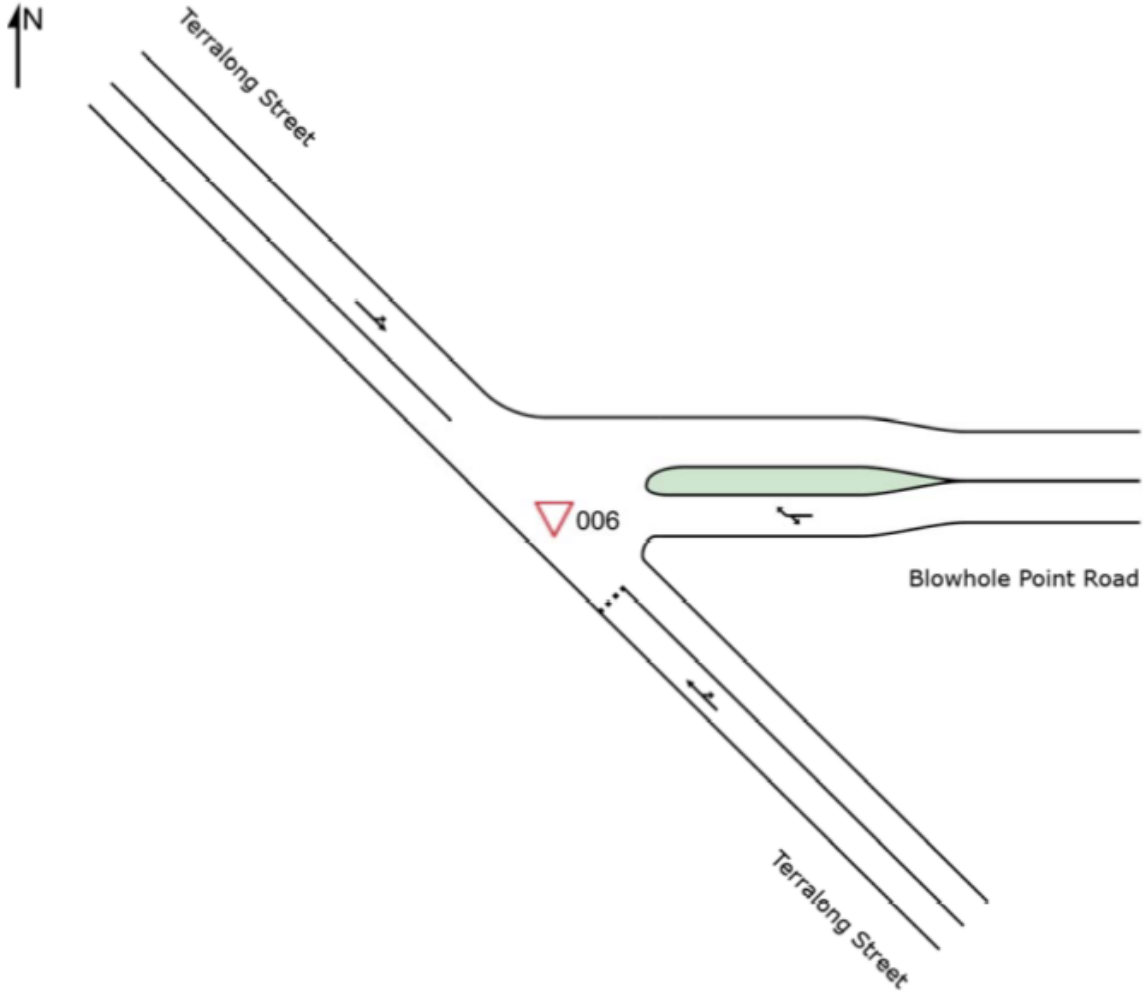


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SITE LAYOUT

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Terralong Street / Blowhole Point Road
Site Category: (None)
Giveaway / Yield (Two-Way)



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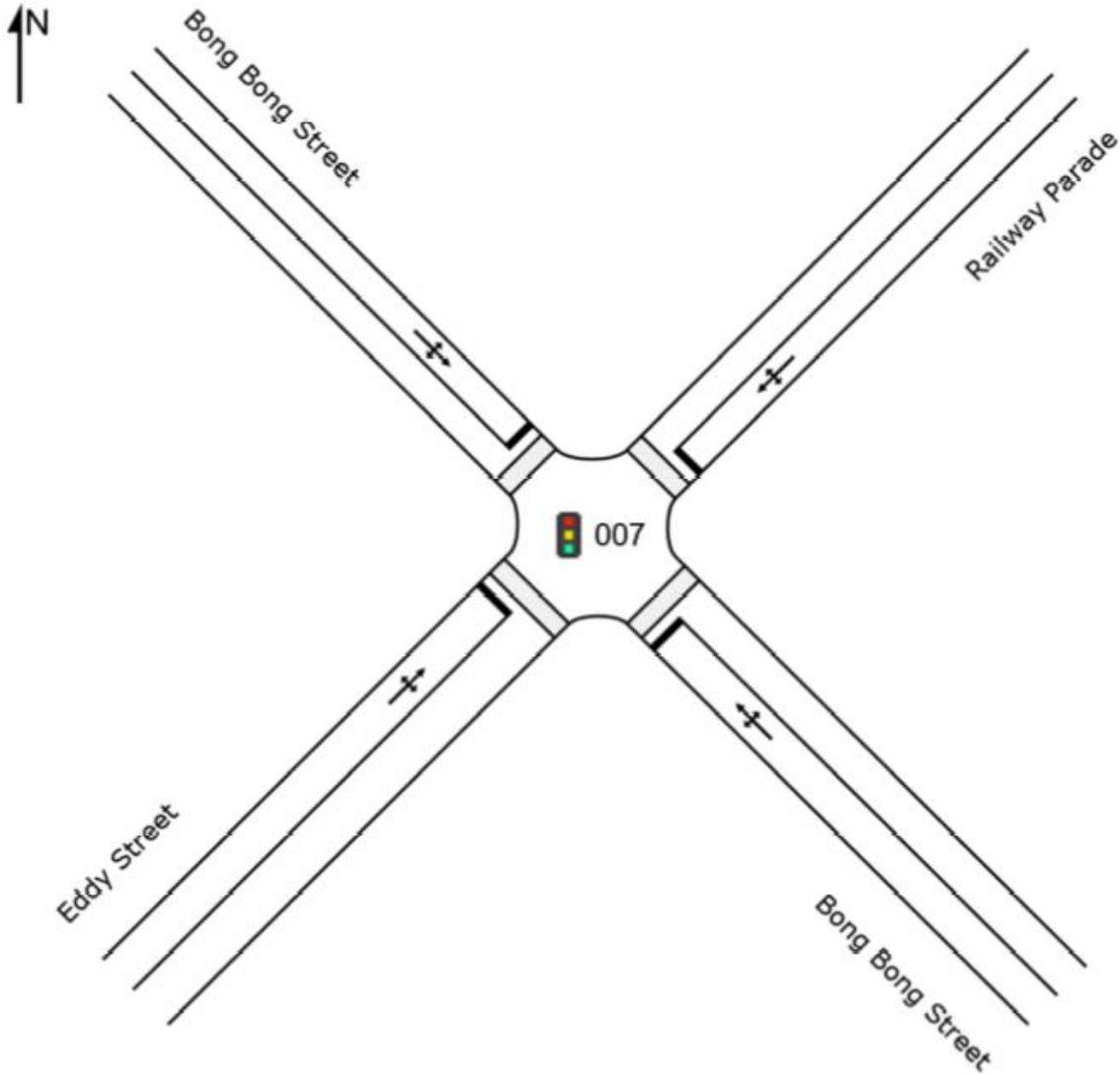
SITE LAYOUT

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Bong Bong Street / Railway Parade / Eddy Street

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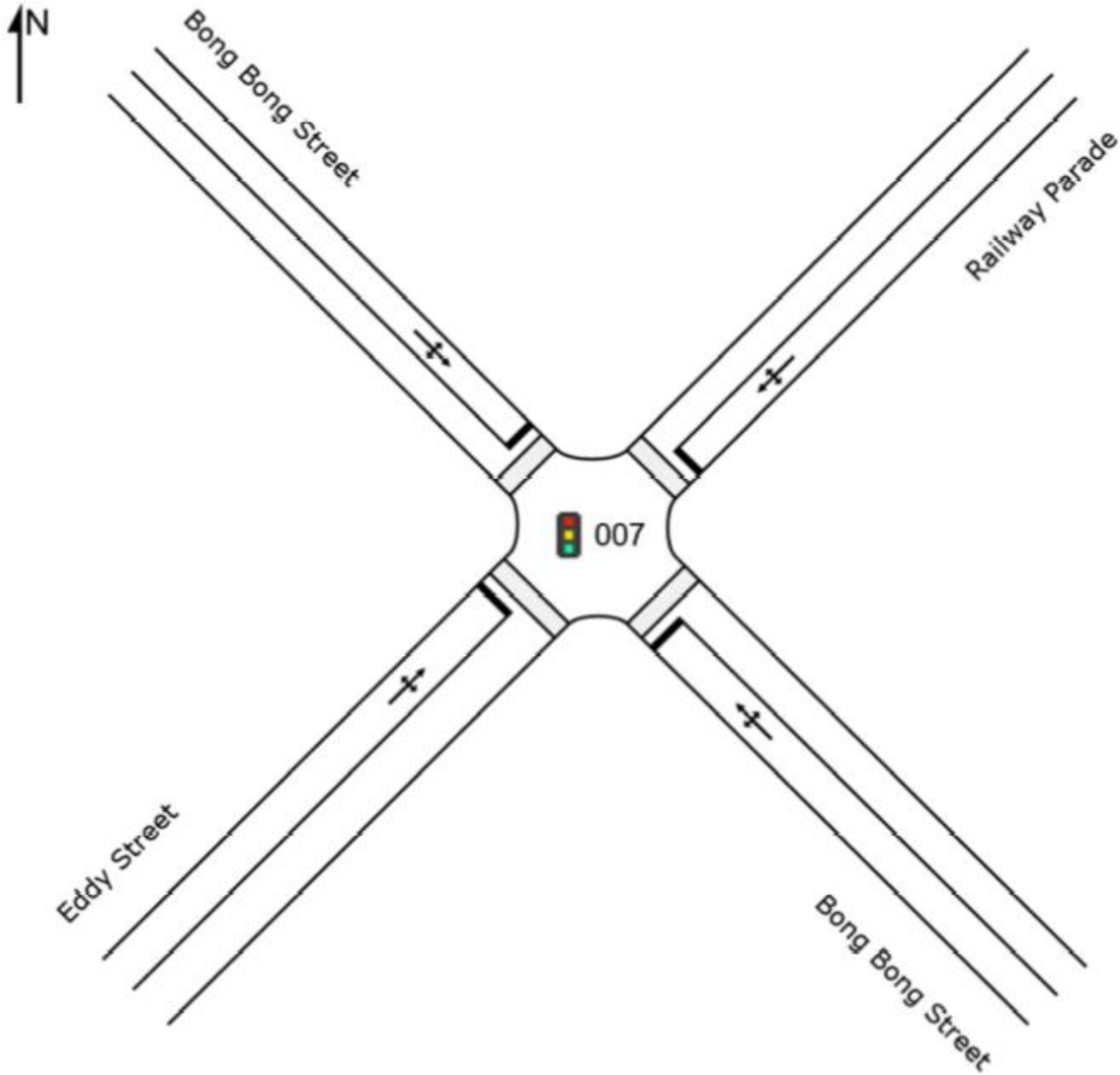
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Bong Bong Street / Railway Parade / Eddy Street

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Signals - Fixed Time Isolated

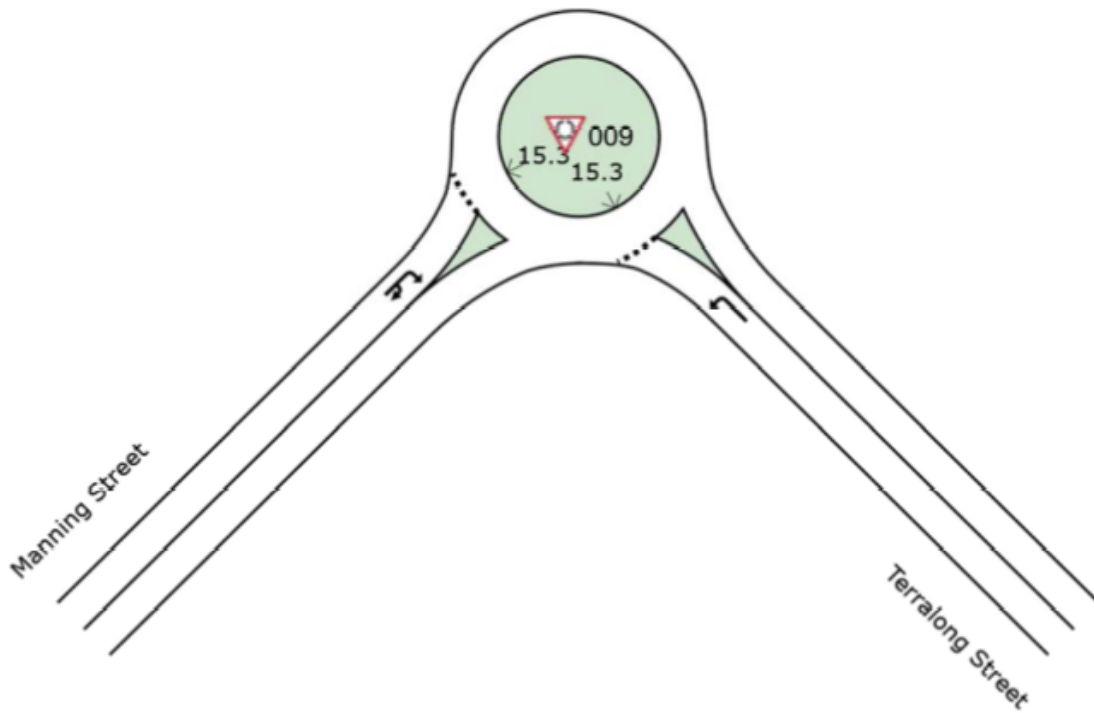


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SITE LAYOUT

 Site: 009 [2021_PM_009_Option 2]

Terralong Street / Manning Street
Site Category: (None)
Roundabout

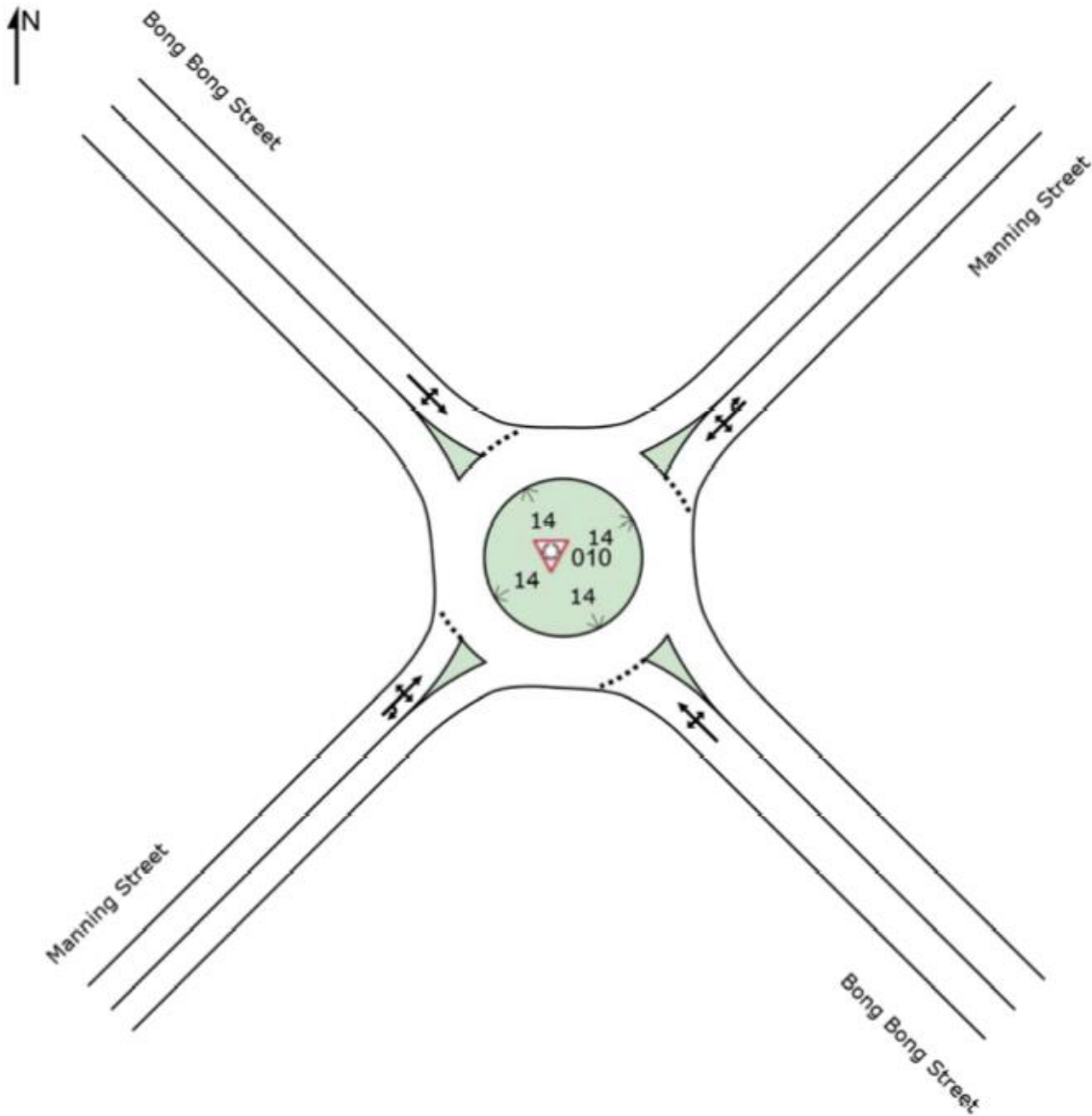


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SITE LAYOUT

Site: 010 [2021_PM_010_Option 2]

Bong Bong Street / Manning Street
Site Category: (None)
Roundabout

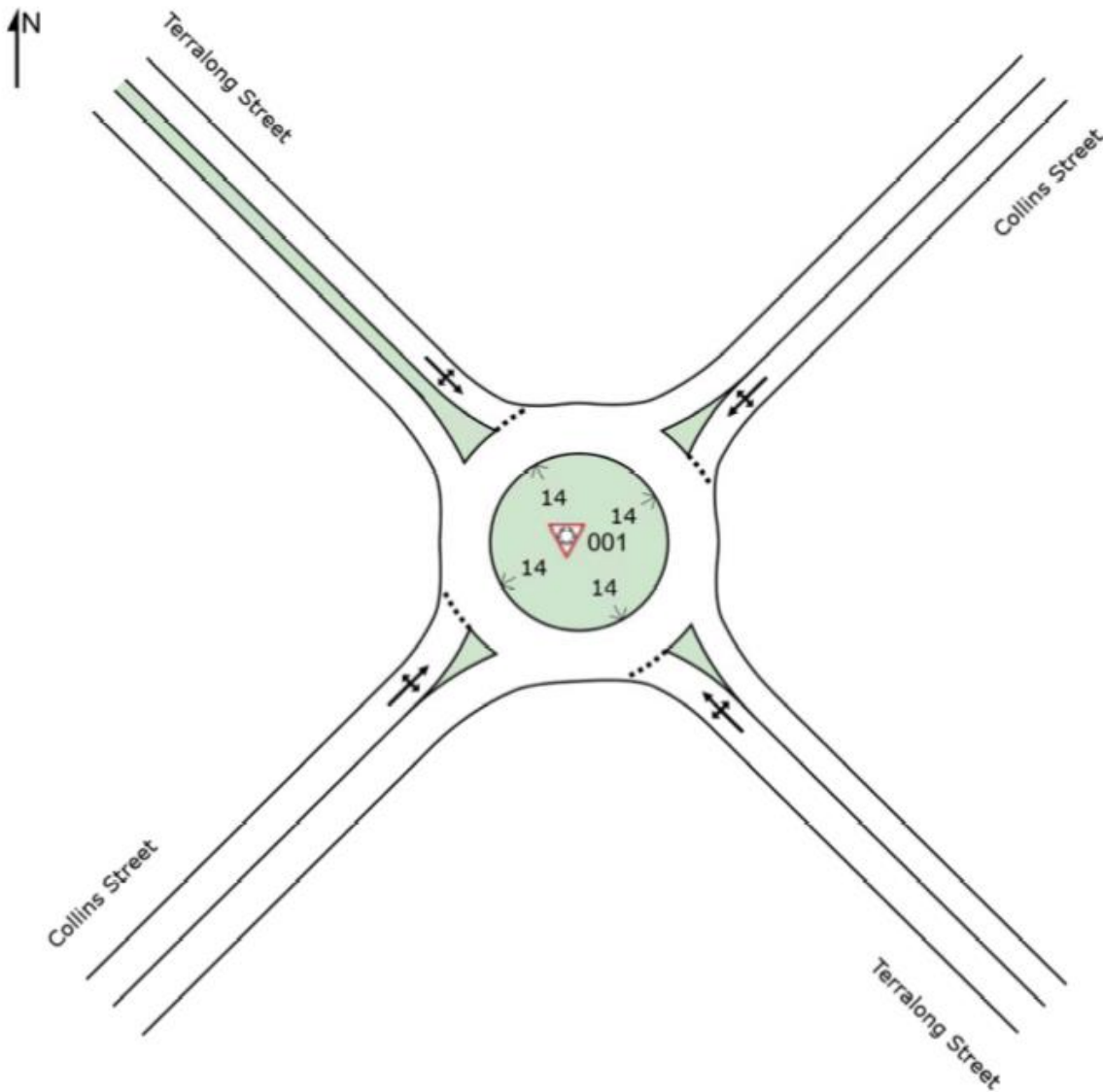


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SITE LAYOUT

Site: 001 [2021_WE_001_Combined]

Terralong Street / Collins Street
Site Category: (None)
Roundabout

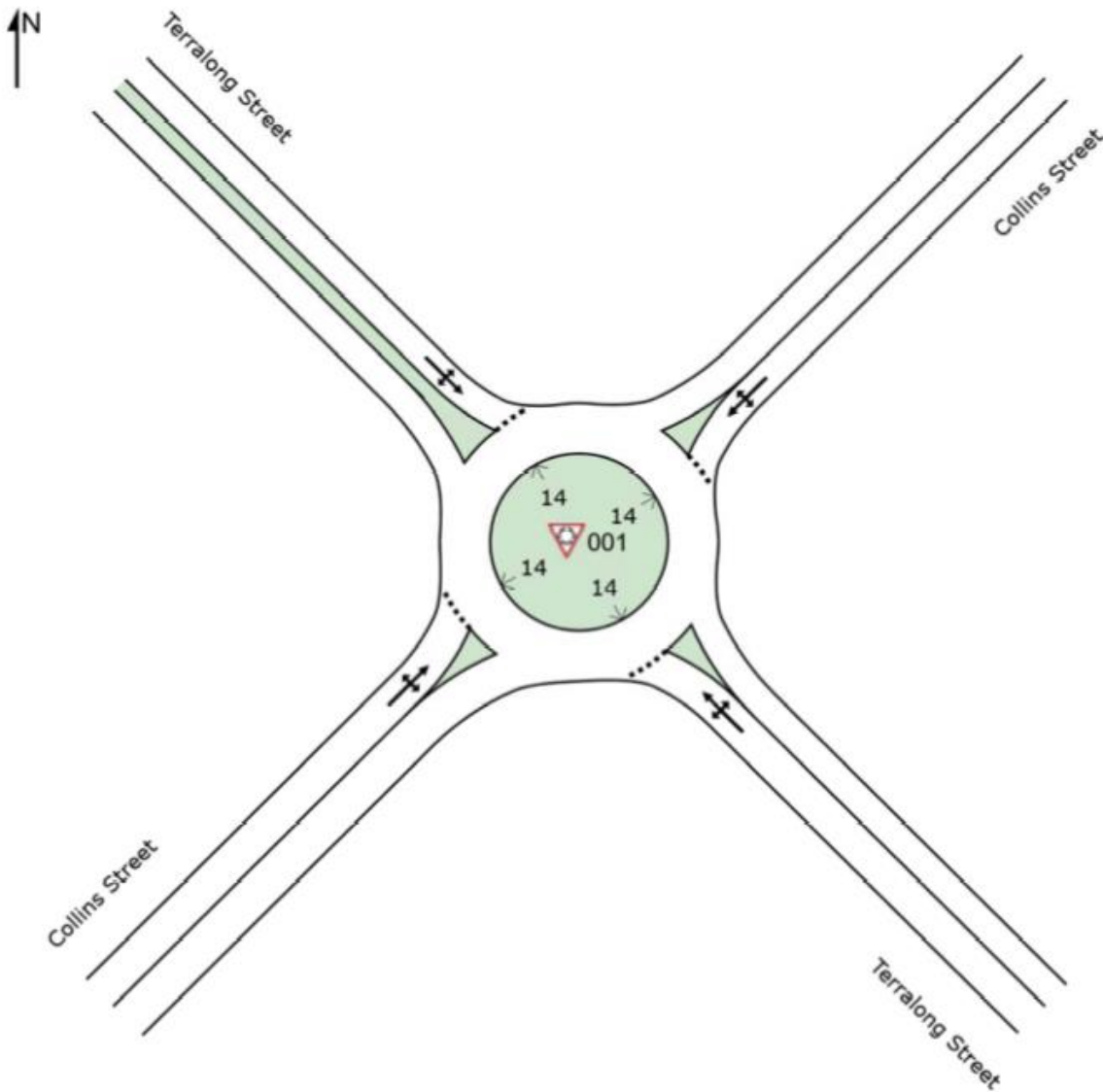


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SITE LAYOUT

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Roundabout

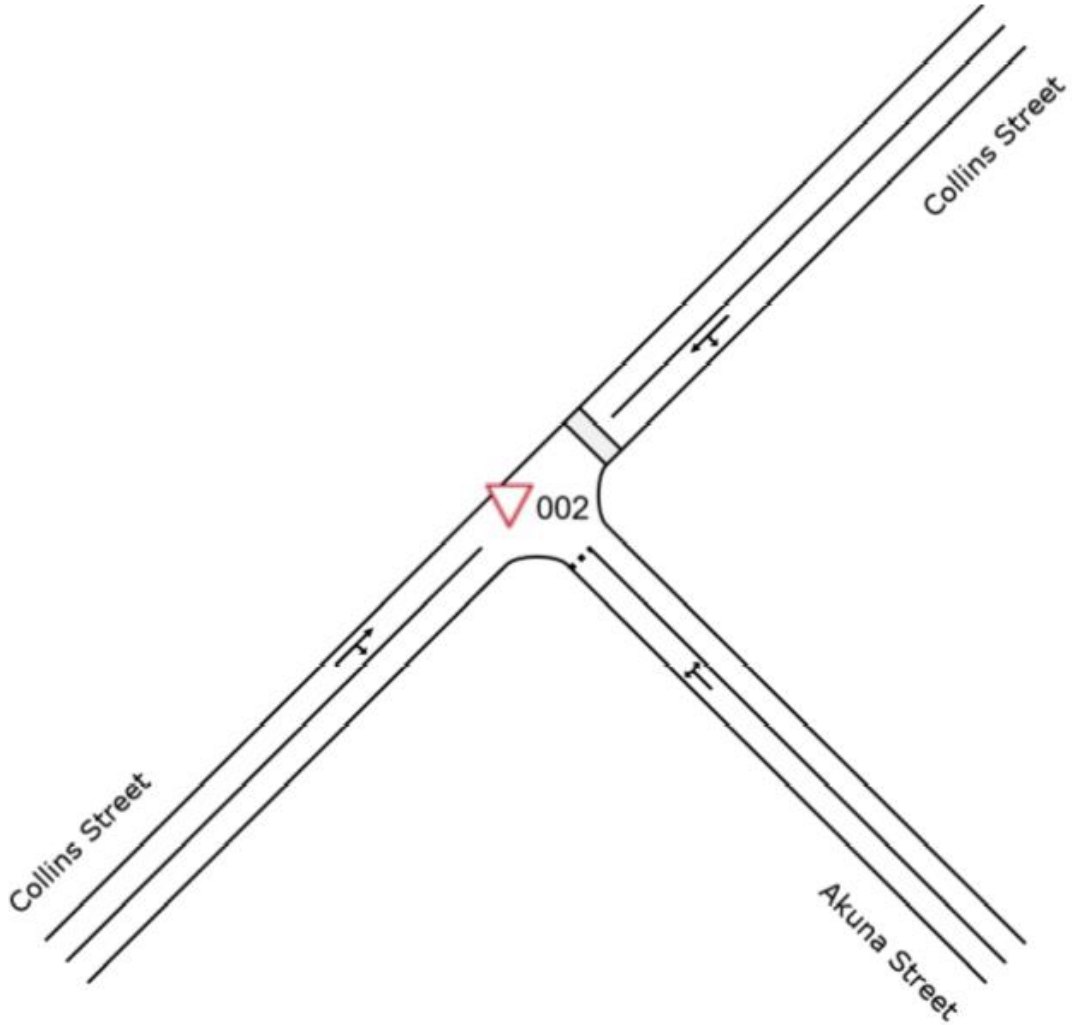


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SITE LAYOUT

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Collins Street / Akuna Street
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Giveaway / Yield (Two-Way)

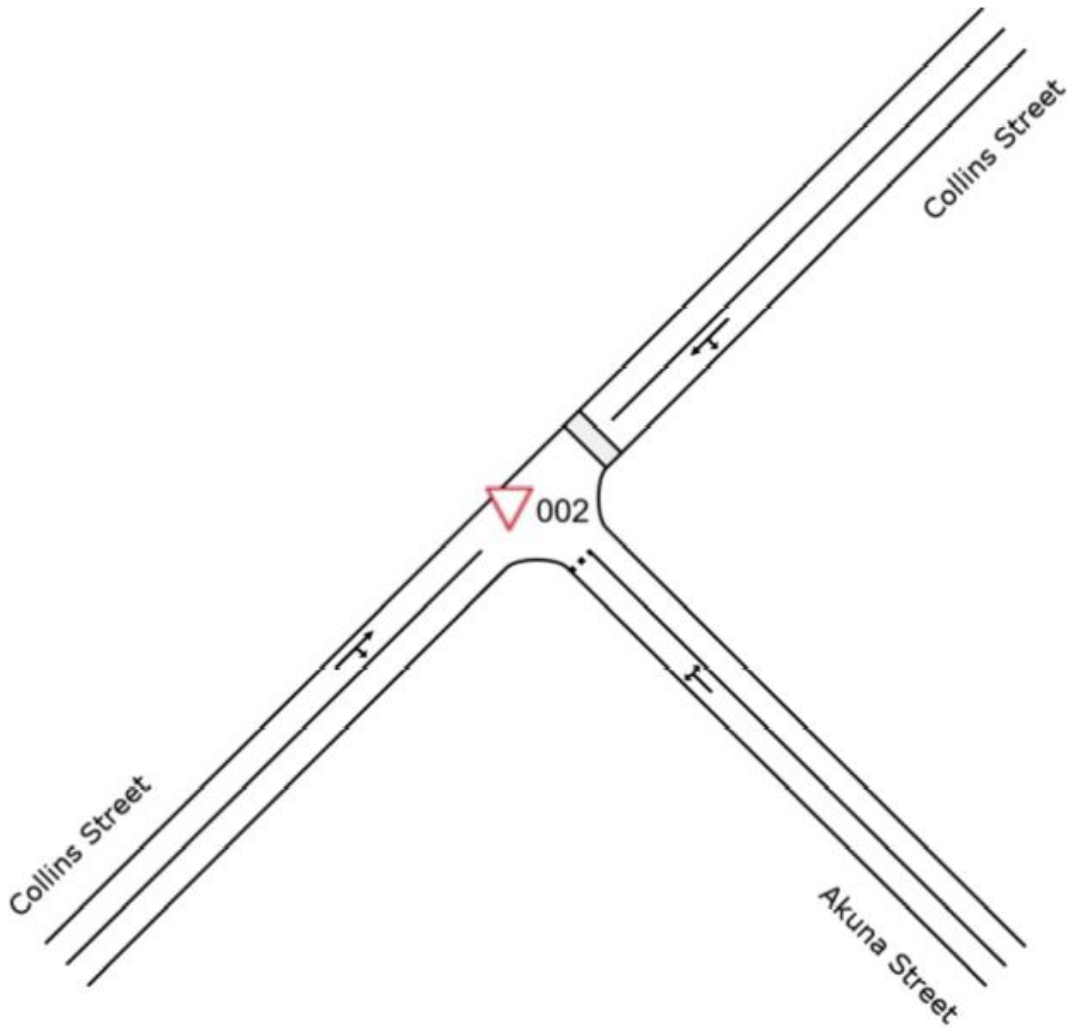


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SITE LAYOUT

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Collins Street / Akuna Street
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Giveaway / Yield (Two-Way)

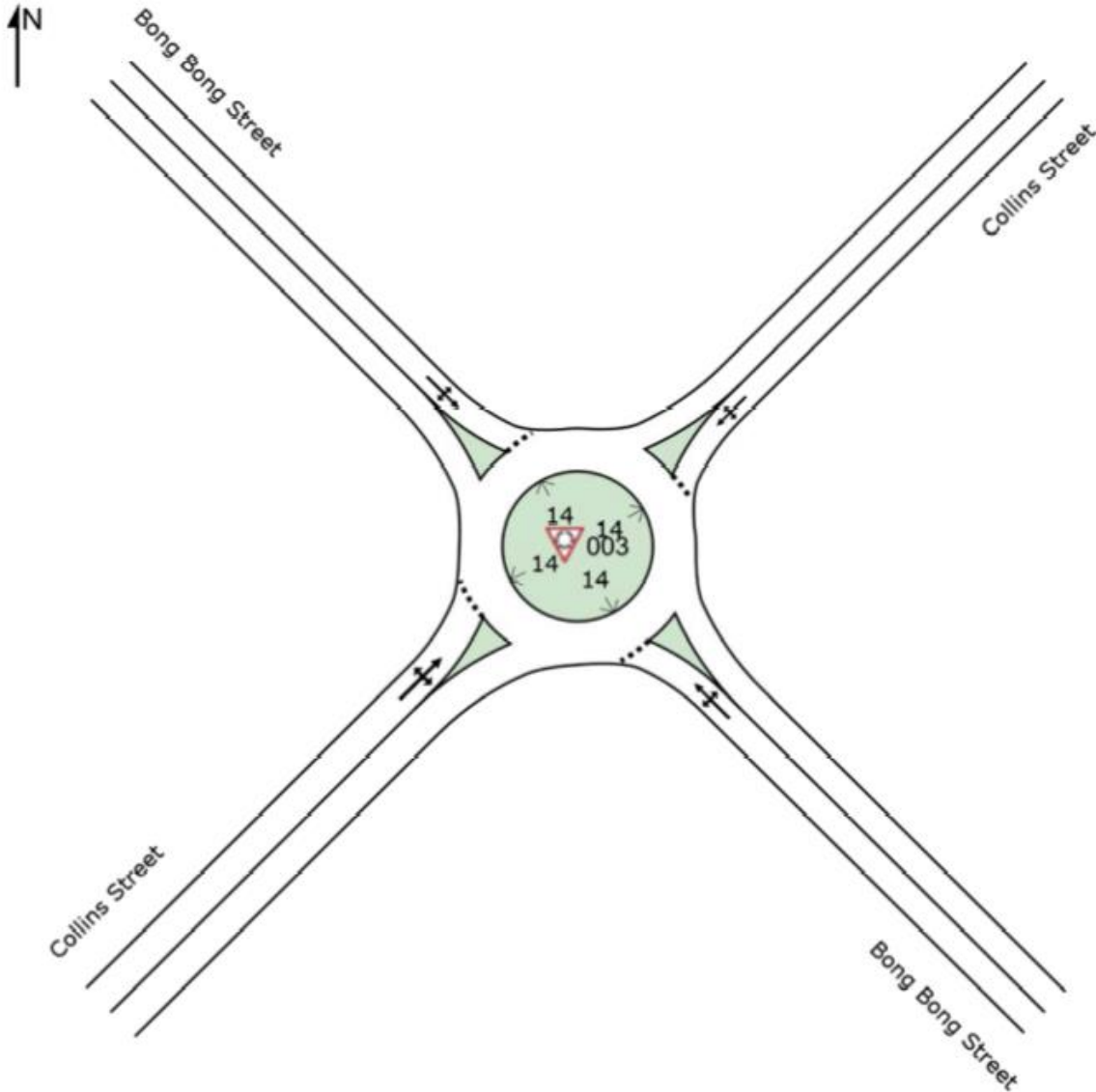


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SITE LAYOUT

Site: 003 [2021_WE_003_Combined]

Collins Street / Bong Bong Street
Site Category: (None)
Roundabout

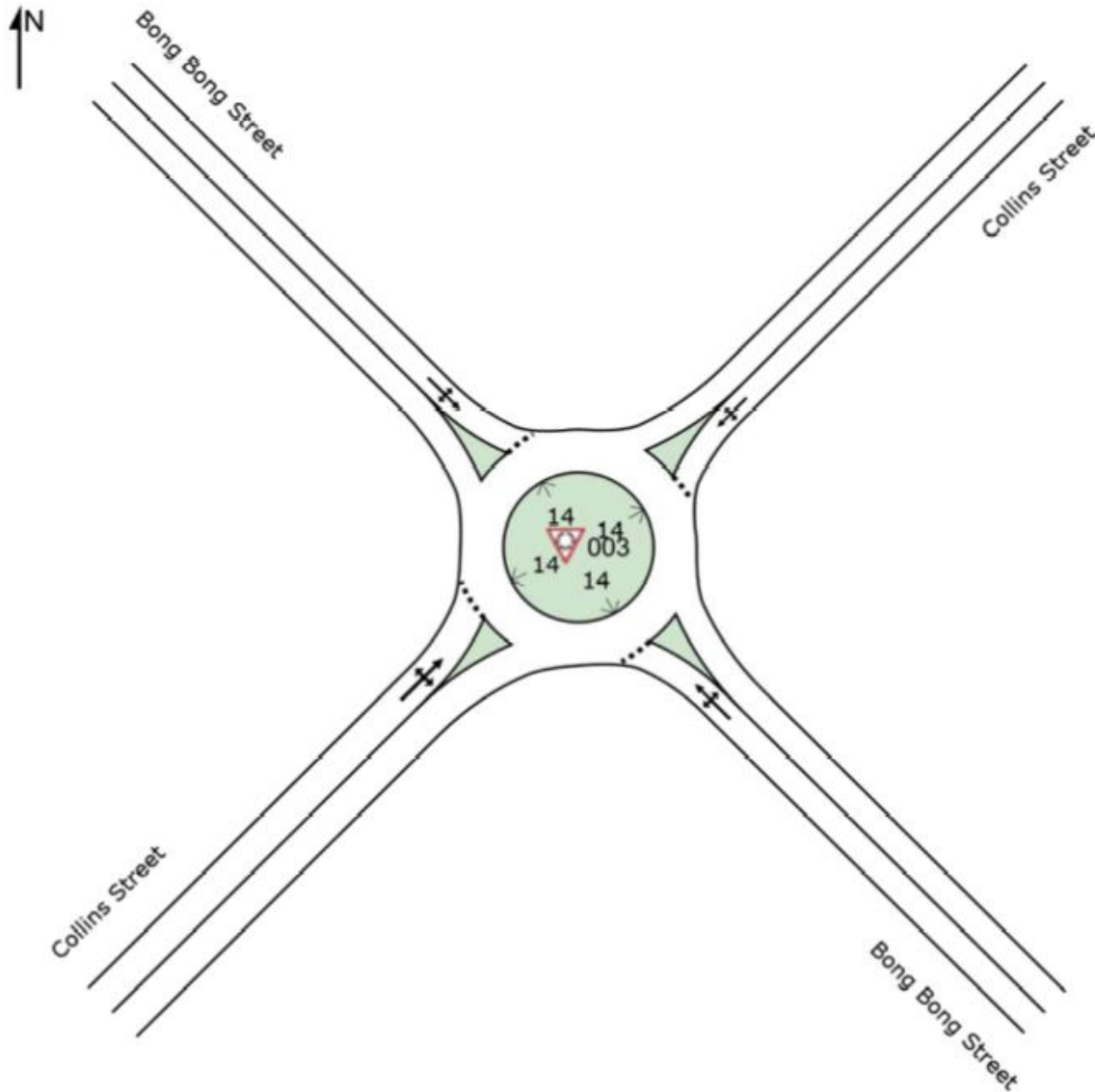


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SITE LAYOUT

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Collins Street / Bong Bong Street
Site Category: (None)
Roundabout

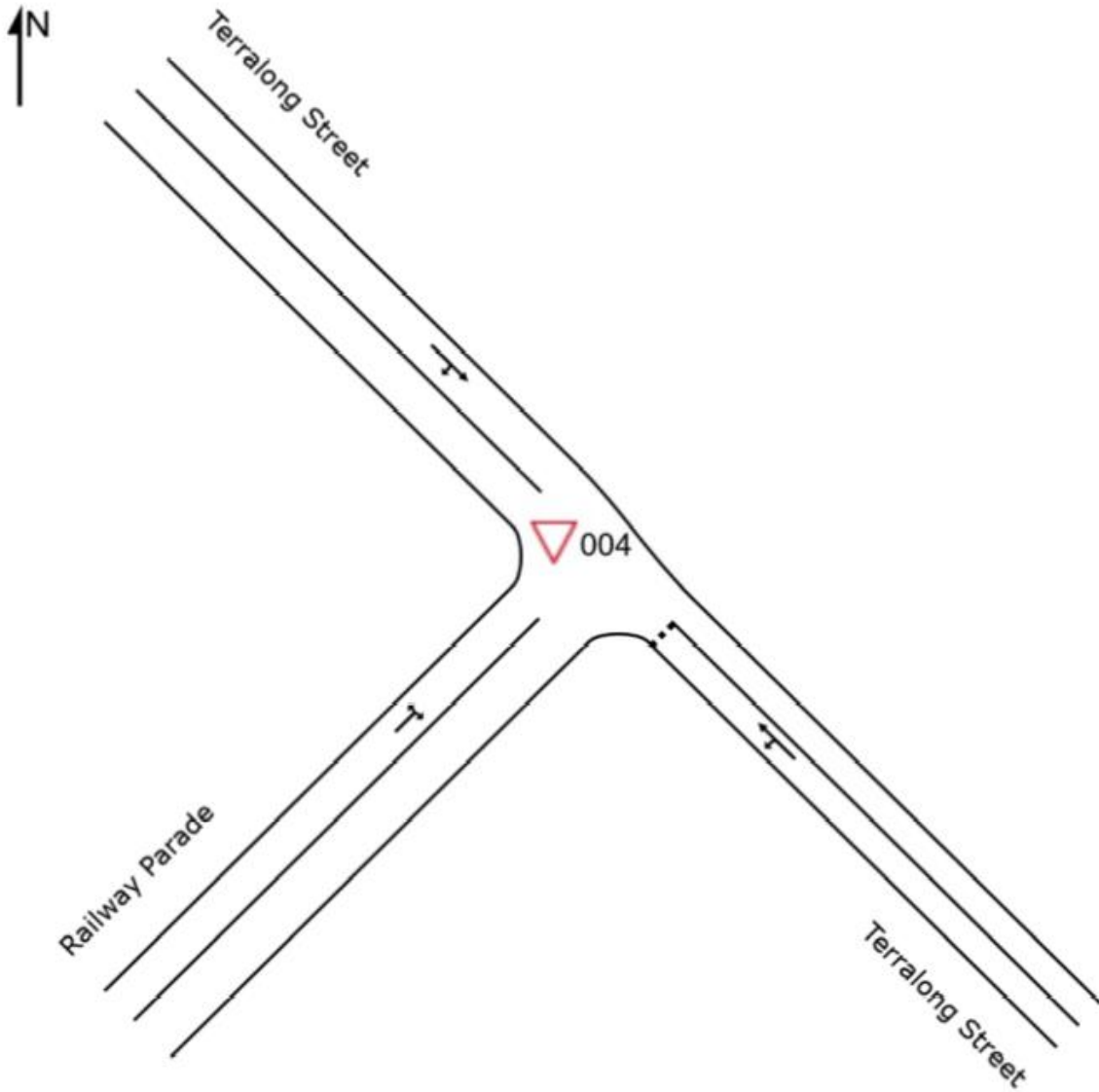


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SITE LAYOUT

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Giveaway / Yield (Two-Way)

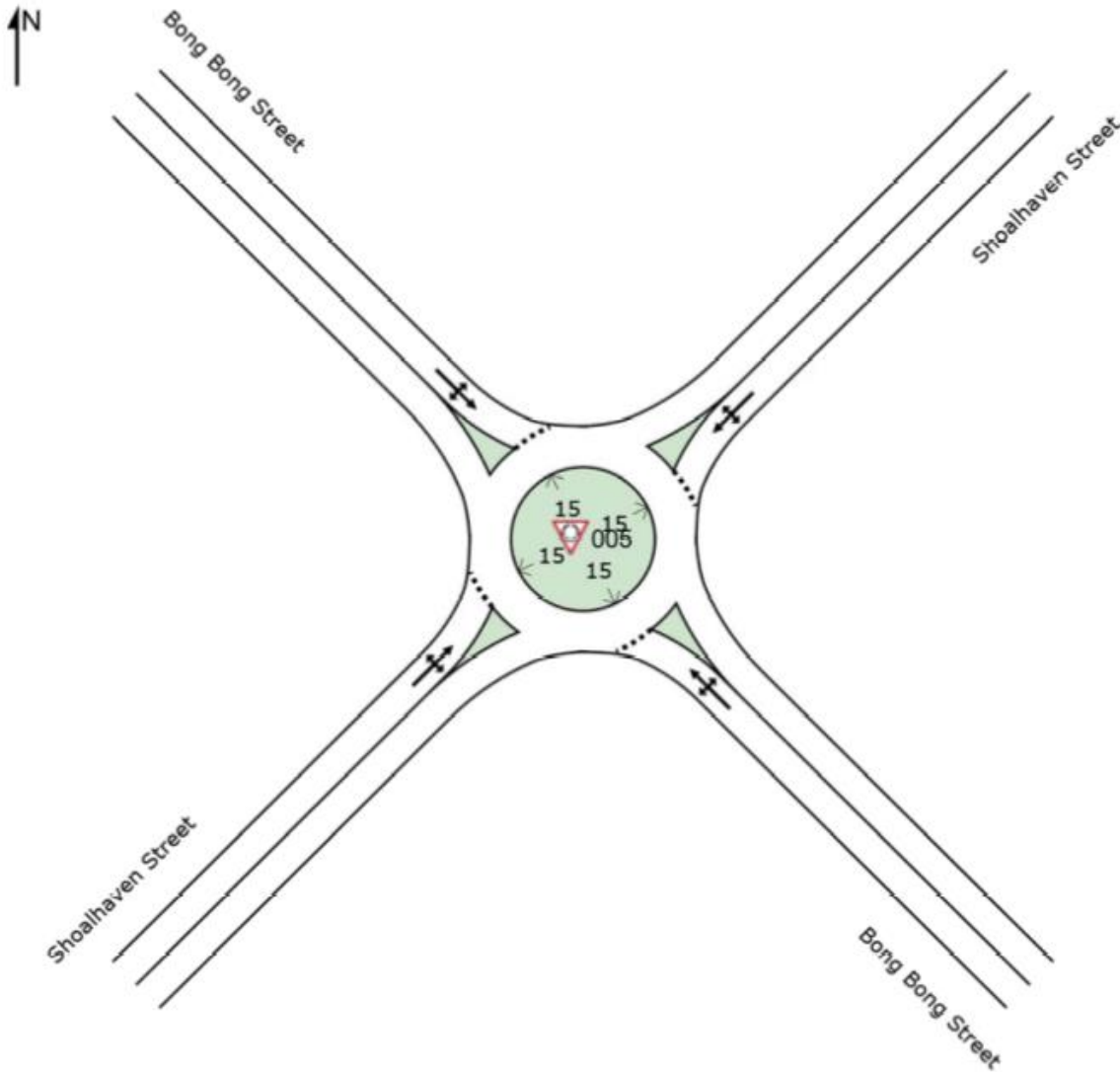


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SITE LAYOUT

Site: 005 [2021_WE_005_Combined]

Bong Bong Street / Shoalhaven Street
Site Category: (None)
Roundabout

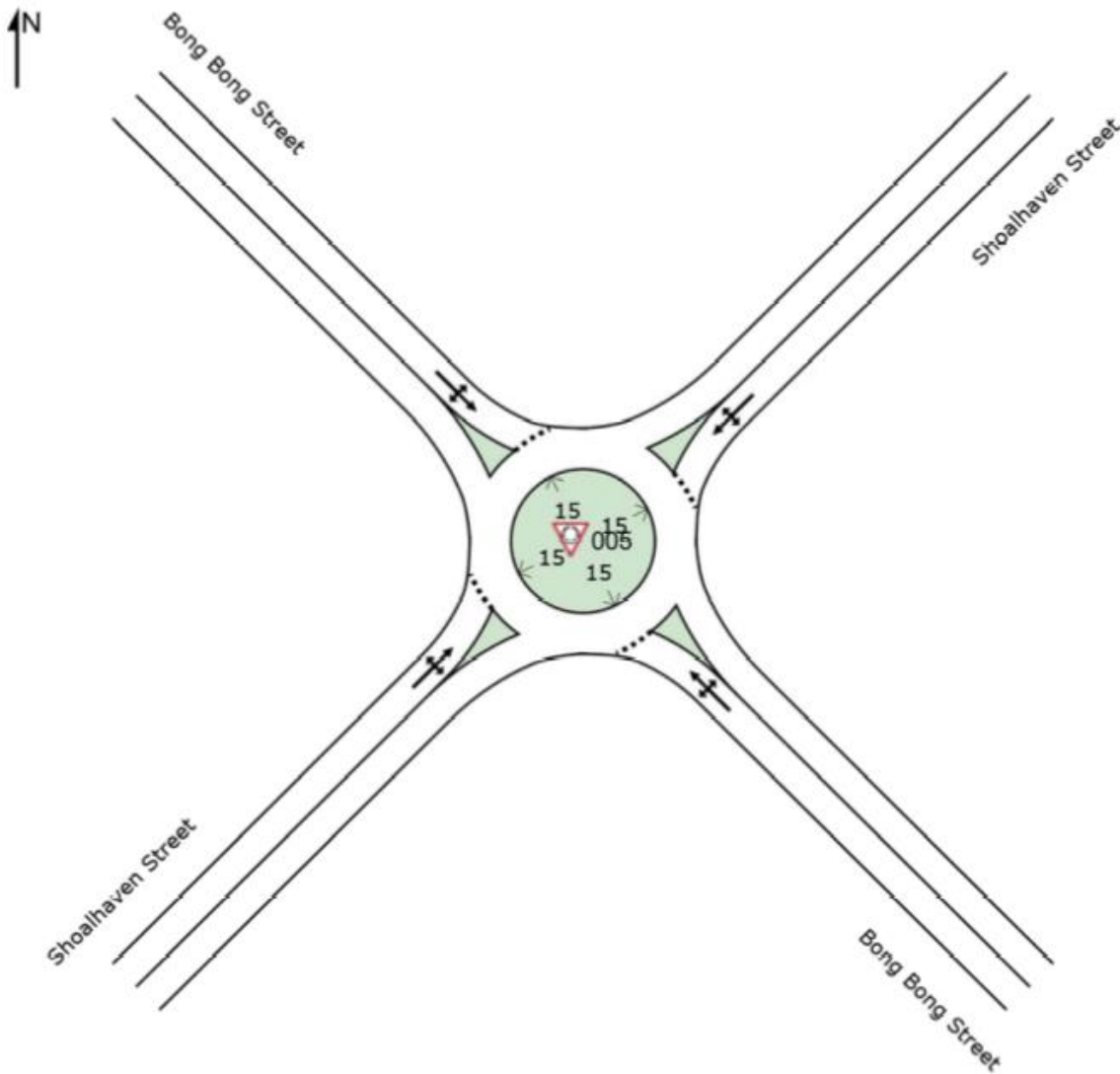


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SITE LAYOUT

Site: 005 [2021_WE_005_Option 4]

Bong Bong Street / Shoalhaven Street
Site Category: (None)
Roundabout



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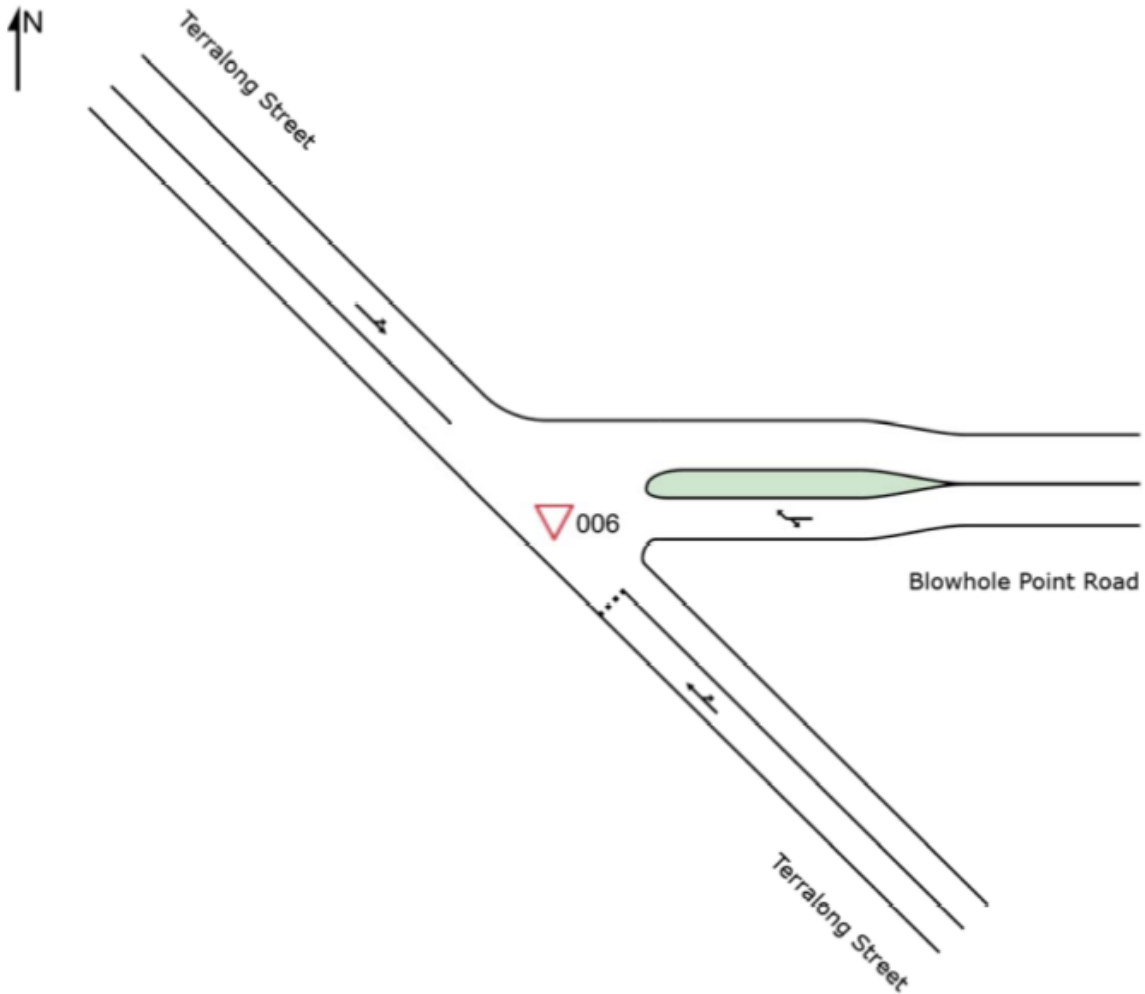
SITE LAYOUT

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Terralong Street / Blowhole Point Road

Site Category: (None)

Giveaway / Yield (Two-Way)



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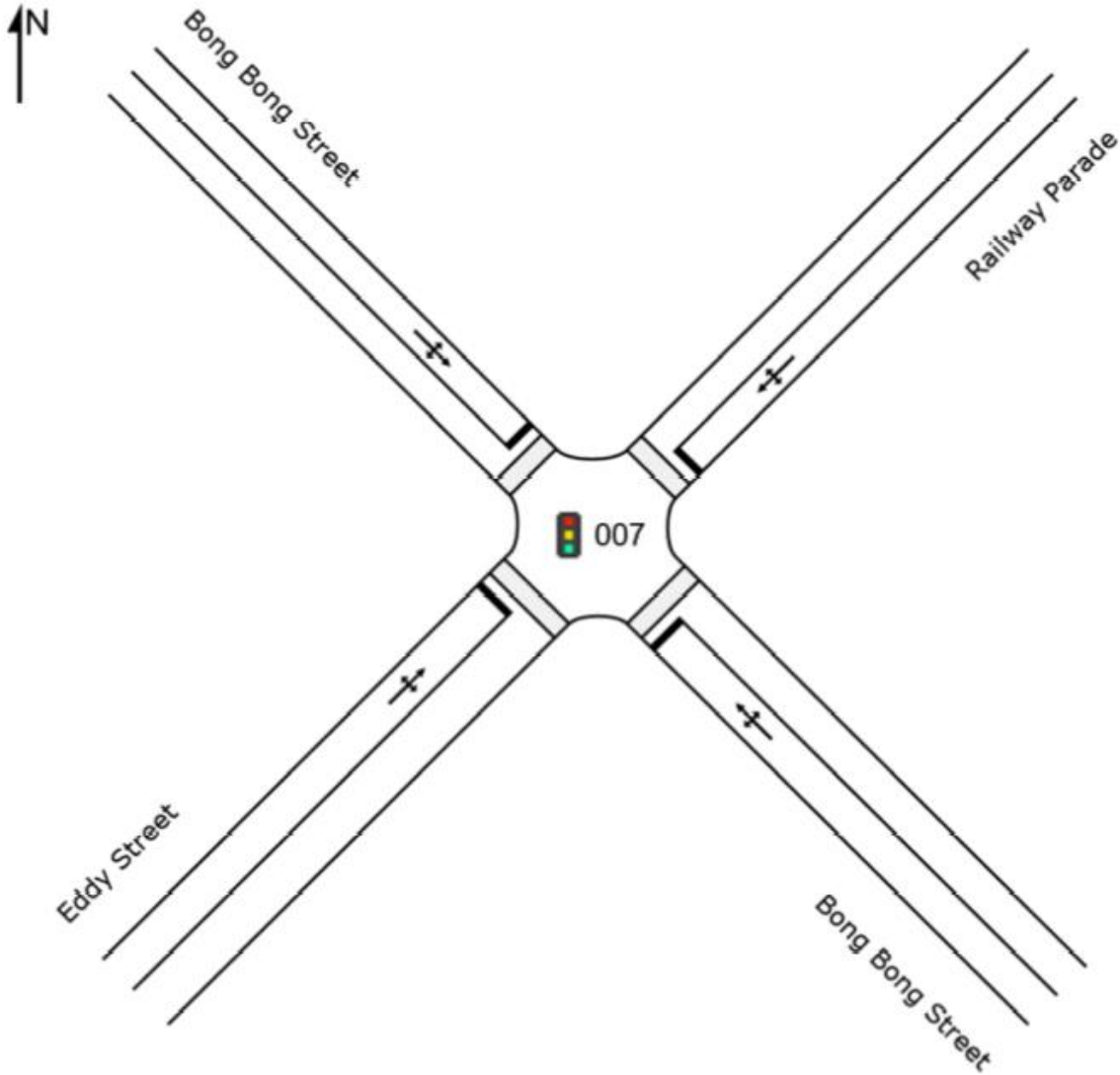
SITE LAYOUT

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Bong Bong Street / Railway Parade / Eddy Street

Site Category: (None)

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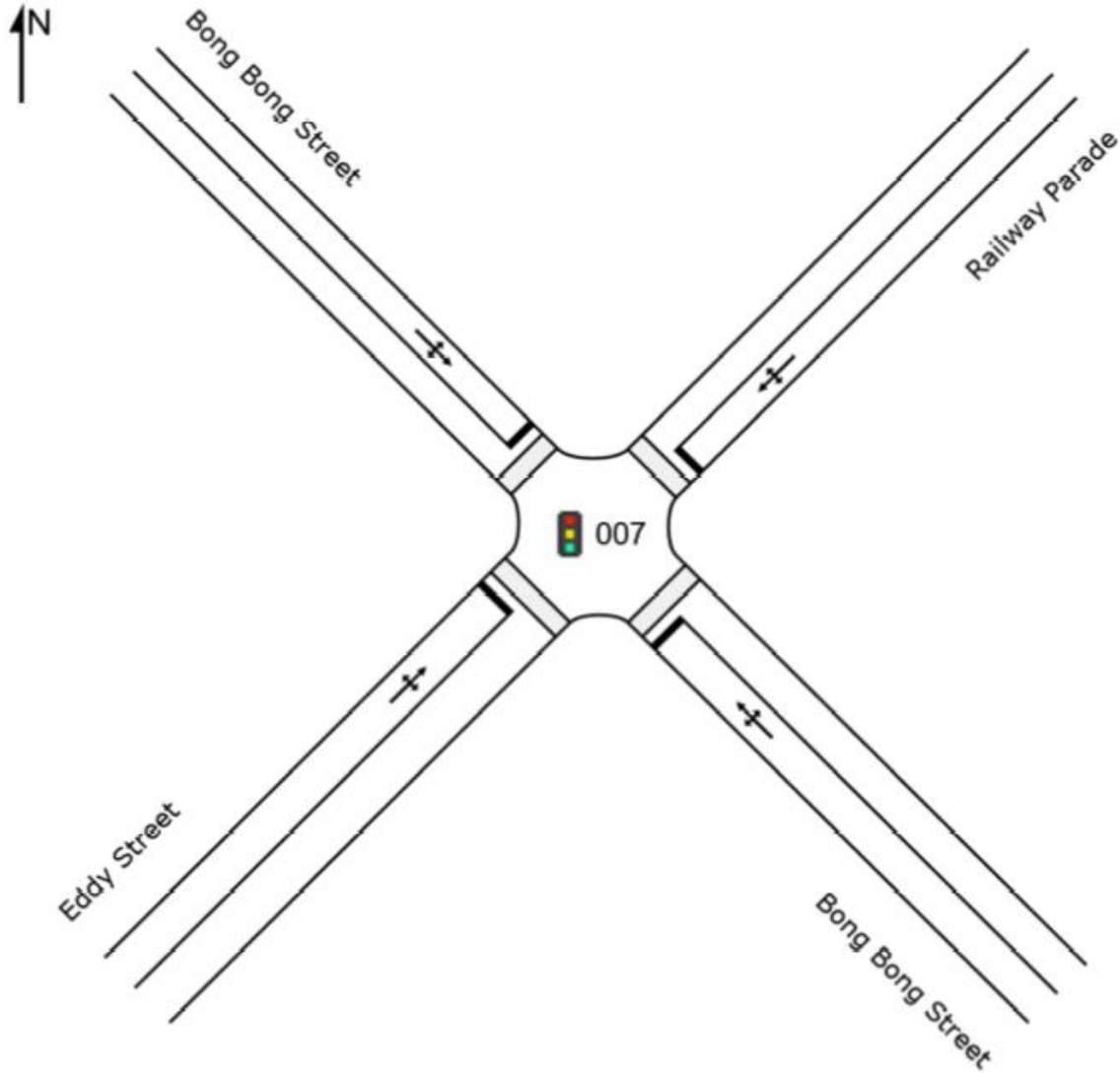
SITE LAYOUT

 Site: 007 [2021_WE_007_Option 4]

Bong Bong Street / Railway Parade / Eddy Street

Site Category: (None)

Signals - Fixed Time Isolated



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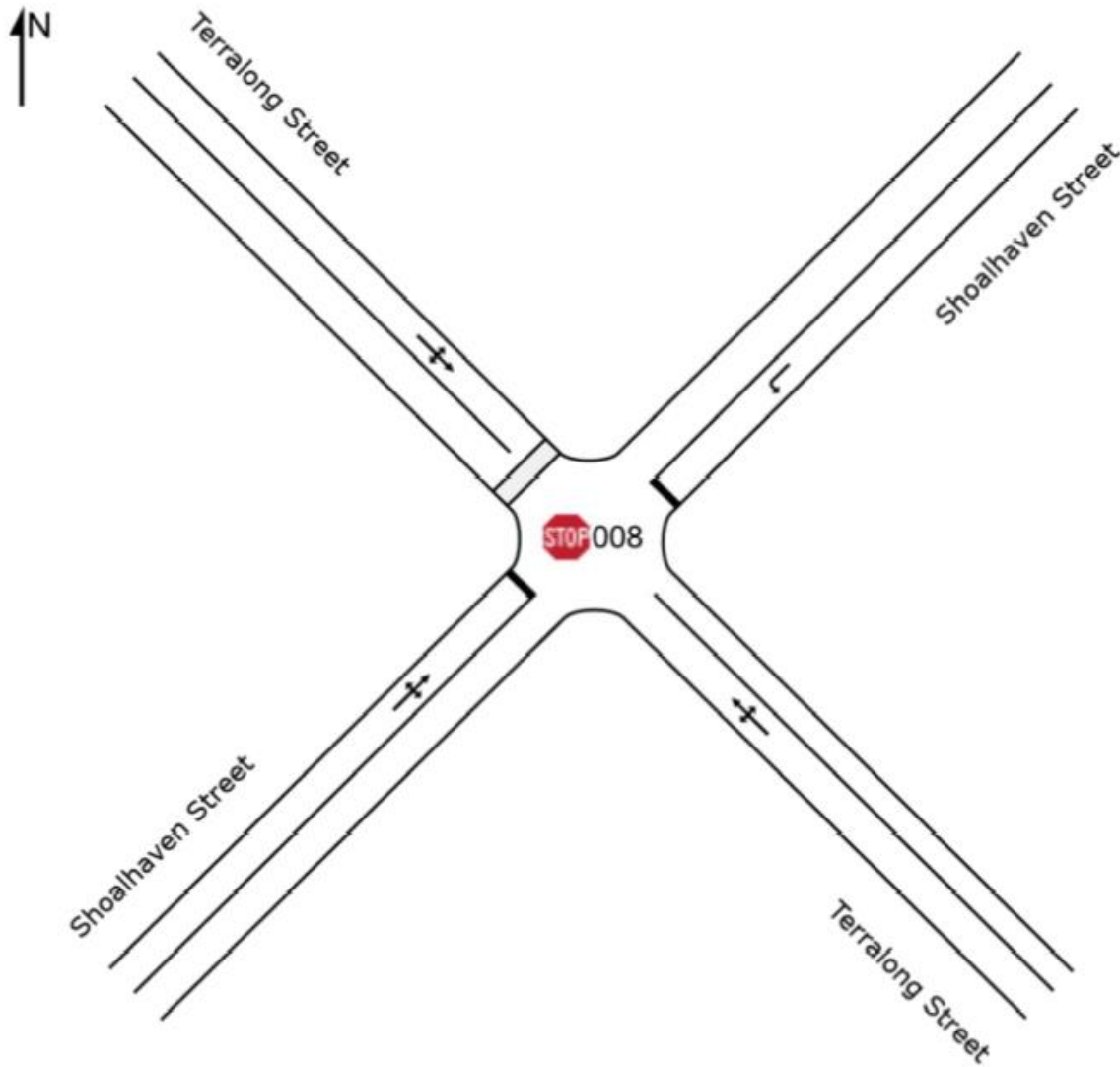
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Project: P:\P4582 Kiama Traffic and Parking Study\Technical Work\Models\SIDRA\P4582.003M 2021_Kiama Traffic and Parking Study Model - Town Centre.sip8

SITE LAYOUT

 Site: 008 [2021_WE_008_Combined]

Terralong Street / Shoalhaven Street
Site Category: (None)
Stop (Two-Way)



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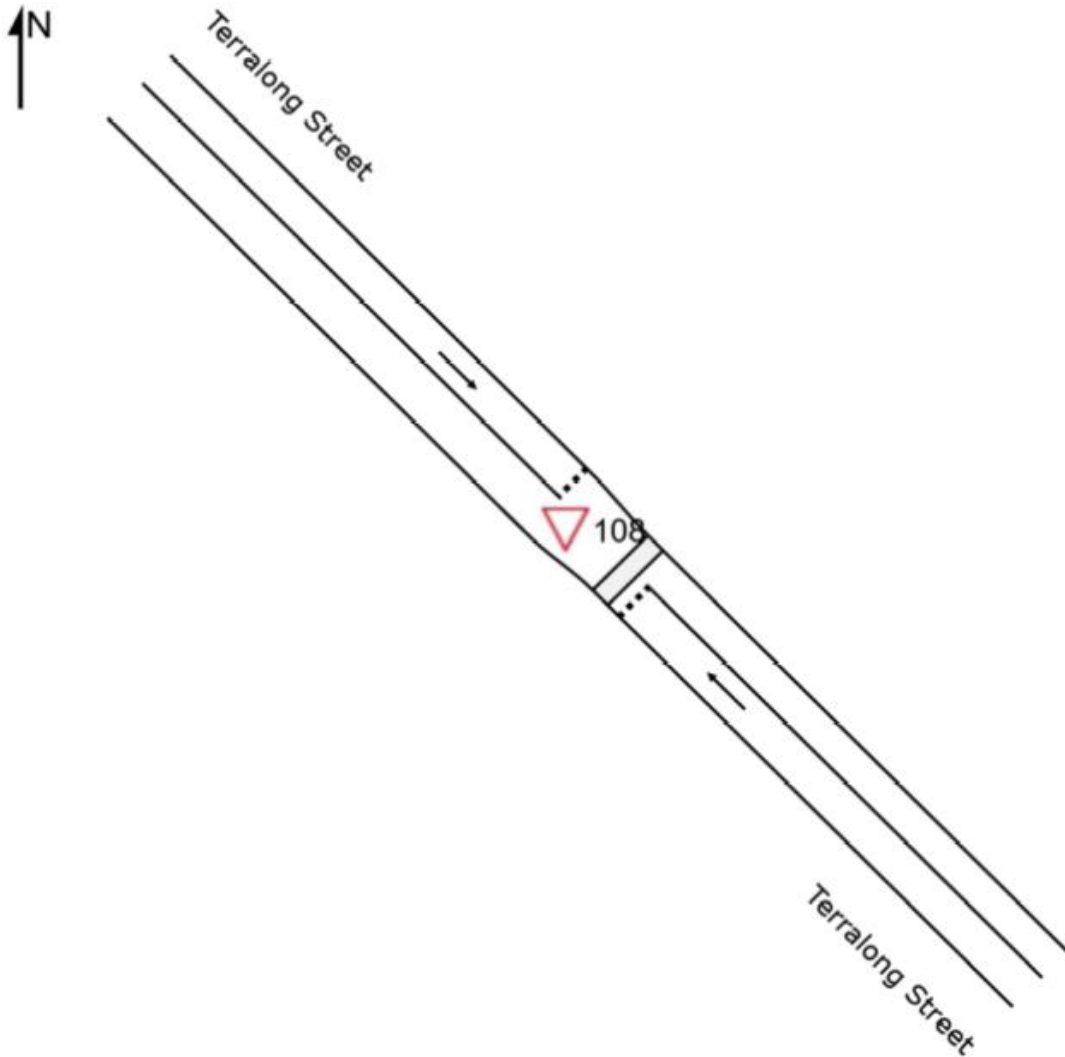
SITE LAYOUT

▽ Site: 108 [2021_WE_108_Combined]

Terralong Street - Pedestrian crossing between Collins Street and Shoalhaven Street

Site Category: (None)

Giveaway / Yield (Two-Way)



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Kiama Traffic and Parking Study

Part C: Alternative Transport Review Report

Kiama Municipal Council

24 May 2021



Item 6.1

Attachment 3

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P4582.001 – Kiama Alternative Transport Review	M. Hearne S. Eshghi	A. Eke	A. Eke	24/05/2021	Darren Brady Via email darrenb@kiama.nsw.gov.au



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1. INTRODUCTION

1.1 Background

Kiama Municipal Council (Council) commissioned a Town Centre Study (TCS) in 2018 with the aim of accommodating growth in the Kiama Town Centre while maintaining, respecting, and supporting the existing character of the town. The TCS proposed a number of traffic and parking actions improvements focused on the commercial core of Kiama and key surrounding streets. Council has engaged Bitzios Consulting to undertake a traffic and parking study of the town centre, investigating the existing traffic and parking issues and reviewing the feasibility of the proposals in the TCS.

This Kiama Traffic and Parking Study project is separated into three parts:

- **Part A** summarises the existing traffic and transport features of the town centre and details the observations made during site investigations as well as additional data that has been collected for the study.
- **Part B** of the project is a wider review and includes the assessment of key intersections outside of the town centre. More detailed modelling was undertaken in SIDRA and using the TRACKS model for the region to assess regional growth effects on the town centre and surrounds over the next 10 years.
- **Part C** of the project consists of a review of active transport (walking and cycling) and public transport travel modes used within Kiama, and includes potential measures to address the future transport demand on various travel modes arising from the expected growth in the region.

This report represents Part C of the overall study and focuses on the active transport and public transport travel modes for Kiama.

1.2 Kiama Characteristics

Kiama is a coastal town within the Illawarra Region, approximately 30km south of Wollongong. The Kiama Town Centre is the key business and administrative centre in the area and it drives the majority of commercial, retail, and tourist activity in Kiama.

Kiama draws large numbers of tourists, many of which drive to the area from within NSW. The ability to cater for the expected increase in tourist visitation, local businesses, and residential population, combined with the implications of an ageing population, will need to be carefully managed to ensure that the town centre can continue to service the needs of the Kiama community and tourists.

Access to Kiama via road is through two primary routes:

- Princes Highway: Connections to the north (Wollongong and Sydney) and south (Shoalhaven, Eurobodalla, South Coast, Victoria)
- Jamberoo Road: Connection to the west.

Other transport options include rail access at Kiama Station which connects to south coast suburbs and onto Sydney. Public and multiple private bus services also provide connections to nearby areas and suburbs.



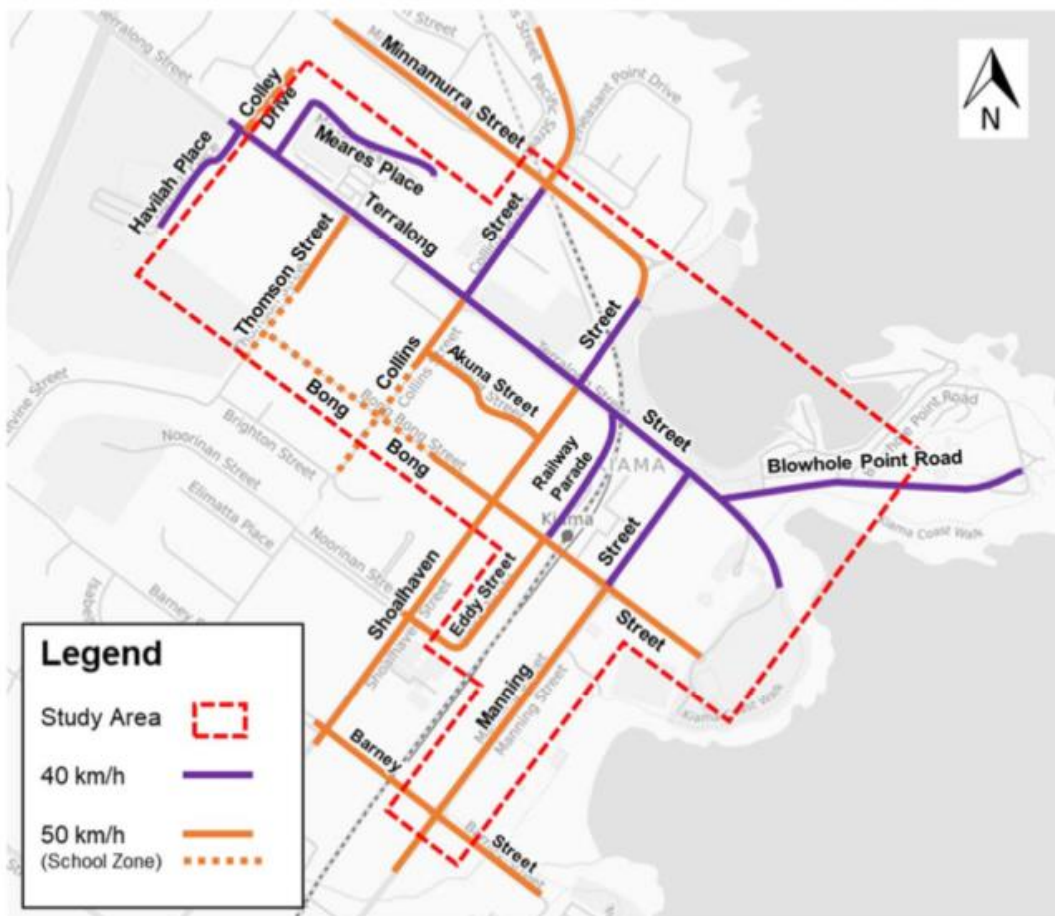
1.3 Road Environment

The commercial core of Kiama is centred around Terralong Street and Manning Street. This area is where the bulk of commercial and retail activity is located. Most of Kiama’s pedestrian and vehicle activity travels to or through this area, which is why it is designated a 40 km/h High Pedestrian Activity Area (HPAA). The majority of streets in the town centre are two-way, with many offering on-street parking.

The Princes Highway provides connections to/from Kiama to other towns:

- Vehicles approaching from the connect to the northern side of Collins Street
- Vehicles approaching from the south will either connect to either the north-western side of Terralong Street or the south-western side of Manning Street.

Outside the town centre, local urban roads operate with the default speed limit of 50 km/h. Jamberoo Road has a posted speed limit of 60 km/h, and Princes Highway has a posted speed limit of 100 km/h. The speed limits of roads within the town centre are shown in Figure 1.1.



Source: OpenStreet Map

Figure 1.1: Speed Limits



2. KIAMA CHARACTERISTICS AND DEMOGRAPHICS

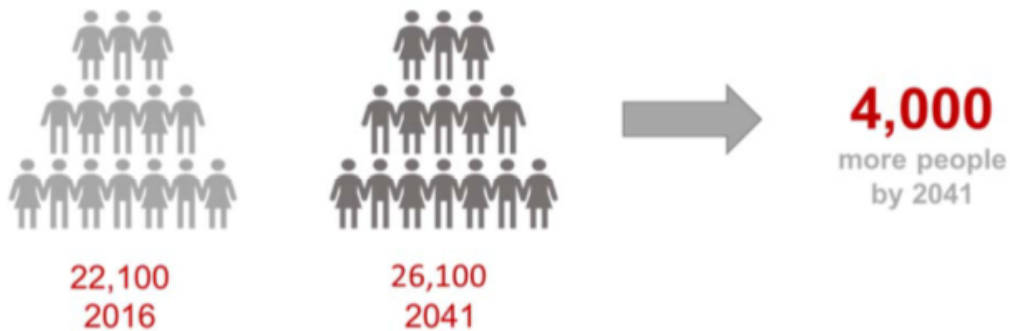
2.1 Overview

The Municipality of Kiama is bordered by the City of Shellharbour to the north, Wingecarribee Shire to the west, and the City of Shoalhaven to the South. The largest town in the LGA is Kiama itself, with a number of smaller towns spread mostly along the coastline also falling within its jurisdiction.

2.2 Population and Demographic Data

2.2.1 Overview

The 2016 Census recorded the Kiama LGA population to be around 22,100 people, with 7,700 in the Kiama Statistical Area. In 2019, Council estimated the population of the Kiama LGA is to grow by approximately 4,000 people by 2041, representing a growth rate of 0.76% p.a. (compounding annual growth rate) over the next 20 years. For Kiama itself, the growth rate is expected to be around 1.4% per year.



Source: Kiama Municipal Council 2019 NSW Population Projections

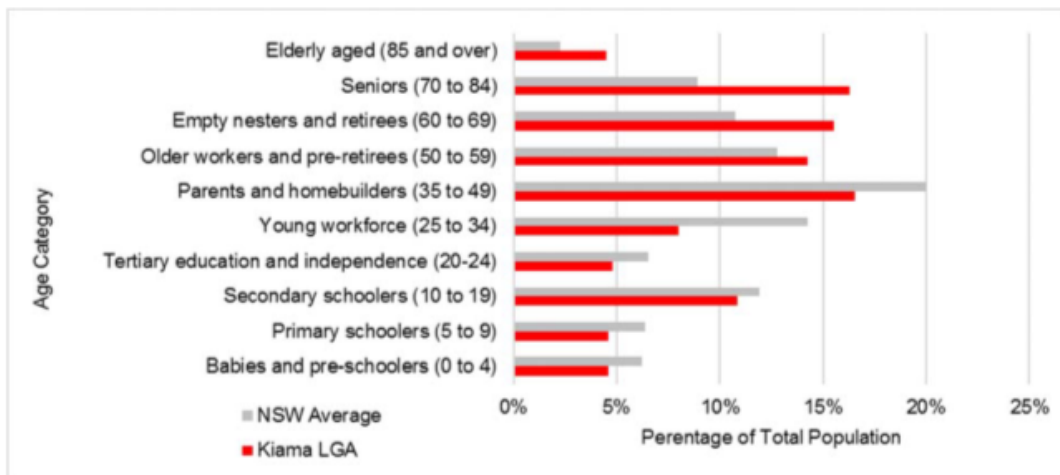
Figure 2.1: Kiama Area Forecast Population

Over this period, the working age is expected to remain stable, with people aged 65 and over to experience the largest growth in population, from 5,000 in 2016 to 8,400 by 2041.

The 2016 Census also identified that the median age in Kiama is 50 years old, significantly higher than the NSW and Australian average of 38.

The age profile for the Kiama LGA is presented in Figure 2.2 with comparisons against the NSW average for 2016 Census Data. This demonstrates the higher rates of elderly and senior residents in Kiama compared to the NSW average.





Source: 2016 Census

Figure 2.2: Age Profile of Kiama LGA Compared with NSW

The higher rates of an older population demonstrates the need to focus on providing safer and more accessible active and public transport options that can be easily utilised by the elderly or vulnerable users. This also presents a challenge for Kiama given the steep topography along many local roads and pathways connecting to the town centre.

Typically, pedestrians aged less than nine years old have a greater need for good walking facilities, due to the use of prams (0-4 years old) and the increased vulnerability of young people. The seniors demographic group also requires safe, accessible facilities for reasons such as reduced mobility, decreased fitness, use of mobility aids, and visual impairment.

2.3 Employment

Employment breakdown in Kiama shows slightly higher numbers of technicians and trade workers, professionals, and managers, with substantially lower numbers of labourers. There is potential to shift some of these employees onto more active or public transport options. This breakdown is shown in Figure 2.3.



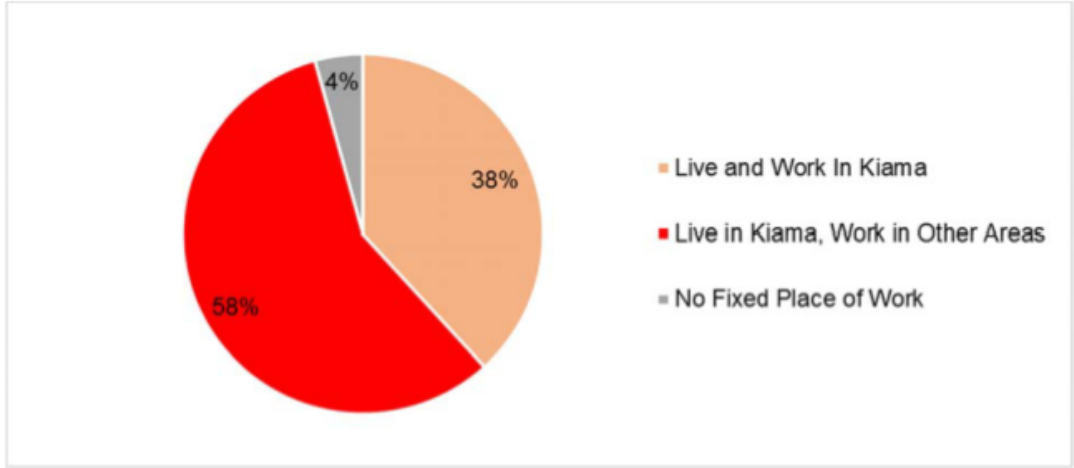
Source: 2016 Census

Figure 2.3: Occupation Breakdown of Kiama LGA Compared with NSW



2.4 Journey to Work

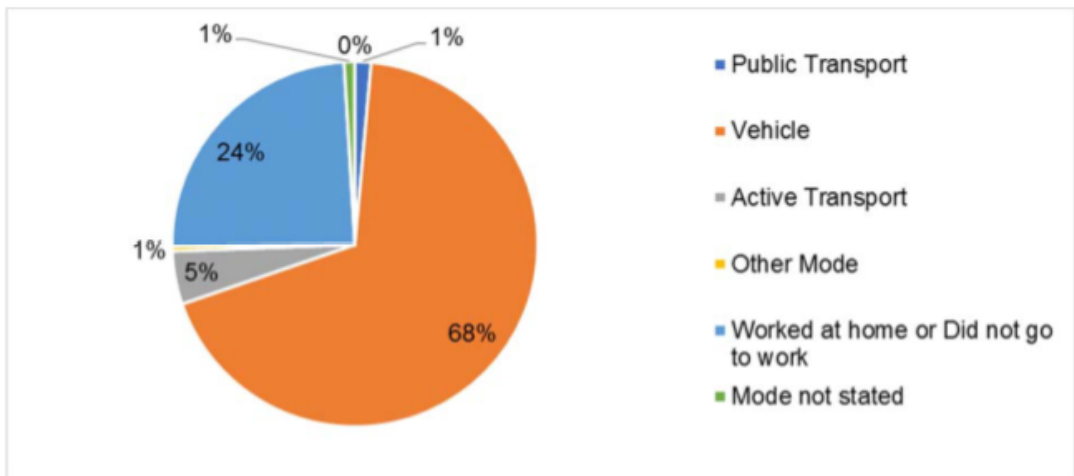
Approximately 58% of people who live in Kiama work in the area as well, with 38% working in other LGAs. This shows there is a high proportion of local journeys to work.



Source: 2016 Census

Figure 2.4: Resident Employment Location

ABS Journey to Work data was used to gain an understanding of work locations and the typical travel modes for trips to work by residents of the LGA. The data as presented in Figure 2.5 demonstrates that 68% of Kiama residents drive to work, 1% take public transport (train/bus), and 5% used active transport (walking/cycling).



Source: 2016 Census

Figure 2.5: Journey to Work Mode Distribution



2.5 Road Hierarchy

Table 2.1 summaries main characteristics of key roads in the study area.

Table 2.1: Key Roads in Study

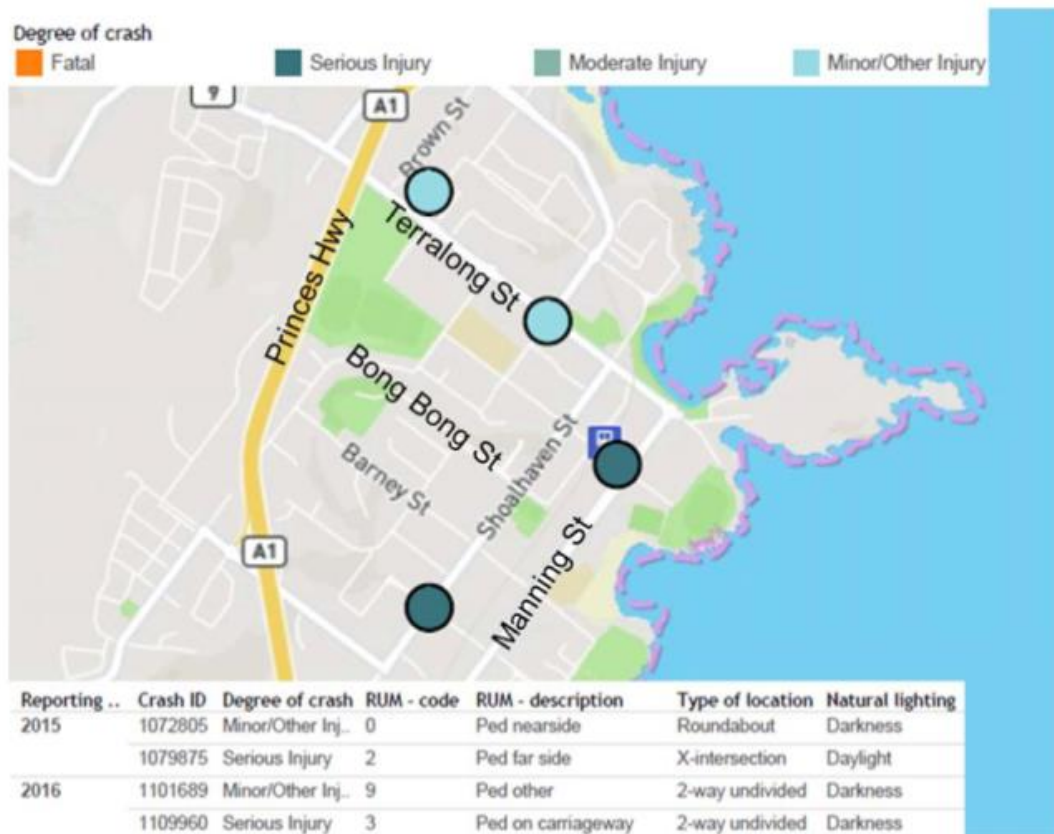
Road Name	Jurisdiction	Hierarchy	Description
Princes Highway	TfNSW	State	The Princes Highway provides the main road connection to the north and south. Most people travelling to and from Kiama would use this highway.
Terralong Street	Council	Local	Terralong Street forms part of the commercial core of Kiama and is also one of the main pedestrian and vehicle links through the town to parks, beaches, and the blowhole. It contains much of the retail and shopping options in the area.
Manning Street	Council	Local	Manning Street provides the main link to Kiama for people approaching from the south via the Princes Highway. It contains a number of recreational facilities including parks and beaches on its eastern side, and retail, commercial, and professional services buildings on its western side.
Gipps Road	Council	Local	Gipps Road is the link between the Princes Highway northern approach to the Kiama Town Centre.
Bong Bong Street	Council	Local	Bong Bong Street runs parallel to Terralong Street. It is mostly surrounded by low density residential properties.
Shoalhaven Street	Council	Local	Shoalhaven Street runs east-west and provides a link between a number of parks and car parking areas surrounding the Kiama commercial core.

2.6 Pedestrian Crash Data

Crash data for the Kiama LGA was sourced from the Transport for NSW Centre for Road Safety for the 5-year period of 2014-2018 (inclusive). The data was further disaggregated to only include crashes within the study area to identify any trends and crash clusters involving pedestrians within the Kiama Town Centre area.

During the 5-year period, there were four pedestrian crashes recorded in the study area, two of which involved serious injury and two involved minor/other injury. The location of these crashes is shown in Figure 2.6.





Source: Transport for NSW Centre for Road Safety















Figure 2.6: Pedestrian Crashes in Kiama Town Centre (2014-2018)

2.7 Key Land Uses, Attractors, and Generators

Key attractors and generators in Kiama were identified and mapped and this is shown below in Figure 2.7. The maps demonstrate that most of the key attractors and generators are located along Terralong Street and Manning Street. Many of these locations are also near Kiama Station, making it a viable option for reaching many of these areas from outside Kiama via this travel mode. Outside the Terralong Street/Manning Street commercial core, the area is mostly residential and there are few attractors/generators. This further supports the notion that Kiama has a highly localised commercial area which forms the majority of Kiama’s retail, commercial, and tourist activity.



Key Land Uses

-  Park
-  Place of Worship
-  Medical Facility
-  Beach
-  Education
-  Sports Facility
-  Vet
-  Council Facility
-  Gyms
-  Library
-  Pool
-  Retirement Village
-  Shopping Centre
-  Train Station

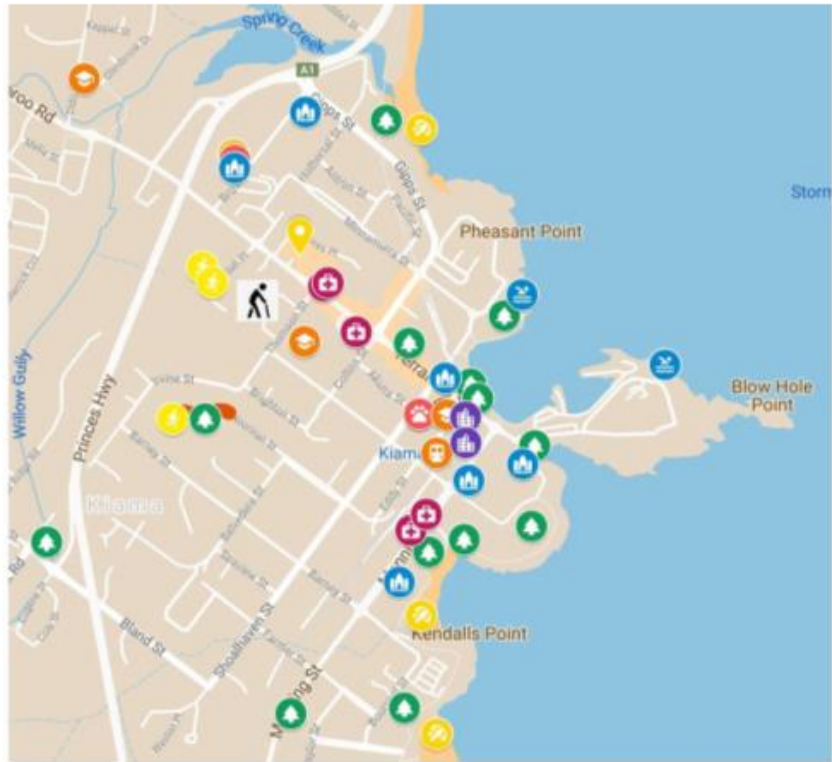


Figure 2.7: Kiama Attractors and Generators

Item 6.1

Attachment 3



3. TRAVEL MODE REVIEW

3.1 Statistical Data

3.1.1 Kiama Town

Travel patterns for Kiama were sourced from 2016 Australian Bureau of Statistics (ABS) Census data. Travel mode breakdown for Kiama and other South Coast regional towns are shown in Table 3.1.

Table 3.1: Travel Mode Locations Kiama and other South Coast Towns

Locations Travel Mode	Kiama	Wollongong	Shellharbour	Nowra
Walked only	6%	11%	2%	4%
Bicycle	0%	1%	0%	1%
Motorbike/scooter	0%	1%	0%	1%
Car, as driver	85%	65%	83%	80%
Car, as passenger	5%	5%	6%	7%
Bus	0%	5%	1%	0%
Train	2%	6%	2%	1%
Other	1%	5%	5%	6%

The dominant method of travel to work for residents within Kiama is by car, as a driver (85%). A smaller proportion travel to work by walking only (6%), by car, as a passenger (5%), by train (2%), or by bicycle (1%). Less than 1% of workers travel by motorbike / scooter or bus.

Kiama’s high rates of private car travel to work is consistent with other regional towns along the South Coast. Journey to Work data extracted for Wollongong, Shellharbour, and Nowra indicate that the travel mode breakdown in Kiama is a general issue with the South Coast in general as opposed to Kiama being an outlier. There is greater variance with Wollongong which is likely due to it being a larger regional city.

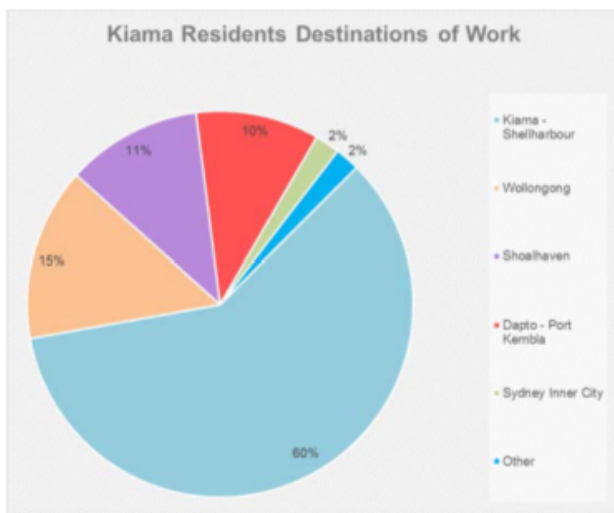


Figure 3.1: Kiama Residents Destinations of Work



The majority of Kiama’s population works locally within the Kiama-Shellharbour region, with the remainder mostly spread along the South Coast. The highly localised nature of work destinations in the Kiama area would generally indicate that it is an area suitable to shift the travel modes of its workforce away from private vehicle commuting.

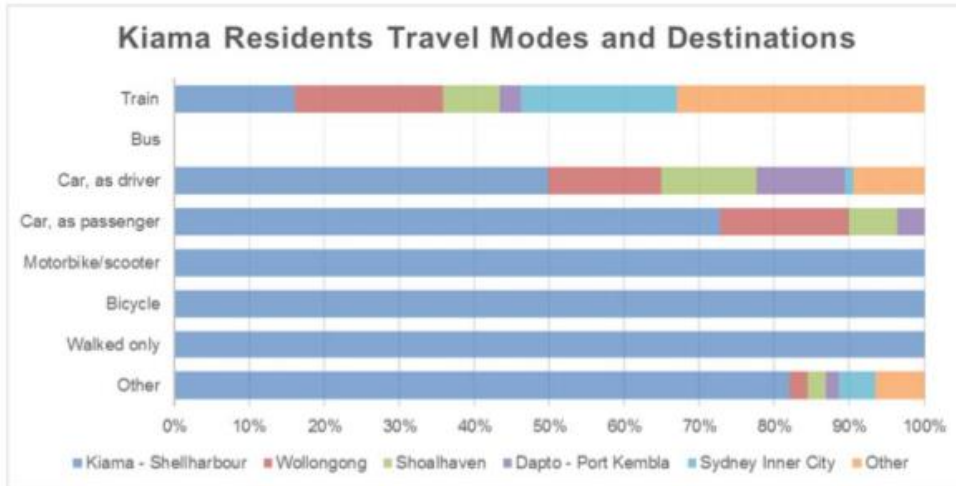


Figure 3.2: Kiama Residents Travel Modes and Destinations

Train commuters in Kiama generally travel to further distances from the town than other travel modes. A high percentage of people who live in Kiama still drive to work despite having a relatively short distance to travel. A large percentage use car to travel to work within the Kiama – Shellharbour area, and some to Wollongong and Shoalhaven. Motorcyclists, cyclists and walking were travel modes only used within the Kiama – Shellharbour region. This is expected due to the travel distances to other regions being too far to be a viable option.

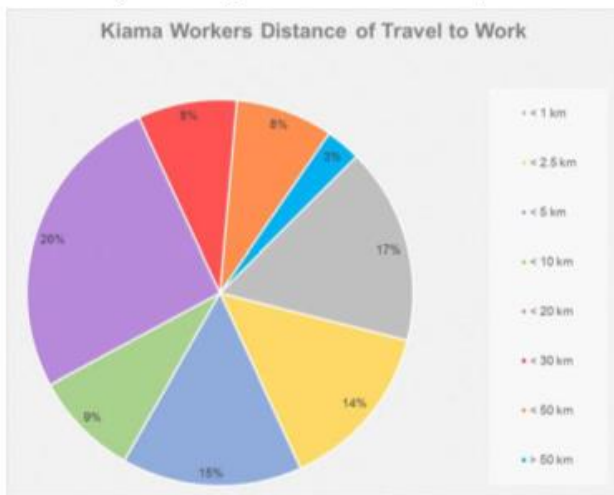


Figure 3.3: Kiama Workers Distance of Travel to Work

For workers travelling to Kiama, the largest portion of people come from within 10 to 20 km (28%). A large portion of workers are relatively close to the town of Kiama, within 5 km, with the most being within 1 km (17%). A small proportion travel more than 50 km to Kiama for work (3%).



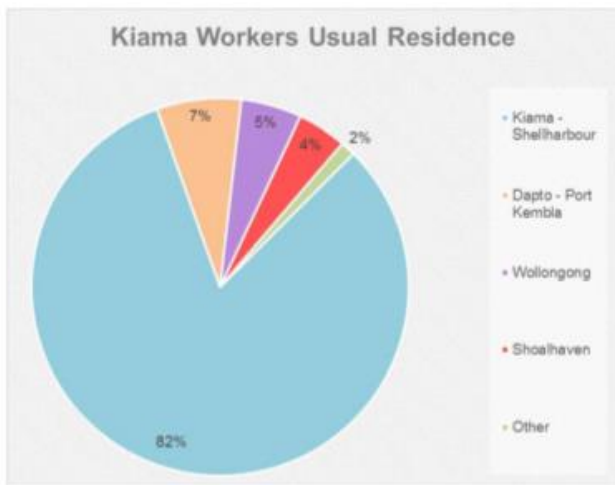


Figure 3.4: Kiama Workers Usual Residence

By region, a large proportion of the workers within Kiama live in the Kiama – Shellharbour area, with a smaller amount living within Dapto - Port Kembla, Wollongong and Shoalhaven.

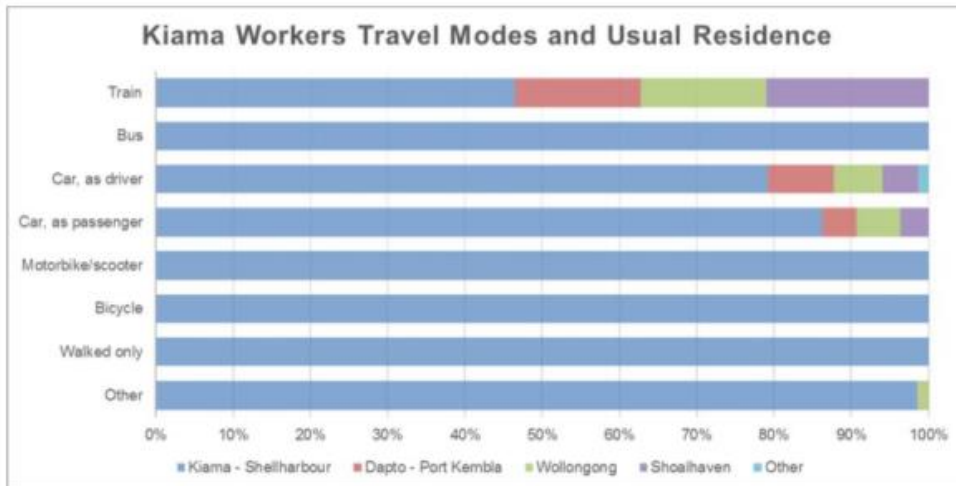


Figure 3.5: Kiama Workers Travel Modes and Unusual Residence

The usual residence of Kiama workers who use train to travel to work are mostly within Kiama – Shellharbour, and the Shoalhaven region. More than 75% of people working in Kiama travel by car from Kiama - Shellharbour, with smaller portions travelling from Dapto - Port Kembla and Wollongong.



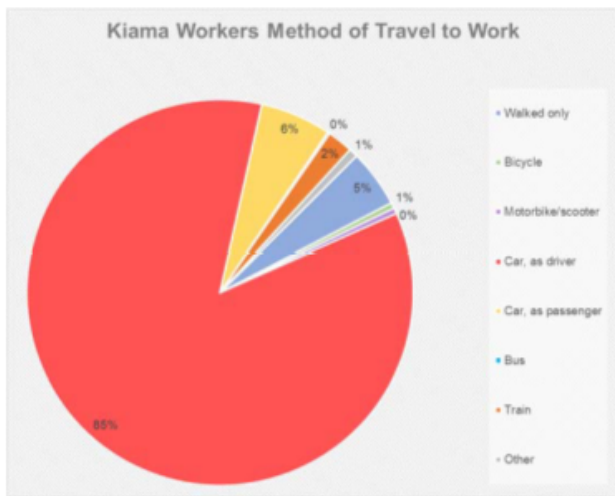


Figure 3.6: Kiama Workers Method of Travel to Work

The most dominant method of travel to Kiama for work is by car, as a driver (85%), and as a passenger (6%). A small portion of people travel by walking only (5%), train (2%), and by bicycle (1%). Less than 1% of workers travel by motorbike / scooter or bus.

3.2 Travel Mode Analysis

The journey to work data shows that cars are the dominant method of travel to work from within and outside Kiama, with a small proportion capable of walking only to work. A very low portion use alternative transport options such as bus, trains and bicycles.

A large portion of residents within Kiama travel relatively far distances to work, with destinations being Wollongong, Port Kembla, and the Kiama – Shellharbour region. Most workers within Kiama travel from a relatively close proximity.

As such, it may be effective to implement alternative transport schemes such as providing additional commuter parking or similar facilities to encourage the use of public transport for workers travelling outside of Kiama, and bicycle or active transport plans for workers living close to Kiama. Providing additional bicycle parking at the train station could be an attractive alternative to driving for workers travelling to Kiama.

3.3 Future Transport Demand

An analysis of the population was undertaken to determine an estimate on the growth of the population and associated future demand on alternative transport. A growth factor associated to the development of Kiama's population and development was determined to be 1.4% which was identified from population growth data for Kiama in the 2017 Census. This growth factor was applied to the total number of people using each travel mode based on the journey to work analysis of the 2016 Census data. The current and estimated future transport demand is summarised in Table 3.2.



Table 3.2: Future Transport Demand

Travel Mode	2016		2021		2031		2041	
	Users	%	Users	%	Users	%	Users	%
Walked only	109	6%	117	6%	133	7%	152	8%
Bicycle	8	0%	9	0%	11	1%	14	1%
Motorbike / scooter	3	0%	3	0%	3	0%	3	0%
Car, as driver	1618	85%	1619	84%	1621	84%	1624	82%
Car, as passenger	101	5%	102	5%	105	5%	109	6%
Bus	0	0%	0	0%	0	0%	0	0%
Train	44	2%	44	2%	44	2%	44	2%
Other	24	1%	24	1%	24	1%	24	1%
Total	1907	-	1917	-	1941	-	1969	-

Key points from this analysis include:

- The number of people cycling to work is extremely low in Kiama and this is not expected to significantly change in coming years
- The total number of trips to work is expected to only have a minor increase due to relatively low population growth rate in Kiama
- The data recorded zero bus trips to work which is understandable given that only one public bus services operates in Kiama.

3.4 Future Actions

Transport for NSW's Regional NSW Services and Infrastructure Plan outlines their plans for developing transport infrastructure for regional NSW. In this plan, Kiama falls into the Illawarra-Shoalhaven region. The plan stipulates two main goals for this region:

1. Improved connections between Wollongong and three cities of Greater Sydney
2. Expanding 30-minute catchments for public transport.

At a local level, Kiama can action these goals through improvements in public transport around the area to ensure that residents of the Greater Kiama region can access the town centre to connect to additional public transport options.

Kiama has a limited number of bus services, with frequency being less than ideal to service the number of new residents the area is expected to gain over the next few decades. Specifically, the proposed residential subdivision at Spring Creek off Dido Street, which is expected to add between 90 and 145 lots/dwellings to the area. This location does not currently have accessible and reliable active transport access to the Kiama Town Centre, and at over 1.5km from the town centre, it is at an undesirable walking distance. The traffic impact assessment for the Spring Creek noted that the only active transport option for the development is by bus route 701 and a private coach service that operates four return services on weekdays. This is not a realistic transport option for these new residents.

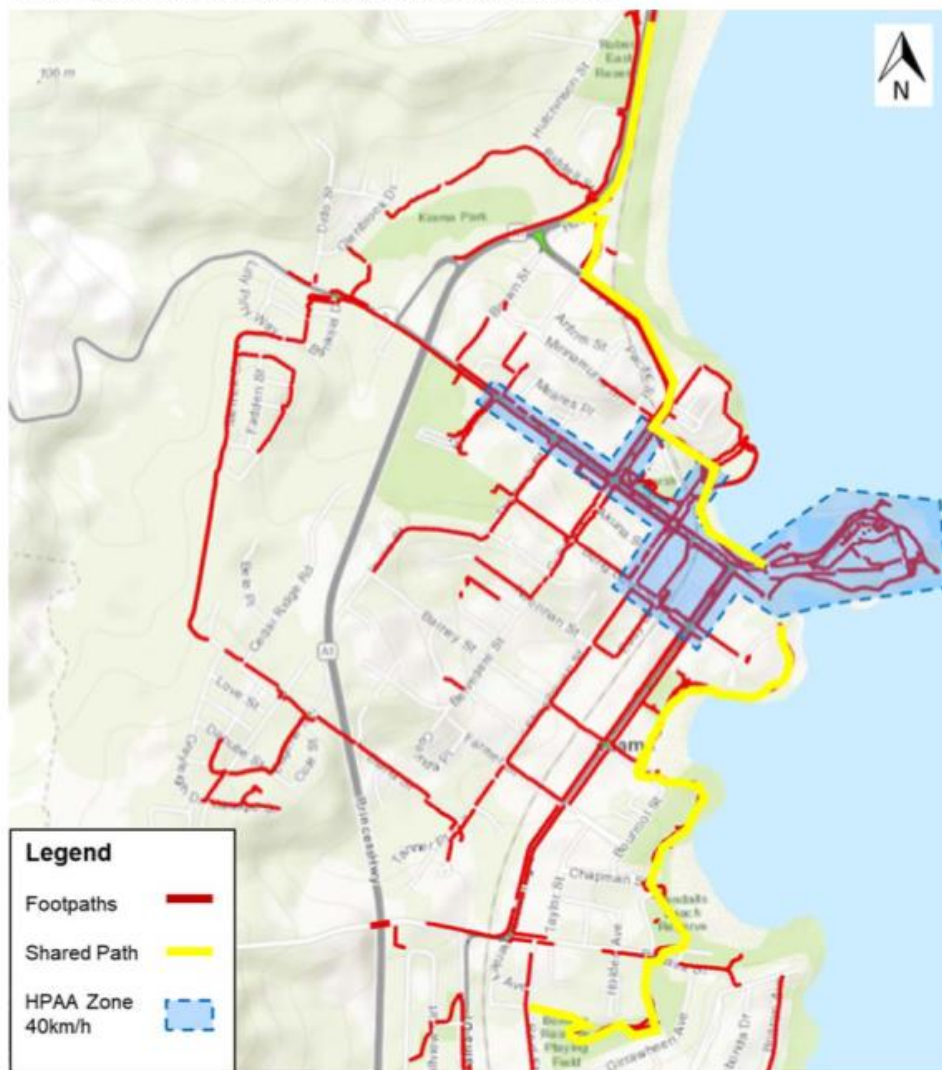


4. ACTIVE TRANSPORT REVIEW

4.1 Walking

Kiama has an extensive footpath network that provides good connectivity to the commercial core. Footpaths are generally available on at least one side of the road throughout most of Kiama. In the commercial core, there are regular crossing points for pedestrians along Terralong Street and Manning Street. Outside the town centre, there are limited or no footpaths and formalised crossings available. There are no traffic signals within the suburb, and hence, no signalised crossings. Shared paths follow the coastline.

The footpath network in Kiama is illustrated in Figure 4.1.



Source: Kiama Municipal Council

Figure 4.1: Kiama Footpaths



Walk Score is a service which rates a location for its accessibility by walking to attractions and transit options. Each location receives a Walk Score which is based on a weighted average of the scores of many addresses in the neighbourhood. The suburb of Kiama has a Walk Score of 54 – Somewhat Walkable, explained as “some errands can be accomplished on foot”. Most of the residential area near Kiama, east of the Princes Highway, is within the 15 minutes walking distance to the Terralong Street and Manning Street commercial areas.

Figure 4.2 shows the travel distance the average person can walk to in 15 minutes. Most of these streets have footpaths on at least one side of the road.

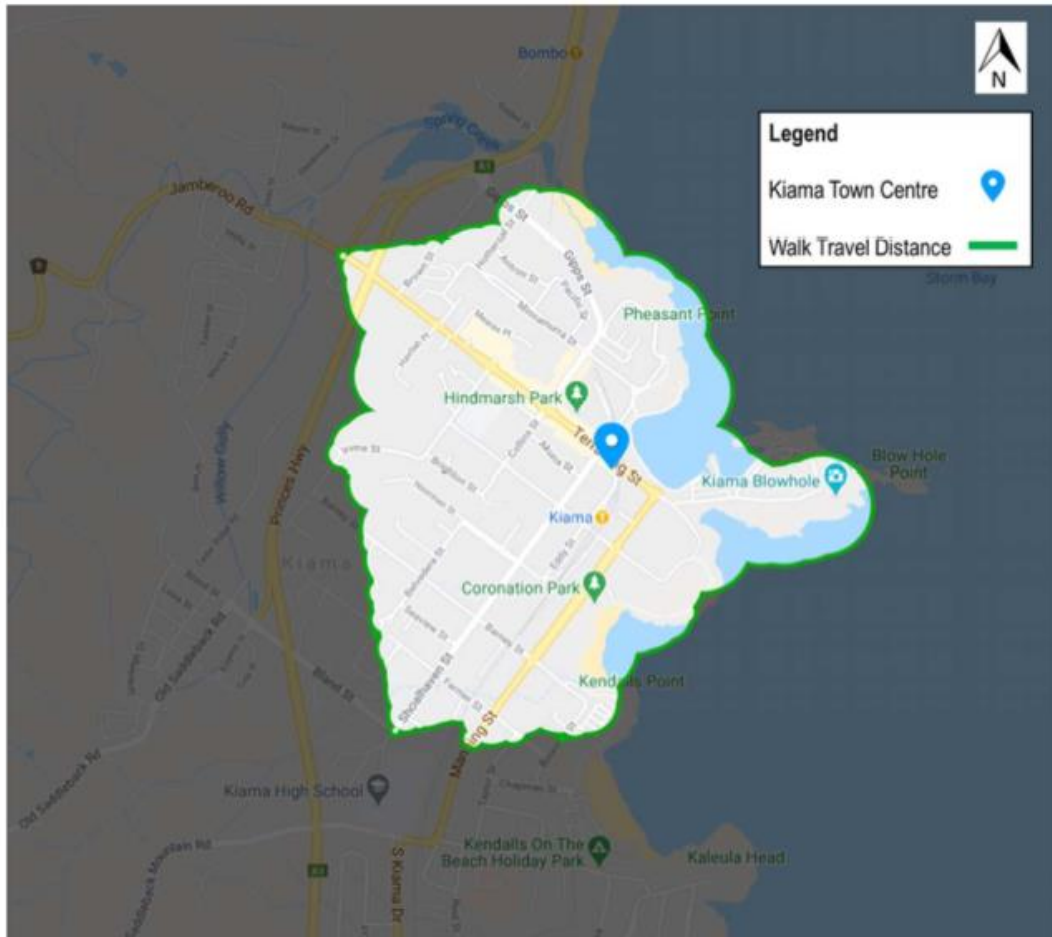


Figure 4.2: 15-Minute Walk Distance from Kiama Town Centre

A large portion of the Kiama residential areas are outside of the 15-minute walking travel distance from the town centre and train station. As a result, it is likely that other travel modes are preferable.

There are significant rises in elevation due to hills in residential areas west of Terralong Street. This makes walking to and from the town centre a less desirable option for many of these residents, especially people with reduced mobility, the elderly, or people with prams and young children.



4.2 Key Walking Issues

The two main issues relating to active transport in Kiama relate to crossing points and footpath links.

4.2.1 Crossing Points

While some sections of the commercial core of Kiama along Terralong Street and Manning Street have pedestrian crossing facilities, other areas have a lack of safe crossing options for pedestrians with most being limited to only kerb ramps. These limitations make the crossing of some areas especially difficult pedestrians that have reduced mobility. Key areas of concern include:

- Bong Bong Street / Railway Parade / Eddy Street: This intersection has kerb ramp crossings only despite being used by large numbers of people from the Eddy Street commuter car park and Bong Bong Street off-street commuter car park. With this intersection being a key vehicle route to avoid the Terralong Street / Manning Street roundabout, pedestrians often have to wait for a safe gap
- Terralong Street, between Railway Parade and Manning Street: This is a wide road, and the only pedestrian crossing infrastructure is a refuge at the Terralong Street / Manning Street roundabout. Pedestrians who wish to cross the road either have to walk a considerable distance to the refuge or risk crossing the road at a point with no crossing infrastructure
- Terralong Street / Blowhole Point Road: Similar to the above point, the only crossing point is a refuge at a roundabout which can be an undesirable distance to walk for pedestrians, especially those with limited mobility.

A number of other crossing issues have been assessed in Part A of this project. These are:

- Terralong Street, between Collins Street and Shoalhaven Street: This section only has a single pedestrian crossing and two unofficial rumble strip crossings. This was assessed in Part A of the report, and the recommendation was to remove one of the rumble strip crossings, and convert the other to a raised pedestrian crossing. The existing pedestrian crossing is also to be converted to a raised crossing
- Collins Street / Akuna Street: Implementation of a pedestrian crossing that would likely be used by students and parents of the nearby Kiama Public School. This was recommended to be supported by traffic calming devices such as speed cushions and appropriate warning signage to mitigate the impacts of the steep approach gradients.

4.2.2 Footpath Links

In general, Kiama is well linked between attractors and generators in the area as well between the commercial core and residential areas. Two existing major deficiencies were identified:

- Akuna Street car parks: With parking occupancy and supply being an ongoing issue in Kiama, these car parks provide residents and visitors with nearby parking opportunities, just one street away from shops along Terralong Street. A drawback from parking in this area is that there are no footpaths along Akuna Street, forcing pedestrians to walk along the nature strip or road to reach their destination
- Thomson Street to Terralong Street (western side): This street contains the Blue Haven retirement village, from which large numbers of trips by elderly residents travel to the town centre. The western side of Thomson Street does not have footpaths, and residents have no crossing points between the village and Terralong Street. Furthermore, Kiama Public School has a frontage to Thomson Street, and while footpaths are available on the eastern side of the street, there are none on the western side.

Streets in Kiama where there are no footpaths either side of the street in the Town Centre Area are listed in Appendix B.



4.3 Cycling

4.3.1 Cycling Routes

In 2005, Kiama Council released the *Kiama Cycleway Plan 2005*. This identified all existing cycling routes and proposed a number of additional routes through the area. The routes identified in this plan are as illustrated in Figure 4.3.



Figure 4.3: Kiama Cycleway Plan 2005 Existing and Proposed Cycle Routes

Existing cycling routes use a range of off-road shared paths and on-road mixed traffic / shoulder lanes.

4.3.2 Bicycle Parking Facilities

There are very limited bicycle parking facilities within Kiama. Cycle racks are located on Terralong Street within the shopping strip, and a bicycle locker hire is located on Eddy Street near the Kiama Station.

Council's *Kiama Cycleway Plan 2005* recommends bicycle racks at the following locations within Kiama:

- Kiama Olympic Pool / Continental Rock Pool
- Kiama Station.



It is worth noting that most shared paths found within Kiama have a width that is less than AustRoads standards. Furthermore, wayfinding signage, reassurance, and general cycling information signage are all limited. There is also a lack of end of trip facilities such as showers at important route destinations.

There are no bicycle sharing systems within Kiama. Bikeshare services are a particularly good option in regional tourist areas so users can travel to and depart and area using public transport, and while there explore it using bicycles, all without needing to use a car.

Examples of existing cycling infrastructure in Kiama are listed in Appendix B.

4.4 Response to Kiama Town Centre Study (TCS) Recommendations

The TCS included a number of recommended actions targeted at improving facilities and routes for pedestrians and cyclists. Responses to TCS recommended actions and community feedback is summarised in Table 4.1.

Table 4.1: Response to TCS Recommended Actions

Feedback / Action	Response
<ul style="list-style-type: none"> ▪ "Focus on town centre area" 	<p>Agreed – Additions to cycling infrastructure in the town centre should be prioritised as this is where the primary demand is currently and expected to grow, as well as to encourage alternative transport options around the core Kiama area.</p>
<ul style="list-style-type: none"> ▪ "Development of preferred suite of bicycle parking racks/ facilities coordinated with street furniture palette" ▪ "Installation of more parking facilities throughout centre in addition to those proposed in the Kiama Cycleway Plan" 	<p>Agreed – There are limited parking facilities for cyclists in Kiama. A number of existing cycling racks were observed to be old or damaged. Modern cycling racks designed in coordination with the streetscape architecture could further emphasise the village atmosphere of the town centre and encourage cycling travel to the town. It is recommended that additional bicycle racks are installed on Terralong Street, providing access to the core shopping and business area of the town centre.</p> <p>Agreed –Additional parking facilities and amenities can improve the attractiveness of cycling to Kiama. Additionally bicycle sharing systems, could encourage cycling as a travel mode or recreational activity within Kiama if introduced to the area.</p> <p>The bicycle locker hire at the station provides only a small number of spaces and the fee could be discouraging to cyclists. Additional bicycle racks could be provided near the station for cyclists to make cycling a more desirable option. Bicycle racks should also be considered at key tourist locations such as the Kiama Continental Pool and the Coast Walk.</p>
<ul style="list-style-type: none"> ▪ "Investigation of possibility for more on-street cycle routes along central streets in town centre" ▪ "Amendment/ update of Cycleway Plan Strategy where relevant" 	<p>Agreed – There is opportunity to address some deficiencies in cycling paths through Kiama, including key streets of Terralong Street and Manning Street. Vehicles already travel at slow speeds within the town centre due to the existing 40 km/h High Pedestrian Activity Area (HPAA) and the village atmosphere of the town. Formalising cycle routes along Terralong Street and Manning Street would drive more cyclist activity to the area.</p> <p>It is difficult to implement cycle routes west of Terralong Street due to steep hills.</p>
<ul style="list-style-type: none"> ▪ "Lack of cycling facilities in the town centre – Cycleway into town stops at Collins Street, disconnected from Harbour" 	<p>Additional cycling routes have been proposed through the Kiama Town Centre area.</p>
<ul style="list-style-type: none"> ▪ "Rumble strips are a hazard for cyclists, are noisy, and confuse visitors" 	<p>The rumble strips have been proposed to be removed in Part A of this project.</p>



Feedback / Action	Response
<ul style="list-style-type: none"> ▪ "Footpath surfaces are uneven, slippery in rain and potentially dangerous and difficult for cycle access" 	<p>Cyclists are not permitted to cycle on footpaths and can only use shared paths or dedicated cycle paths.</p>
<ul style="list-style-type: none"> ▪ Create a better bicycle plan – marked routes, cycle parking and amenities in town centre and safe route to schools and key destinations 	<p>This plan provides high level recommendations to improve cycling facilities and routes in the Kiama area.</p>
<ul style="list-style-type: none"> ▪ Areas outside the town centre have no footpaths to walk on ▪ Provide elevated walkway / boardwalk along Hindmarsh Park 	<p>A footpath gap analysis was undertaken to identify missing footpath links. Ideally, footpaths should be available on one side of the road. An elevated walkway would need to be considered in its own project, as elevated structures may obstruct views in the town centre, but this is outside the scope of this project.</p>
<ul style="list-style-type: none"> ▪ Provide more shade – trees and covered walkways 	<p>Covered walkways assist in improving amenity for pedestrians. Due to costs, these types or facilities are focussed on high pedestrian area only and areas where gathering occurs. Requires further investigation by Council.</p>

4.5 Key Cycling Issues

Issues relating to cycling in Kiama can be separated into cycling routes and cyclist infrastructure.

4.5.1 Limited Cycling Routes

The existing cycling routes in Kiama are generally limited to leisure routes. The commercial core of Kiama, along Terralong Street and Manning Street, is not designated as any type of cycling route. These areas draw the bulk of commercial and retail activity in Kiama, as well as tourist visitation. With the relatively low levels of cyclist activity in Kiama, improvements to infrastructure would assist in increasing utilisation of this travel mode. Improvements to infrastructure can lead to:

- Residents would be able to cycle directly to shops, parks, and other attractors/generators
- Tourists can be less reliant on vehicle travel, reducing pressure on roads and parking
- Commuters from Kiama and other nearby areas such as Minnamurra, Kiama Downs, or the southern part of Kiama will have an additional transport mode to travel to work in the town centre. In particular, the areas to the north have access to a shared path on the eastern side of Princes Highway which can be used to reach Kiama.

In general, there are cycle paths around the tourist areas of Kiama, but not to or through the commercial core along Terralong Street and Manning Street. Council's Kiama Cycleway Plan 2005 contains a number of proposed links which improve connections between existing cycling routes, however, a number of links which may form key parts of cycling access in Kiama are missing. These areas are discussed in Section 6.1.3 and listed in Appendix B.

4.5.2 Cycling Infrastructure Capacity and Demand

Higher rates of in cycling would increase the pressure on existing cycling infrastructure. Having available and accessible bicycle parking facilities in key areas, such as Kiama Station, would encourage further cycling activity. Some residents may be in a position to cycle more if provided with additional facilities and supporting infrastructure, and this would assist in alleviating the current low utilisation of this travel mode

A number of recommendations for cycling are available in Section 6.1.



5. PUBLIC TRANSPORT REVIEW

5.1 Rail Network

Kiama Station is located near the intersection of Railway Parade and Bong Bong Street, with its sole entrance on Railway Parade. It operates on the South Coast Line with services towards Sydney and Wollongong to the north and towards Bomaderry in the south. As the electrification of the South Coast Line ends at Kiama Station, services between Kiama and Bomaderry are operated separately by diesel trains, effectively making Kiama Station a terminus and interchange between diesel and electric services.

Services between Kiama, Sydney, and Bomaderry operate hourly during weekday peak periods. Outside of peak hours and on weekends, services to and from Sydney operate hourly, while services to and from Kiama operate every two hours. Due to a difference in frequencies between rail services, bus service 737 supplements the rail service between Kiama and Bomaderry on weekdays only.

The departure and arrival times of South Coast Line services to and from Sydney or Wollongong during the AM, PM, and weekend mid-day peaks are shown in Table 5.1.

Table 5.1: Departure and Arrival Times at Kiama Station To / From Sydney or Wollongong

Peak	Departure Times	Arrival Times
Weekday AM	5:56, 6:37, 7:13, 7:56, 8:16, 8:56 AM	5:55, 6:20, 7:03, 7:55, 8:39 AM
Weekday PM	3:55, 4:55, 5:50, 6:38, 6:54 PM	4:37, 5:37, 6:14, 6:34 PM
Weekend mid-day	9:56, 11:05, 11:56 AM, 1:05 PM	10:52, 11:47 AM, 12:52 PM

Source: Transport Info NSW

The NSW government has also commenced the *More Trains, More Services* project, and this will include upgrades to the south coast rail line. The project intends to deliver one additional peak and one off-peak service per hour along the south coast rail line. This will make using the train to travel to and from Kiama a much more desirable option for both commuters and tourists.

5.2 Bus Network

Kiama has a number of bus routes which provide some additional connectivity between Kiama and Shellharbour. Bus route 71 is the only public bus service and has only a handful of stops in Kiama, with its primary purpose being an inter-town connection rather than a local commuting option. All bus routes in Kiama operate a small number of trips per weekday and on Saturday, with no bus services operating on Sundays. Bus services 125 and 126 are private coach services and are not on the Opal network. Bookings are required to use these services. While these services provide some additional options for residents, they generally provide more of a social benefit rather than an efficient travel mode for commuters and workers.



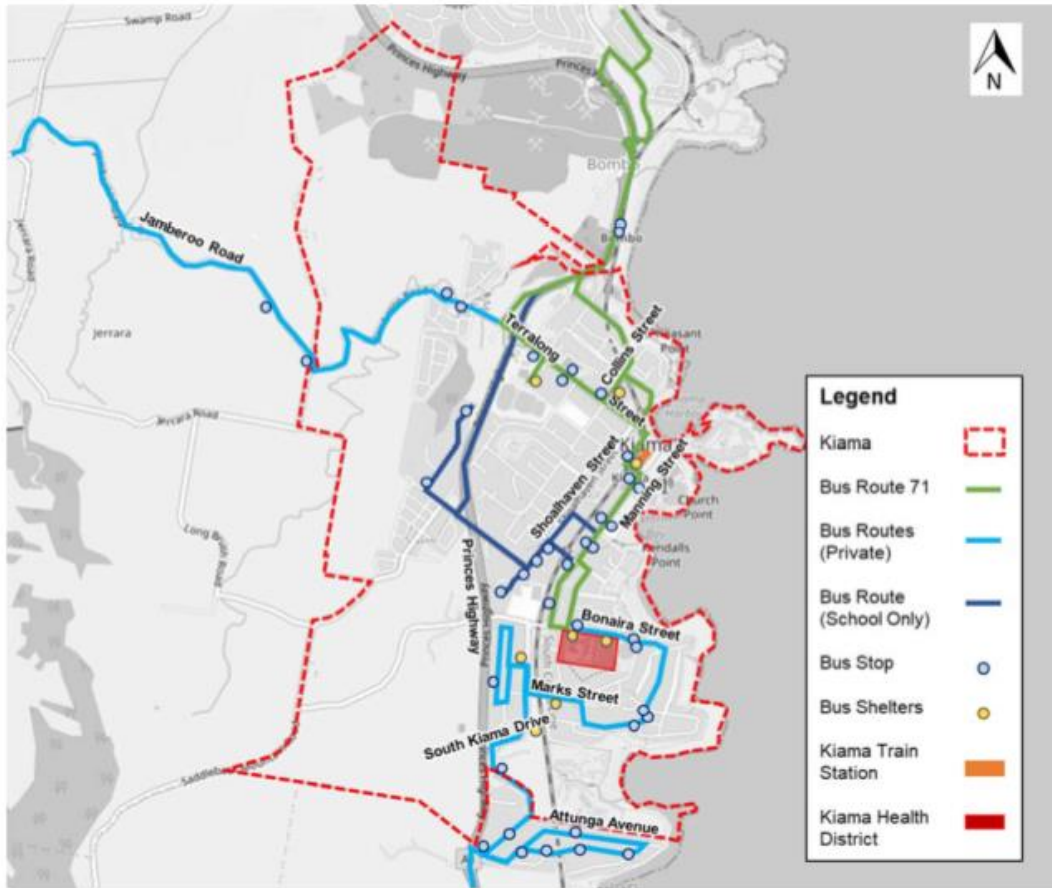
Table 5.2: Bus Routes

Route Number	Destinations	Roads Used	Frequency (Weekday daily trips per direction)
71	Kiama to Shellharbour	Manning Street, Bong Bong Street, Railway Parade, Terralong Street, Collins Street, Havilah Place	8 to 9
125 (non-opal, private service)	Kiama to Jamberoo and Minnamurra Falls	Railway Parade, Bong Bong Street, Manning Street, Terralong Street, Havilah Place	4
126 (non-opal, private service)	Kiama to Gerroa via Gerrigong	Havilah Place, Terralong, Railway Parade, Bong Bong Street, Manning Street	5
737 (Rail Supplement)	Kiama to Bombaderry	Manning Street, Terralong Street, Railway Parade, Bong Bong Street	5
S065 (School Bus)	Kiama High School to Oak Flats	Manning Street, Terralong Street, Minnamurra Street, Spring Creek Drive, Princes Highway	1
S124 (School Bus)	Kiama High School to Calderwood	Taylor Street, Manning Street, Railway Parade, Terralong Street, Shoalhaven Street, Collins Street, Gipps Street, Spring Creek Drive, Princes Highway	1
S138 (School Bus)	Kiama High School to Warilla	Bland Street, Princes Highway	1 to 2
S176 (School Bus)	Kiama to Shellharbour	Gipps Street, Terralong Street, Railway Parade, Manning Street, Taylor Street, Bong Bong Street, Thomson Street, Spring Creek Drive, Princes Highway	1
S199 (School Bus)	Kiama High School to Albion Park	Manning Street, Bong Bong Street, Railway Parade, Terralong Street, Shoalhaven Street, Minnamurra Street, Collins Street, Spring Creek Drive, Princes Highway	1
S213 (School Bus)	Kiama High School to Wollongong	Manning Street, Bong Bong Street, Railway Parade, Terralong Street, Shoalhaven Street, Minnamurra Street, Collins Street, Spring Creek Drive, Princes Highway	1
S237 (School Bus)	Kiama High School to West Wollongong	Manning Street, Bong Bong Street, Railway Parade, Terralong Street, Shoalhaven Street, Minnamurra Street, Collins Street, Spring Creek Drive, Princes Highway	1
S489 (School Bus)	Gerringong to Oak Flats via Kiama	South Kiama Drive, Manning Street, Barney Street, Farmer Street, Shoalhaven Street, Bland Street, Cedar Ridge Road, Bong Bong Street, Railway Parade, Terralong Street, Collins Street, Gipps Street, Princes Highway	1 to 2
S490 (School Bus)	Kiama to Oak Flats via Albion Park	Attunga Avenue, Kalang Road, South Kiama Drive, Wilson Street, Marsden Street, Tombonda Drive, Bonaira Street, Manning Street, Railway Parade, Terralong Street, Jamberoo Road	1 to 2

Source: Transport Info NSW



The bus network and bus stops within Kiama are shown in Figure 5.1. The bus routes provide limited access for residents to travel to the town centre. There are no bus stops along Terralong Street between Collins Street and Manning Street, which is the most likely destination for travellers. Most bus routes stop along Railway Parade, outside Kiama Station. Available bus route connections to other towns include Shellharbour (north), Gerringong (south), and Jamberoo (west).



Map source: OpenStreet Map
 Bus information source: Transport Info NSW

Figure 5.1: Bus Network

5.3 Community Transport

Blue Haven Aged Care Facility provides aged care services such as community transport within Kiama and the Illawarra Region. This is only available to aged care residents within the Kiama Local Government Area (LGA).

Blue Haven also provides social bus trip outings which operate weekly from Monday to Friday at 12:30pm to 4:00pm.

5.4 Bicycle Hire and Bike Share

Some businesses offer hire bicycles for visitors, mostly targeted at single-day hire. Currently, no bicycle share operators are available within Kiama.



5.5 Ride Share, Car Share and Taxis

A number of ride share services operate in Kiama, including Uber and Ola. These can be booked through their respective apps.

Kiama Cabs is the primary taxi service in the area, operating seven vehicles including three maxi taxis which can accommodate persons with a disability (PWD).

The main car share service in Kiama is Car Next Door, which allows people to offer their own cars for hire. There are currently no vehicles listed on this service in Kiama, with the nearest being in Kiama Downs. No car share companies which own and maintain their own vehicles, such as GoGet, currently operate in Kiama.



6. RECOMMENDATIONS

6.1 Active Transport

6.1.1 Add Missing Pedestrian Links

In general, most attractors and generators outside the commercial core are linked by footpaths on at least one side of the road. The town centre along Terralong Street and Manning Street which draws the most pedestrian activity in Kiama has footpaths on both sides of the road.

There are a number of areas that have reasonable levels of pedestrian activity yet do not have adequate connectivity. These areas and their corresponding recommendations are:

- Akuna Street car parks: Add footpaths on both sides of the road which connect to Terralong Street
- Dido Street: Add footpaths on both sides of the road to support people walking to a new bus stop
- Thomson Street to Terralong Street: Install footpaths on the western side of the street.

6.1.2 Improve Crossing Points

Some areas of the town centre have poor crossing opportunities for pedestrians. The following recommendations are proposed:

- Bong Bong Street / Railway Parade / Eddy Street intersection: Implement pedestrian crossing for pedestrians travelling between the commuter parking areas on the south-western side of Bong Bong Street and Kiama Station
- Terralong Street, between Railway Parade and Manning Street: Implement a pedestrian refuge at the midpoint of Railway Parade and Manning Street. There are currently kerb extensions in this location which would minimise the loss of parking spaces
- Terralong Street and Blowhole Point Road: Implement a pedestrian refuge or pedestrian crossing (pending warrant assessment) at this location to support north-south pedestrian movements across Terralong Street.

6.1.3 Expand Cycling Routes

A gap analysis of Council's Kiama Cycleway Plan 2005 identified a number of missing cycling links in the Kiama area. These missing links, and recommended actions are listed in Table 6.1.

Table 6.1: Cycling Route Actions

Road Name	Between	Action
Terralong Street	Havilah Place and Manning Street	Shared Path
Bong Bong Street	Shoalhaven Street and Manning Street	On-Road cycleway
Shoalhaven Street	Terralong Street and Bong Bong Street	On-Road cycleway
Manning Street	Terralong Street and Barney Street	Shared Path
Collins Street	Minnamurra Street and Terralong Street	On-Road separated cycleway
Dido Street	Entire Length	On-road shoulder cycleway
Jamberoo Road	Dido Street and Banksia Drive	On-road shoulder cycleway

Recommended additional routes have been overlaid with Council's cycling plan routes and is illustrated in Figure 6.1



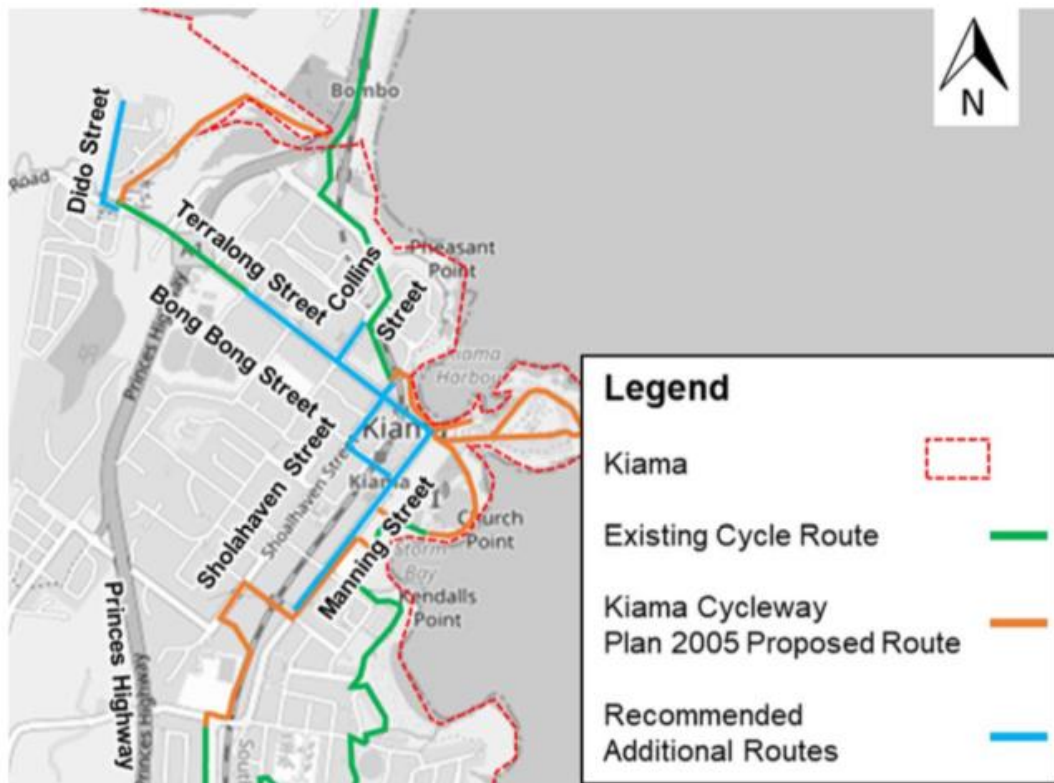


Figure 6.1: Kiama Existing and Proposed Cycle Routes with Recommended Additional Routes

6.1.4 Improve Cycling Support Infrastructure

It is recommended that all new developments in Kiama that have multiple full-time employees be required to prepare a Green Travel Plan as part of their development application, and provide end of trip facilities and secure bicycle storage.

Kiama Station currently only provides bike locker facilities. The feasibility of a bike shed should be investigated by Transport for NSW in order to better service cyclists travelling to the station.

6.1.5 Add Bike Share Services

Bike share services in Kiama would likely increase the numbers of cyclists in the area and lead to reduced private vehicle usage. It is recommended that bike share operators are consulted to identify the reasons for the current lack of services in Kiama.



6.2 Public Transport

6.2.1 Modify Bus Route 71 and Increase Frequency

It is recommended to modify existing bus routes to stop near Dido Street to allow residents to easily travel by bus to the town centre. This would also be supported with more frequent bus services. This additional bus service should also provide a connection to Kiama Station, which would match with Goal 1 from TfNSW's plan. This increase in bus services should be supported by improvements to pedestrian infrastructure so they have a continuous footpath link from their residence to the bus stops.

The proposed modifications to Bus Route 71 is shown in Figure 6.2

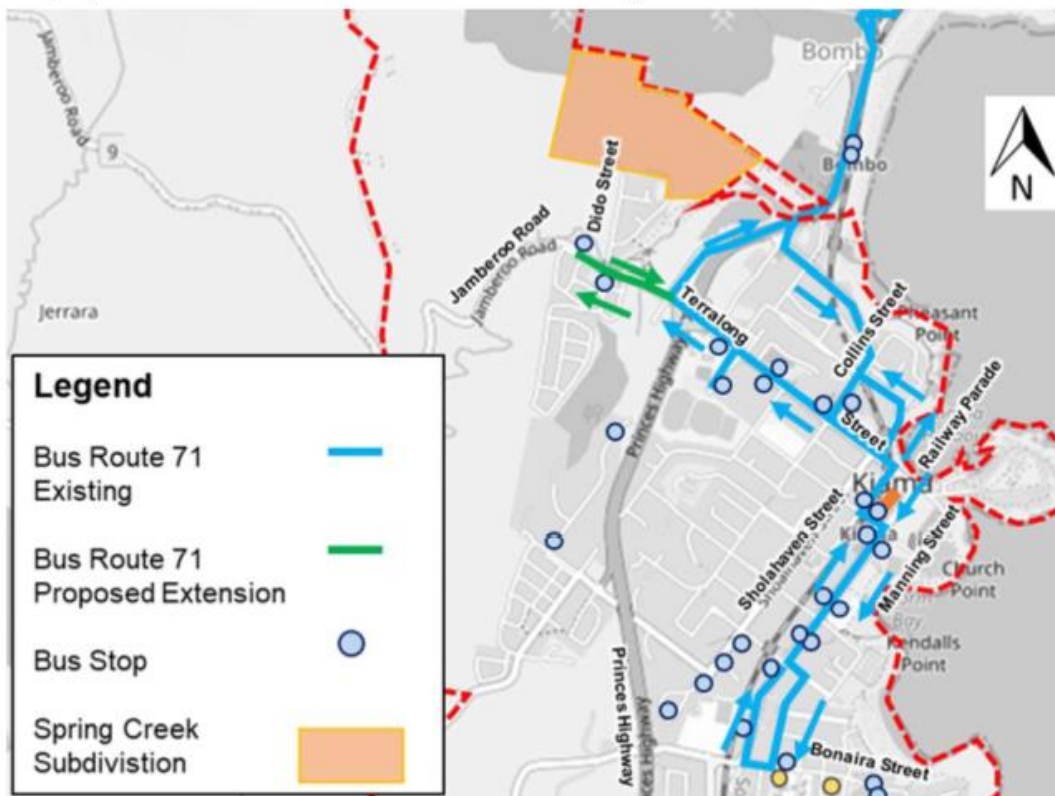


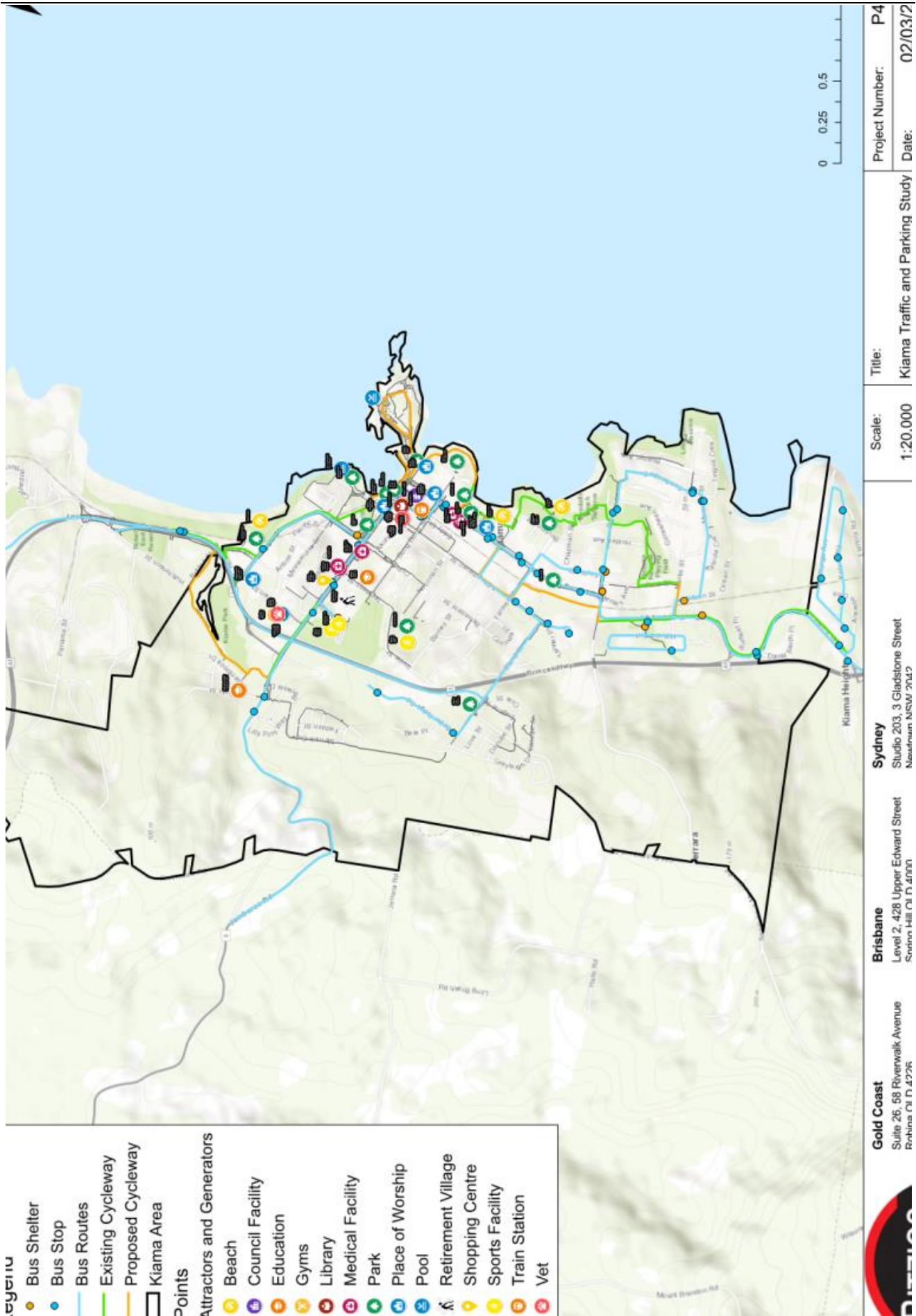
Figure 6.2: Proposed Bus Route 71 Extension

It may also be possible to modify bus route 71 to loop through the subdivision streets via Dido Street. This would be dependent on the road dimensions of the subdivision. This would remove the need to construct turnaround facilities for buses.

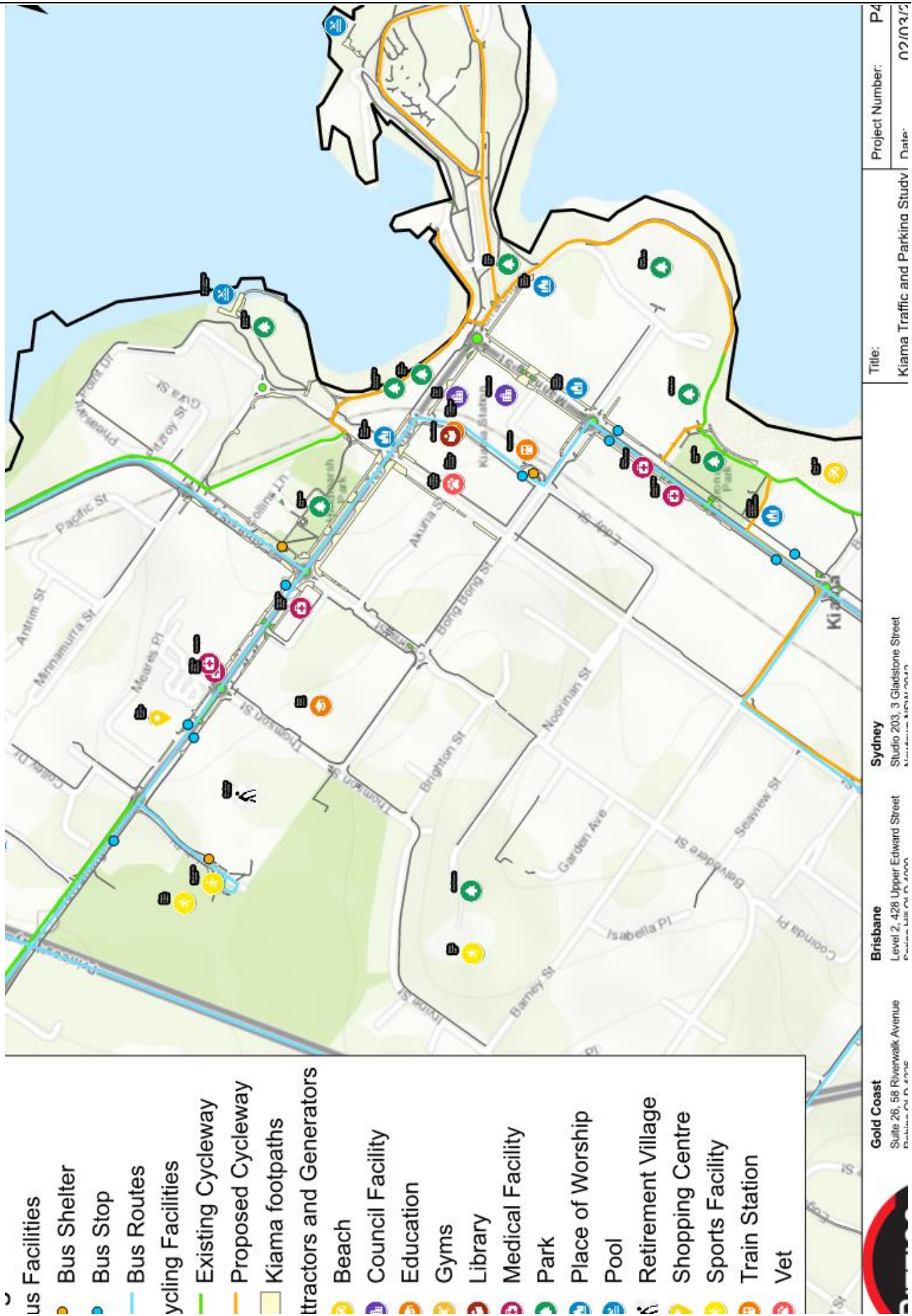




Appendix A: GIS Maps



Gold Coast Suite 26, 58 Riverwalk Avenue Robina QLD 4226	Brisbane Level 2, 428 Upper Edward Street Seaton Hill QLD 4001	Sydney Studio 203, 3 Gladstone Street Newtown NSW 2042	Title: Kiama Traffic and Parking Study	Project Number: P4
			Scale: 1:20,000	Date: 02/03/22



Title: Kiama Traffic and Parking Study
 Project Number: P4
 Date: 02/03/20

Brisbane
 Level 2, 428 Upper Edward Street
 Brisbane QLD 4001

Sydney
 Studio 203, 3 Gladstone Street
 Sydney NSW 2000

Gold Coast
 Suite 26, 58 Riverwalk Avenue
 Gold Coast QLD 4214



Appendix B: Gap Analysis

Walking

Streets in Kiama where there are no footpaths either side of the street in the inner Kiama area are listed in Table B.1. For this purpose, the Inner Kiama area is considered east of the Princes Highway and north of Bonaira Street. Streets outside this area are considered outside of desirable walking distance to Kiama for most individuals. These streets are also more likely to be undeveloped or have only a small number of residences.

Table B.1: Gap Analysis - Streets with No Footpath Facilities – Inner Kiama Area

Road Name	Between
Brighton Street	Entire length
Akuna Street	Entire length
Pacific Street	Entire length
Antrim Street	Entire length
Minnamurra Street	Brown Street and Pacific Street
Pacific Street	Entire length
Antrim Street	Entire length
Meares Place	Entire length
James Lane	Entire length
Brown Street	Minnamurra Street and Gipps Street
Fitzroy Street	Devonshire Street
Gipps Street	Princes Highway and Hothersal Street
Hothersal Street	Minnamurra Street and Gipps Street
Barney Street	Entire length
Garden Avenue	Entire length
Noorinan Street	Collins Street and Shoalhaven Street
Seaview Street	Entire length
Belvedere Street	Entire length
Elouera Place	Entire length
Cooinda Place	Entire length
McFaul Place	Entire length
Tanner Place	Entire length
Weston Place	Entire length
Farmer Street	Manning Street and Bourrool Street
Hatwell Crescent	Entire length
Bourool Lane	Entire length
Barney Street	Manning Street and Burrool Street
Bourool Street	Entire length
Chapman Street	Entire length
Taylor Street	Entire length
Orana Avenue	Entire length
William Street	Entire length
O'Keefe Place	Entire length



Streets where there are no footpaths either side of the street in the remaining Kiama area are shown in Table B.2.

Table B.2: Gap Analysis - Streets with No Footpath Facilities - Outer Kiama

Road Name	Between
Dido Street	Entire length
Glenbrook Drive	Entire length
Keppel Street	Entire length
Evans Place	Entire length
Lilly Pilly Way	Entire length
Turpentine Street	Entire length
Melia Street	Entire length
Coachwood Street	Entire length
Banksia Drive	Entire length
Greyleigh Drive	Entire length
Love Street	Entire length
Price Avenue	Entire length
Danube Street	Entire length
Finlayson Avenue	Entire length
Pike Place	Entire length
Old Saddleback Road	Bland Street and Danube Street
Dudgeon Street	Entire length
Cole Street	Entire length
Cedar Ridge Road	Entire length
Gwinganna Avenue	Entire length
Tombonda Drive	Entire length
Tingra Crescent	Entire length
Marsden Street	Entire length
Ocean Street	Entire length
Wilson Street	Entire length
Surfleet Place	Entire length
Girrawheen Avenue	Entire length
Tharkinna Avenue	Entire length
Hillview Crescent	Entire length
Saddleback Mountain Road	Entire length (urban area only)



Cycling

Gap Analysis

A number of links which may form key parts of cycling access in Kiama are missing. These areas are listed in Table B.3.

Table B.3: Gap Analysis - Key Cycling Routes

Road Name	Between
Terralong Street	Havilah Place and Manning Street
Bong Bong Street	Shoalhaven Street and Manning Street
Manning Street	Terralong Street and Barney Street
Collins Street	Minnamurra Street and Terralong Street
Dido Street	Entire Length
Jamberoo Road	Dido Street and Banksia Drive

Cycling Infrastructure

There are various types of cycling infrastructure currently used in Kiama, as described in Table 2.1.

Table B.4: Examples of Cycling Infrastructure within Kiama

Type	Infrastructure	Example
Path	On-road Shoulder Lane	
Path	Off-road Shared Path	
Path	On-road Mixed Traffic	



Type	Infrastructure	Example
Signage	Shared Path	
Signage	Bicycle Route	
Signage	Bicycle Wayfinding	
Signage	Cyclists Dismount	
Signage	Road Ahead Warning	
Signage	Bicycles On Road Warning	



Type	Infrastructure	Example
Storage	Bike Locker Hire	
Storage	Bike Rack	

6.2 Waste & Environmental Management

CSP Objective: Outcome 2.3: We use our natural resources in efficient and sustainable ways; managing, improving or enhancing through protection, restoration and maintenance.

CSP Strategy: 2.3.1 Responsibly manage resources and waste. Limit the waste we send to landfill.

Delivery Program: 2.3.1.1 Meet our future waste infrastructure and service needs through promotional, service delivery and infrastructure programs.

Summary

Committee members have expressed a desire to discuss Waste & Environmental Management

Financial implication

None for this report

Risk implication

None for this report

Policy

Infrastructure & Liveability Advisory Committee – Terms of Reference

Consultation (internal)

None for this report

Communication/Community engagement

The purpose of this report

Attachments

Nil

Enclosures

Nil

RECOMMENDATION

That the Committee note the status of Infrastructure & Liveability strategy development and indicate their interest in future involvement once the documents are prepared

Background

The Committee members have expressed a desire to discuss waste & environmental management issues.

Report of the Director Infrastructure & Liveability

6.2 Waste & Environmental Management (cont)

Although the Infrastructure & Liveability directorate operationally manages a series of environmental issues, the majority of strategy documents are developed through the Planning, Environment & Communities directorate e.g. the Coastal Management Program www.kiama.nsw.gov.au/Council/Projects/Coastal-Management-Program.

The main areas of strategy development in the Infrastructure & Liveability directorate are in:

- a. The Municipal Waste Strategy – currently being drafted for reporting to council as a draft in approximately May. This Strategy will be forwarded to the Committee when available from the consultant
- b. Related to the Waste Strategy – the Waste Services Service Review. This document is currently be drafted by the Consultant and programmed for receipt at the end of April. Subject to initial internal review and industrial relations matters this document could be made available to the committee as well as potentially a briefing from the sponsoring member of the Financial Advisory Committee

6.3 Planning for Community Facilities

CSP Objective: Outcome 1.1: We want a strong sense of community and belonging, where social and cultural life can flourish; and our families, friends and visitors feel welcome and included.

CSP Strategy: 1.1.1 Provide spaces, services and initiatives that foster a proud, inclusive, and connected community for all.

Delivery Program: 1.1.1.4 Improving the liveability of Kiama for those with diverse backgrounds and abilities.

Summary

The Committee has expressed an interest in contributing to the planning of community facilities and infrastructure due to growth.

This report provides information on the available information and potential opportunities.

Risk implication

None for this report.

Policy

Infrastructure & Liveability Advisory Committee Terms of Reference

Consultation (internal)

None for this report

Communication/Community engagement

The purpose of this report

Attachments

1 Leisure Centre Service Review

Enclosures

Nil

RECOMMENDATION

That the Committee provide feedback on the draft planning documents and advice on the way to take them forward to completion.

Background

The Committee has expressed an interest in contributing to the infrastructure and community facilities provision for the Municipality.

Report of the Director Infrastructure & Liveability

6.3 Planning for Community Facilities (cont)

Council is currently developing a series of strategic documents, that are not yet complete, to enable broader community input – see attachments.

1. Preliminary Draft Open Space & Recreation Strategy
2. Draft 240130 Kiama Sports Complex Community Consultation Report
3. Draft 240130 South Werri Reserve Community Consultation Report

The completion of these projects has been delayed due to internal resource capacity constraints and specific site issues e.g. the Kiama Sports Complex was specifically scoped to exclude the Leisure Centre; however, the recent service review (see attachment 4) has confirmed that this may result in a poor holistic outcome for the site so the scope of works is being altered.

The Committee could consider providing feedback on the current planning documents and advice on the way to take them forward to completion.

Council is also currently directly engaged with development proposals for 3 sites and a stakeholder for a third site that may have significant impacts on the size and type of community for Kiama over the coming decades:

- i. Bombo - West Kiama ('Springside Hill') claims 1069 dwellings
- ii. South Kiama approximate yield is 444 dwellings
- iii. unit developments / redevelopments in the town centre we'd be looking at around 200 or so units.
- iv. Master planning for Bombo Quarry (by others) 3,200 dwellings + commercial area (noting that Council cannot currently share any details on this site as it is only a stakeholder not the project driver)

The Committee may like to express a view on how council can integrate these potential community changes into the planning for public infrastructure and facilities. The committee could consider inviting a representative of the Director Planning, Environment & Communities to provide a briefing on these growth matters.

Council's Community Hubs team are also undertaking a community facilities review, to develop a discussion paper on the provision of community facilities (halls etc) and an activation strategy for increasing utilisation. It is possible that this discussion paper may be available for the May meeting.



Item 6.3

Attachment 1



**Kiama Leisure Centre
Service Review – Summary Report**

February 2024



Document status

Job #	Version	Written	Reviewed	Approved	Report Date
7751	1	C. Middleton	S. Bunting	S. Bunting	16 February 2024

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Executive Summary

Kiama Municipal Council (“Council”) owns and operates the Kiama Leisure Centre, located at Havilah Place, Kiama. Constructed in 1982 and first opened in 1983, the Kiama Leisure Centre is Council’s key multipurpose swimming, fitness and sports facility and plays a critical role in contributing to the overall health, wellbeing, fitness and leisure needs of the Kiama community.

In December 2023, Kiama Municipal Council engaged Morrison Low Consultants (“Morrison Low”) to undertake an external service review of the Kiama Leisure Centre. This review was carried out from December 2023 to February 2024, and informed by engagement with a range of internal stakeholders as an objective review of the Kiama Leisure Centre’s service delivery arrangements and performance.

Service delivery challenges

Key challenges affecting service delivery include:

- A lack of clear strategic long-term direction and market focus for the Kiama Leisure Centre
- Internal expertise and skills in aquatic and leisure management
- Age and poor condition of the Kiama Leisure Centre asset and facilities
- Extensive range of services currently provided and resourcing challenges associated with service delivery

Improving service delivery and performance

We recommend that Council:

1. Review the Kiama Leisure Centre Strategy, ensuring the vision, goals, target market, and strategies to deliver operational performance are updated and consistent with Council’s strategic objectives.
2. Reconsider the service offering and whether Council is best placed to be the provider/operator of services currently provided at the Kiama Leisure Centre (e.g. childcare, fitness and swim coaching), or whether these are better outsourced to commercial operators via contract or licences.
3. Establish and endorse expected service levels and Key Performance Indicators (KPIs) for the Kiama Leisure Centre, and ensure that KPIs are monitored and reported on a quarterly basis.
4. Apply corporate overheads to the Kiama Leisure Centre to establish the true cost of operating the centre and providing its various services, programmes and activities.
5. Introduce user fees for the Jamberoo Public Swimming Policy via the 2024/2025 Statement of Revenue Policy and ensure an appropriate secure entry system is introduced ahead of the 2024/2025 swim season.
6. Review the Chart of Accounts to enable the costs attributable for each service offering (including apportioned overheads) to be monitored alongside revenue.
7. Ensure the financial impact of any changes in service offerings and service levels is modelled in Council’s Long-Term Financial Plan.
8. Review and update Council’s Buildings Asset Management Plan to include Kiama Leisure Centre’s forward maintenance and renewal requirements.
9. Develop and adopt a Kiama Leisure Centre Masterplan, ensuring the development of the Masterplan is informed by robust community engagement.



10. Prepare a Business Case to assist in securing grant funding to deliver the Kiama Leisure Centre Masterplan (once developed).
11. Consider transitioning functional responsibility for the operational oversight of rock pools to the Leisure Centre Manager.
12. Consider transitioning functional responsibility for the operational oversight of Beach Lifeguards to the Leisure Centre Manager.
13. Consider transitioning responsibility for building maintenance at the Kiama Leisure Centre to Council's Facilities and Maintenance team.
14. Review Kiama Leisure Centre team structure with the objective of reducing management layers.
15. Review, align and update position descriptions for Kiama Leisure Centre positions.
16. Review the model of engagement of casual employees engaged at the Kiama Leisure Centre, including the management of all casual employees, to ensure industrial risks are being proactively managed and mitigated.
17. Complete the review and consolidate the Kiama Leisure Centre Operations Manual, ensuring that it is regularly reviewed and quality controlled for currency.

Management has been provided, under separate cover, several additional recommendations to those above. As these recommendations contain matters and issues that are considered confidential under the *Local Government Act 1993* ("the Local Government Act"), they have not been detailed in this Summary Report.

Service delivery model

The Kiama Leisure Centre is currently operated via direct management, which is advantageous in that it allows Council to retain direct influence over how the centre's services, programmes and activities are delivered to customers and community. There are, however, significant drawbacks and risks attached to this model: Council has limited capacity to reduce operational costs, which are driven by market forces, legislative requirements and community expectations, and meeting agreed service levels is challenged due to resourcing constraints and employee retention issues. Maintaining this model requires a high degree of specialist industry expertise, which local councils typically do not possess.

Moving forward, Council should instead assess whether indirect management would be a more suitable service delivery model. Under this model, Council could engage a specialist commercial operator with the necessary industry expertise and capability to assume management of the Kiama Leisure Centre and introduce new management and operating standards, which could in turn benefit customers, community and Council. Responsibility for the Jamberoo Public Swimming Pool could also be included in the management contract, which could deliver further efficiencies for Council.

Should Council determine to pursue an alternative service delivery model, it should be noted that implementing a revised model requires a significant lead-time, of around nine (9) to twelve (12) months and contingent on having a clear future direction for the Centre. This period would allow Council to prepare and undertake a tender process, as required under the Local Government Act, and execute transitional arrangements to ensure a seamless transition for customers and community. Further analysis of the financial and industrial implications of terminating direct management and pursuing an indirect management model should be undertaken prior to any decision being made.

Looking forward: masterplanning and case for change

Irrespective of the management model favoured by Council; the Kiama Leisure Centre is ageing, and its condition is deteriorating. The design and layout of the centre reflect the era in which the facility was constructed but are inconsistent with contemporary expectations and standards. With the facility



approaching end of life, Council will soon need to make complex decisions regarding the future of the Kiama Leisure Centre, including either its upgrade or redevelopment.

Since the Kiama Leisure Centre was constructed in 1982, community expectations in relation to leisure and aquatic facilities have evolved considerably. Facilities are now seen as health and wellbeing hubs, and there is an expectation that public facilities of the Kiama Leisure Centre's size and scale incorporate design features that are accessible and inclusive, environmentally sustainable, and which reflect the demographics and service needs of the local community. All these factors should be considered by Council in its decision-making.

While the Kiama Leisure Centre has been excluded from the scope of the Kiama Sports Complex Masterplan, it is critical that Council develop a Masterplan to guide future decision-making relating to the centre. Council is strongly encouraged to programme the development of a Masterplan, either as an addendum to the Kiama Sports Complex Masterplan (once completed) or as a standalone strategic document, via its next Delivery Program. This masterplanning process should be underpinned by robust engagement with the Kiama Municipality community.



Service review findings

Table 1 Service review findings and commentary

Guiding question	Finding and commentary
<p>Should this service be delivered to the community?</p>	<p>The Community Strategic Plan identifies the outcomes of this service as important services and outcomes for the Kiama Municipality community. Residents are most satisfied with the pool and hall components of the Kiama Leisure Centre and less satisfied with the gym.</p> <p>Over the long-term, Council should consider which elements of the Kiama Leisure Centre need to be delivered to the community.</p> <p>There is arguably a strong need for aquatic services (e.g. pools) to be provided to the community, noting that the Kiama Leisure Centre and Jamberoo Public Swimming Pool are the only public swimming facilities in the Kiama Municipality.</p> <p>However, other services currently provided by the Kiama Leisure Centre – including childcare, gym and fitness services – should be reviewed, noting that there are other commercial providers of these services now operating in the Kiama Municipality and Council is competing against those other operators.</p>
<p>If so, how should it be delivered?</p>	<p>Council is not required to be a direct provider of the Kiama Leisure Centre facilities. Council can:</p> <ul style="list-style-type: none"> (a) Provide and manage all services (current model). (b) Outsource the provision of some services. (c) Outsource the provision of all services. <p>Currently, Council provides and manages all services, which requires a high number of casual employees to be engaged at the Kiama Leisure Centre. As discussed in this report, this model presents risks to Council. Instead, we would recommend that Council consider transitioning to Option B until such time as the future of the Kiama Leisure Centre asset is determined.</p> <p>As discussed in Section 5.3 of this report, there are also a range of management models available to Council over the long-term. We would suggest that Council explore adopting an indirect management model, where the management of the facility is contracted out to an external operator. This should be progressed once the future of the Kiama Leisure Centre asset is determined.</p>
<p>Is this service delivering on community needs and Council's goals?</p>	<p>Council's current Delivery Program and Operational Plan do not include clear performance targets and measures for the Kiama Leisure Centre and its various services, programmes and activities. As such, it is challenging to determine whether the service is delivering on community needs and Council's goals.</p> <p>Council is encouraged to establish clear performance targets and measures for the Kiama Leisure Centre in its next Delivery Program.</p>
<p>Is the service being delivered using the most appropriate service delivery mechanisms?</p>	<p>Council has not yet explored other service delivery mechanisms, so it is challenging to assess whether the current model is the most appropriate. However, preliminary research and analysis conducted as part of this service review indicate that Council should explore transitioning to an indirect management model.</p> <p>Successfully operating and managing a facility of the Kiama Leisure Centre's size requires industry expertise and mature systems, processes and work practices to enable efficient service delivery. On the information available, we would suggest that an established industry operator may be better placed to manage the Kiama Leisure Centre for Council.</p>



Guiding question	Finding and commentary
	<p>There are several established industry operators active in the NSW market, and in recent years, several rural and regional local councils have transitioned from a direct management model to an indirect management model. Research suggests that this can be financially advantageous for councils, and beneficial for their communities, who benefit from improved service delivery.</p>
<p>Is the service being delivered as efficiently and effectively as possible?</p>	<p>On the information available, the service is not being delivered as efficiently as possible. Currently, the Kiama Leisure Centre engages a large number of casual employees to deliver various services, programmes and activities provided by the centre.</p> <p>In the short-term, efficiencies could be achieved via shifting away from delivering many services internally and instead leasing/contracting these to alternative providers. Over the long-term, Council should consider transitioning to an indirect management model.</p>
<p>Is the service resourced appropriately?</p>	<p>Under the current operating model, the service is adequately resourced. As noted above, Council should review the current operating model and explore whether an indirect management model would be more advantageous.</p>
<p>Is the service meeting current service standards and levels?</p>	<p>As service levels have not been established via Council’s Delivery Program and Operational Plan, we are unable to determine whether those standards and levels are being met.</p> <p>We would recommend Council establish clear service standards and levels in its next Delivery Program.</p>
<p>What are the current and future issues affecting the service, and what should be done about them?</p>	<p>The main issues impacting the future service provision are:</p> <ul style="list-style-type: none"> • Lack of clear market focus and long-term direction – develop strategic plan and business plan. • Lack of internal expertise in commercial aquatic centre management – explore transitioning to indirect management model. • Ageing asset in poor condition – improved asset management planning and implementation coupled with renewal or replacement strategy. • Service provision optimisation – investigate service provision opportunity, through contractors, licencing and leasing (short-term), and transitioning to indirect management model (long-term).



1 Introduction

1.1 Background

Local councils are responsible for delivering a wide range of services to their communities and exercising an extensive suite of service, regulatory, revenue, administrative, enforcement and ancillary functions under the Local Government Act and other legislation.

Under the Integrated Planning and Reporting (“IP&R”) framework provisions of the Local Government Act, all local councils are required to plan holistically for the future and must develop a suite of interrelated strategies to guide their long-term planning and decision-making in relation to service delivery and resources. All plans, policies, programs, and activities developed and undertaken by local councils must directly relate to their respective IP&R frameworks.

The IP&R framework is designed to support local councils in establishing service levels, monitoring service performance, improving service delivery and encouraging continuous improvement across their organisations and operations.

The *Integrated Planning and Reporting Guidelines for Local Government in NSW* (“the Guidelines”) published by the NSW Office of Local Government (“the OLG”) and prescribed under the Local Government Act provide that local councils must, via their Delivery Program, “*identify areas of service that the council will review during its term, and how the council will engage with the community and other stakeholders to determine service level expectations and appropriate measures*”.

In turn, local councils must specify which service delivery reviews they will undertake each year via their annual Operational Plan, and report on the results of such reviews in their Annual Report. Importantly, councils must disclose in their Annual Report any changes they have made to services in response to the findings of service delivery reviews undertaken in the previous year.

The service review process asks local councils to consider the following questions when reviewing services:

1. Should this service be delivered to the community?
2. If so, how should it be delivered?
3. Is this service delivering on community needs and Council’s goals?
4. Is the service being delivered using the most appropriate service delivery mechanisms?
5. Is the service being delivered as efficiently and effectively as possible?
6. Is the service resourced appropriately?
7. Is the service meeting current service standards and levels?
8. What are the current and future issues affecting the service, and what should be done about them?

A service delivery review is a vital process for local councils and will ensure that their service functions are:

- **Appropriate** – that is, services meet current community needs and wants, and can be adapted to meet future needs and wants,
- **Effective** – that is, councils deliver targeted, better-quality services in new ways,
- **Efficient** – that is, councils improve resource use (people, materials, equipment, infrastructure) and redirect savings to finance new or improved services, and
- **Affordable** – that is, the community is able to afford the current and any proposed future service levels.



1.2 Context

The Kiama Municipality

The Kiama Municipality is located in south-east NSW and supports a permanent population of approximately 23,074 residents. Encompassing an area of 258 square kilometres, the Kiama Municipality is bordered by Shellharbour City to the north, Wingecarribee Shire to the west and Shoalhaven City to the south.

As with most other communities on the south-coast of NSW, the Kiama Municipality's local population is both growing and ageing. Over the 20-year period from 2021 to 2041, the NSW Department of Planning projects that the Kiama Municipality's population will grow at an annual rate of 1.28 per cent, higher than the NSW average of 0.95 per cent, to comprise close to 31,000 residents by 2041. According to 2021 Census data, the median age of the local population is 48 years, significantly higher than the NSW average of 39 years, and 35.8 per cent of the local population is aged 60 years or older, also significantly higher than the NSW average of 23.5 per cent.

The Kiama Municipality supports a diverse economy, with its stunning natural beauty and idyllic coastline ensuring that tourism is the region's biggest economic driver. The tourism industry contributes approximately \$244 million to the local economy, with more than one million people visiting Kiama each year. As at 2021, the largest industries generating jobs were hospitals (4.9 per cent), primary education (3.6 per cent), cafes and restaurants (3.3 per cent), secondary education (3.0 per cent), and local government administration (2.9 per cent).

Kiama Leisure Centre

The Kiama Leisure Centre is Council's flagship multipurpose swimming, fitness and sports facility and is open 360 days of the year, for 95 hours each week. Located at the Kiama Sports Complex, the facility incorporates an eight-lane 25 metre indoor lap pool, toddler pool, spa, sauna, gym and group fitness room, along with an indoor sports hall and creche.

Built in 1982 and opened in 1983, the facility is now over 40 years old, and its condition is deteriorating. Despite the relative success of the service operation and delivery of periodic facility upgrades since its establishment; the Kiama Leisure Centre's infrastructure and operational plans are being reviewed to ensure Council is demonstrating a proactive and strategic approach to the facility's long-term strategic management.

Other aquatic facilities in the Kiama Municipality include the Jamberoo Public Swimming Pool, which is an outdoor pool and open from December to March each year, and rock pools located at Black Beach, Blowhole Point, Boat Harbour and South Werri. While the Jamberoo Public Swimming Pool is staffed by Council employees, the Municipality's four rock pools are unstaffed.

1.3 Project objective and scope

In December 2023, Morrison Low was engaged by Council to undertake an external service review of the Kiama Leisure Centre. The objective of the service review was to analyse service needs and demand and explore future directions in relation to the Kiama Leisure Centre, including potential alternative operating models.

1.4 Acknowledgements

We wish to thank Council for all the assistance, cooperation and courtesy extended to us over the course of our review, particularly during our site visit to the Kiama Shire from Tuesday, 9 January to Wednesday, 10 January 2024.



1.5 Limitations and restrictions

In preparing this report, Morrison Low has relied on:

- Information provided in-confidence by Council,
- Feedback provided by Council's staff,
- Feedback provided in-confidence by external stakeholders,
- Publicly available information, and
- Our own analysis.



2 Service summary and delivery arrangements

2.1 Service summary

The Kiama Leisure Centre is Council's key multipurpose swimming, fitness and sports facility. The centre is open 360 days of the year, for 95 hours each week. The Kiama Leisure Centre incorporates the following buildings and facilities:

- 25-metre indoor swimming pool
- Indoor toddlers pool
- Spa
- Sauna
- Gym
- Group fitness classes
- Indoor sports hall
- Creche
- BBG facility
- Changerooms and toilets (male and female)
- Reception/kiosk
- Plant and filter rooms.

Council's staff employed at the Kiama Leisure Centre plan and deliver a comprehensive program of activities throughout the year for members of the community accessing the centre. Specific services delivered via the Kiama Leisure Centre include:

- Aqua aerobics
- Childminding services
- Holiday activities
- Group fitness and personal training
- Gymnastics classes
- Indoor court hire
- Learn-to-swim and swim coaching classes.

The Kiama Leisure Centre also manages the Jamberoo Public Swimming Pool, which is staffed by lifeguards from November to March.

2.2 Legislative context and considerations

Aquatic facilities are not statutory responsibilities of local councils under the Local Government Act, or another Act of Parliament. As such, these services are technically considered "discretionary" or "non-core", rather than "non-discretionary" or "core" responsibilities. Notwithstanding this, local communities commonly expect their council to operate a public swimming pool, given Australia's climate and the important role that public swimming pools play in supporting social cohesion and improved health and wellbeing.

Section 24 of the Local Government Act provides that Council may provide services appropriate to the current and future needs within the Kiama community, subject to the provisions of the Local Government Act and accompanying *Local Government (General) Regulation 2021* ("Local Government Regulation").



Where councils operate public swimming pools, they must ensure compliance with a range of legislation, including the *Public Health Act 2010*, *Public Health Regulation 2012*, *Swimming Pools Act 1992* and *Swimming Pools Regulation 2018*.

2.3 Strategic alignment

Under the IP&R provisions of the Local Government Act and accompanying Local Government Regulation, Council is required to develop and adopt an interrelated suite of strategic planning documents, underpinned by a Community Strategic Plan, to guide its decision-making processes.

As illustrated in *Table 2*, below; there is a clear strategic link between the provision of aquatic and recreational services via the Kiama Leisure Centre and the current Kiama Municipal Council Community Strategic Plan, along with Council's Delivery Program 2022-2026 and Operational Plan 2023-2024.

Table 2 Kiama Municipal Council IP&R strategic alignment

IP&R Document	Reference	
Community Strategic Plan	1.2	We love where we live; we have the services and facilities we need, and the natural beauty of our surroundings enhances our safe, active and healthy lifestyle.
Delivery Program 2022-2026	1.2.1	Provide spaces, services and initiatives that foster a proud, inclusive connected community for all.
Operational Plan 2023-2024	1.2.1.3	Manage and maintain the safe operation of a seasonally used outdoor pool in accordance with legislative obligations.
	1.2.1.4	Manage Leisure Centre services and administration for members and guests and provide fitness programs, classes and gym using purpose-specific equipment and a clean and safe environment.

2.4 Recent strategic, management and administrative reviews and decisions

2.4.1 Kiama Leisure Centre Strategic Plan (2008)

In 2007, Council engaged an external consultancy, Direct Incite Pty Ltd, to develop a strategic plan for the Kiama Leisure Centre. The subsequent strategic plan covered the five-year period from 2008 to 2012. In the 12 years since, Council has not reviewed or developed a new strategic plan for the facility.

2.4.2 Kiama Leisure Centre Liability Risk Engineering Report (2022)

In 2022, risk management consultancy Willis Australia Limited ("WTW") prepared a liability risk engineering assessment of the Kiama Leisure Centre on behalf of CivicRisk Mutual and Council as part of their third-party liability control program.

This assessment resulted in Council being provided 18 recommendations to better manage and mitigate liability risk. Of these, five (5) were identified as high priority; 11 were identified as medium priority; and three (3) were identified as low priority.

2.4.3 Kiama Sports Complex Masterplan (Current)

Council has recently commissioned a Masterplan of the Kiama Sports Complex, via grant funding obtained under the Commonwealth Government's Local Roads and Community Infrastructure Program (Phase 3). The scope of this Masterplan does not extend to include the Kiama Leisure Centre but is instead, limited to those



recreational assets surrounding the facility, including netball courts, skate park, public car park, grass sporting fields and athletic track.

Figure 1 Map of Kiama Sports Complex Masterplan scope

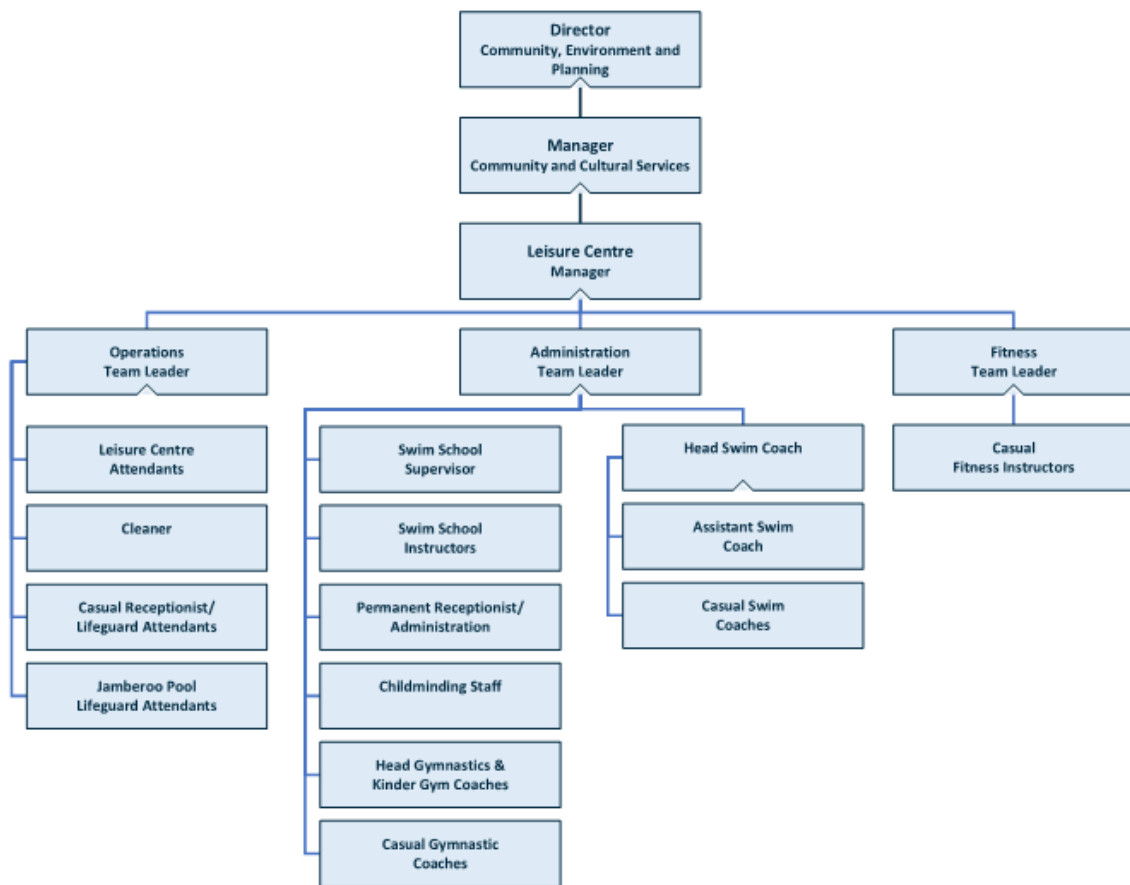




2.5 Service resourcing

The Kiama Leisure Centre is currently managed by a full-time permanent Leisure Centre Manager, who is in turn supported by three full-time permanent team leaders, each overseeing different aspects of the centre’s operations. Council currently employs a large number of casual employees to support the delivery of the Kiama Leisure Centre’s various services, programmes and activities provided.

Figure 2 Kiama Leisure Centre structure

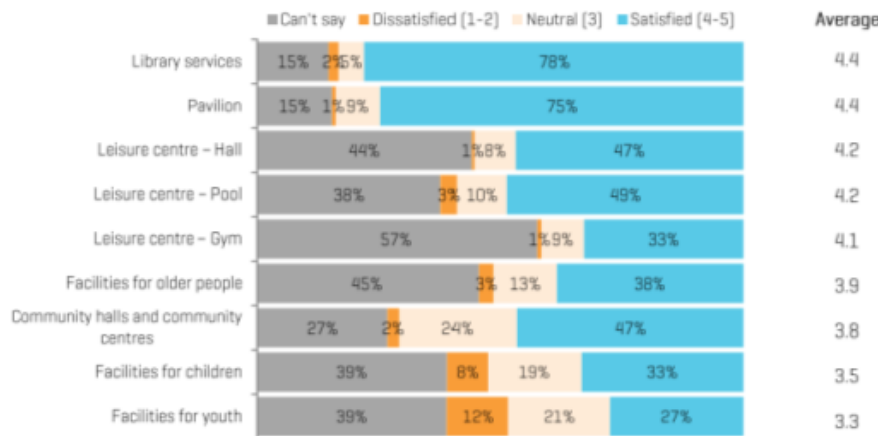


2.6 Community importance and satisfaction

Council regularly commissions external market research company, IRIS Research, to undertake a Community Satisfaction Survey aimed at gauging community sentiment on a range of Council services and facilities, including the Kiama Leisure Centre, and identifying opportunities for improvement. Results of the most recent Community Satisfaction Survey, carried out in 2020, indicate that the community is generally satisfied with the Kiama Leisure Centre. Indeed, results suggest that the Kiama Leisure Centre enjoys the third highest level of satisfaction of Council-operated facilities, after Council’s library services and the Kiama Pavilion.



Figure 3 Community satisfaction with Kiama Municipal Council facilities (Community Satisfaction Survey 2020)



In 2022, Council undertook a targeted Kiama Leisure Centre survey to gather comprehensive information to guide Council in improving customer satisfaction and enhancing the quality of services offered to members and patrons of the centre. Comprising 25 multiple choice and three open-ended questions, the survey was delivered over a 28-day period from April to May 2022 and attracted 759 responses.

Following completion of the survey and analysis of results, Council identified the following focus areas for the centre:

- Improving communication methods and platforms, particularly increasing opportunities for online customer service (e.g., bookings, payments, programs) to overcome reception wait-times, congestion and delay
- Reviewing programs to provide contemporary fitness program offerings and timetables
- Maximising pool use and aquatic programs patronage via refined oversight to provide dedicated management of the aquatic programs area
- Planning for gym enhancement incorporating a five-year space-refresh and equipment renewal plan, functional floor layout, and consideration of additional hours of access
- Maintaining continual focus on competitor offerings and pricing and adapting to change
- Implementing detailed operational plan, staffing breakdown and business plan for the service
- Developing marketing plan to grow and retain customers beyond the LGA boundary given the constraints to customer growth within the Kiama LGA catchment
- Improving operational management and customer service



2.8 Financial performance

The Kiama Leisure Centre's financial performance has been mixed over recent years, generating deficits in each of 2020/21, 2021/22 and 2022/23. Following analysis of the year-to-date actuals provided by Council, we expect the service to similarly generate a deficit in the current 2023/24 year.

As illustrated by *Table 3*, below, the service generated substantial deficits in 2020/21 and 2021/22. This performance is largely attributable to lower income via user and fees and charges received during the Novel Coronavirus ("COVID-19") pandemic era, during which time various social distancing requirements were in force. In the years since the COVID-19 pandemic era, income has increased due to user fees and charges revenue, but some expense categories have also increased (e.g. employee costs, materials and contracts).

Table 3 Kiama Leisure Centre financial performance, 2020-2024

	2020/21 Actual	2021/22 Actual	2022/23 Actual	2023/24 Projected*
Income				
User charges and fees	\$1,935,735	\$1,680,816	\$2,476,525	\$2,624,235
Grants, subsidies, contributions and donations - Operating	\$8,161	\$3,103	\$226	\$0
Grants, subsidies, contributions and donations - Capital	\$0	\$15,530	\$0	\$0
Expenses				
Employee Benefits	\$2,070,579	\$1,754,029	\$1,938,394	\$2,207,638
Borrowing Costs	-\$12	\$4,044	\$1,493	\$9,885
Materials & Contracts (excl. capital expenditure)	\$739,058	\$596,084	\$729,622	\$789,320
Other Expenses	\$270	\$575	\$54	-\$2,642
Capital expenditure	\$997	\$54,737	\$101,721	\$49,593
Total income	\$1,943,897	\$1,699,449	\$2,476,751	\$2,624,235
Total expenses (excl capital expenses)	\$2,809,895	\$2,354,732	\$2,669,564	\$3,004,202
Surplus/(Deficit) before Capital items	-\$865,999	-\$655,283	-\$192,813	-\$379,967
Total expenses (incl capital expenses)	\$2,810,893	\$2,409,468	\$2,771,285	\$3,053,795
Surplus/(Deficit) after Capital items	-\$866,996	-\$710,019	-\$294,534	-\$429,561
*Based on six-month actuals as at December 2023.				



2.9 Patronage and admissions

Council was able to provide patronage and admission data for the Kiama Leisure Centre and Jamberoo Public Swimming Pool for the periods 2020-2024 and 2019-2023, respectively.

2.9.1 Kiama Leisure Centre

As illustrated by *Table 4*, below, admissions were higher in 2022/23 than in the previous 2020/21 and 2021/22 financial years, which – as noted in the previous section – is likely due to the effects of the COVID-19 pandemic era on the Kiama Leisure Centre's operations. Admission data for the current 2023/24 year is strong, and based on actual figures as at December 2023, the centre is likely to marginally exceed its result in 2022/23.

Table 4 Kiama Leisure Centre patronage and admissions, 2020-2024

Grouping	2020/2021	2021/2022	2022/2023	2023/2024*
Aqua	130	6,759	11,487	11,741
Babygym	0	243	355	182
Childminding	898	1,362	2,924	2,146
Coaching Pass	2,555	3,905	4,769	3,470
Court Hire	0	720	9,574	13,620
Fitness Passport	15,221	19,658	31,286	31,596
Group Fitness	15,760	20,382	30,829	31,628
Gym	17,003	23,696	36,470	35,190
Gymnastics	1,382	2,543	2,539	1,827
Health Moves	0	28	3,110	3,336
Kindergym	0	514	1,407	1,797
Personal Training	481	527	887	831
Pool Party Admission	0	0	1,060	2,366
Pool Toy	1,362	1,422	3,067	3,123
Sauna	1,144	7,927	17,184	18,754
School	114	12	7	5
Spa	303	1,690	5,126	6,291
Spectator	6,015	21,295	21,689	22,234
Swim	22,099	32,216	45,723	50,681
Swim School and learn to swim	8,477	27,784	35,964	30,020
Total	92,944	172,683	265,457	270,838

*2024 figures have been annualised based on six-month actuals provided by Council.

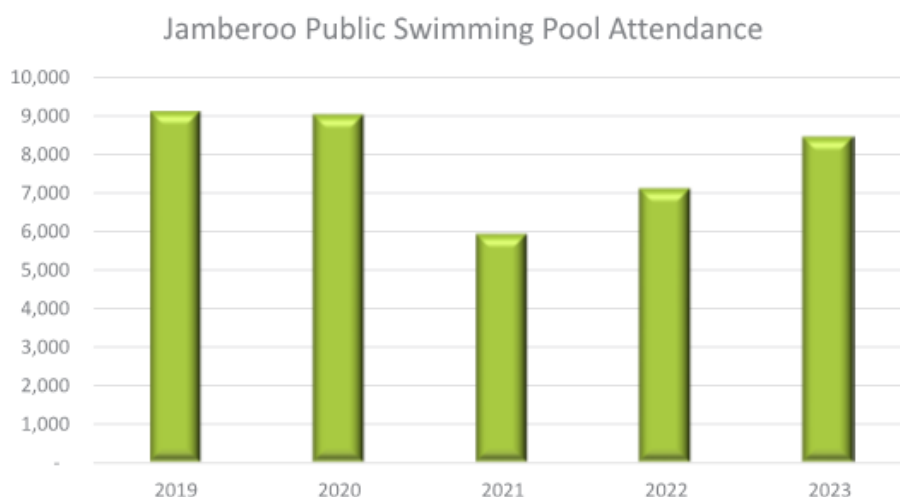


2.9.2 Jamberoo Public Swimming Pool

As with the Kiama Leisure Centre, attendance at the Jamberoo Public Swimming Pool has varied significantly in recent years. Once again, the COVID-19 pandemic is likely to have significantly affected the pool’s patronage, especially in the latter half of 2019/20 and throughout 2020/21 and 2021/22, during which time various Public Health Orders were in force.

As illustrated by *Figure 4*, below, attendance at the Jamberoo Public Swimming Pool has not returned to pre-COVID-19 levels. In 2018/19 and 2019/20, the pool attracted 9,117 and 9,020 patrons, respectively. Patronage dropped significantly in 2020/21, with just 5,914 users accessing the facility, rising to 8,441 users in 2022/23.

Figure 4 Jamberoo Public Swimming Pool Attendance, 2019-2023



2.10 Customer satisfaction

In 2022, Council undertook a targeted Kiama Leisure Centre survey to gather comprehensive information to guide Council in improving customer satisfaction and enhancing the quality of services offered to members and patrons of the centre. Comprising 25 multiple choice and three open-ended questions, the survey was delivered over a 28-day period from April to May 2022 and attracted 759 responses.

Following completion of the survey and analysis of results, Council identified the following focus areas for the centre:

- Improving communication methods and platforms, particularly increasing opportunities for online customer service (e.g., bookings, payments, programs) to overcome reception wait-times, congestion and delay
- Reviewing programs to provide contemporary fitness program offerings and timetables
- Maximising pool use and aquatic programs patronage via refined oversight to provide dedicated management of the aquatic programs area
- Planning for gym enhancement incorporating a five-year space-refresh and equipment renewal plan, functional floor layout, and consideration of additional hours of access
- Maintaining continual focus on competitor offerings and pricing and adapting to change
- Implementing detailed operational plan, staffing breakdown and business plan for the service



- Developing marketing plan to grow and retain customers beyond the LGA boundary given the constraints to customer growth within the Kiama LGA catchment
- Improving operational management and customer service.



3 Consultation insights and analysis

In undertaking this service review, Morrison Low made several positive observations regarding the Kiama Leisure Centre. We were particularly impressed with the strong commitment to customer service excellence and quality customer care demonstrated by those Council employees responsible for providing these services. However, consistent with the objective and scope of this review; we have focused our efforts on identifying opportunities for Council to improve culture, strategy, systems and processes to optimise service delivery and performance.

Commentary on our key findings, and accompanying improvement recommendations, is detailed below.

3.1 Strategy and performance

3.1.1 Key findings

- (a) The Kiama Leisure Centre lacks an endorsed strategic direction and is operated more as a family business servicing local families in a “cradle to grave” leisure offering. Customer satisfaction appears to be prioritised ahead of financial sustainability and commercial opportunities.
- (b) Despite the Kiama Leisure Centre’s location and proximity to the Kiama Sports Complex, there is no interface and few synergies between the two. Council is not planning wholistically for the precinct, despite it being the Kiama Municipality’s premiere fitness, leisure and recreation precinct.
- (c) While Council currently tracks attendance and revenue against the service offering, costs are not tracked against service offering. Further, corporate cost overheads are not being applied. This makes it impossible to identify which services are operating profitably and those that are not, and establish the “true cost” of operating the Kiama Leisure Centre. In turn, this limits Council’s ability to make investment decisions to maximise Kiama Leisure Centre revenue.
- (d) Council’s financial position and culture of conservative financial management have resulted in Kiama Leisure Centre staff minimising spend on maintenance requirements and extending equipment beyond its useful life. As a result, this culture has led to under-investment and now limits the ability of the Kiama Leisure Centre to optimise revenue opportunities.
- (e) Realising commercial opportunities at the Kiama Leisure Centre is difficult due to building and space limitations. Without major changes and significant investment, it is unable to offer leisure water space, a café or other retail offering, or accommodate extended services such as a 24-hour gym.
- (f) The current subsidy in place at Jamberoo Public Swimming Pool is not recommended. Council should address this when developing its next Statement of Revenue Policy, and introduce an appropriate secure entry system to support paid entry.
- (g) Since the development of the Kiama Leisure Centre in 1982, the local market has changed significantly and there are now several commercial gyms operating in the Kiama Municipality. As such, Council is no longer filling a market gap or meeting a community need in operating a gym and providing fitness classes.
- (h) The Kiama Leisure Centre provides a wide service range delivered by Council-employed staff. In many other facilities, the service offering is smaller and/or delivered by a mixture of Council employees, contractors and licensees.



Recommendation/s

1. Review the Kiama Leisure Centre Strategy, ensuring the vision, goals, target market, and strategies to deliver operational performance are updated and consistent with Council's strategic objectives.
2. Reconsider the service offering and whether Council is best placed to be the provider/operator of services currently provided at the Kiama Leisure Centre (e.g. childcare, fitness and swim coaching), or whether these are better outsourced to commercial operators via contract or licences.
3. Establish and endorse expected service levels and Key Performance Indicators (KPIs) for the Kiama Leisure Centre, and ensure that KPIs are monitored and reported on a quarterly basis.
4. Apply corporate overheads to the Kiama Leisure Centre to establish the true cost of operating the centre and providing its various services, programmes and activities.
5. Introduce user fees for the Jamberoo Public Swimming Policy via the 2024/2025 Statement of Revenue Policy and ensure an appropriate secure entry system is introduced ahead of the 2024/2025 swim season.
6. Review the Chart of Accounts to enable the costs attributable for each service offering (including apportioned overheads) to be monitored alongside revenue. Council only tracks attendance and revenue.
7. Ensure the financial impact of any changes in service offerings and service levels is modelled in Council's Long-Term Financial Plan.

3.2 Asset management and maintenance

3.2.1 Key findings

- (a) Council's Buildings Asset Management Plan is dated and does not include appropriate condition data or forward maintenance and renewal requirements for the Kiama Leisure Centre. While Kiama Leisure Centre staff have a schedule for planned, cyclic maintenance, major maintenance and renewal requirements are not being addressed.
- (b) The Kiama Leisure Centre is ageing, its condition is deteriorating, and it does not meet contemporary leisure needs. The facility's age is impacting its performance, and there are many parts of the facility that are in poor condition, non-compliant or not functioning properly.
- (c) Responsibility for planning and undertaking planned and reactive facility maintenance should be formally transferred from the Kiama Leisure Centre staff to Council's Facilities and Maintenance team, with Kiama Leisure Centre staff retaining responsibility for minor (not technical) maintenance.
- (d) Council manages four (4) rock pools, which sit with another section of Council's organisation rather than in the Community Hubs portfolio within the Planning, Environment and Communities directorate. While Council's role is largely a maintenance and lifeguarding responsibility, there are synergies in including operational oversight of these pools within the Leisure Centre team.
- (e) Council employs a number of Beach Lifeguards, who also sit with another section of Council's organisation rather than in the Community Hubs portfolio within the Planning, Environment and Communities directorate. As with the above, there are synergies in including operational oversight of the Beach Lifeguard function within the Leisure Centre team.



Recommendation/s

8. Review and update Council's Buildings Asset Management Plan to include Kiama Leisure Centre's forward maintenance and renewal requirements.
9. Develop and adopt a Kiama Leisure Centre Masterplan, ensuring the development of the Masterplan is informed by robust community engagement.
10. Prepare a Business Case to assist in securing grant funding to deliver the Kiama Leisure Centre Masterplan (once developed).
11. Consider transitioning functional responsibility for the operational oversight of rock pools to the Leisure Centre Manager.
12. Consider transitioning functional responsibility for the operational oversight of Beach Lifeguards to the Leisure Centre Manager.
13. Consider transitioning responsibility for building maintenance at the Kiama Leisure Centre to Council's Facilities and Maintenance team.

3.3 People and culture

3.3.1 Key findings

- (a) The Kiama Leisure Centre team structure should be flattened and management layers reduced.
- (b) Position descriptions require review to ensure clarity and consistency of roles and accountabilities across the Kiama Leisure Centre team.

Recommendation/s

14. Review Kiama Leisure Centre team structure with the objective of reducing management layers.
15. Review, align and update position descriptions for Kiama Leisure Centre positions.

3.4 Risk management

3.4.1 Key findings

- (a) Council may be exposed to industrial risks via the high use of casual employees at the Kiama Leisure Centre. This model should be reviewed to ensure risks are clearly identified and being appropriately managed.

Recommendation/s

16. Review the model of engagement of casual employees engaged at the Kiama Leisure Centre, including the management of all casual employees, to ensure industrial risks are being proactively managed and mitigated.



3.5 Systems and processes

3.5.1 Key findings

- (b) Despite WTC recommending in 2022 that Council develop an overarching Operations Manual for the Kiama Leisure Centre, the Operations Manual is currently split across multiple documents with those components not reviewed since 2015 or 2016. We have been advised that a revision of the Operations Manual is currently in progress.
- (c) While some employees are unhappy with *Envibe*, it is widely used in the gym and leisure market and there is compelling reason to replace it with another product at this time.

Recommendation/s

- 17. Complete the review and consolidate the Kiama Leisure Centre Operations Manual, ensuring that it is regularly reviewed, and quality controlled for currency.



4 Strategic service options

4.1 Kiama Leisure Centre

The Kiama Leisure Centre is an ageing facility and its condition continues to deteriorate. The facility is no longer meeting contemporary recreation needs and typical community expectations. This gap will continue to widen unless addressed. Council has three options:

- **Option 1 – Do nothing:** A do-nothing option would see the continued deterioration of the Kiama Leisure Centre to a point where it would be unusable, unsafe, and unfit to meet the needs of the local community. A decision not to invest in Kiama Leisure Centre may require social infrastructure to be replicated elsewhere in the Kiama Municipality at a greater cost.
- **Option 2 – Upgrade:** This option would include an upgrade of the Kiama Leisure Centre, comprising improvements to the existing facility.
- **Option 3 – Redevelop:** This option would include a complete redevelopment of the Kiama Leisure Centre. Under this option, some existing elements of the Kiama Leisure Centre could be removed, or potentially replaced with new or supplementary elements (.e.g. café, 50-metre competition pool, leisure pool, splash pad, etc.).

Council has the opportunity and obligation to make a strategic direction regarding the future of the Kiama Leisure Centre. As noted previously, Council's decision-making should be informed by a Masterplan, developed in consultation with the Kiama Municipality community.

Significant funding will be required to pursue either **Option 2 – Upgrade** or **Option 3 – Redevelop**. Potential options for funding either the upgrade or redevelopment of the Kiama Leisure Centre could include:

- Section 94 contributions
- Proceeds from the sale of assets
- Grants and contributions
- Debt/loan borrowings
- Forward borrowing from reserves
- Other general income sources.

We believe that given the nature and condition of the asset, Council should commence planning for Option 3 while noting that typically this planning and engagement can take many years, and that construction will be dependent on Council's financial capacity and grant funding. At best, actual redevelopment is only likely to occur in the latter year of Council's Long-Term Financial Plan ("LTFP"); more likely, it would need to be funded in a future LTFP.

Undertaking sufficient planning for this decision-making process should occur sooner and we would suggest that the planning and engagement components be included in the next Delivery Program for consultation with the Kiama Municipality community (via the development of a Kiama Leisure Centre Masterplan).



4.2 Jamberoo Public Swimming Pool

Council currently waives user fees and charges for the Jamberoo Public Swimming Pool. While uncommon, there are examples of other local councils across NSW that waive user fees for smaller, outdoor pools of a similar age and condition to the Jamberoo Public Swimming Pool. *Table 5*, below, includes examples of free-entry public swimming pools in NSW. This is not an exhaustive list, but it does demonstrate a wide range in approaches used by other councils.

Table 5 Sample of free-entry public swimming pools

Council	Population	Facility	Notes
Berrigan Shire Council	8,653	Berrigan Public Swimming Pool	Berrigan Shire Council owns four swimming pools, including one indoor heated aquatic centre and three outdoor pools. Of these, one (Berrigan) does not apply user fees.
MidCoast Council	97,237	Bulahdelah Public Swimming Pool Nabiac Public Swimming Pool	MidCoast Council's owns a number of public swimming pools and aquatic centres. Most are staffed and apply user fees. Both pools located in inland villages. Both pools are unsupervised, with no lifeguards.
Parkes Shire Council	14,361	Peak Hill Public Swimming Pool Trundle Public Swimming Pool Tullamore Public Swimming Pool	Parkes Shire Council's main facility, the Parkes Aquatic Centre, applies user fees. All free-entry pools are located in remote villages. All pools are staffed by lifeguards during open hours.

As illustrated by *Table 5*, above, there is no consistent approach applied by councils in applying user fee subsidies. For example, Berrigan Shire Council waives fees for one of its pools, but applies fees for its three other pools (including two, at Finley and Tocumwal, that are of a similar size and condition). We understand that the Berrigan Public Swimming Pool is operated by a Section 355 Committee and fundraises throughout the year and receives donations to subsidise entry. In contrast, Parkes Shire Council maintains one "premier" facility in the Parkes central business district, which applies fees, but waives fees for smaller outdoor facilities located in remote areas of the local government area.

The distinction between these examples and Kiama Municipal Council is that these facilities are used almost exclusively by residents of the area. A similar situation exists in MidCoast Council, where two pools located in inland communities have a free-entry admission model.

Research undertaken by Kiama Municipal Council suggests that while the pool is predominantly used by residents of the Kiama Municipality; a number of patrons reside in the neighbouring Shellharbour City local government area. As a result, the current model is seeing residents of another local government area access a Kiama Municipal Council-provided and -subsidised service.



As Council is expending funds on staffing the Jamberoo Public Swimming Pool during operating hours, user fees and charges should be introduced for the facility. Noting the limited infrastructure at the facility, as well as the location of the entry point; Council should investigate the feasibility of installing an appropriate entry system (e.g. fob access system) to complement the introduction of user fees and charges. In practice, this may mean that users would need to purchase a season pass in order to receive an access fob for the season.

4.3 Management model

There are various management models available to local councils in managing public community venues such as recreation facilities and aquatic centres. In practice, management models largely fit into one of the following three categories:

- **Direct Management:** under this model, Council directly manages and operates the facility. This is the current model utilised by Council in relation to the Kiama Leisure Centre.
- **Indirect Management:** under this model, an external operator (typically a specialist leisure or recreation management agency) manages or part-manages the facility, via a management services agreement with Council.
- **Independent Management:** under this model, an external operator manages the facility via a formal lease and/or management agreement.

Each of the three management models listed above has inherent strengths (or advantages) and weaknesses (or disadvantages). Further, when determining the most appropriate management model, it must be recognised that no one model will suit all facilities and situations. Factors that should be considered by Council in deciding the most appropriate management model for its specific needs are outlined below.

4.3.1 Direct Management

Under this model, Council would continue to directly manage and operate the Kiama Leisure Centre and design, deliver, and promote services and programmes. The key advantage of this model is that Council can directly control the condition of the centre and the quality of the services and programmes it provides.

Table 6 Management model advantages and disadvantages: direct management

Advantages	Disadvantages
<ul style="list-style-type: none"> - Council can exercise a high level of control over the day-to-day operation of the Kiama Leisure Centre. - Council can ensure the Kiama Leisure Centre is maintained to a high standard and has the capacity to provide adequate funds for all asset management requirements, including cyclical maintenance and structural maintenance. - Council's governing body has capacity to make ongoing input into strategy and service offering. - Council can oversee marketing strategy and initiate direct promotion of the facility, its services and programmes. - Council can respond to changing customer needs and priorities. 	<ul style="list-style-type: none"> - Model requires Executive and senior staff with skills and expertise in managing, operating and/or maintaining aquatic and recreation facilities. - Council must be willing and able to maintain facility to high standard and ensure adequate funds are allocated to meet asset management requirements. - Political influence can be applied by governing body to change strategy and service offering, or stifle/delay new opportunities. - Council may be slower to identify and exploit opportunities due to governance structures and internal bureaucratic arrangements. - Less flexible industrial arrangements may limit resourcing decisions.



4.3.2 Indirect Management

Under this model, Council would enter into a management services contract with a contractor to manage the whole or part of the Kiama Leisure Centre. The key advantage to this model is that the operator can typically provide specialist experience that Council may lack, and is responsible for resourcing, including recruiting, training and managing staff (rather than Council).

Table 7 Management model advantages and disadvantages: Indirect management

Advantages	Disadvantages
<ul style="list-style-type: none"> - Operator can typically apply specialist experience which is usually not readily available to Council. - Council does not need to employ staff to manage and operate the centre or provide services and programmes. - Operation of the centre is at arm’s length from Council and freed from day-to-day Council issues and interventions. - Operator can usually respond to needs, issues and priorities more rapidly and efficiently than Council. - Operator typically able to make more flexible industrial arrangements (not subject to <i>Local Government (State) Award</i>). - Council can remain a partner in the arrangement and thus continues to have some control over the centre and access to performing reporting/ monitoring. - Formal commitments for maintenance and refurbishment allocations can be set. 	<ul style="list-style-type: none"> - Council can find itself locked into an external management agreement with an ineffective manager for a significant period. - Legal implications and possible action for failure to deliver contract obligations. - Operator can focus predominantly on profitable services and programmes to the detriment of wider community obligations.

4.3.3 Independent Management

Under this model, Council would outsource the management and operation of the Kiama Leisure Council to an external party or organisation through a formal lease agreement. The key advantage to this model is that it is likely the most effective financially, and significantly minimises (or eliminates) financial and risk implications for Council. However, this model does present significant risks that community benefits may be lost via service, staffing and programming decisions, with Council restricted in its ability to influence such decisions.

Table 8 Management model advantages and disadvantages: Independent management

Advantages	Disadvantages
<ul style="list-style-type: none"> - Lessee typically able to achieve operational economies on conditions of use, labour, goods and services. - Financial and risk implications for Council are minimised or eliminated entirely. - Lessee typically able to make more flexible industrial arrangements (not subject to <i>Local Government</i> 	<ul style="list-style-type: none"> - Lessee’s objectives may conflict with achieving equitable access or community service obligations desired by Council. - Limited opportunity for community and customer input into establishing and reviewing services, programmes, timetables and fees. - Lessee typically has strong focus on covering costs



Advantages	Disadvantages
<p><i>(State Award).</i></p> <ul style="list-style-type: none"> - Council can set guaranteed operating financial position. - Lessee may be well positioned to obtain and provide immediate capital for improvements and maintenance requirements. 	<p>and generating profit, influencing decision-making relating to services, buildings and equipment.</p> <ul style="list-style-type: none"> - Council has no opportunity to participate in centre management, with control usually exercised via a medium- to long-term lease.

4.3.4 Conclusion and preferred model

Local councils, particularly those in rural and regional areas, are increasingly pursuing indirect management models for similar sized aquatic and leisure facilities. As noted above, there are benefits to direct management; however, workforce shortages, recruitment challenges, rising operating costs and competing service delivery priorities all make indirect management an appealing option for smaller councils that are less well resourced and lack specialist industry experience.

Moving forward, Council should consider the advantages that implementing an indirect management model may provide. Contracting a specialist operator to manage the facility would likely achieve cost savings and efficiency improvements for Council, including reducing internal services required to operate the centre (e.g. Communications and Marketing, Finance, Human Resources, etc.) and enabling Management to focus on other strategic priorities and services. Importantly, customers and community would also be likely to benefit from this model, as the centre would be run by a specialist operator with industry expertise, which would likely be reflected in the quality of services, programmes and activities provided.

Implementing an indirect management model would need to be achieved via a compliant tendering process, carried out in accordance with the relevant provisions of the Local Government Act and the *Tendering Guidelines for NSW Local Government* prescribed by the Office of Local Government. Careful attention should be given to the drafting of the tender specification to ensure that roles and responsibilities are clearly identified and defined, and appropriate performance reporting arrangements are included.



5 Market research and demand analysis

Desktop analysis suggests a relatively strong and competitive fitness market in the Kiama Municipality. As at the time of this report being prepared, there are at least seven (7) other commercial gyms currently operating in the Kiama Municipality, including some aligned with major national operators such as Club Lime, Snap Fitness and F45 Training. We understand that the Kiama Village shopping centre, which is currently undergoing reconstruction and located in close proximity to the Kiama Leisure Centre, will also include a gym tenant.

While there is a competitive market in relation to commercial gyms within the Kiama Municipality; the Kiama Leisure Centre is the only facility that includes both a gym and a swimming pool. Indeed, the only other public swimming facilities within the local government area are those managed and operated by Council: namely the Jamberoo Public Swimming Pool, and the four rockpools located at Black Beach, Blowhole Point, Boat Harbour and South Warri.

5.1 Service age groups

Age structure provides valuable insights into the level of demand for aged-based services, such as child care, recreation facilities and aged care services, and indicate how residential roles and functions are likely to evolve in the future. Service age structure divide the population into age categories that reflect typical life stages and indicate the level of demand that target people at different stages in life and how that demand is changing.

Analysis of the service age groups in the Kiama Municipality compared to Regional NSW shows that, as at the 2021 Census, there was a lower proportion of people in the younger age groups (0 to 17 years) and a higher proportion of people in the older age groups (over 60 years). Overall, 19.9 per cent per cent of the local population was aged between 0 and 17 years, and 35.8 per cent were aged 60 years and over, compared with 21.5 per cent and 29.1 per cent respectively for Regional NSW.

Table 9 Service age group analysis, 2021 Census data (Australian Bureau of Statistics)

Service age group	Years	Kiama Municipality		Regional NSW
		Number	%	%
Babies and preschoolers	0 to 4	1,149	5.0	5.5
Primary schoolers	5 to 11	1,869	8.1	8.6
Secondary schoolers	12 to 17	1,585	6.8	7.4
Tertiary education and independence	18 to 24	1,424	6.1	7.6
Young workforce	25 to 34	1,993	8.6	11.6
Parents and homebuilders	35 to 49	3,866	16.8	17.5
Older workers and pre-retirees	50 to 59	2,965	12.8	12.8
Empty nesters and retirees	60 to 69	3,815	16.6	13.3
Seniors	70 to 84	3,634	15.8	13.0
Elderly	85 and over	777	3.4	2.8



As illustrated in *Table 9*, above, the major differences between the age structure of Kiama Municipality and Regional NSW were:

- A larger percentage of 'Empty nesters and retirees' (16.6 per cent compared to 13.3 per cent)
- A larger percentage of 'Seniors' (15.8 per cent compared to 13.0 per cent)
- A smaller percentage of 'Young workforce' (8.6 per cent compared to 11.6 per cent)
- A smaller percentage of 'Secondary schoolers' (6.8 per cent compared to 7.4 per cent).

5.2 Population change

According to NSW Department of Planning projections, the Kiama Municipality's population is forecast to grow at a rate of 1.28 per cent over the 20-year period from 2021 to 2041. This is significantly higher than the NSW average growth rate of 0.95 per cent for the same period. It should be noted that the NSW Department of Planning projections are generally considered to be modest, and actual population growth may exceed the projected growth rate.

5.3 Leisure facility trends

Analysis of the recreation leisure market suggests that there are a range of trends that are increasingly impacting on the market, specifically on leisure centres. *Table 10*, below, summarises some of these trends and how they may guide future decision-making by Council in relation to the Kiama Leisure Centre:

Table 10 Leisure and aquatic facility trends (summary)

Trend	Summary
Accessibility and inclusivity	Increased focus on designing facilities that are accessible and inclusive for people of all ages and abilities. This includes features such as ramps, sensory-friendly spaces, and inclusive service design and programming.
Demographics and needs based	Increased focus on ensuring facilities adapt to changing demographics and cater for current and expected community needs, including an ageing population and a younger, more technology-savvy generation.
Health and wellbeing	Increased focus on designing facilities that contribute to the community's quality of life and overall wellbeing. This includes incorporating allied health services within aquatic and leisure centres to create a central health hub for local communities.
Flexible design	Increased focus on designing facilities and spaces that provide usage flexibility and can be easily adapted for different purposes and activities, ensuring that space utilisation can be maximised.
Sustainable design	Increased focus on implementing environmentally sustainable practices in facility design and operations. This includes energy-efficient technologies, eco-friendly building materials and water conservation measures such as advanced water filtration systems, water recycling, and efficient water management practices.
Technology and innovation	Increased focus on integrating technology into facility operations and service delivery to enhance customer experience, such as mobile applications for facility bookings, online scheduling, and smart facility management.
Value for money	Increased focus on ensuring that facilities provide value for money and commercial performance can be improved to ensure effective return on investment.



5.4 Implications

As with other communities in south-east coastal NSW, population growth in Kiama Municipality is expected to be driven by increases in the 'Seniors' (70 to 84 years), 'Empty nesters and retirees' (60 to 69 years) and 'Parents and homebuilders' (35 to 49 years) service groups. As a result, it is expected that demand for those services and facilities that cater to older residents will increase in the years ahead, whereas demand for those services that cater to younger residents will remain static.

As previously noted, Council is encouraged to develop and adopt a Masterplan to inform and guide decision-making in relation to the long-term future of the Kiama Leisure Centre. In developing this Masterplan, consideration should be given to the various trends affecting the leisure centre market, including those summarised in *Table 10*, above. Key opportunities include:

- Incorporating accessible and inclusive features in the design of the facility, which could in turn then support more accessible and inclusive services and programming.
- Incorporating sustainable design principles to ensure the facility's carbon footprint is minimised.
- Incorporating allied health services within the centre or introducing new features, such as a hydrotherapy pool, that support health and wellbeing outcomes.
- Incorporating opportunities for secondary spend, such as a café.
- Incorporating water play facilities such as splash pads and interactive water play equipment within the centre precinct, or adjacent to aquatic infrastructure.



6 Comparable Facility Review

As part of this service review, we sought to identify other rural councils that were a similar size to Kiama Municipal Council with similar facilities to the Kiama Leisure Centre, and larger regional councils that either had a similar community profile to Kiama Municipality's or which owned and operated facilities similar to the Kiama Leisure Centre.

Table 11, below, lists the facilities that were identified as part of the comparative analysis.

Table 11 Comparable Facility Analysis

Council	LGA Population ¹	Facility
Cessnock Council	63,632	Kurri Kurri Aquatic and Fitness Centre
Dubbo Regional Council	54,922	Dubbo Aquatic Centre Wellington Aquatic Leisure Centre
Goulburn Mulwaree Council	32,053	Goulburn Aquatic Leisure Centre
Griffith City Council	27,086	Griffith Regional Aquatic and Leisure Centre
Kiama Municipal Council	23,074	Kiama Leisure Centre
Lake Macquarie Council	213,845	West Wallsend Swim Centre
Maitland Council	90,226	East Maitland Aquatic Centre Maitland Aquatic Centre
Shoalhaven City Council	108,531	Nowra Aquatic Park
Singleton Council	24,577	Singleton Gym and Swim Centre

6.1 Key Insights

Key observations from our research include:

- It is difficult for councils that operate aquatic facilities to do so at a cost-neutral level.
- Broader strategic shift away from the traditional model where councils run a 50-metre outdoor pool, along with children's area and picnic facilities, towards indoor facilities.
- Greater focus now on revenue-generating activities such as learn-to-swim, health classes, recreation usage and key stakeholder groups such as swimming clubs.
- Kiosks have the potential to raise revenue if run efficiently and operated by sales-trained staff.
- Commercial returns from learn to swim and other program-based activities may reduce the subsidy per user visit that the community must currently pay.
- Key challenges are the recruitment and retention of experienced staff at all levels, particularly those involved with learn to swim and management/coordination activities.
- Heating and/or operating costs of outdoor pools in the winter tend to favour a seasonal model,

¹ Population data sourced from the Australian Bureau of Statistics (2021 Census).



particularly for councils in rural and regional areas.

- Some councils that run their own aquatic facilities are trying to move away from a younger, casualised workforce to a more experienced permanent staff model.
- Developing a skilled and motivated aquatic facility workforce requires Council to determine a clear long-term operating model, alongside training and professional accreditation opportunities.
- Generally, an in-house model provides councils with greater flexibility to respond to issues raised by elected officials and members of the public.
- An external model allows councils to utilise the skills and experience of a specialist provider with a large network of aquatic facilities to draw resources and knowledge from. However, this model can potentially lead to unforeseen capital or maintenance costs for council, particularly toward the end of a contract.

The following section outlines some of the key themes that were identified via the review of comparable facilities in more detail.

6.1.1 Management model

Of the facilities reviewed, there was a relatively even spread between in-house and outsourced operations. This even spread was equally applied to councils that owned a single facility and those that owned multiple facilities, as well as those that ran seasonal pool facilities and those that ran year-round.

Two councils utilised a mixed model, being Cessnock Council and MidCoast Council. In the case of Cessnock City Council, the council's two outdoor public swimming pools (located at Branxton and Cessnock) are currently managed in-house, whereas the larger Kurri Kurri Aquatic and Fitness Centre (located at Kurri Kurri) is managed and operated externally by Belgravia Leisure. Similarly, MidCoast Council directly operates its smaller public swimming pools (located at Bulahdelah and Stroud), whereas the larger Great Lakes Aquatic Centre (located at Forster) and Manning Aquatic Centre (located at Taree) are managed externally by YMCA.

Decisions regarding management model are largely attributed to strategic drivers and internal capability. Councils with a preference for outsourcing perceive aquatics to be an important service that needs to be delivered, but not necessarily by the councils themselves, and appear motivated predominantly by a desire to achieve cost savings or cost containment. Such councils recognise that external operators are subject to a different ("cheaper") industrial award structure and enjoy greater buying power for pool chemicals, retail merchandise and utilities. In contrast, those councils that manage aquatic facilities themselves are motivated more by a desire to maintain high levels of service and ensure they remain responsive to community needs and expectations. These councils recognise that strong internal capability in aquatics and fitness facility management was critical to the success of the direct management model.

As to whether an external or internal model (or a combination of the two) is the best operating structure for Kiama Municipal Council ultimately depends on several factors, including but not limited to operating costs, maintenance obligations, human resource capacity and user satisfaction and community feedback. As discussed in Section 5 of this report; on the information available, we would recommend that Council review the current management model and explore the potential benefits of pursuing an indirect management model.



6.1.2 Services and strategy

Many of the facilities reviewed indicated Learn to Swim was critical to improve cost recovery of pool operations. Gyms, fitness classes and kiosk facilities were also cited as critical earners that were able to improve cost recovery and reduce the cost burden on ratepayers for these facilities. We note that Kiama Municipal Council already provides Learn to Swim classes as well as a range of other fitness and gym classes. As noted previously in this report, the Kiama Leisure Centre facility does not incorporate or have space for a substantial kiosk or café, so there is no opportunity to achieve further revenue via a secondary spend retail offering such as this.

Construction of 50-metre pools has declined since the late twentieth century, following a peak in popularity during the period between the 1960s and 1990s, when there was strong community pressure to build 50-metre competition and training facilities. Two councils identified 50-metre pools as being detrimental to cost recovery and potentially not required by members of their respective communities, who were predominantly seeking recreational aquatic facilities (rather than competitive swimming facilities). In contrast, one council has recently developed their leisure centre to include a 50-metre outdoor pool.

6.1.3 Fees and charges

Across the facilities examined, there were a variety of different pricing structures which provided for casual/one-off entry, season passes, 'add-on' fitness and aqua classes membership. Competitive long-term membership packages using a direct-debit system attract long-term users of aquatic facilities and provide some reliable cash inflows. We note that Kiama Municipal Council already provides a range of package options.

While pricing structures vary in their degree of complexity, most facilities charged adult, child/concession, spectator, and family categories, with children under either three or four years' old free of charge. *Table 12, overleaf*, provides a comparative analysis of the casual fees and charges levied by each of the shortlisted facilities (with all fees and charges drawn from each council's adopted Revenue Policy for the current 2023/24 year). Review of these figures suggests that Kiama Municipal Council is an outlier in its fees, noting its:

- Family admission fee of \$22.00 is higher than the average of \$18.50
- Adult admission fee of \$7.00 is higher than the average of \$6.30
- Concession admission fee of \$5.00 is higher than the average of \$4.10
- Child admission fee of \$5.00 is higher than the average of \$4.50
- Spectator admission fee of \$4.50 is higher than the average of \$2.00.

We understand that Council has recently reviewed its fees and charges for the Kiama Leisure Centre, including increasing fees and charges. However, as detailed above (and illustrated in further detail in *Table 12, overleaf*), Kiama Municipal Council's fees and charges are comparatively higher than those levied by other centres, which are generally more modern than the Kiama Leisure Centre and some of which have contemporary features such as water play areas.



Table 12 Fees and charges comparative analysis, Casual fees

Council	Facility	Casual Admission Fee				
		Family	Adult	Concession	Child	Spectator
Cessnock Council	Kurri Kurri Aquatic and Fitness Centre	\$20.00	\$6.40	\$5.50	\$5.50	\$3.50
Dubbo Regional Council	Dubbo Aquatic Centre	\$18.50	\$6.00	\$4.00	\$4.00	\$2.00
	Wellington Aquatic Leisure Centre	\$18.50	\$6.00	\$4.00	\$4.00	\$2.00
Goulburn Mulwaree Council	Goulburn Aquatic Leisure Centre	\$18.00	\$6.50	\$4.50	\$4.50	\$2.00
Griffith City Council	Griffith Regional Aquatic and Leisure Centre	\$19.50	\$6.50	\$3.00	\$3.00	\$1.50
Kiama Municipal Council	Kiama Leisure Centre	\$22.00	\$7.00	\$5.00	\$5.00	\$4.50
Lake Macquarie Council	West WallSEND Swim Centre	\$16.80	\$6.60	\$4.10	\$4.10	\$3.10
Maitland Council	East Maitland Aquatic Centre	\$17.60	\$6.30	\$4.20	\$5.20	\$0.00
	Maitland Aquatic Centre	\$17.60	\$6.30	\$4.20	\$5.20	\$0.00
Shoalhaven City Council	Nowra Aquatic Park	\$17.70	\$5.10	\$3.80	\$3.80	\$0.00
Singleton Council	Singleton Gym and Swim Centre	\$19.00	\$6.20	\$4.10	\$4.80	\$2.50
	Median	\$18.50	\$6.30	\$4.10	\$4.50	\$2.00

7 GENERAL BUSINESS

8 CLOSURE