Kalaru to Bega Shared Path Feasibility Design Study

Final Feasibility Report

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BAR	Biodiversity Assessment Report
BC Act	Biodiversity Conservation Act 2016
BCR	Benefit Cost Ratio
BTSR	Bega to Tathra Safe Ride
BVSC	Bega Valley Shire Council
CBA	Cost Benefit Analysis
CPTED	Crime Prevention Through Environmental Design
DPC	Department of Premier and Cabinet
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
IRR	Internal Rate of Return
LEP	Local Environmental Plan
LGA	Local Government Area
LSPS	Bega Valley Local Strategic Planning Statement 2040
NPV	Net Present Value
PCT	Plant Community Type
SWOT	Strengths, Weaknesses, Opportunities and Threats
TEC	Threatened Ecological Community

1 INTRODUCTION

1.1 BACKGROUND

In 2014 Bega Valley Shire Council (BVSC) adopted a Bike Plan to plan and prioritise the development of key cycleway routes within the shire, with a vision that the Bega Valley be recognised for the abundance of cycling opportunities. The Tathra to Kalaru and Kalaru to Bega sections were two key routes identified in the Bike Plan (refer to Figure 1).

In 2017, Bega to Tathra Safe Ride (BTSR) – a community group committed to work with all levels of government to build a safe active transport link between Bega and Tathra – secured $3,120,000 in grant funding from the NSW State Government under the 2017/18 Active Transport Funding program to design and construct a shared path from Bega to Tathra. While the funding enabled the successful construction of an initial 4.6km long, 2.5m wide concrete path from Tathra Public School to Kalaru, the section between Kalaru and Bega currently remains unfunded and the benefits of the entire connection are therefore unable to be fully realised. BVSC has commenced a planning phase to determine the viability and feasibility of connecting this path from Kalaru through to Bega.

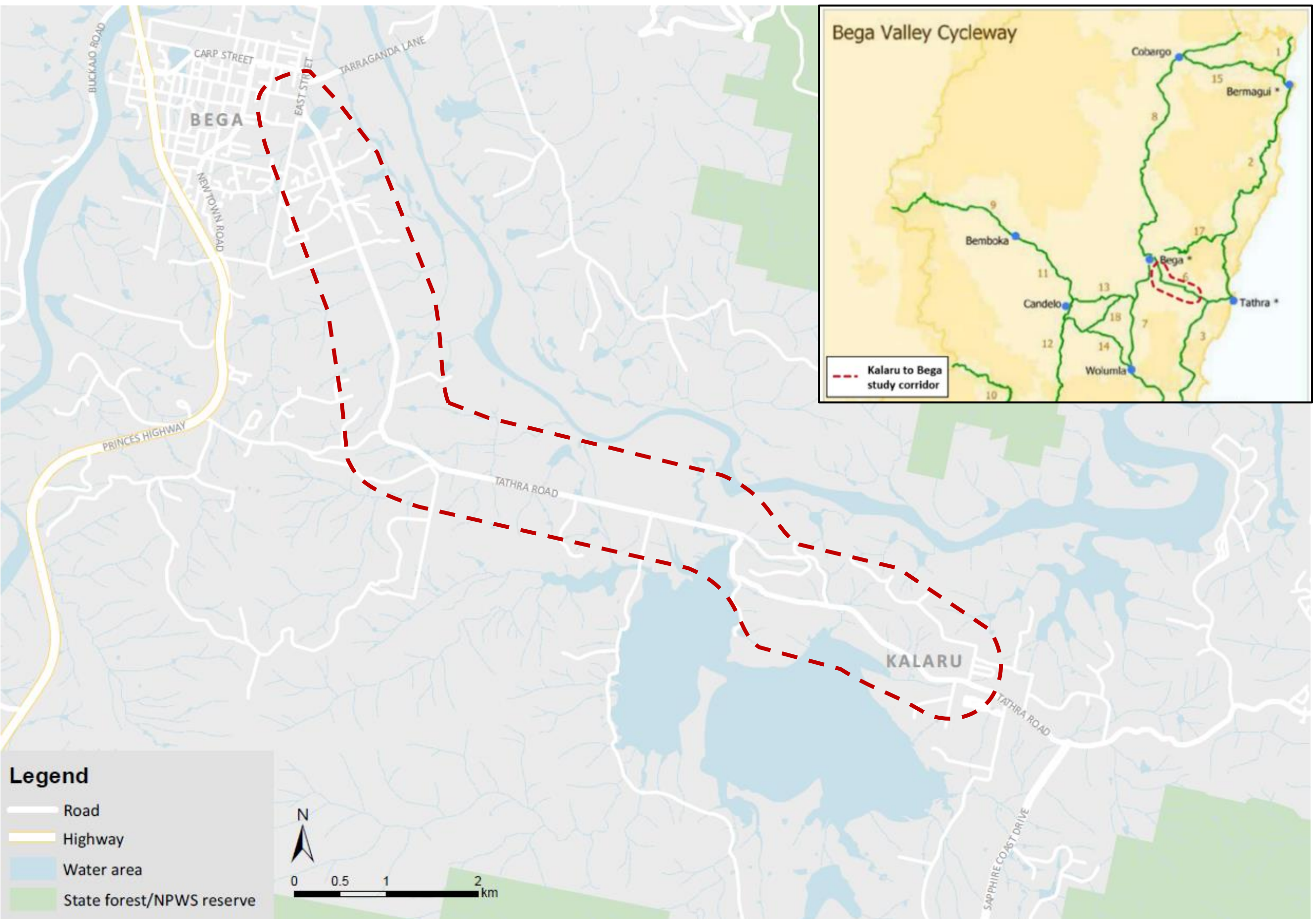


Figure 1: Study corridor

1.2 STUDY PURPOSE

The purpose of this feasibility study is to enable BVSC to make informed decisions regarding the planning for a future design and construction of a Kalaru to Bega shared path and to form the basis of future funding submissions by Council to both state and federal governments. This will require a thorough options analysis study based upon the proposed alignment from Kalaru to Bega and, through a community consultation process, the identification of a preferred alignment for progression. The study will consider diverse user groups, accessibility and inclusion requirements, environmental, heritage and engineering constraints, and costs.

1.3 REPORT STRUCTURE

After this first introductory section, the remainder of the report is comprised of the following sections:

- **Section 2:** Stakeholder engagement – provides a summary of key stakeholder engagement activities that were undertaken.
- **Section 3:** Strategic context – provides a summary of the key policy, land use planning, demographics and transport situations of relevance to the provision of a shared path between Kalaru and Bega.
- **Section 4:** Corridor objectives – provides a summary of the corridor objectives developed to guide future planning and design of a shared path between Kalaru and Bega.
- **Section 5:** Corridor alignment options development – provides a summary of the corridor and individual segment alignment options for a shared path between Kalaru and Bega. This includes a summary of the findings from initial targeted consultation on the options.
- **Section 6:** Corridor alignment options analysis – provides a summary of the approach adopted and findings from the analysis of the corridor alignment options. This includes a summary of the findings from both targeted and whole-of Shire consultation on the options.
- **Section 7:** Preferred corridor alignment option – presents the preferred corridor alignment option for progression.
- **Section 8:** Feasibility – provides a summary of the environmental, heritage, engineering and financial feasibility of the preferred corridor alignment.
- **Section 9:** Delivery – provides a summary of potential delivery mechanisms, including funding sources, and implementation priorities.
- **Section 10:** Conclusions – provides a summary of the key findings from the study.

2 STAKEHOLDER ENGAGEMENT

Stakeholder engagement is critical to ensure that any potential future walk and cycle facility between Kalaru and Bega reflects the needs, desires and expectations of the wider community and remains sensitive to the local context. In light of this, targeted engagement with key community stakeholders and broader, whole-of-shire community consultation has been undertaken to date as part of this project.

2.1 KEY COMMUNITY STAKEHOLDER ENGAGEMENT

Prior to the commencement of this project, BVSC worked with the community to form a key community stakeholder group consisting of representatives from local community organisations (BTSR, Clean Energy for Eternity) and a number of landowners between Kalaru and Bega that could be directly impacted by the implementation of a walk/cycle facility. As key community leaders with significant first-hand experience walking and cycling the corridor and the broader Shire, the purpose of this group was to contribute to the planning and design of the corridor, act as a representative for the community and a barometer for broader community sentiment, and to champion the project.

The following workshops were held with the key community stakeholder group:

- Initial Stakeholder Workshop. This workshop was held on 15 April 2021 and its purpose was to introduce the project and seek initial stakeholder input in relation to current route issues and opportunities, and future route planning considerations.
- Route Alignment Options Workshop. This workshop was held on 2 June 2021 and its purpose was to provide an update on project progress and discuss draft route alignment options (refer to Section 5).

The minutes from these workshops are provided in Appendix 1. As outlined in Section 5 to Section 7, these workshops had a direct impact on the planning and design of a walk/cycle facility along the corridor.

2.2 COMMUNITY CONSULTATION

Following the Route Alignment Options Workshop, the route alignment options were released for public review and comment. Community consultation was open for a period of three weeks between 28 July and 18 August 2021 and was accompanied by a short survey to capture community feedback on the options and insight into community behaviour and sentiment in relation to cycling. Specifically, this included basic information on the background of respondents, their motivations for riding a bike, the potential future usage of a path if provided, the level of support for each option, and ideas for further consideration when refining or implementing the options.

Concurrent with this broader consultation, BVSC also undertook targeted consultation with landowners along the corridor and sought feedback from key bicycle groups including BTSR and Bicycle NSW.

A snapshot of key findings from an analysis of the survey responses is provided in Figure 2 while additional information regarding community consultation is provided in a Community Consultation Report which is attached as Appendix 2.

247
completed surveys

99%
of surveys were completed by residents of Bega Valley Shire

55-64
age group with the highest number of completed surveys

90%
of survey respondents require or prefer dedicated bicycle facilities in order to ride a bike

Recreation & exercise
was the most commonly cited reason for riding a bike

83%
of survey respondents said they would use a Kalaru to Bega walk/cycle path at least once a month if provided

143
individual free text responses were provided through the survey

Safety
was the most common theme in the free text responses

71%
of free text responses expressed support for a walk/cycle link between Kalaru and Bega

Figure 2: Snapshot of survey key findings

3 STRATEGIC CONTEXT

A review of the existing policy, land use planning, demographics, environment, cultural heritage and transport situation surrounding the corridor was undertaken to provide an informed basis for the study. This will help in the development of corridor objectives, route alignments and design treatments that are locally relevant and represent the needs and desires of the community.

3.1 POLICY

A high-level review of relevant state and local policies and plans has been undertaken to understand the policy context, to identify key inputs to the planning and design of the Kalaru to Bega Shared Path, and to outline strategic justifications for its implementation.

3.1.1 Relevant state policies

Future Transport Strategy 2056

Future Transport Strategy 2056 sets the 40-year vision, directions and principles for customer mobility in NSW, guiding transport investment over the longer term. The Strategy is informed by key priorities associated with the NSW Government agenda, it forms part of the State's vision for the future of NSW, and it influences other, more detailed transport strategies and plans, including Transport's 10 Year Blueprint and various divisional and functional plans.

Of relevance to this study, the Strategy incorporates and demonstrates the Movement and Place Framework, highlights the benefits of walking and cycling and the importance of integrating walking and cycling networks, and provides a discussion on the role of walking and cycling networks in regional and outer metropolitan areas. The Strategy acknowledges that a key to supporting the growth and vibrancy of NSW's regional cities, centres and towns through transport is making them places where people want to walk and cycle. Accordingly, the Strategy aims to increase rates of walking from 4% to 8% and cycling from 2% to 5% of all trips over the next 10 years.

South East and Tablelands Regional Plan

The *South East and Tablelands Regional Plan 2036* is the NSW Government's strategy for guiding land use planning decisions for the South East and Tablelands Region for the next 20 years. The region consists of nine local government areas, including Bega Valley.

The Plan comprises a vision, four goals, 28 directions and 109 actions, with the goals articulating the intended outcome, the directions identifying broad issues or policy areas, and the actions representing the steps that need to be taken or the initiatives that need to be introduced/implemented to achieve the goals. The Plan recognises the need to provide better walking and cycling paths to communities and to provide an efficient transport system to accommodate tourism growth and increased demand during holiday periods. The Plan also recognises the opportunities presented by well-designed pedestrian and cycling options to link tourism areas. This is particularly appropriate for the Bega Valley as prior to COVID-19 the Shire received, on average, over 820,000 visitors annually, spending around $350 million each year. The provision of a shared path between Kalaru and Bega will not only help to accommodate existing tourist demand but also help to capitalise on and create new opportunities to increase and diversify the tourism offering.

The 2036 plan is currently under review with a draft plan on exhibition in the middle of 2022.

3.1.2 Relevant local policies

Local Strategic Planning Statement 2040

The *Bega Valley Local Strategic Planning Statement 2040* (LSPS) is a planning tool that provides direction for land use in the Bega Valley Shire through to 2040. The LSPS documents future land use intentions for Bega Valley Shire and provides clarity on the types of development that are likely to be supported by BVSC in certain areas and those that may not. The LSPS, which was informed by the *South East and Tablelands Regional Plan 2036*, the Bega Valley Community Strategic Plan 2040, and a number of other strategic plans, informs Council's Local Environmental Plan (LEP), Development Control Plan, and other local policies.

At a policy level, the LSPS expresses a desire to provide travel choices (including for walking, cycling and public transport), increase opportunities for and investment in foot and bike path connections and to give priority to extending the Shire's shared network via grants and community/business partnerships. Of particular relevance to this study, the LSPS outlines the intention to provide a shared path from Bega to Tathra via Kalaru (refer to Figure 3).

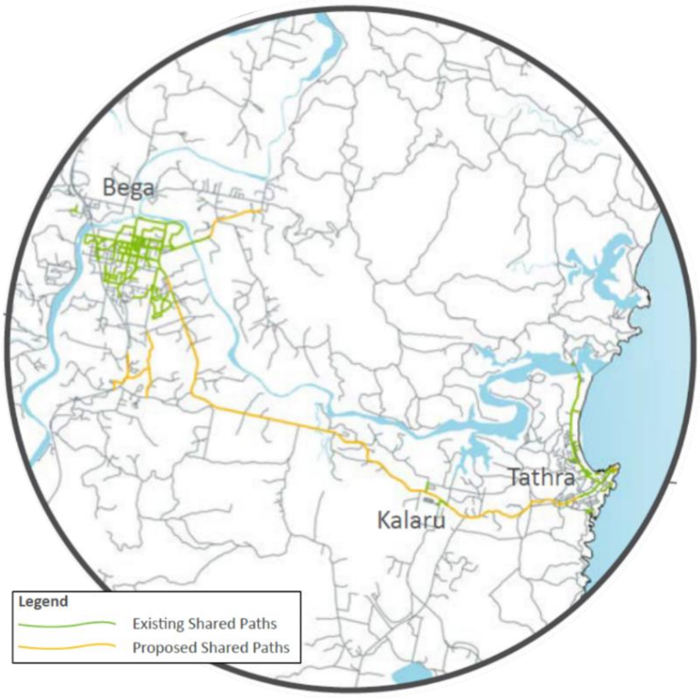


Figure 3: Existing and proposed shared paths (Source: Bega Valley Shire Council, 2020)

The LSPS also identifies residential investigation areas and a precinct map for Bega. As can be seen in Figure 4, a large investigation area is identified on the south-western side of Bega, and a mid-sized investigation area is identified to the south of Bega along Tathra Road (directly adjacent to the study corridor). The residential investigation areas in Kalaru are located to the east of the existing urban areas and on both the northern and southern sides of Tathra Road. These areas have been marked for investigation to support the residential land development principles which include ensuring there is sufficient residential land for the expected population growth and increase diversity of housing.

It is noted that these areas presented in the LSPS are consistent with the areas shown in the *Residential Land Strategy 2040*.

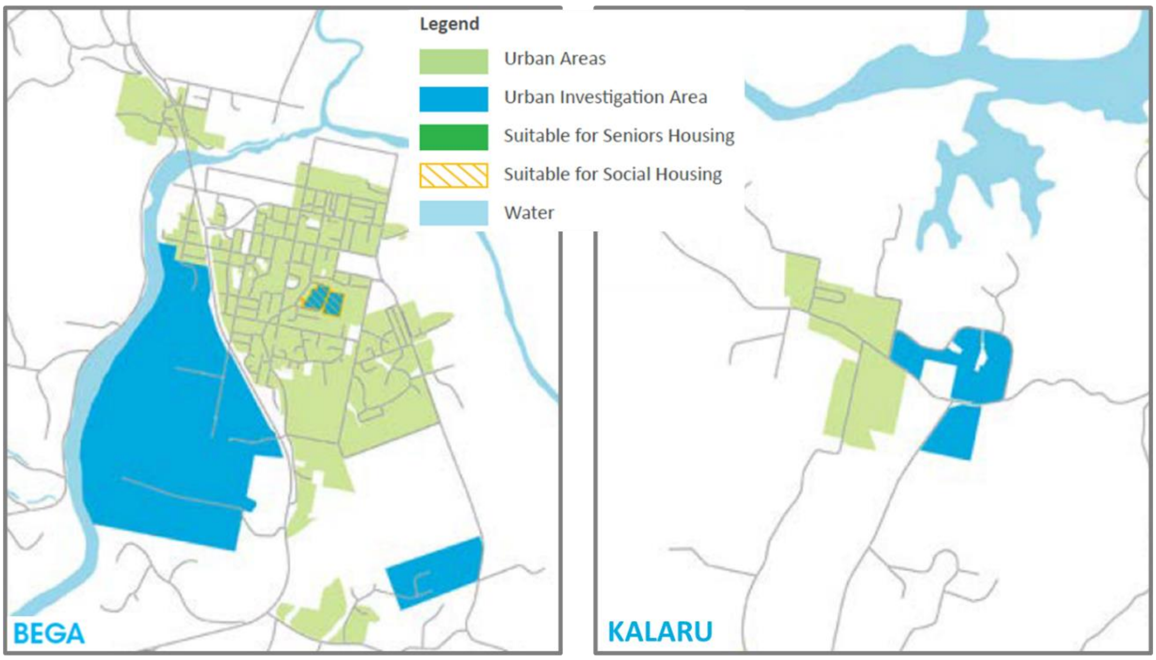


Figure 4: Residential investigation areas (Source: Bega Valley Shire Council, 2020)

Rural Residential Strategy

The *Rural Residential Strategy* February 2020 identifies that there is an insufficient supply of rural residential land to meet projected needs to 2040. As such there are some areas which are proposed as rural residential areas and areas of consideration for lot size reduction in both Bega and Kalaru (refer to Figure 5).

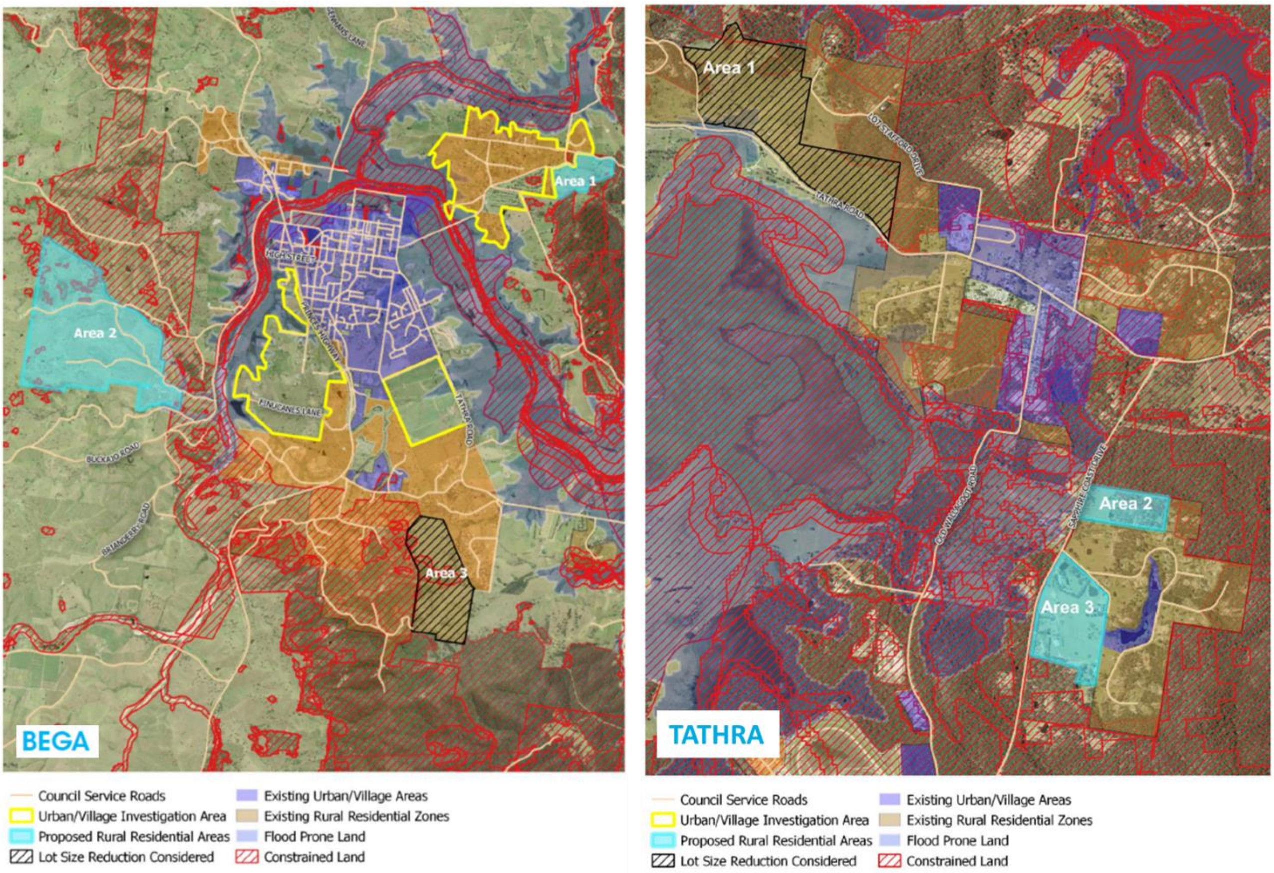


Figure 5: Rural residential future directions (Source: Bega Valley Shire Council, 2020)

Asset Management Plan

Bega Valley Shire Council's current *Transport Asset Management Plan* (June 2017) lists a number of demand drivers that may affect future service delivery and utilisation of assets. The drivers of most relevance to this study are presented in Table 1.

In summary, there is expected to be an increased and diversified use of shared pathways and cycleways, an increased use of public transport, and an increased requirement for accessibility improvements in response to aging populations, tourism and economic factors. Council's recognition of the need to normalise the provision of wider shared paths under the *Access for all* demand driver category in Table 1 should be an important consideration for the design of the Kalaru to Bega shared path.

Table 1: Relevant demand drivers (Source: Bega Valley Shire Council, 2017)

DEMAND DRIVERS	PRESENT POSITION	PROJECTION	IMPACT ON SERVICES
Population change	33,313 forecast population for 2013 2015 forecasted 33,507	In 2036 the population is projected to be 38,829 15.88% increase overall	Increase in demand for all services
Ageing population	We have greater than the state average for ages 50-80 years old, which accounts for 42.7% of our population base.	Increasingly aging population. With projected migration of retiree age groups as well as young mature families.	Increase and diversified use of shared pathways and cycleways Increase use of public transport

DEMAND DRIVERS	PRESENT POSITION	PROJECTION	IMPACT ON SERVICES
			Improved accessibility
Tourism	There is an increase in population during peak holiday seasons for example 90,000 (2014) visitors for the month of January, which equates to approximately 15-20%	Projected to further increase with tourism spread throughout the year.	Construction of car parks, traffic calming, road updated, footpaths & cycleways. Improved accessibility
Economic factors	Significant increase in cost of energy Constraints/Increases in grants and funding sources	Living costs will increase Single parent and low income families will increase Grant funding constrained	Increased demand for alternative forms of transport Improved accessibility Increased costs of works
Access for all	Standard footpaths 1.2m wide, a lot of ramps are non-compliant	Wider shared use paths become the norm	Additional funds required to upgrade the shared path network

3.2 LAND USE PLANNING

As illustrated in Figure 6, land use zoning varies along the corridor. Outside of the centres of Kalaru and Bega, land adjacent the corridor is mainly zoned for rural and environmental uses (C3, C4, RU1, RU2) with a small portion near Kerrisons Lane zoned large lot residential (R5). At the northern end of the corridor in Bega, the corridor intersects with land zoned low and medium density residential (R2, R3) and infrastructure (SP2) (i.e. Bega South East Regional Hospital). At the south-eastern extent of the corridor in Kalaru, the corridor intersects with land zoned General Industrial (IN1) and Village (RU5). These land uses and their associated characteristics will directly influence the design, use, cost and feasibility of the Kalaru to Bega Shared Path.

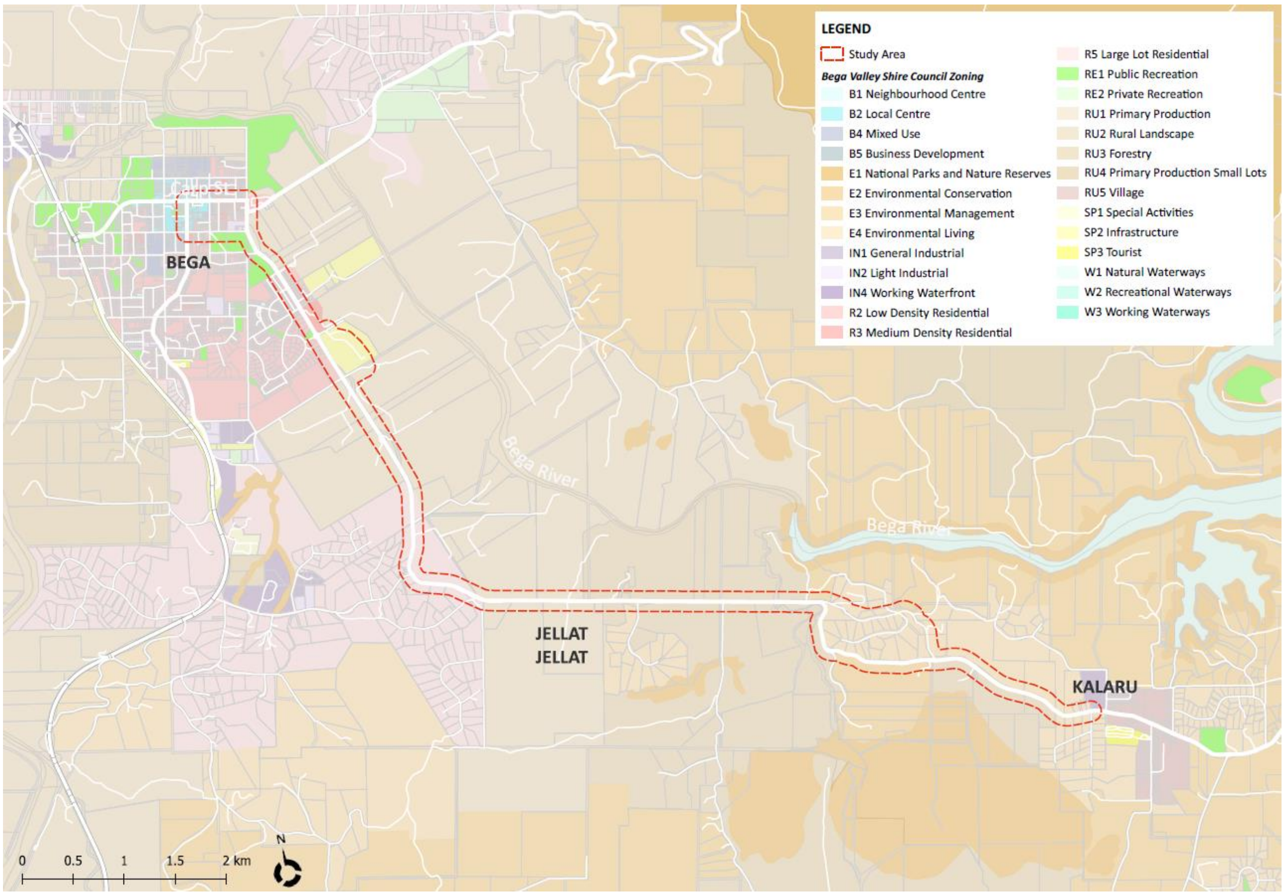


Figure 6: Current land zoning along the study corridor (Source: NSW Government)

3.3 DEMOGRAPHICS

Demographic analysis has been undertaken based on the two statistical areas in which the study corridor extends; namely, Bega District and Tathra-Kalaru District (refer to Figure 7).

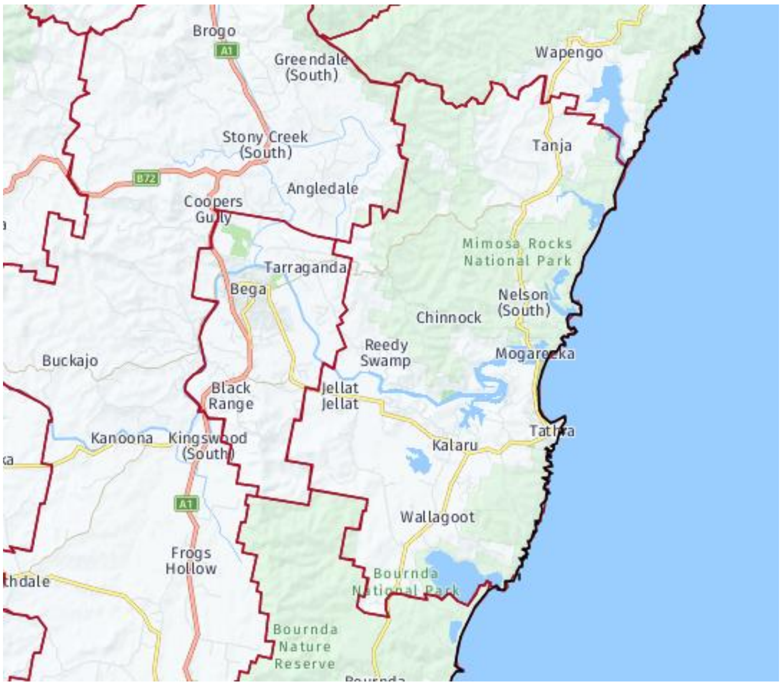


Figure 7: Statistical areas within Bega Valley (Source: ProfileID, 2021)

Table 2 shows the 2016 Census data for both statistical areas. This indicates that at the time of the 2016 Census, 5,206 people lived in Bega District, and 3,341 people lived in the Tathra-Kalaru District. The combined usual resident population of 8,547 represented approximately 26% of the entire BVS local government area (LGA) at 2016.

Between the 2011 and 2016 censuses, the usual resident population of the entire LGA increased by approximately 1,303 people which represents a total increase of 4% over the five-year period or 0.80% on average each year. Between 2016 and 2036, the population in BVS is forecast to increase by 4,194 persons (12.36% growth), at an average annual change of 0.58%. Specifically, Bega District is predicted to increase by 1,255 persons in this time with an average annual change of 1.07%, and Tathra-Kalaru District is predicted to increase by 12 persons in this time with an average annual change of 0.02%.

Table 2: 2016 census data and 2036 forecast population (Source: ProfileID and ForecastID, 2021)

STATISTICAL AREA	BEGA DISTRICT	TATHRA-KALARU DISTRICT	BEGA VALLEY SHIRE LGA
Area	5,699 ha	19,984 ha	627,900 ha
2016 Census population	5,205	3,341	33,253
% of total Bega Valley Shire LGA	15.65%	10.05%	-
2011 Census population (increase to 2016)	5,052 (+153)	3,180 (+160)	31,950 (+1,303)
2036 forecast population change (average annual % change from 2016)	6,571 (1.07%)	3,449 (0.02%)	4,194 (0.58%)

Figure 8 represents the age of people in both of the statistical areas along the corridor at the time of the 2016 Census. The graph indicates that the largest proportion of residents were aged 40 to 59 years in both districts and therefore overall within the study corridor. The 0 to 19 year age category in Bega District is similar to the 40 to 59 years, particularly in Bega District, and therefore identifies a high population of potential school age persons. This same age group is not as high in the Tathra-Kalaru District which is consistent with the number of schools across both areas. This age profile generally provides a greater catchment of potential cyclists and will be important in the development, evaluation and selection of options as these age groups could be considered to include school students, commuters and families.

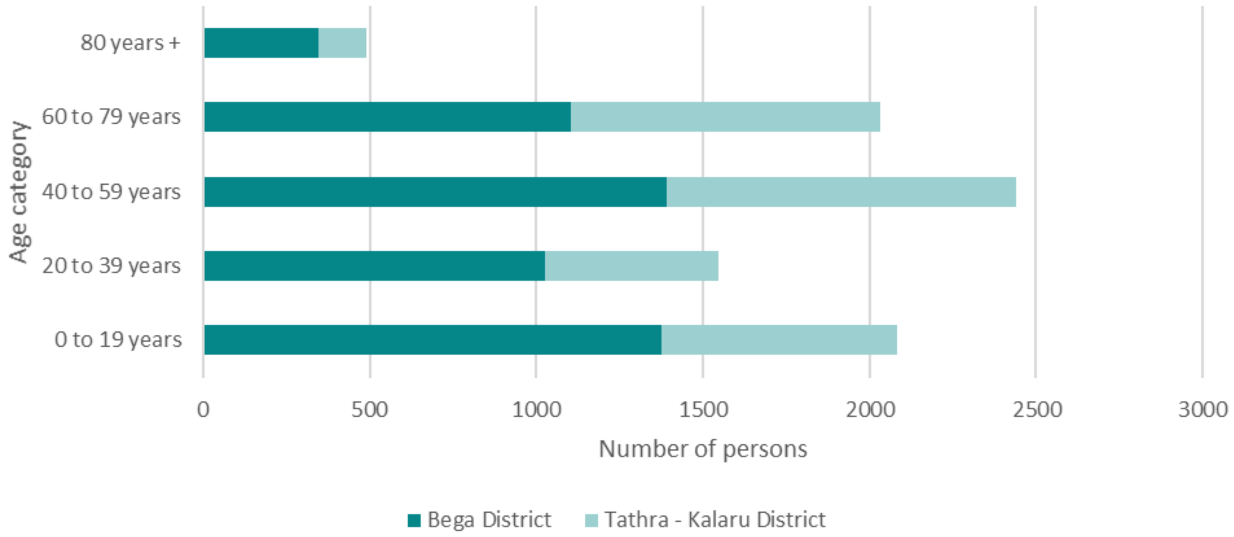


Figure 8: Age breakdown of residents within the corridor statistical areas (Source: ProfileID, 2016)

Figure 9 shows the breakdown of the education level of residents within both statistical areas through which the study corridor extends. Overall, primary (slightly higher) and secondary school students were the largest education category within these areas. This is consistent with the current age profile of residents surrounding the corridor (refer to Figure 8) and is reasonable considering the number of schools within the statistical areas. In light of this and the proximity of schools within the Bega District, there is an opportunity to consider the role of the shared path in providing connections to schools particularly within the western side of the corridor.

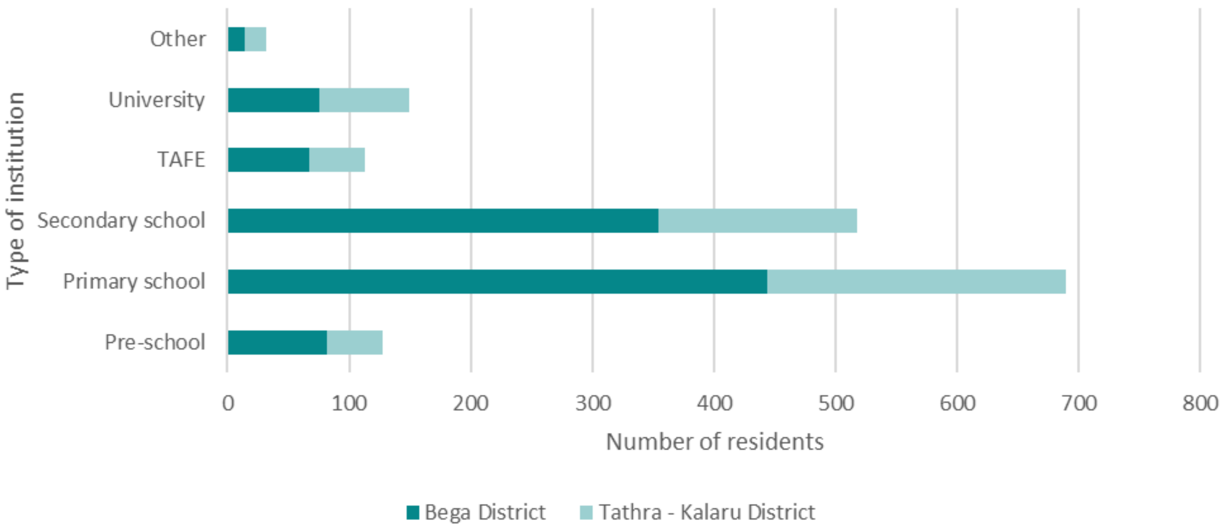


Figure 9: Breakdown of education institutions attended by residents within the corridor statistical areas (Source: ProfileID, 2016)

Figure 10 shows the current breakdown of residents by occupation category within both statistical areas through which the study corridor extends. As can be seen, *Professionals* was the dominant category overall, with *Labourers* closely second. This is important to consider as occupation and type of work undertaken can influence a persons decision to cycle. Generally occupations that are more geographically stable, less physically demanding and that do not require transportation of bulk items (e.g. tools) have greater scope to encourage cycling as a method of travel to work. These occupations typically align with the service sector and could include managers, professionals, community and personal service workers, clerical and administrative workers, and sales workers. According to data presented in Figure 10, these categories represent 63% of the total occupations worked by residents within the corridor statistical areas.

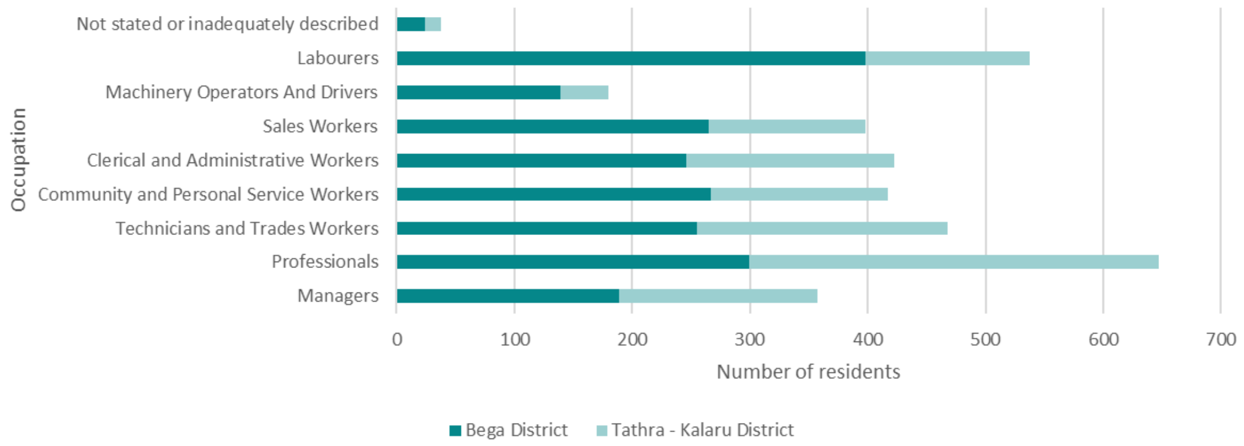


Figure 10: Breakdown of occupation of residents within the corridor statistical areas (Source: ProfileID, 2016)

Figure 11 represents the industry sectors of employment for residents within both statistical areas through which the study corridor extends. The highest industry of employment for residents is the *Health Care and Social Assistance* sector, followed by *Manufacturing* and *Retail Trade*. At the time of the 2016 Census, 97% of Bega Valley Shire's local workers were residents indicating a high amount of employment self-sufficiency.

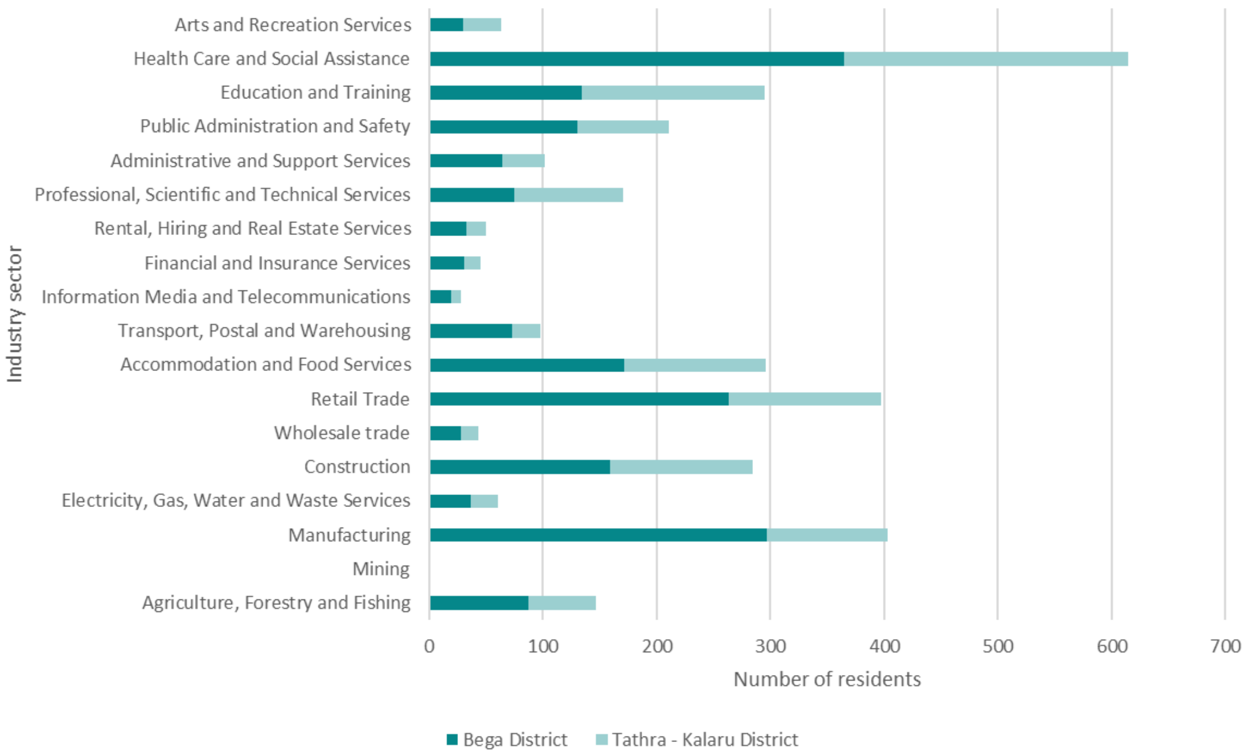


Figure 11: Breakdown of industry sector of residents within the corridor statistical areas (Source: ProfileID, 2016)

According to journey to work data from the 2016 Census, the majority of people residing in the statistical areas through which the study corridor extends currently travel to work by car. As shown in Figure 12, this is slightly higher in the Bega District compared to the Tathra-Kalaru District. Currently less than 1% of residents travel to work by bicycle which is consistent with the Bega Valley Shire average. There is a much higher take up of walking, than cycling to work including 7% for Bega District and 4% for Tathra-Kalaru District. The percentage of walking in Bega District is much higher than the Bega Valley Shire average of 4.9%. It should be noted that the Tathra to Kalaru section of the path and the shared path between Rose Street and the Bega South East Regional Hospital were constructed after the 2016 census which may have led to increases in walking and cycling for the journey to work.

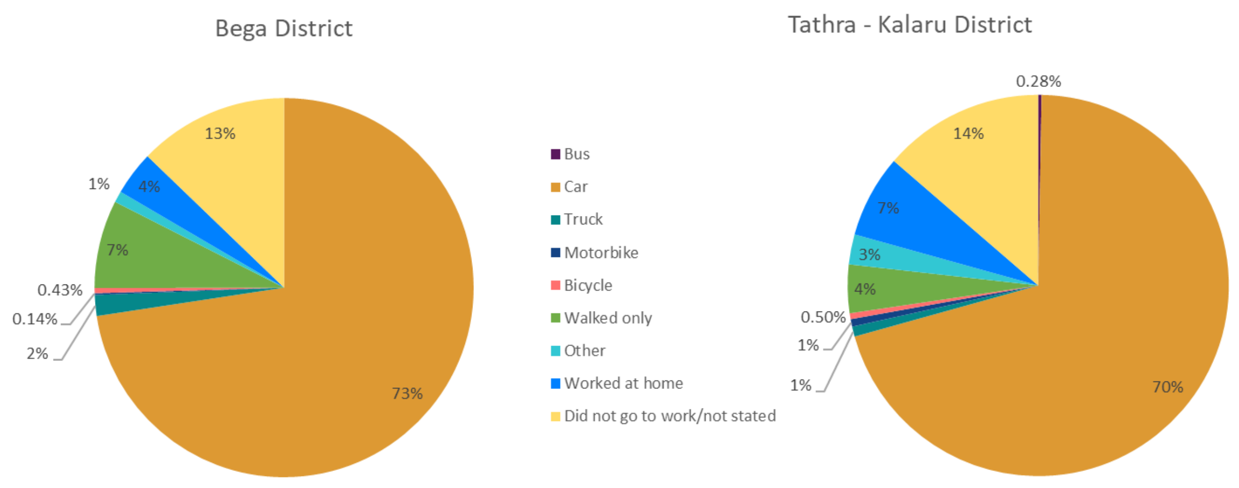


Figure 12: Method of travel to work (Source: ProfileID, 2016)

3.4 TRANSPORT

3.4.1 Walk and cycle network

A review of existing walk and cycle infrastructure was undertaken to understand the current extent of the active transport network along and within the study corridor.

3.4.2 Current route usage

Strava heatmaps suggest that the study corridor is currently used by cyclists extending from Bega to Tathra along Tathra Road with some movements through Ike Game Road and Jellat Way (refer to Figure 13). The pedestrian heatmaps suggest strong pedestrian activity within Bega, although this does not extend south below Boundary Road, and at Armstrong Drive through residential areas and into Kalaru along Tathra Road (refer to Figure 14).

Figure 13: Bicycle activity heatmap (Source: Strava, 2021)

Figure 14: Pedestrian activity heatmap (Source: Strava, 2021)

3.4.3 Crash data analysis

A total of 17 crashes across all modes (i.e. vehicle, pedestrian and cyclist) were recorded along the study corridor between 2015 and 2019. A map of all recorded crashes in this time period is provided in Figure 15 with callouts to specify active transport related crashes and locations. Of these recorded crashes, one was a bicycle crash on the roundabout on Tathra Road / Harry Scanes Avenue which provides access to the Bega South East Regional Hospital and one was a pedestrian crash located just outside the corridor at the T-intersection of Howard Avenue / Dandar Road. The crash data also shows that 71% of crashes were recorded as off path/out of control vehicles which is likely owing to the vertical and horizontal geometry of Tathra Road between Bega and Tathra.

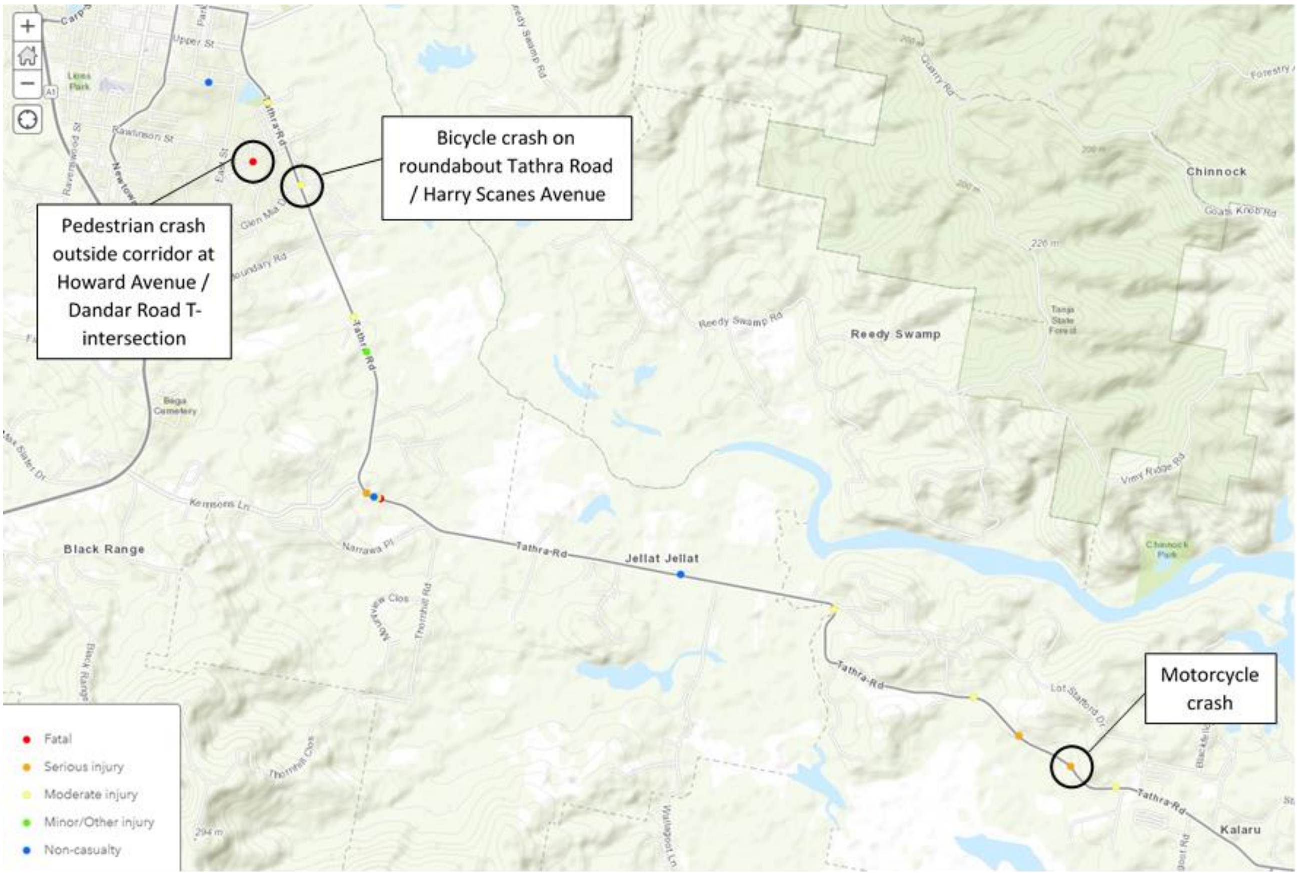


Figure 15: Crash location map (all modes) 2015 to 2019 (Source: Transport for New South Wales, 2021)

3.4.4 User profiles

Based on the findings from the review of policy and planning, land use planning, demographics and existing transport uses, the following key future user groups have been identified and split into two categories: primary and secondary.

Primary:

- Recreational riders
- Tourists

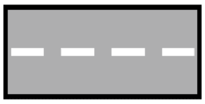
Secondary:

- School students
- Families
- Commuters
- Recreational walking.

4 CORRIDOR OBJECTIVES

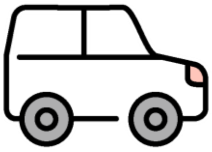
Several objectives have been developed to guide decision making around the planning, design and eventual implementation and maintenance of a cycle facility between Kalaru and Bega. These corridor objectives were informed by the findings from stakeholder engagement and a review of existing land use planning and policy, demographics, environment and cultural heritage, and multi-modal transport situations, including consideration of existing and potential future users.

The objectives for the corridor are:

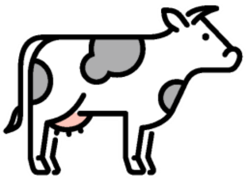


To provide a safe, connected, direct, attractive, comfortable and adaptable walk and cycle facility between the centres of Kalaru and Bega.

To provide a complete facility (paths, crossings and supporting infrastructure) that is suitable for bicycle riders of all ages and abilities.



To provide a genuine, appealing alternative to private vehicle use for trips between Tathra/Kalaru and Bega.



To provide opportunities to increase tourism, local economic development and exposure to Bega Valley Shire's unique environment, heritage, and culture.

To provide a functional walk and cycle facility that can be cost effectively constructed, maintained, and renewed.

5 CORRIDOR ALIGNMENT OPTIONS DEVELOPMENT

This section provides a summary of the process adopted and the route alignment options developed for the Kalaru to Bega Shared Path. The options were directly informed by inputs and feedback provided by the key community stakeholder group as well relevant findings from the existing situation review.

The following approach was adopted to develop route alignment options for the corridor:

- Break the corridor into distinct segments
- Develop individual alignment options for each corridor segment
- Identify the relevant pros and cons of each individual alignment option
- Seek feedback from the key community stakeholder group on the individual alignment options
- Combine the individual alignment options as appropriate into distinct route alignment options.

The outputs from this approach are discussed in greater detail in the relevant sections below.

5.1 CORRIDOR SEGMENTATION

The corridor was broken down into seven segments to assist in the development and subsequent analysis of route alignment options. This break down was based on identified differences in local characteristics (e.g. road typology and use, topography, environment, surrounding land uses) along the corridor and, as a result, an awareness of locations which afforded the greatest ability to develop and analyse discrete alignment options independent of the remainder of the corridor. The corridor segments are illustrated in Figure 16 and the individual alignment options by segment are discussed in Section 5.2.1 to Section 5.2.7 below.

It should be noted that an alignment along the Bega River was considered and discussed but it was agreed with project stakeholders, including key community representatives, that there was no value in pursuing this option as an alternative to the Tathra Road alignment. This was due to a number of key issues including likely resistance from landowners, emergency access issues, and potential for even greater impacts from flooding. This is discussed in Appendix 1.

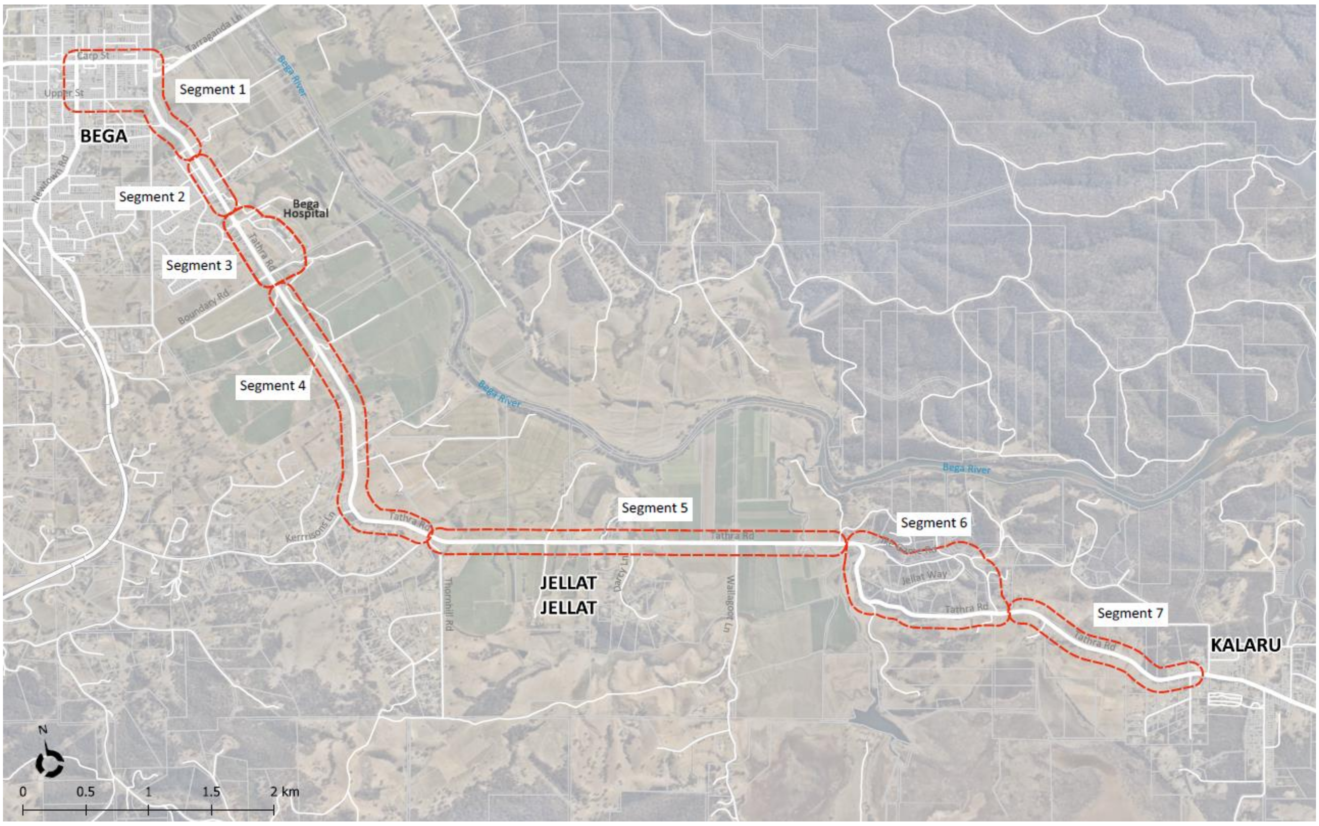


Figure 16: Corridor segments

5.2 INDIVIDUAL ALIGNMENT OPTIONS

5.2.1 Corridor Segment 1

As can be seen in Figure 17, Corridor Segment 1 is concentrated on the Bega township.

Four different route alignment options were developed for this corridor segment. As illustrated in Figure 17, these are:

- Option 1: Connection between the Upper Street/Gipps Street intersection and Rose Street via Upper Street and Tathra Road, using upgraded paths
- Option 2: Connection between the Carp Street/Gipps Street intersection and Rose Street via Carp Street and Tathra Road, using upgraded paths
- Option 3: Connection between the Carp Street/Parker Street intersection and Rose Street via Parker Street and Bega Showgrounds, using upgraded paths
- Option 4: Connection between the existing path network on East Street and Rose Street via East Street and Tathra Road, using new and upgraded paths.

A summary of the major pros and cons of these alignment options is provided in Table 3.

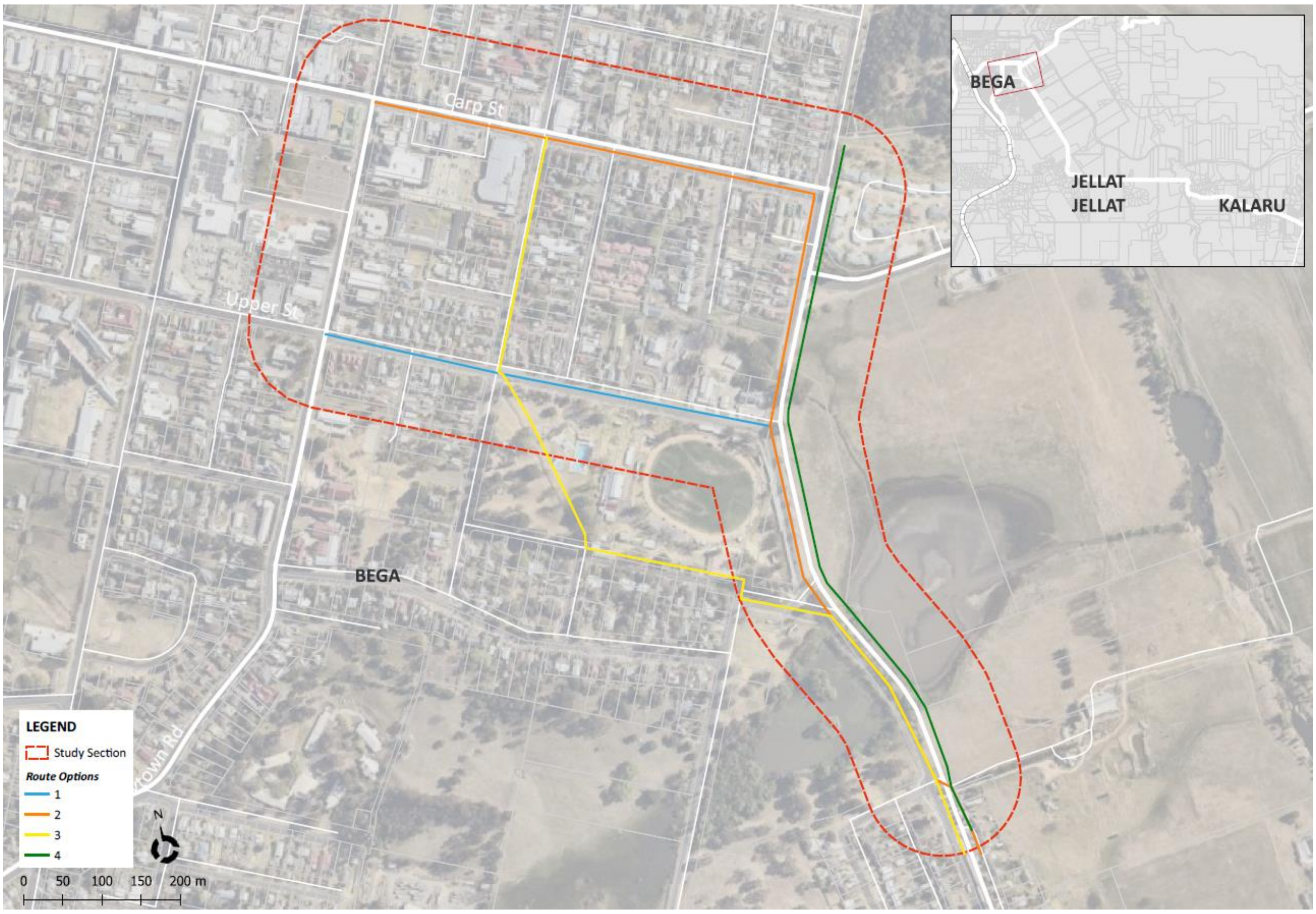


Figure 17: Route alignment options – Corridor Segment 1

Table 3: Route alignment option pros and cons – Corridor Segment 1

PROS	CONS
OPTION 1	
• Footpath already exists along alignment • Opportunity to bypass busy road environment on Carp Street • Opportunity to facilitate connections to Bega Showgrounds, Bega High School and existing bikeway network further west • Wide road reserve along Upper Street to support path widening	• Alignment does not provide direct connection to Bega township • No convenient opportunity to connect to Tarraganda Lane and existing path network • Alignment (use of Upper Street) is inconsistent with Bega Valley Bike Plan
OPTION 2	
• Footpath already exists along alignment • Provides direct connection to Bega township • Wide road reserve along Carp Street to support path widening • Opportunity to connect to Tarraganda Lane and existing path network	• Likely impact to utilities, particularly overhead power, on Tathra Road and Carp Street • Alignment (use of Carp Street) is inconsistent with Bega Valley Bike Plan
OPTION 3	
• Footpath already exists along alignment • Provides direct connection to Bega township • Alignment is consistent with Bega Valley Bike Plan • Alignment uses lower order road network and is potentially more safe, attractive and comfortable • Provides connection to Bega Showgrounds • Wide road reserve along Parker Street to support path widening if required	• Alignment may not be the most legible or intuitive • Path widening on Parker Street may be constrained by existing vegetation • No convenient opportunity to connect to Tarraganda Lane and existing path network
OPTION 4	
• Unconstrained environment to support ease of construction and reduce cost • Provides a continuous connection between existing path network to the north and shared path near Rose Street to the south • Alignment is consistent with Bega Valley Bike Plan • Opportunity to connect to Tarraganda Lane	• No existing paths along alignment • Alignment does not provide direct connection to Bega township • Crossings required across East Street to connect to Bega township

5.2.2 Corridor Segment 2

As can be seen in Figure 18, Corridor Segment 2 is concentrated on the area along and surrounding Tathra Road between Rose Street in the north and Harry Scanes Avenue in the south.

Two different route alignment options were developed for this corridor segment. As illustrated in Figure 18, these are:

- Option 1: Connection on the eastern side of Tathra Road between Rose Street and Harry Scanes Avenue, using existing shared path
- Option 2: Connection on the western side of Tathra Road between Rose Street and Harry Scanes Avenue, using new paths.

A summary of the major pros and cons of these alignment options is provided in Table 4.

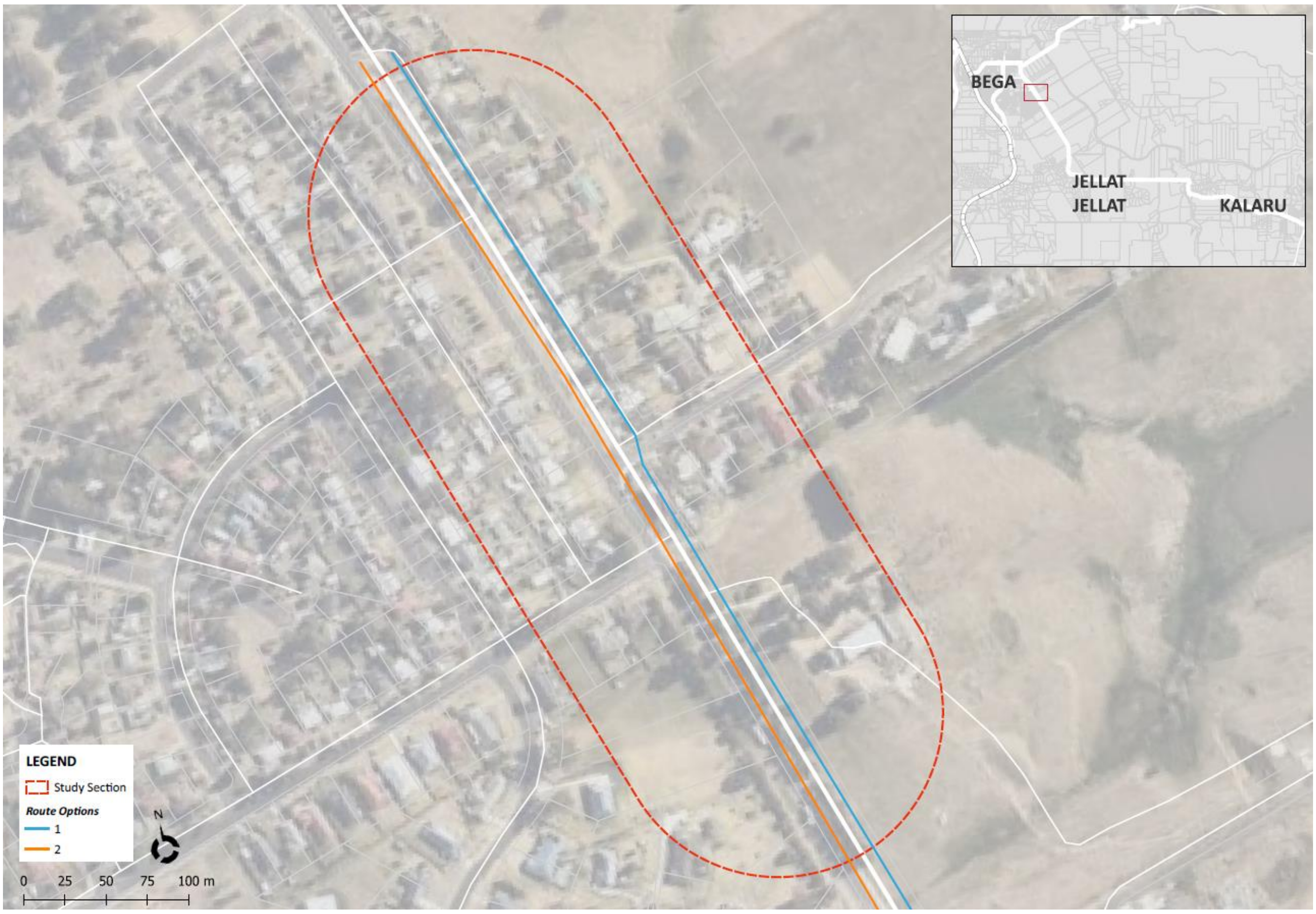


Figure 18: Route alignment options – Corridor Segment 2

Table 4: Route alignment option pros and cons – Corridor Segment 2

PROS	CONS
OPTION 1	
• Utilises existing shared path • Provides access to hospital, primarily for the benefit of hospital staff	• Users required to cross Tathra Road, depending on path alignment to the north and south
OPTION 2	
• Constrained environment due to existing embankment, increasing difficulty and cost to construct • Potential to remove need for users to cross Tathra Road, depending on path alignment to the north and south	• New path required to be constructed, duplicating existing path on eastern side of Tathra Road • Interaction with several property accesses

5.2.3 Corridor Segment 3

As can be seen in Figure 19, Corridor Segment 3 is concentrated on the area along and surrounding Tathra Road between Harry Scanes Avenue in the north and Boundary Road in the south. This segment includes the key attractor of Bega South East Regional Hospital.

Three different route alignment options were developed for this corridor segment. As illustrated in Figure 19, these are:

- Option 1: Connection between the Tathra Road/Harry Scanes Avenue roundabout to the Tathra Road/Boundary Road intersection via the hospital, using a combination of existing and new paths

- Option 2: Connection on the eastern side of Tathra Road between the Tathra Road/Harry Scanes Avenue roundabout to the Tathra Road/Boundary Road intersection, using new paths
- Option 3: Connection on the western side of Tathra Road between the Tathra Road/Harry Scanes Avenue roundabout to the Tathra Road/Boundary Road intersection, using new paths.

A summary of the major pros and cons of these alignment options is provided in Table 5.

In addition to the above, two alignment options connecting corridor segments 3 and 4 (i.e. between Boundary Road and north of Kerrisons Lane) are also shown in Figure 19. These options have been shown for context only as the selection of one of these two options will be influenced by the selection of alignment options for corridor segments 3 and 4.

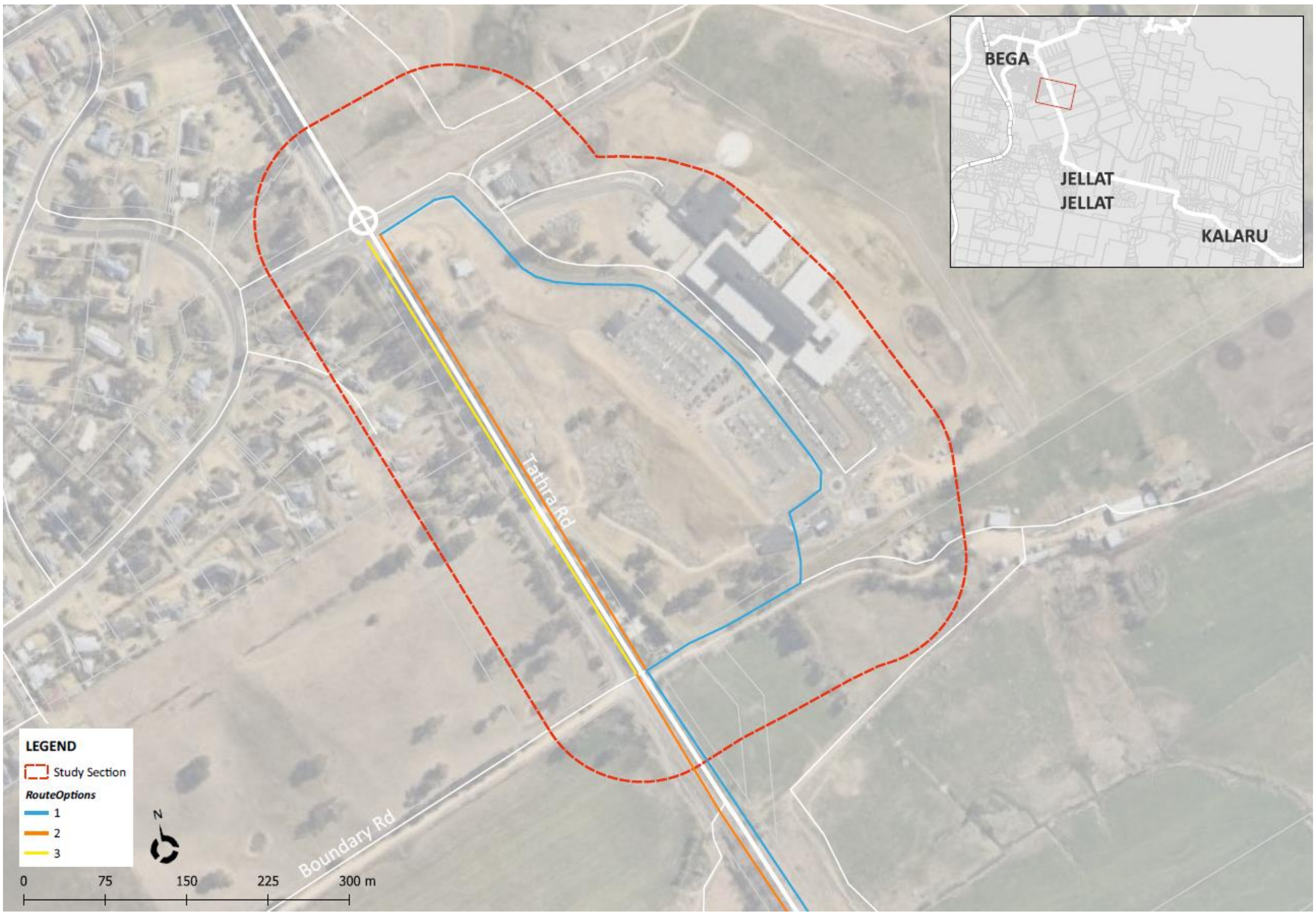


Figure 19: Route alignment options – Corridor Segment 3

Table 5: Route alignment option pros and cons – Corridor Segment 3

PROS	CONS
OPTION 1	
• Majority of path already exists, potentially reducing construction costs • Provides direct access to hospital, primarily for the benefit of hospital staff • Opportunity to implement as an interim measure if Tathra Road alignment option preferred in longer term. Unlikely that construction of missing section would be redundant as it provides a secondary hospital access for pedestrians and cyclists	• Alignment is neither direct nor on the dominant desire line (i.e. to/from Bega) which could undermine usage – route diversion required • Increase potential for cyclist conflicts with pedestrians as existing facility near the hospital is a shared path • Crossing may be required across Tathra Road depending on path alignment further south
OPTION 2	

PROS	CONS
• Sufficient space in road verge to construct • Same alignment (eastern side of Tathra Road) as recently constructed shared path north of Harry Scanes Avenue roundabout	• Water run-off location – drainage/ earthworks may be required • Interaction with one property access
OPTION 3	
• Sufficient space in road verge to construct	• Alignment on opposite side (western side of Tathra Road) to the recently constructed shared path north of Harry Scanes Avenue roundabout – additional road crossing required at the intersection • Interaction with one property access

5.2.4 Corridor Segment 4

As can be seen in Figure 20, Corridor Segment 4 is concentrated on the area along and surrounding Tathra Road near the Kerrisons Lane intersection.

Four different route alignment options were developed for this corridor segment. As illustrated in Figure 20, these are:

- Option 1: Connection on the eastern side and physically separated from Tathra Road, using new paths
- Option 2: Connection on the eastern side and closely following the alignment of Tathra Road, using new paths
- Option 3: Connection on the western side and closely following the alignment of Tathra Road, using new paths
- Option 4: Connection on the western side and physically separated from Tathra Road, using new paths.

A summary of the major pros and cons of these alignment options is provided in Table 6.

In addition to the above, two alignment options connecting corridor segments 3 and 4 (i.e. between Boundary Road and north of Kerrisons Lane) are also shown in Figure 20. These options have been shown for context only as the selection of one of these two options will be influenced by the selection of alignment options for corridor segments 3 and 4.

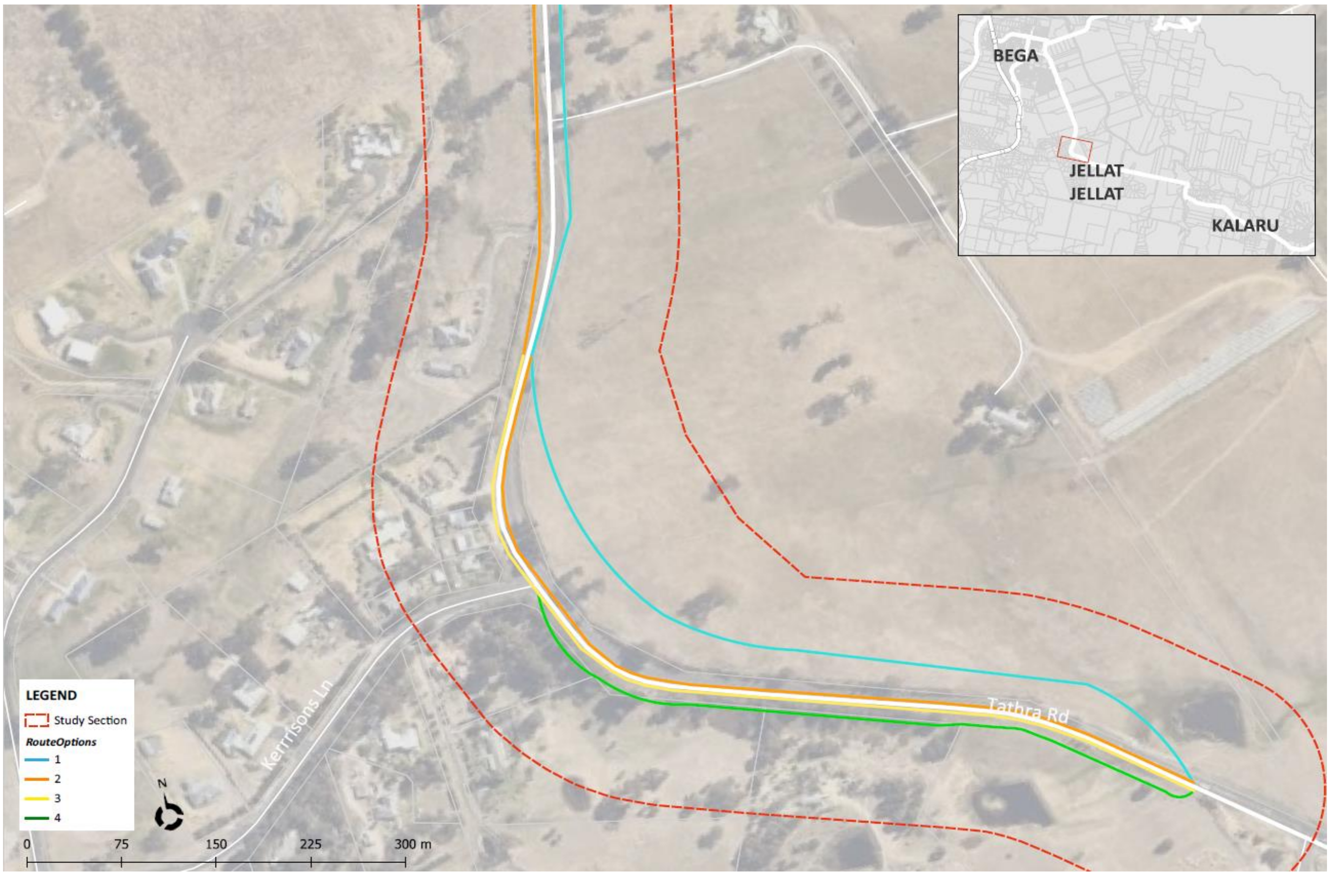


Figure 20: Route alignment options – Corridor Segment 4

Table 6: Route alignment option pros and cons – Corridor Segment 4

PROS	CONS
OPTION 1	
• Scenic • Separation from vehicle traffic • No interaction with driveways or intersecting roads • Opportunity to implement as part of future upgrade to Kerrisons Lane intersection and support potential future development	• Land acquisition required, affecting project cost and timing • No direct connection to service existing properties on western side of Tathra Road or to facilitate longer distance connections (e.g. to/from Sapphire Coast Anglican College)
OPTION 2	
• Follows existing road alignment • Land acquisition not required • No interaction with driveways or intersecting roads • Potentially cheaper to implement, subject to extent of earthworks required	• Comparatively close to vehicle traffic • Existing properties on western side of Tathra Road required to cross road to access path • Does not accommodate future upgrade to Kerrisons Lane intersection • Potential impact to existing vegetation • Earthworks may be required
OPTION 3	
• Follows existing road alignment • Land acquisition not required • Opportunity to implement as part of future upgrade to Kerrisons Lane intersection • Opportunity to service a potential future walk/cycle connection to Sapphire Coast Anglican College and Princes Highway • Directly services existing properties on western side of Tathra Road	• Comparatively close to vehicle traffic • Road crossing required (Kerrisons Lane) • Interaction with multiple property accesses • Earthworks may be required
OPTION 4	
• Scenic • Separation from vehicle traffic • Opportunity to implement as part of future upgrade to Kerrisons Lane intersection • Directly services existing properties on western side of Tathra Road	• Land acquisition required, affecting project cost and timing • Road crossing required (Kerrisons Lane) • Interaction with multiple property accesses • Potential impact to existing vegetation • Earthworks may be required

5.2.5 Corridor Segment 5

As can be seen in Figure 21, Corridor Segment 5 is concentrated on the area along and surrounding Tathra Road between Thornhill Road in the west and the Jellat bends (Henry Taylor Road) in the east.

Three different route alignment options were developed for this corridor segment. As illustrated in Figure 21, these are:

- Option 1: Connection on the northern side of Tathra Road between Thornhill Road and Henry Taylor Road, using new paths
- Option 2: Connection on the southern side of Tathra Road between Thornhill Road and Henry Taylor Road, using new paths
- Option 3: Connection on the southern side of Tathra Road between Thornhill Road and the Jellat bends (Tathra Road), deviating south at Jellat Jellat Creek (Russells Bridge) on existing farmland, using new paths. This option is also presented as part of Corridor Segment 6 due to the direct impact of the option on both segments.

A summary of the major pros and cons of these alignment options is provided in Table 7.

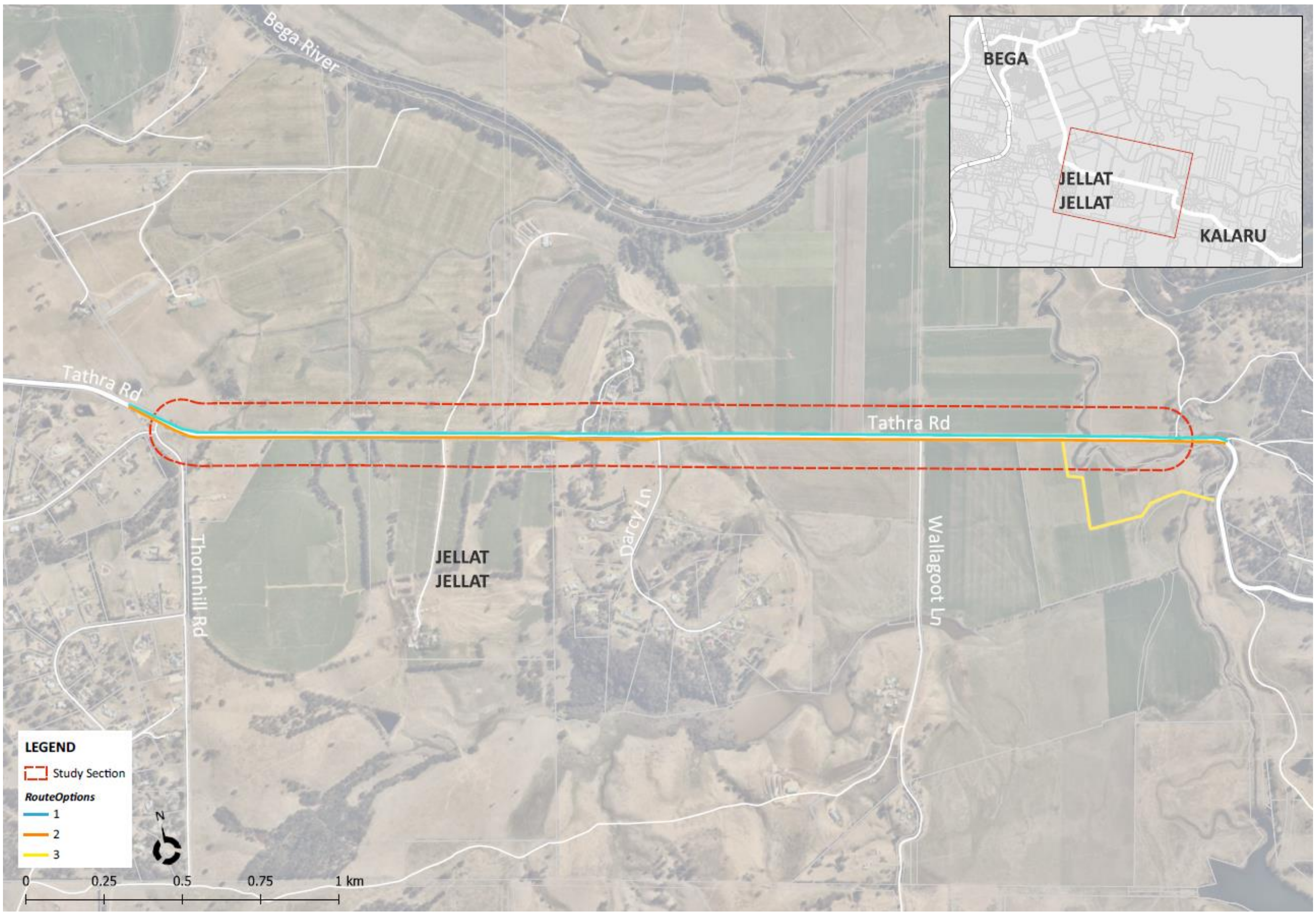


Figure 21: Route alignment options – Corridor Segment 5

Table 7: Route alignment option pros and cons – Corridor Segment 5

PROS	CONS
OPTION 1	
• Follows existing road alignment • Opportunity to implement lower cost separated facility on-road • No crossing of established roads • Land acquisition unlikely to be required • Supports integration with Henry Taylor Road/Ike Game Road or on-road facility through Jellat bends	• Potential impact to existing vegetation, particularly if new bridge provided adjacent existing Gowing Creek Bridge
OPTION 2	
• Provides direct access to on-road cycle route on Wallagoot Lane • Land acquisition unlikely to be required • Supports integration with on-road facility through Jellat bends	• Potential impact to existing vegetation, particularly west of Darcy Lane • Requires crossing three established roads (Thornhill Road, Darcy Lane, Wallagoot Lane) • Potential impact to existing services if new bridge provided on southern side of Russells Bridge • Integration with Ike Game Road requires crossing of Tathra Road
OPTION 3	
• In relation to eastern portion: • Scenic • Significant separation from vehicle traffic • Other pros subject to alignment of western portion	• Land acquisition required for eastern portion, affecting project cost and timing • Flooding and draining issues • Potential impact to ecological communities • Other cons subject to alignment of western portion

5.2.6 Corridor Segment 6

As can be seen in Figure 22, Corridor Segment 6 is concentrated on the area along and surrounding Tathra Road between Henry Taylor Road in the west and Ike Game Road in the east.

Six different route alignment options were developed for this corridor segment. As illustrated in Figure 22, these are:

- Option 1: Connection on the northern side of Tathra Road between Henry Taylor Road and Ike Game Road, using new paths
- Option 2: Connection on the southern side of Tathra Road between Henry Taylor Road and Ike Game Road, using new paths
- Option 3: As per Corridor Segment 5, connection between Jellat Jellat Creek (Russells Bridge) and Jellat bends (Tathra Road) on existing farmland. The remainder of the alignment for this option is as per Option 5 below
- Option 4: Connection on Henry Taylor Road and Ike Game Road bypassing the Jellat bends, using a combination of new paths and existing roadway
- Option 5: Connection adjacent the existing cattle tracks on the southern side of Tathra Road and physically separated from the existing roadway. The northern portion of the alignment for this option is as per Option 2
- Option 6: Connection on Jellat Way bypassing the Jellat bends, using a combination of new paths and existing roadway

A summary of the major pros and cons of these alignment options is provided in Table 8.

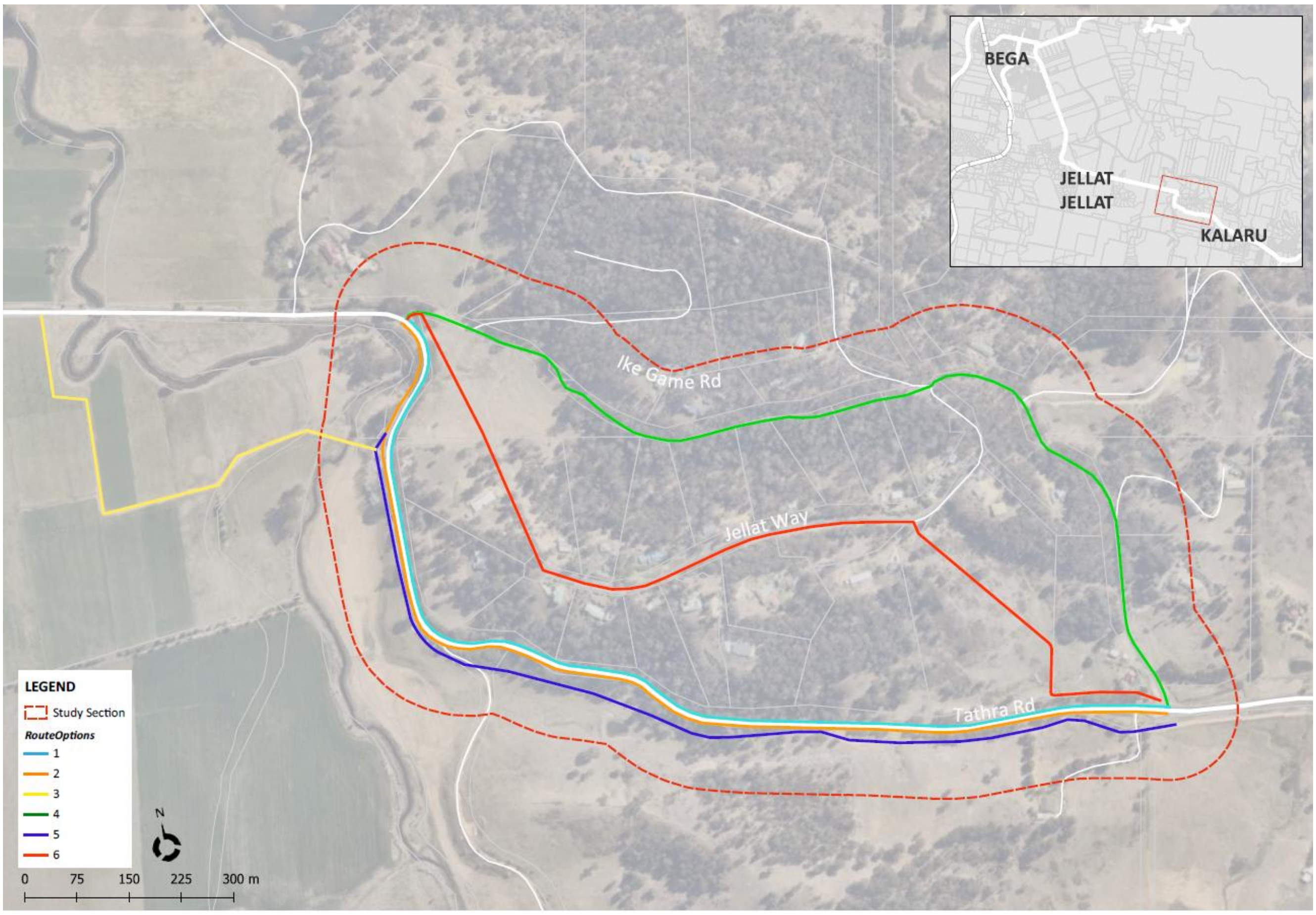


Figure 22: Route alignment options – Corridor Segment 6

Table 8: Route alignment option pros and cons – Corridor Segment 6

PROS	CONS
OPTION 1	
• Follows existing road alignment and is comparatively direct • Moderate gradients generally conducive to cycling when compared to other options • No interaction with property accesses • Land acquisition unlikely to be required	• Close to vehicle traffic • Earthworks (cut) and drainage works may be required • No opportunity to capitalise on views across Jellat flats • Potential impact to vegetation and ecological communities
OPTION 2	
• Follows existing road alignment and is comparatively direct • Moderate gradients generally conducive to cycling when compared to other options • Land acquisition unlikely to be required • Opportunity to capitalise on views across Jellat flats	• Close to vehicle traffic • Earthworks (fill) and drainage works may be required • Interaction with one property access • Potential impact to vegetation and ecological communities
OPTION 3	
• Scenic • Significant separation from vehicle traffic • Reasonably flat gradient • Lower cost to construct path (excluding land acquisition costs) • Opportunity to align path to avoid vegetation impacts • Opportunity to capitalise on views across Jellat flats	• Land acquisition required, affecting project cost and timing • Flooding and draining issues. Flooding issues likely to be more frequent and pronounced than other options due to comparatively lower level • Safety upgrades to Tathra Road (e.g. guardrail provision) may be required to improve safety of path users • Interaction with one property access • Disconnection from Ike Game Road communities • Potential impact to ecological communities
OPTION 4	
• Scenic • Separation of vehicle traffic (partial) • Land acquisition unlikely to be required • Opportunity to capitalise on views across Jellat flats	• Steep gradients not conducive to (non-ebike) cycling • Mixing with vehicle traffic likely required on Ike Game Road • Potential impact to ecological communities
OPTION 5	
• Scenic • Significant separation from vehicle traffic • Reasonably flat gradient • Lower cost to construct path (excluding land acquisition costs) • Opportunity to align path to avoid vegetation impacts • Opportunity to capitalise on views across Jellat flats	• Land acquisition required, affecting project cost and timing • Flooding and draining issues • Safety upgrades to Tathra Road (e.g. guardrail provision) may be required to improve safety of path users • Interaction with one property access • Potential impact to ecological communities
OPTION 6	
• Scenic • Separation of vehicle traffic (partial) • Opportunity to capitalise on views across Jellat flats • No impact to threatened ecological community • Directly services the greatest number of residential properties • Existing road formation may reduce some project costs	• Land acquisition required (multiple affected owners), affecting project cost and timing • Steep gradients not conducive to (non-ebike) cycling • Mixing with vehicle traffic likely required on Jellat Way

5.2.7 Corridor Segment 7

As can be seen in Figure 23, Corridor Segment 7 is concentrated on the area along and surrounding Tathra Road between Ike Game Road in the west and the eastern extent of the corridor at Armstrong Drive in Kalaru.

Three different route alignment options were developed for this corridor segment. As illustrated in Figure 23, these are:

- Option 1: Connection on the northern side of Tathra Road between Ike Game Road and Armstrong Drive, using new paths
- Option 2: Connection on the southern side of Tathra Road between Ike Game Road and Armstrong Drive, using new paths
- Option 3: As per Option 2 though with the western portion (between Ike Game Road and an existing property access) aligned adjacent an existing cattle track, using new paths.

A summary of the major pros and cons of these alignment options is provided in Table 9.

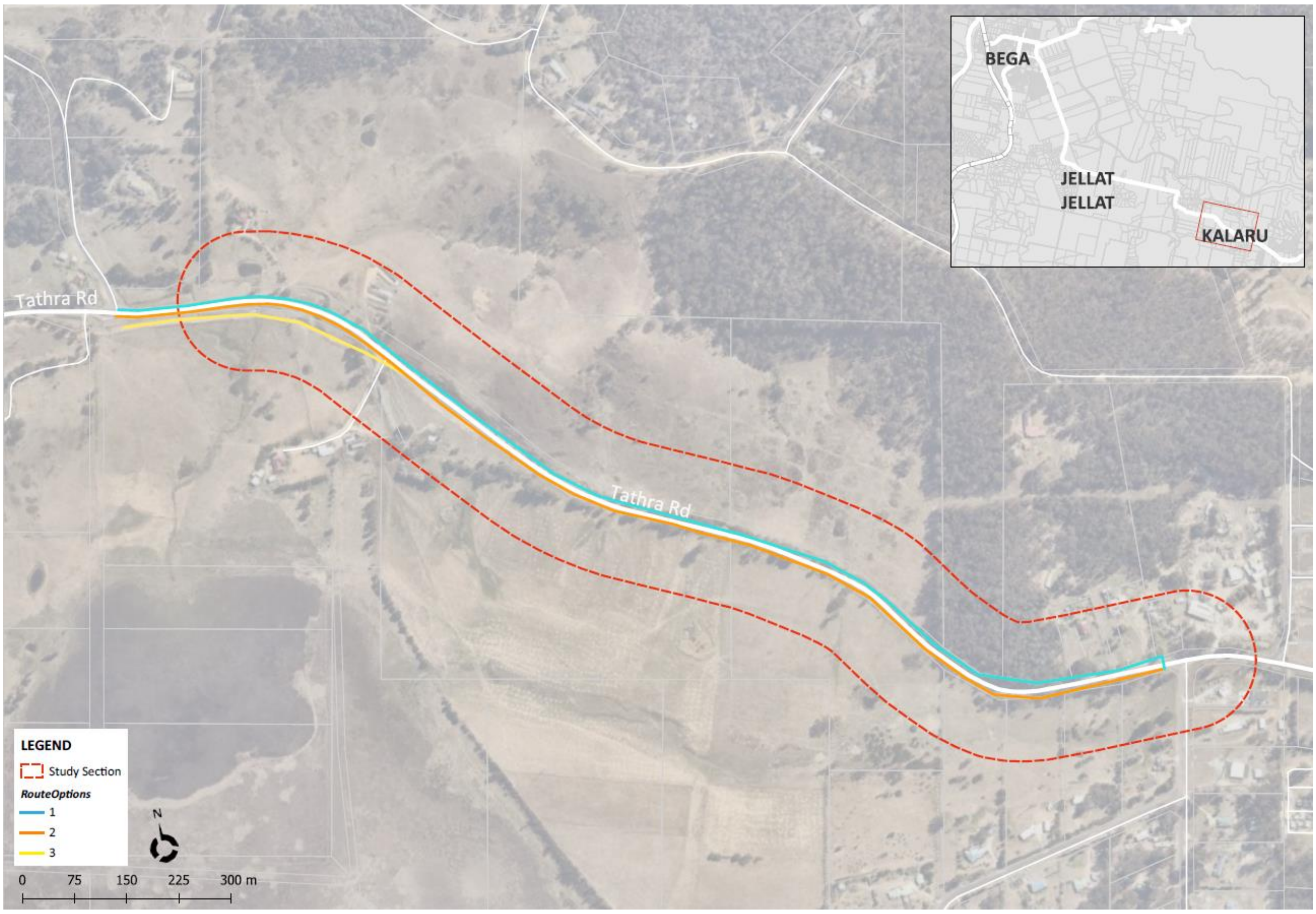


Figure 23: Route alignment options – Corridor Segment 7

Table 9: Route alignment option pros and cons – Corridor Segment 7

PROS	CONS
OPTION 1	
• Land acquisition unlikely to be required • No interaction with property accesses • Improved connectivity to Ike Game Road	• Crossing required to connect to Kalaru cycle path proposed on southern side of Tathra Road near Armstrong Drive • Potential impact to koala habitat, subject to distance of path from road
OPTION 2	

PROS	CONS
• Wider available road verge when compared to northern side of Tathra Road • Alignment on southern side of Tathra Road supports integration with proposed Kalaru path • Opportunity to capitalise on views across Horseshoe Lagoon	• Interaction with one property access • Tathra Road crossing required to access Ike Game Road
OPTION 3	
• Greatest amount of separation from vehicle traffic when compared to other options • Alignment on southern side of Tathra Road supports integration with proposed Kalaru path • Opportunity to capitalise on views across Horseshoe Lagoon	• Land acquisition required, affecting project cost and timing • Interaction with one property access • Tathra Road crossing required to access Ike Game Road

5.3 STAKEHOLDER ENGAGEMENT

As mentioned in Section 2.1, a Route Alignment Options Workshop was held on 2 June 2021 with the key community stakeholder group. The workshop provided an opportunity to discuss the corridor segmentation process, to present the individual alignment options for each corridor segment and further explore their pros and cons, and to identify any additional considerations. The key findings from the workshop of relevance to the development of corridor options are listed below with full meeting minutes provided in Appendix 1.

- Segment 3 (Harry Scanes Avenue to Boundary Road)
  - Potential to use the existing path around the hospital to reduce the duplication of costs
  - Desire line for people walking and cycling is along Tathra Road, not via the hospital
  - Important to have a path on the eastern side of Tathra Road to reduce number of road crossings
  - Option 2 (connection on the eastern side of Tathra Road) identified as the preferred individual alignment.
- Segment 4 (near Kerrisons Lane)
  - Crossing of Kerrisons Lane should be avoided
  - Option 1 (connection to the east and physically separated from Tathra Road) identified as the preferred individual alignment. If property cannot be resumed, then Option 2 is preferred.
- Segment 5 (Thornhill Road to Jellat bends)
  - NBN pits are located on the northern side and water infrastructure is located along the southern side of Tathra Road
  - Understood that landowners on the northern side of Tathra Road are open to property resumption discussions and to the removal of some of the existing pine trees west of Darcy Lane that are dangerous and could impede the provision of a path
  - Physical separation from the road corridor is preferred to an on-road path separated by bollards as bollards will get covered in flood debris
  - Option 1 (connection on the northern side of Tathra Road) identified as the preferred individual alignment.
- Segment 6 (Henry Taylor Road to Ike Game Road)
  - Potential for land slips if cutting into hillside. Vegetation removal and stabilisation works may be required
  - If using the cattle track, would need to ensure separation from cattle (fence likely to be sufficient) and to consider biosecurity of interaction with cattle

    - Views looking west around the Jellat bends would be a highlight for tourists
    - Option 5 (connection on the southern side of Tathra Road adjacent the existing cattle track) identified as the preferred individual alignment. If property cannot be resumed, then Option 2 is preferred, followed by Option 4.
- Segment 7 (Ike Game Road to Armstrong Drive)
    - Only one landowner
    - Option 2 or 3 (connection on the southern side of Tathra Road) is preferred
- Other comments
    - Group consensus that road crossings should be minimised as much as possible as every road crossing is a safety risk
    - The preference is to avoid property acquisition as a general principal so as not to disturb local land holders. Any acquisitions would require adequate consultation with the land holders and the community.

5.4 CORRIDOR ALIGNMENT OPTIONS

A total of four distinct corridor alignment options were developed, utilising a number of the individual alignment options presented in Section 5.2. The combination of relevant individual alignment options into distinct corridor options was informed by feedback provided by the key community stakeholder group as well as relevant findings from the existing situation review.

These corridor options, as presented in Figure 24 to Figure 27 below, were released publicly as part of the broader community consultation exercise and analysed in greater detail to help identify a preferred alignment. This is discussed in greater detail in Section 6.

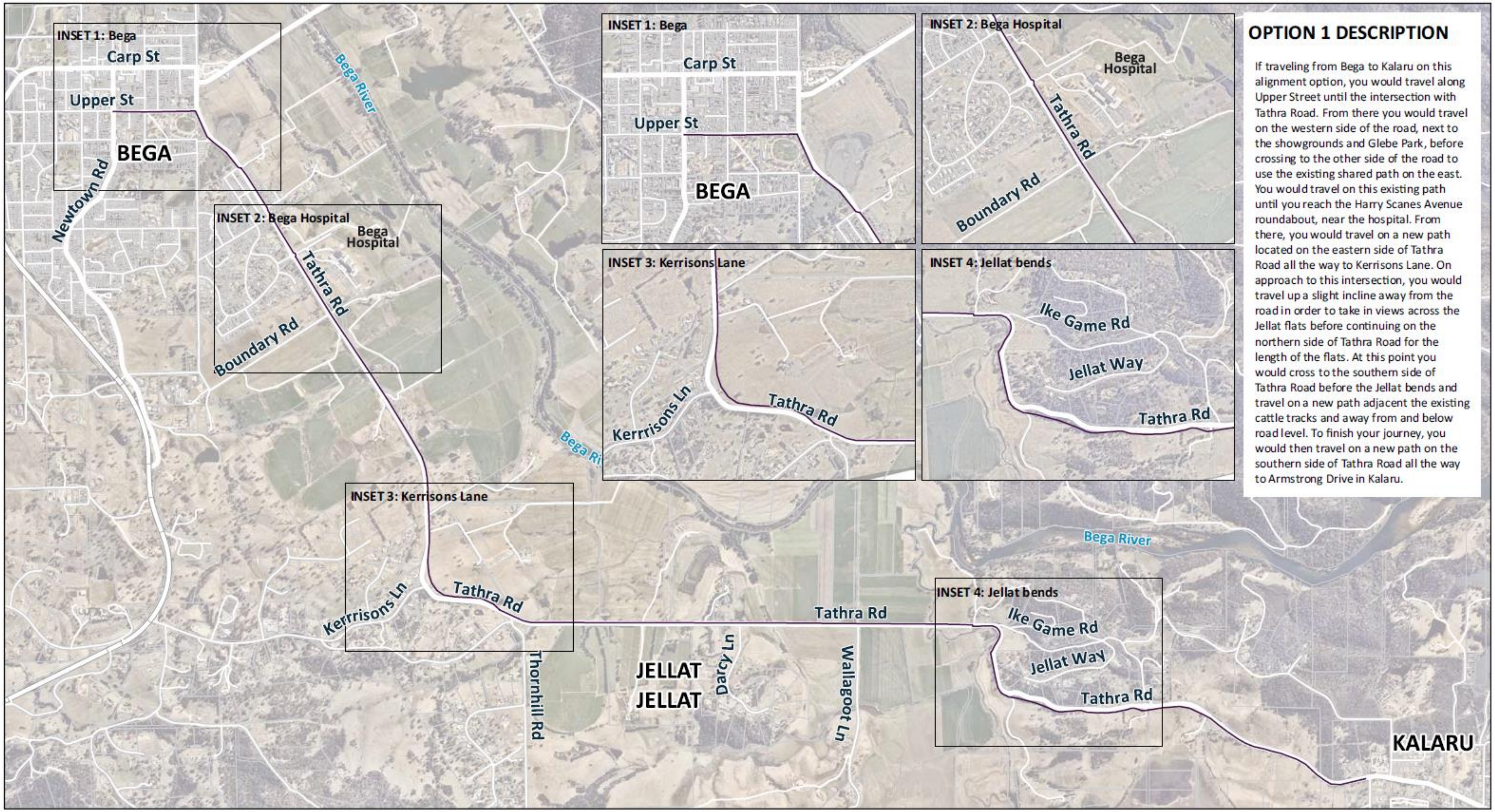


Figure 24: Corridor alignment – Option 1

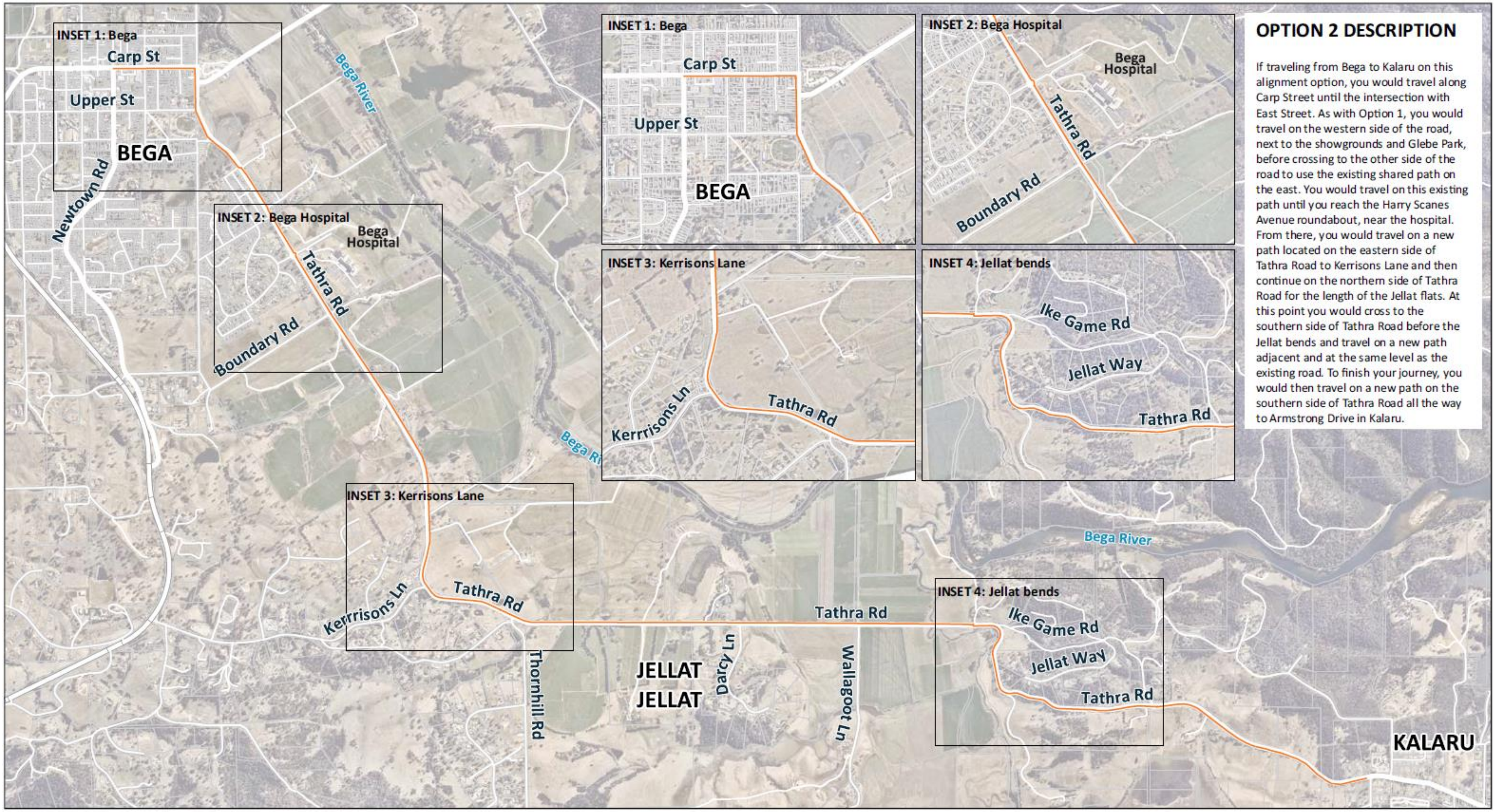


Figure 25: Corridor alignment – Option 2

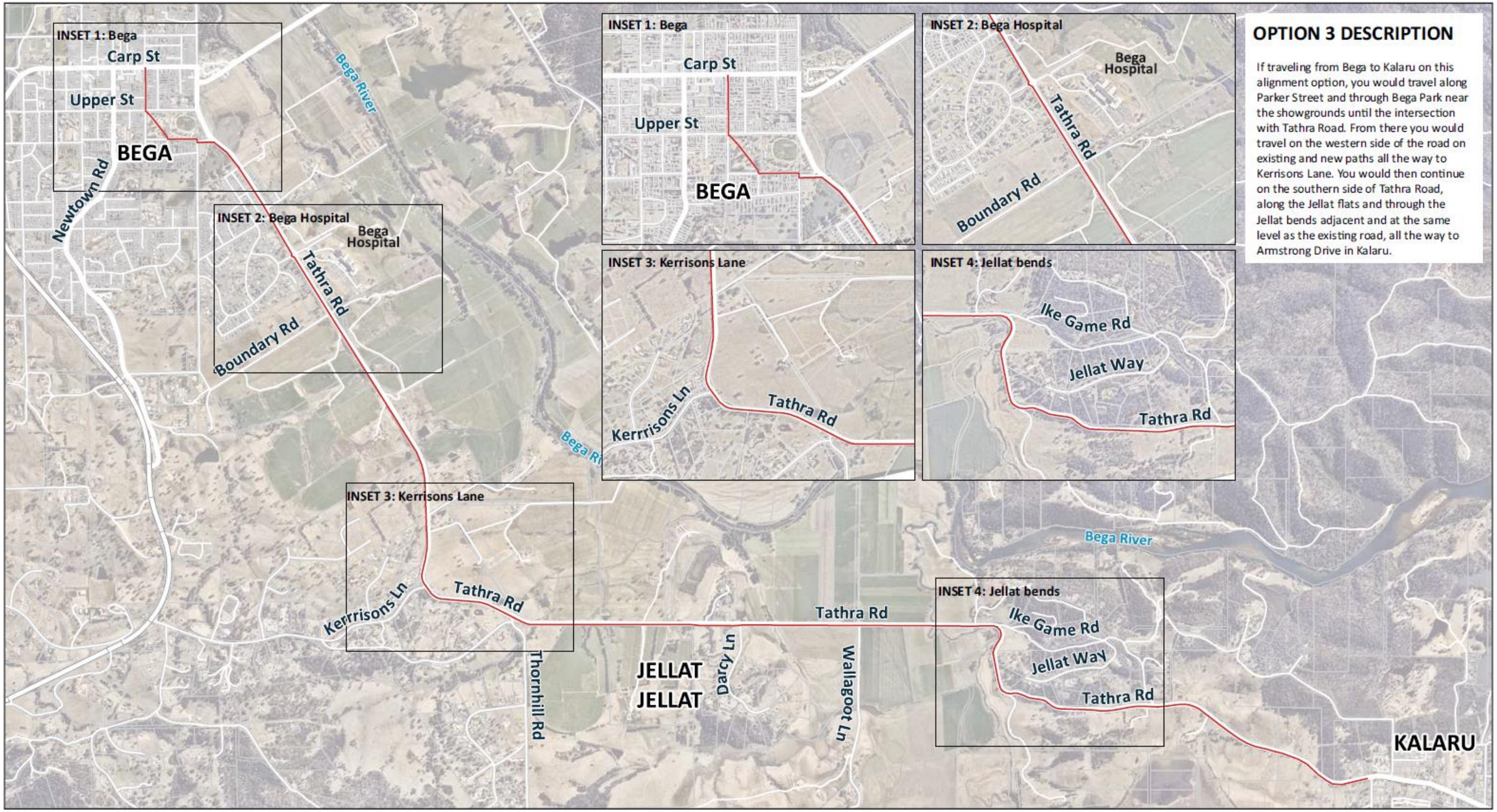


Figure 26: Corridor alignment – Option 3

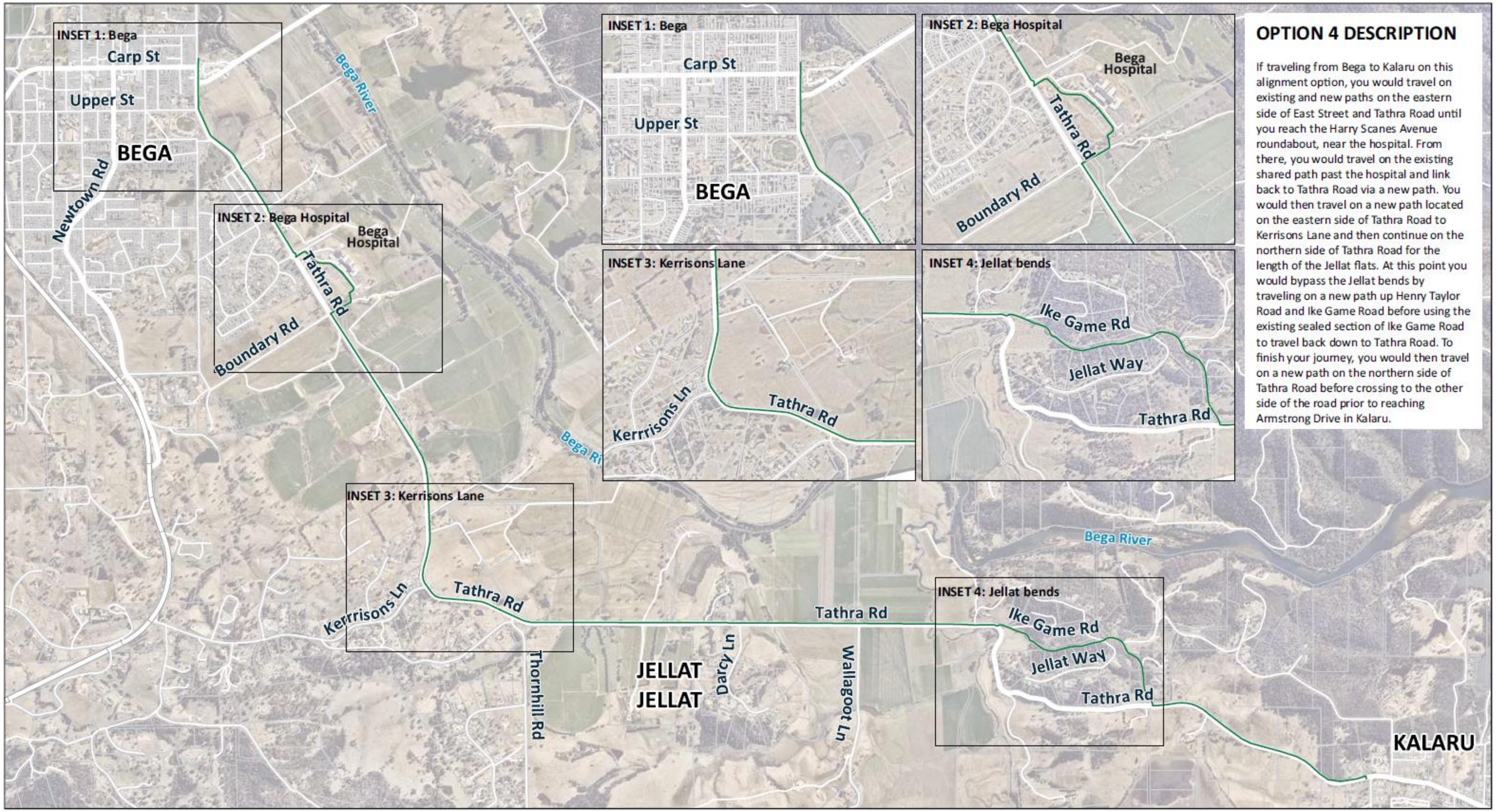


Figure 27: Corridor alignment – Option 4

6 CORRIDOR ALIGNMENT OPTIONS ANALYSIS

This section provides a summary of the process adopted and the findings from an analysis of the corridor alignment options developed for the Kalaru to Bega Shared Path. The purpose of the analysis was to better understand the potential benefits, issues and risks of each of the options and to help inform the selection of a preferred option.

The following approach was adopted to analyse the corridor alignment options:

- Determine the strengths, weaknesses, opportunities and threats of each of the corridor alignment options
- Seek community feedback on the corridor alignment options
- Review community feedback on the corridor alignment options.

The outputs from this approach are discussed in greater detail in the relevant sections below.

6.1 SWOT ANALYSIS

A Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of the four corridor alignment options was undertaken to better understand the potential benefits, issues and risks of each of the options and to help inform the selection of a preferred option for progression. By better understanding the relative benefits and vulnerabilities of the options, this analysis also provided an opportunity to further refine the preferred option and identify ways to guide its staged implementation in the future. The SWOT analysis is presented in Table 10.

Table 10: SWOT analysis of corridor alignment options

OPTION	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Option 1	• Provides significant physical separation from vehicles through dangerous locations (Kerrisons Lane and Jellat bends) • Comparatively low number of crossings of intersecting sealed roads (4) • Closely follows existing road alignment, with minor diversions to improve safety, attractiveness and user comfort • High scenic and amenity value • Limited grade change compared to existing road alignment	• Two crossings of Tathra Road required • Majority of development located on opposite side of road to proposed path, necessitating road crossings for residents • Crossing of Tathra Road required to connect to longer distance on-road cycle route (i.e. Wallagoot Lane) • Additional incline at Kerrisons Lane due to diversion away from roadway • Crime Prevention Through Environmental Design (CPTED) issues with Jellat bends diversion (low-lying, subject to flooding and out of sight of motorists on Tathra Road) • Property resumptions required	• Opportunity to connect to Tarraganda Lane and existing paths at the old Racecourse and along Bega River • Opportunity to provide secondary (southern) connection to hospital in future • Provide lookouts at key locations to maximise views and capitalise on high scenic and amenity value • Connects into proposed Kalaru path (both located on southern side)	• Jellat bends diversion may affect cattle movements, be a biosecurity risk and have environmental impacts • Potential impact to existing NBN pits on the northern side of Tathra Road through Jellat Jellat
Option 2	• Direct and legible route • Little to no CPTED issues as path follows Tathra Road alignment • Grade change consistent with existing road alignment • Little to no property resumptions required	• Tathra Road path alignment through Kerrisons Lane and Jellat bends undermines path attractiveness and the safety and comfort of path users due to proximity to vehicular traffic • Highest number of crossings of intersecting sealed roads (5) • Two crossings of Tathra Road required • Majority of development located on opposite side of road to proposed path, necessitating road crossings for residents • Crossing of Tathra Road required to connect to Wallagoot Lane • Limited opportunities for lookouts	• Opportunity to connect to Tarraganda Lane and existing paths at the old Racecourse and along Bega River • Opportunity to provide secondary (southern) connection to hospital in future • Opportunity to implement Kerrisons Lane path segment as part of future Tathra Road/Kerrisons Lane intersection upgrade works • Connects into proposed Kalaru path (both located on southern side)	• Potential for significant earthworks and vegetation disruption to implement path adjacent Tathra Road through Kerrisons Lane and Jellat bends • Potential impact to existing NBN pits on the northern side of Tathra Road through Jellat Jellat
Option 3	• Direct and legible route • No crossing of Tathra Road required	• Tathra Road path alignment through Kerrisons Lane and Jellat bends undermines path attractiveness and	• Opportunity to implement Kerrisons Lane path segment as part of future Tathra	• No opportunity to connect to Tarraganda Lane and existing

OPTION	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
	• Alignment in Bega consistent with current Bike Plan • Majority of development located on same side of road to proposed path, removing need for road crossings for residents • Provides direct connection to Wallagoot Lane • Little to no CPTED issues as path follows Tathra Road alignment • Grade change consistent with existing road alignment • Little to no property resumptions required	the safety and comfort of path users due to proximity to vehicular traffic Highest number of crossings of intersecting sealed roads (5) • Does not utilise recently constructed shared path on eastern side of Tathra Road between Rose Street and Harry Scanes Avenue, therefore does not optimise existing infrastructure • Crossing of Tathra Road required to access hospital • Crossing of Kerrisons Lane required	Road/Kerrisons Lane intersection upgrade works • Connects into proposed Kalaru path (both located on southern side) • Opportunity to service a potential future walk/cycle connection to Sapphire Coast Anglican College and Princes Highway	paths at the old Racecourse and along Bega River • Potential for significant earthworks and vegetation disruption to implement path adjacent Tathra Road through Kerrisons Lane and Jellat bends • Potential impact to existing water infrastructure on southern side of Tathra Road through Jellat Jellat • Additional crossing of Tathra Road required if secondary (southern) connection to hospital provided in future
Option 4	• Provides physical separation from vehicles through Jellat bends • Provides two direct connections to hospital • Provides connection for residents along Ike Game Road • Lowest number of crossings of intersecting sealed roads (3) • Moderate scenic and amenity value due to Jellat bends diversion	• Indirect route • One crossing of Tathra Road required • Majority of development located on opposite side of road to proposed path, necessitating road crossings for residents • Crossing of Tathra Road required to connect to Wallagoot Lane • Significant works required on Henry Taylor Road to implement Jellat bends diversion • Significant grade change, primarily due to use of Henry Taylor Road/Ike Game Road which reduces attractiveness and ability for path to be used by all ages and abilities • CPTED issues with Jellat bends diversion as it is out of sight of motorists on Tathra Road • Property resumptions required	• Opportunity to connect to Tarraganda Lane and existing paths at the old Racecourse and along Bega River • Opportunity to implement Kerrisons Lane path segment as part of future Tathra Road/Kerrisons Lane intersection upgrade works	• Jellat bends diversion may have environmental impacts • Potential impact to existing NBN pits on the northern side of Tathra Road through Jellat Jellat • People walking and cycling may need to mix with vehicle traffic (incl. school buses) on Ike Game Road if implementation of separate path is unfeasible

6.2 STAKEHOLDER ENGAGEMENT

Community consultation was a critical component of the analysis of the four draft corridor alignment options and it complemented the internal SWOT analysis process. As part of the community consultation exercise, feedback was sought not only from the broader community but also from potentially affected landowners and key cycling organisations. Key findings from the community consultation exercise are provided in the relevant sections below. Additional information is provided in Section 2.2 and in the Community Consultation Report which is included in Appendix 2.

6.2.1 Community

As part of the survey that was developed to support community consultation, respondents were able to express support for one, none or a combination of the corridor alignment options that were presented. According to the findings from this specific survey question, Option 1 and Option 4 received equal support as the preferred option with 31% of the vote each. Options 2 and 3 were comparatively unpopular, receiving 3% and 11% of the votes respectively. The remaining 24% of the vote was spread between respondents desirous of a combination of different aspects of two or more options (20%) and respondents who did not support any of the options presented (4%).

To improve the comprehensiveness and representativeness of the findings and help identify a preferred corridor alignment option, a review of all free text responses was undertaken. Through this review, Options 1 and 4 again garnered the most support, but with amendments to their alignments. Some of the common amendments that were noted included the removal of a path detour to the hospital and the need to ensure that road crossings were limited in order to improve safety. The additional support for the different options contained within the free text responses should be interpreted with caution as a number of the comments expressed support for individual sections of an alignment, rather than full support for an entire alignment option.

Notwithstanding, the combination of the stated preferences and the findings from the review of free text responses provided a fuller picture of support for each option. As can be seen in Figure 28, Option 1 received the highest level of support across the four options with 42% of the vote. The main concerns raised with Option 4 were the steep inclines on Henry Taylor Road and Ike Game Road and the detour past the hospital.

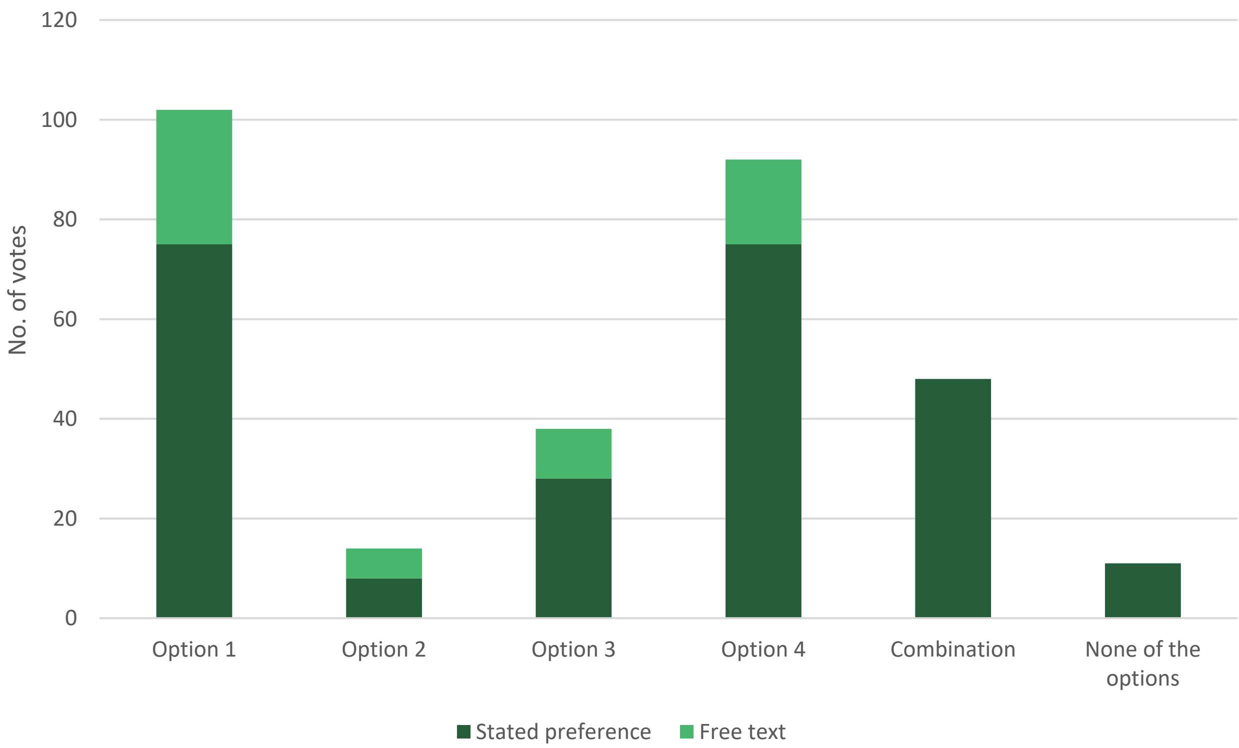


Figure 28: Level of community support for each corridor alignment option (Source: Bega Valley Shire Council, 2021)

6.2.2 Landowners

A total of 46 letters were distributed to landowners along the Kalaru to Bega corridor. Of these, three responses were received. The key findings from these responses included:

- All respondents expressed support for the project and advised that Option 4 was undesirable
- Two respondents identified Option 1 as their preferred corridor alignment option
- One respondent identified Option 3 as their preferred corridor alignment option
- One respondent advised that a crossing over Tathra Road on the western approach to the Jellat bends should be avoided if possible
- One respondent advised that a path through Jellat Jellat along the Jellat Flats was urgently needed to address concerns around cyclist safety.

6.2.3 Bicycle NSW

Bicycle NSW, the peak bicycle advocacy group in NSW, submitted a response in support of the proposed Kalaru to Bega shared path project. Key findings from the submission included:

- Identification of Option 1 as their preferred route alignment option overall
- Recognition that the optimum route may involve elements of all four alignments depending on landowner issues, service locations, etc.
- The need for connections to the paths along the Bega River at the north of the Bega township
- Opposition for a path detour past the hospital
- Recommendation that the path is separated entirely from vehicles and based on all-ages design.

6.2.4 Bega Tathra Safe Ride

Bega Tathra Safe Ride submitted a comprehensive response to the proposed corridor option alignments. Key findings from the submission included:

- Identification of Option 1 as the most desirable option overall
- Incorporation of Option 4, Inset 1 (i.e. a path on the eastern side of East Street and Tathra Road) in the Option 1 alignment to better connect with the Bega township
- Endorsement of Bicycle NSW's submission, particularly in relation to path separation and all-ages design.

7 PREFERRED CORRIDOR ALIGNMENT OPTION

The findings from the SWOT analysis and feedback provided by the community, affected landowners and key bicycle organisations directly informed the selection of a preferred corridor alignment option. As illustrated in Figure 29, corridor alignment option 1 was selected as the preferred option for progression.

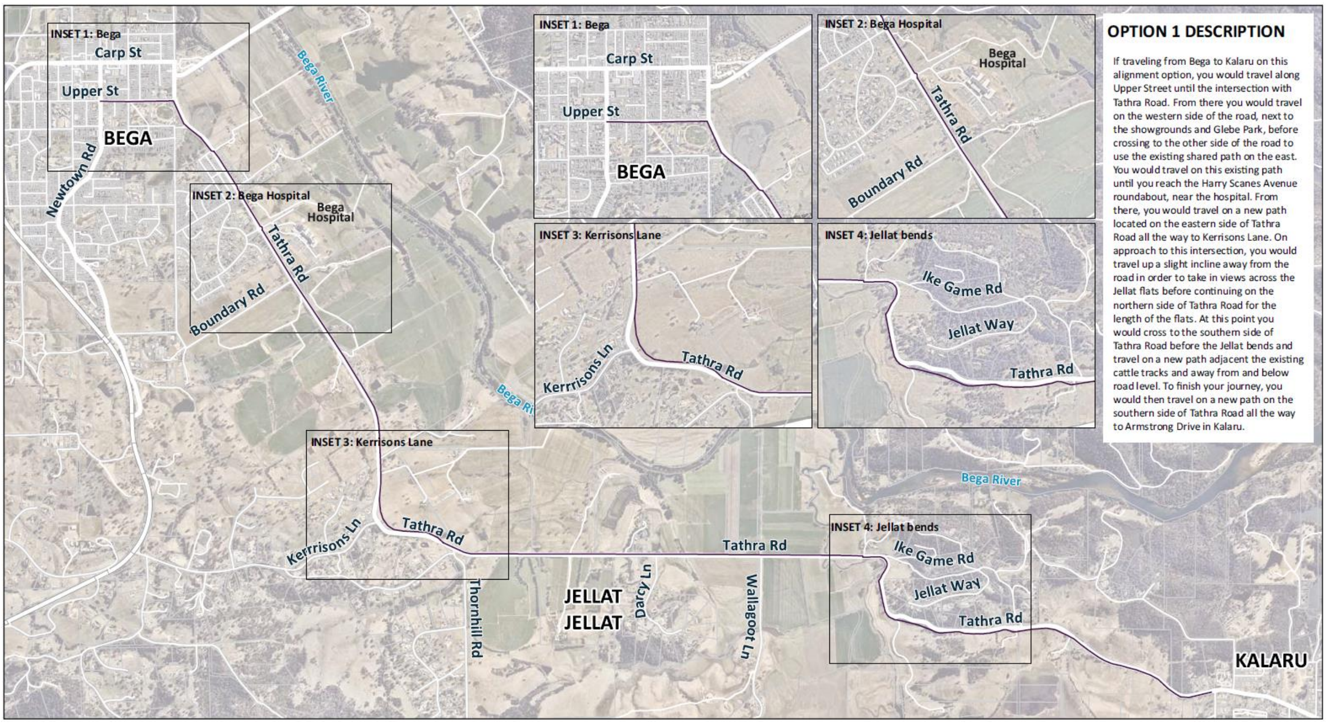


Figure 29: Preferred corridor alignment option

8 FEASIBILITY

The environmental, heritage and engineering feasibility of the preferred corridor alignment option was reviewed to provide better understanding of the overall feasibility of the preferred corridor alignment option and to identify, at a high-level, any specific issues and risks that may be associated with its implementation. This feasibility review also considered the relative costs and benefits associated with the implementation of the preferred corridor alignment option. The findings of each of these reviews are discussed in greater detail below.

8.1 ENVIRONMENT

A biodiversity assessment was undertaken to identify the potential impacts associated with the provision of a shared path between Kalaru and Bega along the preferred corridor alignment. This assessment included:

- A desktop investigation and review of relevant ecological databases to identify threatened species, populations or ecological communities and to inform subsequent field survey work
- A field survey of the subject site to collate lists of present plant species, determine the presence of habitat features and fauna species, and to identify and document the nature and extent of any threatened species or communities. The survey was limited to publicly accessible land only
- The preparation of a written Biodiversity Assessment Report (BAR) that describes the impacts of the proposed activity on native vegetation and threatened species, populations, and ecological communities, and provides recommendations to avoid, minimise and mitigate these impacts. The BAR is provided in full in Appendix 3.

This assessment covers the current form of the proposal, with any changes potentially requiring reassessment. If entry into the Biodiversity Offsets Scheme is triggered by changes, additional field work may be necessary according to the Biodiversity Assessment Method.

8.1.1 Plant Community Types and Threatened Ecological Communities

A total of 1.778 ha of native vegetation occurs within the proposed development site. This vegetation was identified as belonging to two Plant Community Types (PCTs) as illustrated in Figure 30.

PCT 781 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner

PCT 834 - Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion

Figure 30: Plant Community Types near the preferred corridor alignment (Source: OzArk, 2022)

Vegetation within the preferred corridor alignment was assessed against the condition and composition thresholds for each Threatened Ecological Community (TEC) known or predicted to occur within the South Coastal Ranges subregion of the South East Corner bioregion. Four *Biodiversity Conservation Act 2016* (BC Act) and no *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) TECs occur within the subject site. These are:

- Brogo Wet Vine Forest in the South East Corner Bioregion
- Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Lowland Grassy Woodland in the South East Corner Bioregion

- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin, and South East Corner Bioregions.

As the "clearing of native vegetation" is recognised as a Key Threatening Process under the BC Act, efforts should thus be made to reduce the removal of native vegetation where possible. Additional information on these TECs, including their extent and location within the corridor, is provided in the BAR (refer to Appendix 3).

8.1.2 Threatened species and populations

A review of the Threatened Species Profiles database identified 190 threatened flora and fauna species that are known to, or are predicted to, occur within the South East Coastal Ranges of the South East Corner Bioregion. Based on the proximity of past records, habitat requirements, and the results of the field survey, 73 species (10 flora and 63 fauna) were assessed as having a moderate or greater likelihood of occurring within the corridor. These species are listed in the BAR (refer to Appendix 3). The high number of threatened species, relative to the condition of the corridor, is a consequence of its proximity to the coast and to several national parks.

Although no threatened plant species were discovered during the field survey, nine plant species possessed a moderate or greater potential of occurring within or near the corridor. Despite the large number of records within the search area, only one species – the yellow loosestrife (*Lysimachia vulgaris* var. *davurica*) – has records within the corridor, and the most recent of these is from 2010. The highly disturbed, fragmented nature of vegetation within the corridor makes it exceedingly unlikely that any threatened flora species inhabits the area.

Of the 63 threatened fauna species, only one was observed during the field survey – the Grey-headed Flying-fox (*Pteropus poliocephalus*) – which is listed as Vulnerable under both the BC Act and EPBC Act. As illustrated in Figure 31, this was found within, and adjacent to, the corridor immediately south of the Bega township. An existing roadway and footpath currently exists through this part of the corridor.

Provided appropriate mitigation measures are followed (refer to the BAR provided in Appendix 3), no significant impact to a threatened species likely to result in the extinction of a local population is expected as a result of the provision of a shared path consistent with the preferred corridor alignment.

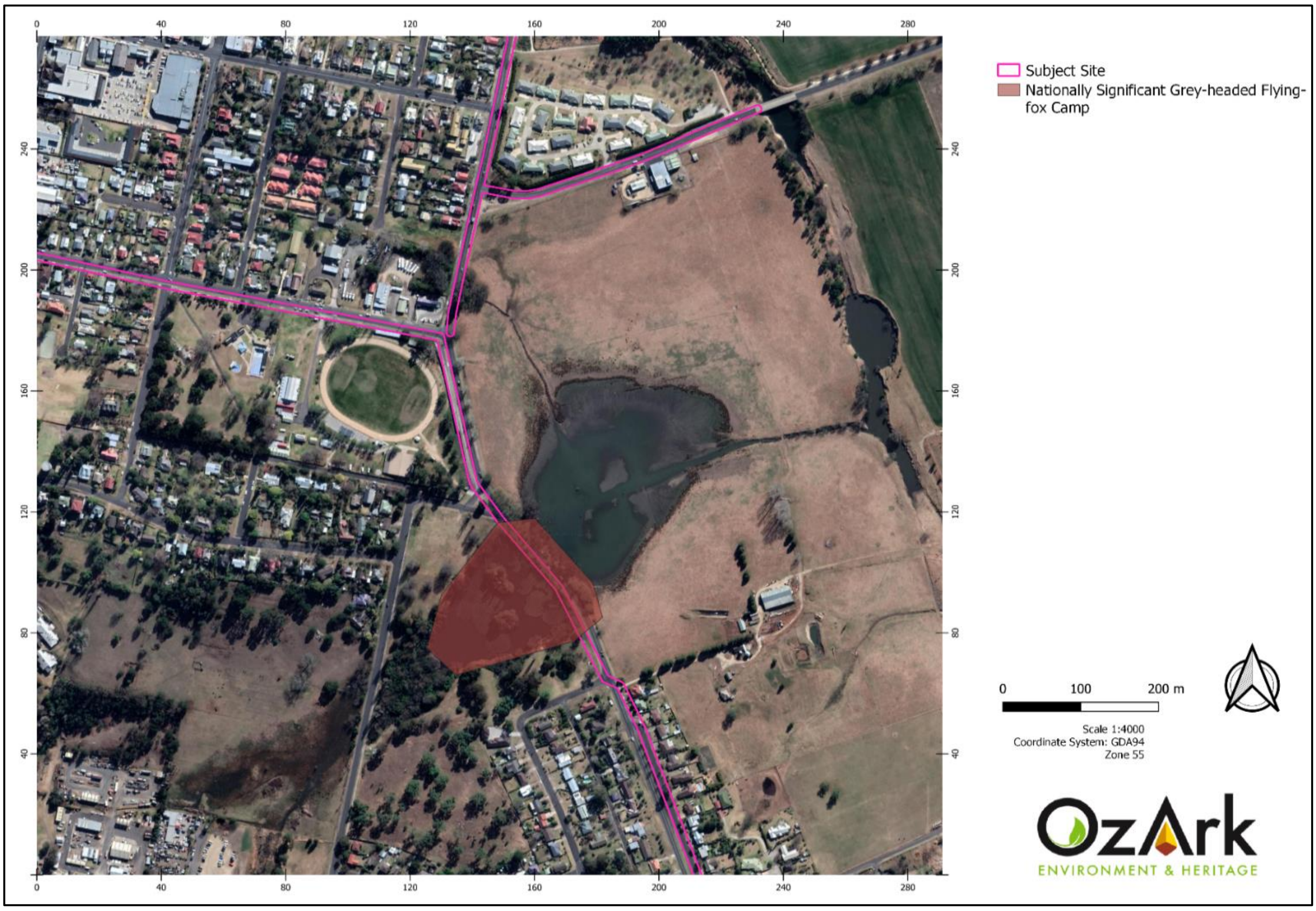


Figure 31: Location of a nationally significant grey-headed flying-fox camp (Source: OzArk, 2022)

8.1.3 Koala habitat

Koala habitat was assessed under the EPBC Act referral guidelines. The application of the Koala Habitat Assessment Tool determined that the corridor does constitute critical habitat for the Koala. However, given the small area of impact, and a lack of recent Koala records, it was determined that referral was not needed.

8.1.4 Wildlife connectivity corridors and habitat features

The corridor currently offers poor connectivity to areas of vegetation in the landscape. Substantial fragmentation owing to historical clearance impedes the capability for wildlife to traverse the site. However, there are two areas, both towards the eastern edge of the corridor, that offer some connectivity to areas of significant vegetation immediately to the north. No significant exacerbation to habitat fragmentation is anticipated given the already poor connectivity offered by the corridor. Notwithstanding, mitigation measures designed to reduce the impact of the proposal on wildlife connectivity should be applied. These measures are outlined in the BAR which is provided in Appendix 3.

As indicated in Figure 32, a total of four hollow-bearing trees (containing a total of one large, and six small hollows) were identified within the search area, clustered towards the eastern edge of the corridor. Efforts should be made to minimise the removal of hollow-bearing trees vegetation where possible.

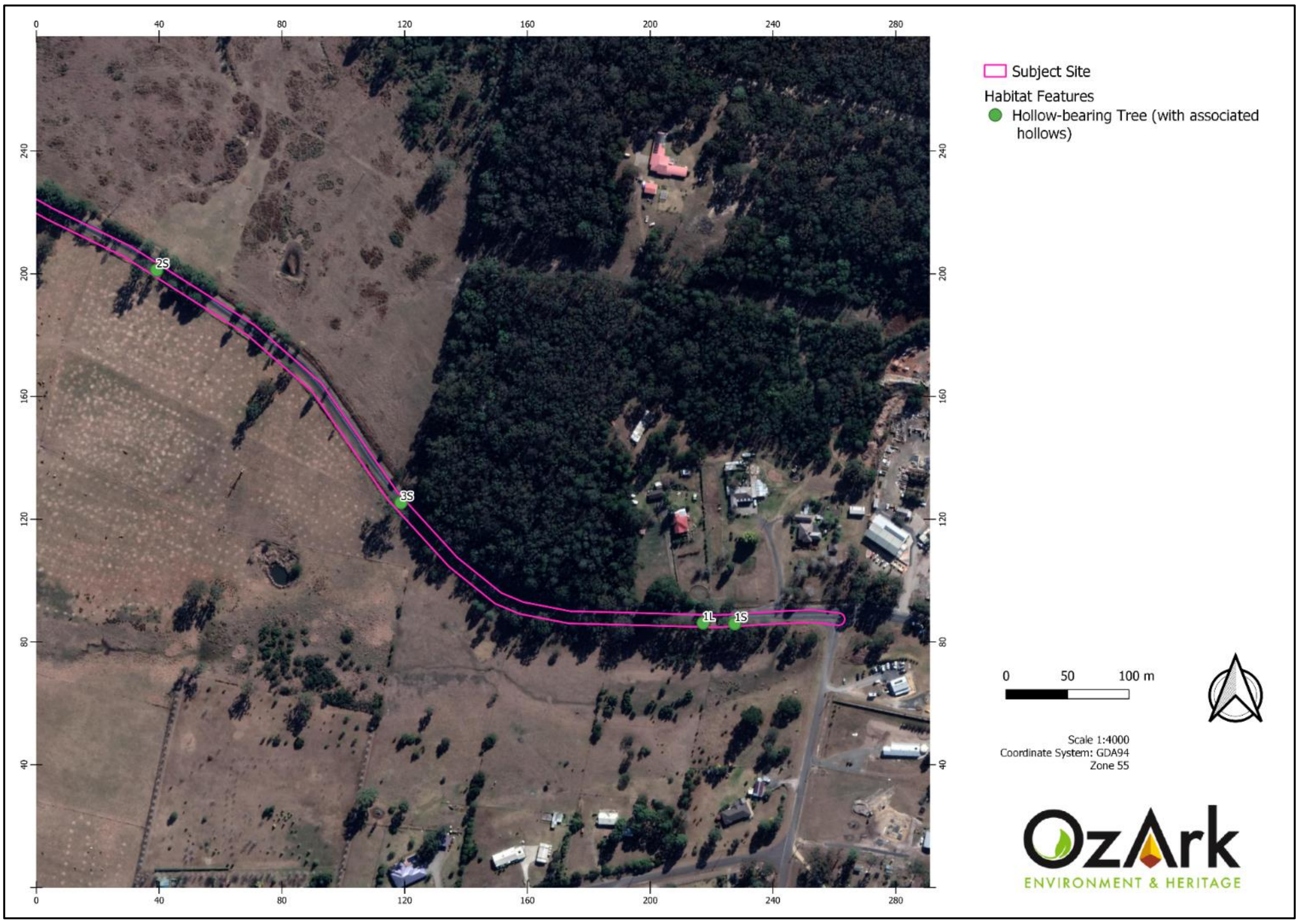


Figure 32: Identified habitat features (Source: OzArk, 2022)

8.1.5 Matters of National Environmental Significance

An EPBC Protected Matters Search identified four Threatened Ecological Communities, 79 threatened and 56 migratory species that may be present within the subject site (refer to Appendix 3). However, no significant impact to any listed entity is expected, provided adequate mitigation measures are followed.

8.1.6 Watercourses

A total of 23 non-perennial minor watercourses of varying biodiversity significance and one major perennial system – the Bega River – flow within the broader study area (refer to Figure 33). Six of the watercourses present in the footprint of the preferred corridor alignment are mapped as Key Fish Habitat, however no specific threatened species are associated with these watercourses.

Although the proposed shared path will not directly interfere with this Key Fish Habitat, there is the potential for indirect impacts relating to runoff from construction. Provided appropriate mitigation measures are followed relating to reducing runoff, interaction with aquatic organisms, and the removal of snags (refer to the BAR provided in Appendix 3), the proposal should not have a significant effect on aquatic life.

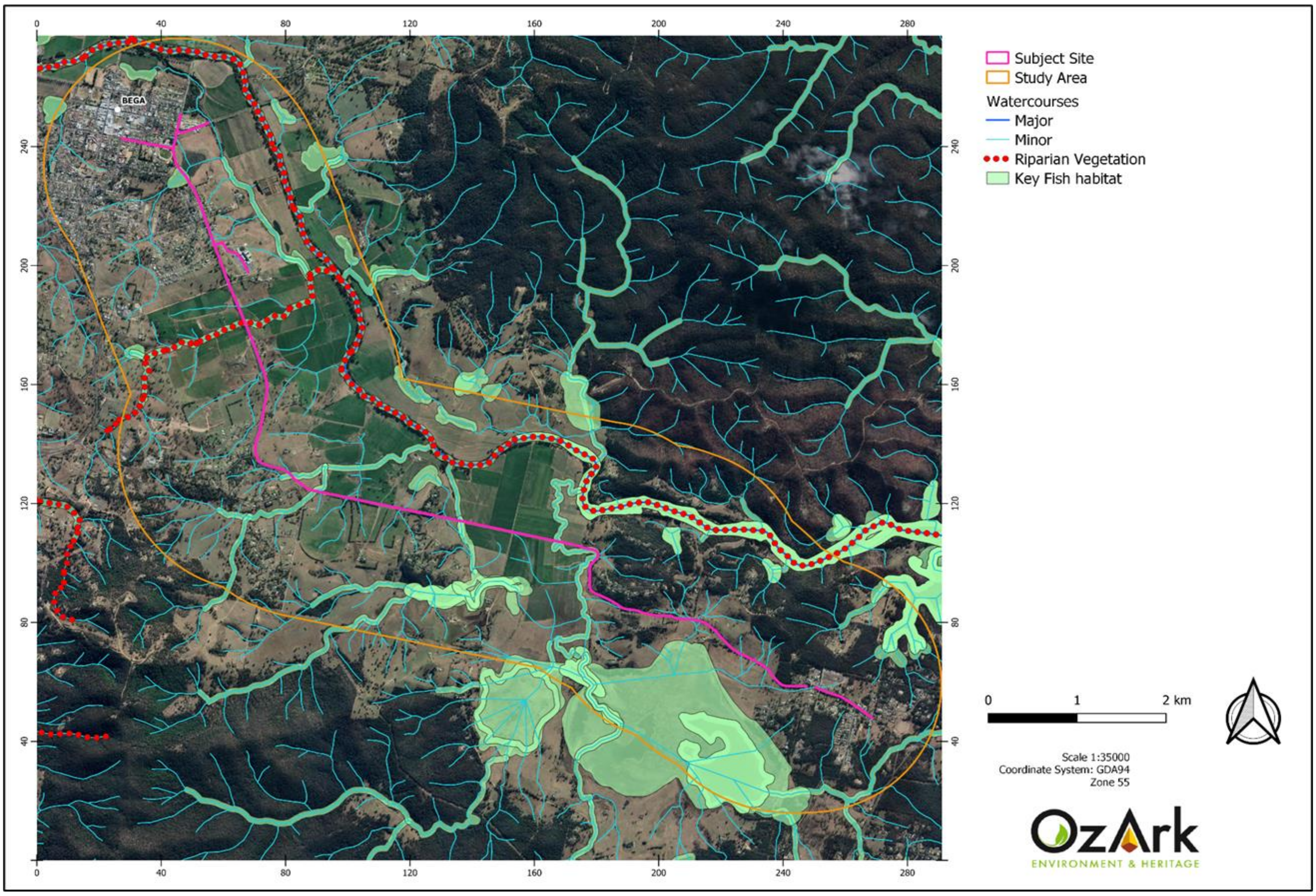


Figure 33: Key Fish Habitat and riparian vegetation near the preferred corridor alignment (Source: OzArk, 2022)

8.2 HERITAGE

An Aboriginal due diligence and historic heritage assessment was undertaken to identify the potential impacts associated with the provision of a shared path between Kalaru and Bega along the preferred corridor alignment. This assessment included:

- Desktop investigations and reviews of relevant Aboriginal and historic heritage databases, and the regional and local archaeological context to identify potential items of significance and to inform subsequent field survey work
- Desktop investigations using aerial imagery and existing modelling data to assess distance to water, landforms, land use and accumulated impacts to predict the location of potential items of significance and to inform subsequent field survey work
- A field survey of the subject site to confirm findings from desktop investigations and determine and document the presence of any items of significance. The survey was limited to publicly accessible land only and was assisted by a representative from the Bega Local Aboriginal Land Council
- The preparation of a written Aboriginal Due Diligence & Historic Heritage Assessment Report that summarises the process and findings from the field survey and the potential impacts and mitigation measures associated with the provision of a shared path along the preferred corridor alignment. The report is provided in full in Appendix 4.

8.2.1 Aboriginal heritage

The survey confirmed that due to the modification of landforms within the study area, mostly associated with the construction, maintenance, and use of Tathra Road, that there are no known Aboriginal objects within the study area and there is little likelihood of the study area containing subsurface archaeological deposits of conservation value. The due diligence process has resulted in the outcome that an Aboriginal Heritage Impact Permit is not required. The rationale for this finding is discussed in greater detail in the Aboriginal Due Diligence & Historic Heritage Assessment Report which is provided in full in Appendix 4.

However, to ensure the greatest possible protection to the area's Aboriginal cultural heritage values, the following recommendations are made:

- The proposed work may proceed within the study area without further archaeological investigation under the following conditions:
  - All land and ground disturbance activities must be confined to within the study area, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms. Should the parameters of the proposal extend beyond the assessed areas, then further archaeological assessment may be required.
  - All staff and contractors involved in the proposed work should be made aware of the legislative protection requirements for all Aboriginal sites and objects.
- If during works, Aboriginal artefacts or skeletal material are noted, all work should cease and the procedures in the *Unanticipated Finds Protocol* (refer to Appendix 2 in Appendix 4) should be followed.
- Inductions for work crews should include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts (refer to Appendix 3 in Appendix 4) and are aware of the legislative protection of Aboriginal objects under the *National Parks and Wildlife Act 1974* and the contents of the *Unanticipated Finds Protocol.*

8.2.2 Historic heritage

A desktop search was conducted on the following databases to identify any potential previously recorded heritage within or adjacent the preferred corridor alignment:

- National and Commonwealth Heritage Listings
- State Heritage Register
- Section 170 register
- Bega Valley LEP.

From these searches, a total of three historic heritage items were identified immediately adjacent to the corridor, all of which were listed in Schedule 5 of the Bega Valley LEP. These items are indicated in Figure 34.

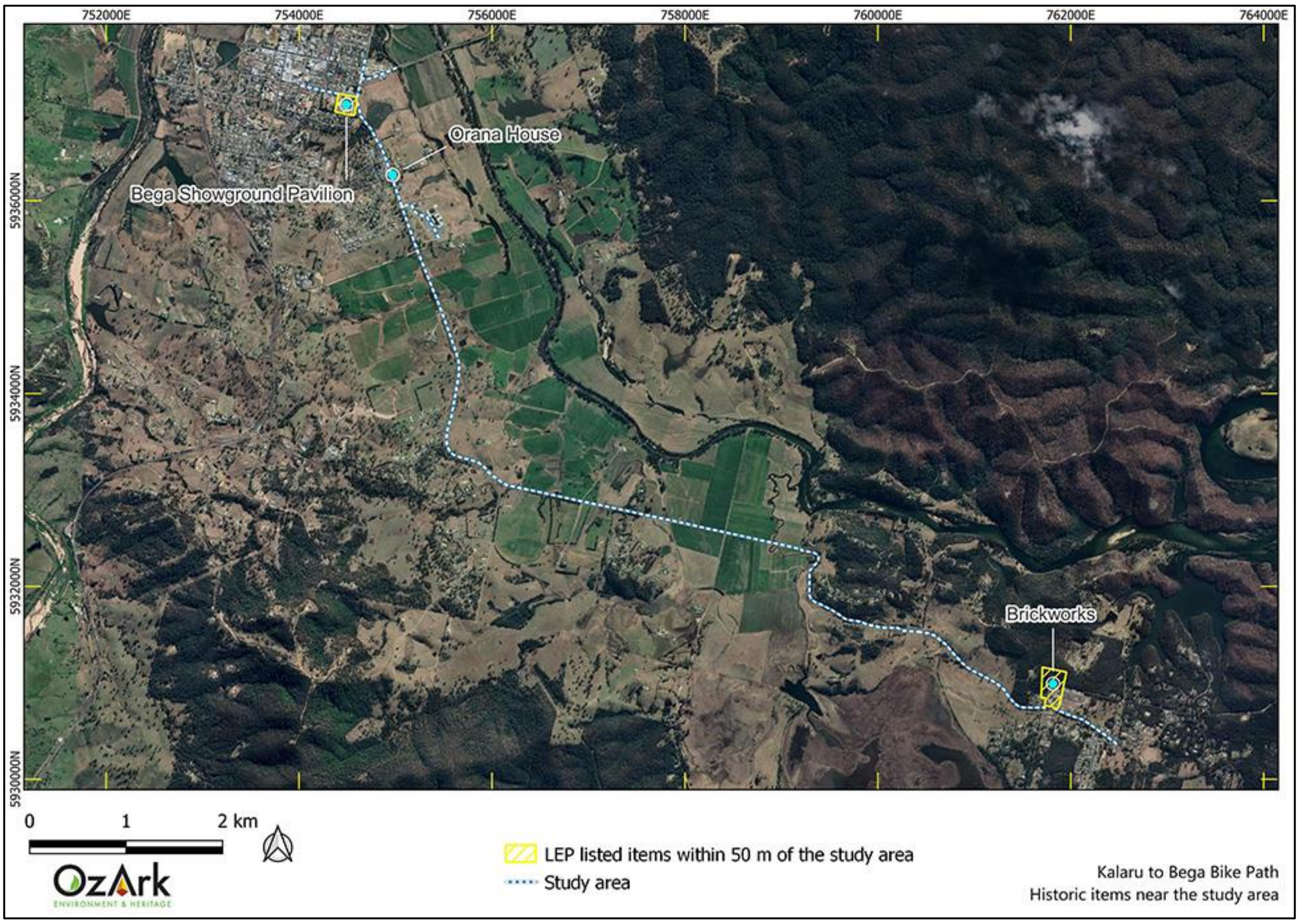


Figure 34: Listed heritage items near the preferred corridor alignment (Source: OzArk, 2022)

While the proposed shared path is adjacent to the heritage curtilage of three listed items, its implementation will not physically impact these curtilages and the nature of the proposal (i.e. a shared path) will not visually impact views to or from the items. Given the previous disturbances within the study area, primarily road construction, the survey concluded that there are no items of significant historic heritage value in the study area.

However, to ensure the greatest possible protection to the area's historic values, the following recommendations are made:

- The fabric of Orana, including the garden strip between the house and the concrete footpath on Tathra Road must not be harmed. If works are required at this location, the street facing garden bed should be fenced with temporary high visibility fencing to ensure Orana and the garden bed are not inadvertently harmed. It is permissible to remove and replace the current concrete footpath if required.
- Although it is unlikely to be required, the works must ensure that the curtilage of the Bega Showground beyond the existing perimeter fence is not harmed.
- If during works, significant historic items or skeletal material are noted, all work should cease and the procedures in the *Unanticipated Finds Protocol* (refer to Appendix 4 in Appendix 4) should be followed.

8.3 ENGINEERING

A Civil Works Design Report (refer to Appendix 5) was prepared to outline the civil design drawings and the cost estimates associated with the civil works for Option 1. The alignment of Option 1 was modelled in 12D with available site data including elevation and depth data (from Elvis), cadastre boundaries (from Digital Cadastral Database) and geotechnical information (from Regional Mapping).

In preparing the civil design, a number of design controls were maintained to ensure that the design would be efficient and practical. These include the following:

- Shared path to stay within the road reserve where possible
- Minimise the need for cut and fill when designing the vertical alignment
- Avoid road cuttings when designing the horizontal alignment
- Provide a feasible level of flood immunity
- Do not encroach onto the existing road pavement
- Avoid steep grades (>10%) where possible
- Avoid road crossings where possible.

As part of the civil design and to achieve the abovementioned design controls, a number of constrained sites along the corridor were identified which presented the need for alternative design solutions to achieve the shared path. These have generally been due to narrow verge/shoulder widths or narrow bridge widths. A total of 12 constrained locations were identified for the corridor.

A summary of the design solutions proposed along the corridor are outlined in Table 11.

Table 11: Site Constraint Solutions (Source: Engeny, 2021)

SITE ID	CHAINAGE (m)	SITE CONSTRAINT	PROPOSED SOLUTION
A	0550-0750	• Embankment constrains the verge width	• Deliver a narrower shared path (2m) by widening the existing 1.5m wide footpath to the back of the kerb
B	2500-2750	• Narrow road verge	• Clear vegetation • Build new embankment level to road
C	2850-2900	• Existing bridge too narrow	• Build new pedestrian boardwalk and bridge / culvert
D	3400-3500	• Embankment too narrow	• Build up embankment • Extend culvert
E	4900-4950	• Narrow culvert	• Extend culvert
F	5200-5350	• Road traverses two culvert spans	• Build new dual-span pedestrian bridge
G	5500-5800	• Narrow shoulders	• Clear vegetation • Widen embankment
H	5750-5800	• Existing culvert would require extending if Site G is delivered	• Extend culvert
I	6500-6650	• Road cutting too narrow	• Excavate embankment (might require geofabric reinforcement) • Clear vegetation
J	6850-6950	• Narrow bridge	• Build new pedestrian bridge (45m)
K	8000-8100	• Narrow bridge	• Build new pedestrian bridge (35m)
L	11400-11747	• Narrow road verge	• Clear vegetation • Widen verge

Other solutions were investigated during the design process, however the proposed solutions presented the most cost effective or practical outcome for the shared path. These are discussed in more detail in the Civil Works Design Report provided in Appendix 5.

A design risk register was prepared as part of the report, which outlined the potential changes to the cost estimate in the event that the identified risks would eventuate. A summary of the risks is presented below.

- **Lack of detailed geotechnical information**, especially relating to bridge foundations, could result in different design parameters than those assumed for the assessment and therefore, would impact on construction outcomes and costs.

- **Survey data** was taken from publicly available data which may be inaccurate or out-of-date. This could result in the modelled design needing to change to achieve constructability.
- **No flood immunity modelling** was prepared for the design, therefore the actual efficacy of flood mitigation measures may not be adequate to meet Council's standards.
- **Reduced availability of local contractors** due to increased pandemic stimulus demand means that there may be a lack of supply for construction workers / materials which would extend construction timeframes or result in increased prices.
- **Estimated haulage distances** between sites may differ in actuality which may impact construction times and costs.
- The **pricing of bridge construction** was estimated on a rate basis which may differ from real construction costs.
- The **pricing of boardwalk construction** was estimated on a rate basis which may differ from real construction costs.
- Costs associated with **land acquisition were not factored** into the estimate. It was reasoned that mutually beneficial deals with landholders could be executed to minimise these costs.
- Costs associated with **crossings into cattle pastures were not factored** into the estimate. These would include construction of cattlegrids, fencing, or underpasses / overpasses.

It is also noted the outlined survey data did not specify whether underground services have been included in the model. Therefore, there is a risk that these services could impact on the design and construction costs.

Based on the preliminary nature of the design, it is likely that some if not all of the above identified risks will eventuate. However, the cost estimate has built in contingencies to deal with these risks if they arise.

8.4 COST ESTIMATE

8.4.1 Construction cost estimate

The cost of construction for the Option 1 alignment is estimated at $18.8M as of January 2022. This is inclusive of contingency costs to account for potential risks during the project as outlined above. A breakdown of the cost components and assumptions is outlined in Table 12 while additional information is provided in the Civil Works Design Report (refer to Appendix 5).

Table 12: Estimated construction costs (Source: Engeny, 2022)

COST COMPONENT	ASSUMPTIONS	COST
DIRECT COSTS **(physical construction)**	• Based on construction rates sourced from Rawlinsons Australian Construction Handbook (2021) and BVSC unit rates derived from similar construction projects undertaken by Council • Factors applied to adjust the rates for locality (regional NSW), construction escalation and construction risk • Flat rate cost for Traffic Management Plan ($12,000), Environmental Management Plan ($20,000) and Cultural Heritage Plan ($16,000) have been based on previous project rates • Costs for bridge construction, boardwalk construction and culverts are noted to be provisional, subject to detailed design • Roadside infrastructure such as guard rails have not been included, these are subject to detailed design and/or road safety audits	$14,187,912
INDIRECT COSTS **(associated requirements)**	• Consist of contractor site overheads (traffic control, site facilities, mobilisation and demobilisation), on-site supervision and quality assurance • Project duration estimated to be nine months and three weeks • Costs estimated from daily rates for each component • As outlined in Section 8.3 the cost of land acquisition/cattle pasture crossings have not been included	$839,862

COST COMPONENT	ASSUMPTIONS	COST
DIRECT COST CONTINGENCY	• 25% of direct costs	$3,546,978
ADDITIONAL CONTINGENCY	• $200,000 to cover price difference in bridge construction • $31,500 to cover potential stand down due to poor weather, assumed to be seven days of stand down with a daily cost of $4,500	$231,500
TOTAL COSTS		**$18,806,252**

The cost estimate has been prepared for the construction of the project and therefore, *does not* cover ongoing maintenance costs for the life of the asset once construction is complete. However, maintenance costs have been included in the Cost Benefit Analysis (CBA), discussed in Section 8.4.2. The above estimate also does not include any costs to develop the design to a detailed design stage or Issue For Construction drawings. Nor has any flood immunity modelling been prepared for the design to factor into the cost estimate. These studies/engineering works will need to be completed before the construction can commence.

Additional information on the cost estimate is provided in the Civil Works Design Report (refer to Appendix 5).

8.4.2 Cost Benefit Analysis

A CBA was prepared to estimate the value of the project in terms of long-term benefits to the community versus the project costs. These benefits and costs are summarised in Table 13.

Table 13: CBA benefits and costs (Source: Regional Economic Advisory, 2022)

BENEFITS		COSTS	
Benefits from additional active recreation • Health benefits from physical activity • Financial benefits from less car/ road use • Environmental benefits from reduced pollution and emissions	$308,797/year	Construction and development costs	$18,806,252 initial cost
Enhanced safety outcomes for active transport users • Transport infrastructure works reduce crash risks • Socio-economic benefits including reduced medical costs and legal costs, productivity impacts	$52,198/year	Ongoing operational and maintenance costs	$190,000/year *(1% of initial capital cost)*
Value add from supported tourism activity	$530,000/year		

The CBA did not quantify or include the following benefits, which would have improved the outcome of the CBA:

- Travel time savings for active travellers
- Increase in business confidence
- Increase in liveability and community amenity.

Therefore, the results of the CBA can be considered as a conservative estimate of the project value.

A range of discount rates were adopted in the assessment (3%, 7% and 10%). The real discount rate of 7% was selected for the project. Based on this rate, the following results of the CBA were identified.

Table 14: CBA results at 7% discount rate – entire path (Source: Regional Economic Advisory, 2022)

PRESENT VALUE COSTS	PRESENT VALUE BENEFITS	NET PRESENT VALUE (NPV)	BENEFIT / COST RATIO (BCR)
$19.7M	$10.2M	$-9.5M	0.52

As outlined in Table 14, at the selected real discount rate of 7% construction of the entire path (i.e. all path segments) is estimated to return a negative NPV of $-9.5 million and a BCR of 0.52. Noting the above assumptions and exclusions, this suggests that the project may not be economically desirable or provide a net financial benefit. The analysis returns a negative NPV across all discount rates applied and yields an Internal Rate of Return (IRR) of 0.5%.

However, it is understood that the benefits and costs of this project are not distributed equally across all path segments as some locations have significantly greater (and unavoidable) infrastructure requirements and correspondingly higher costs while also providing lower direct, localised benefits. These segments are critical to the overall continuity and safety of the path but negatively skew the results of the financial analysis. As a result, an additional high-level CBA analysis was undertaken to consider specific segments of the path to understand the impact on economic viability.

The analysis was undertaken using the same underlying assumptions as for the full corridor, with minor adjustments based on the assumed share of total benefits attributed to the segment (given the length and potential usage level). A high-level summary of the assumptions, costs and benefits of this additional analysis is provided in Table 15.

Table 15: CBA results at 7% discount rate – path segments (Source: Regional Economic Advisory, 2022)

PATH SEGMENT	CORRIDOR BENEFIT	PRESENT VALUE COSTS	PRESENT VALUE BENEFITS	NPV	BCR
Western Segment: Bega to Thornhill Road (5,050m)	55% of total corridor	$5.6M	$5.6M	$0.1M	1.01
Eastern Segment: Henry Taylor Road to Armstrong Drive (3,250m)	30% of total corridor	$4.3M	$3.1M	-$1.2M	0.71

The CBA results indicate:

- The Western Segment is socio-economically **desirable at a 7% discount rate**. The CBA returns an NPV of $0.1 million and a BCR of 1.01, indicating a present value return of $1.01 for every dollar of cost. The Western Section returns a negative NPV at a 10% discount rate and an IRR of 7.1%.
- The Eastern Segment is socio-economically **desirable at a 3% discount rate**. The CBA returns an NPV of $0.2 million and a BCR of 1.01, indicating a present value return of $1.05 for every dollar of cost. The Eastern Section returns a negative NPV at the 7% and 10% discount rates and an IRR of 3.5%.

Additional information on the CBA is provided in Appendix 5.

9 DELIVERY

9.1 FUNDING

A number of potential funding sources have been identified to help facilitate the implementation of the Kalaru to Bega Shared Path. These are discussed in greater detail below.

9.1.1 Government grants

Grant funding is available for a variety of community-based and pedestrian/safety programs or projects from key government sources. A list of relevant grant funding programs for consideration are listed in Table 16. The current expectation is that any active transport project resulting in new and/or additional infrastructure should be fully funded from external funding sources.

Table 16: Potential grant funding programs for consideration

GRANT NAME	GRANT DETAILS
Australian Government	
Building Better Regions Fund[1]	An Australian Government initiative to create jobs, drive economic growth and build stronger regional communities into the future. The fund is available to projects located outside major capital cities. The Infrastructure Projects Stream of the fund supports projects that involve construction of new infrastructure, or the upgrade or extension of existing infrastructure.
New South Wales Government	
Active Transport (Walking and Cycling) Program[2]	The program provides funding to support councils to develop a sustainable forward program of walking and cycling projects that provides tangible benefits for communities. NSW Government funding contribution can be 100% of Design and Construction projects.
Local Government Road Safety Program[3]	The program provides funding to support a dedicated behavioural road safety role, and for behavioural and safer system road safety projects. Project funding will average around $5,000 to $10,000 per project over the life of the project.
Regional Growth Fund[4]	A NSW Government initiative to enable regional communities to attract investment, generate jobs, grow local economy and improve lifestyles.

9.1.2 Bega Valley Shire Council

Although funding contributions from BVSC towards the implementation of the Kalaru to Bega Shared Path are expected to be limited, particularly in relation to upfront construction, the following internal funding sources could be considered:

- Capital and Maintenance Program – the budget in the 2020/21 financial year was $5.134M for cycleways not on road reserves and $0.537M for footpaths. BVSC has advised, however, that this amount is atypical as the annual Capital and Maintenance Program budget is generally much lower
- Transport Asset Management Plan – the plan outlines a recommended $100,000 per annum limit for the region's shared path network to avoid risk of paths deteriorating. The plan also acknowledges that there are some operations and maintenance activities and capital projects that are unable to be undertaken within the next 10 years, including $0.52M in footpath upgrades. This plan is currently under review and a new version is in development.

[1] Australian Government, 2021. Building Better Regions Fund https://www.infrastructure.gov.au/territories-regions-cities/regions/regional-community-programs/building-better-regions-fund

[2] New South Wales Government, 2021. Active Transport (Walking and Cycling) Program https://www.transport.nsw.gov.au/projects/programs/walking-and-cycling-program

[3] New South Wales Government, 2021. Local Government Road Safety Program https://roads-waterways.transport.nsw.gov.au/business-industry/partners-suppliers/lgr/grant-programs/local-government-road-safety-program.html

[4] New South Wales Government, 2021. Regional Growth Fund https://www.nsw.gov.au/regional-growth-fund

- BVSC Roads Capital Works Program
- BVSC Special Rates Variation for Tourism
- BVSC Special Rates Variation for Sports and Recreation
- BVSC S94 contributions for identified regional facilities.

9.1.3 Other sources

Outside of the typical government funding sources there may be opportunities for BVSC to partner with local businesses and the community to help fund, implement and maintain the path.

9.2 STAGING PLAN

The delivery priorities for implementation of the preferred corridor alignment are illustrated in Figure 35 and described in Table 17. These priorities were influenced by the following inputs:

- Key findings from the review of the existing situation, particularly in relation to land use planning, demographics, and network usage
- Consideration of transport network upgrades currently planned by BVSC
- Feedback provided by the key community stakeholder group during the Route Options Alignment Workshop (refer to Appendix 1)
- Feedback provided by the community during community consultation (refer to Appendix 2)
- Consideration of the ability to secure grant funding.

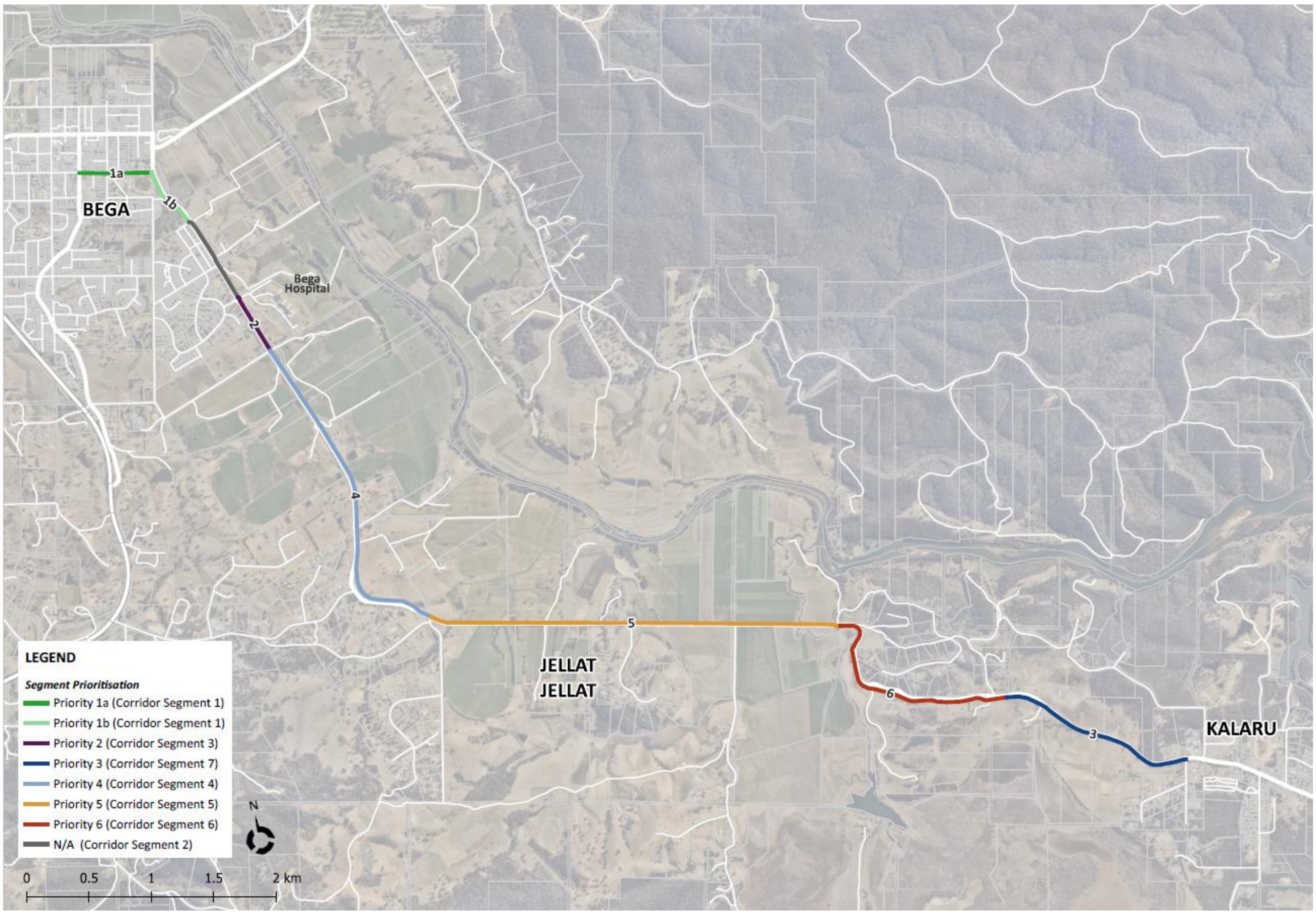


Figure 35: Delivery priorities of preferred option

Table 17: Delivery priorities of preferred option

PRIORITY	SEGMENT	DESCRIPTION	COMMENTS
1a	1	Connection between Bega township and East Street/Tathra Road (current alignment along Upper Street but this is subject to further investigations by BVSC)	• Potential to serve the greatest number of people • Improves active transport connectivity and safety between Bega township and hospital • Opportunity to provide (or provide allowance for) secondary connections to existing path network and Tarraganda Lane
1b	1	Tathra Road between Bega township connection (current alignment along Upper Street) and existing shared path near Rose Street	• Potential to serve the greatest number of people • Further improves active transport connectivity and safety between Bega township and hospital • Opportunity to provide (or provide allowance for) secondary connections to existing path network and Tarraganda Lane
2	3	Tathra Road between Harry Scanes Avenue and Boundary Road	• Extends path further south, towards large lot residential area near Kerrisons Lane • Opportunity to provide additional crossings at Tathra Road/Harry Scanes roundabout to improve safety and connectivity to residential area to the west • Opportunity to integrate with planned upgrade to Boundary Road, noting the requirements of emergency vehicle access to/from the hospital
3	7	Tathra Road between Ike Game Road and Armstrong Drive	• Integrates with and provides an extension from BVSC's planned path through Kalaru • Provides a connection to Kalaru and Tathra for residents along Jellat Way and Ike Game Road • Provision of a lookout along the corridor segment would provide motivation for recreational travel from Tathra and Kalaru, laying a foundation for bicycle tourism
4	4	Tathra Road between Boundary Road and Thornhill Road	• Provides continuous connection between Bega township, hospital and large lot residential area near Kerrisons Lane • Opportunity to integrate with planned upgrade to Tathra Road/Kerrisons Lane intersection but can be delivered separately • Provision of a lookout at the high point near Kerrisons Lane would provide an effective path terminus in lieu of additional connections further east. Also provides motivation for recreational travel from Bega, further supporting bicycle tourism
5	5	Tathra Road between Thornhill Road and Henry Taylor Road	• Addresses unsafe corridor segment • Provides continuous connection between Bega township and residents in Jellat Jellat and along Henry Taylor Road • Provision of additional lookouts/rest stops and secondary connections to the Bega River would increase attractiveness of recreational travel from Bega, further supporting bicycle tourism • Opportunity to integrate with existing RMS gazetted order to fix the levels along Tathra Road

PRIORITY	SEGMENT	DESCRIPTION	COMMENTS
6	6	Tathra Road between Henry Taylor Road and Ike Game Road	• Addresses unsafe corridor segment • Joins adjacent segments to provide a continuous connection between Kalaru and Bega • Provision of a continuous path with additional lookouts/rest stops would increase attractiveness of cycling between Bega, Kalaru and Tathra, significantly increasing bicycle tourism and local economic development opportunities • Implementation of costly segment easier to justify as last remaining gap in the path between Kalaru and Bega
N/A	2	Tathra Road between Rose Street and Harry Scanes Avenue	• Alignment utilises existing shared path so no further works proposed

10 CONCLUSIONS

In recent years, Bega Valley Shire Council (BVSC), in conjunction with the community-led Bega to Tathra Safe Ride (BTSR) advocacy group, have made positive steps towards the provision of a high quality, safe cycle connection between the towns of Tathra in the east and Bega in the west. An initial 4.6km long, 2.5m wide concrete path from Tathra Public School to Blackfellows Lake Road in Kalaru was constructed and opened to the public in 2020 while an adjoining path section, through the township of Kalaru (850m approx.), is currently under construction. The remaining section between Kalaru and Bega (11km approx.) is currently unfunded and its feasibility was hitherto unknown.

The purpose of the Kalaru to Bega Shared Path Feasibility Design Study was to investigate the feasibility of providing a shared path between Kalaru and Bega. This document – the Kalaru to Bega Shared Path Feasibility Report – provides a summary of the findings from background investigations and activities including a review of the existing strategic context, the development of guiding objectives for the corridor, the development and analysis of corridor alignment options, and the findings from relevant stakeholder engagement activities. Importantly, the report also provides an indication of the environmental, heritage, engineering and financial feasibility of the preferred option and outlines strategies to support its staged delivery over time.

This report found that:

- The proposed path is directly recognised in and supported by current local government planning, including BVSC’s current Bike Plan and Local Strategic Planning Statement
- The proposed path helps to satisfy relevant aspects of current State Government policy, including Future Transport Strategy 2056 and the South East and Tablelands Regional Plan 2036, by providing opportunities to integrate walking and cycling, encouraging walking and cycling in regional areas, supporting increased rates of walking and cycling to work towards the achievement of target mode shares, and to accommodate demand and leverage opportunities associated with tourism
- The proposed path is planned to cater to recreational riders and tourists as well as school students, families, commuters and people walking for recreation
- Corridor alignment option 1 was selected as the preferred option for further progression. This option received the highest level of community support from a whole-of-Shire survey with 42% of the vote, was identified as the preferred option by Bicycle NSW and BTSR, and was supported by two of three adjoining landowners directly affected by the proposal who provided comments
- Provided appropriate mitigation measures are followed, no significant impact to a threatened species likely to result in the extinction of a local population is expected as a result of the provision of the proposed path
- The corridor constitutes critical habitat for the Koala, however, given the small area of impact and a lack of recent Koala records, it was determined that referral was not needed
- The provision of the proposed path is not anticipated to result in significant exacerbation to habitat fragmentation given the already poor connectivity offered by the corridor
- Provided adequate mitigation measures are followed, no significant impact to any listed Matter of National Environmental Significance entity is expected as a result of the provision of the proposed path
- No specific threatened species are associated with any of the watercourses within the footprint of the corridor, the provision of the proposed path will not directly interfere with any identified Key Fish Habitats and, provided appropriate mitigation measures are followed, the proposal should not have a significant effect on aquatic life
- There are no known Aboriginal objects within the study area and there is little likelihood of the study area containing subsurface archaeological deposits of conservation value
- An Aboriginal Heritage Impact Permit is not required for the provision of the proposed shared path
- Provision of the proposed path will not physically impact the curtilages of, or views to/from, any of the three heritage sites adjacent the corridor. There are no items of significant historic heritage value in the study area
- The cost of construction for the preferred option (i.e. Option 1) is estimated at $18.8M. This is inclusive of contingency costs to account for potential risks during the project, though it is exclusive of costs associated with the preparation of detailed designs for the corridor

- At a 7% discount rate, construction of the entire path is estimated to return a negative NPV of $-9.5 million and a BCR of 0.52
- At a 7% discount rate, construction of the western segment of the path (Bega to Thornhill Road) in isolation is estimated to return a positive NPV of $0.1 million and a BCR of 1.01
- At a 7% discount rate, construction of the eastern segment of the path (Henry Taylor Road to Armstrong Drive) in isolation is estimated to return a negative NPV of $-1.2 million and a BCR of 0.71. This segment is estimated to return a positive NPV at a 3% discount rate
- Path Segment 1 (between Bega township in the north and the existing shared path in the south, near Rose Street) should be prioritised for delivery to serve the greatest number of people and to improve walk and cycle connectivity and safety between Bega and the hospital. This also presents an opportunity to provide secondary connections to the existing path network (including to/from Tarraganda Lane).

This study and the summary contained within this report will enable BVSC to make informed decisions regarding the planning for a future design and construction of a Kalaru to Bega shared path and will form the basis of future funding submissions by Council to both state and federal governments. Completion of the remaining 11km path section between Kalaru and Bega will achieve Council's and the community's shared vision of a safe, connected, direct, attractive and comfortable connection between Tathra and Bega and provide a variety of economic, tourism, transport, health, and social benefits for the local community and the wider region.

APPENDIX 1: KEY COMMUNITY STAKEHOLDER WORKSHOP MINUTES

AP01

Initial Stakeholder Workshop – Kalaru to Bega Bike Path Feasibility Design Study

Project: Kalaru to Bega Bike Path Feasibility Design Study

Meeting Description: Initial Stakeholder Workshop

Date: 15 April 2021

Time: 5:45pm – 6:45pm

Place: Tathra Hall, Tathra

ATTENDEES			
Daniel Djikic (DD)	BVSC	Sally Gallimore (SG)	BTSR
Nikki Edwards (NE)	BVSC	Doug Reckord (DR)	BTSR
Hannah Richardson (HR)	PSA Consulting	Mark Friedman (MF)	BTSR
Aaron Donges (AD)	PSA Consulting	Robert Hartemink (RH)	BTSR
Rob Russell (RR)	Land holder	Jan Lynch (JL)	BTSR
Prue Kelly (PK)	Clean Energy for Eternity	Chris Polglase (CP)	BTSR
Richard Gallimore (RG)	BTSR		

1). Welcome, introductions and project overview

- Welcome and introductions
- HR and DD provided an overview of the project.

2). General discussion

- DD suggested that the economic benefits of tourism are considered in the cost benefit analysis
- RG noted that bridges at Jellat are an issue. Previous work on culvert at Jellat created erosion issues. Potential cantilever option from existing bridges for a shared path. Believes it is better to have a complete path with reduced quality than a gold-plated but incomplete path
- DD noted that grant funding criteria needs to be considered in the design as providing a complete but lower quality path that does not appeal to a broad cross-section of users may reduce the ability to secure funding
- MF advised that vehicle traffic goes both ways between Tathra and Bega and that the flows are generally balanced
- DR noted that some people could walk along sections of a new shared path (e.g. in more urban residential areas or adjacent the hospital)
- SG noted that families often come to the area to mountain bike but not everyone in a given family will mountain bike. A shared path could cater for family members with other interests (e.g. walking, running, learning to ride)
- PK suggested that any path provided should be a community facility (i.e. shared for people who walk and ride) rather than a bike only path
- DR noted that there is potential for mobility scooters and those with other mobility impairments to use path, particularly near hospital
- DD is keen to provide wayfinding as part of the eventual construction of the path. Council already has a signage palette which can be provided to PSA if required
- RR advised that every flood is different. Attempts to increase flood immunity of Tathra Road in Jellat by building a levee or raising the height of the road would likely lead to greater flooding upstream in Bega

- DR suggested that some parts of the path could be physically separated from vehicles while others might not need to be (e.g. Jellat). Such sections could be integrated as part of the road surface and separated using paint, bollards, or mountable kerbs. Potential that it will lead to lower maintenance and repair costs and that it could be bundled up with road repair budgets
- DD suggested that there is potential to include the cattle underpass at Jellat in the feasibility study
- PK noted that the population of Kalaru is increasing. Expected to increase from 250 to 500 people
- DR noted that kids ride from Kalaru to Tathra for school now that the path has been constructed
- AD confirmed that zoning and development will be considered as part of the project
- DR highlighted the need to speak to farmers and landowners
- RR noted that landowners are generally supportive of the project. There is an opportunity to implement a shared path as part of any upgrade works at the Tathra Road/Kerrisons Lane intersection
- DD confirmed that PSA is to look at opportunities to develop solutions to improve integration with cycle paths in Bega
- Group agreed that there is no value in pursuing investigations into a path along Bega River as an alternative to a Tathra Road alignment. Some of the issues with a river alignment include likely resistance from landowners, emergency access issues, and potential for even greater impacts from flooding
- DD noted that text in the feasibility study report could state that a river path option was considered but not explored.

3). Next steps

- HR provided indication of next steps for the project and opportunities for further participation by BTSR.

Route Alignment Options Workhop
Kalaru to Bega Bike Path Feasibility Design Study
Meeting – 2 June 2021

Project: Kalaru to Bega Bike Path Feasibility Design Study

Meeting Description: Route Alignment Options Workshop

Date: 2 June 2021

Time: 12:00pm – 1:45pm

Place: Bega Valley Commemorative Civic Centre (Gulaga Room)

ATTENDEES			
Daniel Djikic (DD)	BVSC	Hannah Richardson (HR)	PSA Consulting
Nikki Edwards (NE)	BVSC	Aaron Donges (AD)	PSA Consulting
Doug Reckord (DR)	BTSR	Rob Russell (RR)	BTSR
Richard Gallimore (RG)	BTSR	Pip Russell (PR)	BTSR
Sally Gallimore (SG)	BTSR	Prue Kelly (PK)	Clean Engergy for Eternity
Jan Lynch (JL)	BTSR	Stig Virtanen (SV)	BTSR
Chris Polglase (CP)	BTSR	Carla Grey (CG)	BTSR
Rob Hartemink (RH)	BTSR	Jan Robbilliard (JR)	BTSR

1). Welcome and introductions
DD welcomed the group and advised that the discussion today was to assist in the SWOT analysis

2). Project update
AD gave an overview and project update, advising of the assessments undertaken since the site visit. This included a high-level engineering and environmental constraints assessment, the development of route segments and draft route alignment options.

3). Route Alignment Options
AD gave an overview of each of the segments and discussions ensued as captured below. Additional comments provided by workshop attendees contained within a document titled 'Route Alignment Options Workshop Comments'

Segments 1 & 2

- Connections along eastern side tying into existing pathway. (Upper Street and connection to Bega Primary School).

Segment 3

- Budget considerations – potential to use the existing path around the hospital to reduce the duplication of costs
- Traffic around the hospital – more of it but lower speed. More access points to cross.
- Path of least resistance is along Tathra Road (desire line) – Bega to Kalaru is via Tathra Road not via the hospital

- Need a connection to the hospital – Option 1 is a potential future project. Would like to see the connection to Boundary Road costed to see if funding could come from hospital to provide connection at the same time.
- Important to have bike path on eastern side of Tathra Road to reduce number of road crossings. Crossing points at the roundabout required to reduce conflict points
- Majority consensus is for Tathra Road connection on eastern side of the road with width for two-way bike traffic.

Segment 4

- Questions around land acquisition for intersection – if acquiring land for the intersection for the bike path, improve the safety of the intersection at the same time
- Discussion around existing road reserve/s on the eastern side of Tathra Road, opposite Kerrisons Lane
- Option 1 – land acquisition might encourage Council to upgrade the Tathra Road/Kerrisons Lane intersection
- Option 1 – there may be some resistance from land holder. The bike path could come closer to the existing property boundary to minimise the impact on the land holder
- Kerrisons Lane is the primarily signed access to the hospital from the Princess Highway. This is a reason to avoid additional crossings (i.e. any western alignments)
- Consensus is for Option 1 if property can be resumed. If not, Option 2 as preference is to stay on the eastern side of Tathra Road to avoid interaction with Kerrisons Lane.

Segment 5

- Existing water main runs along the southern side of Tathra Road which might affect the provision of a bike path
- Northern side of Tathra Road – property owners happy to discuss acquisition
- Along this segment, Tathra Road is not always located within the centre of the road reserve – affects available width for a bike path
- Owners willing to remove some of the existing pine trees on the northern side of Tathra Road (west of Darcy Lane) that are dangerous and may be in the way if the bike path is provided on this side of the road
- Need a connection to Wallagoot Lane
- Intersection of Wallagoot Lane is dangerous, particularly for right-turning vehicles into Wallagoot Lane
- Request for Wallagoot Lane to be reduced in speed limit to 60km/hr
- New NBN pits run along the northern side of Tathra Road
- Northern side is a preference. Physical separation from the road corridor is preferred to an on-road path separated by bollards as bollards will get covered in flood debris.

Segment 6

- Option 6 – results in an undesirable split of property
- Option 5 – could extend around the bend and cross near the Henry Taylor Drive intersection to get to the northern side. Property owner may be open to this option (wife currently uses the track to walk along)
- If using the cattle track, would need to ensure separation from cattle (likely that a fence would suffice)
- Need to consider biosecurity of interaction with cattle track
- High fibre Telstra lines potential along the cattle track
- Option 3 – too much through the property and results in an undesirable split of property
- Group unsure that rock through the Jellat bends is granite, potentially making cutting work into the hillside more feasible. Potential for slips if cutting into hillside – vegetation removal and stabilisation works required
- Highlight for tourists is the views looking west around the Jellat bends
- Option 4 and 6 – gradients is an issue and could make these routes unappealing for some path users

- Option 4 – reduces the market of users if cyclists required to share the road with vehicles
- Confident cyclists may still want to use the road (e.g. Tathra Road) instead of a path and this will create tension with road users
- Consensus is for Option 5 with a crossing to the northern side of Tathra Road approximately 200m west of Henry Taylor Drive. Crossing only required if Segment 5 path also located on northern side. If property acquisitions are not possible to facilitate Option 5, Option 2 (southern/western side of Tathra Road) would be next preference (cantilever bridging), followed by Option 4 (Ike Games Road).

Segment 7

- Council planning to construct a path through Kalaru on southern side of Tathra Road (east of Segment 7)
- One land holder for several kilometres
- Preference to stay on the southern side of Tathra Road – scenic, integrates well with proposed path through Kalaru, and reduces total number of road crossings across the entire length of the bike path between Kalaru and Bega.

OVERALL

- DD asked the group if the philosophy is to minimise crossings? Group consensus was yes. This will keep the community on side. Every road crossing is a safety risk
- DR advised that the preference is to avoid acquisition as a general principal so as not to disturb local land holders. Any acquisitions would require adequate consultation with the land holders and the community
- SV advised that there must be consultation with land holders before any community consultation
- Road floods – bike path will flood when the road floods – materials will need to be flood-proof
- Cost plan will likely be done in stages similar to the seven segments
- To maximise usage, would be best to prioritise segments 1-3 for implementation then Segment 4 and then Kalaru end (Segment 7). Leaving segments 5 and 6 to the last. Could consider addressing the bridges along the Jellat flats and providing temporary path access address existing pinch points and safety concerns
- Feasibility to consider priority of segments as a recommendation – justify what prioritise are based on (e.g. development areas/potential demand, safety).

4). Next steps and other business

AD provided an overview of the next steps of the project, which includes:

- Removing some options following today's discussion
- Undertaking a SWOT Analysis
- Initial Council consultation with land holders
- Community consultation
- Selecting a preferred alignment option
- Undertaking detailed environmental and engineering assessments
- Undertaking Feasibility Reporting.

APPENDIX 2: COMMUNITY CONSULTATION REPORT

AP02

Kalaru to Bega Bike Path Feasibility Design Study

Community Consultation Report

20 October 2021

Document Control

Document: Project Name: Kalaru to Bega Bike Path Feasibility Design Study
PSA Job Number: 1188
Report Name: Community Consultation Report

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Revision History

VERSION	DATE	DETAILS	AUTHOR	AUTHORISATION
V2	20 October 2021	FINAL	MATT TAYLOR AARON DONGES	HANNAH RICHARDSON

General Disclaimer

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BTSR	Bega Tathra Safe Ride
BVSC	Bega Valley Shire Council
HYS	Have Your Say

1 INTRODUCTION

Bega Valley Shire Council (BVSC) is undertaking a study investigating the feasibility of providing a bike path between the townships of Kalaru and Bega. As part of the study, BVSC developed four distinct route alignment options to respond to the various opportunities and constraints along the corridor. In late July 2021, BVSC released these route options for public review and comment alongside a short survey to capture community feedback on the options. These route options are provided in Appendix 1.

2 WHO WE CONSULTED WITH

Consultation on the draft route alignment options and completion of the accompanying survey was open to everyone, including residents and organisations outside of the Shire. This consultation period ran from 28 July to 18 August 2021. The alignments and survey were publicly released on Council's *Have Your Say* (HYS) online platform and supported by a social media campaign to promote the release and encourage the community to provide feedback. BVSC posted on Council's Facebook page five times over the three week consultation period to further promote the release and encourage the provision of feedback via the survey, as well as issuing a media release and promoting the consultation period in the Bega Valley Together newsletter.

Additionally, BVSC undertook targeted consultation with landowners along the corridor and sought feedback from key bicycle groups including Bega Tathra Safe Ride and Bicycle NSW.

3 WHAT WE ASKED

A short survey, consisting of 10 questions, was released on the HYS platform alongside the draft alignment options. This survey provided insight into the background of respondents (e.g. age, location, type of bike rider), their motivations for riding a bike (e.g. for recreation, to get to work or school), the potential future usage of a path if provided, the level of support for each option, and ideas for further consideration when refining or implementing the options. These questions and the available answer choices are presented in Table 1.

Table 1: Survey questions and answer choices

SURVEY QUESTION	SURVEY ANSWER CHOICES
Q1. What age group do you belong to?	15 and under / 15-24 / 25-34 / 35-44 / 45-54 / 55-64 / 65-plus.
Q2. Are you a Bega Valley Shire resident?	Yes / No.
Q3. If you answered 'Yes' to Q2, what area of the Bega Valley do you currently live in?	Jellat Jellat / Kalaru / Tathra / Other (please specify).
Q4. If you answered 'No' to Q2, where do you reside?	Free text response.
Q5. What best describes you when it comes to riding a bike?	Fearless – I'll ride on road regardless of traffic conditions and without designated cycle facilities (e.g. cycle lane, path) / Confident – I'm comfortable riding on road but would prefer to have a designated cycle facility (e.g. cycle lane, path) / Interested – I'm interested in cycling but would only do so if I was separated from vehicle traffic (e.g. path) / Not interested or able – I'm not interested and/or able to ride a bike - please skip to Question 7.
Q6. In order of frequency, what are you reasons for riding a bike?	Recreation/exercise / To get to work / To get to school / To get to the shops / To accompany my kids / Other (please specify).

SURVEY QUESTION	SURVEY ANSWER CHOICES
Q7. If it was provided, how much would you use a walk/cycle path between Kalaru and Bega? This could include walking or cycling the full length of the path or just a part of it.	At least once a day / A few times a week / A few times a month / A few times a year / Not at all.
Q8. From the path alignment options presented, which would you prefer?	None of the options / Option 1 / Option 2 / Option 3 / Option 4 / A combination of the options (please specify).
Q9. Do you have any further thoughts or comments regarding the project?	Free text response.
Q10. Name and contact details (optional)	Name / Company / Address / Address 2 / City/Town / State/Province / ZIP/Postal Code / Country / Email Address / Phone Number.

4 WHAT WAS SAID

Over the three week consultation period, a total of 247 surveys were completed and 143 free text comments were provided on the draft route alignment options. A snapshot of key findings from an analysis of the survey responses is provided in Figure 1 and discussed below.

247 completed surveys	**99%** of surveys were completed by residents of Bega Valley Shire	**55-64** age group with the highest number of completed surveys
90% of survey respondents require or prefer dedicated bicycle facilities in order to ride a bike	**Recreation & exercise** was the most commonly cited reason for riding a bike	**83%** of survey respondents said they would use a Kalaru to Bega walk/cycle path at least once a month if provided
Option 1 received the most support from survey respondents	**143** individual free text responses were provided through the survey	**71%** of free text responses expressed support for a walk/cycle link between Kalaru and Bega

Figure 1: Snapshot of survey key findings

4.1 BICYCLE RIDER CHARACTERISTICS

Roughly 45% of survey respondents identified as being interested in riding a bike in the Bega Valley Shire but unlikely to do so due to concerns about safety, particularly in relation to vehicle traffic. As can be seen in Figure 2, this proportion is generally consistent with that for New South Wales more broadly. In order to address the concerns of this rider type, it is important that any proposed cycle facility focuses on safety and provides separation from cars, direct routes, and access to information such as wayfinding. It is expected that by designing for these types of riders, the cycle infrastructure would generally also meet the needs of the remaining 49% of more experienced and confident riders in the Shire.

According to the survey, only 6% of respondents identified as being uninterested and/or unable to ride a bike ('no way, no how') which is significantly less than that for New South Wales more broadly. Based on these findings, there appears to be a strong existing rider base within the Bega Valley Shire and a significant opportunity to increase ridership in the future if suitable cycle infrastructure is provided.

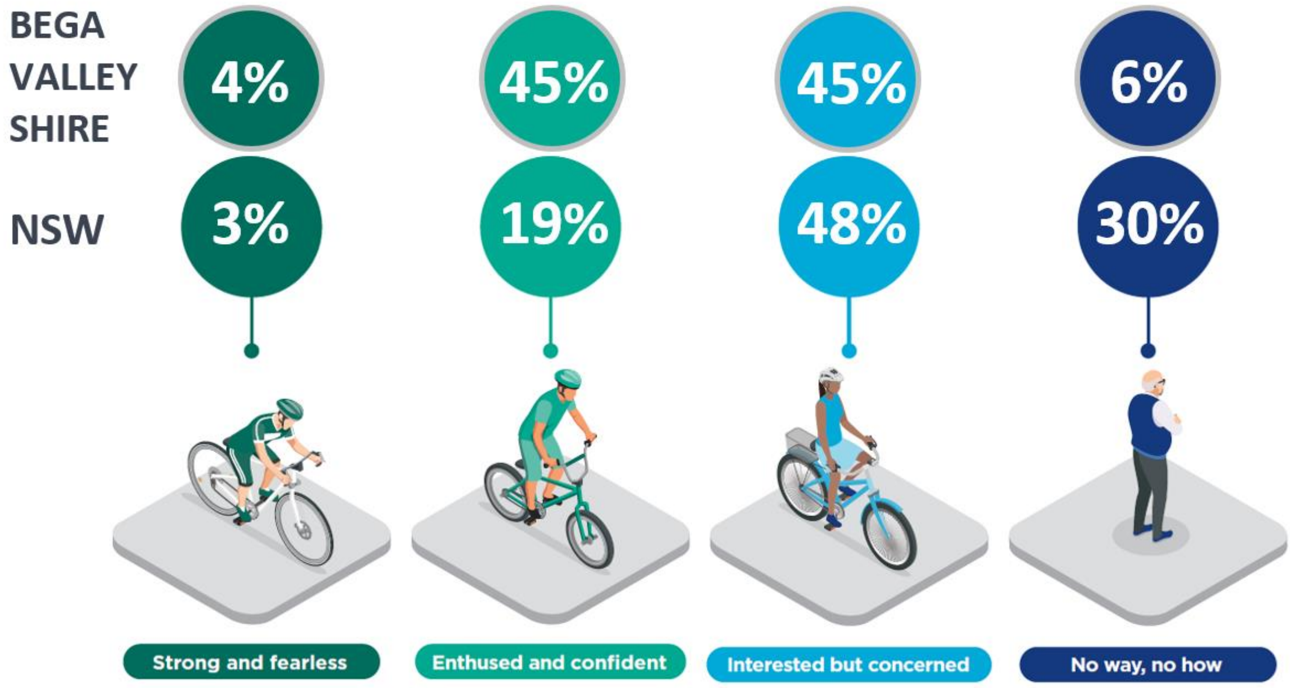


Figure 2: Classification of survey respondents into the four types of bicycle riders (adapted from Transport for New South Wales 'Cycleway Design Toolbox')

Of the survey respondents who currently ride, the main reason in terms of frequency of journey was for recreation/exercise (66%). This was followed by parents or caregivers riding to accompany children (24%), and those riding to get to work (18%). The reason least cited in terms of frequency of journey was for children riding to school, which is unsurprising given the low number of surveys completed by those aged 24 and under. Specifically, only four surveys were completed by residents in the 15-24 age group while no surveys were completed by residents aged 15 and under.

These results suggest that the route alignment and design treatment of a bike path between Kalaru and Bega should prioritise the needs of recreational cyclists and children above commuters. This would typically include a greater emphasis on amenity (including visual appeal), safety, separation from vehicle traffic, connectivity with other recreational paths or points of interest, and the provision of supporting facilities such as shade, rest stops and drinking fountains.

4.2 POTENTIAL PATH USAGE

According to the survey findings, over 80% of respondents stated that if it was provided they would use a walk/cycle path between Kalaru and Bega (either fully or partially) at least once a month. As can be seen in Figure 3, this is comprised of 37% of respondents who stated that they would use the path a few times a month, 37% who stated that they would use the path a few times a week, and 9% who stated that they would use the path at least once a day. 10% of respondents stated that they would only use the path a few times a year while the remaining 7% would not use it at all.

Although this survey question provides an indication of future intent, the findings suggest that there is existing community support for a walk/cycle path between Kalaru and Bega and that regular usage could be expected along all or part of the path if provided. It should be noted that with 99% of survey responses completed by residents of the Bega Shire, this is a reflection of local preferences and does not account for the potential additional usage by those outside of the Shire which would include the tourist market.

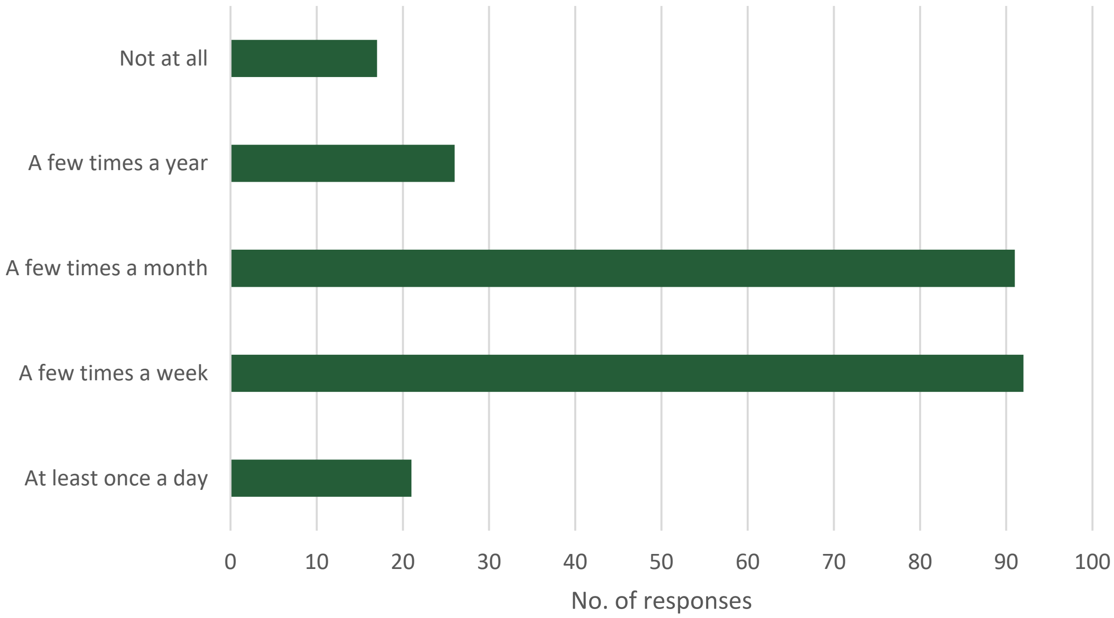


Figure 3: Stated future usage of a walk/cycle path between Kalaru and Bega (Source: BVSC, 2021)

4.3 ROUTE ALIGNMENT OPTION PREFERENCES

Four route alignment options were prepared and released for public comment with the community able to express support for one of the options, for a combination of the options or for none of the options presented. According to the findings from this specific survey question (Question 8), Option 1 and Option 4 received equal support as the preferred option with 31% of the vote each. Options 2 and 3 were comparatively unpopular, receiving 3% and 11% of the votes respectively. The remaining 24% of the vote was spread between respondents desirous of a combination of different aspects of two or more options (20%) and respondents who did not support any of the options presented (4%).

To improve the comprehensiveness and representativeness of the findings and help identify a preferred route alignment option, the free text responses provided in Question 8 and 9 were reviewed. Through this review, Options 1 and 4 again garnered the most support, but with amendments to their alignments. Some of the common amendments that were noted included the removal of a path detour to the hospital and the need to ensure that road crossings were limited in order to improve safety. The additional support for the different options contained within the free text responses should be interpreted with caution as a number of the comments expressed support for individual sections of an alignment, rather than full support for an entire alignment option.

Notwithstanding, the combination of the stated preferences from Question 8 and the findings from the review of free text responses in Question 8 and 9 provided a fuller picture of support for each option. As can be seen in Figure 4, Option 1 received the highest level of support across the four options with 42% of the vote. The main concerns raised with Option 4 were the steep inclines on Henry Taylor Road and Ike Game Road and the detour past the hospital.

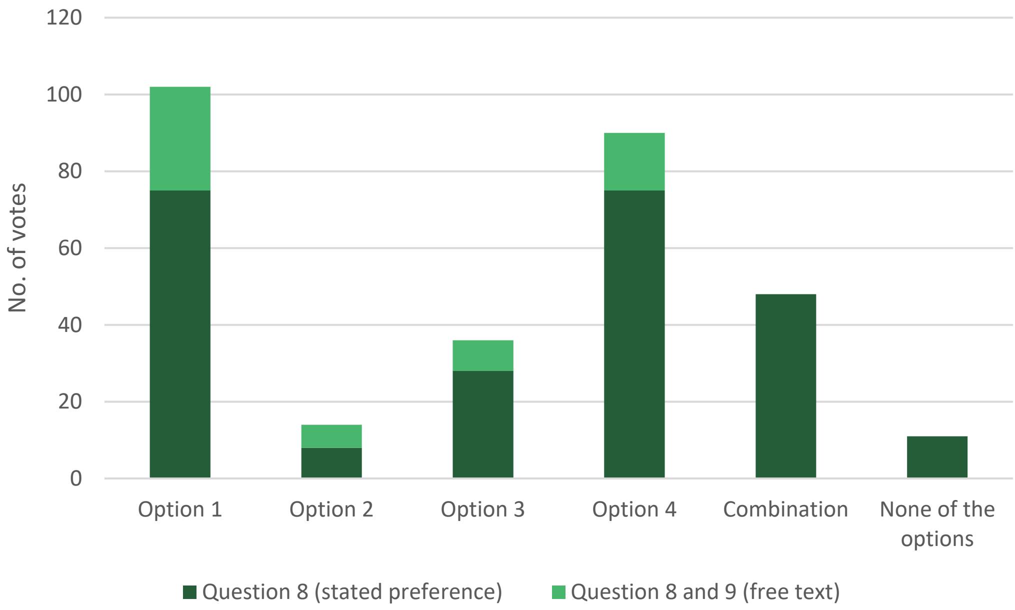


Figure 4: Community support for each route alignment option (Source: BVSC, 2021)

4.4 COMMENTS

4.4.1 Survey

Each of the 143 free text responses provided in Question 9 were reviewed and analysed to understand the level of support for the project, identify key recurring themes, and better understand community concerns.

As can be seen in Figure 5, analysis of the free text responses indicated that there was overwhelming community support for the provision of a walk/cycle path between Kalaru and Bega, regardless of the alignment.

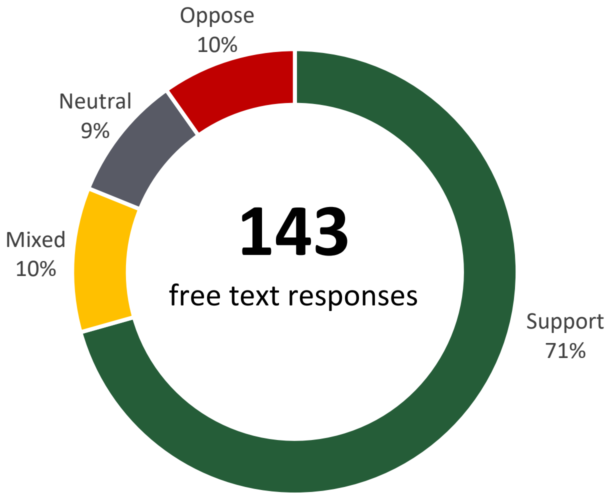


Figure 5: Community support for a walk/cycle path between Kalaru and Bega (Source: BVSC, 2021)

As can be seen in Figure 6, *safety* was the most common theme in the free text responses, accounting for 19% of all feedback received. This was followed by responses relating to *cost* and *crossings* (each with 12%), *amenity* and *connections* (each with 11%), and *gradients* and *tourism* (each with 7%).

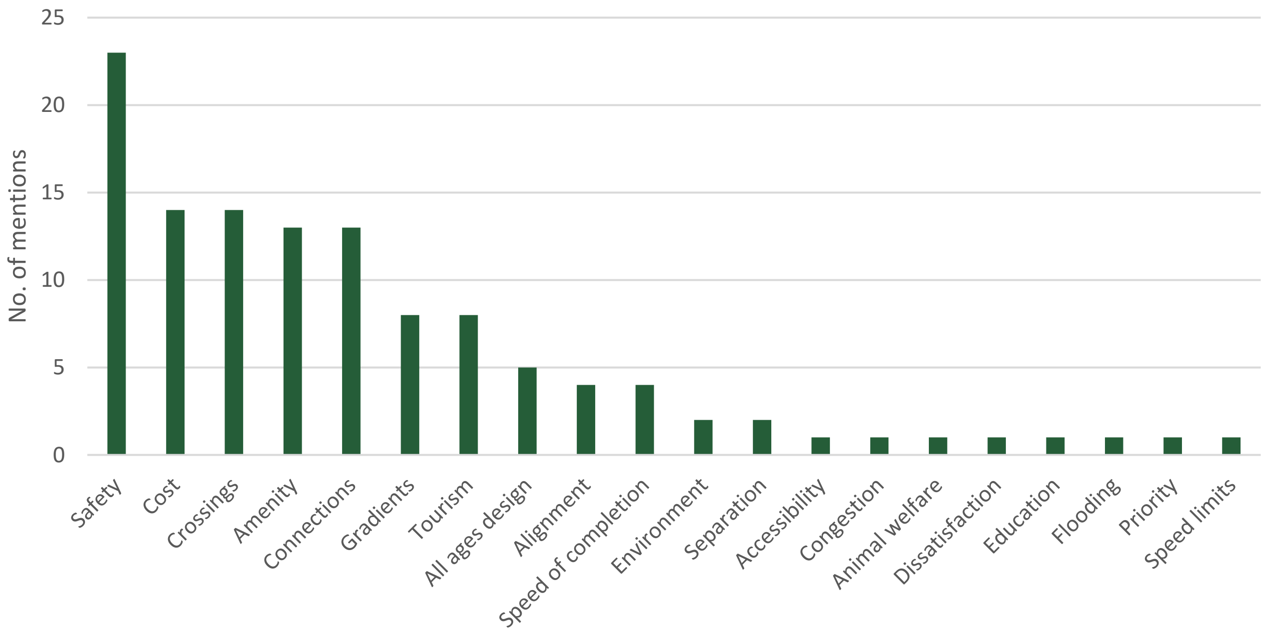


Figure 6: Classification of free text responses by theme (Source: BVSC, 2021)

Key comments from the top seven free text responses include:

- **Safety** – comments focused on the relative safety of different options compared with the others, as well as the perceived improvements in safety from installing a separated path generally.
- **Cost** – for comments which opposed the project, cost was most frequently cited as the primary concern, with many suggesting more appropriate areas for use of Council funds.
- **Crossings** – there was a general opposition to including road crossings in the path alignment, with most of the comments that referenced them citing safety as a concern. As a result, comments typically called for little to no crossings of major roads and intersections.
- **Amenity** – a number of respondents proposed changes to improve overall amenity of the path, including lighting provisions, rest stops, and alignments along Bega River or similar to provide scenic views and/or shade.
- **Connections** – comments primarily related to the need for connections to locations or points of interest not currently provided for in the proposed alignments, such as Merimbula and Mogareeka.
- **Gradients** – comments relating to gradients were almost entirely associated with Option 4. It was suggested that the steep incline on Henry Taylor Road and Ike Game Road would discourage young or less fit cyclists from using the path.
- **Tourism** – this theme was cited as a positive potential outcome, with respondents stating that the path could be a boon for the local area by attracting tourists.

4.4.2 Landowners

A total of 46 letters were distributed to landowners along the Kalaru to Bega corridor. Of these, three responses were received. The key findings from these responses included:

- All respondents expressed support for the project and advised that Option 4 was undesirable
- Two respondents identified Option 1 as their preferred route alignment option
- One respondent identified Option 3 as their preferred route alignment option
- One respondent advised that a crossing over Tathra Road on the western approach to the Jellat bends should be avoided if possible
- One respondent advised that a path along the Jellat Flats was urgently needed to address concerns around cyclist safety.

4.4.3 Bicycle NSW

Bicycle NSW, the peak bicycle advocacy group in NSW, submitted a response in support of the proposed Kalaru to Bega bike path project. Key findings from the submission included:

- Identification of Option 1 as their preferred route alignment option overall
- Recognition that the optimum route may involve elements of all four alignments depending on landowner issues, service locations, etc.
- The need for connections to the paths along the Bega River at the north of the Bega township
- Opposition for a path detour past the hospital
- Recommendation that the path is separated entirely from vehicles and based on all-ages design.

4.4.4 Bega Tathra Safe Ride

Bega Tathra Safe Ride (BTSR), a local cycling advocacy group that has advocated for a Bega to Tathra cycleway since 2015, submitted a comprehensive response to the proposed route option alignments. Key findings from the submission included:

- Identification of Option 1 as the most desirable option overall
- Incorporation of Option 4, Inset 1 (i.e. a path on the eastern side of East Street and Tathra Road) in the Option 1 alignment to better connect with the Bega township
- Endorsement of Bicycle NSW's submission, particularly in relation to path separation and all-ages design.

4.4.5 Social media

Finally, a total of 176 comments were provided by the community on BVSC's Facebook page in relation to the proposed Kalaru to Bega bike path project. The key findings and recurring themes identified from an analysis of these comments included:

- A general lack of support for the project, mostly due to cost concerns and a belief that Council funds and attention should be directed to other locations in the Shire and other areas of Council responsibility
- Support for a structure to improve flood immunity along the Jellat Flats, such as an elevated bridge
- Concern that speed limits on the roads within the study area would be reduced as a result of the project.

It should be noted that the community comments on BVSC's Facebook page were provided in addition to, and outside of, the formal process (i.e. the survey) which was adopted to capture community feedback on the proposed Kalaru to Bega bike path project. This survey was accompanied by supporting materials to provide greater context for the project. As a result, there is a risk that some community comments on BVSC's Facebook page in relation to the project may have been provided without reference to these materials, and therefore without a full appreciation of the project. These comments should therefore contribute to an understanding of community sentiment and be viewed as a complement to, rather than a replacement of, the formal consultation process. Many of the concerns raised in the social media responses, particularly around specific alignments, design treatments and funding mechanisms, are expected to be addressed in future stages of the project.

5 NEXT STEPS

Further public consultation is planned as the Kalaru to Bega bike path project is progressed and additional detail is developed in the future. This will provide an opportunity for a wider cross-section of the community, particularly Indigenous groups, young people, and people who live with a disability, to help shape this important community asset.

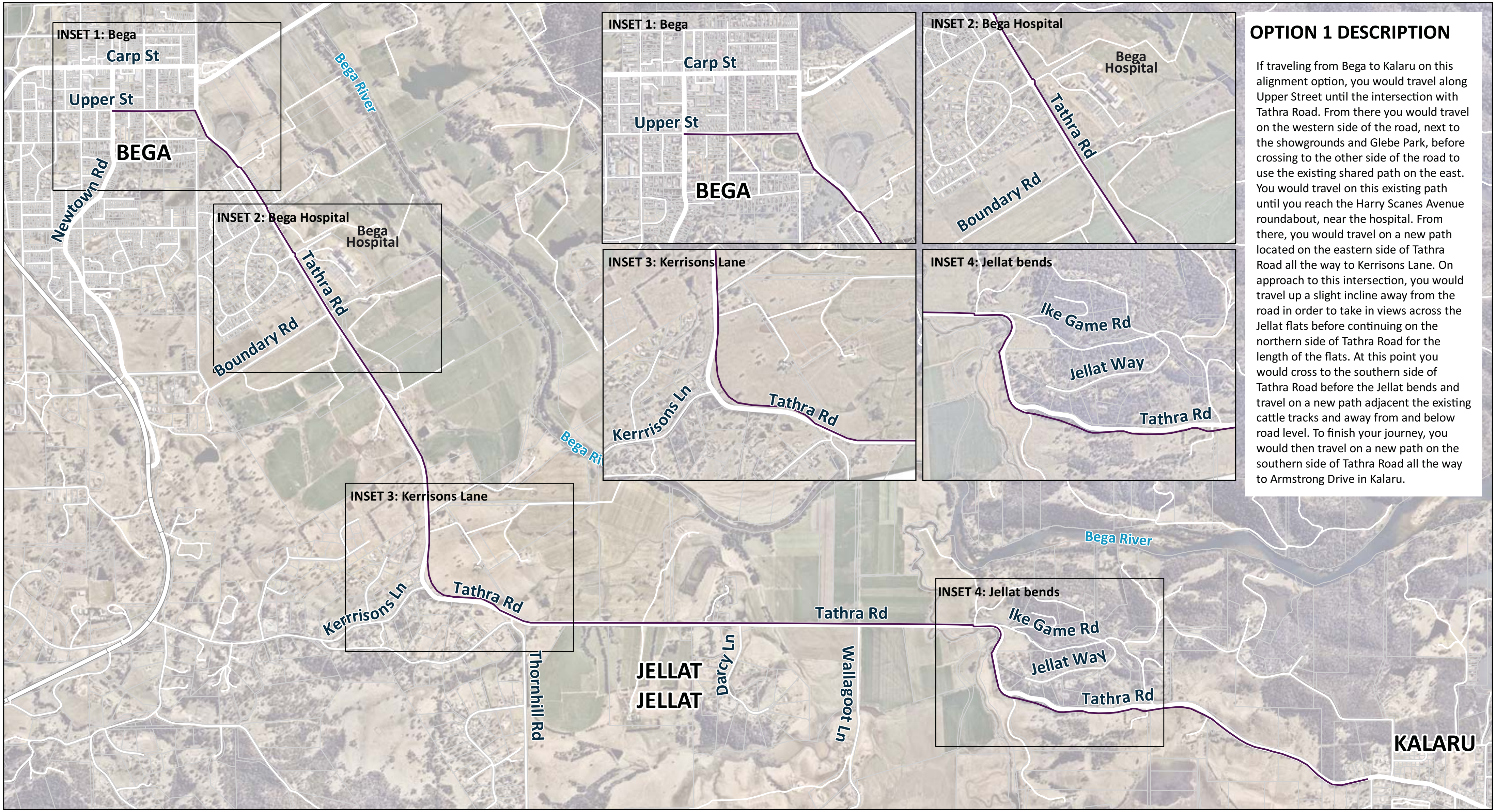
APPENDIX 1: ROUTE OPTIONS

AP01

Bega to Kalaru Active Transport Link - Feasibility Study – Corridor Alignment Options

PSA Job Reference: 1188

PSA CONSULTING



OPTION 1 DESCRIPTION

If traveling from Bega to Kalaru on this alignment option, you would travel along Upper Street until the intersection with Tathra Road. From there you would travel on the western side of the road, next to the showgrounds and Glebe Park, before crossing to the other side of the road to use the existing shared path on the east. You would travel on this existing path until you reach the Harry Scanes Avenue roundabout, near the hospital. From there, you would travel on a new path located on the eastern side of Tathra Road all the way to Kerrisons Lane. On approach to this intersection, you would travel up a slight incline away from the road in order to take in views across the Jellat flats before continuing on the northern side of Tathra Road for the length of the flats. At this point you would cross to the southern side of Tathra Road before the Jellat bends and travel on a new path adjacent the existing cattle tracks and away from and below road level. To finish your journey, you would then travel on a new path on the southern side of Tathra Road all the way to Armstrong Drive in Kalaru.

bega valley shire council

N

0 0.5 1 km

Mapping Data Information

Data Source: NSW Clip and Ship

Spatial Reference: GDA 1994 MGA Zone 55

Author: Danica O

Version: Public Consultation

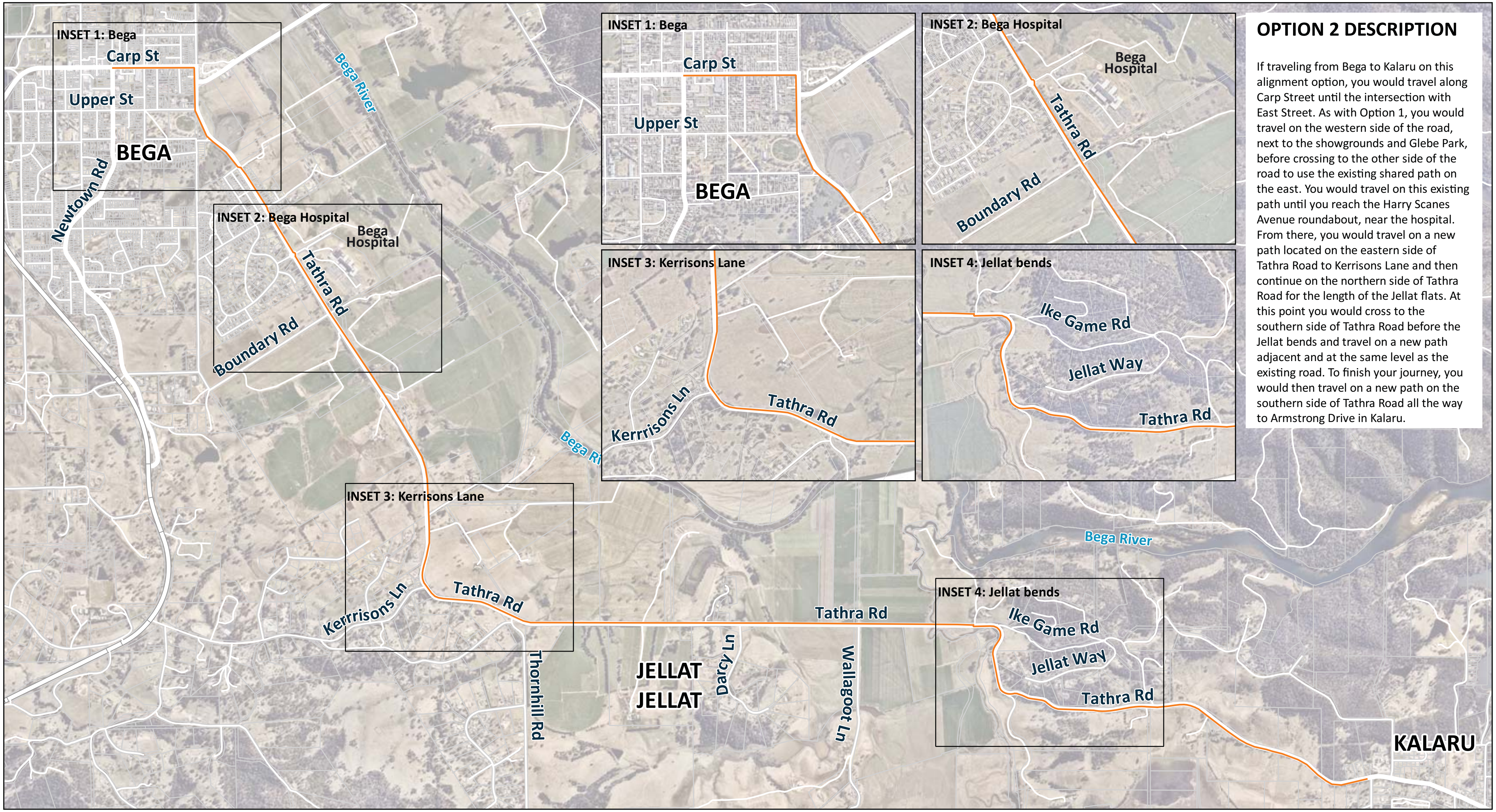
Date: July 2021

Map 3a: Option 1

Bega to Kalaru Active Transport Link - Feasibility Study – Corridor Alignment Options

PSA Job Reference: 1188

PSA CONSULTING



OPTION 2 DESCRIPTION

If traveling from Bega to Kalaru on this alignment option, you would travel along Carp Street until the intersection with East Street. As with Option 1, you would travel on the western side of the road, next to the showgrounds and Glebe Park, before crossing to the other side of the road to use the existing shared path on the east. You would travel on this existing path until you reach the Harry Scanes Avenue roundabout, near the hospital. From there, you would travel on a new path located on the eastern side of Tathra Road to Kerrisons Lane and then continue on the northern side of Tathra Road for the length of the Jellat flats. At this point you would cross to the southern side of Tathra Road before the Jellat bends and travel on a new path adjacent and at the same level as the existing road. To finish your journey, you would then travel on a new path on the southern side of Tathra Road all the way to Armstrong Drive in Kalaru.

bega valley shire council

N

0 0.5 1 km

Mapping Data Information

Data Source: NSW Clip and Ship

Spatial Reference: GDA 1994 MGA Zone 55

Author: Danica O

Version: Public Consultation

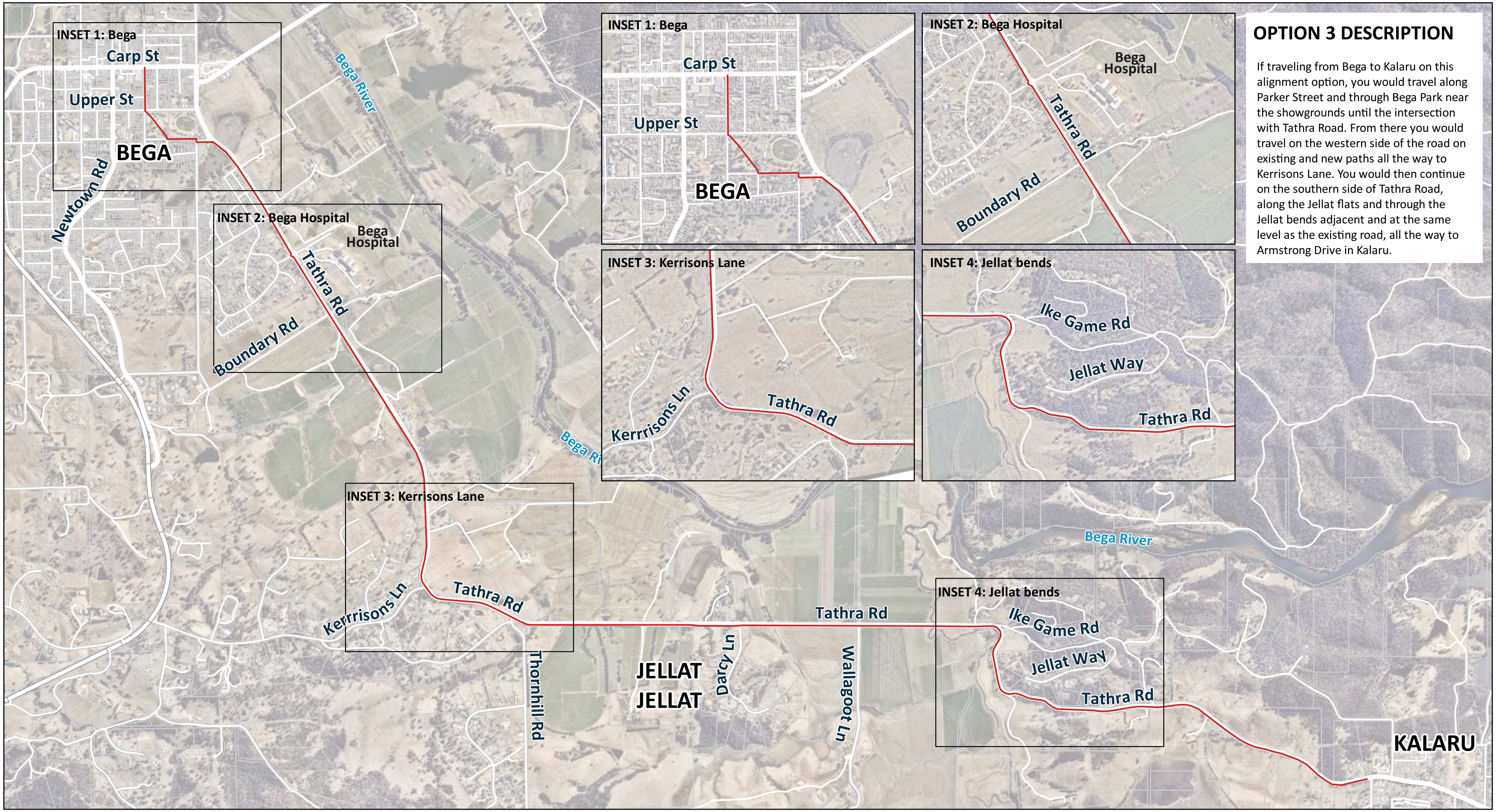
Date: July 2021

Map 3b: Option 2

Bega to Kalaru Active Transport Link - Feasibility Study – Corridor Alignment Options

PSA Job Reference: 1188

PSA CONSULTING



OPTION 3 DESCRIPTION

If traveling from Bega to Kalaru on this alignment option, you would travel along Parker Street and through Bega Park near the showgrounds until the intersection with Tathra Road. From there you would travel on the western side of the road on existing and new paths all the way to Kerrisons Lane. You would then continue on the southern side of Tathra Road, along the Jellat flats and through the Jellat bends adjacent and at the same level as the existing road, all the way to Armstrong Drive in Kalaru.

bega valley shire council

N

0 0.5 1 km

Mapping Data Information

Data Source: NSW Clip and Ship

Spatial Reference: GDA 1994 MGA Zone 55

Author: Danica O

Version: Public Consultation

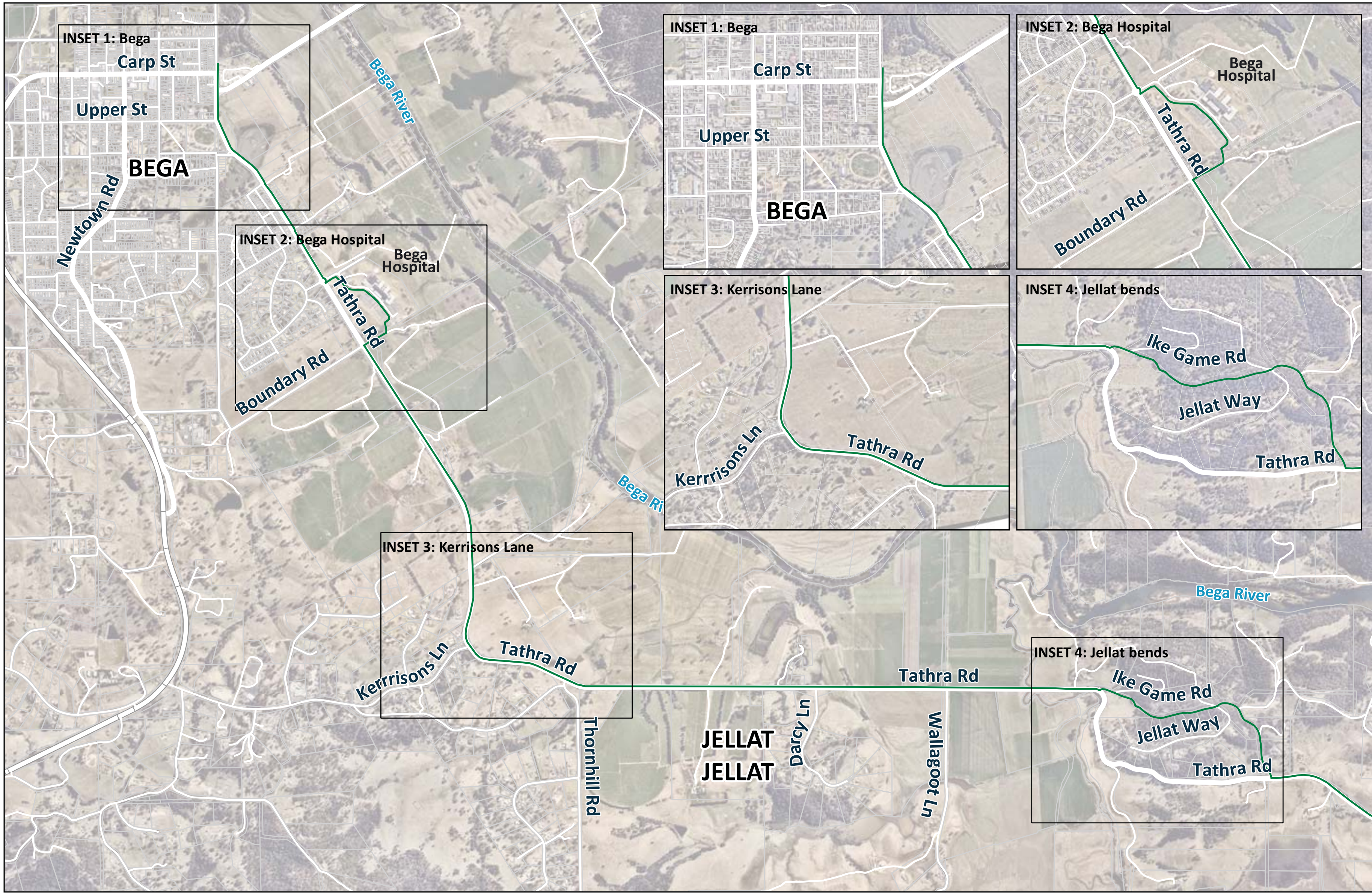
Date: July 2021

Map 3c: Option 3

Bega to Kalaru Active Transport Link - Feasibility Study – Corridor Alignment Options

PSA Job Reference: 1188

PSA CONSULTING



OPTION 4 DESCRIPTION

If traveling from Bega to Kalaru on this alignment option, you would travel on existing and new paths on the eastern side of East Street and Tathra Road until you reach the Harry Scanes Avenue roundabout, near the hospital. From there, you would travel on the existing shared path past the hospital and link back to Tathra Road via a new path. You would then travel on a new path located on the eastern side of Tathra Road to Kerrisons Lane and then continue on the northern side of Tathra Road for the length of the Jellat flats. At this point you would bypass the Jellat bends by traveling on a new path up Henry Taylor Road and Ike Game Road before using the existing sealed section of Ike Game Road to travel back down to Tathra Road. To finish your journey, you would then travel on a new path on the northern side of Tathra Road before crossing to the other side of the road prior to reaching Armstrong Drive in Kalaru.

bega valley shire council

N

0 0.5 1 km

Mapping Data Information

Data Source: NSW Clip and Ship

Spatial Reference: GDA 1994 MGA Zone 55

Author: Danica O

Version: Public Consultation

Date: July 2021

Map 3d: Option 4

APPENDIX 3: BIODIVERSITY ASSESSMENT REPORT

AP03

Biodiversity Assessment Report

Kalaru to Bega Bike Path

Bega Valley Local Government Area

April 2022

Report prepared by
OzArk Environment & Heritage
for PSA Consulting

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DOCUMENT CONTROLS

Proponent	Bega Valley Shire Council			
Purchase order number				
Document description	Kalaru to Bega Bike Path – Biodiversity Assessment Report			
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Clients reviewing officer				
Clients representative managing this document		**OzArk representative managing this document**		
		Samuel Bulling (SEB)		
Location		**OzArk job number:**		
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Final report for client		V3.0	20/04/2022	CG to client
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Acknowledgement

OzArk acknowledge Traditional Owners of the area on which this assessment took place and pay respect to their beliefs, cultural heritage, and continuing connection with the land. We also acknowledge and pay respect to the post-contact experiences of Aboriginal people with attachment to the area and to the elders, past and present, as the next generation of role models and vessels for memories, traditions, culture and hopes of local Aboriginal people.

EXECUTIVE SUMMARY

OzArk Environment & Heritage has been contracted by PSA Consulting, on behalf of the Bega Valley Shire Council, to conduct a Biodiversity Assessment Report (BAR) regarding their proposal to construct a bike path linking the townships of Kalaru and Bega, NSW. This BAR will assess the potential impacts of this proposal on local biodiversity.

A total of 1.778 ha of native vegetation occurs within the proposed development site. This vegetation was identified as belonging to two Plant Community Types (PCTs):

- PCT 781 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion
- PCT 834 - Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion

Vegetation within the subject site was assessed against the condition and composition thresholds for each Threatened Ecological Community (TEC) known or predicted to occur within the relevant IBRA subregion. Four *Biodiversity Conservation Act 2016* (BC Act) and no *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) TECs occur within the subject site:

- *Brogo Wet Vine Forest in the South East Corner Bioregion*
- *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*
- *Lowland Grassy Woodland in the South East Corner Bioregion*
- *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin, and South East Corner Bioregions*

Seventy-three species listed as threatened under the BC Act and/or the EPBC Act were assessed as having a moderate or greater likelihood of occurring at the subject site. The high number of threatened species, relative to the condition of the subject site, is a consequence of its proximity to the coast and to several national parks. One threatened species was observed during the field survey – the Grey-headed Flying-fox (*Pteropus poliocephalus*) – which was found within, and adjacent to, the subject site at the nationally significant population at Bega. Given the position of the subject site relative to this significant population, it should be noted that development may only be carried out in the vicinity of these animals if a Threatened Species License is obtained under the BC Act to disturb these animals. Provided appropriate mitigation measures are followed (likely including night works in the area occupied by flying foxes), a Bat Management Plan is devised and implemented, and a Threatened Species License is sought under the BC Act, no significant impact to a threatened species likely to result in the extinction of a local population is expected as a result of this proposal.

The area of impacted native vegetation is small and discontinuous, with significant incursions by exotic species, such as African Love Grass and Blackberry. Four hollow-bearing trees (with a total of one large, and six small hollows) were recorded within the subject site. As these habitat features were clustered at the subject sites eastern edge, they may be able to be avoided.

An EPBC Protected Matters Search identified four Threatened Ecological Communities, 79 threatened and 56 migratory species that may be present within the subject site. However, no significant impact to any listed entity is expected, provided adequate mitigation measures are followed.

Numerous watercourses of varying biodiversity significance occur within the study area. Twenty-three non-perennial minor watercourses cross through the subject site, with the Bega River also within the study area. Six of the watercourses present in the impact footprint are mapped as Key Fish Habitat, however no specific threatened species are associated with these watercourses. Works within Key Fish Habitat will require approval under Part 7 of the *Fisheries Management Act 1994* (FM Act). In-stream activities, should follow the guidelines outlined in the *Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management* and other relevant documents. Mitigation measures intended to reduce any potential impacts are provided in **Section 7.**

The application of the Koala Habitat Assessment Tool determined that the subject site does constitute critical habitat for the Koala. However, given the small area of impact, and a lack of recent Koala records, it was determined that referral was not needed.

This assessment covers the current form of the proposal, with any changes potentially requiring reassessment. If entry into the Biodiversity Offsets Scheme is triggered by changes, additional field work may be necessary according to the Biodiversity Assessment Method.

CONTENTS

FIGURES

TABLES

ABBREVIATIONS AND GLOSSARY

Glossary

Term	Description
Areas of outstanding biodiversity value	An area of outstanding biodiversity value is: • an area important at a State, national or global scale, and • an area that makes a significant contribution to the persistence of at least one of the following: o multiple species or at least one threatened species or ecological community o irreplaceable biological distinctiveness o ecological processes or ecological integrity o outstanding ecological value for education or scientific research. The declaration of an area may relate, but is not limited, to protecting threatened species or ecological communities, connectivity, climate refuges and migratory species (BC Act).
Cumulative impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to Clause 228(2) of the EP&A Regulation 2000 for cumulative impact assessment requirements.
Direct impacts	Are those that directly affect the habitat of species and ecological communities and of individuals using the study area. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat (OEH 2018).
Habitat	The area occupied or used, including areas periodically or occasionally occupied or used, by any threatened species or ecological community and includes all the different aspects (both biotic and abiotic) used by species during the different stages of their life cycle (OEH 2018).
Important population	Is a population that is necessary for a species' long-term survival and recovery; this may include populations identified as such in recovery plans, and/or that are: • key source populations either for breeding or dispersal • populations that are necessary for maintaining genetic diversity, and/or • populations that are near the limit of the species range (DE 2013).
Indirect impact	Occur when project-related activities affect species or ecological communities in a manner other than direct loss within the subject site. Indirect impacts may sterilise or reduce the habitability of adjacent or connected habitats. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, reduction in viability of adjacent habitat due to edge effects, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, noise, light spill, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas (OEH 2018).
Invasive species	Is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources, or which is a predator of native species. Introducing an invasive species into an area may result in that species becoming

	established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.
Local population (in regard to a threatened species)	Comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area (DECC 2007).
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (OEH 2018).
Mitigation	Action to reduce the severity of an impact.
Mitigation measure	Any measure that prevents, reduce or controls adverse environmental effects of a project.
Proposal	Is considered to include 'all activities likely to be undertaken within the subject site to achieve the objective of the proposed development' (DECC 2007).
Study area	Means the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly. The study area should extend as far as is necessary to take all potential impacts into account (OEH 2018).
Search area	Is considered to 'include the lands that surround the subject site for a distance of 10 km' (DECC 2007). The study region has been used to search information sources to establish the landscape context of the subject site.
Subject site	Means the area directly affected by the proposal. The subject site includes the footprint of the proposal and any ancillary works, facilities, accesses or hazard reduction zones that support the construction or operation of the development or activity (OEH 2018).
Target species	A species that is the focus of a study or intended beneficiary of a conservation action or connectivity measure.

Abbreviations used

Term	Description
^{0}C	Degrees Celsius
AOBV	Areas of Outstanding Biodiversity Value
ASL	Above Sea Level
BAM	Biodiversity Assessment Method
BAR	Biodiversity Assessment Report
BC Act	NSW *Biodiversity Conservation Act 2016*
BOS	Biodiversity Offset Scheme
BVT	Biometric Vegetation Type
CAMBA	China-Australia Migratory Bird Agreement
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DoE	Department of Environment
DPI	NSW Department of Primary Industries
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*

EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ESCP	Erosion and Sediment Control Plan
FM Act	NSW *Fisheries Management Act 1994*
GWDEs	Groundwater dependent ecosystems
GPS	Global Positioning System
ha	Hectare
IBRA	Interim Biogeographically Regionalisation of Australia. Each region is a land area made up of a group of interacting ecosystems repeated in similar form across the landscape.
JAMBA	Japan-Australia Migratory Bird Agreement
KFH	Key Fish Habitat
KTP	Key Threatening Process
LEP	Local Environmental Plan
LGA	Local Government Area
mm/cm/m/m^2/km	Millimetres, centimetres, metres, square metres, kilometres
MNES	Matters of National Environmental Significance
NPW Act	NSW *National Parks and Wildlife Act 1974*
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
PMST	Protected Matters Search Tool
RAMSAR	Convention on Wetlands of International Importance
REF	Review of Environmental Factors
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
TECs	Threatened Ecological Communities
TSPD	Threatened Species Profile Database
VIS	Vegetation information system
WoNS	Weeds of National Significance

1. INTRODUCTION

OzArk Environment and Heritage (OzArk) has been contacted by PSA Consulting (the client), on behalf of the Bega Valley Shire Council (the proponent), to complete a Biodiversity Assessment Report (BAR) regarding their proposal to construct a bike path linking the townships of Bega and Kalaru, in the Bega Valley Shire Local Government Area (LGA; **Figure 1-1**). This path will be approximately 12.5 km long and up to 10 m wide, with several alternative forking routes. Much of it will be along pre-existing road corridors. This BAR will assess the impacts of this proposed development on local biodiversity.

This biodiversity assessment has been undertaken in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). For this proposal, Bega Valley Shire Council will act as both the public authority proponent (EP&A Act s.5.3) and the determining authority (EP&A Act s.5.1). The biodiversity assessment has been prepared in accordance with Clause 228 of the *EP&A Regulation* (2000).

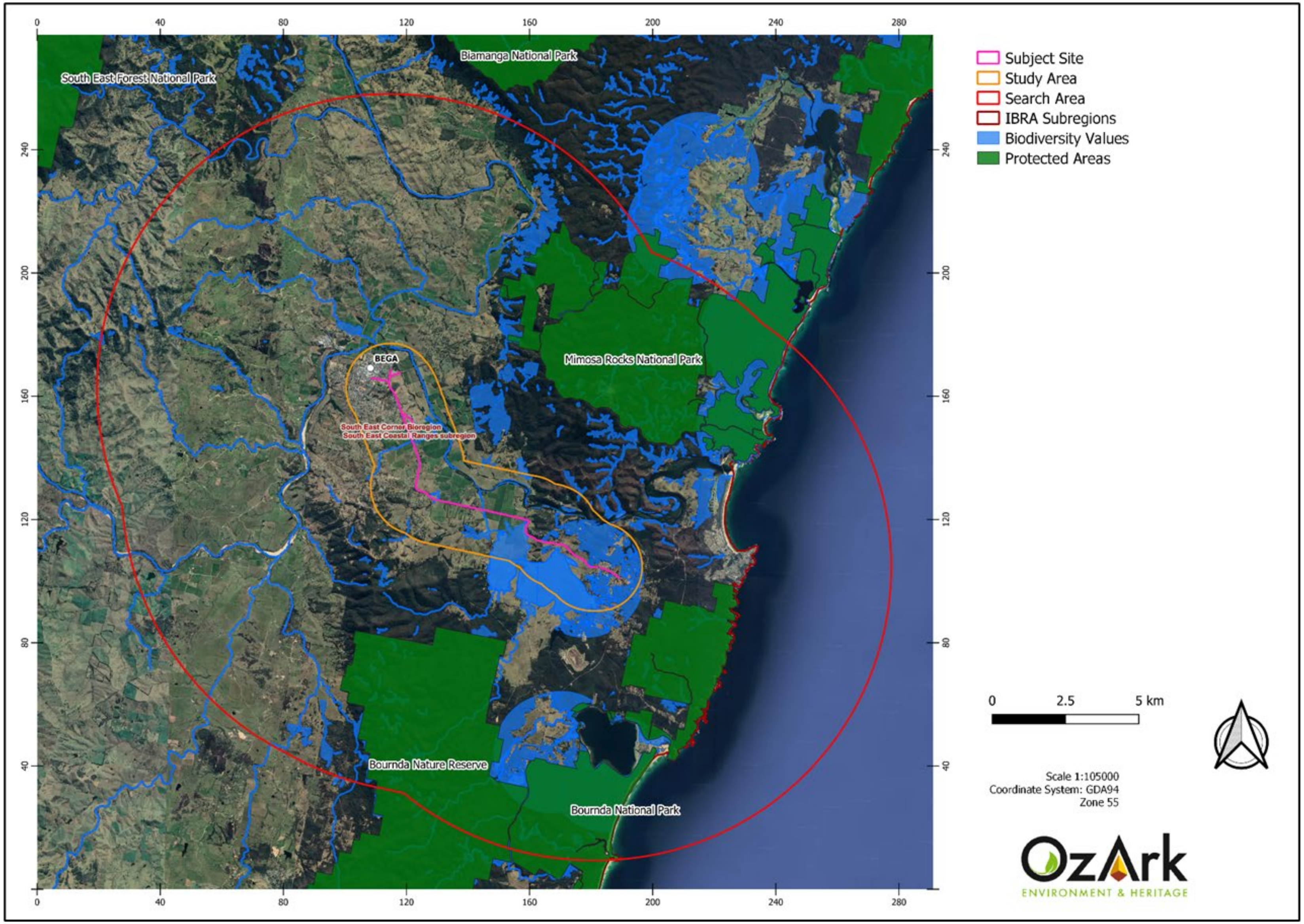


Figure 1-1: Regional location of proposal.   .

Table 1-1. Regional context for the project.

Criteria	Value
Interim Biogeographic Regionalisation for Australia (IBRA Region)	NSW South East Corner Bioregion
Interim Biogeographic Regionalisation for Australia Sub-region (IBRA Sub-Region)	South East Coastal Ranges
State	NSW
Local Government Area	Bega Valley Shire
Nearest town	Bega/Kalaru
Nearest park, state forest or reserve	Bournda Nature Reserve
NSW (Mitchell) landscapes	Bega Granites Bega Coastal Alluvium Bega Coastal Foothills
Nearest waterway (Name, Type)	23 non-perennial watercourses (unnamed) Bega River, major, perennial
Surrounding land use	Grazing native vegetation Grazing modified pastures Grazing irrigated modified pastures Residential and farm infrastructure Services
Surrounding land zone	E4 R2 R5 RU1 RU2 SP2

1.1 STUDY AREA

This report uses the following terms to describe and contextualise the development location:

10 km search area the area within a 10 km radius of the subject site. This 10 km buffer has been used to search information sources to establish the landscape context of the subject site.

Study area the area within a 1,500 m radius of the subject site. Native vegetation has been mapped within this 1,500 m buffer to provide some context regarding the connectivity and cover of native vegetation in the area affected by the proposal, and to inform the impact assessment of the proposal.

Subject site the footprint of the proposal and the area directly affected by the development activities.

2. STATUTORY AND PLANNING CONTEXT

2.1 COMMONWEALTH LEGISLATION

2.1.1 *ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999* (EPBC ACT)

To assist with nationally listed matters assessments, the *Matters of National Environmental Significance: Significant impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999* (DoE 2013) are followed.

Birds which are listed in the following international agreements are listed as migratory birds under the EPBC Act.

- Japan-Australia Migratory Bird Agreement (JAMBA).
- China-Australia Migratory Bird Agreement (CAMBA).
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Matters which fall under this legislation are addressed in **Section 5.6** and **Appendix E.**

2.2 STATE LEGISLATION

2.2.1 *ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979* (EP&A ACT)

The EP&A Act is the principal planning legislation for NSW by providing the framework for environmental planning and the assessment of proposals.

Part 5 of the Act requires that a determination be made as to whether a proposed action is likely to significantly affect threatened species or ecological communities, or their habitats listed on Schedule 1 and 2 of the BC Act. Where found, the assessment criteria under Part 7 Section 7.3 of the BC Act (the 'Assessment of Significance') will be drawn upon to determine whether there would be a significant effect on these species and hence whether a Species Impact Statement (or Biodiversity Development Assessment Report should the proponent elect that option) is required.

2.2.2 *BIODIVERSITY CONSERVATION ACT 2016* (BC ACT)

The BC Act relates to the terrestrial environment and includes threatened species, ecological communities, key threatening processes and other protected animals and plants.

Section 7.3 of the BC Act contains a five-part test of significance for determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats.

Where a significant impact is likely to occur, the proponent must either opt into the Biodiversity Offsets Scheme (BOS) and prepare a Biodiversity Development Assessment Report (BDAR) or prepare a Species Impact Statement (SIS) for each significantly impacted BC listed entity.

BC Act listed species and communities are addressed in **Sections 5.2** and **5.3** and **Appendices C** and **D**.

2.2.3 NSW *BIOSECURITY ACT 2015*

The Biosecurity Act aims to manage biosecurity risks from animal and plant pests and diseases, weeds, and contaminants in NSW. The Biosecurity Act imposes a general biosecurity duty to ensure that, so far as is reasonably practicable, any biosecurity risk is prevented, eliminated, or minimised.

The proponent is required to manage the presence of weeds in the study area.

2.2.4 *LOCAL LAND SERVICES ACT 2013* (LLS ACT)

The objects of the Act include ‘to ensure the proper management of natural resources in the social, economic and environmental interests of the State, consistently with the principles of ecologically sustainable development. The Act regulates the clearing of native vegetation; however, section 60(O)(b)(ii) excludes the need for consent under the LLS Act where the clearing is an activity carried out by a determining authority within the meaning of Part 5 of the EP&A Act 1979.

2.2.5 *FISHERIES MANAGEMENT ACT 1994* (FM ACT)

Part 7A of the FM Act along with schedules within the act, list threatened aquatic and marine species, populations and ecological communities and key threatening processes which must be considered as part of obligations under Section 5.5 of the EP&A Act.

Section 200 of the FM Act states that a local government authority must seek a permit from NSW Department of Primary Industries – Fisheries (DPI – Fisheries) for dredging or reclamation work. Dredging work means any work that involves excavating water land. Reclamation work means any work that involves depositing any material on water land.

Under section 198A of the FM Act:

“water land” means land submerged by water:

(a) whether permanently or intermittently, or

(b) whether forming an artificial or natural body of water,

and includes wetlands and any other land prescribed by the regulations as water land to which this Division applies.

Refer to **Section 4.3** for issues relating to watercourses and the FM Act.

2.2.6 *ROADS ACT 1993*

Section 88 of the Roads Act states that a roads authority may, despite any other Act or law to the contrary, remove or lop any tree or other vegetation that is on or overhanging a public road if, in its opinion, it is necessary to do so for the purposes of carrying out road work or removing a traffic hazard.

2.2.7 BEGA VALLEY LEP (2011)

A Local Environmental Plan (LEP) is a legal document prepared by a Council and approved by the State Government for the regulation of land-use and development. LEPs guide planning decisions for local governments. The plan allows Council to regulate the ways in which all land both private and public may be used and protected through zoning and development controls.

The Bega Valley LEP (2011) aims:

(a) to protect and improve the economic, natural and social resources of Bega Valley through the principles of ecologically sustainable development, including conservation of biodiversity, energy efficiency and taking into account projected changes as a result of climate change,

(b) to provide employment opportunities and strengthen the local economic base by encouraging a range of enterprises, including tourism, that respond to lifestyle choices, emerging markets and changes in technology,

(c) to conserve and enhance environmental assets, including estuaries, rivers, wetlands, remnant native vegetation, soils and wildlife corridors,

(d) to encourage compact and efficient urban settlement,

(e) to ensure that development contributes to the natural landscape and built form environments that make up the character of Bega Valley,

(f) to provide opportunities for a range of housing choice in locations that have good access to public transport, community facilities and services, retail and commercial services and employment opportunities,

(g) to protect agricultural lands by preventing land fragmentation and adverse impacts from non-agricultural land uses,

(h) to identify and conserve the Aboriginal and European cultural heritage of Bega Valley,

(i) to restrict development on land that is subject to natural hazards,

(j) to ensure that development has minimal impact on water quality and environmental flows of receiving waters.

2.2.8 *State Environmental Planning Policy (Transport and Infrastructure) 2021*

The Transport and Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across the state, including for roads and road infrastructure facilities. It permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under SEPP (Resilience and Hazards) 2021, SEPP (Precincts - Regional) 2021 or SEPP (Planning Systems) 2021.

2.2.9 *State Environmental Planning Policy (Biodiversity and Conservation) 2021*

The State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) consolidates, transfers and repeals provisions of 11 SEPPs, the following of which are relevant to the current assessment:

- SEPP (Koala Habitat Protection) 2020
- SEPP (Koala Habitat Protection) 2021

The *SEPP (Koala Habitat Protection)* aims to encourage the 'proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline'. *SEPP (Koala Habitat Protection) 2020* commenced on 30th November 2020 and *SEPP 2021* commenced on 22nd March 2021. Currently both *SEPP 2020* and *SEPP 202*1 apply within NSW, this is an interim measure until all codes are developed under *SEPP 2021*. The *SEPP 2020* applies to RU1, RU2 and RU3 zoned land, excluding 9 LGAs within the Sydney basin. The *SEPP 2021* applies to all other zoned land within the additional 74 LGAs.

The proposal will operate under both *SEPP 2020* and *SEPP 2021*. The subject site contains land zoned as RU1, RU2, E4, R2, R5 and SP2, as such SEPP 2020 and *SEPP 2021* will apply to different sections of the subject site. However, as this proposal will be assessed as a Part 5 development, the Koala SEPP does not apply in this case.

The proposal's potential impacts to threatened species, including Koalas, have however been considered in this BAR. This includes a specific Koala habitat assessment, using the guidelines and Koala Habitat Assessment tool contained in the Commonwealth Department of the Environment (2014) *EPBC Act referral guidelines for the vulnerable koala* (**Appendix G**).

3. METHODS

The ecological assessment was carried out in three stages:

1. An investigation and review of the relevant ecological databases to identify threatened species, populations or ecological communities listed in the NSW *Biodiversity Conservation Act 2016*, *Fisheries Management Act 1994* and/or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* that have the potential to occur in the study area.
2. A field survey of the subject site for the purposes of:
   - Collating lists of present plant species; with these assisting in the identification of the site's vegetation communities.
   - Determining the presence of habitat features such as rock outcrops, nests, and hollow-bearing trees.
   - Determining the presence of fauna species.
   - Identifying and documenting the nature and extent of any threatened species or communities and describing its 'viable local population'.
3. The preparation of a written BAR that describes the impacts of the proposed activity on native vegetation and threatened species, populations, and ecological communities, and provides recommendations to avoid, minimise and mitigate these impacts.

3.1 PERSONNEL

OzArk operates under NSW Scientific Research License 101908, and NSW Department of Primary Industries (DPI) Accreditation of a corporation as an animal research establishment Ref No. 53103. The field survey was completed over two days(23rd and 24th of January, 2022) by Ecologists Dr David Orchard and Ian Griffith. Reporting components were completed by Ecologist Samuel Bulling, with quality control provided by Senior Ecologist Dr Crystal Graham. Key details of personnel involved in the assessment are provided in **Table 3-1**.

Table 3-1. Summary of OzArk personnel qualifications.

Name	Position	CV Details
Dr David Orchard	Ecologist	• Doctor of Philosophy (Agriculture) – Charles Sturt University • Graduate Diploma in Science (Botany) – University of New England • Bachelor of Arts (Honours) – Australian National University • First Aid Training • WH&S Induction Training for Construction Work • Biodiversity Assessment Method (BAM) – Accredited Assessor
Ian Griffith	Ecologist	• Honours in Genetics – La Trobe University • Bachelor of Conservation Biology & Ecology – La Trobe University • First Aid Training • WH&S Induction Training for Construction Work
Dr Crystal Graham	Senior Ecologist	• Postdoctoral Fellow – Smithsonian Tropical Research Institute • Doctor of Philosophy (Biology) – University of Sydney • Honours in Biology – University of Sydney • Bachelor of Advanced Science – University of Sydney • 4WD Training • First Aid Training • WH&S Induction Training for Construction Work
Sam Bulling	Ecologist	• Bachelor of Science (Wildlife Conservation Biology) – University of Adelaide • First Aid Training • WH&S Induction Training for Construction Work

3.2 Background Research

Preliminary assessments drew on local experience, previous reporting, and information available on governmental databases. Database search results were used to assist in identifying distributions, suitability of habitats, and known records of threatened species to increase the effectiveness of field investigations. Information sources reviewed included:

– NSW Government online aerial imagery (www.maps.six.nsw.gov.au).

– Critical habitat register, available on the DPIE website: https://www.environment.nsw.gov.au/criticalhabitat/CriticalHabitatProtectionByDoctype.htm

– NSW Government Biodiversity Values Map which identifies land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2022*: https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity

– Flora and fauna records and profiles contained in the NSW Threatened Species Database, EPBC Protected Matters Search Tool and DPI threatened fish distribution maps.

– BioNet Wildlife Atlas and Plant Community Type (VIS) databases: www.bionet.nsw.gov.au

– Flora of NSW (Harden 1991-2002) and Flora NSW Online: https://www.plantnet.rbgsyd.nsw.gov.au/

– Regional Scale State Vegetation Type Map: State Vegetation Type Map: Southeast NSW VIS_ID 2230 (OEH, 2016)

Database searches were conducted prior to the field assessment to predict the occurrence of species in the Subject site. These searches indicated key species for field survey efforts and targeted searches. The results of the database searches are provided in **Appendix A**.

A series of other background searches were performed to comply with legal standards (**Table 3-2**).

Table 3-2. Presence and/or proximity of environmental considerations.

Environmental Considerations	In the study area?
Land identified on the Biodiversity Values Map under the NSW *BC Act 2016*?	Yes (**Figure 1-1)**
Area of Outstanding Biodiversity Value (AOBV) under the NSW *BC Act 2016*?	No
Critical habitat nationally?	No
An area reserved or dedicated under the *National Parks and Wildlife Act 1974*?	No
Is the proposal located within land reserved or dedicated within the meaning of the *Crown Lands Act 1989* for preservation of other environmental protection purposes?	No
A World Heritage Area?	No
Environmental Protection Zones in environmental planning instruments?	No
Lands protected under SEPP (Biodiversity and Conservation) 2021?	Yes
Land identified as wilderness under the *Wilderness Act 1987* or declared as wilderness under the *National Parks and Wildlife Act 1974*?	No
Aquatic reserves dedicated under the *Fisheries Management Act 1994*?	No
Aquatic Threatened Ecological Community?	No
Wetland areas dedicated under the Ramsar Wetlands Convention?	No
Land subject to a conservation agreement under the *National Parks and Wildlife Act 1974*?	No
Land identified as State Forest under the *Forestry Act 1916*?	No
Acid sulphate area?	No
Protected riparian habitat?	Yes (**Figure 4-2)**
Mapped Key Fish Habitat?	Yes (**Figure 4-2**)

3.3 Habitat Assessment

The results of the database investigation and the field assessment were collated and reviewed in the context of local ecological knowledge to determine the likelihood of threatened species and ecological community occurrence, and potential impacts of the proposal (**Appendix C**). To demonstrate, a threatened species may be predicted to occur, but key habitat elements may be absent, in which case the species would be assessed as either not being impacted or not present.

The likelihood of the occurrence of threatened species, populations or ecological communities was categorised as follows:

- 'High' – a medium to high probability that a species uses the site, based on nearby records and suitable habitat being present.
- 'Moderate' – suitable habitat for a species occurs on the site, but the species has not been observed or previously recorded at the site.
- 'Low' – a very low likelihood that the species uses the site, based on lack of the preferred type and size of habitat.
- 'Absent' – habitat on-site and in the vicinity is unsuitable for the species.

For those species or ecological communities considered to have a moderate-high likelihood of occurring at the site (**Appendix C**), tests of significance were then completed for these species and ecological communities in accordance with the BC Act (**Appendix D**) and/or the assessment of significance under the EPBC Act (**Appendix E**), and the relevant guidelines for these assessments.

3.4 Field Survey

The objectives of the field survey that was conducted on the 23rd and 24th of January, 2022, was to:

- Identify native species and the present vegetation communities.
- Describe the quality and value of the vegetation and the flora and fauna that inhabit the development site.
- Determine the presence of species, populations, or ecological communities listed as threatened under the BC Act or EPBC Act.
- Determine the significance of impact to any threatened entities present or likely to be present.

3.4.1 Vegetation surveys

Vegetation communities were identified in accordance with the online NSW Master Plant Community Type Classification (OEH, 2018a), which is the current state-wide vegetation classification system for Plant Community Types (PCT). This classification system is used for vegetation mapping, development assessment and site planning purposes. It describes over 1,500 PCTs across the state, and groups vegetation communities into vegetation Class and Formation/Sub-formation as per Keith (2004).

PCTs were identified on the following basis:

- Regional Scale State Vegetation Type Map: State Vegetation Type Map: Southeast NSW VIS_ID 2230 (OEH, 2016)

– (OEH, 2016), which provides predictive mapping of PCTs in and around the subject site. This mapping is indicative only. It is not necessarily accurate at a fine scale for the purposes of the current study.
– Professional ecological knowledge about locally occurring vegetation types and landscape, soil, and topographic patterns, including transitions from one community to another and potential for intergrades between plant communities.
– Field survey results confirming the flora species present, vegetation structure, landscape position and soil type at the subject site and the extent and condition of native vegetation.
– The BioNet Vegetation Classification database was used to identify the candidate vegetation communities likely to be present based on the site conditions (flora species present, vegetation structure, bioregion, and landscape position and soil type) and the relevant published PCT descriptions.

If any of the PCTs were identified as having potential to be part of a Threatened Ecological Community (TEC), the relevant identification guidelines (NSW Scientific Committee listing criteria and Commonwealth identification guides) were consulted to determine the status of the vegetation community on the subject site. These guidelines provide the identification criteria used to positively identify the community as being part of the TEC. Criteria includes location; species present; overstorey species; weed cover; number; and type of native species, including 'important' native species.

Plant identification followed nomenclature in the Royal Botanic Gardens PlantNet online database (Royal Botanic Gardens and Domain Trust, 2022).

When surveying the assessment area, the Random Meander Method (Cropper 1993) was employed. This method is comprised of traversing by foot through sites that require investigation, during which notes are made on the structure and floristic composition of the native vegetation, as well as the availability of habitat for threatened species.

The locations of the predicted PCTs are given in **Figure 3-1**.

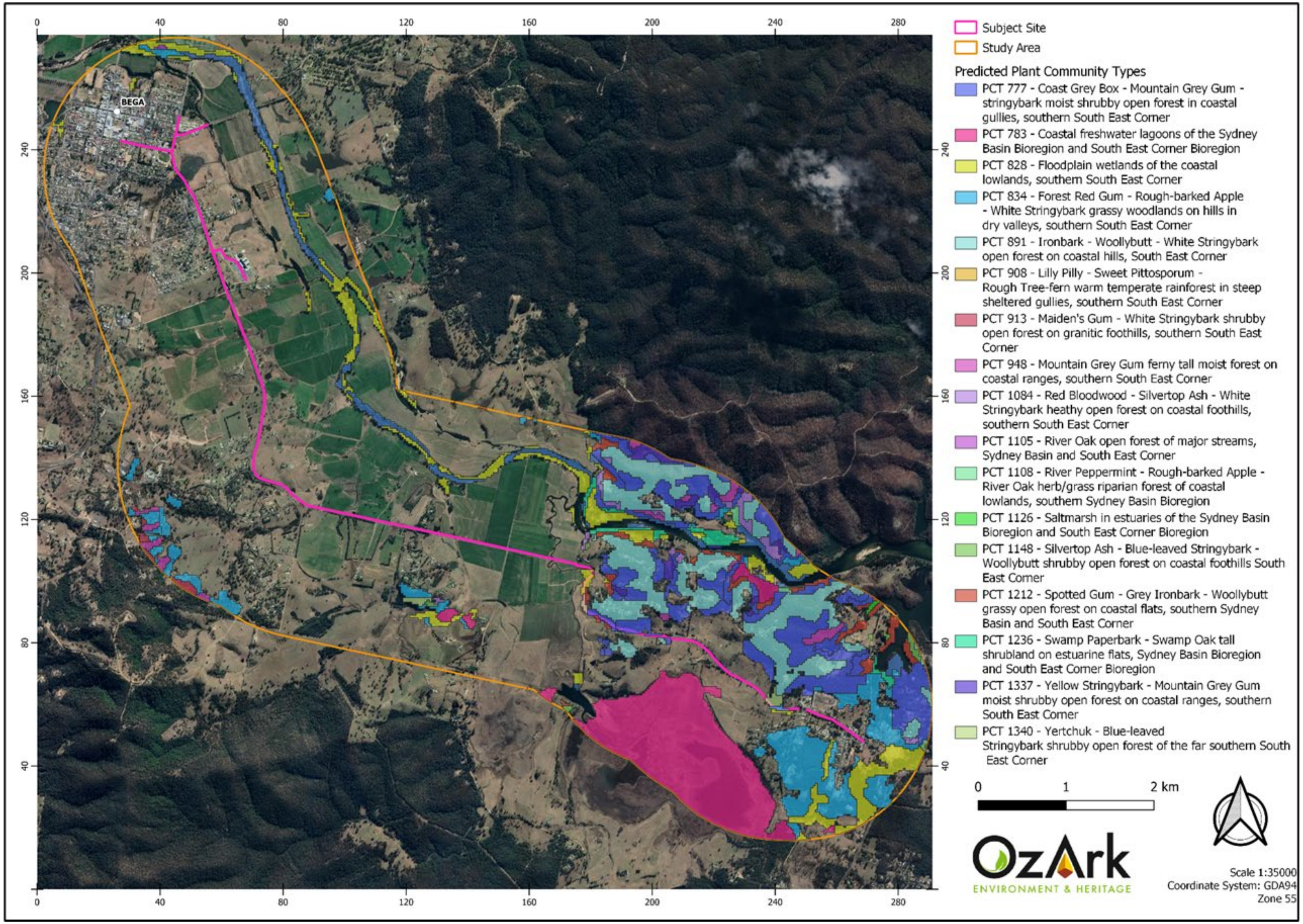


Figure 3-1: PCTs predicted to occur within the subject site and study area.

3.4.2 TARGETED FAUNA SURVEYS

The subject site was incidentally searched for fauna use while undertaking floristic and habitat surveys. All habitat trees (i.e., hollow-bearing trees or trees containing nests) were GPS tagged. The size, number of hollows and/or type of nest was recorded for each tree. Potential habitat (e.g., rocks, logs, loose bark and coarse woody debris) was examined for cryptic species. Areas of suitable substrate were searched for animal tracks and burrows. Secondary evidence of fauna presence on the subject site (e.g., scats, feathers and sloughed skin) was also recorded. Herpetological searches were conducted by overturning bark, logs and rocks while traversing the site.

3.5 LIMITATIONS

As this study is predicated on the data available at the time of the study, in addition to the environmental conditions, season, and time constraints imposed for the field survey, it has some limitations. These include:

- The field survey being completed in two days. This short duration may not have been conducive to surveying all species. Thus, the fauna and flora list should not be considered wholly representative of the greater diversity of species at the site and non-detection should not be considered absence.
- Not being able to inspect private property within, and adjacent to, the subject site. Thus, the assemblage of species and vegetation communities present may have been incomplete.
- Failure to conduct fauna trapping, aquatic and frog surveys, nocturnal spotlighting, and microbat ultrasonic call capture.

To overcome these limitations, a 'precautionary approach' for species presence was adopted. If suitable habitat for a particular threatened species is present on the site or is known to occur in the study area, then the species is assumed to be present, and the impact assessment will be completed on that basis.

The above-mentioned constraints were also considered when preparing the recommendations of avoiding, minimising, and mitigating potential impacts.

4. EXISTING ENVIRONMENTS

4.1 BIOREGION

The study area falls within the South East Coastal Ranges subregion of the NSW South East Corner Bioregion as per the Interim Biogeographic Regionalisation of Australia (IBRA) (Thackway & Cresswell, 1995). The subregion is characterised by geology, landforms, soil types and vegetation as described in **Table 4-1**.

Table 4-1. Description of the subregion of the subject site.

Bioregion	NSW South East Corner
Subregion	South East Coastal Ranges
Geology	Based on Ordovician slates, cherts and quartzite
Landforms	Metamorphosed sediments are oriented north-south and this controls the overall direction of the coastal ranges
Soils	Vary with bedrock type and slope position. Metamorphic rocks weather to clay and granites weather to a mixture of sand and clay.
Vegetation	The diversity in topography, rainfall and temperature across the bioregion is reflected in the diversity of vegetation communities. Coastal headlands support heaths dominated by hakea (*Hakea sericea*), melaleuca (*Melaleuca armillaris*), coast rosemary (*Westringia fruticosa*) and dwarfed red bloodwood (*Corymbia gummifera*).

4.2 NSW LANDSCAPES

The landscapes of NSW (Mitchell) landscapes were mapped in 2002 in order to provide a framework for reporting reserve establishment and for determining over-cleared landscapes (Mitchell, 2002). These landscapes broadly describe areas of similar topography, geology, soils and vegetation. The subject site is represented by Bega Granites, Bega Coastal Alluvium, and the Bega Coastal Foothills (**Figure 4-1**).

Bega Granites

Depressed basin of rolling hills and wide sandy or swampy valleys with dendritic drainage below the Great Escarpment on a large batholith of Silurian-Devonian granite and granodiorite. Elevation 50 to 500m, local relief to 250m. Rounded tors and rock outcrop common near the granite margin where a metamorphic contact ridge with steep slopes is found. Coarse uniform sands on steep slopes grade to red and yellow gritty texture-contrast soils on the central hills and slopes and deep, dark organic sands in the swampy valley floors. Streams often incised and carry abundant coarse sand as bedload. Mostly cleared formerly open woodland with forest red gum (*Eucalyptus tereticornis*), rough-barked apple (*Angophora floribunda*) and grasses.

Bega Coastal Alluvium

Channel, floodplain, and terraces of the widening alluvial valley of Quaternary alluvium of the Bega River from the coast to the base of the Great Escarpment. Elevation 0 to 200m. Extensive freshwater swamps and billabongs, stunted grey mangrove (*Avicennia marina*) at the mouths of estuaries. Small patches of temperate rainforest with sassafras (*Doryphora sassafras*) and lilly pilly (*Acmena smithii*) in gully heads and as a gallery forest along major streams in sheltered locations.

Bega Coastal Foothills

Low hills with general slope toward the coast on Ordovician quartzite, slate, chert, phyllite. General elevation 0 to 520m, local relief 250m. Thin stony red and red-yellow soils. Open forest of tall spotted gum (*Corymbia maculata*), grey ironbark (*Eucalyptus paniculata*), red bloodwood (*Corymbia gummifera*), white stringybark (*Eucalyptus globoidea*), blackbutt (*Eucalyptus pilularis*) with blady grass (*Imperata cylindrica*), bracken (*Pteridium esculentum*) and burrawang (*Macrozamia* sp.) in the understorey, shrubs limited. On headlands heaths of bushy needlewood (*Hakea sericea*), giant honey-myrtle (*Melaleuca armillaris*), coast rosemary (*Westringia friticosa*) and dwarfed red bloodwood occur in shallow soils subject to high salt spray input and frequent fire.

4.3 NSW WATERCOURSES

Twenty-three minor, non-perennial watercourses, of varying biodiversity significance, flow through the subject site (**Figure 4-2**). The Bega River, a major perennial system, is present within the study area. Six watercourses present in the impact footprint are mapped as Key Fish Habitat (**Figure 4-2**), although no threatened species distributions are associated.

Despite the proposal not directly interfering with this Key Fish Habitat, there is the potential for indirect impacts relating to runoff from construction. Provided mitigation measures (see **Section 7**) are followed, relating to reducing runoff, interaction with aquatic organisms and the removal of snags, the proposal should not have a significant effect on aquatic life.

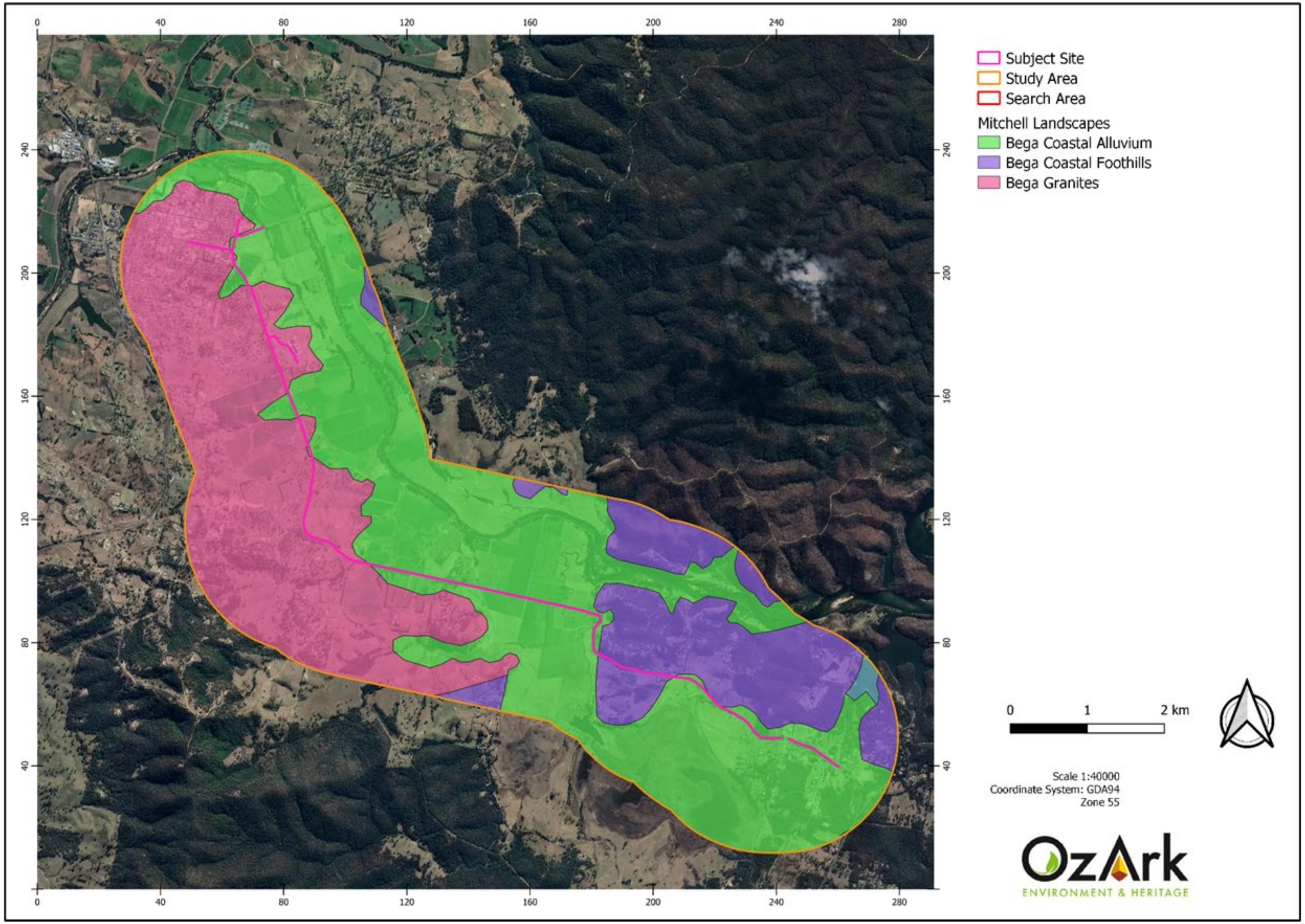


Figure 4-1: Mitchell (NSW) Landscapes of the study area.

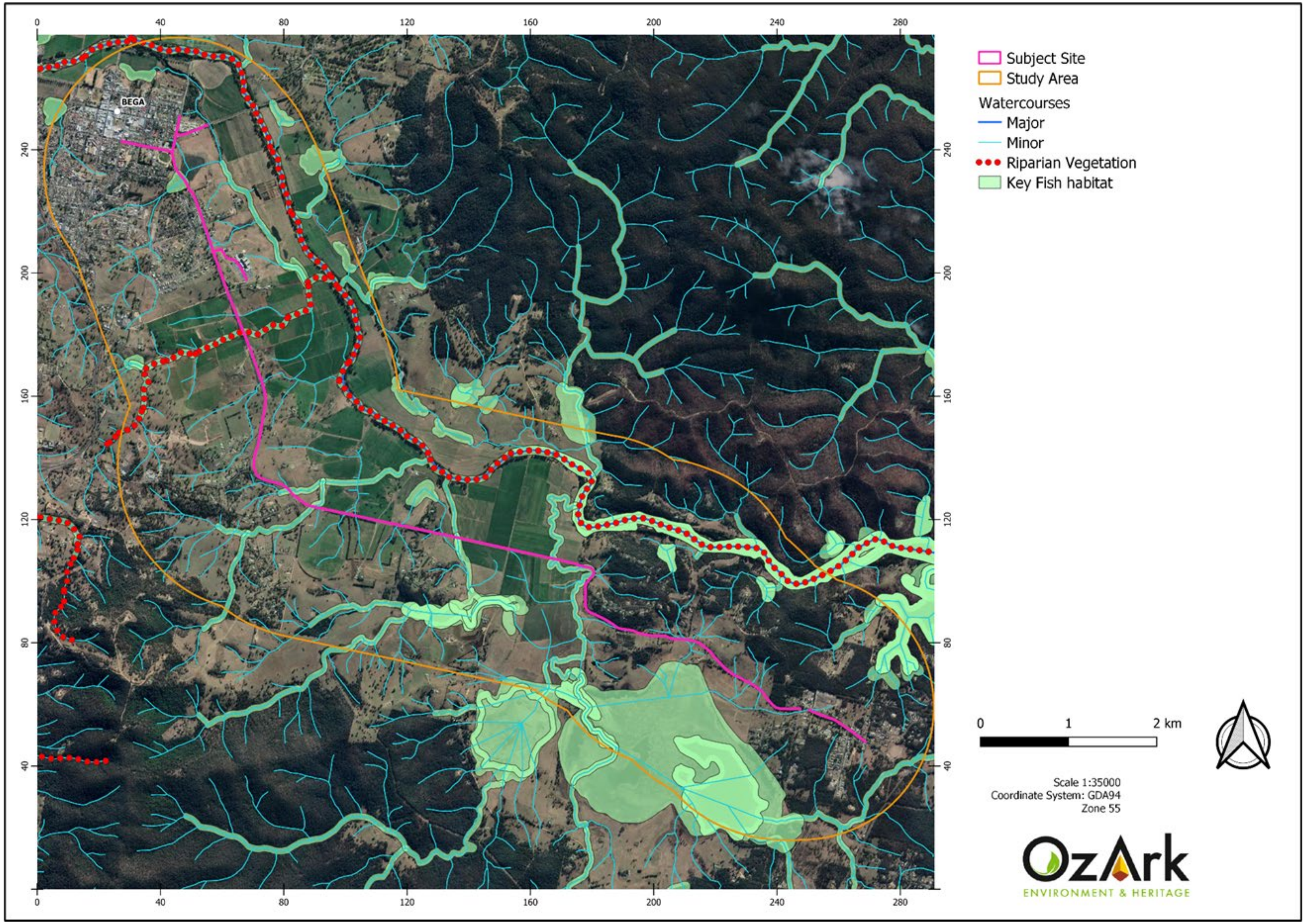


Figure 4-2: Key Fish Habitat, protected riparian land and watercourses within the subject site and study area.

4.4 GROUNDWATER DEPENDENT ECOSYSTEMS

Groundwater plays an important ecological role in supporting terrestrial and aquatic ecosystems. Groundwater sustains terrestrial and aquatic ecosystems by supporting vegetation and providing discharge to channels and wetlands. Aquifer ecosystems are inherently groundwater dependent (QLD Department of Environment and Heritage Protection, 2022).

The degree of groundwater dependence of ecosystems can be categorised into three broad categories:

- Non-dependent ecosystems that occur mostly in recharge areas and have no connection with groundwater.
- Facultative Groundwater Dependant Ecosystems (GDEs) that require groundwater in some locations but not in others, particularly where an alternative source of water can be accessed to maintain ecological function. Minor changes to the groundwater regime in facultative GDEs with proportional or opportunistic groundwater dependence may not have any adverse impacts but these ecosystems can be damaged or destroyed if a lack of access to groundwater is prolonged.
- Obligate GDEs that are restricted to locations of groundwater discharge and ecosystems located within aquifers (e.g., subterranean cave and stygofauna communities (Kuginis et al. 2012). Aquifer ecosystems are inherently groundwater dependent (QLD Department of Environment and Heritage Protection, 2022).

Groundwater dependant ecosystems have been classified into seven types under two broad categories as follows (Kuginis et al. 2012):

- Subsurface ecosystems – Underground ecosystems
  - Karst systems and caves (limestone geology)
  - Subsurface aquifer (phreatic) ecosystems
  - Baseflow streams (hyporheic or subsurface component)
- Surface ecosystems – Above ground ecosystems
  - Groundwater dependent wetlands
  - Baseflow surface streams (surface/free-water component)
  - Estuarine and near shore marine ecosystems
  - Groundwater dependent terrestrial ecosystems; dependent on subsurface groundwater (phreatophytic).

The Bureau of Meteorology Atlas of Groundwater Dependant Ecosystems identified high potential aquatic GDEs within the subject site (**Figure 4-3**). Although the proposal will not involve extracting or interfering with groundwater, mitigation measures intended to reduce any potential impacts are provided in **Section 7.**

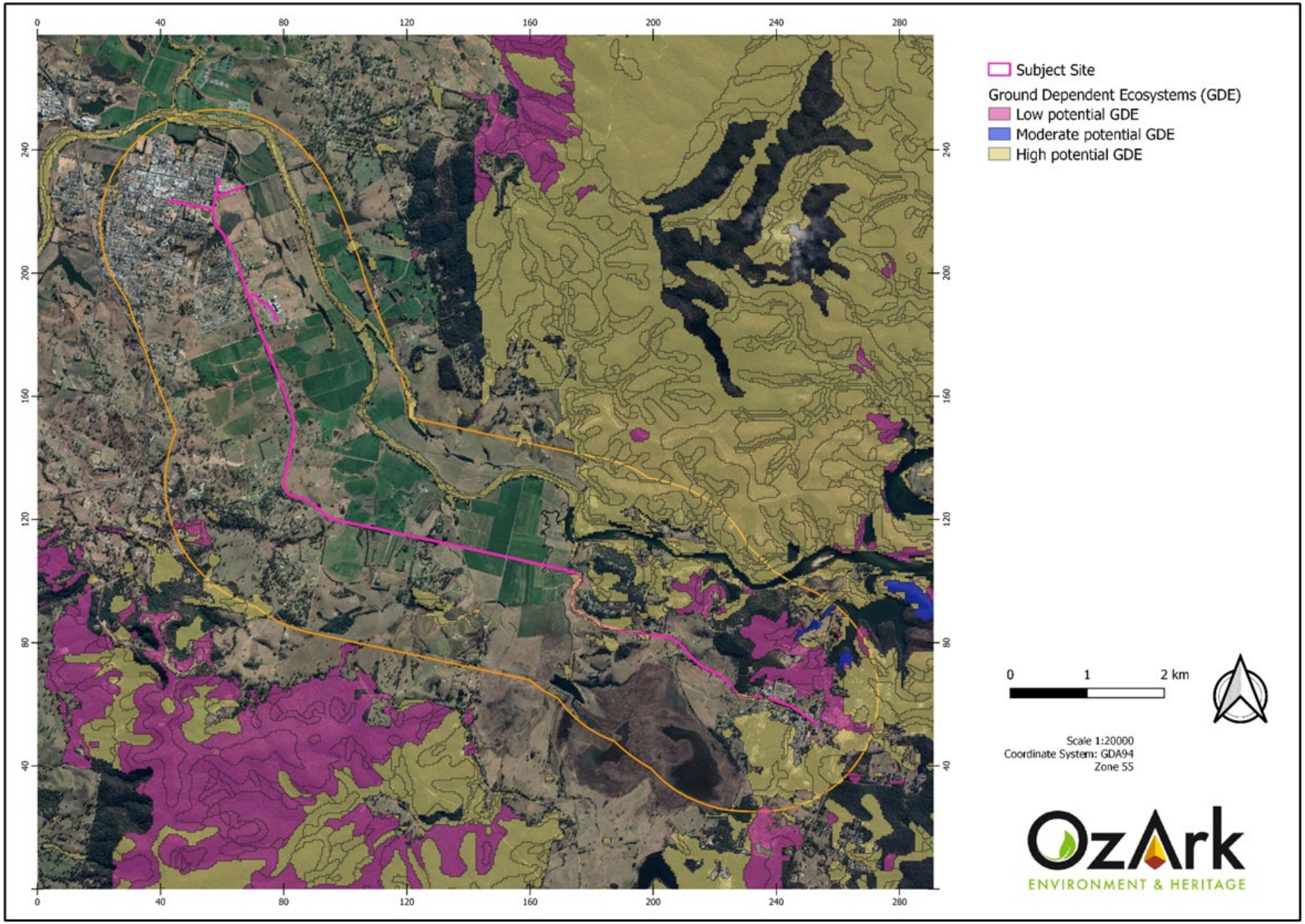


Figure 4-3: Groundwater-dependent ecosystems (GDEs) overlaid on the subject site.

4.5 CLIMATE

The nearest weather station is at Bega (station number: 069139), less than 500 m west of the subject site.

The area experiences warm summers and mild winters: with the highest average temperatures (minimum = 14.2°C, maximum = 27°C) in January, and the lowest average temperatures in July (minimum =1.4°C, maximum = 16.7°C).

The average annual rainfall at the station is 860.5 mm (1907-2022). Rainfall occurs predominately in the late summer, with March (96.2mm), February (92.1mm), and January (80.8mm) recording high values, and a later peak in June (81.4 mm). The lowest monthly rainfall occurs in early spring, with August (50.5mm), September (50.7mm) and July (51.5mm) recording the lowest (**Figure 4-4**).

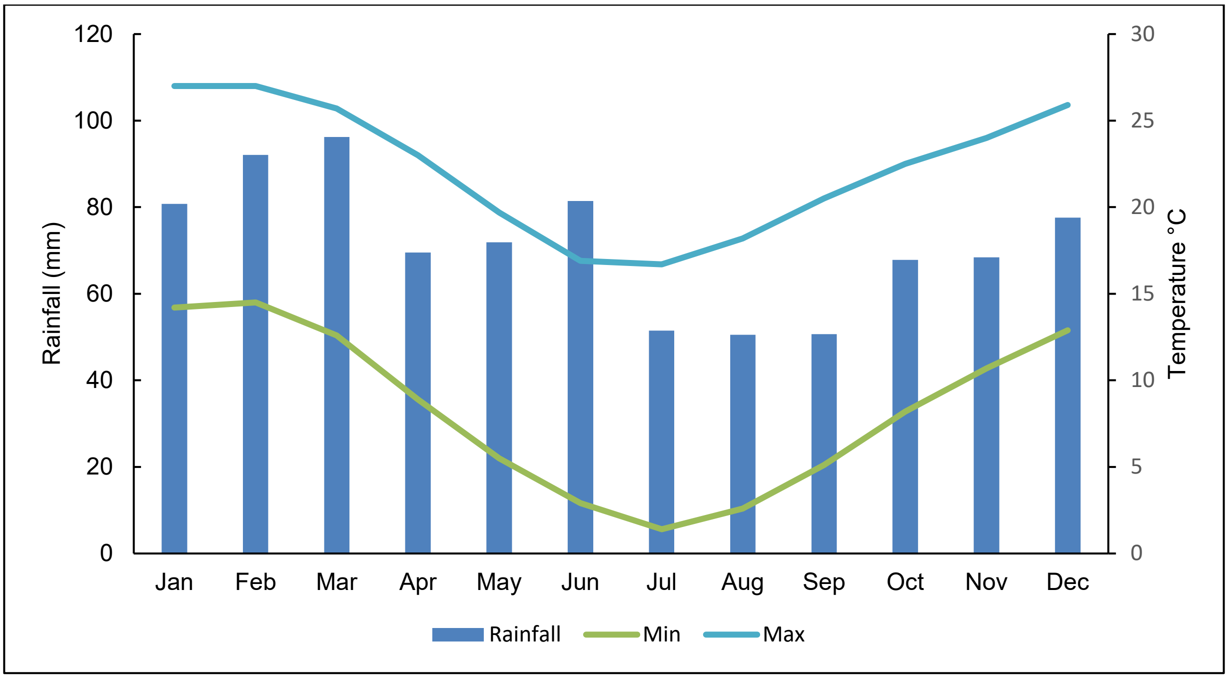


Figure 4-4: Climate Data for the Bega weather station, showing mean monthly rainfall and minimum/maximum temperatures.

5. RESULTS

5.1 PLANT COMMUNITY TYPES (PCTs)

The Regional Scale State Vegetation Map: State Vegetation Type Map: Southeast NSW VIS_ID 2230 (OEH, 2016) models 17 PCTs, as available in **Figure 3-1**, within the subject site:

- PCT 777 – Coast Grey Box - Mountain Grey Gum - stringybark moist shrubby open forest in coastal gullies, southern South East Corner Bioregion
- PCT 783 - Coastal freshwater swamps of the Sydney Basin Bioregion
- PCT 828 - Floodplain wetlands of the coastal lowlands, southern South East Corner Bioregion
- PCT 834 - Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion
- PCT 891 - Ironbark - Woollybutt - White Stringybark open forest on coastal hills, South East Corner Bioregion
- PCT 908 - Lilly Pilly - Sweet Pittosporum - Rough Tree-fern warm temperate rainforest in steep sheltered gullies, southern South East Corner Bioregion
- PCT 913 - Maiden's Gum - White Stringybark shrubby open forest on granitic foothills, southern South East Corner Bioregion
- PCT 948 - Mountain Grey Gum ferny tall moist forest on coastal ranges, southern South East Corner Bioregion
- PCT 1084 - Red Bloodwood - Silvertop Ash - White Stringybark heathy open forest on coastal foothills, southern South East Corner Bioregion
- PCT 1105 - River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion
- PCT 1108 - River Peppermint - Rough-barked Apple - River Oak herb/grass riparian forest of coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion
- PCT 1126 - Estuarine saltmarsh
- PCT 1148 - Silvertop Ash - Blue-leaved Stringybark - Woollybutt shrubby open forest on coastal foothills central South East Corner Bioregion
- PCT 1212 - Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats, southern Sydney Basin Bioregion and South East Corner Bioregion
- PCT 1236 - Coastal Swamp Paperbark - Swamp Oak scrub
- PCT 1337 - Yellow Stringybark - Mountain Grey Gum moist shrubby open forest on coastal ranges, southern South East Corner Bioregion
- PCT 1340 - Yertchuk - Silvertop Ash - Blue-leaved Stringybark shrubby open forest of the Wallagaraugh catchment, far southern South East Corner Bioregion

The field survey identified only one of these PCTs within the subject site: PCT 834. PCT 781, which was not predicted, was also encountered.

The extent of each community is provided in **Table 5-1.** Given the discontinuous nature of the vegetation within the subject site, PCT mapping has been made available from **Figure 5-1** through **Figure 5-9**. A list of all flora species encountered during the field survey is available in **Appendix B.**

Table 5-1. Plant Community Types recorded within the subject site.

Plant Community Type (PCT)	Area in subject site (ha)
PCT 781 – Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	0.083
PCT 834 – Forest Red Gum – Rough Barked Apple – White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion	1.695
Total	1.778

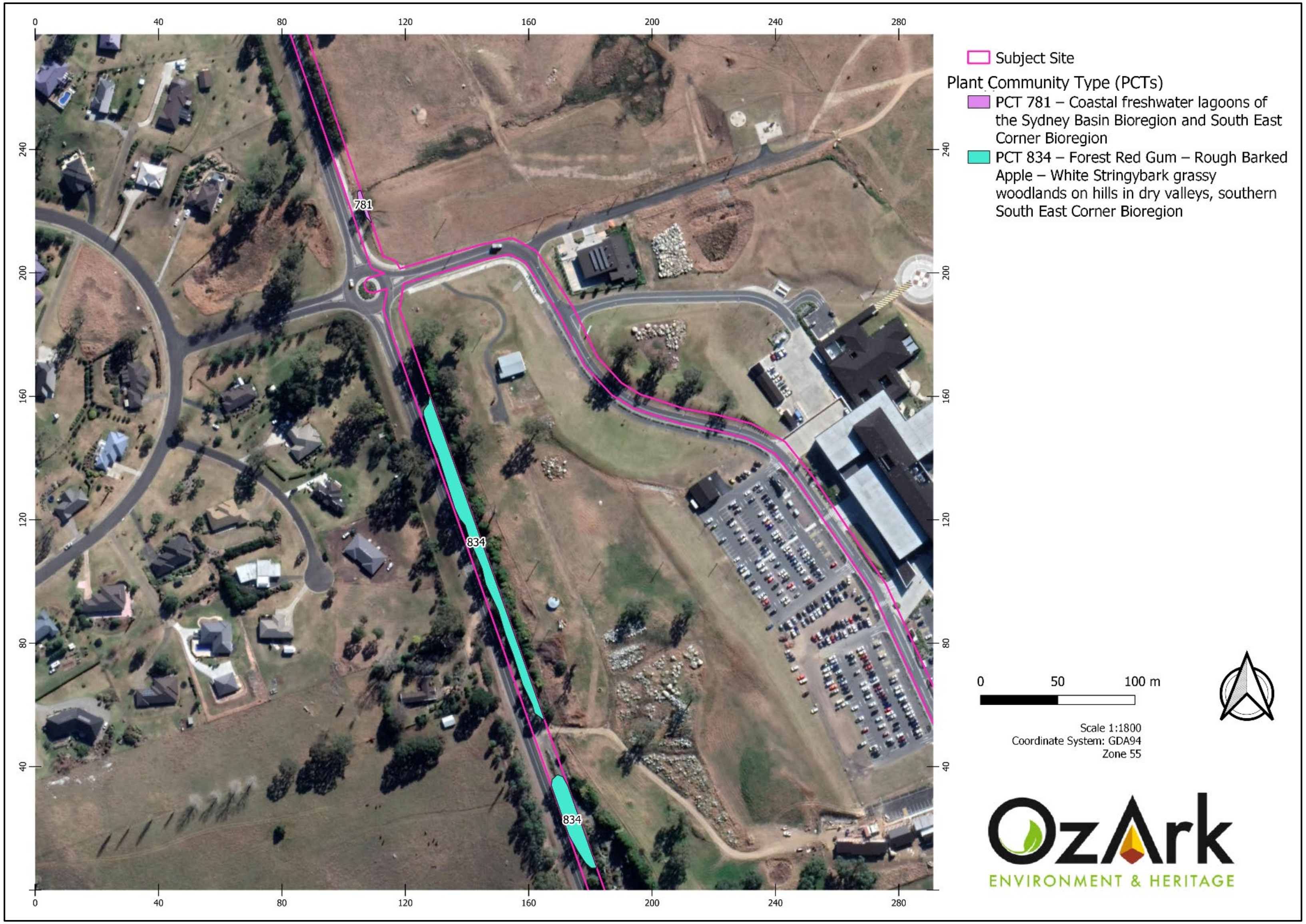


Figure 5-1: Magnified Plant Community Types (PCTs) along the subject site, immediately south of Bega

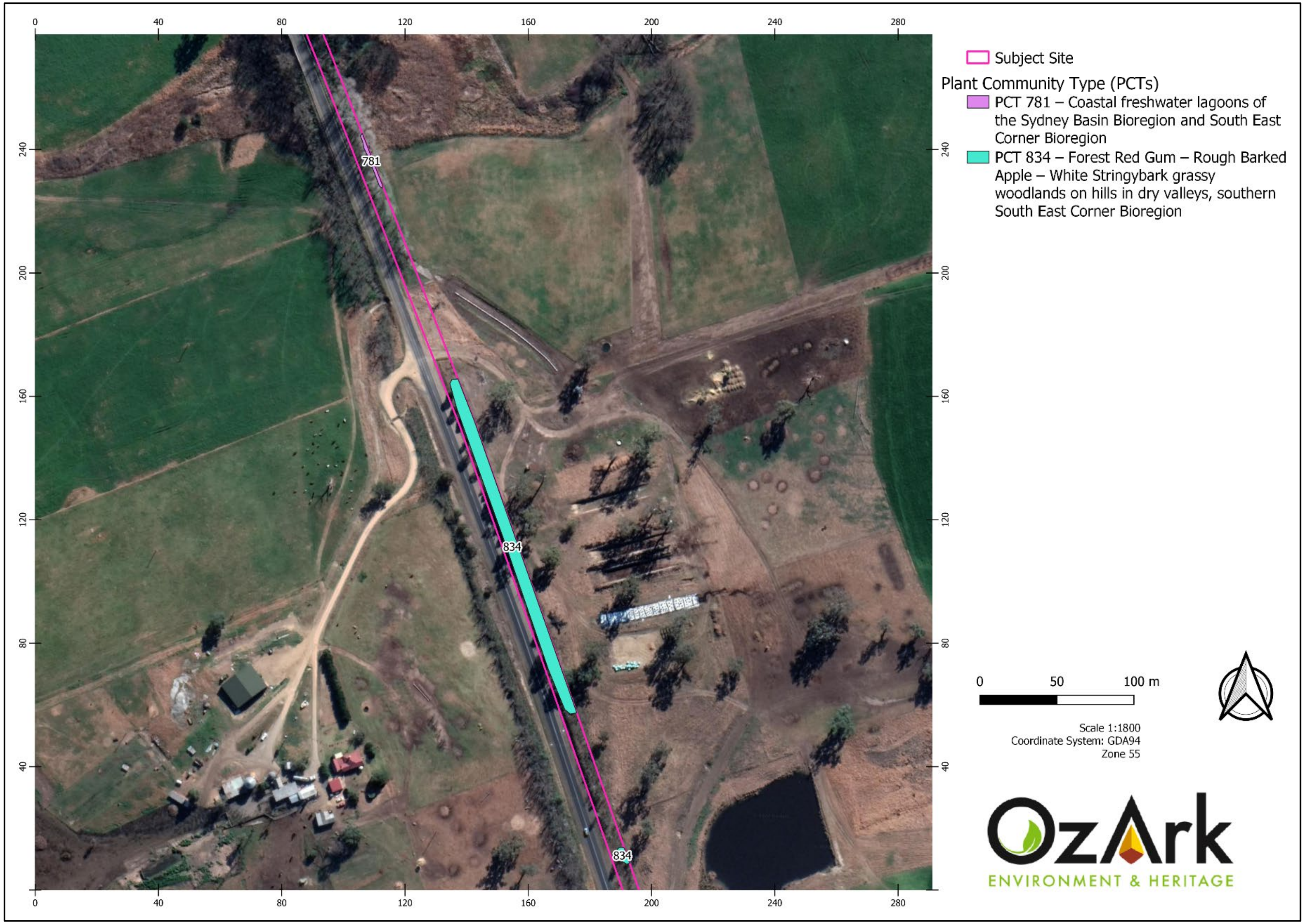


Figure 5-2: Magnified Plant Community Types (PCTs) along the subject site.

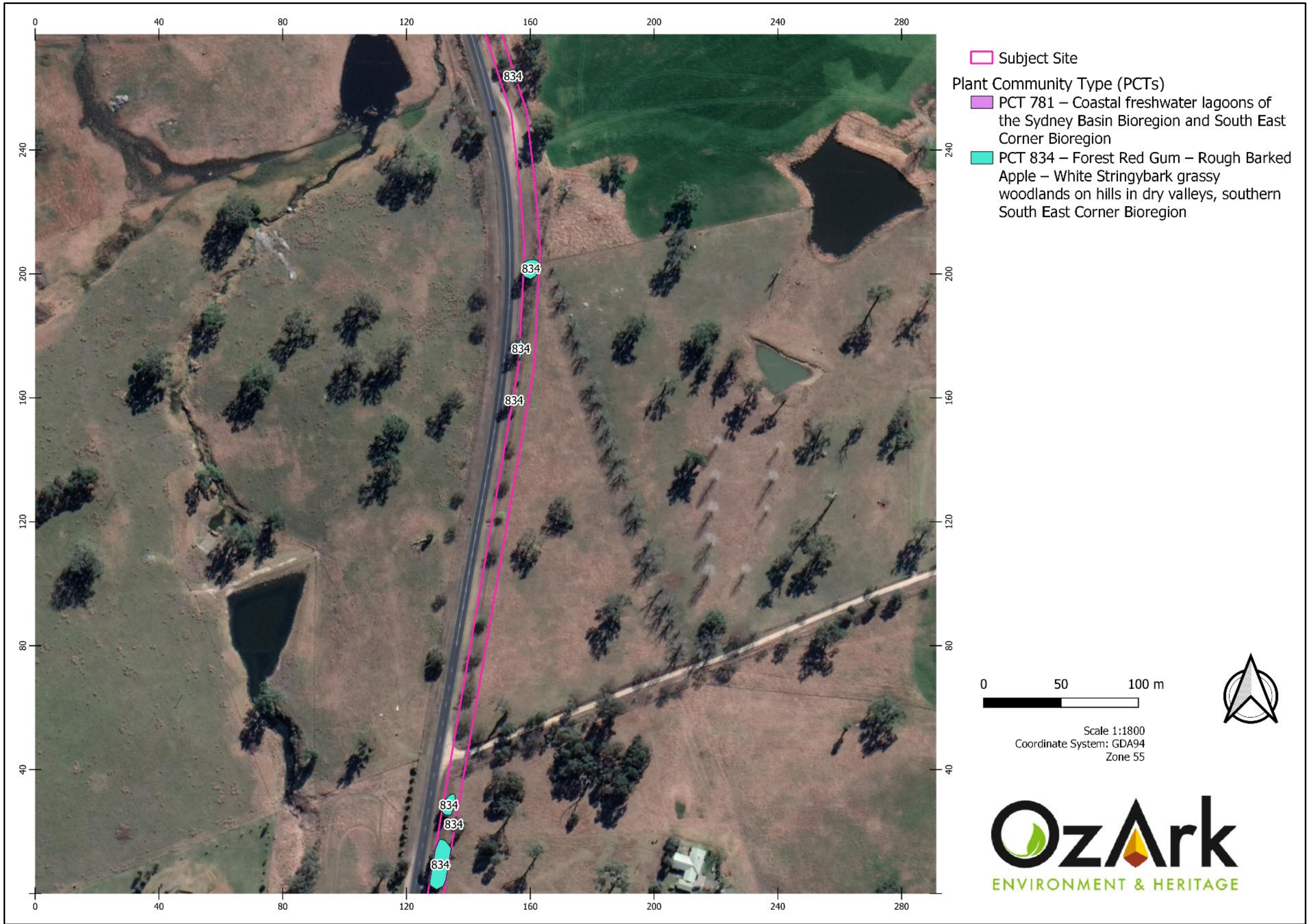


Figure 5-3: Magnified Plant Community Types (PCTs) along the subject site.

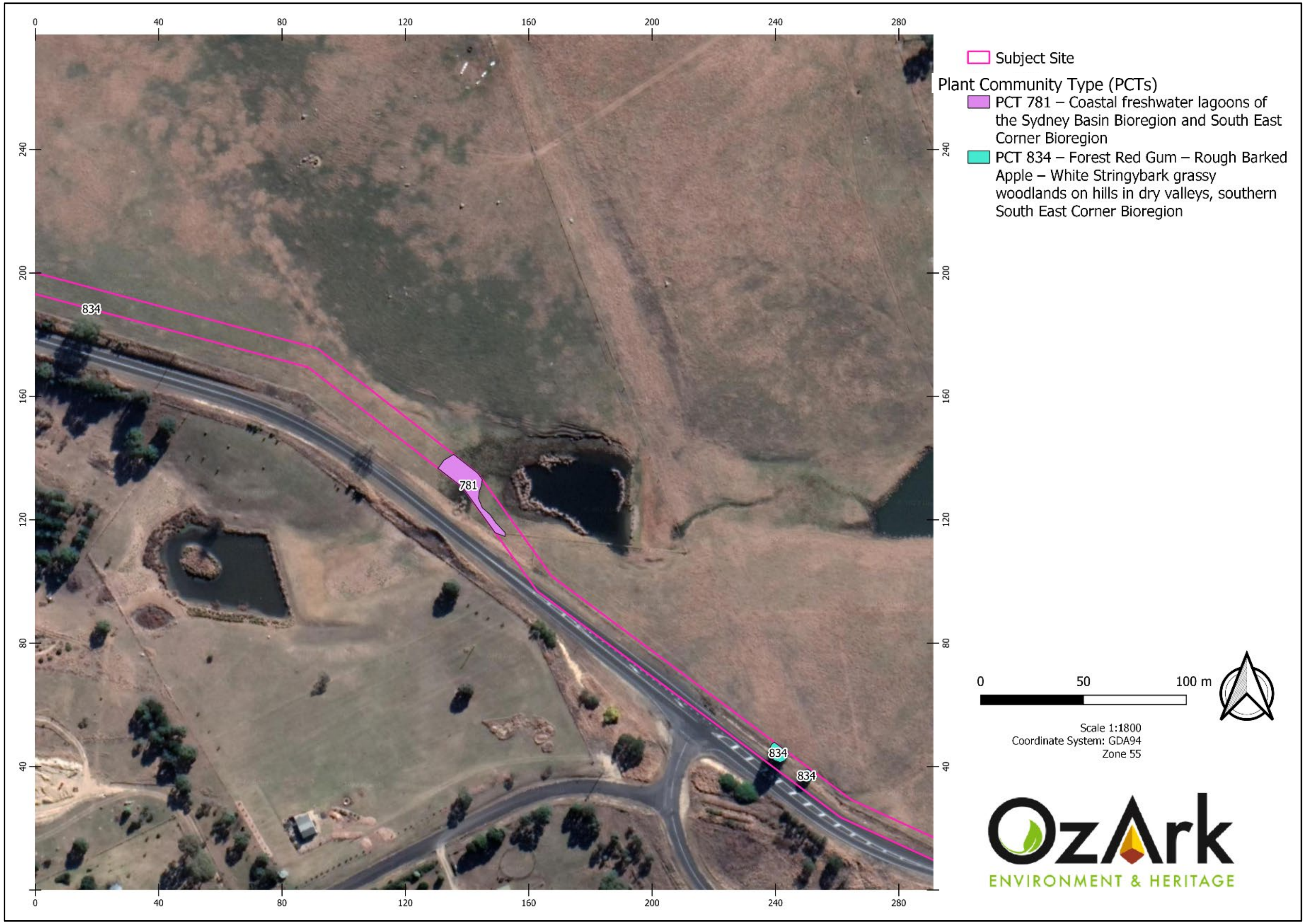


Figure 5-4: Magnified Plant Community Types (PCTs) along the subject site.

Figure 5-5: Magnified Plant Community Types (PCTs) along the subject site.

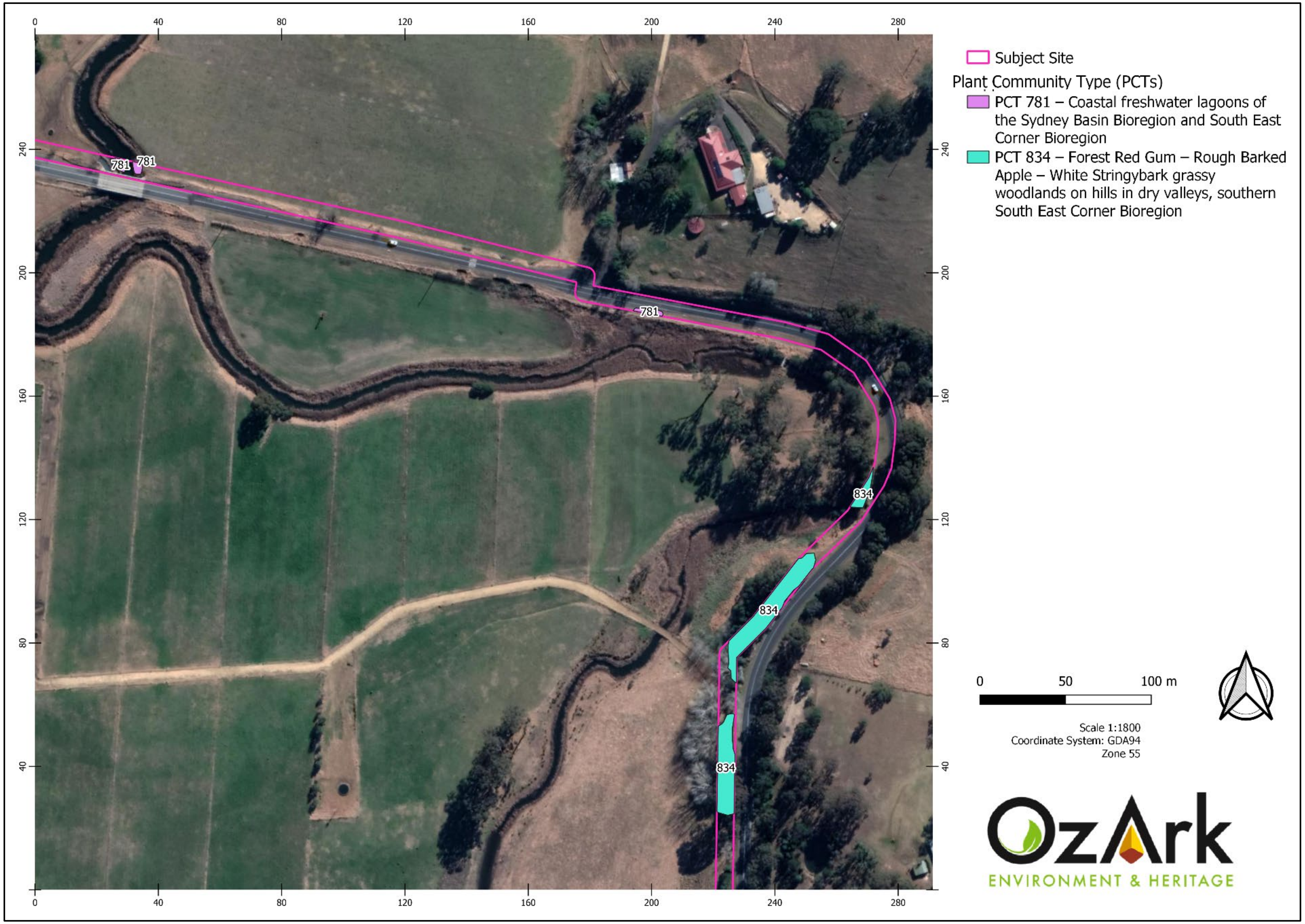


Figure 5-6: Magnified Plant Community Types (PCTs) along the subject site.

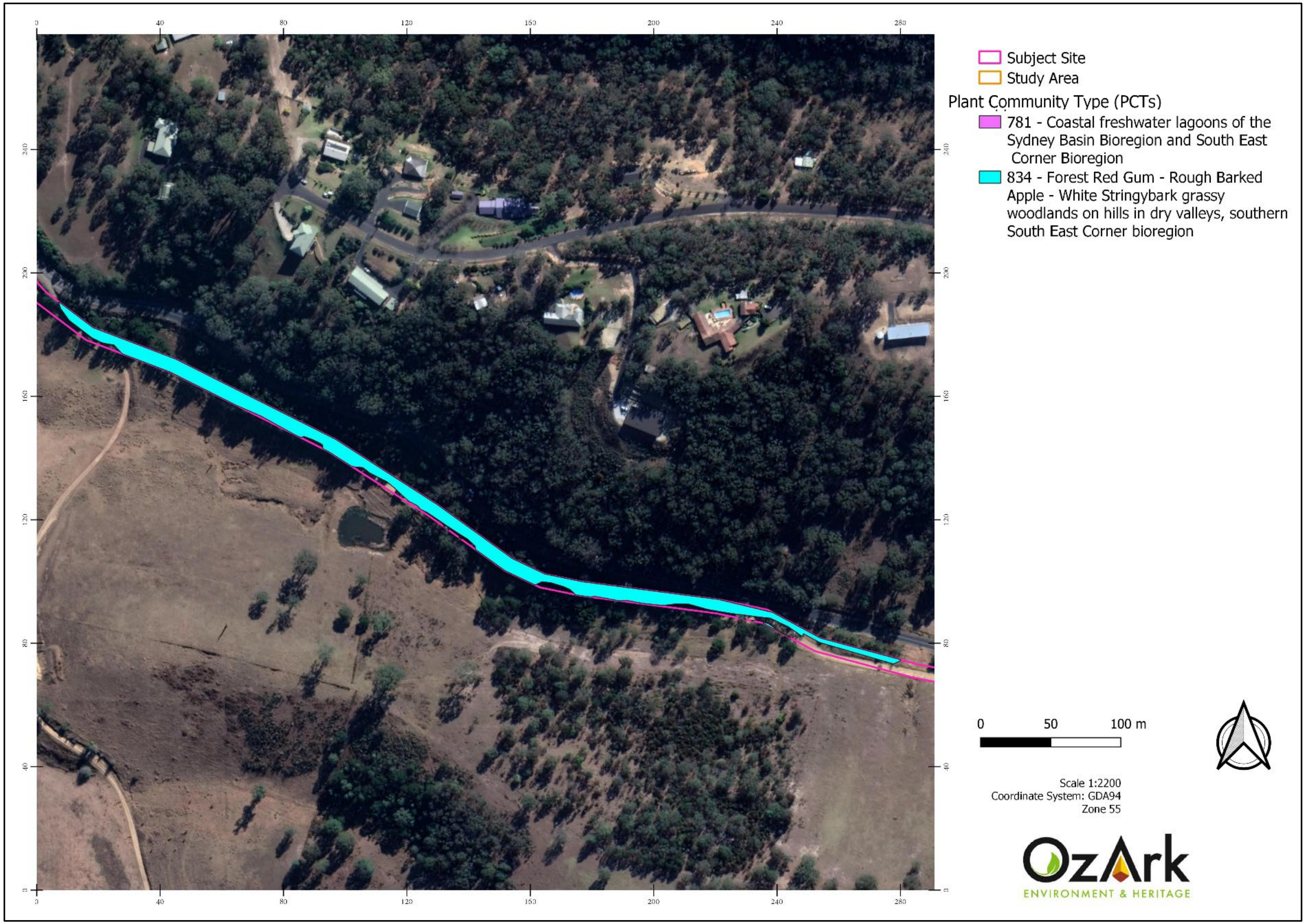


Figure 5-7: Magnified Plant Community Types (PCTs) along the subject site.

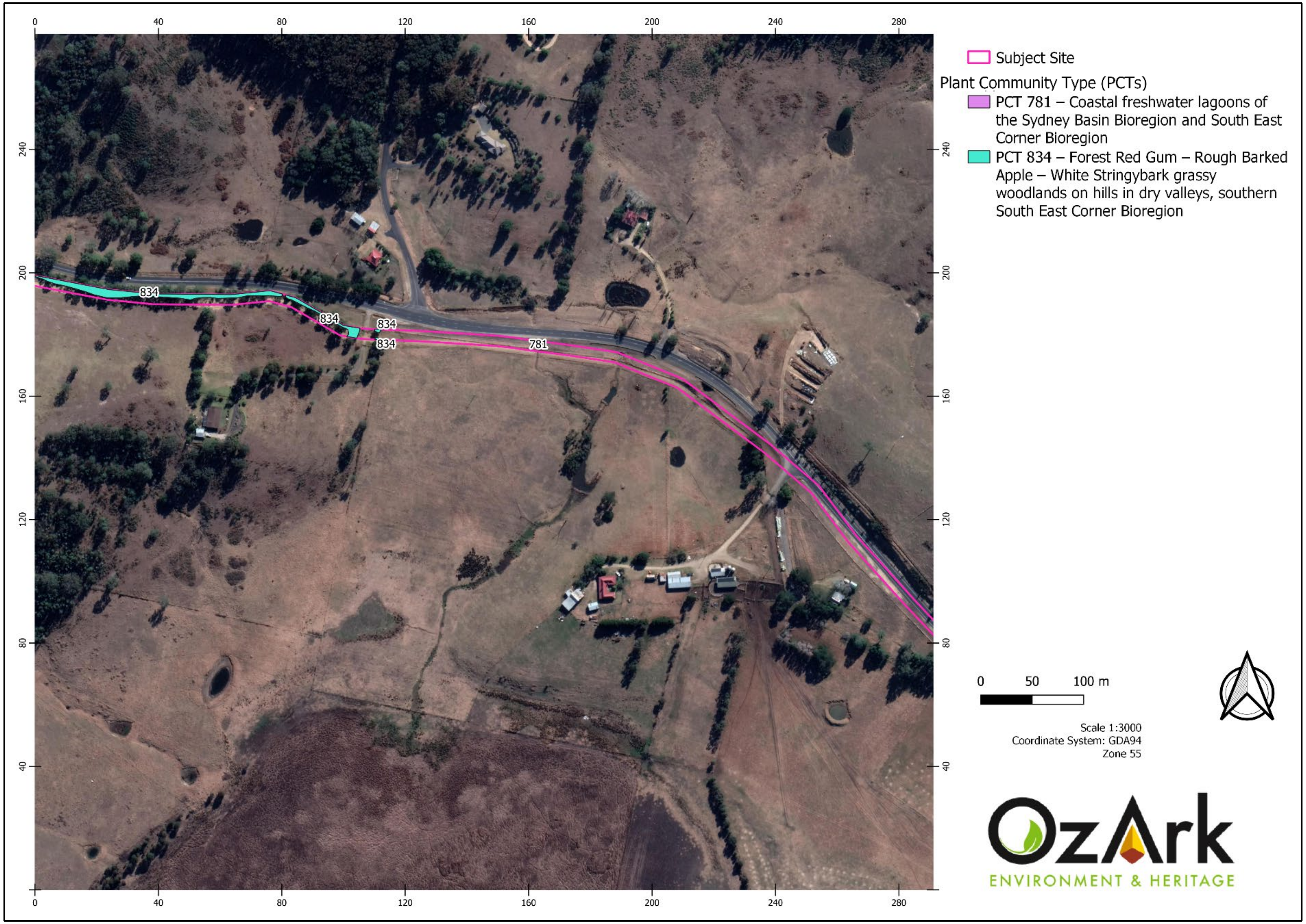


Figure 5-8: Magnified Plant Community Types (PCTs) along the subject site.

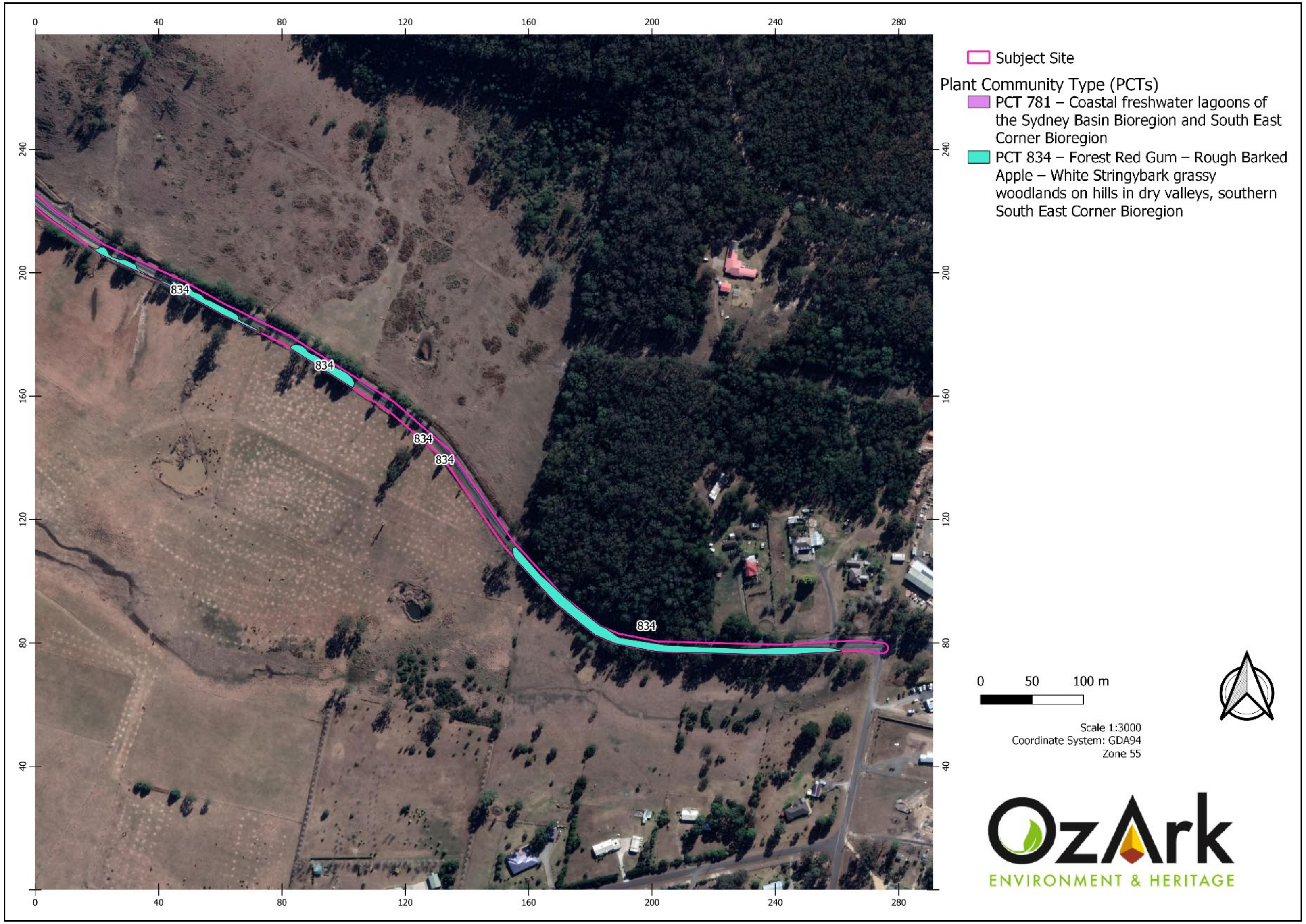


Figure 5-9: Magnified Plant Community Types (PCTs) at the eastern edge of the subject site, immediately adjacent to Kalaru.

5.2 THREATENED ECOLOGICAL COMMUNITIES (TECS)

Vegetation within the subject site was assessed against the condition and composition thresholds for each BC Act- or EPBC Act-listed Threatened Ecological Community (TEC) known or predicted to occur within the South Coastal Ranges subregion of the South East Corner bioregion.

The dominant canopy species within the impact footprint – namely Forest Red Gum (*Eucalyptus tereticornis*) and Rough-barked Apple (*Angophora floribunda*) – are shared by four Endangered Ecological Communities (EECs) listed under the BC Act:

- *Araluen Scarp Grassy Forest in the South East Corner Bioregion*
- *Brogo Wet Vine Forest in the South East Corner Bioregion*
- *Lowland Grassy Woodland in the South East Corner Bioregion*
- *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*

The observed vegetation was assessed against the listing criteria for these communities. Additionally, pockets of rainforest featuring areas of Sweet Pittosporum (*Pittosporum undulatum*) were assessed against the BC Act-listed EEC *Dry Rainforest of the South East Forests in the South East Corner Bioregion*, and wetland communities were assessed against both the *Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* and *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*.

The *Araluen Scarp Grassy Forest in the South East Corner Bioregion* EEC is reported to occur chiefly in the north and west of the Araluen Valley in an altitude range of 200 to 700 m ASL. As the subject site falls outside this geographic range and below the lower limit of the altitude range, this EEC could be discounted.

Vegetation towards the eastern limit of the subject site was removed from consideration under the *Lowland Grassy Woodland in the South East Corner Bioregion* EEC listing as it was observed to possess a dense understorey dominated by shrubs, forbs, and vines, with only an intermittent grass layer. Vegetation towards the western limit of the subject site and in low hill formations throughout the subject site more closely resembled this EEC listing. While frequently in a degraded condition, these occurrences were found to possess associated canopy species (chiefly *E. tereticornis* and *A. floribunda*), and a range of associated mid- and understorey species, including Black Wattle (*Acacia mearnii*), Hickory Wattle (*Acacia implexa*), Blackthorn (*Bursaria spinosa*), the Wallaby Grass *Rytidosperma racemosum* (listed as *Austrodanthonia racemosa*), Forest Hedgehog Grass (*Echinopogon ovatus*), Weeping Grass (*Microlaena stipoides*), Kangaroo Grass (*Themeda triandra*), Kidneyweed (*Dichondra repens*), Spiny-headed mat-rush (*Lomandra longifolia*), Slender Tick-trefoil (*Grona varians*, listed as *Desmodium* *varians*), Twining Glycine (*Glycine clandestina*), and Variable Glycine (*Glycine tabacina*). Consequently, occurrences of PCT 834 occurring on lowlands and undulating low hills – but not on floodplains – have been identified as a component of this EEC.

Occurrences of PCT 834 on floodplains and wetland margins show affinities to both the *Lowland Grassy Woodland* EEC and to the *River-Flat Eucalypt Forest on Coastal Floodplains* EEC. These occurrences have typically been reduced to isolated trees or small stands of *E. tereticornis*, with or without *A. floribunda*, and typically lacking a substantial shrub layer, either naturally or as a result of disturbance. Associated groundcover plants recorded from these occurrences include the key indicator species Kidneyweed (*Dichondra repens*), Forest Hedgehog Grass (*Echinopogon ovatus*), Weeping Grass (*Microlaena stipoides*), Twining Glycine (*Glycine clandestina*), and the Bluebell *Wahlenbergia gracilis*. Considering the strong overlap in species composition between this EEC and the *Lowland Grassy Woodland* EEC, these occurrences may be considered an example of either community. The *River-Flat Eucalypt Forest on Coastal Floodplains* EEC has been preferred in this case due to the landscape position of these occurrences.

The occurrence of PCT 834 towards the eastern limit of the subject site shows a strong affinity to the *Brogo Wet Vine Forest in the South East Corner Bioregion* EEC. Associated species recorded within or near the subject site include the trees Forest Red Gum (*Eucalyptus tereticornis*), Blue Box (*E. baueriana*), White Stringybark (*E. globoidea*), and Rough-barked Apple (*Angophora floribunda*); the shrubs Hickory Wattle (*Acacia implexa*), *Cassinia trinerva*, Tree Violet (*Melicytus dentatus,* listed as *Hymenanthera dentata*), and Native Raspberry (*Rubus parvifolius*); the forbs Kidneyweed (*Dichondra repens*) and Indian Weed (*Sigesbeckia orientalis*); the graminoids Forest Hedgehog Grass (*Echinopogon ovatus*), Spiny Mat-rush (*Lomandra longifolia*), Weeping Grass (*Microlaena stipoides*), and Basket Grass (*Oplismenus imbecilis*); and the vines Slender Tick-trefoil (*Grona varians*, listed as *Desmodium varians*) and Scrambling Lily (*Geitonoplesium cymosum*). As the whole patch – including areas on private property – was not assessed, it is likely that additional associated species are present that were not detected during the survey. Consequently, the eastern limit of PCT 834 has been identified as a component of the *Brogo Wet Vine Forest* EEC.

Occurrences of PCT 781 within the subject site represent degraded examples of the *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* EEC. A small number of associated species were recorded within the subject site, including the Spike-rush *Eleocharis acuta*, the Knotweed *Persicaria decipiens*, and the Rush *Juncus usitatus*. Larger and higher-quality examples of this EEC appear to occur on private grazing land outside the subject site, although these areas were not directly assessed.

Areas of Sweet Pittosporum (*Pittosporum undulatum*) did not satisfy the listing conditions for the EEC *Dry Rainforest of the South East Forests in the South East Corner Bioregion* as they lacked the most characteristic associated species, Port Jackson Fig (*Ficus rubiginosa*), and possessed a canopy of Rough-barked Apple (*Angophora floribunda*), which is not associated with this EEC.

No other BC Act-listed TECs were identified which resembled the vegetation within the subject site. The observed vegetation was also assessed against the EPBC Act-listed TECs known or predicted to occur within the relevant IBRA subregion but was found not to meet the condition or composition thresholds for any of these entities. The *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* Critically Endangered Ecological Community (CEEC) could be discounted as all occurrences of this CEEC fall within 2 km of the eastern coastline. At its eastern limit, the subject site remains c. 4 km from the coastline. The *Subtropical and Temperate Coastal Saltmarsh* Vulnerable Ecological Community could likewise be discounted as no saltmarsh was recorded within the subject site.

Despite strong affinities in associated species, vegetation within the subject site was excluded from consideration under the *Lowland Grassy Woodland in the South East Corner Bioregion* CEEC listing as none of the patches of native vegetation within the subject site met all associated threshold conditions. Most patches did not meet the requirement for a majority native understorey, and those that did typically possessed a shrubby mid-layer that was both denser and more diverse than indicated in the CEEC listing, which states only that a shrub layer of *Bursaria spinosa* may be present. These latter patches also frequently exceeded the maximum 30% projected canopy cover typically associated with this CEEC.

Similarly, despite strong affinities between the observed vegetation on the floodplain and lowlands and the *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* CEEC, this community was ruled out as no patches meeting the minimum 0.5 ha patch size were identified on a suitable landform (identified as floodplains, river-banks, riparian zones, lake foreshores, creek lines, floodplain pockets, depressions, alluvial flats, fans, terraces, and localised colluvial fans, typically below 50 m ASL).

Consequently, four BC Act-listed TECs and no EPBC Act-listed TECs occur within the subject site. The extent of each TEC within the subject site is provided in **Table 5-2**, with TEC occurrences mapped in **Figure 5-10** through **Figure 5-20.**

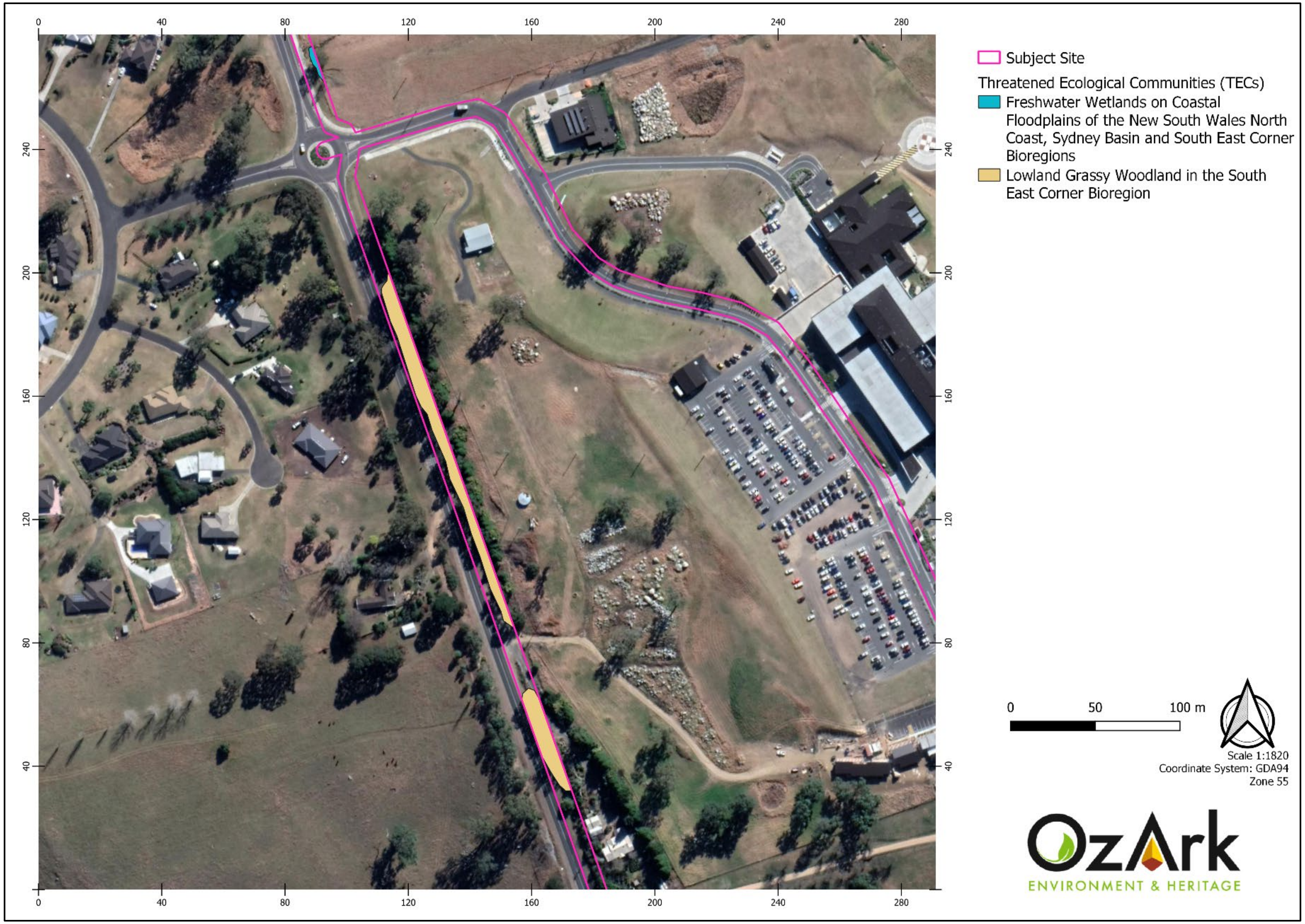


Figure 5-10: Magnified Threatened Ecological Communities (TECs) at the western edge of the subject site, immediately adjacent to Bega.

Figure 5-11: Magnified Threatened Ecological Communities (TECs) along the subject site.

Figure 5-12: Magnified Threatened Ecological Communities (TECs) along the subject site.

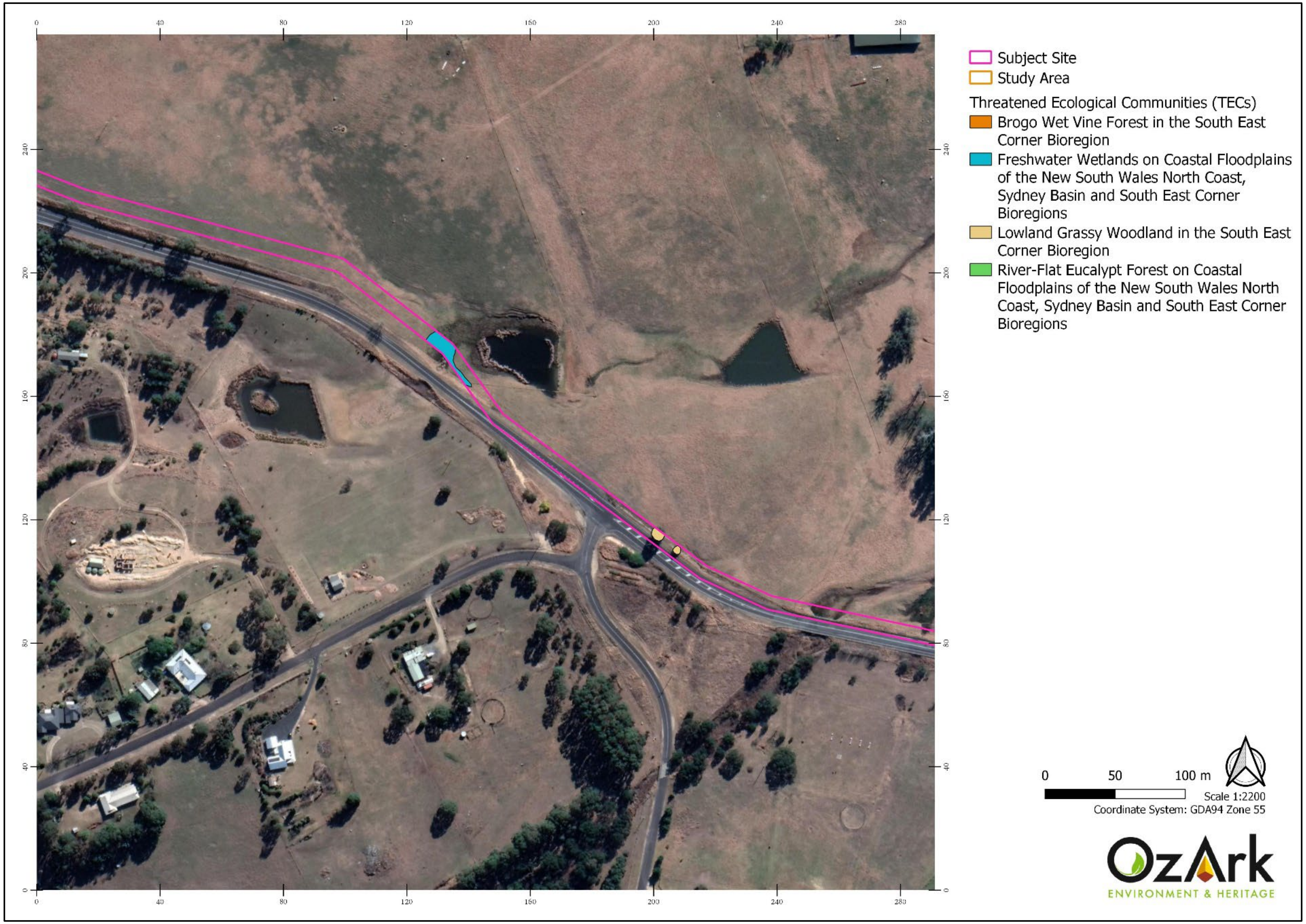


Figure 5-13: Magnified Threatened Ecological Communities (TECs) along the subject site.

Figure 5-14: Magnified Threatened Ecological Communities (TECs) along the subject site.

Figure 5-15: Magnified Threatened Ecological Communities (TECs) along the subject site.

Figure 5-16: Magnified Threatened Ecological Communities (TECs) along the subject site.

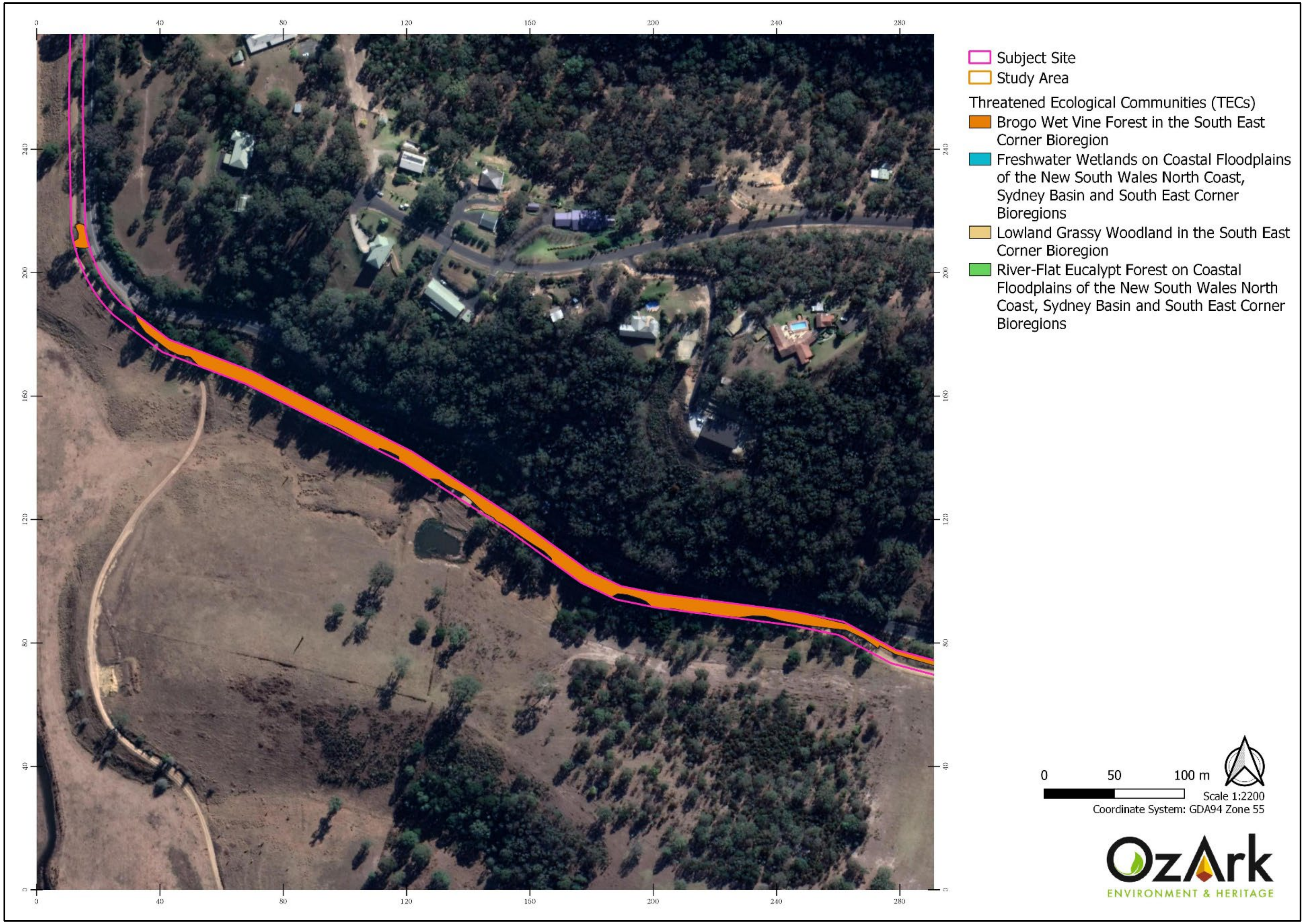


Figure 5-17: Magnified Threatened Ecological Communities (TECs) along the subject site.

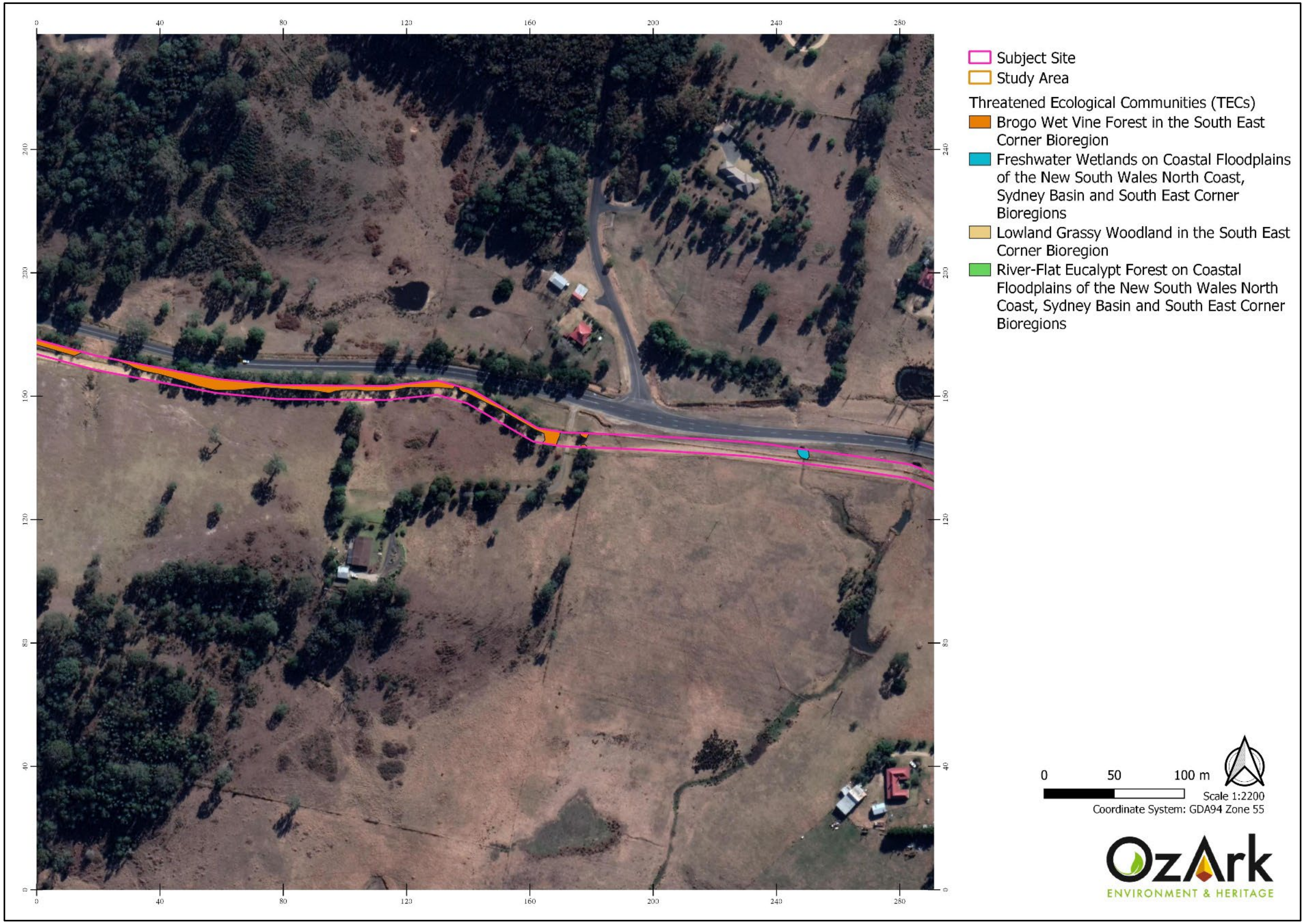


Figure 5-18: Magnified Threatened Ecological Communities (TECs) along the subject site.

Figure 5-19: Magnified Threatened Ecological Communities (TECs) along the subject site.

Figure 5-20: Magnified Threatened Ecological Communities (TECs) at the eastern edge of the subject site at Kalaru.

Table 5-2. Threatened Ecological Communities within the subject site.

Threatened Ecological Community (TEC)	BC Act	Area in subject site (ha)
Brogo Wet Vine Forest in the South East Corner Bioregion	Endangered	1.179
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	0.083
Lowland Grassy Woodland in the South East Corner Bioregion	Endangered	0.435
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	0.081
Total		1.695

5.3 THREATENED SPECIES AND POPULATIONS

A review of the Threatened Species Profiles database identified 190 threatened flora and fauna species that are known to, or are predicted to, occur within the South East Coastal Ranges of the South East Corner Bioregion (**Appendices A** and **C**). Based on the proximity of past records, habitat requirements, and the results of the field survey, 73 species demonstrated a moderate to high likelihood of occurrence (**Appendix C**). These are listed in **Table 5-3**.

One threatened species was detected during the field survey: the Grey-headed Flying Fox (*Pteropus poliocephalus*), listed as Vulnerable under both the BC and EPBC Act (**Appendix B**). The individuals were found to be roosting within, and adjacent to, the subject site (**Figure 5-21**). The observed individuals were members of Bega's nationally significant Flying-fox camp that hosts a population between 500-2,499 members (as of 2020), according to the National Flying Fox Monitoring Viewer (see **Figure 5-21**). The Grey-headed Flying Fox gives birth in October or November. During late-stage pregnancy and motherhood, this species is vulnerable to miscarriage or abandoning their young. As such, if a maternity camp of this species is present near the construction site it will be impacted by the proposal. A Bat Management Plan and Threatened Species License under the BC Act will be required to carry out the works without adversely impacting this threatened species.

Regarding the apparent absence of other threatened species, a failure of detection should not be considered as a confirmation of absence, particularly given the short duration of the field survey and a lack of detailed targeted surveys.

Table 5-3. BC Act & EPBC Act-listed threatened species with a moderate-high potential to be impacted by the proposal.

Scientific Name	Common Name	NSW Status	Comm. Status
^^*Mixophyes balbus*	Stuttering Frog	E1,P,2	V
Litoria aurea	Green and Golden Bell Frog	E1,P	V
Litoria littlejohni	Littlejohn's Tree Frog	V,P	V
Heleioporus australiacus	Giant Burrowing Frog	V,P	V
Botaurus poiciloptilus	Australasian Bittern	E1, P	E
Ixobrychus flavicollis	Black Bittern	V,P	
Circus assimilis	Spotted Harrier	V,P	
Haliaeetus leucogaster	White-bellied Sea-Eagle	V,P	
Hieraaetus morphnoides	Little Eagle	V,P	
Lophoictinia isura	Square-tailed Kite	V,P,3	
Pandion cristatus	Eastern Osprey	V,P,3	
Burhinus grallarius	Bush Stone-curlew	E1,P	
Haematopus fuliginosus	Sooty Oystercatcher	V,P	
Hirundapus caudacutus	White-throated Needletail	P	V, C, J, K
Haematopus longirostris	Pied Oystercatcher	E1,P	
Thinornis cucullatus cucullatus	Eastern Hooded Dotterel	E4A	V
Irediparra gallinacea	Comb-crested Jacana	V,P	
Calidris alba	Sanderling	V, P	C, J,K
Calidris ferruginea	Curlew Sandpiper	E1, P	CE, C, J, K
Numenius madagascariensis	Eastern Curlew	P	CE,C,J,K
Sternula albifrons	Little Tern	E1,P	C,J,K
Callocephalon fimbriatum	Gang-gang Cockatoo	V,P,3	
^^*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2	
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	V,P,3	
Glossopsitta pusilla	Little Lorikeet	V,P	
Lathamus discolor	Swift Parrot	E1,P,3	CE
Neophema chrysogaster	Orange-bellied Parrot	E4A,P,3	CE
Neophema pulchella	Turquoise Parrot	V,P,3	
Pezoporus wallicus wallicus	Eastern Ground Parrot	V,P,3	
Ninox connivens	Barking Owl	V,P,3	
Ninox strenua	Powerful Owl	V,P,3	
Tyto novaehollandiae	Masked Owl	V,P,3	
Tyto tenebricosa	Sooty Owl	V,P,3	
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V,P	
Calamanthus fuliginosus	Striated Fieldwren	E1,P	
Chthonicola sagittata	Speckled Warbler	V,P	
Anthochaera phrygia	Regent Honeyeater	E4A,P	CE
Epthianura albifrons	White-fronted Chat	V,P	
Daphoenositta chrysoptera	Varied Sittella	V,P	
Pachycephala olivacea	Olive Whistler	V,P	
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V,P	
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V,P	
Petroica boodang	Scarlet Robin	V,P	
Petroica phoenicea	Flame Robin	V,P	
Petroica rodinogaster	Pink Robin	V,P	
Stagonopleura guttata	Diamond Firetail	V,P	
Dasyurus maculatus	Spotted-tailed Quoll	V,P	E
Phascogale tapoatafa	Brush-tailed Phascogale	V,P	
Sminthopsis leucopus	White-footed Dunnart	V,P	
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E1,P	E
Phascolarctos cinereus	Koala	V,P	E

Scientific Name	Common Name	NSW Status	Comm. Status
Cercartetus nanus	Eastern Pygmy-possum	V,P	
Petaurus australis	Yellow-bellied Glider	V,P	V
Petauroides volans	Greater Glider	P	
Petaurus norfolcensis	Squirrel Glider	V,P	
Potorous tridactylus	Long-nosed Potoroo	V,P	V
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V,P	
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V,P	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P	
Myotis macropus	Southern Myotis	V,P	
Scoteanax rueppellii	Greater Broad-nosed Bat	V,P	
Miniopterus orianae oceanensis	Large Bent-winged Bat	V,P	
Wilsonia backhousei	Narrow-leafed Wilsonia	V	
Wilsonia rotundifolia	Round-leafed Wilsonia	E1	
Pultenaea pedunculata	Matted Bush-pea	E1	
Acacia georgensis	Bega Wattle	V	V
Haloragis exalata subsp. exalata	Square Raspwort	V	V
Persicaria elatior	Tall Knotweed	V	V
Lysimachia vulgaris var. davurica	Yellow Loosestrife	E1,3	
Pomaderris bodalla	Bodalla Pomaderris	V	
Thesium australe	Austral Toadflax	V	V
Viola cleistogamoides	Hidden Violet	E1,3	

***NSW Status:** ^^=Category 2 sensitive species, P=Protected, P13=Protected native plant, V=Vulnerable, E1=Endangered, E2=Endangered population,
E4=Extinct, E4A=Critically endangered, 2=Category 2 sensitive species, 3=Category 3 sensitive species.
+ Comm. Status: C=CAMBA, J=JAMBA, K=ROKAMBA, CE=Critically endangered, E=Endangered, V=Vulnerable.

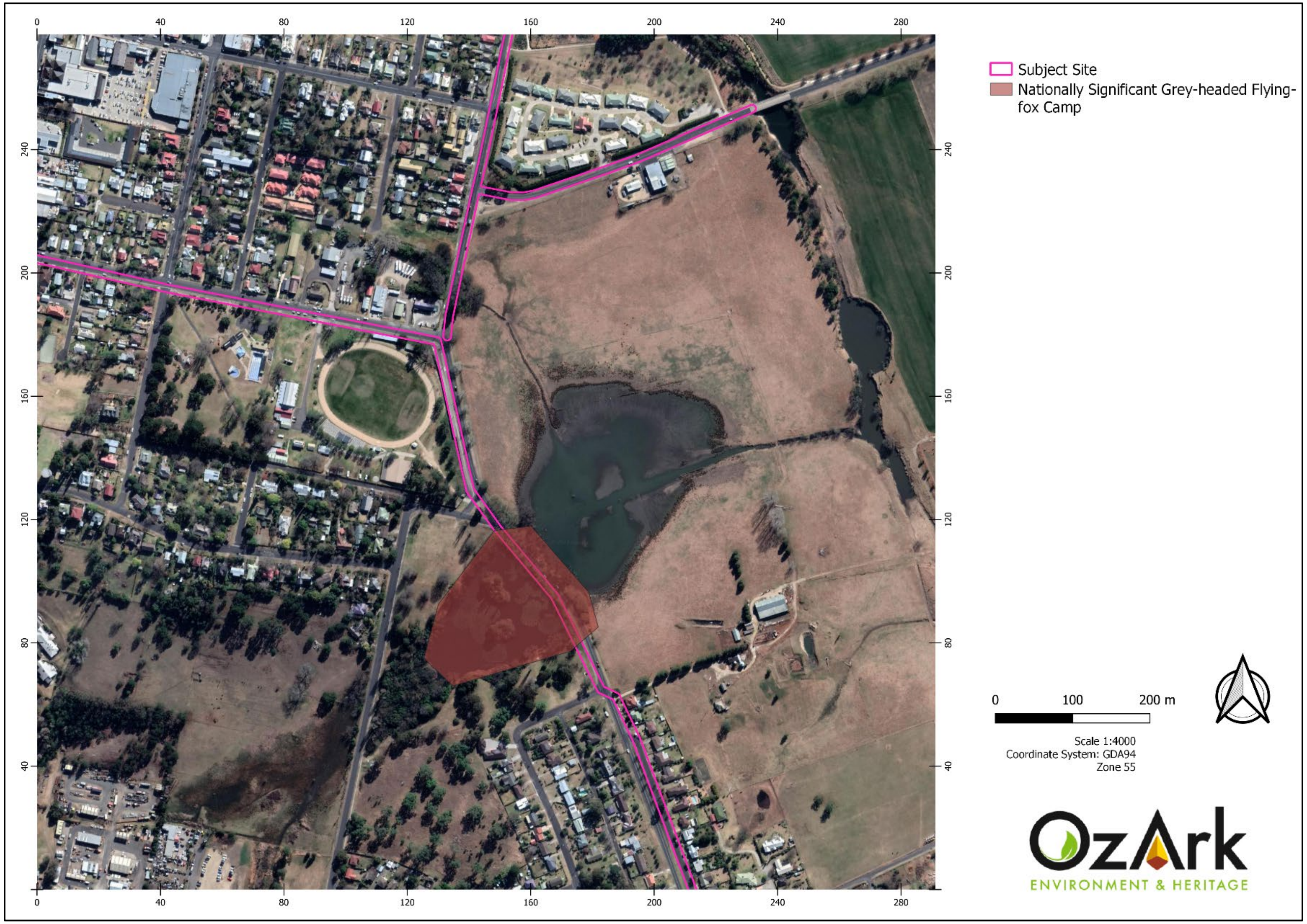


Figure 5-21: Magnified western edge of the subject site, displaying the position of nationally significant Grey-headed Flying-fox Camp at Bega.

5.4 WILDLIFE CONNECTIVITY CORRIDORS

The subject site offers poor connectivity to areas of vegetation in the landscape. Substantial fragmentation owing to historical clearance impedes the capability for wildlife to traverse the site. However, there are two areas, both towards the eastern edge of the subject site, that offer some connectivity to areas of significant vegetation immediately to the north. Although there is no vegetation to the south that would be fragmented by this proposal, the removal of further vegetation from the subject site may exacerbate existing issues with connectivity.

5.5 HABITAT FEATURES

There are a total of four hollow-bearing trees (containing a total of one large, and six small hollows) within the impact footprint. All habitat features were clustered towards the eastern edge of the subject site (as available in **Figure 5-22**).

The “Loss of Hollow-bearing Trees”, and its associated implications, including “Infection by Psittacine Circoviral Disease” and “Competition from feral honey bees”, are recognised as a Key Threatening Processes under the BC Act. Thus, efforts should be made to minimise the removal of hollow-bearing trees vegetation where possible (see **Section 7**).

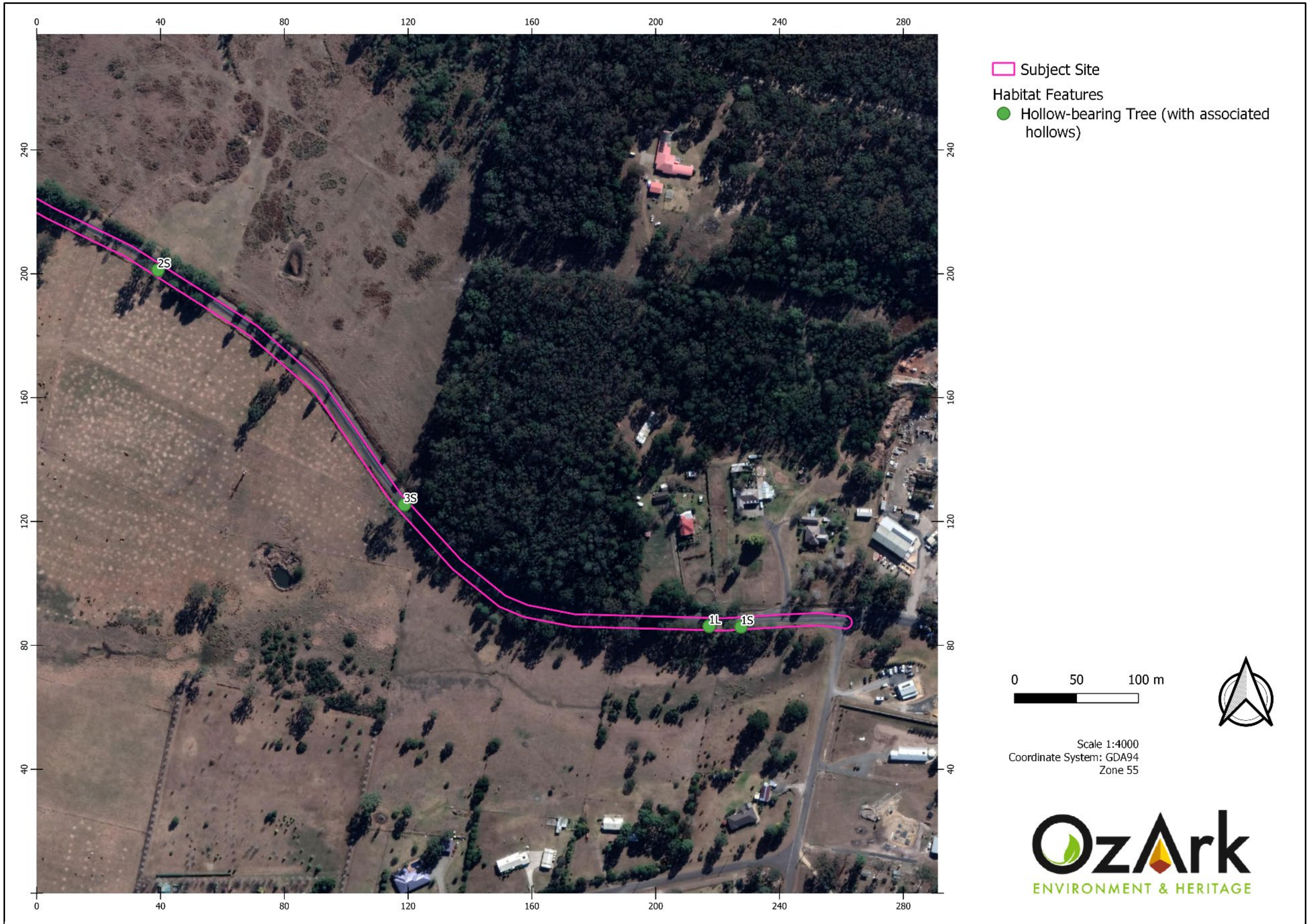


Figure 5-22: Magnified habitat features towards the eastern edge of the impact footprint.

5.6 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Under the environmental assessment provisions of the EPBC Act; Matters of National Environmental Significance (MNES) and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government Department of Agriculture, Water and the Environment (DAWE).

The EPBC Act protected matters search identified no World Heritage Places or Wetlands of International Importance, four Threatened Ecological Communities, 79 threatened species and 56 migratory species that could possibly occur in the study area (**Appendices A and E**). A summary of these matters and whether the proposal is likely to impact them is provided in **Table 5-4**. No entities listed under the EPBC Act will be significantly impacted by this proposal.

Table 5-4. Impacts to matters of national environmental significance.

Factor	Potential impact
Any impact on a World Heritage property?	No
Any impact on a National Heritage place?	No
Any impact on a wetland of international importance?	No
Any impact on a listed threatened species or community?	Yes (non-significant, **Appendix E**)
Any impacts on listed migratory species?	Yes (non-significant, **Appendix E**)
Any impact on a Commonwealth marine area?	No
Does the proposal involve a nuclear action (including uranium mining)?	No
Additionally, any impact (direct or indirect) on Commonwealth land?	No
Any impact on a water resource, in relation to coal seam gas development and large coal mining development?	No

6. Impact assessments

6.1 Construction impacts

6.1.1 Removal of native vegetation

The subject site contained 1.778 ha of native vegetation, belonging to two Plant Community Types: PCT 781 (0.083 ha) and PCT 834 (1.695). Therefore, up to 1.778 ha of native vegetation may be removed or disturbed by this proposal.

Four BC Act-listed EECs are present within the impact footprint.

- *Brogo Wet Vine Forest in the South East Corner Bioregion*
- *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*
- *Lowland Grassy Woodland in the South East Corner Bioregion*
- *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*

As the “clearing of native vegetation” is recognised as a Key Threatening Process under the BC Act, efforts should thus be made to reduce the removal of native vegetation where possible (see **Section 7**).

6.1.2 Impacts on threatened flora

Although no threatened plant species were discovered during the field survey, ten plant species possessed a moderate or greater potential of occurring at the subject site. Despite the large number of records of threatened flora species within the search area, only one species – the yellow loosestrife (*Lysimachia vulgaris* var. *davurica*) – has records within the study area, and the most recent of these is from 2010. The highly disturbed, fragmented nature of vegetation within the subject site makes it exceedingly unlikely that any threatened flora species inhabits the area. Nonetheless mitigation measures, as outlined in **Section 7**, should be adhered to. If followed, then it is not expected that the proposal will result in any significant impacts to any threatened flora species. The 5-part test of significance and EPBC test of significance (if applicable) was applied and the results concluded that the proposal would not constitute a significant impact on these species or their habitats.

6.1.3 Impacts on threatened fauna

Although 63 threatened fauna species were assessed as having a moderate or greater potential of occurring within the subject site, only one was detected during the field survey: the Grey-headed Flying-fox (*Pteropus poliocephalus*), listed as Vulnerable under both the BC and EPBC Act (**Appendix B**). The relatively high number of threatened fauna species assessed as potentially using the subject site is largely related to its proximity to numerous national parks and the coast.

The Grey-headed Flying Fox (*Pteropus poliocephalus*) gives birth in October or November. During late-stage pregnancy and motherhood, this species is vulnerable to miscarriage or abandoning their young. As such, if a maternity camp of this species is present near the construction site it will be impacted by the proposal. A Bat Management Plan and Threatened Species License under the BC Act will be required to carry out the works without adversely impacting this threatened species.

The 5-part test of significance and EPBC test of significance (if applicable) was applied to each species (**Appendices D** and **E**). The results concluded that the proposal would not constitute a significant impact on these species or their habitats, provided adequate mitigation measures are implemented.

Koala habitat was assessed under the DoE (2014) EPBC Act referral guidelines. Application of the Koala Habitat Assessment Tool (**Appendix G**) determined that the site could be considered critical habitat for the Koala (total habitat score = 5), but that referral under the EPBC Act was not recommended.

6.1.4 Fauna Injury and mortality

During the construction phase of the proposal the removal of vegetation is likely to disturb or injure fauna. Further, fauna may also become trapped by, or choose to shelter within, machinery stored at the site overnight. These animals are likely to suffer injury or mortality once the machinery is in use. Mitigation measures designed to reduce such outcomes are provided in **Section 7.**

6.2 Indirect/operational impacts

6.2.1 Wildlife connectivity and habitat fragmentation

No significant exacerbation to habitat fragmentation is anticipated given the already poor connectivity the subject site already offers. Further mitigation measures designed to reduce the impact of the proposal on wildlife connectivity are provided in **Section 7**.

6.2.2 Edge effects on adjacent native vegetation and habitat

The subject site is in an area that is currently subject to a moderate level of edge effects from the roadside corridor. The clearance of vegetation will exacerbate the impacts of existing edge effects. These may result from changes in abiotic factors (e.g., the microclimate) or from biotic factors associated with colonisation. Weed encroachment, which is a significant edge effect, is considered further below.

6.2.3 INVASION AND SPREAD OF WEEDS

See **Appendix B** for a full list of exotic species recorded on site. Twenty-one significant weeds – including twenty-one identified as high-threat exotic species (HTE), one Weed of National Significance (WoNS), and three priority weeds for the South East (PW) – were recorded during the field survey (**Table 6-1**).

Table 6-1. List of significant weeds recorded from the subject site.

Growth Form	Scientific name	Common name	HTE	WoNS	PW
TG	*Ailanthus altissima*	Tree of Heaven	Y	N	N
TG	*Populus alba*	White Poplar	Y	N	N
TG	*Prunus* sp.	Prunus	Y	N	N
TG	*Salix spp.*	Willow	Y	N	N
SG	*Cotoneaster* sp.	Cotoneaster	Y	N	N
SG	*Ligustrum lucidum*	Large-leaved Privet	Y	N	N
SG	*Ligustrum sinense*	Small-leafed Privet	Y	N	N
SG	*Rubus fruticosus*	Blackberry	Y	Y	Y
FG	*Hypericum perforatum*	St John's Wort	Y	N	N
FG	*Raphanus raphanistrum*	Wild Radish	Y	N	N
FG	*Rumex acetosella*	Sorrel	Y	N	N
FG	*Senecio madagascariensis*	Fireweed	Y	N	Y
FG	*Tradescantia fluminensis*	Trad	Y	N	N
GG	*Cenchrus clandestinus*	Kikuyu Grass	Y	N	N
GG	*Cyperus eragrostis*	Umbrella Sedge	Y	N	N
GG	*Ehrharta erecta*	Panic Veldt Grass	Y	N	N
GG	*Eragrostis curvula*	African Lovegrass	Y	N	Y
GG	*Paspalum dilatatum*	Paspalum	Y	N	N
GG	*Phyllostachys aurea*	Fishpole Bamboo	Y	N	N
EG	*Gazania linearis*	Treasure Flower	Y	N	N
OG	*Araujia sericifera*	Moth Vine	Y	N	N

The proliferation of weeds species would be an indirect impact of the proposal activities. The likely cause of weed dispersal is associated with earthworks, movement of soil, and attachment of seeds (and other propagules) to vehicles and machinery. In addition, weed propagules could spread on bicycle wheels traversing the bike path. Mitigation measures designed to limit the spread of weeds are provided in **Section 7.**

6.2.4 Invasion and Spread of Pathogens and Disease

Several pathogens known from NSW have the potential to impact biodiversity as a result of their transportation during the construction phase of this proposal. Of these, three are listed as KTPs under either the EPBC Act and/or BC Act including:

- Dieback caused by *Phytophthora* (Root Rot; EPBC Act and BC Act)
- Infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis (EPBC Act and BC Act)
- Infection by Psittacine Circoviral (beak and feather) Disease (EPBC Act and BC Act)

These pathogens were not observed or tested for in the study area. The most likely causes of pathogen dispersal and importation include earthworks, movement of soil, and attachment of plant matter to vehicles and machinery during establishment of the clear zone. Mitigation measures designed to limit the invasion and spread of pathogens and disease are provided in **Section 7**.

6.2.5 NOISE AND VIBRATION

Some noise and vibration impacts are expected during the construction phase of this proposal. Given that the proposal will be occurring within the existing road corridor, these additional sources of noise and vibration construction should not impact biodiversity. Mitigation measures designed to limit the impact of noise and vibration are provided in **Section 7** to minimise their impacts to biodiversity.

6.3 CUMULATIVE IMPACTS

The potential impacts of this proposal should be considered as part of the wider loss of biodiversity in NSW. Rather than this proposal acting in isolation, it will serve as an additive part contributing to biodiversity loss. The incremental effects of multiple impacts – past, present, and future – are referred to as cumulative impacts. This BAR provides an opportunity to consider the proposal within an appropriate strategic context.

The accumulating impacts of historic vegetation clearance for agriculture and development of infrastructure have contributed to the high rate of loss of biodiversity in the local region. Significant recent developments include the Barclay Street Sportsground Revitalisation; the Bega Sports Complex Building Project; the Bega Valley Regional Gallery upgrade; the Brogo Water Treatment Plant upgrade; the Cobargo, Murrabrine Creek Bridge and the Merimbula Airport Infrastructure Works. This proposal will not in isolation significantly reduce the biodiversity values within the region.

6.4 IMPACT SUMMARY

Based on the assessment above, the proposal will not have a significant impact on biodiversity, including on threatened species. Separate assessments of significance were undertaken under the differing impact significance criteria of the NSW BC Act and the Commonwealth EPBC Act (**Appendices D** and **E**). The assessments made under the BC Act and the EPBC Act concluded that the proposal would not have a significant impact on threatened species. However, opportunities to avoid and minimise impacts should be considered in finalising the proposal design.

7. AVOID, MINIMISE AND MITIGATE IMPACTS

A key part of the proponent's management of biodiversity for this proposal is the application of the 'avoid, minimise, mitigate and offset' hierarchy as follows:

1. Avoid and minimise impacts as the highest priority

2. Mitigate impacts where avoidance is not feasible or practicable in the circumstance

3. Offset where residual, significant unavoidable impacts would occur

7.1 AVOIDANCE AND MINIMISATION

The following minimization measures are proposed:

- To avoid impacts associated with weed introduction and spread, inspect all machinery before entering and exiting the subject site. Machinery must be cleaned of all mud, soil and vegetation.
- The construction works and vehicle access to the construction site is to be constrained to the minimum area practical. The proposed access will provide the sole access to the construction site. Use of previously cleared areas is recommended.
- Material stockpiles, equipment and machinery storage and laydown areas will be consolidated within a defined impact area to minimise the overall impact footprint.
- The impact footprint will be minimised by restricting access across the site to the defined development footprint, including avoiding unnecessary vehicle and personnel movements across unused land.

7.2 MITIGATION MEASURES

Mitigation measures are to be undertaken during the construction and operational phases, including managing the vegetation clearing process, weed management, and installation of erosion and sediment controls as appropriate.

The following mitigation measures are recommended for implementation (see **Table 7-1**).

Table 7-1: Mitigation measures and environmental safeguards recommended for implementation.

Impact	Environmental safeguards	Responsibility	Timing
General	• Any change in design outside the assessed impact footprint within the subject site will require further ecological survey and/or assessment.	Proponent	Pre-construction, construction, operation

Impacts to threatened species	• All personnel would be inducted to be aware of threatened flora and fauna species that are likely to be present within the subject site (**Table 5-3**) and are to stop works if the species are encountered within the subject site. In the case of threatened flora, an ecologist should be engaged to mark out a no-go zone to protect the threatened population. In the case of threatened fauna, works should cease until the animal leaves the site or an ecologist is consulted to provide additional advice.
	• To avoid impacts to threatened bats (Grey-headed Flying-foxes), a Bat Management Plan should be produced, implemented, and adhered to, and a Threatened Species License should be sought under the BC Act. If issued, the Threatened Species License will dictate the conditions under which works may be carried out. Measures to reduce impacts on flying-foxes include:
	  ◦ Carrying out works at night after flying-foxes have departed to feed
	  ◦ Avoiding pruning or removing roosting trees
	  ◦ Engaging a flying-fox expert to be present during the works to ensure bats are not becoming stressed
	  ◦ Undertaking works near the flying fox camp only when females are not heavily pregnant, or carrying young (i.e., works must be completed by early September, as females give birth in October/November)
		Proponent, contractor	Pre-construction, construction

Accidental death of fauna	• If any habitat trees (nest-bearing or hollow-bearing) are to be removed, a fauna spotter catcher should be present to ensure no animals are injured. • Where fauna is encountered, a suitably qualified fauna handler/ecologist/veterinarian will be engaged to remove the animal(s).	Contractor	During construction

Impact	Environmental safeguards	Responsibility	Timing
Clearing and prevention of over-clearing	• All construction personnel should be inducted to be aware that any deliberate or accidental damage of a stand of native vegetation outside the subject site has legislative consequences under Part 4 or 5 of the EP&A Act. Evidence of all personnel receiving an induction would be kept on file (signed induction sheets etc.). • Where possible, hollow-bearing trees should be avoided. If any hollow-bearing trees need to be removed a fauna spotter catcher should be present to ensure that no animals are injured. • Any hollows that are removed to be removed may be offset with the installation of an equivalent number of nest boxes in remnant trees. • Before starting work, a physical vegetation clearing boundary at the approved clearing limit is to be demarcated and implemented. The delineation of such a boundary may include the use of temporary fencing, parawebbing or similar. • Vegetation would be removed in such a way as to avoid damage to surrounding vegetation. • Groundcover disturbance would be kept to a minimum. • Where possible, vegetation to be removed would be mulched on-site and re-used to stabilise disturbed areas.	Proponent / Contractor	Pre-construction, during construction

Damage to native vegetation outside of impact zone	• Before starting work, a physical vegetation clearing boundary at the approved clearing limit is to be demarcated and implemented. The delineation of such a boundary may include the use of temporary fencing, parawebbing or similar
	• Any stockpile and compound sites should be located using the following criteria:
	  o At least 40 m away from the nearest waterway
	  o In areas of low ecological conservation significance (i.e. previously disturbed land)
	  o On relatively level ground
	  o Outside the one in 10-year Average Recurrence Interval (ARI) floodplain
	• Stockpiling materials and equipment and parking vehicles would be avoided within the dripline (extent of foliage cover) of any tree.
		Contractor	Pre-construction, during construction

Impact	Environmental safeguards	Responsibility	Timing
Soil Management	• Erosion and sediment controls are required. An Erosion and Sediment Control Plan (ESCP) shall be prepared for the work and would be in line with Landcom's Managing Urban Stormwater, Soils & Construction Guidelines (The Blue Book. Landcom 2004). • Stockpile topsoil in suitable areas for later use during rehabilitation.	Contractor	Pre-construction, during construction
Introduction and spread of noxious weeds and pathogens	• Any declared noxious weeds identified during construction would be managed according to the requirements of the *Biosecurity Act 2015*. See **Table 6-1**. • Construction machinery (bulldozers, excavators, trucks, loaders, and graders) would be cleaned using a high-pressure washer (or other suitable device) before entering and exiting work sites. • Weed-free fill would be used for on-site earthwork. • All pesticides would be used in accordance with the requirements on the label. Any person carrying out pesticide (including herbicide) application would be trained to do so and have the proper certificate of completion/competency or statement of attainment issued by a registered training organisation.	Contractor	Construction, operation
Disturbance to fallen timber, dead wood, and bush rock	• Any fallen timber, dead wood, and bush rock encountered on site would be left *in situ* or relocated to a suitable place nearby. • Rock would be removed with suitable machinery so as not to damage the underlying rock or result in excessive soil disturbance.	Contractor	Construction
Rehabilitating cleared areas	• Revegetation of any bare soil or cleared areas with locally occurring native flora species typical of the original habitat types is usually recommended. • Stockpiled topsoil to be re-spread over cleared areas.	Proponent, contractor	Construction and post-construction

Impact	Environmental safeguards	Responsibility	Timing
Disturbance to waterways	• Mitigation measures from the Department of Primary Industries *Policy and guidelines for fish habitat conservation and management* (Fairfull 2013) shall be incorporated into detailed design and the CEMP, to maintain connectivity between upstream and downstream habitat, and to minimise impacts to fish passage and aquatic and riparian habitat • Consideration will be given to undertaking the works during low (or no) flow conditions where possible, to minimise impacts on aquatic organisms	Proponent, contractor	Construction
Removal of snags	• Snags, as described by the Department of Primary Industries, are forms of woody debris from trees and shrubs that are wholly or partially submerged in water • Although no snags were encountered during the field survey, they may still be uncovered during the construction phase of the project. There are four categories of snag management that are ordered in increasing impact: -Lopping – whereby protruding limbs of in-stream woody habitat are sawn-off and allowed to sink into the river bed -Realignment – whereby a snag is rotated from its existing position -Relocation – whereby a snag is physically moved from one location to another -Removal – the snag is extracted from the water • It is recommended that the proponent avoids the removal or alteration of snags where not absolutely necessary, and that they employ the lowest impact category of the snag management hierarchy (above)	Proponent, contractor	Construction
Attracting fauna to the study area	• All food scraps and rubbish are to be appropriately disposed of in sealed receptacles to prevent providing forage habitats for foxes, rats, dogs, and cats.	Contractor	Construction
Increased risk of fire	• If any “hot works” are to be undertaken, these activities will not take place on days of extreme fire danger (where possible).	Contractor	Construction

8. CONCLUSION

OzArk been contracted by PSA Consulting, on behalf of the Bega Valley Shire Council, to conduct a BAR regarding their proposed bike path. This BAR has assessed the potential impacts of this proposal on local biodiversity.

A total of 1.778 ha of native vegetation occurs within the proposed development site. This vegetation was identified as belonging to two PCTs:

- PCT 781 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion
- PCT 834 - Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion

Vegetation within the subject site was assessed against the condition and composition thresholds for each TEC known or predicted to occur within the relevant IBRA subregion. Four BC Act- and no EPBC Act-listed TECs occur within the subject site:

- *Brogo Wet Vine Forest in the South East Corner Bioregion*
- *Lowland Grassy Woodland in the South East Corner Bioregion*
- *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin, and South East Corner Bioregions*
- *Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*

Seventy-three species listed as threatened under the BC Act and/or the EBPC Act were assessed as having a moderate or greater likelihood of occurring at the subject site. The high number of threatened species, relative to the condition of the subject site, is a consequence of its proximity to the coast and to several national parks. One threatened species was observed during the field survey - the Grey-headed Flying-fox (*Pteropus poliocephalus)* – which was found within, and adjacent to, the subject site at the nationally significant population at Bega. Given the position of the subject site relative to this significant population, it should be noted that development may only be carried out in the vicinity of these animals if a Threatened Species License is obtained under the BC Act to disturb these animals. Provided appropriate mitigation measures are followed (likely including night works in the area occupied by flying foxes), a Bat Management Plan is devised and implemented, and a Threatened Species License is sought under the BC Act, no significant impact to a threatened species likely to result in the extinction of a local population is expected as a result of this proposal.

The area of impacted native vegetation is small and discontinuous, with significant incursions by exotic species, such as African Love Grass and Blackberry. Four hollow-bearing trees (with a total of one large, and six small hollows) were recorded within the subject site. As these habitat features were clustered at the subject sites eastern edge, they may be able to be avoided.

An EBPC Protected Matters Search identified four Threatened Ecological Communities, 79 threatened and 56 migratory species that may be present within the subject site. However, no significant impact to any entity listed under the EPBC Act is expected, provided adequate mitigation measures are followed.

Numerous watercourses of varying biodiversity significance occur within the study area. Twenty-three non-perennial minor watercourses cross through the subject site, with the Bega River also within the study area. Six of the watercourses present in the impact footprint are mapped as Key Fish Habitat, however no specific threatened species are associated with these specific watercourses. Mitigation measures intended to reduce any potential impacts are provided in **Section 7.**

The application of the Koala Habitat Assessment Tool determined that the subject site does constitute critical habitat for the Koala. However, given the small area of impact, and a lack of recent Koala records, it was determined that referral under the EPBC Act was not needed.

This assessment covers the current form of the proposal, with any changes potentially requiring reassessment. If entry into the Biodiversity Offsets Scheme is triggered by changes, additional field work may be necessary according to the Biodiversity Assessment Method.

BIBLIOGRAPHY

Briggs, J and Leigh, J 1996, Rare or Threatened Australian Plants, CSIRO Publishing, Collingwood, Victoria

Bureau of Meteorology 2021a, Bureau of Meteorology Climate Averages, <http://www.bom.gov.au/climate/averages>

– 2021b, Atlas of Groundwater Dependant Ecosystems, <http://www.bom.gov.au/water/groundwater/gde/map.shtml>

Churchill, S 2008, Australian bats - 2nd Edition, Allen and Unwin, Crows Nest, NSW

Cogger, H 2018, Reptiles and Amphibians of Australia, CSIRO Publishing, Collingwood, Victoria

Cropper, S 1993, Management of Endangered Plants, CSIRO Publishing, Collingwood, Victoria

Cunningham, GM., Mulham, WE., Milthorpe, Pl. and Leigh, JH 1992, Plants of Western New South Wales. CSIRO Publishing, Collingwood, Victoria

Department of the Environment 2014, EPBC Act referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory). Commonwealth of Australia. <https://www.awe.gov.au/environment/ biodiversity/threatened/publications/epbc-act-referral-guidelines-vulnerable-koala>

– 2013, Matters of National Environmental Significance: Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999, <http://www.environment.gov.au/system/files/resources/42f84df4-720b-4dcf-b262-48679a3aba58/files/nes-guidelines_1.pdf>

Department of Agriculture, Water and the Environment 2022a, National Flying Fox Monitoring Viewer <https://www.environment.gov.au/webgis-framework/apps/ffc-wide/ffc-wide.jsf>

Department of Agriculture, Water and the Environment 2022b, Protected Matters Search Tool, <https://www.awe.gov.au/environment/epbc/protected-matters-search-tool>

– 2022c, Register of Critical Habitat, <http://www.environment.gov.au/cgi-bin/sprat/public/publicregisterofcriticalhabitat.pl>

– 2022d, Species profile and threats database, <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

– 2022e, Weeds of National Significance, <http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html>

Department of Planning, Industry and the Environment 2016, State Vegetation Type Map: Riverina 1.2. VIS_ID 4469. <https://datasets.seed.nsw.gov.au/dataset/riverina-regional-native-vegetation-map-version-v1-0-vis_id-4449>

Department of Primary Industries 2013, Policy and guidelines for fish habitat conservation and management (update 2013), <https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/468927/Policy-and-guidelines-for-fish-habitat.pdf>

– 2022a, NSW WeedWise: Priority weeds for the Riverina <://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=9>

– 2022b, Key Fish Habitat Maps, viewed April 2022<https://www.dpi.nsw.gov.au/about-us/research-development/spatial-data-portal >

– 2022c, Freshwater threatened species distribution maps, viewed April 2022<https://www.dpi.nsw.gov.au/fishing/threatened-species/threatened-species-distributions-in-nsw/freshwater-threatened-species-distribution-maps>

Fairfull, S and Witheridge, G 2003, Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings, NSW Fisheries, Cronulla, NSW, <https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0004/633505/Why-do-fish-need-to-cross-the-road_booklet.pdf>

Fairfull, S. 2013. Policy and Guidelines for Fish Habitat Conservation and Management. Sydney: NSW Department of Primary Industries.

Frith, HJ (Ed) 2007, Complete book of Australian birds, Readers Digest, Surry Hills, NSW

Harden, G (Ed) 1992-2002, Flora of New South Wales Vols 1, 2, 3 and 4, NSW University Press, Kensington, NSW

Keith, D. 2004, Ocean Shores to Desert Dunes: The Vegetation of New South Wales and the ACT. Department of Environment and Conservation NSW.

Mitchell. 2002, Descriptions for NSW (Mitchell) Landscapes. NSW: Department of Environment and Climate Change.

NSW Department of Environment and Conservation 2004, Threatened Biodiversity Survey and Assessment: Guidelines for developments and activities (Working Draft), New South Wales Department of Environment and Conservation, Hurstville, NSW

NSW Department of Primary Industries 2008, Threatened species assessment guidelines: The assessment of significance, NSW Department of Primary Industries.

Office of Environment and Heritage 2018, Threatened Species Test of Significance Guidelines, <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/threatened-species-test-significance-guidelines-220634.pdf>

– 2018, Glossary of Biobanking terms <https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/biobanking/glossary-of-biobanking-terms>

– 2022a, BioNet Vegetation Classification database, <https://www.environment.nsw.gov.au/NSWVCA20PRapp/>

– 2022b, BioNet (Atlas of NSW Wildlife) Database, data downloaded August 2021<http://www.environment.nsw.gov.au/atlaspublicapp/UI_Modules/ATLAS_/AtlasSearch.aspx>

– 2022c, Threatened Biodiversity Data Collection database, viewed April 2022<https://data.nsw.gov.au/data/dataset/nsw-bionet-threatened-entity-profile-data-collection8f027>

– 2022d, Bioregions of NSW. Retrieved from Office of Environment and Heritage <https://www.environment.nsw.gov.au/bioregions/NSWSouthWesternSlopesBioregion.htm>

– 2022e, Threatened biodiversity profile search, viewed April 2022 <http://www.environment.nsw.gov.au/threatenedSpeciesApp/>

Richardson, F.J., Richardson, R.G. and Shepherd, R.C.H. 2011, Weeds of the south-east: An identification guide for Australia. R.G and F.J. Richardson, Meredith, Victoria.

Rose 2016, Grasses of the New South Wales slopes and adjacent plains. NSW Department of Primary Industries

The Royal Botanic Gardens and Domain Trust 2022, PlantNET. <www.plantnet.rbgsyd.nsw.gov.au>

Simpson, K and Day, N 2010, Field guide to the birds of Australia, 8th Edition, Penguin Books Australia, Victoria

Thackway, R and Cresswell I.D 1995, An Interim Biogeographic Regionalisation for Australia: A Framework for Setting Priorities in the National Reserves System Cooperative Program, Australian Nature Conservation Agency, Canberra, <https://www.environment.gov.au/system/files/resources/4263c26f-f2a7-4a07-9a29-b1a81ac85acc/files/ibra-framework-setting-priorities-nrs-cooperative-program.pdf>

Triggs, B 1996, Tracks, scats and other traces: a field guide to Australian mammals, Oxford University Press, Melbourne, Victoria

Van Dyck, S and Strahan, R (Eds) 2008, The mammals of Australia (3rd edition). Reed New Holland, Sydney, NSW

Appendix A - Database search results

EPBC Act Protected Matters Report

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 24-Mar-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	79
Listed Migratory Species:	56

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	5
Commonwealth Heritage Places:	None
Listed Marine Species:	84
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	5
Regional Forest Agreements:	1
Nationally Important Wetlands:	3
EPBC Act Referrals:	5
Key Ecological Features (Marine):	1
Biologically Important Areas:	11
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area	In buffer area only
Lowland Grassy Woodland in the South East Corner Bioregion	Critically Endangered	Community likely to occur within area	In feature area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area	In feature area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area	In feature area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area	In buffer area only
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pycnoptilus floccosus Pilotbird [525]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thinornis cucullatus cucullatus Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
FISH			
Epinephelus daemelii Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat may occur within area	In feature area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area	In feature area
Seriolella brama Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In buffer area only
Thunnus maccoyii Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
FROG			
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area	In feature area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area	In feature area
Litoria watsoni Watson's Tree Frog [91509]	Endangered	Species or species habitat known to occur within area	In feature area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat may occur within area	In buffer area only
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In buffer area only
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area	In feature area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petaurus australis australis Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat known to occur within area	In feature area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Potorous tridactylus trisulcatus Long-nosed Potoroo (southern mainland) [86367]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pseudomys fumeus Smoky Mouse, Konoom [88]	Endangered	Species or species habitat likely to occur within area	In feature area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area	In feature area
PLANT			
Acacia georgensis Bega Wattle [9848]	Vulnerable	Species or species habitat known to occur within area	In feature area
Astrotricha crassifolia Thick-leaf Star-hair [10352]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Correa baeuerlenii Chef's Cap [17007]	Vulnerable	Species or species habitat known to occur within area	In feature area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pomaderris cotoneaster Cotoneaster Pomaderris [2043]	Endangered	Species or species habitat likely to occur within area	In feature area
Pomaderris parrisiae Parris' Pomaderris [22119]	Vulnerable	Species or species habitat may occur within area	In feature area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat may occur within area	In buffer area only
REPTILE			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area	In feature area
SHARK			
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Galeorhinus galeus School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Listed Migratory Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area	In buffer area only
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat likely to occur within area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Sternula albifrons Little Tern [82849]		Breeding likely to occur within area	In buffer area only
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Migratory Marine Species			
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In buffer area only
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In buffer area only
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Migratory Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Symposiachrus trivirgatus as Monarcha trivirgatus			
Spectacled Monarch [83946]		Species or species habitat known to occur within area	In buffer area only
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area	In feature area
Gallinago megala			
Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Gallinago stenura			
Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Limosa lapponica			
Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian Telecommunications Commission [12256]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [15611]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Corporation [12253]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [12255]	NSW	In buffer area only
Defence		
Commonwealth Land - Defence Service Homes Corporation [12254]	NSW	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area	In buffer area only
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]		Species or species habitat likely to occur within area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni as Diomedea gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area overfly marine area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]		Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Stercorarius skua as Catharacta skua Great Skua [823]		Species or species habitat may occur within area	In buffer area only
Sternula albifrons as Sterna albifrons Little Tern [82849]		Breeding likely to occur within area	In buffer area only
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri platei as Thalassarche sp. nov. Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thinornis cucullatus as Thinornis rubricollis Hooded Dotterel, Hooded Plover [87735]		Species or species habitat known to occur within area overfly marine area	In buffer area only
Thinornis cucullatus cucullatus as Thinornis rubricollis rubricollis Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In buffer area only
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In buffer area only
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area	In buffer area only
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area	In buffer area only
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In buffer area only
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area	In buffer area only
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area	In buffer area only
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area	In buffer area only
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area	In buffer area only
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In buffer area only
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area	In buffer area only
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area	In buffer area only
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area	In buffer area only
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In buffer area only
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area	In buffer area only
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In buffer area only
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In buffer area only
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In buffer area only
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area	In buffer area only
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In buffer area only
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In buffer area only
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In buffer area only
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In buffer area only
Mammal			
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In buffer area only
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In buffer area only
Reptile			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area	In feature area

Whales and Other Cetaceans			[Resource Information]
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			

Current Scientific Name	Status	Type of Presence	Buffer Status
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In buffer area only
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In buffer area only
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In buffer area only
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In buffer area only
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In buffer area only
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In buffer area only
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
Megaptera novaeangliae Humpback Whale [38]		Foraging, feeding or related behaviour known to occur within area	In buffer area only
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In buffer area only
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In buffer area only
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In buffer area only

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Bournda	National Park	NSW	In buffer area only
Bournda	Nature Reserve	NSW	In buffer area only
Mimosa Rocks	National Park	NSW	In buffer area only
Mumbulla	Flora Reserve	NSW	In buffer area only
Tanja	Flora Reserve	NSW	In feature area

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

RFA Name	State	Buffer Status
Eden RFA	New South Wales	In feature area

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Bondi Lake	NSW	In buffer area only
Nelson Lagoon	NSW	In buffer area only
Wallagoot Lagoon (Wallagoot Lake)	NSW	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Upgrade electricity supply line and supporting infrastructure	2009/5053	Not Controlled Action	Completed	In buffer area only
Upgrade to Sewage Treatment Plant at Bega	2004/1815	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region	Buffer Status
Upwelling East of Eden	South-east	In buffer area only

Biologically Important Areas

Scientific Name	Behaviour	Presence	Buffer Status
Dolphins			
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Likely to occur	In buffer area only
Seabirds			
Ardenna grisea Sooty Shearwater [82651]	Foraging	Likely to occur	In buffer area only
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging	Likely to occur	In buffer area only
Ardenna tenuirostris Short-tailed Shearwater [82652]	Foraging	Likely to occur	In buffer area only
Pelagodroma marina White-faced Storm-petrel [1016]	Breeding	Known to occur	In buffer area only
Pelagodroma marina White-faced Storm-petrel [1016]	Foraging	Known to occur	In buffer area only

Scientific Name	Behaviour	Presence	Buffer Status
Thalassarche cauta cauta Shy Albatross [82345]	Foraging likely	Likely to occur	In feature area
Sharks			
Carcharias taurus Grey Nurse Shark [64469]	Foraging	Known to occur	In buffer area only
Carcharodon carcharias White Shark [64470]	Distribution	Known to occur	In buffer area only
Whales			
Eubalaena australis Southern Right Whale [40]	Known core range	Known to occur	In buffer area only
Megaptera novaeangliae Humpback Whale [38]	Foraging	Known to occur	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

BioNET Atlas search – threatened species predicted to occur within the NSW South East Corner Bioregion of the South East Coastal Ranges IBRA Subregions

Class	Scientific Name	Common Name	*NSW status	+Comm Status	Records
Amphibia	^^*Mixophyes balbus*	Stuttering Frog	E1,P,2	V	22
Amphibia	^^*Mixophyes iteratus*	Giant Barred Frog	E1,P,2	E	1
Amphibia	*Litoria aurea*	Green and Golden Bell Frog	E1,P	V	21
Amphibia	*Litoria booroolongensis*	Booroolong Frog	E1,P	E	1
Amphibia	*Litoria littlejohni*	Littlejohn's Tree Frog	V,P	V	20
Amphibia	*Litoria verreauxii alpina*	Alpine Tree Frog	E1,P	V	P
Amphibia	*Heleioporus australiacus*	Giant Burrowing Frog	V,P	V	68
Reptilia	*Eretmochelys imbricata*	Hawksbill Turtle	P	V	2
Reptilia	*Varanus rosenbergi*	Rosenberg's Goanna	V,P		P
Reptilia	^^*Hoplocephalus bungaroides*	Broad-headed Snake	E1,P,2	V	P
Aves	*Anseranas semipalmata*	Magpie Goose	V,P		1
Aves	*Oxyura australis*	Blue-billed Duck	V,P		2
Aves	*Ptilinopus superbus*	Superb Fruit-Dove	V,P		1
Aves	*Apus pacificus*	Fork-tailed Swift	P	C,J,K	12
Aves	*Hirundapus caudacutus*	White-throated Needletail	P	V,C,J,K	131
Aves	*Diomedea exulans*	Wandering Albatross	E1,P	E	1
Aves	*Diomedea gibsoni*	Gibson's Albatross	V,P	V	1
Aves	*Thalassarche cauta*	Shy Albatross	V,P	V	5
Aves	*Thalassarche impavida*	Campbell Albatross	P	V	1
Aves	*Thalassarche melanophris*	Black-browed Albatross	V,P	V	2
Aves	*Ardenna grisea*	Sooty Shearwater	P	J	2
Aves	*Ardenna pacifica*	Wedge-tailed Shearwater	P	J	10
Aves	*Ardenna tenuirostris*	Short-tailed Shearwater	P	C,J,K	37
Aves	*Macronectes halli*	Northern Giant-Petrel	V,P	V	1
Aves	*Pterodroma nigripennis*	Black-winged Petrel	V,P		1
Aves	*Pterodroma solandri*	Providence Petrel	V,P		3

Class	Scientific Name	Common Name	*NSW status	+Comm Status	Records
Aves	*Botaurus poiciloptilus*	Australasian Bittern	E1,P	E	5
Aves	*Ixobrychus flavicollis*	Black Bittern	V,P		1
Aves	*Circus assimilis*	Spotted Harrier	V,P		3
Aves	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P		241
Aves	*Hieraaetus morphnoides*	Little Eagle	V,P		35
Aves	*Lophoictinia isura*	Square-tailed Kite	V,P,3		29
Aves	*Pandion cristatus*	Eastern Osprey	V,P,3		10
Aves	^^*Falco hypoleucos*	Grey Falcon	E1,P,2		1
Aves	*Falco subniger*	Black Falcon	V,P		1
Aves	*Burhinus grallarius*	Bush Stone-curlew	E1,P		1
Aves	*Esacus magnirostris*	Beach Stone-curlew	E4A,P		2
Aves	*Haematopus fuliginosus*	Sooty Oystercatcher	V,P		29
Aves	*Haematopus longirostris*	Pied Oystercatcher	E1,P		235
Aves	*Charadrius mongolus*	Lesser Sand-plover	V,P	E,C,J,K	1
Aves	*Pluvialis fulva*	Pacific Golden Plover	P	C,J,K	2
Aves	*Pluvialis squatarola*	Grey Plover	P	C,J,K	3
Aves	*Thinornis cucullatus cucullatus*	Eastern Hooded Dotterel	E4A	V	60
Aves	*Irediparra gallinacea*	Comb-crested Jacana	V,P		2
Aves	*Actitis hypoleucos*	Common Sandpiper	P	C,J,K	3
Aves	*Arenaria interpres*	Ruddy Turnstone	P	C,J,K	2
Aves	*Calidris acuminata*	Sharp-tailed Sandpiper	P	C,J,K	8
Aves	*Calidris alba*	Sanderling	V,P	C,J,K	3
Aves	*Calidris canutus*	Red Knot	P	E,C,J,K	2
Aves	*Calidris ferruginea*	Curlew Sandpiper	E1,P	CE,C,J,K	10
Aves	*Calidris ruficollis*	Red-necked Stint	P	C,J,K	8
Aves	*Gallinago hardwickii*	Latham's Snipe	P	J,K	16
Aves	*Limosa lapponica*	Bar-tailed Godwit	P	C,J,K	20
Aves	*Limosa lapponica baueri*	Bar-tailed Godwit (baueri)	P	V	2

Class	Scientific Name	Common Name	*NSW status	+Comm Status	Records
Aves	*Limosa limosa*	Black-tailed Godwit	V,P	C,J,K	3
Aves	*Numenius madagascariensis*	Eastern Curlew	P	CE,C,J,K	33
Aves	*Numenius minutus*	Little Curlew	P	C,J,K	3
Aves	*Numenius phaeopus*	Whimbrel	P	C,J,K	13
Aves	*Tringa brevipes*	Grey-tailed Tattler	P	C,J,K	3
Aves	*Tringa glareola*	Wood Sandpiper	P	C,J,K	1
Aves	*Tringa nebularia*	Common Greenshank	P	C,J,K	16
Aves	*Tringa stagnatilis*	Marsh Sandpiper	P	C,J,K	2
Aves	*Tringa totanus*	Common Redshank	P	C,J,K	1
Aves	*Stercorarius parasiticus*	Arctic Jaeger	P	C,J,K	3
Aves	*Chlidonias leucopterus*	White-winged Black Tern	P	C,J,K	1
Aves	*Hydroprogne caspia*	Caspian Tern	P	J	43
Aves	*Sterna hirundo*	Common Tern	P	C,J,K	10
Aves	*Sternula albifrons*	Little Tern	E1,P	C,J,K	96
Aves	*Thalasseus bergii*	Crested Tern	P	J	118
Aves	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V,P,3		684
Aves	^^*Calyptorhynchus banksii samueli*	Red-tailed Black-Cockatoo (inland subspecies)	V,P,2		1
Aves	^^*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		1494
Aves	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet	V,P,3		P
Aves	*Glossopsitta pusilla*	Little Lorikeet	V,P		66
Aves	*Lathamus discolor*	Swift Parrot	E1,P,3	CE	124
Aves	*Neophema chrysogaster*	Orange-bellied Parrot	E4A,P,3	CE	P
Aves	*Neophema pulchella*	Turquoise Parrot	V,P,3		4
Aves	*Pezoporus wallicus wallicus*	Eastern Ground Parrot	V,P,3		51
Aves	*Ninox connivens*	Barking Owl	V,P,3		28
Aves	*Ninox strenua*	Powerful Owl	V,P,3		937

Class	Scientific Name	Common Name	*NSW status	+Comm Status	Records
Aves	*Tyto novaehollandiae*	Masked Owl	V,P,3		248
Aves	*Tyto tenebricosa*	Sooty Owl	V,P,3		943
Aves	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V,P		51
Aves	*Calamanthus fuliginosus*	Striated Fieldwren	E1,P		1
Aves	*Chthonicola sagittata*	Speckled Warbler	V,P		19
Aves	*Anthochaera phrygia*	Regent Honeyeater	E4A,P	CE	12
Aves	*Epthianura albifrons*	White-fronted Chat	V,P		44
Aves	*Daphoenositta chrysoptera*	Varied Sittella	V,P		148
Aves	*Pachycephala olivacea*	Olive Whistler	V,P		92
Aves	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V,P		195
Aves	*Melanodryas cucullata cucullata*	Hooded Robin (south-eastern form)	V,P		18
Aves	*Petroica boodang*	Scarlet Robin	V,P		302
Aves	*Petroica phoenicea*	Flame Robin	V,P		87
Aves	*Petroica rodinogaster*	Pink Robin	V,P		8
Aves	*Stagonopleura guttata*	Diamond Firetail	V,P		29
Mammalia	*Dasyurus maculatus*	Spotted-tailed Quoll	V,P	E	459
Mammalia	*Phascogale tapoatafa*	Brush-tailed Phascogale	V,P		13
Mammalia	*Sminthopsis leucopus*	White-footed Dunnart	V,P		48
Mammalia	*Isoodon obesulus obesulus*	Southern Brown Bandicoot (eastern)	E1,P	E	355
Mammalia	*Phascolarctos cinereus*	Koala	V,P	V	978
Mammalia	*Cercartetus nanus*	Eastern Pygmy-possum	V,P		153
Mammalia	*Petaurus australis*	Yellow-bellied Glider	V,P		2133
Mammalia	*Petaurus norfolcensis*	Squirrel Glider	V,P		4
Mammalia	*Petauroides volans*	Greater Glider	P	V	605
Mammalia	*Potorous longipes*	Long-footed Potoroo	E4A,P	E	14
Mammalia	*Potorous tridactylus*	Long-nosed Potoroo	V,P	V	1363
Mammalia	*Petrogale penicillata*	Brush-tailed	E1,P	V	3

Class	Scientific Name	Common Name	*NSW status	+Comm Status	Records
		Rock-wallaby			
Mammalia	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	408
Mammalia	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P		7
Mammalia	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V,P		22
Mammalia	*Chalinolobus dwyeri*	Large-eared Pied Bat	V,P	V	1
Mammalia	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V,P		132
Mammalia	*Myotis macropus*	Southern Myotis	V,P		45
Mammalia	*Phoniscus papuensis*	Golden-tipped Bat	V,P		33
Mammalia	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V,P		45
Mammalia	*Miniopterus australis*	Little Bent-winged Bat	V,P		2
Mammalia	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V,P		99
Mammalia	*Pseudomys fumeus*	Smoky Mouse	E4A,P	E	175
Mammalia	*Dugong dugon*	Dugong	E1,P		2
Mammalia	*Arctocephalus forsteri*	New Zealand Fur-seal	V,P		1
Mammalia	*Arctocephalus pusillus doriferus*	Australian Fur-seal	V,P		5
Mammalia	*Eubalaena australis*	Southern Right Whale	E1,P	E	1
Mammalia	*Megaptera novaeangliae*	Humpback Whale	V,P	V	6
Mammalia	*Physeter macrocephalus*	Sperm Whale	V,P		1
Flora	*Astrotricha crassifolia*	Thick-leaf Star-hair	V	V	1
Flora	*Astrotricha sp. Wallagaraugh*	Merimbula Star-hair	E1		341
Flora	*Calotis glandulosa*	Mauve Burr-daisy	V	V	4
Flora	*Leucochrysum albicans var. tricolor*	Hoary Sunray		E	1
Flora	*Rutidosis leiolepis*	Monaro Golden Daisy	V	V	1
Flora	*Senecio spathulatus*	Coast Groundsel	E1		P
Flora	*Xerochrysum palustre*	Swamp Everlasting		V	9
Flora	*Wahlenbergia scopulicola*	Rock-face Bluebell	E1		7
Flora	*Wilsonia backhousei*	Narrow-leafed Wilsonia	V		26
Flora	*Wilsonia rotundifolia*	Round-leafed Wilsonia	E1		P
Flora	*Hibbertia circinata*	Connie's Guinea Flower	E4A		10

Class	Scientific Name	Common Name	*NSW status	+Comm Status	Records
Flora	*Monotaxis macrophylla*	Large-leafed Monotaxis	E1		14
Flora	*Pseudanthus ovalifolius*	Oval-leafed Pseudanthus	E1		1
Flora	*Bossiaea bombayensis*	Bombay Bossiaea	V		11
Flora	*Bossiaea oligosperma*	Few-seeded Bossiaea	V	V	P
Flora	*Pultenaea baeuerlenii*	Budawangs Bush-pea	V	V	5
Flora	*Pultenaea parrisiae*	Parris' Bush-pea	V	V	10
Flora	*Pultenaea pedunculata*	Matted Bush-pea	E1		10
Flora	*Acacia constablei*	Narrabarba Wattle	V	V	123
Flora	*Acacia georgensis*	Bega Wattle	V	V	137
Flora	*Dampiera fusca*	Kydra Dampiera	E1		1
Flora	*Haloragis exalata subsp. exalata*	Square Raspwort	V	V	8
Flora	*Westringia davidii*	David's Westringia	V	V	39
Flora	*Eucalyptus aggregata*	Black Gum	V	V	7
Flora	*Eucalyptus imlayensis*	Imlay Mallee	E4A,3	E	15
Flora	*Eucalyptus kartzoffiana*	Araluen Gum	V	V	96
Flora	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	1
Flora	*Eucalyptus parvula*	Small-leaved Gum	E1	V	4
Flora	*Eucalyptus pulverulenta*	Silver-leafed Gum	V	V	1
Flora	*Eucalyptus recurva*	Mongarlowe Mallee	E4A	CE	1
Flora	*Eucalyptus saxatilis*	Suggan Buggan Mallee	E1		27
Flora	*Leptospermum thompsonii*	Monga Tea Tree	V	V	26
Flora	*Rhodamnia rubescens*	Scrub Turpentine	E4A		4
Flora	^^*Caladenia tessellata*	Thick Lip Spider Orchid	E1,P,2	V	1
Flora	^^*Cryptostylis hunteriana*	Leafless Tongue Orchid	V,P,2	V	P
Flora	^^*Diuris ochroma*	Pale Golden Moths	E1,P,2	V	1
Flora	^^*Genoplesium rhyoliticum*	Rhyolite Midge Orchid	E1,P,2	E	77
Flora	^^*Genoplesium vernale*	East Lynne Midge Orchid	V,P,2	V	88
Flora	^^*Pterostylis alpina*	Alpine Greenhood	V,P,2		1
Flora	^^*Thelymitra alpicola*	Alpine Sun-orchid	V,P,2		3
Flora	*Distichlis distichophylla*	Australian Saltgrass	E1		9
Flora	*Plinthanthesis rodwayi*	Budawangs	E4A	V	17

Class	Scientific Name	Common Name	*NSW status	+Comm Status	Records
		Wallaby Grass			
Flora	*Persicaria elatior*	Tall Knotweed	V	V	3
Flora	*Lysimachia vulgaris var. davurica*	Yellow Loosestrife	E1,3		4
Flora	*Grevillea acanthifolia subsp. paludosa*	Bog Grevillea	E1	E	8
Flora	*Grevillea renwickiana*	Nerriga Grevillea	E1		6
Flora	*Baloskion longipes*	Dense Cord-rush	V	V	24
Flora	*Pomaderris bodalla*	Bodalla Pomaderris	V		92
Flora	*Pomaderris cotoneaster*	Cotoneaster Pomaderris	E1	E	19
Flora	*Pomaderris elachophylla*	Lacy Pomaderris	E1		4
Flora	*Pomaderris gilmourii var. cana*	Grey Deua Pomaderris	V	V	3
Flora	*Pomaderris pallida*	Pale Pomaderris	V	V	19
Flora	*Pomaderris parrisiae*	Parris' Pomaderris	V	V	13
Flora	*Galium australe*	Tangled Bedstraw	E1		3
Flora	*Boronia deanei*	Deane's Boronia	V,P	V	14
Flora	*Correa baeuerlenii*	Chef's Cap Correa	V	V	203
Flora	*Correa lawrenceana var. genoensis*	Genoa River Correa	E1	E	9
Flora	*Leionema ralstonii*	Ralston's Leionema	V	V	132
Flora	*Nematolepis rhytidophylla*	Nalbaugh Nematolepis	V	V	159
Flora	^^*Zieria adenophora*	Araluen Zieria	E4A,2	E	4
Flora	^^*Zieria buxijugum*	Box Range Zieria	E4A,2	E	6
Flora	^^*Zieria formosa*	Shapely Zieria	E4A,2	E	12
Flora	^^*Zieria parrisiae*	Parris' Zieria	E4A,2	CE	7
Flora	*Zieria tuberculata*	Warty Zieria	V	V	38
Flora	*Thesium australe*	Austral Toadflax	V	V	7
Flora	*Viola cleistogamoides*	Hidden Violet	E1,3		18

*NSW Status: P=Protected, P13=Protected native plant, V=Vulnerable, E1=Endangered, E2=Endangered population, E4=Extinct, E4A=Critically endangered, 2=Category 2 sensitive species, 3=Category 3 sensitive species.
+ Comm. Status: C=CAMBA, J=JAMBA, K=ROKAMBA, CE=Critically endangered, E=Endangered, V=Vulnerable.
Number of Records: P = predicted to occur; K = known to occur, #number of records

BioNET Atlas search – Threatened ecological communities predicted to occur within the South East Coastal Ranges of the NSW South East Corner Bioregion.

Community	NSW Status	Commonwealth status
Alpine Sphagnum Bogs and Associated Ferns		E
Araluen Scarp Grassy Forest in the South East Corner Bioregion	E3	
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions	E3	
Brogo Wet Vine Forest in the South East Corner Bioregion	E3	
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	
Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community		E
Dry Rainforest of the South East Forests in the South East Corner Bioregion	E3	
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	
Illawarra and south coast lowland forest and woodland ecological community		CE
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia		CE
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	
Lowland Grassy Woodland in the South East Corner Bioregion	E3	
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions	E3	
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria		CE
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	
Subtropical and Temperate Coastal Saltmarsh		V
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E3	
Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions	E4B	
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern	E4B	

Community	NSW Status	Commonwealth status
Highlands, NSW South Western Slopes, South East Corner and		
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		CE

***NSW Status:** P=Protected, P13=Protected native plant, V=Vulnerable, E1=Endangered, E2=Endangered population, E4=Extinct, E4A=Critically endangered, 2=Category 2 sensitive species, 3=Category 3 sensitive species.
+Comm. Status: C=CAMBA, J=JAMBA, K=ROKAMBA, CE=Critically endangered, E=Endangered, V=Vulnerable.
- Number of Records: P = predicted to occur, K = known to occur.

BioNET Atlas search – Key Threatening Processes predicted to occur within the South East Coastal Ranges of the NSW South East Corner Bioregion.

Threats	NSW Status	Comm. Status
Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners, *Manorina melanocephala* (Latham, 1802)	KTP	KTP
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	KTP	
Anthropogenic Climate Change	KTP	KTP
Bushrock removal	KTP	
Clearing of native vegetation	KTP	KTP
Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus* (L.)	KTP	KTP
Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 1758	KTP	KTP
Competition from feral honey bees, *Apis mellifera* L.	KTP	
Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners	KTP	
Herbivory and environmental degradation caused by feral deer	KTP	
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	KTP	
Importation of Red Imported Fire Ants *Solenopsis invicta* Buren 1972	KTP	KTP
Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations	KTP	KTP
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	KTP	KTP
Infection of native plants by *Phytophthora cinnamomi*	KTP	KTP
Introduction and establishment of Exotic Rust Fungi of the order *Pucciniales* pathogenic on plants of the family *Myrtaceae*	KTP	

Threats	NSW Status	Comm. Status
Introduction of the Large Earth Bumblebee *Bombus terrestris* (L.)	KTP	
Invasion and establishment of exotic vines and scramblers	KTP	
Invasion and establishment of Scotch Broom (*Cytisus scoparius*)	KTP	
Invasion and establishment of the Cane Toad (*Bufo marinus*)	KTP	KTP
Invasion of native plant communities by African Olive *Olea europaea subsp. cuspidata* (Wall. ex G. Don) Cif.	KTP	
Invasion of native plant communities by *Chrysanthemoides monilifera*	KTP	
Invasion of native plant communities by exotic perennial grasses	KTP	
Invasion of the Yellow Crazy Ant, *Anoplolepis gracilipes* (Fr. Smith) into NSW	KTP	
Invasion, establishment and spread of Lantana (*Lantana camara L. sens. Lat*)	KTP	
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	KTP	KTP
Loss of Hollow-bearing Trees	KTP	
Loss or degradation (or both) of sites used for hill-topping by butterflies	KTP	
Predation and hybridisation by Feral Dogs, *Canis lupus familiaris*	KTP	
Predation by *Gambusia holbrooki* Girard, 1859 (Plague Minnow or Mosquito Fish)	KTP	
Predation by the European Red Fox *Vulpes vulpes* (Linnaeus, 1758)	KTP	KTP
Predation by the Feral Cat *Felis catus* (Linnaeus, 1758)	KTP	KTP
Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa* Linnaeus 1758	KTP	KTP
Removal of dead wood and dead trees	KTP	

APPENDIX B – FIELD SURVEY RESULTS

FLORA SPECIES LIST

The following table lists all 165 flora species recorded within or immediately adjacent to the subject site during the January 2022 survey. Of these, 83 species (50%) are native and 83 (50%) are introduced.

Growth form	Scientific name	Common name	Status	HTE	WONS	PW
TG	*Acacia melanoxylon*	Blackwood	N	-	-	-
TG	*Ailanthus altissima*	Tree of Heaven	I	N	N	N
TG	*Allocasuarina littoralis*	Black She-oak	N	-	-	-
TG	*Angophora floribunda*	Rough-barked Apple	N	-	-	-
TG	*Casuarina cunninghamiana* subsp. *cunninghamiana*	River Oak	I	N	N	N
TG	*Eucalyptus baueriana*	Blue Box	N	-	-	-
TG	*Eucalyptus bosistoana*	Coastal Grey Box	N	-	-	-
TG	*Eucalyptus cypellocarpa*	Monkey Gum	N	-	-	-
TG	*Eucalyptus globoidea*	White Stringybark	N	-	-	-
TG	*Eucalyptus tereticornis*	Forest Red Gum	N	-	-	-
TG	*Grevillea robusta*	Silky Oak	I	N	N	N
TG	*Jacaranda mimosifolia*	Jacaranda	I	N	N	N
TG	*Pinus radiata*	Radiata Pine	I	N	N	N
TG	*Populus alba*	White Poplar	I	Y	N	N
TG	*Prunus* sp.	Prunus	I	Y	N	N
TG	*Salix* spp.	Willows	I	Y	N	N
TG	*Syncarpia glomulifera*	Turpentine	I	N	N	N
TG	*Thuja* sp.	Cedar	I	N	N	N
TG	*Ulmus* sp.	Elm	I	N	N	N
SG	*Acacia baileyana*	Cootamundra Wattle	I	N	N	N
SG	*Acacia falciformis*	Mountain Hickory	N	-	-	-
SG	*Acacia implexa*	Hickory Wattle	N	-	-	-
SG	*Acacia mearnsii*	Black Wattle	N	-	-	-
SG	*Bursaria spinosa*	Native Blackthorn	N	-	-	-
SG	*Cassinia trinerva*	Three-nerved Cassinia	N	-	-	-
SG	*Coleonema* sp.	Diosma	I	E	N	N
SG	*Coprosma repens*	Mirror Bush	I	E	N	N
SG	*Cotoneaster* sp.	Cotoneaster	I	Y	N	N
SG	*Dodonaea triquetra*	Large-leaf Hop-bush	N	-	-	-
SG	*Exocarpos cupressiformis*	Cherry Ballart	N	-	-	-
SG	*Ligustrum lucidum*	Large-leaved Privet	I	Y	N	N
SG	*Ligustrum sinense*	Small-leafed Privet	I	Y	N	N
SG	*Melicytus dentatus*	Tree Violet	N	-	-	-
SG	*Myrtus communis*	Common myrtle	I	N	N	N
SG	*Ozothamnus diosmifolius*	White Dogwood	N	-	-	-
SG	*Pittosporum undulatum*	Sweet Pittosporum	N	-	-	-
SG	*Pyracantha crenulata*	Nepalese Firethorn	I	N	N	N
SG	*Rubus fruticosus*	Blackberry	I	Y	Y	Y
SG	*Rubus parvifolius*	Native Raspberry	N	-	-	-
FG	*Agapanthus praecox*	Agapanthus	I	E	N	N
FG	*Artemisia verlotiorum*	Chinese Wormwood	I	E	N	N
FG	*Arthropodium sp. South-east Highlands*	Vanilla Lily	N	-	-	-
FG	*Aster subulatus*	Wild Aster	I	Y	N	N
FG	*Centaurium tenuiflorum*	Centaury	I	Y	N	N
FG	*Cichorium intybus*	Chicory	I	Y	N	N
FG	*Cirsium vulgare*	Spear Thistle	I	Y	N	N
FG	*Commelina cyanea*	Scurvy Weed	N	-	-	-

Growth form	Scientific name	Common name	Status	HTE	WONS	PW
FG	*Conium maculatum*	Hemlock	I	N	N	N
FG	*Conyza bonariensis*	Flaxleaf Fleabane	I	N	N	N
FG	*Coriandrum sativum*	Coriander	I	N	N	N
FG	*Cynoglossum australe*	Hound's Tongue	I	-	-	-
FG	*Dianella longifolia* var. *longifolia*	Blue Flax-lily	N	-	-	-
FG	*Dichondra repens*	Kidneyweed	N	-	-	-
FG	*Erigeron sumatrensis*	Tall Fleabane	I	N	N	N
FG	*Foeniculum vulgare*	Fennel	I	N	N	N
FG	*Fumaria capreolata*	Climbing Fumitory	I	N	N	N
FG	*Gamochaeta americana*	Cudweed	I	N	N	N
FG	*Geranium retrorsum*	Native Geranium	N	-	-	-
FG	*Gomphrena celosioides*	Gomphrena Weed	I	N	N	N
FG	*Hypericum perforatum*	St John's Wort	I	Y	N	N
FG	*Hypochaeris radicata*	Flatweed	I	N	N	N
FG	*Lactuca serriola*	Prickly Lettuce	I	N	N	N
FG	*Leontodon rhagadioloides*	Cretan Weed	I	N	N	N
FG	*Lobelia anceps*	Angled Lobelia	N	-	-	-
FG	*Lobelia purpurascens*	Whiteroot	N	-	-	-
FG	*Lysimachia arvensis*	Pimpernel	I	N	N	N
FG	*Medicago lupulina*	Hop Medic	I	N	N	N
FG	*Medicago sativa*	Lucerne	I	N	N	N
FG	*Nothoscordum gracile*	Onion Weed	I	N	N	N
FG	*Oenothera affinis*	Evening Primrose	I	N	N	N
FG	*Opercularia hispida*	Hairy Stinkweed	N	-	-	-
FG	*Oxalis exilis*	Native Oxalis	N	-	-	-
FG	*Paronychia brasiliana*	Brazilian Whitlow	I	N	N	N
FG	*Persicaria decipiens*	Knotweed	N	-	-	-
FG	*Physalis peruviana*	Cape Gooseberry	I	N	N	N
FG	*Phytolacca octandra*	Inkplant	I	N	N	N
FG	*Plantago lanceolata*	Narrow-leaf Plantain	I	N	N	N
FG	*Pseuderanthemum variabile*	Pastel Flower	N	-	-	-
FG	*Raphanus raphanistrum*	Wild Radish	I	Y	N	N
FG	*Richardia humistrata*	Richardia	I	N	N	N
FG	*Rumex acetosella*	Sorrel	I	Y	N	N
FG	*Rumex brownii*	Swamp Dock	N	-	-	-
FG	*Rumex crispus*	Curled Dock	I	N	N	N
FG	*Rumex obtusifolius*	Broadleaf Dock	I	N	N	N
FG	*Senecio glomeratus*	Groundsel	N	-	-	-
FG	*Senecio linearifolius*	Fireweed Groundsel	N	-	-	-
FG	*Senecio madagascariensis*	Fireweed	I	Y	N	Y
FG	*Sida rhombifolia*	Arrowleaf Sida	I	E	N	N
FG	*Sigesbeckia orientalis*	Indian Weed	N	-	-	-
FG	*Silene gallica*	French Catchfly	I	N	N	N
FG	*Solanum chenopodioides*	Whitetip Nightshade	I	N	N	N
FG	*Spergularia rubra*	Sandspurry	I	N	N	N
FG	*Tradescantia fluminensis*	Trad	I	Y	N	N
FG	*Tricoryne elatior*	Yellow Rush-lily	N	-	-	-
FG	*Trifolium repens*	Clover	I	N	N	N
FG	*Trifolium resupinatum*	Persian Clover	I	N	N	N
FG	*Verbena incompta*	Purpletop	I	N	N	N
FG	*Verbena rigida*	Veined Verbena	I	N	N	N
FG	*Veronica anagallis-aquatica*	Blue Water Speedwell	I	N	N	N
FG	*Wahlenbergia communis*	Bluebell	N	-	-	-
FG	*Wahlenbergia gracilis*	Bluebell	N	-	-	-
GG	*Aristida ramosa*	Wiregrass	N	-	-	-
GG	*Arrhenatherum elatius*	Oatgrass	I	N	N	N

Growth form	Scientific name	Common name	Status	HTE	WONS	PW
GG	*Austrostipa rudis*	Speargrass	N	-	-	-
GG	*Austrostipa* sp.	Speargrass	N	-	-	-
GG	*Austrostipa verticillata*	Slender Bamboo Grass	N	-	-	-
GG	*Avena barbata*	Bearded Oat	I	N	N	N
GG	*Bolboschoenus caldwellii*	Sedge	N	-	-	-
GG	*Bothriochloa macra*	Redgrass	N	-	-	-
GG	*Briza maxima*	Quaking Grass	I	N	N	N
GG	*Cenchrus clandestinus*	Kikuyu Grass	I	Y	N	N
GG	*Cynodon dactylon*	Couch	N	-	-	-
GG	*Cynosurus echinatus*	Rough Dog's Tail	I	N	N	N
GG	*Cyperus difformis*	Sedge	N	-	-	-
GG	*Cyperus eragrostis*	Umbrella Sedge	I	Y	N	N
GG	*Cyperus laevis*	Sedge	N	-	-	-
GG	*Dactylis glomerata*	Cocksfoot	I	N	N	N
GG	*Dichelachne micrantha*	Shorthair Plumegrass	N	-	-	-
GG	*Echinopogon ovatus*	Forest Hedgehog Grass	N	-	-	-
GG	*Ehrharta erecta*	Panic Veldtgrass	I	Y	N	N
GG	*Eleocharis acuta*	Spike-rush	N	-	-	-
GG	*Enneapogon nigricans*	Nineawn Grass	N	-	-	-
GG	*Entolasia marginata*	Bordered Panic	N	-	-	-
GG	*Eragrostis curvula*	African Lovegrass	I	Y	N	Y
GG	*Gahnia radula*	Saw-sedge	N	-	-	-
GG	*Gahnia sieberiana*	Red-fruit Saw-sedge	N	-	-	-
GG	*Holcus lanatus*	Yorkshire Fog	I	N	N	N
GG	*Imperata cylindrica*	Blady Grass	N	-	-	-
GG	*Juncus prismatocarpus*	Rush	N	-	-	-
GG	*Juncus subsecundus*	Rush	N	-	-	-
GG	*Juncus usitatus*	Rush	N	-	-	-
GG	*Lolium multiflorum*	Italian Ryegrass	I	N	N	N
GG	*Lomandra longifolia*	Spiny Mat-rush	N	-	-	-
GG	*Microlaena stipoides*	Weeping Grass	N	-	-	-
GG	*Oplismenus imbecillis*	Creeping Beard Grass	N	-	-	-
GG	*Paspalum dilatatum*	Paspalum	I	Y	N	N
GG	*Phalaris aquatica*	Phalaris	I	N	N	N
GG	*Phragmites australis*	Common Reed	N	-	-	-
GG	*Phyllostachys aurea*	Fishpole Bamboo	I	Y	N	N
GG	*Rytidosperma racemosum*	Wallaby Grass	N	-	-	-
GG	*Schoenoplectus subulatus*	Sedge	N	-	-	-
GG	*Setaria verticillata*	Whorled Pigeon Grass	I	N	N	N
GG	*Sorghum bicolor*	Sorghum	I	N	N	N
GG	*Sporobolus africanus*	Parramatta Grass	I	N	N	N
GG	*Themeda triandra*	Kangaroo Grass	N	-	-	-
GG	*Zea mays*	Maize	E	N	N	N
EG	*Adiantum aethiopicum*	Common Maidenhair	N	-	-	-
EG	*Cheilanthes sp.*	Rock Fern	N	-	-	-
EG	*Doodia aspera*	Prickly Rasp Fern	N	-	-	-
EG	*Gazania linearis*	Treasure Flower	I	Y	N	N
EG	*Lastreopsis microsora*	Creeping Shield Fern	N	-	-	-
EG	*Pellaea falcata*	Sickle Fern	N	-	-	-
EG	*Pteris tremula*	Tender Brakefern	N	-	-	-
OG	*Araujia sericifera*	Moth Vine	I	Y	N	N
OG	*Calystegia sepium*	Hedge Bindweed	N	-	-	-
OG	*Convolvulus erubescens*	Blushing Bindweed	N	-	-	-
OG	*Geitonoplesium cymosum*	Scrambling Lily	N	-	-	-
OG	*Eustrephus latifolius*	Wombat Berry	N	-	-	-
OG	*Glycine clandestina*	Twining Glycine	N	-	-	-
OG	*Glycine microphylla*	Small-leaf Glycine	N	-	-	-
OG	*Glycine tabacina*	Variable Glycine	N	-	-	-

Growth form	Scientific name	Common name	Status	HTE	WONS	PW
OG	*Grona varians*	Slender Tick-trefoil	N	-	-	-
OG	*Pandorea pandorana*	Wonga Wonga Vine	N	-	-	-
OG	*Passiflora cinnabarina*	Red Passionflower	N	-	-	-
OG	*Passiflora edulis*	Common Passionfruit	I	N	N	N
OG	*Smilax australis*	Lawyer Vine	N	-	-	-

[1]Growth form: FG = Forb, GG = Grass and Grass-like, SG = Shrub, TG = Tree, EG = Fern, OG = Other. [2]Status: N = Native, I = Introduced. [3]High-threat exotic species (Yes/No). [4]Weed of National Significance (Yes/No). [5]Priority weed for the region (Yes/No).

FAUNA SPECIES LIST

In total, 24 fauna species were detected during the field survey.

Clade	Common Name	Scientific Name	BC Act	EPBC Act
Amphibia	Peron's Tree Frog	*Litoria peronii*		
Aves	Australian Raven	*Corvus coronoides*		
Aves	Eastern Rosella	*Platycercus eximius*		
Aves	White-headed Pigeon	*Columba leucomela*		
Aves	Little Corella	*Cacatua sanguinea*		
Aves	Yellow-tailed Black Cockatoo	*Artamus cyanopterus*		
Aves	Eastern Whipbird	*Psophodes olivaceus*		
Aves	Bell Miner	*Manorina melanophrys*		
Aves	Pacific Black Duck	*Anas superciliosa*		
Aves	Welcome Swallow	*Hirundo neoxena*		
Aves	Superb Fairy-wren	*Malurus cyaneus*		
Aves	Masked Lapwing	*Vanellus miles*		
Aves	Eastern Yellow Robin	*Eopsaltria australis*		
Aves	Black-faced Cuckoo-shrike	*Coracina novaehollandiae*		
Aves	White-throated Treecreeper	*Cormobates leucophaea*		
Aves	Yellow Thornbill	*Acanthiza nana*		
Aves	Spotted Turtle-dove	*Spilopelia chinensis*		
Aves	House Sparrow	*Passer domesticus*		
Aves	Noisy Miner	*Manorina melanocephala*		
Aves	Crested Pigeon	*Ocyphaps lophotes*		
Aves	Peaceful Dove	*Geopelia placida*		
Aves	Figbird	*Sphecotheres vieilloti*		
Mammalia	Grey-headed Flying Fox**	*Pteropus poliocephalus*	V	V
Mammalia	Fox (Dead)	*Vulpes vulpes*		

**Individuals of the nationally significant Grey-headed Flying-fox camp at Bega were recorded within and adjacent to the subject site. They were roosting at the time of the survey. V = Vulnerable

Representative Photographs of Plant Community Types At the Subject Site

PCT ID	Photograph
PCT 781 - Coastal freshwater lagoons of the Sydney Basin Bioregion and South East Corner Bioregion	

PCT 834 - Forest Red Gum - Rough-barked Apple - White Stringybark grassy woodlands on hills in dry valleys, southern South East Corner Bioregion	

APPENDIX C – BC & EPBC ACT HABITAT ASSESSMENT FOR THREATENED SPECIES AND COMMUNITIES PREDICTED TO OCCUR

List generated by conducting a vegetation associations report for the South East Coastal Ranges IBRA subregion and filtering the results by the PCTs present within the subject site. To determine whether any threatened species were known to occur near the subject site, BioNet Atlas records of threatened species within these subregions were downloaded and the records clipped to within 10 km of the subject site in QGIS.

Likelihood of occurrence table for BC Act listed threatened species

Species name	Common Name	NSW Status*	Comm. Status+	Record within 10 km	Likelihood of Occurrence	5-part test required (Yes / No)
^^*Mixophyes balbus*	Stuttering Frog	E1,P,2	V	Yes	Stuttering Frogs occur along the east coast of Australia from southern Queensland to north-eastern Victoria. Considered to have disappeared from Victoria and to have undergone considerable range contraction in NSW, particularly in south-east NSW. It is the only *Mixophyes* species that occurs in south-east NSW and in recent surveys it has only been recorded at three locations south of Sydney. The Dorrigo region, in north-east NSW, appears to be a stronghold for this species. Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
^^*Mixophyes iteratus*	Giant Barred Frog	E1,P,2	E	No	The Giant Barred Frog is distributed along the coast and ranges from Eumundi in south-east Queensland to Warrimoo in the Blue Mountains. Declines appear to have occurred at the margins of the species' range, with no recent records south of the Hawkesbury River and disappearances from a number of streams in QLD. Northern NSW, particularly the Coffs Harbour-Dorrigo area, is a stronghold. **Low – Search area not within species distribution and not associated with any present PCT.**	No
Litoria aurea	Green and Golden Bell Frog	E1,P	V	No	Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. Records from west to Bathurst, Tumut and the ACT region. Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated. Large populations	Yes

					in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. **Moderate - Search area within species distribution and associated PCT 781 present.**	
Litoria booroolongensis	Booroolong Frog	E1,P	E	No	The Booroolong Frog is restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. It has disappeared from much of the Northern Tablelands, however several populations have recently been recorded in the Namoi catchment. The species is rare throughout most of the remainder of its range. Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. **Low - Search area not within species distribution and not associated with any present PCT.**	No
Litoria littlejohni	Littlejohn's Tree Frog	V,P	V	Yes	Littlejohn's Tree Frog has a distribution that includes the plateaus and eastern slopes of the Great Dividing Range from Watagan State Forest (90 km north of Sydney) south to Buchan in Victoria. The majority of records are from within the Sydney Basin Bioregion with only scattered records south to the Victorian border and this species has not been recorded in southern NSW within the last decade. Records are isolated and tend to be at high altitude. This species breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath based forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground. **Moderate – Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
Litoria verreauxii alpina	Alpine Tree Frog	E1,P	V	No	The Alpine Tree Frog occurs in the south-eastern NSW and Victorian high country (alpine and sub-alpine zones) generally above 1100 m asl. Most locations are within National Park and some are close to alpine resorts. Found in a wide variety of habitats including woodland, heath, grassland and herb fields. Breed in natural and artificial wetlands including ponds, bogs, fens, streamside pools, stock dams and drainage channels that are still or slow flowing.	No

					Low - Search area within predicted species distribution, however, not associated with any present PCT.	
Heleioporus australiacus	Giant Burrowing Frog	V,P	V	No	The Giant Burrowing Frog is distributed in south eastern NSW and Victoria, and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Whilst in non-breeding habitat it burrows below the soil surface or in the leaf litter. Individual frogs occupy a series of burrow sites, some of which are used repeatedly. The home ranges of both sexes appear to be non-overlapping suggesting exclusivity of non-breeding habitat. Home ranges are approximately 0.04 ha in size. **Moderate – Search area within species distribution and associated PCT 834 present.**	Yes
Varanus rosenbergi	Rosenberg's Goanna	V,P		No	Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. There are records from the South West Slopes near Khancoban and Tooma River. Also occurs in South Australia and Western Australia. Found in heath, open forest and woodland. **Low - Search area within predicted species distribution, however, not associated with any present PCT.**	No
^^*Hoplocephalus bungaroides*	Broad-headed Snake	E1,P,2	V	No	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. **Low - Search area within predicted species distribution, however, not associated with any present PCT.**	No
Anseranas semipalmata	Magpie Goose	V,P		Yes	The Magpie Goose is still relatively common in the Australian northern tropics but had disappeared from south-east Australia by 1920 due to drainage and overgrazing of reed swamps used for breeding. Since the 1980s there have been an increasing number of records in central and northern NSW. Vagrants can follow food sources to south-eastern NSW. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. **Low – Although records within 10km, no suitable wetland habitat present and not associated with any present PCT.**	No

Oxyura australis	Blue-billed Duck	V,P		Yes	The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. It is generally only during summer or in drier years that they are seen in coastal areas. The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. **Low – Although records within 10km, no suitable wetland habitat present and not associated with any present PCT.**	No
Ptilinopus superbus	Superb Fruit-Dove	V,P		No	The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. There are records of vagrants as far south as eastern Victoria and Tasmania. Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Diomedea exulans	Wandering Albatross	E1, P	E	No	The Wandering Albatross visits Australian waters extending from Fremantle, Western Australia, across the southern water to the Whitsunday Islands in Queensland between June and September. It has been recorded along the length of the NSW coast. At other times birds roam the southern oceans and commonly follow fishing vessels for several days. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Diomedea gibsoni	Gibson’s Albatross	V, P	V	No	Essentially endemic to the Auckland Islands of New Zealand. The non-breeding range is poorly known however the species probably disperses across the southern Pacific. The species is regularly encountered on trans-Tasman shipping routes and at seas off Sydney, and regularly occurs off the NSW coast usually between Green Cape and Newcastle. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Thalassarche cauta	Shy Albatross	V, P	V	Yes	This species is circumpolar in distribution, occurring widely in the southern oceans. Islands off Australia and New Zealand provide breeding habitat. In Australian waters, the Shy Albatross occurs along the east coast from Stradbroke Island in Queensland along the entire south coast of the continent to Carnarvon in Western Australia. Although uncommon north of Sydney, the species is commonly recorded off southeast NSW, particularly between July and November, and has been recorded in Ben Boyd National Park. This	No

					pelagic or ocean-going species inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea **Low – Although records exist within 10 km, no suitable habitat present.**	
Thalassarche melanophris	Black-browed Albatross	V, P	V	No	The Black-browed Albatross has a circumpolar range over the southern oceans and are seen off the southern Australian coast mainly during winter. This species migrates to waters off the continental shelf from approximately May to November and is regularly recorded off the NSW coast during this period. The species has also been recorded in Botany Bay National Park. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Macronectes halli	Northern Giant-Petrel	V, P	V	No	The Northern Giant-Petrel has a circumpolar pelagic distribution, usually between 40-64ºS in open oceans. Their range extends into subtropical waters (to 28ºS) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Pterodroma nigripennis	Black-winged Petrel	V, P		No	Ranges throughout the Tasman Sea and Central Pacific Ocean, breeding at various island groups including Lord Howe Island. In recent years they have expanded their range. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Pterodroma solandri	Providence Petrel	V, P		No	Ranges across eastern Pacific. Only known breeding sites are at Lord Howe Island and Philip Island, offshore from Norfolk Island. Previously also bred on main Norfolk Island but extinct there by 1800 **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Botaurus poiciloptilus	Australasian Bittern	E1, P	E	Yes	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha* spp.) and spikerushes (*Eleocharis* spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch. **High - Search area within species distribution, records within 10km and associated PCT 781 present.**	Yes

Ixobrychus flavicollis	Black Bittern	V,P		Yes	The Black Bittern has a wide distribution, from southern NSW north to Cape York and along the north coast to the Kimberley region. The species also occurs in the south-west of Western Australia. In NSW, records of the species are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland. Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. **High - Search area within species distribution and associated PCT 781 present.**	Yes
Circus assimilis	Spotted Harrier	V,P		No	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. **High - Search area within species distribution, records within 10km, and associated PCTs 781 & 834 present.**	Yes
Haliaeetus leucogaster	White-bellied Sea-Eagle	V,P		Yes	The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or seashore, such as around bays and inlets, beaches, reefs, lagoons, estuaries, and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts. Nests are large structures built from sticks and lined with leaves or grass. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals, and carrion. Hunts its prey from a perch or whilst in flight (by circling slowly, or by sailing along 10–20 m above the shore). Prey is usually carried to a feeding platform or (if small) consumed in flight, but some items are eaten on the ground. May be solitary or live in pairs or small family groups	Yes

					consisting of a pair of adults and dependent young. Typically lays two eggs between June and September with young birds remaining in the nest for 65-70 days. **High - Search area within species distribution and associated PCTs 781 & 834 present.**	
Hieraaetus morphnoides	Little Eagle	V,P		Yes	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. **High - Search area within species distribution and associated PCTs 781 & 834 present.**	Yes
Lophoictinia isura	Square-tailed Kite	V,P,3		Yes	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. **High - Search area within species distribution and associated PCTs 781 & 834 present.**	Yes
Pandion cristatus	Eastern Osprey	V,P,3		Yes	The Osprey has a global distribution with four subspecies previously recognised throughout its range. Eastern Ospreys are found right around the Australian coastline, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. There are a handful of records from inland areas. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea. **High - Search area within species distribution and associated PCT 781.**	Yes
^^*Falco hypoleucos*	Grey Falcon	E1,P,2		No	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than	No

					500mm rainfall in NSW. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. **Low – Although records within 10km, search area not within species distribution and not associated with any present PCT.**	
Falco subniger	Black Falcon	V,P		No	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres. The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring. **Low - Search area not within species distribution and not associated with any present PCT.**	No
Burhinus grallarius	Bush Stone-curlew	E1,P		No	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer. **Moderate - Search area within species distribution and associated PCTs 781 & 834 present.**	Yes
Esacus magnirostris	Beach Stone-curlew	E4A, P		No	The Beach Stone-curlew occupies coastlines from about Point Cloates in Western Australia, across northern and north-eastern Australia south to north-eastern NSW, with occasional vagrants to south-eastern NSW and Victoria. In NSW, the species occurs regularly to about the Manning River, and the small population of north-eastern NSW is at the limit of the normal range of the species in Australia. Surveys in 2000 put the NSW population at a minimum of 13 adult birds. Outside Australia, the species also occurs in south-eastern Asia, from the Malay Peninsula through Indonesia and southern New Guinea, east to the Solomon Islands, Vanuatu and New Caledonia. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Haematopus fuliginosus	Sooty Oystercatcher	V,P		Yes	Sooty Oystercatchers are found around the entire Australian coast, including offshore islands, being most common in Bass Strait. Small	Yes

					numbers of the species are evenly distributed along the NSW coast. The availability of suitable nesting sites may limit populations. Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. **Moderate - Search area within species distribution and records within 10km, however, no associated PCT present**	
Haematopus longirostris	Pied Oystercatcher	E1,P		Yes	The species is distributed around the entire Australian coastline, although it is most common in coastal Tasmania and parts of Victoria, such as Corner Inlet. In NSW the species is thinly scattered along the entire coast, with fewer than 200 breeding pairs estimated to occur in the State. 'Pied' Oystercatchers are occasionally recorded on Lord Howe island but it is uncertain which species is involved. **Moderate - Search area within species distribution and records within 10km, however, no associated PCT present**	Yes
Thinornis cucullatus cucullatus	Eastern Hooded Dotterel	E4A	V	Yes	The Hooded Plover is endemic to southern Australia and is nowadays found mainly along the coast from south of Jervis Bay, NSW, south through Victoria and Tasmania to the western side of the Eyre Peninsula (South Australia). In south-west Western Australia the Hooded Plover is not restricted to the coast, and can also live and breed around inland salt lakes. The range of the Hooded Plover has declined in eastern Australia since European settlement. Southern coastal Queensland and northern NSW were probably once part of the range of the Hooded Plover, but the species has not been recorded there since the 1920s. In the late 1920s and early 1930s the species was recorded from Port Stephens but are now considered locally extinct. It has not been seen in the Sydney area since the 1940s. Presently the Hooded Plover occurs in NSW north to Sussex Inlet. Occasionally, individual birds are sighted slightly further north to the Shoalhaven River and Comerong Beach and one bird was sighted at Lake Illawarra in March 2001. **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
Irediparra gallinacea	Comb-crested Jacana	V,P		No	The Comb-crested Jacana occurs on freshwater wetlands in northern and eastern Australia, mainly in coastal and subcoastal regions, from the north-eastern Kimberley Division of Western Australia to Cape York Peninsula then south along the east coast to the Hunter region of NSW, with stragglers recorded in south-eastern NSW (possibly in response to unfavourable conditions further north). Inhabit permanent freshwater wetlands, either still or slow-flowing, with a good surface cover of floating vegetation, especially water-lilies, or fringing and aquatic vegetation.	Yes

					Moderate - Search area within species distribution and associated PCT 781 present.	
Calidris alba	Sanderling	V, P	C, J,K	Yes	A regular summer migrant from Siberia and other Arctic breeding grounds to most of the Australian coastline. It is uncommon to locally common, arriving from September and leaving by May (some may overwinter in Australia). Sanderlings occur along the NSW coast, with occasional inland sightings. Often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands **Moderate - Search area within species distribution, however, not associated with any present PCT.**	Yes
Calidris ferruginea	Curlew Sandpiper	E1, P	CE, C, J, K	Yes	The Curlew Sandpiper is distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration. The Curlew Sandpiper breeds in Siberia and migrates to Australia (as well as Africa and Asia) for the non-breeding period, arriving in Australia between August and November, and departing between March and mid-April. **High - Search area within species distribution and associated PCT 781 present.**	Yes
Sternula albifrons	Little Tern	E1,P	C,J,K	Yes	Migrating from eastern Asia, the Little Tern is found on the north, east and south-east Australian coasts, from Shark Bay in Western Australia to the Gulf of St Vincent in South Australia. In NSW, it arrives from September to November, occurring mainly north of Sydney, with smaller numbers found south to Victoria. It breeds in spring and summer along the entire east coast from Tasmania to northern Queensland, and is seen until May, with only occasional birds seen in winter months. Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records) **Moderate - Search area within species distribution, however, not associated with any present PCT.**	Yes
Callocephalon fimbriatum	Gang-gang Cockatoo	V,P,3		Yes	The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee. In spring and summer, generally found in tall mountain forests and	Yes

					woodlands, particularly in heavily timbered and mature wet sclerophyll forests. **High - Search area within species distribution, records within 10km, and associated PCT 834 present.**	
^^*Calyptorhynchus banksii samueli*	Red-tailed Black-Cockatoo (inland subspecies)	V,P,2		No	The Red-tailed Black-Cockatoo (inland subspecies) is known to occur around watercourses and overflows of the Darling, Paroo, Bogan, Macquarie and Barwon Rivers extending in an arc along the Darling River from Wentworth (though rare south of Menindee) in the south to Bourke and thence through to Brewarrina in the north. It extends east to Walgett and perhaps Boggabilla on the Barwon and south through to the Macquarie Marshes. **Low - Search area not within species distribution and not associated with any present PCT.**	No
^^*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V,P,2		Yes	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, *Allocasuaraina diminuta*, and *A. gymnathera*. Belah is also utilised and may be a critical food source for some populations. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May. **High - Search area within species distribution, records within 10km and associated PCT 834 present.**	Yes
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	V,P,3		No	The Purple-crowned Lorikeet occurs across the southern parts of the continent from Victoria to south-west Western Australia. It is uncommon in NSW, with records scattered across the box-ironbark woodlands of the Riverina and south west slopes, the River Red Gum forests and mallee of the Murray Valley as far west as the South Australian border, and, more rarely, the forests of the South Coast. The species is nomadic and most, if not all, records from NSW are associated with flowering events. Found in open forests and woodlands, particularly where there are large flowering eucalypts. Also recorded from mallee habitats. Feed primarily on nectar and pollen of flowering Eucalypts, including planted trees in urban areas. Breeds away from feeding areas, utilising hollow branches or holes in trees. Also roosts in dense vegetation up to several kilometres away from feeding areas.	Yes

					Moderate - Search area within species predicted distribution and associated PCT 834 present.	
Glossopsitta pusilla	Little Lorikeet	V,P		Yes	The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs. Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. **High - Search area within species distribution, records within 10km, and associated PCTs 781 & 834 present.**	Yes
Lathamus discolor	Swift Parrot	E1,P,3	CE	Yes	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. **High - Search area within species distribution, records within 10km, and associated PCT 834 present.**	Yes
Neophema chrysogaster	Orange-bellied Parrot	E4A,P,3	CE	No	The Orange-bellied Parrot breeds in the south-west of Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern South Australia and southern Victoria. There are occasional reports from NSW, with the most recent records from Shellharbour and Maroubra in May 2003. It is expected that NSW habitats may be being more frequently utilised than observations suggest. Typical winter habitat is saltmarsh and strandline/foredune vegetation communities either on coastlines or coastal lagoons. Spits and islands are favoured but they will turn up anywhere within these coastal regions. The species can be found foraging in weedy areas associated with these coastal habitats or even in totally modified landscapes such as pastures, seed crops and golf courses. On the mainland, the Orange-bellied Parrot spends winter mostly within 3 km of the coast in sheltered coastal habitats including bays, lagoons, estuaries, coastal dunes and saltmarshes. The species also inhabits small islands and peninsulas and occasionally saltworks and golf	Yes

					courses. Birds forage in low samphire herbland or taller coastal shrubland. **Moderate - Search area within species predicted distribution with associated PCT 834 present.**	
Neophema pulchella	Turquoise Parrot	V,P,3		Yes	The Turquoise Parrot's range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
Pezoporus wallicus wallicus	Eastern Ground Parrot	V,P,3		Yes	There are three recognised subspecies of the Ground Parrot in Australia, though the subspecies in Tasmania (*leachii*) is not always recognised. Recently, the possibility that the western subspecies (*flaviventris*) may be a separate species has been raised. The eastern subspecies (*wallicus*) inhabits south-eastern Australia from southern Queensland through NSW to western Victoria. It formerly occurred in South Australia, but was last recorded in 1945. In NSW populations have declined and contracted to islands of coastal or subcoastal heathland and sedgeland habitats. The species is found in relatively large numbers on the north coast (Broadwater, Bundjalung, Yuraygir and Limeburners Creek NPs) and in smaller numbers at Myall Lakes on the central coast. There are also large populations on the NSW south coast, particularly Barren Grounds NR, Budderoo NP, the Jervis Bay area and Nadgee NR. Small numbers are recorded at Morton and Ben Boyd NP and other areas on the south coast. Estimated population size is about 2000 birds. **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
Ninox connivens	Barking Owl	V,P,3		Yes	The Barking Owl is found throughout continental Australia except for the central arid regions. Although common in parts of northern Australia, the species has declined greatly in southern Australia and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. Many populations crashed as woodland on fertile soils was cleared over the past century, leaving linear riparian strips of remnant trees as the last inhabitable areas. Surveys in 2001 demonstrated that the Pilliga Forest supported the largest population in southern Australia. The owls sometimes extend their home range into urban areas, hunting birds in garden trees and insects attracted to streetlights. Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest	Yes

					and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile riparian soils. **High - Search area within species distribution, records within 10km, and associated PCT 834 present.**	
Ninox strenua	Powerful Owl	V,P,3		Yes	The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains suggesting occupancy prior to land clearing. Now at low densities throughout most of its eastern range, rare along the Murray River and former inland populations may never recover. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as *Turpentine Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple A*ngophora floribunda*, Cherry Ballart *Exocarpus cupressiformis* and several eucalypt species. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. While the female and young are in the nest hollow the male Powerful Owl roosts nearby (10-200 m) guarding them, often choosing a dense "grove" of trees that provide concealment from other birds that harass him. **High - Search area within species distribution, records within 10km and associated PCT 834 present.**	Yes
Tyto novaehollandiae	Masked Owl	V,P,3		Yes	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. **High - Search area within species distribution, records within 10km and associated PCT 834 present.**	Yes
Tyto tenebricosa	Sooty Owl	V,P,3		Yes	This species is distributed across relatively large areas and is subject to threatening processes that generally act at the landscape scale (e.g. habitat loss or degradation) rather than at distinct, definable locations. **Moderate - Search area within species distribution and records within 10km, however, no associated PCT present**	Yes

Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V,P		No	The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. The western boundary of the range of *Climacteris picumnus victoriae* runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell and along this line the subspecies intergrades with the arid zone subspecies of Brown Treecreeper *Climacteris picumnus picumnus* which then occupies the remaining parts of the state. The eastern subspecies lives in eastern NSW in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands such as the Snowy River Valley, Cumberland Plains, Hunter Valley and parts of the Richmond and Clarence Valleys. The population density of this subspecies has been greatly reduced over much of its range, with major declines recorded in central NSW and the northern and southern tablelands. Declines have occurred in remnant vegetation fragments smaller than 300 hectares, that have been isolated or fragmented for more than 50 years. **Moderate - Search area within species predicted distribution and associated PCT 834 present**	Yes
Calamanthus fuliginosus	Striated Fieldwren	E1,P		Yes	The Striated Fieldwren is found in coastal swamp heaths and tussock fields of south-eastern NSW, into southern Victoria and the south-east of South Australia. It is also found in Tasmania. There are four recognised subspecies, but only one (*albiloris*) occurs in NSW. Most records are from two main regions - the far south coast (Nadgee NR and Ben Boyd NP) and in Morton NP (Little Forest, Tianjara Falls) though there are scattered records in between these two areas (particularly in coastal habitats). Is occasionally recorded further north with records at Bilpin (1979), Kurnell (1979) and Mittagong (1992), though there do not appear to be resident populations at any of these sites. **Moderate - Search area within species distribution and records within 10kn, however, not associated with any present PCT.**	Yes
Chthonicola sagittata	Speckled Warbler	V,P		No	The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive. The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed	Yes

					remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant, often among fallen branches and other litter. A side entrance allows the bird to walk directly inside. A clutch of 3-4 eggs is laid, between August and January, and both parents feed the nestlings. The eggs are a glossy red-brown, giving rise to the unusual folk names 'Blood Tit' and 'Chocolatebird'. Some cooperative breeding occurs. The species may act as host to the Black-eared Cuckoo. Speckled Warblers often join mixed species feeding flocks in winter, with other species such as Yellow-rumped, Buff-rumped, Brown and Striated Thornbills. **Moderate - Search area within species distribution and associated PCT 834 present.**	
Anthochaera phrygia	Regent Honeyeater	E4A,P	CE	Yes	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests. The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. **High - Search area within species distribution, records within 10km and associated PCT 834 present**	Yes
Epthianura albifrons	White-fronted Chat	V,P		Yes	The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it	Yes

					occupies foothills and lowlands up to 1000 m above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas. **High - Search area within species distribution, records within 10km, and associated PCT 781 present.**	
Daphoenositta chrysoptera	Varied Sittella	V,P		Yes	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. The Varied Sittella's population size in NSW is uncertain but is believed to have undergone a moderate reduction over the past several decades. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. **High - Search area within species predicted distribution, records within 10km, and associated PCT 834 present.**	Yes
Pachycephala olivacea	Olive Whistler	V,P		Yes	The Olive Whistler inhabits the wet forests on the ranges of the east coast. It has a disjunct distribution in NSW chiefly occupying the beech forests around Barrington Tops and the MacPherson Ranges in the north and wet forests from Illawarra south to Victoria. In the south it is found inland to the Snowy Mountains and the Brindabella Range. Mostly inhabit wet forests above about 500m. During the winter months they may move to lower altitudes. Forage in trees and shrubs and on the ground, feeding on berries and insects. **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V,P		Yes	Dusky woodswallows are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. **High - Search area within species distribution, records within 10km and associated PCTs 781 & 834 present.**	Yes

Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V,P		No	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. The south-eastern form (subspecies *cucullata*) is found from Brisbane to Adelaide and throughout much of inland NSW, apart from the extreme north-west, where it is replaced by subspecies *picata*. Two other subspecies occur outside NSW. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. **Moderate - Search area within species distribution and associated PCT 834 present.**	Yes
Petroica boodang	Scarlet Robin	V,P		Yes	The Scarlet Robin is found from south east Queensland to south east South Australia and also in Tasmania and south west Western Australia. In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees. The Scarlet Robin is a quiet and unobtrusive species which is often quite tame and easily approached. Birds forage from low perches, fenceposts or on the ground, from where they pounce on small insects and other invertebrates which are taken from the ground, or off tree trunks and logs; they sometimes forage in the shrub or canopy layer. **High - Search area within species distribution, records within 10km and associated PCT 834 present.**	Yes

Petroica phoenicea	Flame Robin	V,P		Yes	The Flame Robin is endemic to south eastern Australia, and ranges from near the Queensland border to south east South Australia and also in Tasmania. In NSW, it breeds in upland areas and in winter, many birds move to the inland slopes and plains. It is likely that there are two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. Prefers clearings or areas with open understoreys. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains), in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees. **High - Search area within species distribution, records within 10km and associated PCT 834 present.**	Yes
Petroica rodinogaster	Pink Robin	V,P		Yes	Pink Robins are endemic to (only found in) south-eastern Australia. In the breeding season (September to March) Pink Robins are seen singly or in pairs in deep gullies in dense shrub layers of damp and wet forests or rainforests. In winter, they are found in more open and drier habitats. **Moderate - Search area within species distribution, records within 10km, however, not associated with any present PCT.**	Yes
Stagonopleura guttata	Diamond Firetail	V,P		Yes	The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW, though is very rare west of the Darling River. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. **High - Search area within species distribution, records within 10km, and associated PCT 834 present.**	Yes
Dasyurus maculatus	Spotted-tailed Quoll	V,P	E	Yes	The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing	Yes

					trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. **High - Search area within species distribution, records within 10km, and associated PCTs 781 & 834 present.**	
Phascogale tapoatafa	Brush-tailed Phascogale	V,P		No	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. **Moderate - Search area within species distribution and associated PCT 834 present.**	Yes
Sminthopsis leucopus	White-footed Dunnart	V,P		Yes	The White-footed Dunnart occurs in Tasmania and along the Victorian and southern NSW coast. The Shoalhaven area is the species' northern-most limit. It has not been recorded west of the coastal escarpment with the western-most record being from Coolangubra State Forest, approximately 10 km south-east of Bombala. The White-footed Dunnart is found in a range of different habitats across its distribution, including coastal dune vegetation, coastal forest, tussock grassland and sedgeland, heathland, woodland and forest. In NSW, the species seems to favour vegetation communities with an open understorey structure (contrasting with populations in Victoria which apparently prefer dense shrub and ground layers). It is patchily distributed across these habitats and, where present, typically occurs at low densities. Breeding populations have been recorded in logged forest shortly after disturbance, but these usually do not persist as regeneration proceeds and a dense ground cover of vegetation establishes. **High - Search area within species distribution, records within 10km and associated PCT 834 present.**	Yes
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E1,P	E	Yes	The Southern Brown Bandicoot has a patchy distribution. It is found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
Phascolarctos cinereus	Koala	V,P	E	Yes	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In New South Wales, koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range. Inhabit eucalypt woodlands and forests.	Yes

					High - Search area within species distribution, records within 10 km and associated PCT 834 present.	
Cercartetus nanus	Eastern Pygmy-possum	V,P		Yes	The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. **High - Search area within species distribution, records within 10km and associated PCT 834 present.**	Yes
Petaurus australis	Yellow-bellied Glider	V,P		Yes	The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. **High - Search area within species distribution, records within 10km and associated PCTs 834 present.**	Yes
Petaurus norfolcensis	Squirrel Glider	V,P		Yes	Squirrel Gliders are distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas **High - Search area within species distribution, records within 10km and associated PCT 834 present.**	Yes
Potorous longipes	Long-footed Potoroo	E4A,P	E	No	The long-footed potoroo has a very limited distribution and is extremely rare. Two core populations occur in Victoria and a much smaller population has also been found in far south-eastern NSW, approximately 20 km north of the Victorian border in the South East. All known NSW populations now exist entirely within the South East Forests National Park. The species may also occur in adjacent State Forest and private land, but this remains to be determined. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Potorous tridactylus	Long-nosed Potoroo	V,P	V	Yes	The long-nosed potoroo is found on the south-eastern coast of Australia, from Queensland to eastern Victoria and Tasmania, including some of the Bass Strait islands. There are geographically isolated populations in western Victoria. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. The fruit-	Yes

					bodies of hypogeous (underground-fruiting) fungi are a large component of the diet of the Long-nosed Potoroo. They also eat roots, tubers, insects and their larvae and other soft-bodied animals in the soil. **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	
Petrogale penicillata	Brush-tailed Rock-wallaby	E1,P	V	No	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. However, the distribution of the species across its original range has declined significantly in the west and south and has become more fragmented. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops, and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night when foraging. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. Highly territorial and have strong site fidelity with an average home range size of about 15 ha. Males tend to have larger home ranges than females. The home range consists of a refuge area and a foraging range linked by habitually used commuting routes. Females settle in or near their mother's range, while males mainly disperse between female groups within colonies, and less commonly between colonies. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V	Yes	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young. Annual mating commences in January and conception occurs in April or May; a single young is born in October or November. Site fidelity to camps is high; some camps have been used for over a century. Can travel up to 50 km from the camp to forage; commuting distances are more often <20 km. Feed on the nectar and pollen of native trees, in particular Eucalyptus,	Yes

					Melaleuca and Banksia, and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops. **Present - Search area within species distribution, records within 10km and associated PCTs 781 & 834 present. Detected during the field survey.**	
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V,P		Yes	The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn. **High - Search area within species distribution, records within 10km, and associated PCT 781 present**	Yes
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V,P		Yes	The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. **High - Search area within species distribution, records within 10km, and associated PCTs 781 & 834 present**	Yes
Chalinolobus dwyeri	Large-eared Pied Bat	V,P	V	No	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies. **Low - Search area within species distribution, however, not associated with any present PCT.**	No

Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P		Yes	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally, roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. **High - Search area within species distribution, records within 10km and associated PCT 834 present**	Yes
Myotis macropus	Southern Myotis	V,P		Yes	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. **High - Search area within species distribution, records within 10km and associated PCTs 781 & 834 present**	Yes
Phoniscus papuensis	Golden-tipped Bat	V,P		No	The Golden-tipped Bat is distributed along the east coast of Australia in scattered locations from Cape York Peninsula in Queensland to south of Eden in southern NSW. It also occurs in New Guinea. Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, *Casuarina*-dominated riparian forest and coastal *Melaleuca* forests. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Scoteanax rueppellii	Greater Broad-nosed Bat	V,P		Yes	The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however, does not occur at altitudes above 500 m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Forages after sunset, flying slowly and directly along creek and river corridors at an altitude of 3 - 6 m. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species. **High - Search area within species distribution, records within 10km, and associated PCTs 781 & 834 present.**	Yes
Miniopterus australis	Little Bent-winged Bat	V,P		No	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal	No

					forests, and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. **Low - Search area within species distribution, however, not associated with any present PCT.**	
Miniopterus orianae oceanensis	Large Bent-winged Bat	V,P		Yes	Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. **High - Search area within species distribution, records within 10km and associated PCTs 781 & 834 present.**	Yes
Pseudomys fumeus	Smoky Mouse	E4A,P	E	No	The Smoky Mouse is currently limited to a small number of sites in western, southern, and eastern Victoria, south-east NSW and the ACT. In NSW there are 3 records from Kosciuszko National Park and 2 records adjacent to the park in Bondo and Ingbyra State Forests; the remainder are centred around Mt Poole, Nullica State Forest and the adjoining South East Forests National Park. The Smoky Mouse appears to prefer heath habitat on ridge tops and slopes in sclerophyll forest, heathland and open forest from the coast (in Victoria) to sub-alpine regions of up to 1800 metres, but sometimes occurs in ferny gullies. Nesting burrows have been found in rocky localities among tree roots and under the skirts of Grass Trees Xanthorrhoea spp. **Low - Search area within species distribution and no associated PCT.**	No
Dugong dugon	Dugong	E1,P		No	Extends south from warmer coastal and island waters of the Indo-West Pacific to northern NSW, where its known from incidental records only. **Absent – Subject site is not marine**	No
Arctocephalus forsteri	New Zealand Fur-seal	V,P		No	Occurs in Australia and New Zealand. Reports of non-breeding animals along southern NSW coast particularly on Montague Island, but also at other isolated locations to north of Sydney. **Absent – Subject site is not marine**	No
Arctocephalus pusillus doriferus	Australian Fur-seal	V,P		Yes	Reported to have bred at Seal Rocks, near Port Stephens and Montague Island in southern NSW. Haul outs are observed at isolated places along the NSW coast. Prefers rocky parts of islands with flat, open terrain. They occupy flatter areas than do New Zealand Fur-seals where they occur together. **Absent – Subject site is not marine**	No
Eubalaena australis	Southern Right Whale	E1,P	E	Yes	Temperate and subpolar waters of the Southern Hemisphere, with a circumpolar distribution between about 20°S and 55°S with some records further south to 63°S. **Absent – Subject site is not marine**	No

Megaptera novaeangliae	Humpback Whale	V,P	V	Yes	The population of Australia's east coast migrates from summer cold-water feeding grounds in Subantarctic waters to warm-water winter breeding grounds in the central Great Barrier Reef. **Absent – Subject site is not marine**	No
Physeter macrocephalus	Sperm Whale	V,P		No	Wide, but patchy distribution from the tropics to the edge of the polar pack-ice in both hemispheres. **Absent – Subject site is not marine**	No
Astrotricha crassifolia	Thick-leaf Star-hair	V	V	Yes	Occurs near Patonga (Gosford LGA), and in Royal NP and on the Woronora Plateau (Sutherland and Campbelltown LGAs). There is also a record from near Glen Davis (Lithgow LGA). Occurs in dry sclerophyll woodland on sandstone; flowers in spring; resprouter from root suckers or basal stem buds after fire. **Moderate - Search area within species distribution, however, not associated with any present PCT.**	Yes
Astrotricha sp. Wallagaraugh	Merimbula Star-hair	E1		No	The Merimbula Star-hair has a highly restricted and severely fragmented distribution in NSW. It is currently known from only three localities. One population is along the upper reaches of the Wallagaraugh River about 30 km south-west of Eden (in Yambulla and Timbillica State Forests). A small population is located near Middle Beach in Merimbula. The largest population is centred on the township of Tura Beach north of Merimbula, lying partly along one edge of Bournda National Park. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Calotis glandulosa	Mauve Burr-daisy	V	V	No	The distribution of the Mauve Burr-daisy is centred on the Monaro and Kosciuszko regions. There are three known sites in the upper Shoalhaven catchment. There are old and possibly dubious records from near Oberon, the Dubbo area and Mt Imlay. Found in montane and subalpine grasslands in the Australian Alps. Found in subalpine grassland (dominated by *Poa* spp.), and montane or natural temperate grassland dominated by Kangaroo Grass (*Themeda australis*) and Snow Gum (*Eucalyptus pauciflora*) Woodlands on the Monaro and Shoalhaven area. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Rutidosis leiolepis	Monaro Golden Daisy	V	V	No	The Monaro Golden Daisy is found in scattered populations on the Monaro, and in low subalpine plains of Kosciuszko National Park (eg. Long Plain and Happy Jacks Plain). Found in Natural Temperate Grassland on the Monaro. Occurs in sub-alpine grasslands in Kosciuszko National Park. Grows on basalt, granite and sedimentary substrates. Apparently highly susceptible to grazing, being retained in only a small number of populations on roadsides, un-grazed reserves and very lightly grazed pastures on private lands.	No

					Low - Search area within species distribution, however, not associated with any present PCT.	
Senecio spathulatus	Coast Groundsel	E1		No	Coast Groundsel occurs in Nadgee Nature Reserve (Cape Howe) and between Kurnell in Sydney and Myall Lakes National Park (with a possible occurrence at Cudmirrah). In Victoria there are scattered populations from Wilsons Promontory to the NSW border. Coast Groundsel grows on frontal dunes. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Wahlenbergia scopulicola	Rock-face Bluebell	E1		No	The distribution of the Mauve Burr-daisy is centred on the Monaro and Kosciuszko regions. There are three known sites in the upper Shoalhaven catchment. There are old and possibly dubious records from near Oberon, the Dubbo area and Mt Imlay. Found in montane and subalpine grasslands in the Australian Alps. Found in subalpine grassland (dominated by *Poa* spp.), and montane or natural temperate grassland dominated by Kangaroo Grass (*Themeda australis*) and Snow Gum (*Eucalyptus pauciflora*) Woodlands on the Monaro and Shoalhaven area. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Wilsonia backhousei	Narrow-leafed Wilsonia	V		Yes	The Narrow-leafed Wilsonia is known from several sites in the Jervis Bay area, Royal National Park, near Deniliquin and on the lakebeds of Lake George and Lake Bathurst when these are exposed during droughts. **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
Wilsonia rotundifolia	Round-leafed Wilsonia	E1		No	Round-leafed Wilsonia is known from several sites in the Jervis Bay area, Royal National Park, near Deniliquin and on the lakebeds of Lake George and Lake Bathurst when these are exposed during droughts. The Lake George and Lake Bathurst populations appear to be locally extensive. Also found Western Australia, South Australia and Victoria. Grows in mud in coastal saltmarsh and inland saline or brackish lake beds. **Moderate - Search area within species distribution associated PCT 781 present.**	Yes
Hibbertia circinata	Connie's Guinea Flower	E4A		No	Known only from the summit area of Mt Imlay, south-west of Eden on the South Coast of New South Wales. Mainly occurs in shrubby woodland dominated by *Eucalyptus sieberi* with a diverse understorey including Bor*onia imlayensis, Oxylobium ellipticum, Xanthorrhoea australis, Tetratheca subaphylla, Dillwynia glaberrima*, and *Amperea xiphoclad*a. Some plants grow beneath the canopy of the endangered mallee *E. imlayensis* on the eastern face of Mt Imlay or beneath *E. fraxinoides* below the northern edge. The species occurs in a very narrow elevation range between about	No

					800 and 850 m a.s.l. **Low - Search area within species distribution, however, not associated with any present PCT.**	
Monotaxis macrophylla	Large-leafed Monotaxis	E1		No	Large-leafed Monotaxis is recorded from several highly disjunct populations in NSW: eastern edge of Deua NP (west of Moruya), Bemboka portion of South East Forests National Park, Cobar area (Hermitage Plains), the Tenterfield area, and Woodenbong (near the Queensland border). It is also in Queensland. A recent record from the eastern spur of the Nandewar Range is in the Namoi catchment. *Monotaxis macrophylla* displays the properties of a fire ephemeral species in many ways. Germination is stimulated by the passage of fire, individual plants have a short life span, a large biomass is produced in a short period of time, flowering occurs shortly after germination, and populations do not persist in the absence of fire. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Pseudanthus ovalifolius	Oval-leafed Pseudanthus	E1		No	There is a single NSW record of this species in Ben Boyd National Park (near Eden). The species is also found in scattered localities from central western Victoria to Gippsland and in Tasmania. In the south the species is found in near coastal dry sclerophyll forest growing in sandy soil. Flowering occurs in September and October. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Bossiaea bombayensis	Bombay Bossiaea	V		No	The Bombay Bossiaea is restricted to the Shoalhaven River valley between Warri and Bombay, about 10 km west of Braidwood. Bombay Bossiaea grows in the steeply incised valley of the Shoalhaven River, near Braidwood on the Southern Tablelands. It is mainly found on sandy, rocky slopes and terraces above the frequent flood line in a shrubland of *Callitris endlicheri, Grevillea arenaria, Lomandra longifolia, Micrantheum hexandrum, Pomaderris andromedifolia* and *Leptospermum polygalifolium*. Plants are presumably killed by fire, but fire is not required for regeneration. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Bossiaea oligosperma	Few-seeded Bossiaea	V	V	No	The Few-seeded Bossiaea is known from two disjunct areas - the lower Blue Mountains in the Warragamba area (Wollondilly, Allum, Tonalli River catchments) and the Windellama area in Goulburn Mulwaree Shire, where it is locally abundant. A 1960s record for the Araluen valley south of Braidwood is credible but has not been relocated. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Pultenaea baeuerlenii	Budawangs Bush-pea	V	V	No	The Few-seeded Bossiaea is known from two disjunct areas - the lower Blue Mountains in the Warragamba area (Wollondilly, Allum,	No

					Tonalli River catchments) and the Windellama area in Goulburn Mulwaree Shire, where it is locally abundant. A 1960s record for the Araluen valley south of Braidwood is credible but has not been relocated. Occurs on stony slopes or ridges on sandstone in the Yerranderie area. Occurs in low woodland on loamy soil in the Windellama area. Nothing is known about its ecology but it probably has hard-coated seeds that respond well to fire and soil disturbance. **Low - Search area within species distribution, however, not associated with any present PCT.**	
Pultenaea parrisiae	Parris' Bush-pea	V	V	No	This subspecies is known only from far north-east Gippsland (in Victoria) and three sites in NSW (Wadbilliga Trig area and two sites south of Nalbaugh). Parris' Bush-pea grows in moist heathlands in loam soils, sometimes at the margins of woodlands. Also in riparian vegetation. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Pultenaea pedunculata	Matted Bush-pea	E1		Yes	Matted Bush-pea is widespread in Victoria, Tasmania, and south-eastern South Australia. In NSW however, it is represented by just three disjunct populations, in the Cumberland Plains in Sydney, the coast between Tathra and Bermagui and the Windellama area south of Goulburn (where it is locally abundant). NSW populations are generally among woodland vegetation but plants have also been found on road batters and coastal cliffs. It is largely confined to loamy soils in dry gullies in populations in the Windellama area. wers appear in spring (August to December), with fruit maturing from October to January but sometimes persistent on the plant until April-May. **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
Acacia constablei	Narrabarba Wattle	V	V	No	This species is a South Coast endemic known from only two localities. The largest population is found at Narrabarba Hill south of Eden. The other population is found on a rocky ridgetop 1.4 km to the north on the other side of the Wonboyn River. It is often dominant or co-dominant in an open shrubland community which also includes Giant Honey-myrtle, Tick Bush, Coastal Zieria and Lance-leaf Platysace; the herbaceous component of the vegetation is dominated by Long-leafed Wallaby Grass (*Notodanthonia longifolia*) and *Lepidosperma urophorum*. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Acacia georgensis	Bega Wattle	V	V	Yes	Only occurs in the far South East of NSW with known sites at Kianinny Bay in Bournda National Park, on Dr George Mountain, Wadbilliga National Park and in Bemboka and Coolangubra Sections (one location on cliffs above the Towamba River) of the South East Forests National Park. The sites where it is found	Yes

					represent a range of different environments with correspondingly varied vegetation; in general, other tree species are uncommon but can include Veined Olive (*Notelaea venosa*), Hickory Wattle (*Acacia implexa*), Forest Red Gum (*Eucalyptus tereticornis*), Woollybutt (*E. longifolia*), Bega Mallee (*E. spectatrix*) and Gully Gum (*E. smithi* **Moderate - Search area within species distribution, however, not associated with any present PCT.**	
Dampiera fusca	Kydra Dampiera	E1		No	Highly restricted. Currently only known to occur on and near the eastern edge of the Southern Tablelands in New South Wales. Scattered occurrences have been recorded from the northern end of the Kybeyan Range, East-South-East of Cooma, probably all within Wadbilliga National Park. A single population consisting of 20 plants has been located south of Tinderry Peak in Tinderry Nature Reserve. The species is also known from the Australian Capital Territory and Nunniong Plateau in far North-East Gippsland in Victoria. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Haloragis exalata subsp. exalata	Square Raspwort	V	V	No	Highly restricted. Currently only known to occur on and near the eastern edge of the Southern Tablelands in New South Wales. Scattered occurrences have been recorded from the northern end of the Kybeyan Range, East-South-East of Cooma, probably all within Wadbilliga National Park. A single population consisting of 20 plants has been located south of Tinderry Peak in Tinderry Nature Reserve. The species is also known from the Australian Capital Territory and Nunniong Plateau in far North-East Gippsland in Victoria. The species may germinate in large numbers after fires, rapidly colonising areas and setting seed within two years post-fire. However, few (if any) standing plants are observed in populations 20-30 years post fire. Recorded in montane heath, also amongst rock platform and tors interspersed with closed heath. Habitat in the Canberra area is generally restricted to granite ridgetops and plateaux on very shallow soils supporting heath, scrub and heathy snow gum and/or mallee woodland. Flowers from October to February. Plant is very hard to observe when not in flower. **Moderate - Search area within species distribution and associated PCT 781 present.**	Yes
Westringia davidii	David's Westringia	V	V	No	David's Westringia is endemic to rocky outcrops above 250 m in elevation in the coastal ranges to the west of Eden and Pambula in NSW. Largely restricted to shallow organic loam soils fringing rocky outcrops. This narrow niche is an ecotone between open forest dominated by Silvertop Ash (*Eucalyptus sieberi*) and the rocky outcrops which support a mosaic of shrubland, scattered herbs and	No

					shrubs and bare rock. **Low - Search area within species distribution, however, not associated with any present PCT.**	
Eucalyptus aggregata	Black Gum	V	V	No	Black Gum is found in the NSW Central and Southern Tablelands, with small isolated populations in Victoria and the ACT. In NSW it occurs in the South Eastern Highlands Bioregion and on the western fringe of the Sydney Basin Bioregion. Black Gum has a moderately narrow distribution, occurring mainly in the wetter, cooler and higher parts of the tablelands, for example in the Blayney, Crookwell, Goulburn, Braidwood and Bungendore districts. Grows on alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Often grows with other cold-adapted eucalypts, such as Snow Gum or White Sallee (Eucalyptus pauciflora), Manna or Ribbon Gum (*E. viminalis*), Candlebark (*E. rubida*), Black Sallee (*E. stellulata*) and Swamp Gum (*E. ovata*). Black Gum usually occurs in an open woodland formation with a grassy ground layer dominated either by River Tussock (*Poa labillardierei*) or Kangaroo Grass (*Themeda australis*), but with few shrubs. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Eucalyptus imlayensis	Imlay Mallee	E4A,3	E	No	This species is found on the upper slopes of Mt Imlay, in Mt Imlay National Park near Eden. Only 80 plants are known in a single population. Grows in shrubland on a steep, rocky, east facing slope; associated species include *Leptospermum scoparium, Boronia muelleri* and *Prostanthera walteri*. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Eucalyptus kartzoffiana	Araluen Gum	V	V	No	Araluen Gum is found in the Araluen, Bendethera and Majors Creek area, south of Braidwood. Grows near rivers, in grassy or shrubby woodland or in wet sclerophyll forest on moderately fertile sandy soil on granite. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	Yes	This species is sparsely distributed but widespread on the New England Tablelands from Nundle to north of Tenterfield, being most common in central portions of its range. Found largely on private property and roadsides, and occasionally in conservation reserves. Planted as urban trees, windbreaks and corridors. Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. **Low - Search area not in species distribution and no associated PCT present, although there is a single record within 10km**	No

Eucalyptus parvula	Small-leaved Gum	E1	V	No	This species has a very small distribution in the eastern edge of the Monaro, in a narrow 100km strip from Big Badja Mountain (north-east of Cooma) to Nunnock Swamp in South-East Forests National Park, north-east of Bombala. Grows at and above an elevation of 1100 m in acidic soil on cold wet grassy flats. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Eucalyptus pulverulenta	Silver-leafed Gum	V	V	No	The Silver-leafed Gum is found in two quite separate areas, the Lithgow to Bathurst area and the Monaro (Bredbo to Bombala). Grows in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum (*Eucalyptus mannifera*), Red Stringybark (*E. macrorhynca*), Broad-leafed Peppermint (*E. dives*), Silvertop Ash (*E. sieberi*) and Apple Box (*E. bridgesiana*). **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Eucalyptus recurva	Mongarlowe Mallee	E4A	CE	No	The Mongarlowe Mallee is confined to the NSW Southern Tablelands where it is known from only four locations. Three of these occur near Mongarlowe (with at least a two km separation between the sites) and the third is about 30 km away near Windellama. Three of these sites support only single plants, whilst the other has three individuals present - the total known population of this species is thus only six individuals. Genetic analysis by CSIRO has confirmed that each mallee clump is comprised of a single individual (genotype). It is likely that these individuals represent a relict of a more widespread ancestor, and it is unlikely that many more individuals of the species remain undiscovered. lowering occurs in January, but very few seeds are set so the chances of recruitment of new individuals in the field is low. Seed germinated from naturally set seed has mostly produced hybrids, showing that there is a low level of cross pollination occurring with a few other locally occurring eucalypt species. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Eucalyptus saxatilis	Suggan Buggan Mallee	E1		No	The Suggan Buggan Mallee is currently known from ten populations in NSW and Victoria. In NSW it is confined to the Lower Snowy area of Kosciuszko National Park. Two populations occur south of Running Water Creek, one on Black Jack Mountain, one near Windmill Hill and two near Kangaroo Ground Creek. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Leptospermum thompsonii	Monga Tea Tree	V	V	No	The species is mostly found in Monga National Park near Braidwood. Two populations have also been recorded in Morton National Park to the north (near The Vines). Monga Tea-tree is found in swamps and drainage lines. It also invades road verges.	No

					Flowering occurs mainly in summer. **Low - Search area within species distribution, however, not associated with any present PCT.**	
Rhodamnia rubescens	Scrub Turpentine	E4A		No	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts **Low - Search area within species distribution, however, not associated with any present PCT.**	No
^^*Caladenia tessellata*	Thick Lip Spider Orchid	E1,P,2	V	No	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. The species occurs on the coast in Victoria from east of Melbourne to almost the NSW border. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
^^*Cryptostylis hunteriana*	Leafless Tongue Orchid	V,P,2	V	No	The Leafless Tongue Orchid has been recorded from as far north as Gibraltar Range National Park south into Victoria around the coast as far as Orbost. It is known historically from a number of localities on the NSW south coast and has been observed in recent years at many sites between Batemans Bay and Nowra (although it is uncommon at all sites). Also recorded at Munmorah State Conservation Area, Nelson Bay, Wyee, Washpool National Park, Nowendoc State Forest, Ku-Ring-Gai Chase National Park and Ben Boyd National Park. Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
^^*Diuris ochroma*	Pale Golden Moths	E1,P,2	V	No	Recorded in south-eastern NSW on the sub-alpine plains of Kosciuszko National Park and the Kybean area. Also recorded in eastern Victoria. Open grassy woodland of *Eucalyptus viminalis* / *E. pauciflora* or *E. pauciflora* / *E. parvula* (or secondary grassland). Also found in sub-alpine grassland. **Low - Search area within species distribution, however, not associated with any present PCT.**	No

^^*Genoplesium rhyoliticum*	Rhyolite Midge Orchid	E1,P,2	E	No	The Rhyolite Midge Orchid is endemic to a narrow strip of NSW south coast. Known from only six sites, it is expected that new populations of the Rhyolite Midge Orchid may be found when sites with appropriate habitat are surveyed during the restricted time when the species is in flower. The population numbers at the known sites range from 50 to 1000. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
^^*Genoplesium vernale*	East Lynne Midge Orchid	V,P,2	V	No	The East Lynne Midge Orchid is currently known from only a narrow belt, approximately 12 km wide, of predominantly Dry Sclerophyll Forest from north Moruya to 24 km north of Ulladulla. The species occurs primarily on National Park and Forests Corporation NSW estate. grows in dry sclerophyll woodland and forest extending from close to the coast to the adjoining coastal ranges. Each plant produces a single leaf-like stem that emerges from an underground tuber. The orchid stems can appear from late October and take only a few weeks to produce flowers. Many stems that emerge do not produce flowers. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
^^*Pterostylis alpina*	Alpine Greenhood	V,P,2		No	The Alpine greenhood grows in moist forests on foothills and ranges, extending to montane areas in New South Wales, the Australian Capital Territory and Victoria. In NSW the species occurs in the Southern Tablelands south from Bondo State Forest. Often found on sheltered southern slopes near streams in rich loam. The species flowers from August to October. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
^^*Thelymitra alpicola*	Alpine Sun-orchid	V,P,2		No	Distributed in south–eastern New South Wales and north–eastern Victoria. The northernmost populations are in the upper Blue Mountains. The remainder of the New South Wales distribution is from the Snowy Mountains extending north–west to Bago State Forest and to the eastern part of the Great Dividing Range south from Braidwood. Flowering occurs from late November to mid December with fruits taking about a month to ripen. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Distichlis distichophylla	Australian Saltgrass	E1		No	This grass is common in Victoria and Tasmania, and extends to South Australia and Western Australia. In Victoria it is found inland as well, but in its limited NSW range it grows only in coastal situations, except for one existing population at Lake Cargelligo in south western NSW. Scattered records are from the areas of Jervis Bay, Bermagui, Wonboyn, Narooma, Bodalla and Nadgee Nature Reserve (at Womboyn).	No

					Low - Search area within species distribution, however, not associated with any present PCT.	
Plinthanthesis rodwayi	Budawangs Wallaby Grass	E4A	V	No	The species appears be restricted to two peaks in Budawang NP (Mt Budawang, Mt Currockbilly), recorded in open heathland on shallow soils. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Persicaria elatior	Tall Knotweed	V	V	No	Tall Knotweed has been recorded in south-eastern NSW (Mt Dromedary (an old record), Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. **Moderate - Search area within species distribution and associated PCT 781 present.**	Yes
Lysimachia vulgaris var. davurica	Yellow Loosestrife	E1,3		Yes	Yellow Loosestrife is only known from Wingecarribee Swamp, the Boro area near Braidwood and the Bega River Valley. Also found in Victoria and it is also found throughout much of Europe and Asia. There is some suggestion that it may not be native to Australia; however, the Victorian specimens were collected very early. This species is regarded as a serious weed in parts of northern America. The species has an extensive spreading rhizomatous root system from which it resprouts in late spring and subsequently flowers in January and February. It then dies back to the rootstck in late March and April. The NSW populations are thus thought to be clonal, and probably originating from seed carried from an overseas population on a migratory bird. **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
Grevillea acanthifolia subsp. paludosa	Bog Grevillea	E1	E	No	Bog Grevillea is known from two small populations: Nalbaugh National Park south-east of Bombala; Bega Swamp near Bemboka. Found, as the name implies, in peaty swamps. Within such habitat it grows on densely vegetated low hummocks. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Grevillea renwickiana	Nerriga Grevillea	E1		No	Restricted to a small area between Mongarlowe (Nettletons Creek) and Nerriga. *G. renwickiana* occurs in a range of plant communities: low woodland of one or more of *Eucalyptus mannifera, E. radiata, E. pauciflora, E. aggregata, E. dives, E. rossii* or *Allocasuarina nana* heath. Especially on sandy or loamy soils fringing damp heath/sedge dominated vegetation and occasionally on ridges in rocky soil	No

					Low - Search area within species distribution, however, not associated with any present PCT.	
Baloskion longipes	Dense Cord-rush	V	V	No	Dense Cord-rush has been recorded from the Kanangra-Boyd area to the Southern Tablelands but all populations are small. Populations have been recorded in Blue Mountains National Park, Kanangra-Boyd National Park, Penrose State Forest (in Hanging Rock Swamp), Morton National Park (The Vines), the Clyde Mountain area and Ballalaba (south of Braidwood). Commonly found in swamps or depressions in sandy alluvium, sometimes growing with sphagnum moss. Also occurs in swails within tall forest, and in Black Gum (*Eucalyptus aggregata*) Woodland. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Pomaderris bodalla	Bodalla Pomaderris	V		Yes	Bodalla Pomaderris is endemic to NSW and is currently known to occur on the south coast between Bodalla and Merimbula, and in the upper Hunter Valley near Muswellbrook. There are ten populations of Bodalla Pomaderris currently known, and a further two imprecisely described locations from which the species was collected approximately 40 years ago. The majority of populations are small with seven of the populations having estimates of less than a hundred plants each. All populations have locally restricted distributions. The largest known population is in Wollemi National Park and is unlikely to include more than one thousand plants. **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes
Pomaderris cotoneaster	Cotoneaster Pomaderris	E1	E	No	Cotoneaster Pomaderris has a very disjunct distribution, being known from the Nungatta area, northern Kosciuszko National Park (near Tumut), the Tantawangalo area in South-East Forests National Park and adjoining freehold land, Badgery's Lookout near Tallong, Bungonia State Conservation Area, the Yerranderie area, Kanangra-Boyd National Park, the Canyonleigh area and Ettrema Gorge in Morton National Park. The species has also been recorded along the Genoa River in Victoria. Cotoneaster Pomaderris has been recorded in a range of habitats in predominantly forested country. The habitats include forest with deep, friable soil, amongst rock beside a creek, on rocky forested slopes and in steep gullies between sandstone cliffs. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Pomaderris elachophylla	Lacy Pomaderris	E1		No	Apparently restricted to escarpment forests in the far south of the State with an outlier in the Tinderry range near Michelago. The species has been recorded near Brown Mountain in Glenbog State Forest, and in the Coolangubra, Nalbaugh and Tantawangalo sections of South East Forests National Park, and in Tinderry Nature Reserve. Found in and adjacent to creeklines and gullies, or	No

					at sites with impeded drainage, often on sheltered aspects, in tall damp forest. **Low - Search area within species distribution, however, not associated with any present PCT.**	
Pomaderris gilmourii var. cana	Grey Deua Pomaderris	V	V	No	The species is restricted to Deua National Park, south-west of Moruya. Grey Deua Pomaderris has been recorded in open shrubland on a single rhyolite outcrop. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Pomaderris pallida	Pale Pomaderris	V	V	No	Pale Pomaderris has been recorded from near Kydra Trig (north-west of Nimmitabel), Tinderry Nature Reserve, the Queanbeyan River (near Queanbeyan), the Shoalhaven River (between Bungonia and Warri), the Murrumbidgee River west of the ACT and the Byadbo area in Kosciuszko National Park. It is also found along the Murrumbidgee River in the ACT and has been recently recorded in eastern Victoria. This species usually grows in shrub communities surrounded by Brittle Gum (*Eucalyptus mannifera*) and Red Stringybark (*E. macrorhyncha*) or *Callitris* spp. woodland. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Pomaderris parrisiae	Parris' Pomaderris	V	V	No	Parris' Pomaderris has been recorded in Egan Peaks Nature Reserve, Wadbilliga National Park (near Wadbilliga Trig.) and South East Forests National Park (Brown Mountain / Cochrane Dam area), with a questionable record in Ben Boyd National Park. Populations once referred to *P. parissiae* in the upper Kangaroo River catchment above Carrington Falls have been named *Pomaderris walshii*. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Galium australe	Tangled Bedstraw	E1		No	Tangled Bedstraw is widespread in Victoria and Tasmania and is also found in South Australia (and ACT Territory in Jervis Bay). Following a taxonomic revision, many recent records in NSW have been re-determined as other species. Tangled Bedstraw has been recorded historically in the Nowra (Colymea) and Narooma areas and is extant in Nadgee Nature Reserve, south of Eden. Records in the Sydney area are yet to be confirmed. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Boronia deanei	Deane's Boronia	V,P	V	No	There are scattered populations of Deane's Boronia between the far south-east of NSW and the Blue Mountains with the species found on Newnes Plateau (Newnes State Forest), Nalbaugh Plateau (South East National Park), Kanangra-Boyd National Park, Budderoo National Park and Morton National Park. The species mainly occurs in conservation reserves and once grew profusely in	No

					Morton National Park near Bundanoon but has rarely been seen in that area since being impacted by devastating bushfires of the 1960s. The 2019/20 black summer bushfires impacted populations at Newnes Plateau, Nalbaugh Plateau and Kanangra-Boyd National Park. Grows in wet heath, often at the margins of open forest adjoining swamps or along stream. **Low - Search area within species distribution, however, not associated with any present PCT.**	
Correa baeuerlenii	Chef's Cap Correa	V	V	No	Chef's Cap Correa has been recorded between Nelligen (on Nelligen Creek and the Buckenbowra River) and Mimosa Rocks National Park. Occurs in riparian sites within forests of various eucalypts, including Silvertop Ash (*Eucalyptus sieberi*), Yellow Stringybark (*E. muelleriana*), Blue-leafed Stringybark (*E. agglomerata*) and Spotted Gum (*Corymbia maculata*), or she-oak woodland. It may also be found in near-coastal rocky sites. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Correa lawrenceana var. genoensis	Genoa River Correa	E1	E	No	The Genoa River Correa has only been recorded along the Genoa River and its tributaries in the vicinity of the Victorian border (South East Forests National Park). There is only one population known in NSW. Found in riparian vegetation (tall open forest) dominated by Monkey Gum (*Eucalyptus cypellocarpa*) and Hazel Pomaderris (*Pomaderris aspera*). **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Leionema ralstonii	Ralston's Leionema	V	V	No	Ralston's Leionema is endemic to the coastal ranges of south-east NSW between Eden and Pambula. The species is largely confined to dry, rocky habitats. It is most likely to be found in dry shrub communities but can also occur in open forest. It flowers mainly in winter. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Nematolepis rhytidophylla	Nalbaugh Nematolepis	V	V	No	This species is found only at a few sites on the Nalbaugh Plateau in the South-East Forests National Park south-east of Bombala. The Nalbaugh Nematolepis grows in shrubby habitat in rocky areas or forms part of the understorey in open forest. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
^^*Zieria adenophora*	Araluen Zieria	E4A,2	E	No	The species is currently known only from a single population of only 18 mature plants in 2020 near Araluen, south of Braidwood. There are two other historic records of the species, one from 'near the Clyde' in 1889 and the other from 'Some of the remotest sources of Murrumbidgee at Maneroo' in 1888. Searches in the Clyde River catchment have failed to re-locate the species there. Plants	No

					generally flower profusely in the wild and produce plentiful quantities of seed. Major recruitment events appear rare. There was a significant seedling germination event around 2000 and the next major germination event was not until autumn 2020. **Low - Search area within species distribution, however, not associated with any present PCT.**	
^^*Zieria buxijugum*	Box Range Zieria	E4A,2	E	No	The Box Range Zieria is known from only one population which was about 125 plants in June 2015. This represents a significant increase since 1987 when only 68 heavily browsed plants were recorded. The population occupies an area of about 0.25 hectares on private property about 15 km west of Pambula on the NSW far south coast. Grows in a shrub plant community dominated by *Melaleuca armillaris* (Bracelet Honey Myrtle) and below the outcrop is open forest dominated by *Eucalyptus sieberi* (Silvertop Ash). The groundcover is very sparse and includes scattered plants of *Lepidosperma urophorum* (Rapier Saw Sedge), *Platysace lanceolata* (Shrubby Platysace), *Plectranthus parviflorus* (Cockspur Flower) and *Dendrobium speciosum* (Rock Orchid). **Low - Search area within species distribution, however, not associated with any present PCT.**	No
^^*Zieria formosa*	Shapely Zieria	E4A,2	E	No	Only a single population of Shapely Zieria is known. It occupies an area of about 1 hectare on private land located about 5 km west of Pambula on the NSW far south coast. The soil is skeletal, grey sandy loam and there is much exposed surface rock. Associated vegetation includes Black Wattle (*Acacia mearnsii*), Blackfellows' Hemp (*Commersonia fraseri*), Large-leaf Hop-bush (*Dodonea triquetra*), Snowy Mint-bush (*Prostanthera nivea*), Sweet Pittosporum (*Pittosporum undulatum*), White Kunzea (*Kunzea ambigua*), and Yellow Tea-tree (*Leptospermum flavescens*). **Low - Search area within species distribution, however, not associated with any present PCT.**	No
^^*Zieria parrisiae*	Parris' Zieria	E4A,2	CE	No	Parris' Zieria is known from only one population, which is split between two main patches loacted about 200 m apart in a gully on private property about 15 km west of Pambula on the NSW far south coast. A very small sub-population of less than 10 plants occurs between the two larger patches. The main flowering period is in August and September, but flowering may commence as early as late July. **Low - Search area within species distribution, however, not associated with any present PCT.**	No
Zieria tuberculata	Warty Zieria	V	V	No	Warty Zieria grows in the Mt Dromedary and Tilba Tilba area. A total of 13 sites are currently known and the total population (all age clsses) is about 3,000 plants. The population in the Cambewarra Mountain area near Nowra is now referable to a separate taxon. The	No

					flowers appear from late winter to spring. **Low - Search area within species distribution, however, not associated with any present PCT.**	
Thesium australe	Austral Toadflax	V	V	No	Austral Toad-flax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Although originally described from material collected in the SW Sydney area, populations have not been seen in a long time. It may persist in some areas in the broader region. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda australis*). **Moderate - Search area within species distribution and associated with PCT 834.**	Yes
Viola cleistogamoides	Hidden Violet	E1,3		Yes	Hidden Violet is locally common in parts of coastal Victoria, Tasmania and South Australia. In NSW, it is known from several sites in the Wonboyn area (including Nadgee Nature Reserve). Hidden Violets have also been found inland in heathland, woodland with a heathy understorey and grassy forests. Disturbed sites such as tracks, firebreaks and even lawns have also been colonised. **Moderate - Search area within species distribution and records within 10km, however, not associated with any present PCT.**	Yes

*NSW Status: P=Protected, P13=Protected native plant, V=Vulnerable, E1=Endangered, E2=Endangered population, E4=Extinct, E4A=Critically endangered, 2=Category 2 sensitive species, 3=Category 3 sensitive species.

+Commonwealth Status: C=CAMBA, J=JAMBA, K=ROKAMBA, CE=Critically endangered, E=Endangered, V=Vulnerable

Likelihood of occurrence table for BC Act Threatened Ecological Communities

Community	NSW Status	Comm. Status	Likelihood of Occurrence	5-part test required (Yes / No)
Araluen Scarp Grassy Forest in the South East Corner Bioregion	E3		This community is largely restricted to the escarpment and associated ridges on the northern and western sides of the Araluen valley, occurring typically on sandy loams derived from granite, usually on steep slopes between approximately 200 and 700 metres in altitude. This distribution falls within a rain shadow zone, where mean rainfall is between approximately 890 and 1000 mm per annum. **Absent – Community not within the subject site**	No
Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions	E3		Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions is currently known from parts of the Local Government Areas of Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions. It is known to occur within a number of conservation reserves, including Royal, Seven Mile Beach, Conjola, Meroo, Murramarang, Eurobodalla and Biamanga National Parks, though these areas are often exposed to degradation by visitor overuse due to their proximity to popular beaches and camping areas. **Absent – Community not within the subject site**	No
Brogo Wet Vine Forest in the South East Corner Bioregion	E3		The Brogo Wet Vine Forest is confined to the Bega Valley area on the far south coast of NSW. It is found on the margins of the valley between Myrtle Mountain, Tantawangalo and Brogo, from Brogo to Cobargo and on a few hills within the valley, including the Meringola Peak area. **Present – Community within the subject site**	Yes
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	V	This community occurs in the intertidal zone along the NSW coast. **Absent – Community not within the subject site**	No
Dry Rainforest of the South East Forests in the South East Corner Bioregion	E3		Dry Rainforest of the South East Forests is found on the margins of the Bega Valley between Myrtle Mountain, Tantawangolo and Brogo, from Brogo to Cobargo and some hills within the Bega Valley. A small stand may also occur in the Araluen Valley. **Absent – Community not within the subject site**	No

Community	NSW Status	Comm. Status	Likelihood of Occurrence	5-part test required (Yes / No)
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		Known from along the majority of the NSW coast. However, it is distinct from Sydney Freshwater Wetlands which are associated with sandplains in the Sydney Basin bioregion. Extensively cleared and modified. **Present – Community within the subject site**	Yes
Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	CE	Littoral Rainforest occurs only on the coast and is found at locations in the NSW North Coast Bioregion, Sydney Basin Bioregion and South East Corner Bioregion. Littoral Rainforest is very rare and occurs in many small stands. In total, it comprises less than one percent of the total area of rainforest in NSW. **Absent – Community not within the subject site**	No
Lowland Grassy Woodland in the South East Corner Bioregion	E3	CE	Lowland Grassy Woodland in the South East Corner bioregion is currently known to occur within the Bega Valley, Eurobodalla and Palerang Local Government Areas, but may occur elsewhere in the bioregion. **Present – Community within the subject site**	Yes
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions	E3	E	The Montane Peatlands and Swamps EEC is currently known from parts of the Local Government Areas of Armidale Dumaresq, Bega Valley, Bellingen, Blue Mountains, Bombala, Cooma-Monaro, Eurobodalla, Gloucester, Greater Argyle, Guyra, Hawkesbury, Lithgow, Oberon, Palerang, Severn, Shoalhaven, Snowy River, Tenterfield, Tumbarumba, Tumut, Upper Lachlan and Wingecarribee but may occur elsewhere in these bioregions **Absent – Community not within the subject site**	No
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	CE	Known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Parramatta, Penrith, Blue Mountains, Fairfield, Holroyd, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Palerang, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions. **Present – Community within the subject site**	Yes

Community	NSW Status	Comm. Status	Likelihood of Occurrence	5-part test required (Yes / No)
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	E	Known from parts of the Local Government Areas of Tweed, Byron, Lismore, Ballina, Richmond Valley, Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Hastings, Greater Taree, Great Lakes, Port Stephens, Maitland, Newcastle, Cessnock, Lake Macquarie, Wyong, Gosford, Pittwater, Warringah, Hawkesbury, Baulkham Hills, Hornsby, Lane Cove, Blacktown, Auburn, Parramatta, Canada Bay, Rockdale, Kogarah, Sutherland, Penrith, Fairfield, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Wollongong, Shellharbour, Kiama, Shoalhaven, Eurobodalla and Bega Valley but may occur elsewhere in these bioregions. **Absent – Community not within the subject site**	No
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		This community is known from parts of the Local Government Areas of Tweed, Byron, Lismore, Ballina, Richmond Valley, Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Hastings, Greater Taree, Great Lakes and Port Stephens, Lake Macquarie, Wyong, Gosford, Hornsby, Pittwater, Warringah, Manly, Liverpool, Rockdale, Botany Bay, Randwick, Sutherland, Wollongong, Shellharbour, Kiama and Shoalhaven but may occur elsewhere in these bioregions. **Absent – Community not within the subject site**	No
Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E3		*Themeda* Grassland on seacliffs and coastal headlands is found on a range of substrates in the NSW North Coast, Sydney Basin and South East Corner bioregions. Stands on sandstone are infrequent and small. **Absent – Community not within the subject site**	No
Werriwa Tablelands Cool Temperate Grassy Woodland in the South Eastern Highlands and South East Corner Bioregions	E4B		Werriwa Grassy Woodlands (WGW) occur in the Southern Tablelands of NSW, occupying broad valley floors and gentle slopes and low rises of the moderately undulating Southern Tablelands of NSW. **Absent – Community not within the subject site**	No

APPENDIX D – BC ACT 5-PART TEST OF SIGNIFICANCE

Biodiversity Conservation Act 2016 Test of significance

The threatened species 'test of significance' (or '5-part test') is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. The test of significance is set out in s.7.3 of the Biodiversity Conservation Act 2016, and is completed in accordance with the questions set out below:

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

   i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

   ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

c) in relation to the habitat of a threatened species or ecological community:

   i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

   ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

   iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

BC Act Test of Significance for Threatened Ecological Communities.

Community	a.	b.	c.	d.	e.	Impact Significance
Brogo Wet Vine Forest in the South East Corner Bioregion	N/A	The proposal would remove up to 1.179 ha of this EEC. It is highly unlikely that the proposal would result in local extinction, given the small area covered by the impact footprint. However, it is not possible to determine the extent of the EEC in the surrounding area as private land was not surveyed during field work. The distribution of this EEC within the subject site was discontinuous and fragmentary. Its quality was highly reduced, with a non-native understory. Therefore, these remnants were limited in biodiversity and habitat value for threatened fauna species.	The landscape surrounding the subject site has been historically modified. Fauna must cross open farmland or the road corridor corridors to move between fragments. As this proposal would entail the reduction in extent, of this EEC, it would potentially increase the distances fauna species are required to travel. Fragmentation is however anticipated to be insignificant, given the short width of the impact footprint (10 m) and its confinement to the pre-existing road corridor.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	N/A	The proposal would remove up to 0.083 ha of this EEC. It is highly unlikely that the proposal would result in local extinction for this community, as it was only present in drainages lines extending from beyond the subject site. However, it is not possible to determine the extent of the EEC in the surrounding area as private land was not surveyed during field work. Given the incredibly small size of this EEC within the impact footprint, its degraded quality through exotic incursion, and its continued existence within the study area, it is not anticipated that its removal would produce deleterious effects on any threatened species.	The removal of 0.083 ha of this EEC will not significantly exacerbate pre-existing fragmentation. This EEC is present in land adjacent to the subject site in modified farmland, and its presence in the impact footprint is a result of incursion along drainage lines. The removal of this EEC from the subject site would therefore not impede the movement of fauna.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact
Lowland Grassy Woodland in the South East Corner Bioregion	N/A	The proposal would remove up to 0.435 ha of this EEC. It is highly unlikely that the proposal would result in local extinction, given the small area covered by the impact footprint. However, it is not possible to determine the extent of the EEC in the surrounding	The landscape surrounding the subject site has been historically modified. Fauna must cross open farmland or the road corridor to move between fragments. As this proposal would entail the reduction in extent, of this	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact

		area as private land was not to be surveyed during field work. The distribution of this EEC within the subject site was discontinuous and degraded, with a non-native understorey. Its representatives were either isolated stands of *Eucalyptus tereticornis* and *Angophora floribunda* or a row one tree in depth. Thus, this EEC would provide limited value for threatened fauna species.	EEC, it would potentially increase the distances fauna are required to travel. However, as this EEC exists within the road corridor largely as a single row of *Eucalyptus tereticornis* and *Angophora floribunda* with an exotic understorey, it possesses limited intrinsic habitat value and is unlikely to offer significant landscape connectivity for most species. Therefore, while some impacts on landscape connectivity would result from this proposal, it is unlikely to be significant.			
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	N/A	The proposal would remove up to 0.081 ha of this EEC. It is highly unlikely that the proposal would result in local extinction, given the small area covered by the impact footprint. However, it is not possible to determine the extent of the EEC in the surrounding area. The distribution of this EEC was clustered near a creek that was directly to the south of the subject site. Although the vegetated section of this creek line was not surveyed, it does suggest that the EEC within the subject site represents a remnant fragmentary patch of this community. However, given that the EEC was represented only by isolated stands of *Eucalyptus tereticornis* and *Angophora floribunda,* the EEC within the subject site would provide limited value for threatened fauna species.	The landscape surrounding the subject site has been historically modified. Fauna species must cross open farmland or the road corridor to move between fragments. As this proposal would entail the removal of this EEC from the subject site, it would potentially increase the distances fauna species are required to travel. However, as this EEC exists within the road corridor largely as a single row of *Eucalyptus tereticornis* and *Angophora floribunda* with an exotic understorey, it has limited intrinsic habitat value and is unlikely to offer significant landscape connectivity for most species. Further, as it appears most of this EEC in the immediate vicinity is to the south of the subject site, fragmentation should not be exacerbated.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact

BC Act Test of Significance for Threatened Species.

Species Name	Common Name	a.	b.	c.	d.	e.	Impact Significance
^^*Mixophyes balbus*	Stuttering Frog	The life cycle of this species is reliant on the presence of waterbodies. It is not anticipated for this proposal to have an impact on any watercourse, and if mitigation methods are adhered to, it will not significantly increase the risk of local extinction for this species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area it must be considered as potentially impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Litoria aurea	Green and Golden Bell Frog	The life cycle of this species is reliant on the presence of waterbodies. It is not anticipated for this proposal to have an impact on any watercourse, and if mitigation methods are adhered to, it will not significantly increase the risk of local extinction for this species.	N/A	i. This species is associated with PCT 781. Consequently, 0.083 ha of habitat may be impacted. However, there are no records of this species within 10 km. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Litoria littlejohni	Littlejohn's Tree Frog	The life cycle of this species is reliant on the presence of waterbodies. It is not anticipated for this proposal to have an impact on any watercourse, and if mitigation methods are adhered to, it will not significantly increase the	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

		risk of local extinction for this species.		proposal will not remove habitat likely to be critical for the long-term survival of the species.			
Heleioporus australiacus	Giant Burrowing Frog	The life cycle of this species is reliant on the presence of waterbodies. It is not anticipated for this proposal to have an impact on any watercourse, and if mitigation methods are adhered to, it will not significantly increase the risk of local extinction for this species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. However, there are no records of this species within 10 km. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Botaurus poiciloptilus	Australasian Bittern	This species requires appropriate marsh habitat to complete its life cycle. The discontinuous nature of this habitat within the subject site and the lack of marsh habitat makes it unlikely that the species will select it for breeding purposes. Given this, it is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCT 781. Consequently, 0.083 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Ixobrychus flavicollis	Black Bittern	This species requires appropriate marsh habitat to complete its life cycle. The discontinuous nature of this habitat within the subject site and the lack of marsh habitat makes it unlikely that the species will select it for breeding purposes. Given this, it is unlikely to be critical	N/A	i. This species is associated with PCT 781. Consequently, 0.083 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

		to the maintenance of the life cycle of this species.					
Circus assimilis	Spotted Harrier	This species constructs its nests in trees either in open or remnant woodland. The subject site is situationally well suited for breeding, and there are records within the search area. However, given the discontinuous nature of habitat in the subject site, it is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCTs 781 and 834. Consequently, 1.778 ha of habitat may be impacted. However, there are no records of this species within 10 km. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Haliaeetus leucogaster	White-bellied Sea-eagle	This species breeds in large stick nests generally within 1 km of large watercourses. The subject site is situationally well suited for breeding, and there are records within the search area. However, the most recent is from 1992, and given the discontinuous nature of habitat it is unlikely to be critical to the maintenance of the life cycle of this species. During the field survey, no individuals or nests were observed within the subject site.	N/A	i. This species is associated with PCTs 781 and 834. Consequently, 1.778 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Hieraaetus morphnoides	Little Eagle	This species constructs its nests in riparian, or adjacent, vegetation. The subject site is thus well suited for breeding, and	N/A	i. This species is associated with PCTs 781 and 834. Consequently, 1.778 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the

		there are records within the search area. However, the most recent record was from 2010, from vegetation adjacent to the Bega River. Given the absence of nests observed during the field survey, and the discontinuous nature of habitat, it is unlikely to be critical to the maintenance of the life cycle of this species.		fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.			undertaking of the proposal
^^*Lophoictinia isura*	Square-tailed Kite	This species breeds in twig stick nests in large old trees in open woodland or riparian vegetation. Considering the subject site has been historically cleared, with few remnant Eucalypts, very few suitable large old trees exist on the subject site for this species to nest within. Given this, the lack of nests and detected individuals, it is reasonable to assume that the subject site would be critical to the maintenance of the life cycle of the species.	N/A	i. This species is associated with PCTs 781 and 834. Consequently, 1.778 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Pandion cristatus	Eastern Osprey	The species constructs its nests in close proximity to the ocean, typically within one kilometre. At its nearest point, the subject site is 4.2km from the ocean. The only record from the search area is from suitable coastal	N/A	i. This species is associated with PCT 781. Consequently, up to 0.083 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

		habitat, from 1996. It is therefore unlikely that the subject site provides habitat that would be critical to the maintenance of the life cycle of this species.		proposal will not remove habitat likely to be critical for the long-term survival of the species.			
Burhinus grallarius	Bush Stone-curlew	As this conspicuous bird breeds on the ground, the failure to detect it during the field survey, and the lack of historical records, makes it unlikely that the subject site is critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCTs 781 and 834. Consequently, 1.778 ha of habitat may be impacted. However, there are no records of this species within 10 km. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Haematopus fuliginosus	Sooty Oystercatcher	This species breeds almost exclusively on offshore islands. As such, the subject site would represent at best marginal foraging habitat. Therefore, it would not constitute habitat critical to the maintenance of the life cycle of the species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area it must be considered as potentially impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Haematopus longirostris	Pied Oystercatcher	This species nests almost exclusively on coastal or estuarine beaches. As such, the subject site would represent at best marginal foraging habitat. Therefore, it would not constitute habitat critical to the	N/A	i. This species is not known to be associated with any PCT. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

		maintenance of the life cycle of the species.		critical for the long-term survival of the species.			
Thinornis cucullatus cucullatus	Eastern Hooded Dotterel	This species nests almost exclusively on a narrow strip of beach between the high-water mark and the base of the fore-dunes. As such, the subject site would represent at best marginal foraging habitat. Therefore, it would not constitute habitat critical to the maintenance of the life cycle of the species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Irediparra gallinacea	Comb-crested Jacana	This species nests almost exclusively in permanent freshwater wetlands. As such, the subject site would represent at best marginal foraging habitat. Therefore, it would not constitute habitat critical to the maintenance of the life cycle of the species.	N/A	i. This species is associated with PCT 781. Consequently, up to 0.083 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Calidris alba	Sanderling	This species nests only in the Northern Hemisphere. As such, the subject site would represent at best marginal foraging habitat. Therefore, it would not constitute habitat critical to the maintenance of the life cycle of the species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

				critical for the long-term survival of the species.			
Calidris ferruginea	Curlew Sandpiper	Given that this species requires appropriate coastal habitat to complete its life cycle, and that this is not present within the subject site, it is unlikely that the subject site is critical to the maintenance of the life cycle of this species. Rather, the subject site may represent transient feeding habitat.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Sternula albifrons	Little Tern	Given that this species requires low dunes or sandy beaches to complete its life cycle, it is unlikely that the subject site is critical to the maintenance of the life cycle of this species. Rather, the subject site may represent transient feeding habitat.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Callocephalon fimbriatum	Gang-gang Cockatoo	This species favours old growth forests and hollows >10 cm in diameter to complete its life cycle. Given the disturbed nature of the site, and the presence of only four hollow-bearing trees, it is unlikely to be critical to the maintenance	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

		of the life cycle of this species.					
^Calyptorhynchus lathami	Glossy Black-Cockatoo	The life cycle of this species is reliant on large tree hollows, close to water. As there was only a single appropriate hollow within the subject site, it is unlikely to be critical to the life cycle of the species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	The life cycle of this species is reliant on an abundance of tree hollows. As there were only seven hollows within the subject site, it is unlikely to be critical to the life cycle of the species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. However, there are no records of this species within 10 km. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Glossopsitta pusilla	Little Lorikeet	This species nests in proximity to, if possible, feeding areas, most typically selecting hollows in the limb or trunk of large smooth-barked Eucalypts. As there were only seven hollows within the subject site, it is unlikely to be critical to the life cycle of the species.	N/A	i. This species is associated with PCTs 781 and 834. Consequently, 1.778 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
^^ *Kathamus discolr*	Swift Parrot	This species life cycle involves seasonal migrations between the	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted.	No, AOBV not present within or	Yes. See **Appendix F**	No significant impact will arise to the local viability of this

		Australian mainland and Tasmania. As breeding habitat occurs exclusively in Tasmania, only marginal foraging habitat should be impacted by the proposal. As such, the subject site is unlikely to be critical to the maintenance of the life cycle of the species.		ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	close to the subject site.		species or its habitat due to the undertaking of the proposal
Neophema chrysogaster	Orange-bellied Parrot	This species life cycle involves seasonal migrations between the Australian mainland and Tasmania. As breeding habitat occurs exclusively in Tasmania, only marginal foraging habitat should be impacted by the proposal. As such, the subject site is unlikely to be critical to the maintenance of the life cycle of the species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
^^*Neophema pulchella*	Turquoise Parrot	This species nests in proximity to, if possible, feeding areas, most typically selecting hollows in the limb or trunk of large smooth-barked Eucalypts. As there were only seven hollows within the subject site, it is unlikely to be critical to the life cycle of the species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

Pezoporus wallicus wallicus	Eastern Ground Parrot	This species nests in proximity to coastal, or near coastal, low heathlands and sedgelands. As this habitat was not present within the subject site, only marginal foraging habitat should be impacted by the proposal. As such, the subject site is unlikely to be critical to the maintenance of the life cycle of the species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
^^*Ninox connivens*	Barking Owl	The species requires large hollow bearing trees (dead or alive) of which there was only a single large hollow within the subject site. Given this, it is unlikely that the subject site represents habitat critical to the life cycle of the species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Ninox strenua	Powerful Owl	The species requires large hollow bearing trees (dead or alive) of which there was only a single large hollow within the subject site. Given this, it is unlikely that the subject site represents habitat critical to the life cycle of the species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
^^*Tyto novaehollandiae*	Masked Owl	The species requires large hollow bearing trees (dead or alive) of which there was	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted.	No, AOBV not present within or	Yes. See **Appendix F**	No significant impact will arise to the local viability of this

		only a single large hollow within the subject site. Given this, it is unlikely that the subject site represents habitat critical to the life cycle of the species.		ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	close to the subject site.		species or its habitat due to the undertaking of the proposal
Tyto tenebricosa	Sooty Owl	The species requires large hollow bearing trees (dead or alive) that contain large hollows. Within the subject site there was a total of one large hollow. Given the disturbed nature of the subject site, it is unlikely to be critical to the maintenance of the life cycle of this species. Nonetheless, where possible, the hollow bearing trees should be retained to reduce impacts on this species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	This species requires eucalypt woodland and dry open forests for breeding. As vegetation within the subject site is discontinuous, and considerable vegetation will remain within the study area, this proposal will not significantly increase the risk of local extinction.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Calamanthus fuliginosus	Striated Fieldwren	This species requires dense tussock vegetation for breeding. As this vegetation	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the	No, AOBV not present within or	Yes. See **Appendix F**	No significant impact will arise to the local viability of this

		feature was absent from the subject site, it is unlikely to be critical to the maintenance of the life cycle of this species.		search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	close to the subject site.		species or its habitat due to the undertaking of the proposal
Chthonicola sagittata	Speckled Warbler	The species requires large, relatively undisturbed areas of Eucalyptus dominated communities with a thick grassy understory. Given the disturbed nature of the road corridor, it is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Anthochaera phrygia	Regent Honeyeater	The species has three known key breeding areas, two of them in NSW (Capertee Valley and Bundarra-Barraba regions) which occurs exclusively within Box-Ironbark riparian gallery forest dominated by River Sheoak. As the subject site is located outside of these regions and does not have this associated vegetation, the subject site it is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

Epthianura albifrons	White-fronted Chat	This species builds a cup nest in low vegetation. Although the species was not detected during the field survey, it has been recorded within 10km. However, considering the disturbed nature of the subject site, it is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCT 781. Consequently, 0.083 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Daphoenositta chrysoptera	Varied Sittella	This species builds a cup nest in vegetation. Although the species was not detected during the field survey, it has been recorded within 10km. However, given the disturbed nature of the subject site, it is unlikely to be critical to the maintenance of the life cycle of this species. Therefore, this proposal will not significantly increase the risk of local extinction.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Pachycephala olivacea	Olive Whistler	This species constructs its nests out of twigs and grass in the low forks of shrubs. Although there are records of this species within 10km of the subject site, no appropriate vegetation is present. Consequently, the subject site it is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

				critical for the long-term survival of the species.			
Artamus cyanopterus cyanopterus	Dusky Woodswallow	This species builds a cup-shaped nest in dense foliage in open eucalypt forests. Although the species was not detected during the field survey, there are records from within 10km of the subject site. However, given the disturbed nature of the subject site, it is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCTs 781 and 834. Consequently, 1.778 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	This species builds a cup-shaped nest in a tree. Neither the species or its nests were detected during the field survey, nor are there records from within 10km of the subject site. Given this, and the disturbed nature of the subject site, it is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Petroica boodang	Scarlet Robin	This species builds a cup-shaped nest in a tree. Although there are records from within the search area, the species was not detected during the field survey. Given this, and the	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the

		disturbed nature of the subject site, it is unlikely to be critical to the maintenance of the life cycle of this species.		proposal will not remove habitat likely to be critical for the long-term survival of the species.			undertaking of the proposal
Petroica phoenicea	Flame Robin	To complete their life cycle, this species requires tall moist eucalypt forests and woodlands, with breeding habitat consisting of native grasses and shrubs. Given the absence of breeding habitat, and the disturbed nature of the subject site, it is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Petroica rodinogaster	Pink Robin	This species inhabits rainforests and tall, open eucalypt forests, particularly densely vegetated gullies. Given the lack of suitable habitat, the subject site is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Stagonopleura guttata	Diamond Firetail	This species builds a grass nest in trees or shrubs. Although there are records from within 10km, the disturbed nature of the subject site makes it unlikely to be critical to the	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the

		maintenance of the life cycle of this species.		proposal will not remove habitat likely to be critical for the long-term survival of the species.			undertaking of the proposal
Dasyurus maculatus	Spotted-tailed Quoll	The life cycle of this species is reliant on large home ranges across relatively undisturbed habitat; 200-500ha for females, and 500-4000ha for males. Despite records from the search area, the discontinuous habitat within the subject site makes it unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCTs 781 and 834. Consequently, 1.778 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Phascogale tapoatafa	Brush-tailed Phascogale	The life cycle of this species is dependent on an abundant number of tree hollows. As the subject site contains seven suitable hollows, it is unlikely to be critical to the life cycle of the species. Where possible, hollow-bearing trees should be retained to reduce impacts on this species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Sminthopsis leucopus	White-footed Dunnart	This species requires an open understorey structure in undisturbed habitat to complete its life cycle. Although breeding populations have been recorded in areas post disturbance – these typically do not persist as regeneration proceeds and	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

		the vegetation community shifts. Owing to the historical clearance of the site, and the discontinuous structure of vegetation within the subject site, it is unlikely that a population continues to persist. Given the only record from within the search area is from undisturbed habitat within Mimosa Rocks National Park, it is unlikely a population inhabits the subject site.					
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	The species requires heath and open forest environments, with a healthy understorey, to successfully complete its life cycle. Despite the historical records, the significant historical disturbance makes it unlikely that a population continues to persist. Therefore, the subject site is unlikely to be critical to the maintenance of the life cycle of this species.	N/A	i i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Phascolarctos cinereus	Koala	This species is dependent on the presence of its food tree species, of which five were present: *Eucalyptus baieroama; E. bosistoana;*	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the

		E. cypellocarpa; E. globaoidea; E. tereticornis. See **Appendix G** for further consideration.		iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.			undertaking of the proposal
Cercartetus nanus	Eastern Pygmy-possum	The species is highly dependent on the presence of an abundance of hollows. Within the subject site there was a total of seven hollows. Where possible, hollow-bearing trees should be retained to reduce impacts on this species. If achieved, this proposal will not significantly increase the risk of local extinction. If achieved, this proposal will not significantly increase the risk of local extinction.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Petaurus australis	Yellow-bellied Glider	This species requires large hollow bearing trees (dead or alive). Within the subject site there was a single large hollow. It is thus unlikely that the subject site is critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Petaurus norfolcensis	Squirrel Glider	This species requires large hollow bearing trees (dead or alive). Within the subject site there was a single large hollow. It is thus unlikely that the subject site is critical to	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

		the maintenance of the life cycle of this species.		critical for the long-term survival of the species.			
Potorous tridactylus	Long-nosed Potoroo	This species requires coastal heaths and sclerophyll forests with dense understories. Given the absence of suitable habitat, it is unlikely that the subject site is critical to the maintenance of this species life cycle.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Pteropus poliocephalus	Grey-headed Flying-fox	If flying foxes are present at their roosting camp during construction phase of the development, then the proposal may reduce the species area of occupancy by encouraging migration elsewhere, or population fragmentation. As the species is prone to health issues relating to stress, females may miscarry or abandon their young. It is likely that flying foxes will be present, given that the population is one of national significance and that they were during the field survey, then a Bat Management Plan must be devised and implemented, along with appropriate mitigation	N/A	i. Individuals of this species were found to be roosting within, and adjacent to, the subject site, in association with PCT 781 and 834. Consequently, 1.778 ha of foraging habitat may be impacted. Although roosting habitat will likely be unaffected, the greatest concern involves the populations response to noise and vibration. ii. As impacts will be confined to much of the pre-existing road corridor, then the extent of population fragmentation is expected to be minor. However, there is serious concern that development of the project will promote the population partitioning in two or more if individuals leave their roosts and establish new camps. In the likely event that flying foxes are present, then a Bat Management Plan must be devised and implemented. A Threatened Species License under the BC Act will also be required. iii. The proposal should not have a long-term impact on flying fox habitat. Concerns are	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	If flying fox camps are present, a Bat Management Plan must be devised and implemented, to prevent significant impacts to this species. In addition, a Threatened Species License under the BC Act, would be required.

		methods. In addition, a Threatened Species License under the BC Act would be required.		specific to the short-term, during construction, and relate to noise and vibration.			
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	This species roosts alone, or in small groups of up to 6, in tree hollows, buildings or burrows. The subject site contains seven suitable hollows. Where possible, the hollow-bearing trees should be retained to reduce impacts on this species. If achieved, this proposal will not significantly increase the risk of local extinction.	N/A	i. This species is associated with PCT 781. Consequently, 0.083ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	This species is a solitary rooster with a preference for tree hollows but will also utilise bark and man-made structures. The subject site contains seven suitable hollows for the species. Where possible, the hollow-bearing trees should be retained to reduce impacts on this species. If achieved, this proposal will not significantly increase the risk of local extinction.	N/A	i. This species is associated with PCT 781 and 834. Consequently, 1.778 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Falsistrellus tasmaniensis	Eastern False Pipistrelle	This species generally roosts in eucalypt hollows, but has also been found to utilise loose bark and buildings. The subject site	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the

		contains seven suitable hollows for the species. Where possible, the hollow-bearing trees should be retained to reduce impacts on this species. If achieved, this proposal will not significantly increase the risk of local extinction.		fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.			undertaking of the proposal
Myotis macropus	Southern Myotis	This species roosts in groups of 10 – 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. The subject site contains seven suitable hollows for the species. Where possible, the hollow-bearing trees should be retained to reduce impacts on this species. If achieved, this proposal will not significantly increase the risk of local extinction.	N/A	i. This species is associated with PCT 781 and 834. Consequently, 1.778 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Scoteanax rueppellii	Greater Broad-nosed Bat	Although this species prefers tree hollows for roosting purposes, it has also been found in buildings. The subject site contains seven suitable hollows. Where possible, the hollow-bearing trees should be retained to reduce impacts on this species. If achieved, this proposal will not	N/A	i. This species is associated with PCT 781 and 834. Consequently, 1.778 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

		significantly increase the risk of local extinction.					
Miniopterus orianae oceanensis	Large Bent-winged Bat	Caves are the primary roosting habitat for the species, but it will also utilise derelict mines, storm-water tunnels, buildings and other man-made structures. As the subject site lacks many of these habitat features, it is unlikely to be key habitat for the species.	N/A	i. This species is associated with PCT 781 and 834. Consequently, 1.778 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Wilsonia backhousei	Narrow-leafed Wilsonia	This species grows at the margins of salt marshes and lakes. Although recorded from within the search area, this habitat was absent from the subject site. It is thus unlikely that the subject site is critical to the maintenance of the life cycle of this species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Wilsonia rotundifolia	Round-leafed Wilsonia	This species grows in the mud of coastal saltmarsh and inland lake beds. Although recorded from within the search area, this habitat was absent form the subject site. It is thus unlikely that the subject site is critical to the maintenance of the life cycle of this species.	N/A	i. This species is associated with PCT 781. Consequently, up to 0.083 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

Pultenaea pedunculata	Matted Bush-pea	NSW populations of this species are typically associated with woodland vegetation, although some individuals have been recorded in roadside vegetation. Although there are records from the search area, the lack of records from within the subject site, the failure to detect the species during the field survey, and the discontinuous nature of vegetation makes it unlikely that the area is critical to the maintenance of the life cycle of this species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Acacia georgensis	Bega Wattle	This species requires well-drained, shallow soils. Although there are records within the search area, the failure to detect the species during the field survey, and the highly disturbed nature of the subject site, makes it unlikely that the area is critical to the maintenance of the life cycle of the species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Haloragis exalata subsp. exalata	Square Raspwort	This species requires protected, shaded, riparian habitat. Given the absence of this from the subject site, it is unlikely to be critical to	N/A	i. This species is associated with PCT 781. Consequently, up to 0.083 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the

		the maintenance of the life cycle of this species.		iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.			undertaking of the proposal
Persicaria elatior	Tall Knotweed	This species grows in damp, moist conditions – primarily beside streams and lakes. Although potential suitable habitat was present, the failure to detect the species during the field survey, and the absence of records from the search area makes it unlikely that the subject site is critical to the maintenance of the life cycle of the species.	N/A	i. This species is associated with PCT 781. Consequently, up to 0.083 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Lysimachia vulgaris var. davurica	Yellow Loosestrife	The species requires extensive wetland habitat to successfully complete its life cycle. Although the Bega Valley represents one of its strongholds in NSW, and there are records within the search area, the lack of appropriate habitat makes it unlikely that the subject site is critical to the maintenance of the life cycle of the species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Pomaderris bodalla	Bodalla Pomaderris	This species grows in moist open forest along sheltered gullies and along stream banks. Although there are records within the search area, the absence of appropriate habitat makes it	N/A	i. This species is not associated any PCT. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the

		unlikely that the subject site is critical to the maintenance of the life cycle of the species.		critical for the long-term survival of the species.			undertaking of the proposal
Thesium australe	Austral Toadflax	This species occurs in grassy woodland, often found in association with Kangaroo Grass. Although suitable habitat was present, the absent of records from within the search area, and the fragmentary nature of vegetation within the subject site, makes it unlikely that the area is critical to the maintenance of the life cycle of the species.	N/A	i. This species is associated with PCT 834. Consequently, 1.695 ha of habitat may be impacted. ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal
Viola cleistogamoides	Hidden Violet	The species grows in a variety of habitats, often in wet sandy coastal heaths, but also inland among woodland and forests with a grassy understorey. Although there are records from within the search area, the absence of appropriate habitat and the disturbed nature of the subject site make it unlikely that the area is critical to the maintenance of the life cycle of the species.	N/A	i. This species is not known to be associated with any PCT present within the subject site. However, given historical records within the search area, it must be considered as a species potentially impacted by the development ii. As impacts will be confined to much of the pre-existing road corridor, the extent of fragmentation is expected to be minor. iii. Considering the above, and point a., the proposal will not remove habitat likely to be critical for the long-term survival of the species.	No, AOBV not present within or close to the subject site.	Yes. See **Appendix F**	No significant impact will arise to the local viability of this species or its habitat due to the undertaking of the proposal

APPENDIX E - MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The EPBC Act protects nationally and internationally important flora, fauna, ecological communities, and heritage places, which are defined in the EPBC Act as matters of national environmental significance. The EPBC Act policy Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (DoE, 2013) forms the basis of determining if impact to protected matters is significant.

A Protected Matters Search identified four Endangered Ecological Communities, 79 threatened species, 56 migratory/marine species with a potentially occurring within 10 km of the subject site.

The following tables give an overview of the assessments of these threatened entities and shows that the Proposed activity:

1. Is not likely to have a significant impact on a matter of national environmental significance. The matters of national environmental significance are:
    i. World heritage properties.
    ii. National heritage places.
    iii. Wetlands of international importance.
    iv. Threatened species and ecological communities.
    v. Migratory species.
    vi. Commonwealth marine areas.
    vii. The Great Barrier Reef Marine Park.
    viii. Nuclear actions (including uranium mines).
    ix. A water resource, in relation to coal seam gas development and large coal mining development.
2. Is not likely to have a significant impact on the environment in general (for actions by Commonwealth agencies or actions on Commonwealth land) or the environment on Commonwealth land (for actions outside Commonwealth land).

Notes: Important Population as determined by the Environment Protection and Biodiversity Conservation Act 1999, is one that for a vulnerable species:

a) is likely to be key source population either for breeding or dispersal

b) is likely to be necessary for maintaining genetic diversity

c) is at or near the limit of the species range.

A ‘significant impact’ is an impact which is important, notable, or of consequence, having regard to its context or intensity (DoE, 201

Table of EPBC Act-listed Threatened Ecological Communities

Name	Status	Likelihood of Occurrence	5-part test required (Yes / No)
Alpine Sphagnum Bogs and Associated Fens	Endangered	**Absent** Does not occur within the subject site	No
Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community	Endangered	**Absent** Does not occur within the subject site	No
Illawarra and south coast lowland forest and woodland ecological community	Critically Endangered	**Absent** Does not occur within the subject site	No
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	**Absent** Does not occur within the subject site	No
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Critically Endangered	**Absent** Does not occur within the subject site	No
Subtropical and Temperate Coastal marsh	Vulnerable	**Absent** Does not occur within the subject site	No
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	**Absent** Does not occur within the subject site	No

EPBC Act-listed Critically Endangered and Endangered Species

Australasian Bittern - *Botaurus poiciloptilus*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of a population	The proposal is unlikely to have a significant impact on the species. There are records from within the search area, however, the most recent is from 1996. Although the subject site is within a priority management area, the highly disturbed, discontinuous nature of vegetation and lack of marsh habitat makes it highly unlikely that the proposal will induce a long-term decline in the population of this species. Any population that exists within the area would likely only utilise the available 0.083 ha's of habitat for foraging or transiently. Significantly more habitat will remain within the search area.
Reduce the area of occupancy of the species	No. The subject site would represent fragmented, potentially unusable habitat for this species.
Fragment an existing population into two or more populations	No. The subject site is unlikely to contain a population of this species, at best, it may support foraging or transiting individuals.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species.
Disrupt the breeding cycle of a population	No significant breeding habitat would be impacted by this proposal.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 0.083 ha of potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Drainage of wetlands; reduction of water quality; predation by introduced species; use of herbicides and inappropriate grazing regimes are the main threats to the species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Curlew Sandpiper – *Calidris ferruginea*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of a population	The proposal is unlikely to have a significant impact on the species. Although there are records within the search area, the subject site is not within a priority management area for the species. The highly disturbed, discontinuous nature of vegetation within the subject site makes it highly unlikely that the proposal will induce a long-term decline in the population of this species. Any population that exists within the area would likely only utilise the available 0.083 ha's of habitat for foraging or transiently. Significantly more habitat will remain within the search area.
Reduce the area of occupancy of the species	No. The subject site would represent fragmented, potentially unusable habitat for this species.
Fragment an existing population into two or more populations	No. The subject site is unlikely to contain a population of this species, at best, it may support foraging or transiting individuals.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species.
Disrupt the breeding cycle of a population	Breeding habitat occurs exclusively in the northern hemisphere, and thus will not be affected by this proposal.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 0.083 ha of potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Developmental pressure and disturbance are the main threats to the species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Eastern Curlew – *Numenius madagascariensis*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of a population	The proposal is unlikely to have a significant impact on the species. Although there are records within the search area, the subject site is not within a priority management area for the species. The highly disturbed, discontinuous nature of vegetation within the subject site makes it highly unlikely that the proposal will induce a long-term decline in the population of this species. No associated vegetation with the species is present at the subject site.
Reduce the area of occupancy of the species	No. The subject site does not contain usable habitat for this species.
Fragment an existing population into two or more populations	No. The subject site is unlikely to contain a population of this species, at best, it may support foraging or transiting individuals.
Adversely affect habitat critical to the survival of a species	No. The subject site does not contain critical habitat for this species.
Disrupt the breeding cycle of a population	Breeding habitat occurs exclusively in the northern hemisphere, and thus will not be affected by this proposal.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify no known potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Developmental pressure and disturbance are the main threats to the species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Swift Parrot – *Lathamus discolor*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of a population	The proposal is unlikely to have a significant impact on the species. There are records from within the search area, however, the most recent is from 2007. Although the subject site is within a priority management area, the highly disturbed, discontinuous nature of vegetation makes it highly unlikely that the proposal will induce a long-term decline in the population of this species. Any population that exists within the area would likely only utilise the available 1.695 ha's of habitat for foraging or transiently. Significantly more vegetation of use will remain within the search area.
Reduce the area of occupancy of the species	No. The subject site would represent fragmented, potentially unusable habitat for this species.
Fragment an existing population into two or more populations	No. The subject site is unlikely to contain a population of this species, at best, it may support foraging or transiting individuals.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species.
Disrupt the breeding cycle of a population	Breeding habitat occurs exclusively in Tasmania, and thus will not be affected by the proposal.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 1.695 ha of potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Habitat loss; reduced food availability from drought; competition from bees and larger honeyeaters; Psittacine Beak and Feather Disease; exotic weed invasions of key habitat and predation by introduced species are the main threats to the species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Orange-bellied Parrot – *Neophema chrysogaster*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of a population	The proposal is unlikely to have a significant impact on the species. The subject site is not within a priority management area and there are no historical records from the search area. It is therefore highly unlikely that the proposal will induce a long-term decline in the population of this species. Any population that exists within the area would likely only utilise the available 1.695 ha's of habitat for foraging or transiently. Significantly more vegetation of use will remain within the search area.
Reduce the area of occupancy of the species	No. The subject site would represent fragmented, potentially unusable habitat for this species.
Fragment an existing population into two or more populations	No. The subject site is unlikely to contain a population of this species, at best, it may support foraging or transiting individuals.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species.
Disrupt the breeding cycle of a population	Breeding habitat occurs exclusively in Tasmania, and thus will not be affected by the proposal.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 1.695 ha of potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Habitat loss; competition from bees; Psittacine Beak and Feather Disease and predation by introduced species are the main threats to the species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Regent Honeyeater – *Anthochaera phrygia*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of a population	The proposal is unlikely to have a significant impact on the species. Although there are records from within the search area, the most recent is from 2010. The subject site is not within a priority management area, and the highly disturbed, discontinuous nature of vegetation makes it unlikely that the proposal will induce a long-term decline in the population of this species., Any population that exists within the area would likely only utilise the available 1.695 ha's of habitat for foraging or transiently. Significantly more vegetation of use will remain within the search area.
Reduce the area of occupancy of the species	No. The subject site would represent fragmented, potentially unusable habitat for this species.
Fragment an existing population into two or more populations	No. The subject site is unlikely to contain a population of this species, at best, it may support foraging or transiting individuals.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species.
Disrupt the breeding cycle of a population	No significant breeding habitat would be impacted by this proposal.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 1.695 ha of potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Habitat loss; competition from larger honeyeaters; inappropriate fire regimes and predation by introduced species are the main threats to the species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Spotted-tailed Quoll – *Dasyurus maculatus*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of a population	The proposal is unlikely to have a significant impact on the species, as although 0.91 ha of suitable habitat occurs on the subject site, individuals may require up to 4000 ha of undisturbed habitat, and therefore it is unlikely that any individuals inhabit the area. The subject site is not within a priority management area for the species. Although there is a record from 2019 adjacent to the subject site, this was from an area of continuous vegetation unimpacted by the proposal. Therefore, it is unlikely that the subject site contains an important population of this species.
Reduce the area of occupancy of the species	No. The subject site would represent fragmented, potentially unusable habitat for this species.
Fragment an existing population into two or more populations	No. The subject site is unlikely to contain a population of this species, at best, the site may support transiting individuals.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species.
Disrupt the breeding cycle of a population	No significant breeding habitat would be impacted by this proposal.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 0.91 ha of potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Loss and fragmentation of habitat; competition with introduced species; illegal culling and collision with motor vehicles are the main threats to the species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Southern Brown Bandicoot (eastern) – *Isodon obesulus obesulus*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of a population	The proposal is unlikely to have a significant impact on the species. Although there are records from within the search area, the most recent is from 1992. The subject site contained no suitable habitat for the species, nor is it within a priority management area. Therefore, it is unlikely that the subject site contains an important population of this species.
Reduce the area of occupancy of the species	No. The subject site would represent fragmented, potentially unusable habitat for this species.
Fragment an existing population into two or more populations	No. The subject site is unlikely to contain a population of this species, at best, the site may support transiting individuals.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species.
Disrupt the breeding cycle of a population	No significant breeding habitat would be impacted by this proposal.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify no known habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Loss and fragmentation of habitat; inappropriate fire regimes; predation by introduced species and collision with motor vehicles are the main threats to the species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Koala – *Phascolarctos cinereus*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of a population	The proposal is unlikely to have a significant impact on the species. Although there are records from adjacent to the subject site, the most recent of these is from 1989. The 1.695 ha of habitat is potentially unsuitable, given the highly fragmentary nature of vegetation along the subject site. For more considerations, consult **Appendix G. It** is however unlikely that the subject site contains an important population of this species.
Reduce the area of occupancy of the species	No. The subject site would represent fragmented, potentially unusable habitat for this species.
Fragment an existing population into two or more populations	No. The subject site is unlikely to contain a population of this species, at best, the site may support transiting individuals.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species.
Disrupt the breeding cycle of a population	No significant breeding habitat would be impacted by this proposal.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 1.695 ha of potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Loss and fragmentation of habitat; collision with motor vehicles; proliferation of koala disease and predation by canines are the main threats to the species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

EPBC Act-listed Vulnerable

Stuttering Frog – *Mixophyes balbus*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area, nor are there records from later than 1994. It is unlikely that an important population inhabits the subject site.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	No habitat critical to the survival of an important population will be impacted, as no vegetation within the subject site is associated with the species.
Disrupt the breeding cycle of an important population	No. No population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove or modify habitat associated with the species. It will also not exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Modification and loss of habitat; disease – chytrid fungus; changes to water flows and quality; predation of eggs and tadpoles by introduced fish; and disturbance by domestic stock are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Green and Golden Bell Frog – *Litoria aurea*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area for the species, nor are there historical records. The nearest record is 15km to the south of the subject site, from 2000. As such, the subject site is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species, as no records exist within the search area.
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 0.083 ha of potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Modification and loss of habitat; disease – chytrid fungus; changes to water flows and quality and predation of eggs and tadpoles by introduced fish are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Littlejohns Tree Frog – *Litoria littlejohni*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area. The only record from the search area is from the Horseshoe Lagoon, an area 4.4km southeast of the subject site. It is unlikely that the subject site contains an important population of this species.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species, as the only population within the search area is located to the southeast and it is not associated with any known vegetation.
Disrupt the breeding cycle of an important population	No. No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove or modify habitat associated with the species. It will also not exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Modification and loss of habitat; disease – chytrid fungus; changes to water flows and quality and predation of eggs and tadpoles by introduced fish are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Giant Burrowing Frog – *Heleioporus australiacus*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area, nor are there records from within the search area. The nearest record is 13.6km to the south, from 2010. As such, the subject site is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for an important population, as no records exist within the search area.
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 1.695 ha of potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Modification and loss of habitat; disease – chytrid fungus; changes to water flows and quality and predation of eggs and tadpoles by introduced fish are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

White-throated Needletail – *Hirundapus caudacutus*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area. Although there are records from within the search area, they exist exclusively along the coastline. As at its nearest point the subject site is ~4km from the coast, it is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is unlikely critical habitat for the species, as no individuals have been recorded away from the coastline.
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 1.778 ha of potential habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Vegetation clearing and rotor strikes from windfarms are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Eastern Hooded Dotterel – *Thinornis cucullatus cucullatus*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area. The only records from the search area are clustered along the coast. As at its nearest point the subject site is ~4km from the coast, it is unlikely to contain an important population of this species.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The subject site would not provide critical habitat for an important population as no individuals have been recorded away from the coastline.
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove or modify habitat associated with the species. It will also not exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Predation of eggs and chicks by foxes; disturbance; and loss or degradation of coastal habitat are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Yellow-bellied Glider – *Petaurus australis*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. Despite the abundance of records from within the search area, the species requires large hollow-bearing trees for nesting. As the subject site possessed only a single suitable tree, it would not be possible for an important population to persist.
Reduce the area of occupancy of an important population	No important population is expected to occur.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species given the lack of hollow-bearing trees.
Adversely affect habitat critical to the survival of a species	The subject site is unlikely to possess critical habitat for an important population, given the lack of hollow bearing-trees.
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 1.695 ha of habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Loss and fragmentation of habitat; loss of hollow-bearing trees and loss of feed trees are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Greater Glider – *Petauroides volans*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area, nor are there records from the search area more recent than 1990. As the species requires large hollow-bearing trees for nesting, the single suitable tree would not permit an important population to persist at the subject site..
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The subject site is unlikely to be critical habitat for an important population given the scarcity of hollow-bearing trees
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove or modify habitat associated with the species. It will also not exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Loss and fragmentation of habitat; loss of hollow-bearing trees and loss of feed trees are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Long-nosed Potoroo – *Potorous triactylus*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area for the species nor are there records more recent than 2009. As the species requires a thick, dense understorey, the subject site is unlikely to contain an important population of the species.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The subject site is unlikely to be critical habitat for an important population given the lack of an appropriate understorey
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove or modify habitat associated with the species. It will also not exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Loss and fragmentation of habitat; predation by introduced species; and collision with motor vehicles are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Grey-headed Flying-fox – *Pteropus poliocephalus*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is expected to impact 1.778 ha of habitat for this species. The subject site is not within a priority management area for the species. However, the subject site contains a nationally significant population. If the flying-foxes are in residence during the clearance or construction process, as they were during the field survey, there may be significant adverse impacts to this population. Thus, a Bat Management Plan must be devised and implemented, with appropriate mitigation methods to be followed. In addition, a Threatened Species License under the BC Act would be required.
Reduce the area of occupancy of an important population	If the flying-foxes are in residence during the clearance or construction process, this proposal may reduce the area of occupancy for this species by encouraging it to move elsewhere. Thus, a Bat Management Plan must be devised and implemented, with appropriate mitigation methods to be followed. In addition, a Threatened Species License under the BC Act would be required.
Fragment an existing important population into two or more populations	If the flying-foxes are in residence during the clearance or construction process, the population may be partitioned if individuals leave their roost and establish new camps. Thus, a Bat Management Plan must be devised and implemented, with appropriate mitigation methods to be followed. In addition, a Threatened Species License under the BC Act would be required.
Adversely affect habitat critical to the survival of a species	It is not anticipated for this proposal to have a persistent, long-term impact on habitat critical to the survival of this species. The impacts would be short-term, during the clearance and construction process. Most of the impacts would relate to noise and vibration, rather than long-term habitat loss.
Disrupt the breeding cycle of an important population	If the flying-foxes are in residence during the clearance or construction process, the proposal may disrupt the breeding cycle by stressing the animals to the point that they either miscarry or abandon their young. Thus, a Bat Management Plan must be devised and implemented, with appropriate mitigation methods to be followed. In addition, a Threatened Species License under the BC Act would be required.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify 1.695 ha of habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any impacts would be short-term, during the clearing and construction, and mostly a result of noise and vibration, it would not result in long-term habitat loss.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).

Grey-headed Flying-fox – *Pteropus poliocephalus*	
Interfere with the recovery of the species.	Loss and fragmentation of habitat; predation by introduced species; and collision with motor vehicles are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Mitigation methods	No roosting trees are permittable to be removed or pruned; construction work should only occur when individuals of the species are absent; construction must be undertaken in the presence of a flying-fox expert; a BC Act permit must be obtained prior to commencement of development
Conclusion	**If a Bat Management Plan is devised and implemented, no significant impacts to this species anticipated. A Threatened Species License under the BC Act would also be required.**

Bega Wattle – *Acacia georgensis*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area for the species. Although the most recent records date from 2019, all are located either in Mimosa Rocks National Park or along the coastal heathlands. As this conspicuous species was not detected during the field survey, it is unlikely that the subject site contains an important population of this species.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The habitat within the subject site is not associated with the species and is thus unlikely to be critical to its survival.
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove or modify habitat associated with the species. It will also not exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Loss and fragmentation of habitat; incursions by exotic species and inappropriate fire regimes are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Square Raspwort – *Haloragis exalata* subsp. *exalata*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area for the species nor are records from within the search area. The nearest record is 41km to the north, dated from 1980. It is therefore unlikely that the subject site contains an important population of this species.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The subject site is unlikely to possess critical habitat for an important population given the sites degraded quality.
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will not remove or modify habitat associated with the species. It will also not exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Loss and fragmentation of habitat; incursions by exotic species; lack of disturbance and sea level rise are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Tall Knotweed – *Persicaria elatior*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area for the species nor are there records from the search area. It is therefore unlikely that the subject site contains an important population of this species.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The subject site is unlikely critical habitat for an important population given its degraded quality.
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 0.083 ha of habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Clearing and disturbance; change of hydrological flow into wetlands and grazing pressures are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

Austral Toadflax – *Thesium austral*	
Significant Impact Guideline	**Assessment**
Lead to a long-term decrease in the size of an important population of a species	The proposal is not anticipated to generate a significant impact on an important population of this species. The subject site is not within a priority management area for the species nor are there records from within the search area. It is therefore unlikely that the subject site contains an important population of this species.
Reduce the area of occupancy of an important population	No important population is expected to occur at the site.
Fragment an existing important population into two or more populations	The subject site is unlikely to contain an important population of this species.
Adversely affect habitat critical to the survival of a species	The subject site is unlikely critical habitat for an important population given its degraded quality.
Disrupt the breeding cycle of an important population	No important population is expected to occur at the site.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove and/or modify up to 1.695 ha of habitat for the species. The proposal will not significantly exacerbate existing fragmentation for this species. Any reduction and fragmentation of available habitat is unlikely to cause the species to decline at a regional scale.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	There is the potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Introduce disease that may cause the species to decline	Machinery used on site can potentially act as a transport for biosecurity risks. Environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Interfere with the recovery of the species.	Clearing and disturbance; exotic weed incursions; inappropriate fire regimes and grazing pressures are the main threats to this species. The proposal is unlikely to directly interfere with the recovery of the species within the region.
Conclusion	**No significant impact.**

EPBC Act-listed Migratory Species

Common Sandpiper – *Actitis hypoleucos*	
Significant Impact Guideline	**Assessment**
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	As the species is very widely distributed, and as the subject site contains only small areas of potential habitat for this species it is unlikely to constitute important habitat for this species; superior habitat will remain nearby.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	It is unlikely that the subject site constitutes important habitat for this species. While there is potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the subject site. The proposal is unlikely to seriously disrupt the lifecycle for this species.
Conclusion	**No significant impact**

Fork-tailed Swift – *Apus pacificus*	
Significant Impact Guideline	**Assessment**
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	As the species is very widely distributed, and as the subject site contains only small areas of potential habitat for this species it is unlikely to constitute important habitat for this species; superior habitat will remain nearby.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	It is unlikely that the subject site constitutes important habitat for this species. While there is potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the subject site. The proposal is unlikely to seriously disrupt the lifecycle for this species.
Conclusion	**No significant impact**

White-throated Needletail – *Hirundapus caudacutus*	
Significant Impact Guideline	**Assessment**
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	As the species is very widely distributed, and as the subject site contains only small areas of potential habitat for this species it is unlikely to constitute important habitat for this species; superior habitat will remain nearby.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	It is unlikely that the subject site constitutes important habitat for this species. While there is potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the subject site. The proposal is unlikely to seriously disrupt the lifecycle for this species.
Conclusion	**No significant impact**

Sanderling – *Calidris alba*	
Significant Impact Guideline	**Assessment**
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	As the species is very widely distributed, and as the subject site contains only small areas of potential habitat for this species it is unlikely to constitute important habitat for this species; superior habitat will remain nearby.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	It is unlikely that the subject site constitutes important habitat for this species. While there is potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the subject site. The proposal is unlikely to seriously disrupt the lifecycle for this species.
Conclusion	**No significant impact**

Curlew Sandpiper – *Calidris ferruginea*	
Significant Impact Guideline	**Assessment**
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	As the species is very widely distributed, and as the subject site contains only small areas of potential habitat for this species it is unlikely to constitute important habitat for this species; superior habitat will remain nearby.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	It is unlikely that the subject site constitutes important habitat for this species. While there is potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the subject site. The proposal is unlikely to seriously disrupt the lifecycle for this species.
Conclusion	**No significant impact**

Pectoral Sandpiper – *Calidris melanotos*	
Significant Impact Guideline	**Assessment**
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	As the species is very widely distributed, and as the subject site contains only small areas of potential habitat for this species it is unlikely to constitute important habitat for this species; superior habitat will remain nearby.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	It is unlikely that the subject site constitutes important habitat for this species. While there is potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the subject site. The proposal is unlikely to seriously disrupt the lifecycle for this species.
Conclusion	**No significant impact**

Bar-tailed Godwit – *Limosa lapponica*	
Significant Impact Guideline	**Assessment**
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	As the species is very widely distributed, and as the subject site contains only small areas of potential habitat for this species it is unlikely to constitute important habitat for this species; superior habitat will remain nearby.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	It is unlikely that the subject site constitutes important habitat for this species. While there is potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the subject site. The proposal is unlikely to seriously disrupt the lifecycle for this species.
Conclusion	**No significant impact**

Rainbow Bee-eater – *Merops ernatus*	
Significant Impact Guideline	**Assessment**
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	As the species is very widely distributed, and as the subject site contains only small areas of potential habitat for this species it is unlikely to constitute important habitat for this species; superior habitat will remain nearby.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	It is unlikely that the subject site constitutes important habitat for this species. While there is potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the subject site. The proposal is unlikely to seriously disrupt the lifecycle for this species.
Conclusion	**No significant impact**

Satin Flycatcher – *Myiagra cyanoleuca*	
Significant Impact Guideline	**Assessment**
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	As the species is very widely distributed, and as the subject site contains only small areas of potential habitat for this species it is unlikely to constitute important habitat for this species; superior habitat will remain nearby.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	It is unlikely that the subject site constitutes important habitat for this species. While there is potential for works to introduce invasive species to the subject site or exacerbate existing infestations of significant invasive species, environmental safeguards for the management of biosecurity risks will be implemented (see **Section 7**).
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	It is unlikely that an ecologically significant proportion of the population occurs within or is dependent on the subject site. The proposal is unlikely to seriously disrupt the lifecycle for this species.
Conclusion	**No significant impact**

APPENDIX F – KEY THREATENING PROCESSES

Key Threatening Processes (KTP) predicted as acting on the study area that may be exacerbated by the proposal.

Name	NSW status	Comm status	Likelihood of Occurrence	Exacerbated by Proposal
Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners, *Manorina melanocephala* (Latham, 1802)	KTP	KTP	**Unlikely**	**No** The proposal does not include any activities that would exacerbate this threat.
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	KTP		**Unlikely**	**Potentially** The Bega River is mapped within the study area, and 23 minor, non-perennial watercourses flow through the subject site. Provided active attempts are made to minimise runoff, this KTP should not be exacerbated.
Anthropogenic Climate Change	KTP	KTP	**Likely**	**Yes** Some unavoidable emissions will occur from construction machinery and removal of native vegetation will diminish the carbon storing capacity of the subject site.
Bushrock removal	KTP		**Unlikely**	**No** No bushrock was observed during the field survey.
Clearing of native vegetation	KTP	KTP	**Very Likely**	**Yes** Up to 1.778 ha of native vegetation may be cleared by the proposal.
Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus* (L.)	KTP	KTP	**Likely**	**Potentially** The spread of grassy weeds that may result from these works could encourage rabbit activity.
Competition and habitat degradation by Feral Goats, *Capra hircus* Linnaeus 2258	KTP	KTP	**Unlikely**	**No** The proposal does not include any activities that would exacerbate this threat.
Competition from feral honey bees, *Apis mellifera* L.	KTP		**Very likely**	**Yes** Loss of tree hollows can exacerbate this threat. Four hollow-bearing trees (with a total of one large, and six small hollows) were recorded within the subject site, removal of these trees could exacerbate this KTP. Exacerbation of this KTP could be avoided by retaining these hollow-bearing trees.

Name	NSW status	Comm status	Likelihood of Occurrence	Exacerbated by Proposal
Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners	KTP		**Unlikely**	**No** The proposal does not include any activities that would exacerbate this threat.
Herbivory and environmental degradation caused by feral deer	KTP		**Unlikely**	**No** The proposed development will not increase occupancy by this species.
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	KTP		**Unlikely**	**No** Fire frequency will not increase due to activities undertaken as part of the proposal.
Importation of Red Imported Fire Ants *Solenopsis invicta* Buren 1972	KTP	KTP	**Unlikely**	**Potentially** Machinery used on site can potentially act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.
Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations	KTP	KTP	**Unlikely**	**Yes** Loss of tree hollows can exacerbate this threat. Four hollow-bearing trees (with a total of one large, and six small hollows) were recorded within the subject site, removal of these trees could exacerbate this KTP. Exacerbation of this KTP could be avoided by retaining these hollow-bearing trees.
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	KTP	KTP	**Unlikely**	**Potentially** Machinery used on site can potentially act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.
Infection of native plants by *Phytophthora cinnamomi*	KTP	KTP	**Unlikely**	**Potentially** Machinery used on site can potentially act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.
Introduction of the Large Earth Bumblebee *Bombus terrestris* (L.)	KTP		**Unlikely**	**No** This species only occurs in Tasmania.
Invasion and establishment of exotic vines and scramblers	KTP		**Unlikely**	**Potentially** No exotic vines or scramblers were recorded on the subject site, however, machinery used on site can potentially act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.

Name	NSW status	Comm status	Likelihood of Occurrence	Exacerbated by Proposal
Invasion and establishment of Scotch Broom (*Cytisus scoparius*)	KTP		**Unlikely**	**Potentially** Machinery used on site can potentially act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.
Invasion and establishment of the Cane Toad (*Bufo marinus*)	KTP	KTP	**Unlikely**	**No** This species is primarily confined to wetter subtropical and tropical sites. Should the cane toad be introduced to the subject site conditions would be too cold to permit survival. Machinery used on site can potentially act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.
Invasion of native plant communities by African Olive *Olea europaea* subsp. *cuspidata* (Wall. ex G. Don) Cif.	KTP		**Unlikely**	**Potentially** Machinery used on site can potentially act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.
Invasion of native plant communities by *Chrysanthemoides monilifera*	KTP		**Unlikely**	**Potentially** Machinery used on site can potentially act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.
Invasion of native plant communities by exotic perennial grasses	KTP		**Likely**	**Potentially** Machinery used on site can potentially act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.
Invasion of the Yellow Crazy Ant, *Anoplolepis gracilipes* (Fr. Smith) into NSW	KTP		**Unlikely**	**Potentially** This species is not known within the area, however machinery used on site can potentially act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.
Invasion, establishment and spread of Lantana (*Lantana camara L. sens. La*t)	KTP		**Unlikely**	**Potentially** This species has been recorded near the subject site and machinery can act as a transport for biosecurity risks. Implementation of the mitigation measures in **Section 7** should reduce this risk.
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	KTP	KTP	**Unlikely**	**No** The bike corridor will not exacerbate the escape of house plants.

Name	NSW status	Comm status	Likelihood of Occurrence	Exacerbated by Proposal
Loss of Hollow-bearing Trees	KTP		**Very likely**	**Yes** There are four hollow bearing trees within the subject site. It is recommended that these trees be retained to avoid exacerbating this KTP.
Loss or degradation (or both) of sites used for hill-topping by butterflies	KTP		**Unlikely**	**No** No sites known or suspected to be present.
Predation and hybridisation by Feral Dogs, *Canis lupus familiaris*	KTP		**Unlikely**	**No** The proposed works will not increase the likelihood of this threat.
Predation by *Gambusia holbrook*i Girard, 1859 (Plague Minnow or Mosquito Fish)	KTP		**Unlikely**	**No** The proposed works will not increase the likelihood of this threat.
Predation by the European Red Fox *Vulpes Vulpes* (Linnaeus, 2258)	KTP	KTP	**Unlikely**	**No** Ease of access for feral foxes will not be increased by the proposal
Predation by the Feral Cat *Felis catus* (Linnaeus, 2258)	KTP	KTP	**Unlikely**	**No** Ease of access for feral cats will not be increased by the proposal
Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa* Linnaeus 2258	KTP	KTP	**Unlikely**	**No** Ease of access for feral pigs will not be increased by the proposal
Removal of dead wood and dead trees	KTP		**Very Likely**	**Yes** Some dead wood is likely to be removed. It is recommended that this wood be retained or relocated where possible.

Appendix G – Koala Habitat Assessment Tool

Table 4: Koala habitat assessment tool

<table>
<tr><th>Attribute</th><th>Score</th><th>Inland</th><th>Coastal</th></tr>
<tr><td rowspan="3">Koala occurrence</td><td>+2 (high)</td><td>Evidence of one or more koalas within the last 5 years.</td><td>Evidence of one or more koalas within the last 2 years.</td></tr>
<tr><td>+1 (medium)</td><td>Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.</td><td>Evidence of one or more koalas within 2 km of the edge of the impact area within the last 5 years.</td></tr>
<tr><td>0 (low)</td><td>None of the above.</td><td>None of the above.</td></tr>
<tr><td rowspan="3">Vegetation composition</td><td>+2 (high)</td><td>Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, OR
1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.</td><td>Has forest or woodland with 2 or more known koala food tree species, OR
1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.</td></tr>
<tr><td>+1 (medium)</td><td>Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.</td><td>Has forest or woodland with only 1 species of known koala food tree present.</td></tr>
<tr><td>0 (low)</td><td>None of the above.</td><td>None of the above.</td></tr>
<tr><td rowspan="3">Habitat connectivity</td><td>+2 (high)</td><td>Area is part of a contiguous landscape ≥ 1000 ha.</td><td>Area is part of a contiguous landscape ≥ 500 ha.</td></tr>
<tr><td>+1 (medium)</td><td>Area is part of a contiguous landscape < 1000 ha, but ≥ 500 ha.</td><td>Area is part of a contiguous landscape < 500 ha, but ≥ 300 ha.</td></tr>
<tr><td>0 (low)</td><td>None of the above.</td><td>None of the above.</td></tr>
<tr><td rowspan="3">Key existing threats</td><td>+2 (high)</td><td colspan="2">Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence.
Areas which score 0 for koala occurrence and have no dog or vehicle threat present</td></tr>
<tr><td>+1 (medium)</td><td colspan="2">Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, OR
Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.</td></tr>
<tr><td>0 (low)</td><td colspan="2">Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, OR
Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.</td></tr>
<tr><td rowspan="3">Recovery value</td><td>+2 (high)</td><td colspan="2">Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.</td></tr>
<tr><td>+1 (medium)</td><td colspan="2">Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.</td></tr>
<tr><td>0 (low)</td><td colspan="2">Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.</td></tr>
</table>

Koala occurrence: No koala records within 2 km of the impact area in the past 5 years, although there are records from 2020 within the search area – but outside the 2 km boundary.

Vegetation composition: One primary koala food tree (*Eucalyptus tereticornis*), three secondary feed trees (*E. baureiana; E. bosistoana; E. cypellocarpa*) and one supplementary species (*E. globoidea*).

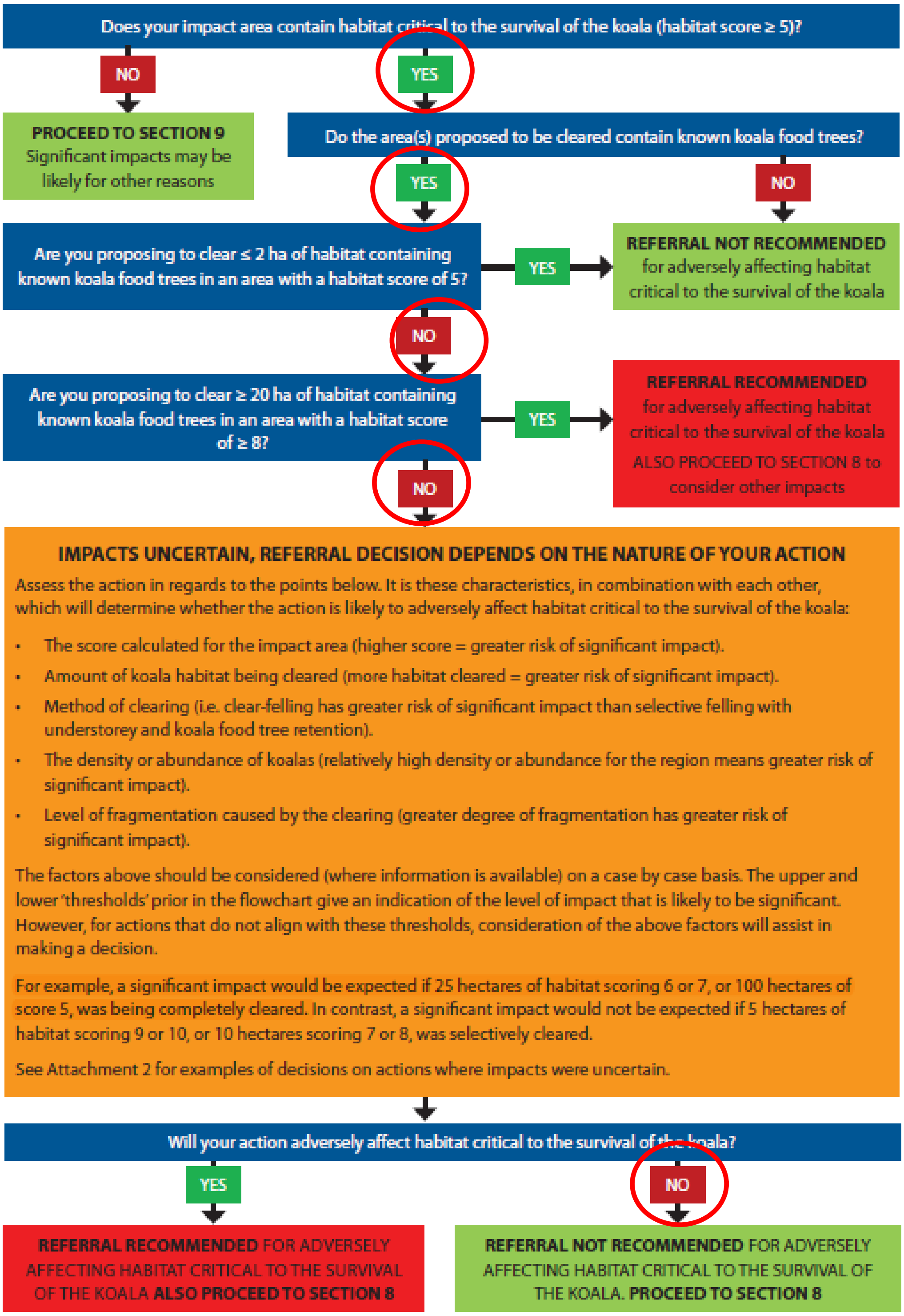
Habitat connectivity: The subject site offers some connectivity but not to continuous areas greater than 500 ha.

Key existing threats: There is likely to be a risk of vehicle strike and dog attack.

Recovery value: Given the lack of koala records in the area and the fragmentated nature of habitat, the subject site is unlikely to be important for achieving the interim recovery objectives.

Total score: The subject site qualifies as critical Koala habitat (score = 5).

Note: although this Koala Assessment Tool is now outdated as the Koala listing status has been elevated to Endangered, from Vulnerable, there are no new tools yet available, as such, this tool has been retained here.

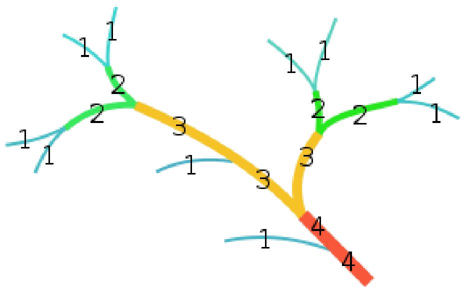


Assessment outcome: Referral not recommended.

APPENDIX H – TERMS AND ABBREVIATIONS

Abbreviation	Terminology	Description
BC Act	*Biodiversity Conservation Act 2016* (NSW)	The purpose of this Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. This Act contains schedules relating to the listing of threatened species, populations and communities in NSW. It also outlines the framework regulating development impact assessments in relation to biodiversity.
	Biosecurity Act 2015 (NSW)	The broad objectives for biosecurity in NSW are to manage biosecurity risks from animal and plant pests and diseases, weeds and contaminants by • Preventing their entry into NSW • Quickly finding, containing and eradicating any new entries • Effectively minimising the impacts of those pests, diseases, weeds and contaminants that cannot be eradicated through robust management arrangements. The *Biosecurity Act 2015* provides a statutory framework to help achieve these objectives.
CAMBA	China-Australia Migratory Bird Agreement	A bilateral migratory bird agreement with China entered into in 1986. It provides an important mechanism for pursuing conservation outcomes for migratory birds, including migratory waterbirds.
	Cumulative impacts	Impacts, when considered together, lead to a stronger impact than any impact in isolation.
	Direct impacts	Directly affect the habitat and individuals. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development.
DoEE	Australian Government Department of Environment and Energy	The Department of the Environment designs and implements the Australian Government's policies and programmes to protect and conserve the environment, water and heritage and promote climate action.
EEC	Endangered Ecological Community	An ecological community identified by relevant legislation likely to become extinct or is in immediate danger of extinction.
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW).	Provides the legislative framework for land use planning and development assessment in NSW.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).	Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
FM Act	*Fisheries Management Act 1994* (NSW)	The objects of this Act are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. This Act protects aquatic habitats and species which are not protected under the BC Act.
IBRA	Interim Biogeographic Regionalisation of Australia	The Interim Biogeographic Regionalisation for Australia (IBRA) is a biogeographic regionalisation of Australia developed by the Australian Government's Department of the Environment. Each region is a land area made up of a group of interacting ecosystems repeated in similar form across the landscape.
	Indirect impacts	Occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by

Abbreviation	Terminology	Description
		domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development.
JAMBA	Japan-Australia Migratory Bird Agreement	A bilateral migratory bird agreement with Japan entered into in 1974. It provides an important mechanism for pursuing conservation outcomes for migratory birds, including migratory waterbirds.
KTP	Key Threatening Process	A key threatening process is defined as a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities. A requirement of their listing on the TSC Act is that the process adversely affects two or more threatened species, populations or ecological communities, or may cause species, populations or ecological communities not threatened to become threatened.
	Local population (species)	A local population of a threatened plant species comprises those individuals occurring in a defined area or a cluster of individuals extend into habitat adjoining and contiguous with the study area where the individuals could reasonably be expected to cross-pollinate. A local population of fauna species comprises those individuals known or likely to occur in in a defined area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area. The local population of migratory or nomadic fauna species comprises those individuals likely to occur in the study area from time to time.
	Local occurrence (EEC)	The ecological community present within the study area. However, the local occurrence may include adjacent areas if the ecological community on the study area forms part of a larger contiguous area of the ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated.
	Low condition (vegetation)	Vegetation in low condition means: a) woody native vegetation with native over-storey percent foliage cover less than 50% of the lower value of the over-storey percent foliage cover benchmark for that vegetation type, and where either: – less than 50% of ground cover vegetation is indigenous species, or – greater than 90% of ground cover vegetation is cleared OR b) native grassland, wetland or herbfield where either: – less than 50% of ground cover vegetation is indigenous species, or – more than 90% of ground cover vegetation is cleared If native vegetation is not in low condition, it is in moderate to good condition. The percentages for the ground cover calculations must be made in a season when the proportion of native ground cover vegetation compared to non-native ground cover vegetation in the area is likely to be at its maximum. NOTE: Clearing the habitat of threatened species, populations or communities for the purposes of reducing its condition prior to assessment under the methodology may be a breach of environmental legislation, including sections 118A and 118D of the *National Parks and Wildlife Act 1974* (NPW Act), the *Native Vegetation Act 2003* (NV Act) and/or the *Environmental Planning and Assessment Act 1979* (EP&A Act).
MNES	Matters of national environmental significance	Refers to the seven matters of national environmental significance outlined under the EPBC Act.
NPW Act	*National Parks and Wildlife Act 1974* (NSW)	The objects of this Act are as follows: • The conservation of nature, including, but not limited to, the conservation of: • habitat, ecosystems and ecosystem processes, and • biological diversity at the community, species and genetic levels, and

Abbreviation	Terminology	Description
		• landforms of significance, including geological features and processes, and • landscapes and natural features of significance including wilderness and wild rivers, The conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to: • places, objects and features of significance to Aboriginal people, and • places of social value to the people of New South Wales, and • places of historic, architectural or scientific significance, • Fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation, • Providing for the management of land reserved under this Act in accordance with the management principles applicable for each type of reservation. The objects of this Act are to be achieved by applying the principles of ecologically sustainable development.
OEH	Office of Environment and Heritage	The Office of Environment and Heritage (OEH) is a separate agency within the Planning and Environment cluster. OEH was formed on 4 April 2011 and works to protect and conserve the NSW environment, including the natural environment, Aboriginal country, culture and heritage and our built heritage, and manages NSW national parks and reserves.
RAMSAR	Convention on Wetlands of International Importance	The Ramsar Convention's broad aims are to halt the worldwide loss of wetlands and to conserve, through wise use and management, those remaining. This requires international cooperation, policy making, capacity building and technology transfer.
	Risk of extinction	The likelihood that the local population will become extinct either in the short-term or in the long-term as a result of direct or indirect impacts on the viability of that population.
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement	A bilateral migratory bird agreement with the Republic of Korea entered into in 2007. It provides an important mechanism for pursuing conservation outcomes for migratory birds, including migratory waterbirds.
SEPP 44	State Environmental Planning Policy No.44 – Koala Habitat	This Policy aims to encourage the proper conservation and management of areas of natural vegetation with habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline: • by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and • by encouraging the identification of areas of core koala habitat, and • by encouraging the inclusion of areas of core koala habitat in environment protection zones.
Significant impact		A ‘significant impact’ is an impact which is important, notable, or of consequence, having regard to its context or intensity.
Strahler stream order		Strahler stream order and are used to define stream size based on a hierarchy of tributaries. 

APPENDIX 4: ABORIGINAL DUE DILIGENCE & HISTORIC HERITAGE ASSESSMENT REPORT

AP04

A view of the study area at the Jellat Bends.

Aboriginal Due Diligence & Historic Heritage Assessment Report

Kalaru to Bega Bike Path

Bega Valley Shire Council LGA

May 2022

Report prepared by

OzArk Environment & Heritage

for PSA Consulting

on behalf of Bega Valley Shire Council

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Acknowledgement

OzArk acknowledge the traditional custodians of the area on which this assessment took place and pay respect to their beliefs, cultural heritage, and continuing connection with the land. We also acknowledge and pay respect to the post-contact experiences of Aboriginal people with attachment to the area and to the Elders, past and present, as the next generation of role models and vessels for memories, traditions, culture and hopes of local Aboriginal people.

EXECUTIVE SUMMARY

OzArk Environment & Heritage (OzArk) has been engaged by PSA Consulting, on behalf of the Bega Valley Shire Council (the proponent) to complete an Aboriginal and historic heritage due diligence heritage assessment for the Kalaru to Bega bike path (the proposal).

In 2021, OzArk completed an Aboriginal and historic heritage opportunities and constraints assessment for the proposal. Given the previous disturbances of the study area, primarily road construction, the opportunities and constraints assessment concluded it would be unlikely that the proposal will harm scientifically significant Aboriginal sites or objects and that there is a very low risk that historic heritage values will be harmed.

To assess the results of the constraints and opportunities assessment, a visual inspection of the study area was undertaken by OzArk Principal Archaeologist, Ben Churcher, on 25 February 2022. The visual inspection was assisted by Chris Hoskins representing the Bega Local Aboriginal Land Council.

The survey confirmed that due to the modification of landforms within the study area, mostly associated with the construction, maintenance, and use of Tathra Road, that there are no known Aboriginal objects within the study area and there is little likelihood of the study area containing subsurface archaeological deposits of conservation value.

While the proposal is adjacent to the heritage curtilage of three listed items, the proposal will not physically impact these curtilages and the nature of the proposal (a bike path) will not visually impact views to or from the items. Given the previous disturbances within the study area, primarily road construction, the survey concluded that there are no items of significant historic heritage value in the study area.

<u>Aboriginal heritage</u>

To ensure the greatest possible protection to the area's Aboriginal cultural heritage values, the following recommendations are made:

1) The proposed work may proceed within the study area without further archaeological investigation under the following conditions:

    a) All land and ground disturbance activities must be confined to within the study area, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms. Should the parameters of the proposal extend beyond the assessed areas, then further archaeological assessment may be required.

    b) All staff and contractors involved in the proposed work should be made aware of the legislative protection requirements for all Aboriginal sites and objects.

2) This assessment has concluded that there is a low likelihood that the proposed work will adversely harm Aboriginal cultural heritage items or sites. If during works, however, Aboriginal artefacts or skeletal material are noted, all work should cease and the procedures in the *Unanticipated Finds Protocol* (**Appendix 2**) should be followed.

3) Inductions for work crews should include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts (see **Appendix 3**) and are aware of the legislative protection of Aboriginal objects under the *National Parks and Wildlife Act 1974* and the contents of the *Unanticipated Finds Protocol.*

4) The information presented here meets the requirements of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. It should be retained as shelf documentation for five years as it may be used to support a defence against prosecution in the event of unanticipated harm to Aboriginal objects.

Historic heritage

Recommendations concerning the historic values within study area are as follows.

5) The fabric of Orana, including the garden strip between the house and the concrete footpath on Tathra Road must not be harmed. If works are required at this location, the street facing garden bed should be fenced with temporary high visibility fencing to ensure Orana and the garden bed are not inadvertently harmed. It is permissible to remove and replace the current concrete footpath if required.

6) Although it is unlikely to be required, the works must ensure that the curtilage of the Bega Showground beyond the existing perimeter fence is not harmed.

7) This assessment has concluded that there is a low likelihood that the proposed work will adversely harm historic cultural heritage items or sites. If during works, however, significant historic items or skeletal material are noted, all work should cease and the procedures in the *Unanticipated Finds Protocol* (**Appendix 4**) should be followed.

Contents

FIGURES

TABLES

1 INTRODUCTION

1.1 BRIEF DESCRIPTION OF THE PROPOSAL

OzArk Environment & Heritage (OzArk) has been engaged by PSA Consulting, on behalf of the Bega Valley Shire Council (the proponent) to complete an Aboriginal and historic heritage due diligence heritage assessment for the Kalaru to Bega bike path (the proposal). The proposal is in the Bega Valley Shire Local Government Area (LGA) (**Figure 1-1**).

Figure 1-1. Map showing the location of the proposal.

1.2 BACKGROUND

In 2021, OzArk completed an Aboriginal and historic heritage opportunities and constraints assessment for the proposal (OzArk 2021).

This document presented an initial assessment of the cultural heritage values (Aboriginal and historic) that may be present at the location of the proposal.

This study aimed to identify any opportunities and constraints with regard to cultural heritage that could be determined at a desktop level.

The document first examined several variables associated with the identification of Aboriginal cultural heritage values, such as known Aboriginal sites, proximity to water, and landscape features.

Historic cultural heritage values were more difficult to map as they do not conform to environmental variables in the same way as Aboriginal cultural heritage values. However, statutory heritage lists were searched, and aerial imagery was used to determine the likelihood of the proposal impacting historic heritage values.

In conclusion, the opportunities and constraints assessment concluded that the proposal generally posed a low risk to Aboriginal heritage values despite sites having been recorded near the study area. No previously recorded sites will be directly impacted by the proposal.

Given the previous disturbances of the study area, primarily road construction, the opportunities and constraints assessment concluded it would be unlikely that the proposal will harm scientifically significant Aboriginal sites or objects should they be recorded during survey. Rather, objects such as isolated finds, and perhaps disturbed potential archaeological deposits (PADs), would be most likely. The limited extent of the proposal, the nature of the landforms through which it passes, and the level of previous disturbance, indicate that any recordings are likely to have a low scientific significance and will not pose a substantial constraint to the proposal.

The opportunities and constraints assessment concluded that there is a very low risk that historic heritage values will be harmed by the proposal. While the proposal is adjacent to the heritage curtilage of three listed items, the proposal will not physically impact these curtilages and the nature of the proposal (a bike path) will not visually impact views to or from the items. Given the previous disturbances within the study area, primarily road construction, the opportunities and constraints assessment concluded it would be unlikely that survey will record any items of significant historic heritage value.

1.3 STUDY AREA

The study area is closely associated with existing roads. In the north within the township of Bega, the study area is adjacent to Upper Street, East Street, and Tarraganda Lane. From the northern extent of the study area at East Street, the study area extends alongside Tathra Road to Kalaru. From East Steet to the Bega-South East Regional Hospital there is an existing footpath/bike path on the eastern side of East Street/Tathra Road. South from the Bega-South East Regional Hospital, the study area is alongside Tathra Road in areas where no footpaths/bike paths currently exist. At the Kalaru end of the study area, construction of a footpath is currently underway associated with a separate project.

The study area passes through both residential and rural landscapes with varying topography. Generally the northern and southern ends are elevated with the landforms around Gowing Creek and Jellat Jellat Creek being very low lying and devoted to grazing and cropping industries.

The study area is shown on **Figure 1-2**.

Figure 1-2: Aerial showing the location of the study area.

1.4 ASSESSMENT APPROACH

Aboriginal cultural heritage

The desktop and visual inspection component for the study area follows the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (due diligence; DECCW 2010). The field inspection followed the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011).

Historic cultural heritage

The inspection and assessment of historic heritage significance follows the:

- The International Council on Monuments and Sites' *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Burra Charter 2013)
- Heritage Council's *Historical Archaeology Code of Practice* (Heritage Council 2006)
- Heritage Council's *Assessing Significance for Historical Archaeological Sites and 'Relics'* (Heritage Council 2009)
- NSW Heritage Office's *Assessing heritage significance* (NSW Heritage Office 2001).

2 ABORIGINAL DUE DILIGENCE ASSESSMENT

2.1 INTRODUCTION

Section 57 of the National Parks and Wildlife Regulation 2019 (NPW Regulation) made under the *National Parks and Wildlife Act 1974* (NPW Act) advocates a due diligence process to determining likely impacts on Aboriginal objects. Carrying out due diligence provides a defence to the offence of harming Aboriginal objects and is an important step in satisfying Aboriginal heritage obligations in NSW.

2.2 DEFENCES UNDER THE NPW REGULATION 2019

2.2.1 Low impact activities

The first step before application of the due diligence process itself is to determine whether the proposed activity is a "low impact activity" for which there is a defence in the NPW Regulation. The exemptions are listed in Section 58 of the NPW Regulation (DECCW 2010: 6).

The activities of the proponent are not considered a 'low impact activity' and the due diligence process must be applied.

2.2.2 Disturbed lands

Relevant to this process is the assessed levels of previous land-use disturbance.

The NPW Regulation Section 58 (DECCW 2010: 18) define disturbed land as follows:

> *Land is disturbed if it has been the subject of a human activity that has changed the land's surface, being changes that remain clear and observable.*
>
> *Examples include ploughing, construction of rural infrastructure (such as dams and fences), construction of roads, trails and tracks (including fire trails and tracks and walking tracks), clearing vegetation, construction of buildings and the erection of other structures, construction or installation of utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines, stormwater drainage and other similar infrastructure) and construction of earthworks.*

As the study area is alongside established roads, apart from one small portion, it is considered that the proposal is almost entirely within 'disturbed land'. Tathra Road is either cut into adjacent hills in its more elevated portions or had been constructed on fill in the more low-lying portions raising it above the surrounding landscape. In other areas, the study area is occupied by an existing concrete footpath/bike path.

Despite the high levels of disturbance along the study area, the proponent has elected to undertake the due diligence process to ensure that Aboriginal objects are not harmed.

Views of the disturbances within the study area are shown on **Figure 2-1**.

Figure 2-1: Views of disturbances within the study area.

	
1. View south of Tathra Road cut into surrounding hillslopes.	2. View of Tathra Road built up above the surrounding low-lying landforms.
	
3. View of the existing concrete footpath north of the Bega-South East Regional Hospital.	4. View of the existing concrete footpath along East Street.

In summary, it is determined that the proposal could be exempt from assessment under the Due Diligence Code, however, the precautionary principle is being applied and the due diligence process will be followed. The reasoning for this determination is set out in **Table 2-1**.

Table 2-1: Determination of whether Due Diligence Code applies.

Item	Reasoning	Answer
Is the activity to be assessed under Division 4.7 (state significant development) or Division 5.2 (state significant infrastructure) of the EP&A Act?	The proposal will be assessed under Part 5 of the EP&A Act.	No
Is the activity exempt from the NPW Act or NPW Regulation?	The proposal is not exempt under this Act or Regulation.	No
Do either or both apply: Is the activity in an Aboriginal place?	The activity will not occur in an Aboriginal place. No previous investigations have been undertaken for this proposal.	No

Item	Reasoning	Answer
Have previous investigations that meet the requirements of this Code identified Aboriginal objects?		
Is the activity a low impact one for which there is a defence in the NPW Regulation?	The proposal is not a low impact activity for which there is a defence in the NPW Regulation.	No
Is the activity occurring entirely within areas that are assessed as 'disturbed lands'?	The proposal is almost entirely within areas of high modification and could be classified as 'disturbed land'. However, the precautionary principle will be applied, and the due diligence process followed.	Yes
Due Diligence Code of Practice assessment is not required but assessment will continue under the precautionary principle.		

2.3 Application of the Due Diligence Code of Practice to the proposal

To follow the generic due diligence process, a series of steps in a question/answer flowchart format (DECCW 2010: 10) are applied to the proposed impacts and the study area, and the responses documented.

2.3.1 Step 1

Will the activity disturb the ground surface or any culturally modified trees?

Yes, the proposal will impact the ground surface but will not impact culturally modified trees.

For the purposes of this assessment a nominal 10 metre (m) wide easement along the study area was assessed. This easement is adjacent to existing roads, apart from a small (750 m) section where the study area runs parallel but 40 m to the east of Tathra Road. All works associated with the proposal are expected to be contained within this 10 m easement.

The proposal will involve excavation of the ground surface or the placement of fill to achieve desired heights. As noted, at the Kalaru end of the study area, a similar program for a separate project has already commenced. This shows the nature of the works expected to be associated with the proposal and are shown on **Figure 2-2**. This figure shows that in more level sections the works involve impact to the existing road verge with the major impact being the placement of road base to form a suitable substratum (**Figure 2-2**, photo 1). In landforms where additional cutting is required to create sufficient space for the bike path (**Figure 2-2**, photo 2), the cutting slightly extends the existing road verge.

Most sections of the study area are within cleared landscapes where harm to culturally modified trees is not a constraint. At other sections where trees exist, the proposal is either within the already established clear zone for the existing roads or could potentially impact exotic or immature native species. Therefore, it is highly unlikely that the proposal will harm modified trees.

Figure 2-3 presents views of the vegetation typically associated with the study area.

Figure 2-2: Views of similar works to that of the proposal.

	
1. View of a bike path being constructed at Kalaru in a level section of Tathra Road.	2. View of a bike path being constructed at Kalaru in a section of Tathra Road where minor cutting is required.

Figure 2-3: Views of vegetation near the study area.

	
1. View of the study area at the Jellat bends showing a large exotic tree and immature native species. The study area is to the left of the road in this view.	2. View of the study area crossing Jellat Jellat Creek. The study area is to the left of the road in this view and only exotic tree species will be impacted by the proposal.

	
3. View of the study area in largely cleared landscapes. The study area is to the right of the road in this view and the trees seen to the right in this photo are outside the road's clear zone.	4. View of the modified vegetation in the Tarraganda Lane portion of the study area.

2.3.2 Step 2a

<u>Are there any relevant confirmed site records or other associated landscape feature information on AHIMS?</u>

No, there are no previously recorded sites within the study area.

A search of the Department of Premier and Cabinet administered Aboriginal Heritage Information Management System (AHIMS) database completed on 26 April 2021 returned 64 records for Aboriginal heritage sites within a 10 km^2 search area centred on the study area (GDA Zone 55, Eastings: 753532–763532, Northings: 5927533–5937533 with no buffer). Further review of the AHIMS records shows that site 62-6-0495 is a duplication of site 62-6-0465, and site 62-6-0724 appears to be a duplication of 62-6-0707. These sites will be omitted from further analysis, and it will be considered that the search area contains a total of 62 previously recorded sites.

Table 2-2 lists the site types and frequencies of the AHIMS sites within the search area and the location of these sites are shown on **Figure 2-4**. It should be noted that four sites (62-6-0529, 62-6-0530, 62-6-0531 and 62-6-0683) are listed as 'restricted' sites on AHIMS meaning that the site type and location of these sites is not known. As such, they have not been included in **Table 2-2** or shown on **Figure 2-4**. On 28 April 2021, OzArk sent an email to AHIMS enquiring as to whether any of the restricted sites are located within or near to the study area. In reply on 10 May 2021, David Gordon (AHIMS) confirmed by email that none of the restricted sites will be harmed by the proposal.

As shown in **Table 2-2**, the most common site type within the search area is potential archaeological deposits (PADs) accounting for over half or 55% of all recorded site types. PADs have been recorded in instances on their own and in combination with other site types forming more complex sites. Sites and/or features identified in relation to PADs include artefact scatters and Resource and Gathering sites. These PAD recordings appear to be clustered within a certain area, which is the result of a past archaeological assessment completed for a subdivision. The next main category of sites is isolated finds, accounting for 17% of sites within the search area.

Modified trees (carved or scarred) (5%), artefact sites with no specified quantity (5%) and artefact scatters (3.5%) are some of the common site types across the Australian landscape and are usually associated with waterways. Site 62-6-0682 (modified tree) is situated adjacent to a major waterway in the Bega region, the Bega River. The remaining sites of this site type are situated within proximity to other minor, unnamed waterways.

Table 2-2: Site types and frequencies of AHIMS sites.

Site Type	Number	% Frequency
Potential archaeological deposit (PAD)	32	55%
Isolated find	10	17%
Artefact scatter with PAD	4	8%
Modified tree (carved or scarred)	3	5%
Stone artefact site (unspecified quantity)	3	5%
Artefact scatter	2	3.5%
Ceremonial ring (stone or earth)	2	3.5%
Ceremonial ring (stone or earth) and artefact scatter	1	1.5%
PAD, Aboriginal resource and gathering and isolated find	1	1.5%
Total	**58**	**100**

None of the previously recorded sites are located within the study area, however, there are four sites recorded within 50 m of the study area. These sites are as follows:

- 62-6-0623: is a PAD located 45 m west of the study area (**Figure 2-4**). This PAD was assessed by NSW Archaeology (2005) has having moderate archaeological potential
- 62-6-0724: an isolated find located 30 m to the east of the study area (**Figure 2-4**)
- 62-2-0776: a stone artefact scatter (number unspecified) located 13 m east of the study area (**Figure 2-4**)
- 62-6-0779: is a PAD located 25 m to the east of the study area (**Figure 2-4**).

Figure 2-4: Previously recorded sites in relation to the study area.

Proximity to water is typically the key consideration in terms of predictive modelling for Aboriginal sites. However, as shown on **Figure 2-4**, the opposite result is applicable to the study area with more sites being located over 200 m from water and very few associated with waterways such as the Bega River. This result is very likely due to the completion of specific archaeological assessments (i.e. NSW Archaeology 2005) that have skewed the site distribution data in the region of the study area. These assessments recorded a relatively high number of sites, however, many of these are PADs, only some of which have been further investigated (i.e. NSW Archaeology 2006).

The subsurface investigations that have taken place near the study area (NSW Archaeology 2006) show a widespread but variable scatter of stone artefacts with higher densities on level areas within 200 m of water. The results included "*numerous collections of…artefacts produced during single knapping events*" (NSW Archaeology 2013: 16), and it was suggested that this pattern indicated archaeological material had undergone negligible post depositional disturbance.

Therefore, while the limited archaeological investigation that has taken place near the study area indicates that:

- Landforms within 200 m of water have a greater probability of containing Aboriginal objects, especially in subsurface contexts where a variable but widespread incidence of Aboriginal objects can be expected

- Due to the well-watered nature of the landforms in the Bega area, sites are also likely to recorded in landforms beyond 200 m of waterways
- Sites are more likely to be recorded in the Bega Granites landscape unit (Mitchell 2002).

Specifically, artefact scatters have been located either on the surface and/or in subsurface contexts in the region of the study area. The raw materials used for artefact manufacture will commonly be silcrete, quartz, chert and volcanics. Within the local area, stone artefacts will be widely distributed across the landscape in a virtual continuum, but with significant variations in density in relation to different environmental factors. Artefact density and site complexity will be greater near reliable water (c. 100 m of the highest order streams). The detection of artefact scatters depends on ground surface factors and whether the soil profile is visible. Prior ground disturbance, vegetation cover and sediment/gravel deposition can act to obscure artefact scatter presence. Given the environmental and geomorphological context of the study area, it is predicted that archaeological evidence in the form of stone artefacts in the area will be sparse.

Isolated finds are single stone artefacts and are rarely a reflection of artefact density as they have often been displaced from their original depositional context. It is predicted that isolated finds could be recorded in the study area, although they are likely to be representative of the background scatter of artefacts found in most Australian landscapes.

PAD sites are sedimentary deposits which are assessed as having a high likelihood of containing sub-surface artefacts. PAD sites may occur in association with a surface scatter of stone artefacts or alternatively exhibit no archaeological surface material. Based on previous recordings of PADs near the study area, the potential for PAD sites to be present in the study area is assessed to be moderate. However, given the previous disturbances within and near the study area, primarily from the construction and maintenance of roads, if PADs are present, they may lack integrity.

Other site types, such as grinding grooves, quarries, scarred trees, are not expected to occur in the study area given the high degree of modern disturbances, principally from road construction and past agricultural clearing.

2.3.3 Step 2b

<u>Are there any other sources of information of which a person is already aware?</u>

No, there are no other sources of information that would indicate the presence of Aboriginal objects in the study area.

Broad landscape archaeological surveys in the Bega Valley that were undertaken through the 1980s and 1990s found that 75% all sites were recorded on ridge lines, with a high proportion (50%) of sites recorded on saddles and 25% on ridge crests in a forest environment. Surveys in the NSW State Forests Eden Management area found that 81% of sites were on ridge lines in locations of low gradient (NGH Environmental 2018).

As landforms such as ridges, saddles and ridge crests are absent from the study area, this lowers the potential for the study area to contain sites.

Most of the previously recorded sites (96.5%) in the area are located within the Bega Granites landscape unit meaning it would appear to have the most archaeological potential. Only 2.3% of sites are located within the Bega Coastal Alluvium landscape unit and no sites are located within the Bega Coastal Foothills landscape unit suggesting that these landform types have low archaeological potential (**Figure 2-5**).

The study area itself consists mostly of either the Bega Granites or the Bega Coastal Alluvium landscape units. Only a small portion of the study area is within the Bega Coastal Foothills landscape unit. As such, sites are most likely to be recorded within the portions of the study area which are within the Bega Granites landscape unit. Sites within this landscape unit are most likely to be stone artefact sites (either isolated finds or scatters) or landforms with potential to contain subsurface deposits (PADs).

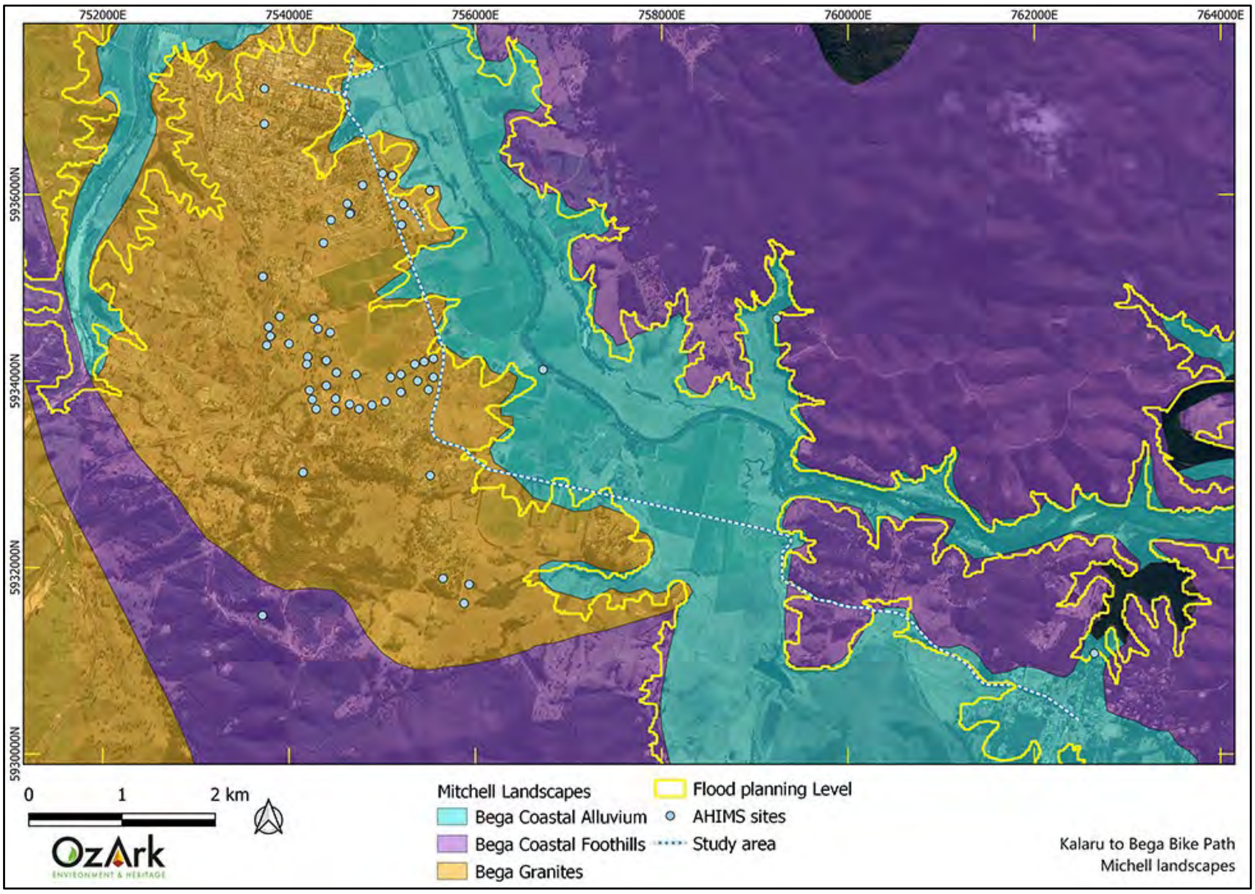
This data is reliant on AHIMS site recordings that have been heavily skewed in the area by development driven assessments, mostly for proposed housing developments. As housing developments are located on more elevated terrain, the sites recorded during these assessments are also in the more elevated Bega Granites landscape unit. Conversely, the Bega Coastal Alluvium landscape unit is low-lying and unsuitable for housing developments. These landscapes are almost exclusively devoted to agriculture where there has been little or no archaeological investigation.

Notwithstanding this observation of bias in the AHIMS data, it is also the case that while Aboriginal people would have used the flat river terraces of the Bega Coastal Alluvium landscape given the resources that would be available, these landforms are poor preservers of archaeological deposits due to frequent inundation and sediment accumulation. Therefore, while the AHIMS data is skewed to where surveys have taken place, it is also the case that the Bega Granites landscape unit that occupies the northern half of the study area is probably the area where sites will be preserved best.

Figure 2-5 shows the study area in relation to Mitchell landscapes and the flooding zone. This figure shows a marked patterning of sites being recorded within the Bega Granites landscape and outside of the flooding zone. While partially accounted for by survey bias, it also underlines the fact that flooding in Bega Coastal Alluvium landscape unit may well have removed evidence of Aboriginal occupation in these landscapes.

Therefore, should sites be recorded in the study area, they are likely to be associated with the elevated Bega Granites landscape in the northern half of the study area.

Figure 2-5: The study area showing Mitchell landscapes and flooding zones.



2.3.4 Step 2c

<u>Are there any landscape features that are likely to indicate presence of Aboriginal objects?</u>

Yes, portions of the study area contain landforms with identified archaeological sensitivity.

The study area is within 200 m of 'waters', a landform identified in the Due Diligence Code as having archaeological sensitivity.

However, in the case of the study area, it has been noted that the location of previously recorded sites does not correspond to expectations based on waterway modelling, as only 33% of sites are located within 200 m of a waterway and only 10% are within a more nuanced drainage buffer (i.e. within 50 m of an unnamed waterway, within 100 m of a named creek, and within 200 m of a named river).

The large difference between AHIMS sites within specific watercourse buffers and within 200 m of all watercourses suggests that Aboriginal occupation of the landscape was not restricted to larger and more permanent watercourses (such as the Bega River).

Another factor is that land within 200 m of major waterways tends to have been intensively used for agricultural practices (hence sites may have been disturbed or dispersed over time) and the physical nature of these flood plain landforms that obscure or disperse archaeological evidence (aggrading sediment, flooding disturbances). In addition, many of the landforms within proximity to water are privately held where archaeological survey has not taken place. An obvious example of this are the foreshores of the seasonal lakes, Benooka Lake and Horse Shoe lagoon located just south of the Kalaru end of the study area. Despite the floors of these lakes being used for agriculture at times of low water levels, no Aboriginal sites have been recorded in association with these waterbodies. As it is difficult to imagine that the resources of these lakes would not have encouraged occupation in the past, the lack of sites must be a product of a lack of survey rather than a genuine lack of sites.

The high number of sites distant to water (39 sites over 200 m from any discernible watercourse, 66% of all sites) is very likely to be a product of specific surveys recording sites at a small number of locations. It is also likely that the generally well-watered landscape surrounding the study area serves to lessen the close relationship observed elsewhere of occupation sites and the availability of water.

2.3.5 Step 3

<u>Can harm to Aboriginal objects or disturbance of archaeologically sensitive landscape features be avoided?</u>

No. landforms with identified archaeological sensitivity may be impacted by the proposal.

Although much of the study area is within ‘disturbed lands’, it does cross at least two named creeks (Jellat Jelatt and Gowing Creeks). However, both creeks are with the Bega Coastal Alluvium landscape unit where sites are not expected due to the flood prone nature of the landforms. It has also been noted that the close relationship between water sources and Aboriginal occupation generally noted elsewhere in the state does not hold true for the Bega area. Nonetheless, strictly speaking, landforms within 200 m of ‘waters’ will be impacted by the proposal, although these landforms will probably not record Aboriginal sites.

2.3.6 Step 4

<u>Does a desktop assessment and visual inspection confirm that there are Aboriginal objects or that they are likely?</u>

No, there are no Aboriginal objects within the study area, and the proposal is unlikely to disturb archaeological deposits of conservation value.

The visual inspection of the study area was undertaken by OzArk Principal Archaeologist, Ben Churcher, on 25 February 2022. The visual inspection was assisted by Chris Hoskins representing the Bega Local Aboriginal Land Council.

On the day of the assessment it was raining, and Tathra Road was quite busy. Therefore it was not possible to walk alongside the road for long stretches, both because of the heavy rain and due safety issues with traffic on the road in wet conditions. Instead, the route was driven with frequent stops being made wherever it was possible to pull off the road safely.

This survey method confirmed the highly modified nature of the study area and the high likelihood that no Aboriginal objects would be recorded. It was noted that the cut and fill construction method of Tathra Road means that there are few areas of natural ground surface surviving, and where original ground surfaces were present, these had been impacted by the construction and use of the road.

Visibility varied along the road verge and while some areas were obscured by thick ground covers, there were extensive exposures as well (**Figure 2-6**, photos 1 and 2). This allowed an adequate sample of the ground surface to be observed.

Only one portion of the study area was unable to be accessed as it was in private property: a 750 m section where the study area runs parallel but 40 m to the east of Tathra Road to avoid a sharp bend in Tathra Road (**Figure 2-6**, photos 3 and 4). This portion of the study area was viewed from the north and south and was assessed to have low archaeological potential as it consists of moderate slopes. Ground surface visibility within the field was near zero, so not being able to access this small portion of the study area did not reduce the survey efficacy.

It has been noted that several sites have been recorded near the study area. The sites near the Bega-South East Regional Hospital (62-6-0776 and 62-6-0724) plot to disturbed landforms and it is likely that the sites were salvaged before the construction of the hospital, but their details have not been updated with AHIMS.

The other closest sites to the study area are 62-6-0623 and 62-6-0779; both recorded as PADs. The survey concluded that these PADs do not extend into the study area. At 62-6-0623, Tathra Road is built up above the surrounding landscape and the areas of PAD are on the other side of the road away from the proposal. At 62-6-0779 the PAD occupies the crest of a hill on the southern outskirts of Bega. A concrete footpath/bike path already exists in the study area and Tathra Road has been cut into the crest containing the PAD. Therefore, if the PAD had extended into the study area it has been removed by the construction of Tathra Road.

In conclusion the survey confirmed that due to the modification of landforms within the study area, mostly associated with the construction, maintenance, and use of Tathra Road, that there are no known Aboriginal objects within the study area and there is little likelihood of the study area containing subsurface archaeological deposits of conservation value.

Figure 2-6: Views of the study area.

	
1. View of the study area along Tathra Road showing an exposure with imported gravels in the foreground and very low ground surface visibility beyond.	2. View of the study area along Tathra Road showing an exposure with imported gravels in the foreground and very low ground surface visibility beyond.
	
3. View south of the landform where the bike path deviates from Tathra Road. The proposal here crosses the field to the left of the road.	4. View north of the landform where the bike path deviates from Tathra Road. The proposal here crosses the left flank of the hill seen to the right of the road.

A 'no' answer for Step 4, results in the following outcome (DECCW 2010):

> *AHIP* (Aboriginal Heritage Impact Permit) *application not necessary. Proceed with caution. If any Aboriginal objects are found, stop work, and notify Heritage NSW (02) 9873 8500 (heritagemailbox@environment.nsw.gov.au). If human remains are found, stop work, secure the site, and notify NSW Police and Heritage NSW.*

2.4 CONCLUSION

The due diligence process has resulted in the outcome that AHIP is not required. The reasoning behind this determination is set out in **Table 2-3**.

Table 2-3: Due Diligence Code application.

Step	Reasoning	Answer
Step 1 Will the activity disturb the ground surface or any culturally modified trees?	The proposed works will disturb the ground surface through the construction of a bike path that will involve ground excavation and the importation of fill. The proposal will not impact mature, native vegetation and therefore will not harm culturally modified trees.	Yes
If the answer to Step 1 is 'yes', proceed to Step 2		
Step 2a Are there any relevant records of Aboriginal heritage on AHIMS to indicate presence of Aboriginal objects?	AHIMS indicated that there are no Aboriginal sites within the study area.	No
Step 2b Are there other sources of information to indicate presence of Aboriginal objects?	There are no other sources of information to indicate that Aboriginal objects are likely in the study area, although it is noted that there is a general likelihood for landforms in the region to contain Aboriginal objects.	No
Step 2c Will the activity impact landforms with archaeological sensitivity as defined by the Due Diligence Code?	Landforms with identified archaeological sensitivity are present as the study area is within 200 m of 'waters'.	Yes
If the answer to any stage of Step 2 is 'yes', proceed to Step 3		
Step 3 Can harm to Aboriginal objects listed on AHIMS or identified by other sources of information and/or can the carrying out of the activity at the relevant landscape features be avoided?	The proposal will impact landforms with archaeological sensitivity as identified in the Due Diligence Code: landforms within 200 m of 'waters'.	No
If the answer to Step 3 is 'no', a visual inspection is required. Proceed to Step 4.		
Step 4 Does the visual inspection confirm that there are Aboriginal objects or that they are likely?	The visual inspection recorded no Aboriginal objects in the study area. Landforms with identified archaeological sensitivity that were identified at a desk-top level were found during the inspection to have low archaeological potential.	No
Conclusion		
AHIP not necessary. Proceed with caution.		

3 HISTORIC HERITAGE ASSESSMENT: BACKGROUND

3.1 INTRODUCTION

The current assessment will apply the Heritage Council *Historical Archaeology Code of Practice* (Heritage Council 2006) and the International Council on Monuments and Sites' *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (Burra Charter 2013) in the completion of a historical heritage assessment, including field investigations.

3.2 BRIEF HISTORY OF BEGA/KALARU

The first squatters moved into the Bega Valley from the inland areas of Monaro and Braidwood and staked out their grazing 'runs' in the early 1830s. In 1834 the Imlay brothers, who acquired over 65,000 acres of runs, arrived and began permanent settlement of the area including the 'Tarraganda' run at 'Biggah'.

Government Surveyor Parkinson laid out a new town at what is now North Bega (on the site of the present Bega Cheese Factory). After a disastrous flood in May 1851 the town was moved to higher ground on the southern side of the river where it still stands today. In the first plan, the main street was Auckland Street, hence the construction of substantial buildings along that street. When the town centre moved, Carp Street became the main street.

Bega was gazetted a town in 1851, its name derived from an Aboriginal word meaning either "big camping place" or "beautiful." By 1861 the population of Bega was 625 in 100 households. The Bega district was regarded as one of the few successful areas where land selections under the 1861 Crown Lands Acts facilitated orderly settlement of the lands, with an average consolidated holding up to 500 acres.

On the Princes Highway, Bega serves a district of dairying, mixed farming, pastoralism, and granite quarrying. Bega has a large milk-processing plant, fish canneries, sawmills, and furniture, plaster, tile, and agricultural machinery factories; high-quality cheese comes from the area as well. Bega is 16 km from the small resort port of Tathra, noted for its surfing facilities.

Kalaru developed as a stop on the Bega to Tathra road that was built as early as 1857 to provide access for horse and bullock teams to deliver produce from throughout the Bega Valley to Tathra Wharf (and prior to this, Merimbula and Kangarutha Point). The village was formerly known simply as 'Tathra Road' before being renamed 'Kalaru'.

3.3 LOCAL CONTEXT

3.4 DESKTOP DATABASE SEARCHES CONDUCTED

A desktop search was conducted on the following databases to identify any potential previously recorded heritage within the study area. The results of this search are summarised in **Table 3-1**.

Table 3-1: Historic heritage: desktop-database search results.

Name of Database Searched	Date of Search	Type of Search	Comment
National and Commonwealth Heritage Listings	28 April 2021	Bega Valley LGA	No items listed are located within or near to the study area.
State Heritage Register (SHR)	28 April 2021	Bega Valley LGA	No items listed on the SHR are located within or near to the study area.
Section 170 register	28 April 2021	Bega Valley LGA	No items listed on the Section 170 register are located within or near to the study area.
Local Environmental Plan (LEP)	28 April 2021	Bega Valley LEP 2013	Three items listed on the Bega valley LEP are immediately adjacent to the study area (**Table 3-2**).

There are three historic heritage items listed on Schedule 5 of the Bega Valley LEP which are immediately adjacent to the study area (**Table 3-2**). The curtilages of these items in relation to the study area is shown on **Figure 3-1**.

Table 3-2: Historic heritage sites listed on the Bega Valley LEP.

Item name	Item Number	Level of significance
Orana House	I015	Local
Bega Showground Pavilion	I016	Local
Brickworks	I746	Local

3.5 Heritage Items Near the Study Area

3.5.1 Orana House

Orana House is located within Lot 1 DP 708174 at 34 Tathra Road, Bega. It is located along the eastern boundary of the study area adjacent to Tathra Road (**Figure 3-1**).

Orana House is described as a single storey brick residence with verandahs on two sides featuring cast iron decorations built circa 1865 and was formerly the homestead for a surrounding dairy farm.

3.5.2 Bega Showground Pavilion

The Bega Showground Pavilion is located within Lot 1, Section 49, DP 758076 and Lot 1 DP 667563 on Upper Street, Bega. It is located along the north/western extent of the study area (**Figure 3-1**).

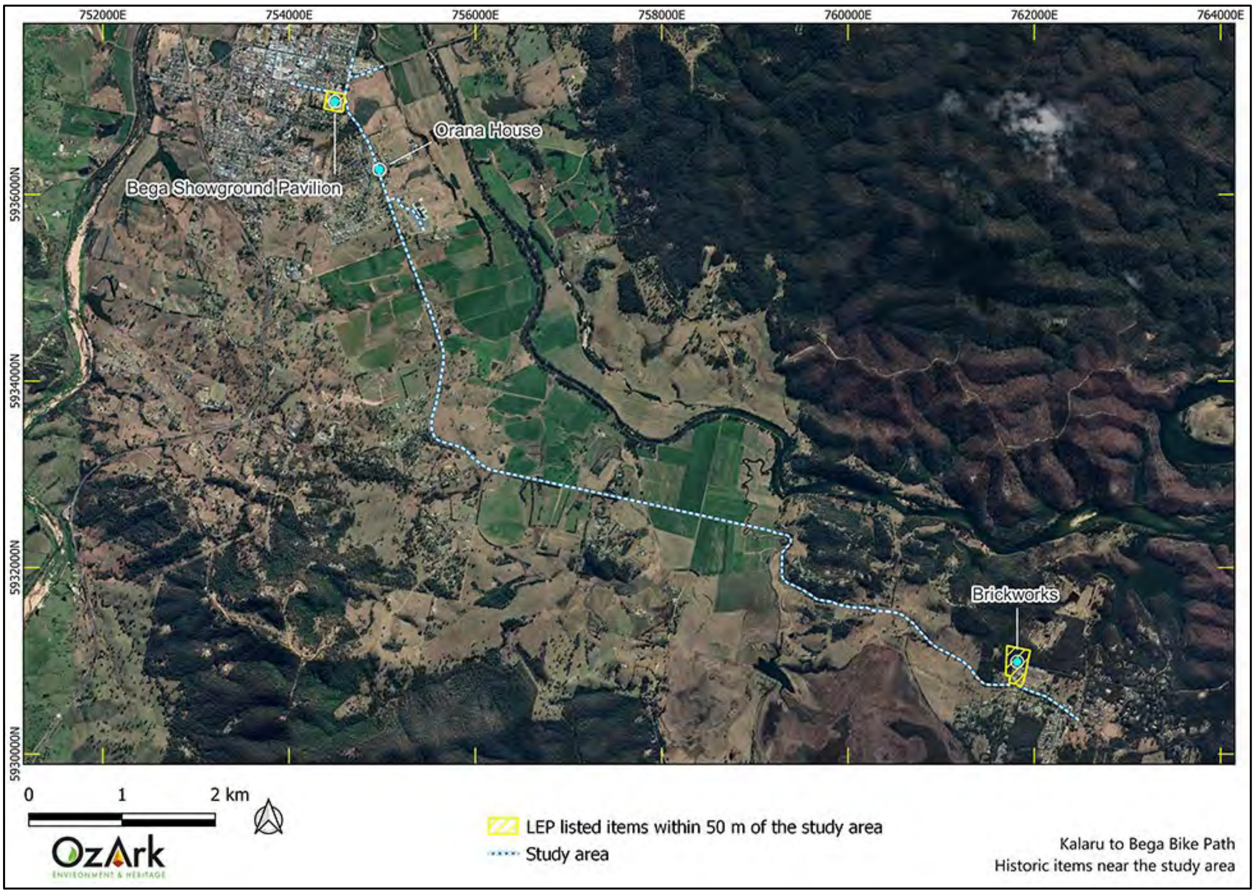
The social significance of the Bega Showground Pavilion is related to its lengthy use by the residents of the district for leisure activities for more than 120 years, while the extant heritage buildings, structures, and facilities present attribute to the aesthetic and historic significance of the item.

3.5.3 Brickworks

The Brickworks, also known as the Kalaru Brickworks building, is located within Lot 3 DP1174727, along Tathra Road at Kalaru. It is located at the south/eastern extent of the study area (**Figure 3-1**).

The Brickworks was built in the 1930s by William Stafford with design sourced from the Goulburn brickworks. The item has been assessed as having technical and historic significance with the kilns present showcasing a prominent industry in the district and its contribution to supplying bricks for many buildings in the local area.

Figure 3-1: Listed heritage items near the study area.



3.6 SURVEY METHODOLOGY

The survey was undertaken at the same time as the survey for Aboriginal cultural heritage (see **Section 2.3.6**).

Prior to the survey, aerial imagery and an understanding of the current land use of the study area (transport corridor) suggested that there is little potential for significant historic heritage items to be recorded in the study area. It was noted that previous historic heritage assessments completed on behalf of Bega Valley Shire Council are likely to have captured most prominent, historically significant places in the LGA.

If any historic items are present within the study area, it was predicted that they would likely to be of low heritage significance.

3.7 RESULTS OF HISTORIC HERITAGE ASSESSMENT

No significant heritage items were recorded during the survey.

In terms of potential impacts to known heritage items, the following observations were made:

- Orana House. The residential dwelling is immediately adjacent to Tathra Road and a concrete path is already in place between the road and the house (**Figure 3-2**, photo 1)
- Bega Showground Pavilion. The study area runs alongside the showgrounds but is separated from the showgrounds by fencing. The pavilion is not fronting Upper Street where the study area is located. The study area near the showground already has a concrete footpath in place (**Figure 3-2**, photo 2)
- Kalaru Brickworks. The brickworks is located on the other side of Tathra Road from the proposal, and it is in an area where a similar project (the Kalaru bike path) is already being constructed. Therefore, there will be no impact from the proposal at this location.

Figure 3-2: Views of heritage listed items.

	
1. View of the study area next to Orana looking south.	2. View of the study area along the Bega Showgrounds (to left) on Upper Street.

3.8 LIKELY IMPACTS TO HISTORIC HERITAGE FROM THE PROPOSAL

There are three locally listed heritage items whose curtilages are adjacent to the study area. However, due to the nature of the proposal, it is will not have an impact on the significance of these items. Further, no historic heritage items of local or state significance are present within the study area.

As it is determined that the locally listed heritage items have no potential to be indirectly or directly impacted by the proposal, a Statement of Heritage Impact (SOHI) is not required.

4 MANAGEMENT RECOMMENDATIONS

4.1 ABORIGINAL CULTURAL HERITAGE

The undertaking of the due diligence process resulted in the conclusion that the proposal will have an impact on the ground surface, however, no Aboriginal objects or intact archaeological deposits will be harmed. This moves the proposal to the following outcome:

> *AHIP application not necessary. Proceed with caution. If any Aboriginal objects are found, stop work, and notify Heritage NSW (02) 9873 8500 (heritagemailbox @environment.nsw.gov.au). If human remains are found, stop work, secure the site, and notify NSW Police and Heritage NSW.*

To ensure the greatest possible protection to the area's Aboriginal cultural heritage values, the following recommendations are made:

1) The proposed work may proceed within the study area without further archaeological investigation under the following conditions:
   a) All land and ground disturbance activities must be confined to within the study area, as this will eliminate the risk of harm to Aboriginal objects in adjacent landforms. Should the parameters of the proposal extend beyond the assessed areas, then further archaeological assessment may be required.
   b) All staff and contractors involved in the proposed work should be made aware of the legislative protection requirements for all Aboriginal sites and objects.
2) This assessment has concluded that there is a low likelihood that the proposed work will adversely harm Aboriginal cultural heritage items or sites. If during works, however, Aboriginal artefacts or skeletal material are noted, all work should cease and the procedures in the *Unanticipated Finds Protocol* (**Appendix 2**) should be followed.
3) Inductions for work crews should include a cultural heritage awareness procedure to ensure they recognise Aboriginal artefacts (see **Appendix 3**) and are aware of the legislative protection of Aboriginal objects under the NPW Act and the contents of the *Unanticipated Finds Protocol.*
4) The information presented here meets the requirements of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. It should be retained as shelf documentation for five years as it may be used to support a defence against prosecution in the event of unanticipated harm to Aboriginal objects.

4.2 HISTORIC HERITAGE

Recommendations concerning the historic values within study area are as follows.

5) The fabric of Orana, including the garden strip between the house and the concrete footpath on Tathra Road must not be harmed. If works are required at this location, the street facing garden bed should be fenced with temporary high visibility fencing to ensure Orana and the garden bed are not inadvertently harmed. It is permissible to remove and replace the current concrete footpath if required.

6) Although it is unlikely to be required, the works must ensure that the curtilage of the Bega Showground beyond the existing perimeter fence is not harmed.

7) This assessment has concluded that there is a low likelihood that the proposed work will adversely harm historic cultural heritage items or sites. If during works, however, significant historic items or skeletal material are noted, all work should cease and the procedures in the *Unanticipated Finds Protocol* (**Appendix 4**) should be followed.

REFERENCES

Burra Charter 2013	International Council on Monuments and Sites 2013. *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*.
DECCW 2010	DECCW. 2010. *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW*. Department of Environment, Climate Change and Water, Sydney.
Heritage Council 2006	*Historical Archaeology Code of Practice*. Heritage Council of New South Wales and the NSW Government Department of Planning.
Heritage Council 2009	*Assessing Significance for Historical Archaeological Sites and 'Relics'*. Heritage Council of New South Wales and the NSW Government Department of Planning.
Mitchell 2002	Mitchell, Dr. Peter. 2002. *Description for NSW (Mitchell) Landscapes Version 2.* Department of Environment and Climate Change NSW.
NGH Environmental 2018	NGH Environmental. *Aboriginal Heritage Due Diligence Assessment. Frogs Hollow Recreational Flying School*. Report for Sports Aviation Flight College Australia Limited.
NSW Archaeology 2005	New South Wales Archaeology. *Proposed Commercial, Residential and Industrial Subdivision Lot 4 DP 1077434, Lot 1510 DP 1977898 & Lot 2432 DP 793758 South Bega, NSW Aboriginal Archaeological Assessment.* Report for Planning Initiatives.
NSW Archaeology 2005b	New South Wales Archaeology. *Bega Eco-Neighbourhood Development, Bega, NSW. Aboriginal Archaeological Assessment*. Report for Jenny Spinks.
NSW Archaeology 2006	New South Wales Archaeology. *Proposed Commercial, Residential and Industrial Subdivision Lot 4 DP1077434, Lot 1510 DP 1977898 & Lot 2432 DP 793758 South Bega NSW Subsurface Test Excavation*. A report to Planning Initiatives.
NSW Archaeology 2013	NSW Archaeology. *Bemboka River Bridge, Morans Crossing, via Bemboka Aboriginal Cultural Heritage Assessment Report*. Report to NSW Roads and Maritime Services.
NSW Heritage Office 2001	*Assessing heritage significance*. NSW Heritage Manual 2.
OEH 2011	Office of Environment and Heritage. 2011. *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales.* Department of Environment, Climate Change and Water, Sydney.

OzArk 2021	OzArk Environment & Heritage. *Aboriginal and Historic Heritage Desktop Opportunities and Constraints Analysis. Proposed Kalaru to Bega Bike Path*. Report for Bega Valley Shire Council.

APPENDIX 1: AHIMS SEARCH RESULTS

Office of Environment & Heritage NSW

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 1451 Cap and bore

Client Service ID : 234895

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
08-1-0008	Onepah 2a	AGD	55	379109	6777244	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Peter Peckham					**Permits**		
08-1-0009	Onepah 8	AGD	55	393031	6763983	Open site	Valid	Artefact : -, Ceremonial Ring (Stone or Earth) : -, Hearth : 2		
	Contact	**Recorders**	Peter Peckham					**Permits**		
07-3-0004	Tenterfield-Dumaresq IF 2	GDA	55	353060	6778276	Open site	Valid	Artefact : -		
	Contact	**Recorders**	OzArk Environmental and Heritage Management,Mr Ben Churcher					**Permits**		
08-4-0022	ERM WR01	GDA	55	362631	6704300	Open site	Valid	Artefact : -		
	Contact	**Recorders**	ERM					**Permits**		
08-1-0003	Unnjoona Reserve	AGD	55	388600	6756500	Open site	Valid	Aboriginal Ceremony and Dreaming : -		905,1060
	Contact	**Recorders**	Jane Balme					**Permits**		
08-1-0004	Tarwoona Downs Site 2	AGD	55	369500	6764000	Open site	Valid	Artefact : -	Open Camp Site	905
	Contact	**Recorders**	Mr Allan Lance					**Permits**		
08-1-0005	Tarwoona Downs Site 1	AGD	55	371500	6764000	Open site	Valid	Artefact : -	Open Camp Site	905
	Contact	**Recorders**	Mr Allan Lance					**Permits**		
08-4-0008	LILA DMR 7;	AGD	55	378960	6698130	Open site	Valid	Artefact : -	Open Camp Site	3550
	Contact	**Recorders**	Mr John Appleton					**Permits**		
08-4-0009	LILA DMR 8;	AGD	55	379300	6698420	Open site	Valid	Artefact : -	Open Camp Site	3550
	Contact	**Recorders**	Mr John Appleton					**Permits**		
08-4-0010	LILA DMR 9;	AGD	55	379680	6698690	Open site	Valid	Artefact : -	Open Camp Site	3550
	Contact	**Recorders**	Mr John Appleton					**Permits**		
08-4-0011	LILA DMR 10;	AGD	55	382490	6701220	Open site	Valid	Artefact : -	Open Camp Site	3550
	Contact	**Recorders**	Mr John Appleton					**Permits**		
08-4-0012	Lila DMR 11;	AGD	55	382670	6701320	Open site	Valid	Artefact : -	Open Camp Site	3550
	Contact	**Recorders**	Mr John Appleton					**Permits**		
08-4-0013	LILA DMR 12;	AGD	55	382920	6701390	Open site	Valid	Artefact : -	Open Camp Site	3550
	Contact	**Recorders**	Mr John Appleton					**Permits**		
08-4-0014	LILA DMR 13;	AGD	55	383350	6701510	Open site	Valid	Artefact : -	Isolated Find	3550
	Contact	**Recorders**	Mr John Appleton					**Permits**		
08-4-0015	LILA DMR 14;	AGD	55	383230	6701910	Open site	Valid	Artefact : -	Open Camp Site	3550
	Contact	**Recorders**	Mr John Appleton					**Permits**		
08-4-0016	LILA DMR 15;	AGD	55	384000	6701800	Open site	Valid	Artefact : -	Open Camp Site	3550
	Contact	**Recorders**	Mr John Appleton					**Permits**		

Report generated by AHIMS Web Service on 19/07/2016 for Stephanie Rusden for the following area at Datum :GDA, Zone : 55, Eastings : 298475 - 395739, Northings : 6697678 - 6779807 with a Buffer of 0 meters. Additional Info : Survey. Number of Aboriginal sites and Aboriginal objects found is 28

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

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APPENDIX 2: ABORIGINAL HERITAGE: UNANTICIPATED FINDS PROTOCOL

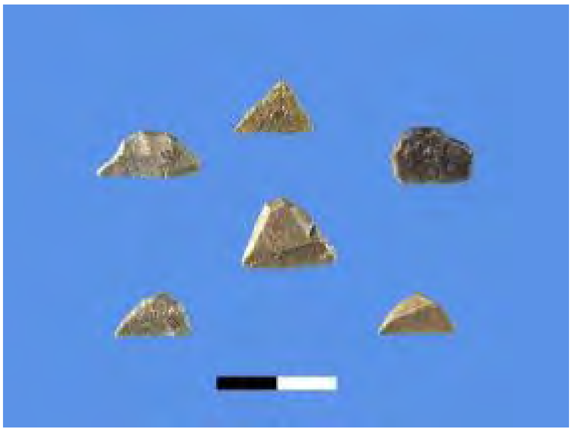
An Aboriginal artefact is anything which is the result of past Aboriginal activity. This includes stone (artefacts, rock engravings etc.), plant (culturally scarred trees) and animal (if showing signs of modification; i.e. smoothing, use). Human bone (skeletal) remains may also be uncovered while onsite.

Cultural heritage significance is assessed by the Aboriginal community and is typically based on traditional and contemporary lore, spiritual values, and oral history, and may also consider scientific and educational value.

Protocol to be followed if previously unrecorded or unanticipated Aboriginal object(s) are encountered:

1. If any Aboriginal object is discovered and/or harmed in, or under the land, while undertaking the proposed development activities, the proponent must:
   a. Not further harm the object
   b. Immediately cease all work at the particular location
   c. Secure the area to avoid further harm to the Aboriginal object
   d. Notify Heritage NSW as soon as practical on (02) 9873 8500 (heritagemailbox @environment.nsw.gov.au), providing any details of the Aboriginal object and its location; and
   e. Not recommence any work at the particular location unless authorised in writing by Heritage NSW.
2. If Aboriginal burials are unexpectedly encountered during the activity, work must stop immediately, the area secured to prevent unauthorised access and NSW Police and Heritage NSW contacted.
3. Cooperate with the appropriate authorities and relevant Aboriginal community representatives to facilitate:
   a. The recording and assessment of the find(s)
   b. The fulfilment of any legal constraints arising from the find(s), including complying with Heritage NSW directions
   c. The development and implementation of appropriate management strategies, including consultation with stakeholders and the assessment of the significance of the find(s).
4. Where the find(s) are determined to be Aboriginal object(s), recommencement of work in the area of the find(s) can only occur in accordance with any consequential legal requirements and after gaining written approval from Heritage NSW (normally an Aboriginal Heritage Impact Permit).

APPENDIX 3: ABORIGINAL HERITAGE: ARTEFACT IDENTIFICATION

	
A retouched silcrete flake	A quartz flake
	
Microliths (scale = 1 cm)	Volcanic flakes
 	
Flake characteristics (scale = 1 cm)	A mudstone/tuff core from which flakes have been removed

APPENDIX 4: HISTORIC HERITAGE: UNANTICIPATED FINDS PROTOCOL

A historic artefact is anything which is the result of past activity not related to the Aboriginal occupation of the area. This includes pottery, wood, glass, and metal objects as well as the built remains of structures, sometimes heavily ruined.

Heritage significance of historic items is assessed by suitably qualified specialists who place the item or site in context and determine its role in aiding the community's understanding of the local area, or their wider role in being an exemplar of state or even national historic themes.

The following protocol should be followed if previously unrecorded or unanticipated historic objects are encountered:

1. All ground surface disturbance in the area of the finds should cease immediately, then:
   a) The discoverer of the find(s) will notify machinery operators in the immediate vicinity of the find(s) so that work can be halted
   b) The site supervisor will be informed of the find(s).
2. If finds are suspected to be human skeletal remains, then NSW Police must be contacted as a matter of priority.
3. If there is substantial doubt regarding the historic significance for the finds, then gain a qualified opinion from an archaeologist as soon as possible. This can circumvent proceeding further along the protocol for items which turn out not to be significant. If a quick opinion cannot be gained, or the identification is that the item is likely to be significant, then proceed to the next step.
4. Notify Heritage NSW as soon as practical on (02) 9873 8500 (heritagemailbox @environment.nsw.gov.au), providing any details of the historic find and its location.
5. If in the view of the heritage specialist or Heritage NSW that the finds appear <u>not</u> to be significant, work may recommence without further investigation. Keep a copy of all correspondence for future reference.
6. If in the view of the heritage specialist or Heritage NSW that the finds appear to be significant, facilitate the recording and assessment of the finds by a suitably qualified heritage specialist. Such a study should include the development of appropriate management strategies.
7. If the find(s) are determined to be significant historic items (i.e. of local or state significance), any re-commencement of ground surface disturbance may only resume following compliance with any legal requirements and gaining written approval from Heritage NSW.

APPENDIX 5: CIVIL WORKS DESIGN REPORT

AP05

Bega Valley Shire Council

Kalaru to Bega Bike path

Civil Works Design Report

30 May2022

M7309_001-001-0

Job no. and Project Name: M7309_001 Bega Bikepath
Doc Path File: \\online.com\files\Management\Projects\M7000_Miscellaneous Clients\M7309_001 Bega Bikeway\07 Deliv\2. Report\M7309_001-REP-001-D-Bega Bikepath Design Report.docx

Rev	Date	Description	Author	Reviewer	Project Mgr.	Approver
0	30/05/2022	Final	Matthew Stephensen	Joel O'Neill	Joel O'Neill	Sean Richardson
Signatures						

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

In 2014 Bega Valley Shire Council (BVSC) adopted a Bike Plan to plan and prioritise the development of key cycleway routes within the shire. In 2017 the Bega to Tathra Safe Ride Council was successful in securing a $3,120,000 funding grant from the NSW Statement Government under the 2017/18 financial year to design and construct a cycleway from Tathra to Kalaru. Council is now nearing the completion of the construction of the 4.6km long, 2.5m wide concrete bike path from Tathra Public School to Kalaru; and with the remaining funding Council is seeking to commence Phase Two of the master plan, which involves determining determine the viability and feasibility for connecting the existing in Kalaru through to Bega into the future.

PSA engaged Engeny to provide engineering and costing documentation for the civil works associated with the Feasibility Design Study for the proposed 10km bike-path extension from Kalaru to Bega. Engeny was engaged to review the alignment provided by PSA and determine the civil construction requirements, cost requirements and design requirements to complete the bike path along the proposed alignment.

1.2 PURPOSE OF DOCUMENT

The purpose of this document is to outline the design considerations for undertaking the construction of Control Line MCR11 of the Bega-Kalaru Bike-path extension. This document will highlight and explain Engeny's design decisions, methodologies, and considerations used to the produce bike path alignment and construction details.

2 BASIS OF DESIGN

2.1 PROJECT SCOPE

The Scope of Works for this project included:

- Review of flood levels.
- Review of existing infrastructure and establishment of site constraints.
- Design of horizontal alignment as agreed with stakeholders.
- Design of vertical alignment suitable for bike traffic.
- Design of road and waterway crossings.
- Earthworks modelling of proposed design.

2.2 BASIS OF DESIGN

In order to complete the preliminary design alignment for the Bega-Kalaru bike path, a series of design input decisions and assumptions were made. These decisions formed the criteria for which the completed design would be measured against. These criteria are summarised in Appendix B, the Basis of Design table.

2.3 CONSTRAINTS

The following design constraints were observed and imposed during the design process to ensure that the resultant design was efficient and practical:

1. Bikepath alignment is to stay within road reserve where possible.
2. Vertical and horizontal alignment should minimise the need for cut and fill.
3. Avoid a horizontal alignment that creates the necessity for road cuttings (cuttings adjacent to existing road pavement).
4. Provide a feasible level of flood immunity at waterway crossings and across floodplains.
5. Avoid encroachment onto existing road pavement (ie. No shared path on roadway where possible).
6. Avoid steep vertical grades in excess of 10% where possible.
7. Avoid road crossings (from one side of the road corridor to the other) where possible.

2.4 SURVEY

The following data sources were utilised to feed survey and GIS data into the design 12D Model:

- Elvis – Elevation and Depth.
- Digital Cadastral Database (DCDB).

2.5 GEOTECHNICAL INFORMATION

Geotechnical information was sourced from ‘Regional mapping’ for this design.

3 DESIGN PROCESS

Multiple alignments were modelled to a concept level to identify any potential constraints and their impacts. The designed alignments and their limitations were presented to stakeholders for a review and determination. The stakeholders selected their preferred alignment for the bikepath titled 'Option 1', Option One was modelled in 12D to a preliminary design level to the design guidelines and constraints listed in this document. From this preliminary design, a construction cost estimate was drafted to be used in further cost-benefit analysis and for budgeting purposes.

3.1 DESIGN REVIEW

The initial designs were presented to Bega Valley Shire Council for review where Option One was selected as the preferred alignment. Option One was submitted as the preferred design in November of 2021.

3.2 DESIGN RISKS REGISTER

Due to the nature of this project and the process, there are certain risks inherent in the final preliminary design and cost estimate. These risks if eventuated would challenge and potentially change the outcome of the preliminary design process and the cost estimate, and the conclusions reached by this design process would no longer be valid. Risks in the design system are identified below:

Table 3.1: Design Risk Register

Design Risk Name	Risk Origin	Risk Impact
No Geotechnical Information	No geotechnical information available to inform design of pavement and structure during preliminary phase.	Additional soil/subgrade treatments may be required that have not been priced in BoQ.
Coarse Survey	Survey information was taken from publicly available data, which could be inaccurate, out of date or incomplete.	Topography in-situ may differ from the topography used in the design model which may interfere with constructability on site.
Potential Flooding Impacts	Flood levels indicated are as provided by council. No flood modelling was undertaken on the bike path or proposed waterway structures to determine level of immunity or impact provided by proposed structures.	Actual efficacy of flood mitigation measures may not be sufficient for real-world flood events, causing disruptions to cycle path use.
Local Contractor Availability	Post-pandemic stimulus has increased the demand for local contractors thus reducing their availability.	Lack of supply and increase demand could lead to an increase of wait times and push prices above estimated levels.
Haulage Distances	Haulage distances between sites and distance between gravel pads and site may fluctuate compared to estimated distances.	Increased travel time will increase construction time and therefore construction costs above what was estimated.
Bridge Pricing	Price per m^2 of bridge construction was based on a conservative rate estimate	Actual prices to supply and install bridgework may fluctuate largely compared to what was priced
Boardwalk Pricing	Price per m^2 of boardwalk construction was based on a conservative rate estimate	Actual prices to supply and install bridgework may fluctuate largely compared to what was priced
Land Acquisition	Several instances in the preliminary design require encroachment onto private property	If deals with landholders cannot be struck, prices to buy land have not been considered in the final estimate
Cattle Considerations	Several sections of the design alignment require crossing into utilised cattle pastures	Pricing for cattlegrids, fencing, land acquisition or underpasses/overpasses haven not been considered.

4 INFRASTRUCTURE

4.1 GENERAL QUANTITIES

Table 4.1 described the total general construction quantities required if this alignment option is undertaken.

Table 4.1: General Construction Quantities

Project Item	Qty	Unit
Total Length of Works	11,747	m
Length of New Works (Type A – New path)	9947	m
Length of Widening Works (Type B - Widening)	1050	m
Total Concrete (Cyclepath only)	3971	m^3
Total Disturbance Area	6.18	ha
Earthworks Volume: Total Cut required	4046	m^3
Earthworks Volume: Total Fill required	9717	m^3
Total Boardwalk Span	450	m^2
Total Bridge Span	465	m^2

During the investigation, several key sites were identified where detailed civil works will need to be conducted to make the desired Option 1 alignment feasible. These Civil Sites require work over and above the general works required to complete the Type A and Type B Cross Sections.

4.2 SITE A – EXISTING FOOTPATH WIDTH RESTRICTION

4.2.1 Chainage 0550m to 0750m Tathra Rd, Bega

The existing 1.5m footpath enters a constrained area between Chainage 0550m and 0750m. The footpath runs alongside kerb, channel and shoulder designated for on-street parking on the eastern side; and a geofabric-lined garden bed/embankment on the west.

In order to provide a 2.5m wide bike path through the area, the kerb will have to be demolished or the garden embankment will have to excavated back.

In the design calculations, it has been assumed that the grass running down the eastern side of the footpath will be excavated and the concrete footpath will be extended all the way to the back of the kerb. This will provide approximately 2m of bike path.

Demolishing and reconstructing the kerb was not considered, as the on-street parking facility used for the showground would be restricted. Further, the expense of demolishing and reconstructing the kerb, channel and pavement would be an unnecessary expense.

Excavating the existing embankment on the western side was not considered, as the slope of the garden bed is already at a slope of approximately 1:1. Additional excavation would likely require the construction of a retaining wall, which was considered an unnecessary expense.

4.3 SITE B – EXCAVATE VEGETATION AND WIDEN VERGE

4.3.1 Chainage 2500m to 2750m and Chainage 2900m to 2950m Tathra Rd, Bega

It is understood an upgrade to the existing Tathra Road and Boundary Road intersection is proposed, with design recently completed. The proposed upgrade is to incorporate allowance for a bike path on the northern side of the intersection as described below.

The existing road verge is too narrow to accommodate the Type A cross section between the above chainages. In order to fit in the new bike path alignment, it is recommended that the vegetation be cleared along the proposed alignment and a new level embankment be built running parallel to the existing road.

Works would include felling and removing approximately 40 trees, clearing and grubbing the new alignment and constructing the new level alignment. These works have been calculated in the provided construction estimate.

Reducing the width of the bike path to keep it within the existing road verge was not considered due to safety considerations. There is currently no sealed shoulder on the road, which means that the path for car run-off would be directly on to the new bike path if it was constructed within the current verge.

4.4 SITE C – CONSTRUCT BOARDWALK AND CULVERT STRUCTURE OVER PARBERY CREEK

4.4.1 Chainage 2850m to 2900m Tathra Rd, Bega

The existing road and bridge infrastructure is not wide enough to accommodate the proposed bike path over Parbery Creek. It is therefore proposed that a combination of pedestrian boardwalk and bridge/culvert be constructed to allow for a level grade crossing over the creek and surrounding flood plain. The construction of the boardwalk, culvert and approaches has been calculated in the construction estimate.

Bridge extension works were not considered. There is a considerable height difference between the bridge deck and the creek bed. Extending the bridge was considered to not be cost effective.

Keeping the vertical alignment of the bike path along the natural surface level was not considered. Due to the assumed soil composition of the flood plain, significant compaction and surface treatments would need to be undertaken to prevent any subsidence issues. Further, the bike path would likely be inundated during minor rain events, which would effectively eliminate travel along the alignment during rainy weather.

As the introduction of an additional obstruction in the waterway has the potential to impact upstream properties, further flood assessment is required to determine the appropriate configuration of the waterway crossing.

4.5 SITE D – WIDEN BRIDGE EMBANKMENT AND EXTEND CUVLERT

4.5.1 Chainage 3400m to 3500m Rd Tathra Rd, Bega

The existing road alignment moves onto an embankment to cross a valley, which is currently too narrow to support a 2.5m bike path safely. It is proposed that the embankment on the Eastern side be built up to accommodate the bike path alignment. The existing embankment appears to cross a bore drain from adjacent properties; and a drainage structure underneath the current embankment allows for cattle and pedestrian access from one property to another.

Works would include preparing embankment foundation, supplying and install drainage structures (nominal 2.4m cell, 2400mm by 2100mm RCBC, two cell widths), supplying embankment fill and constructing embankment and approaches. Guard rails have not been included in these proposed works.

Reducing the width of the bike path to fit in next to the existing road was not considered due to safety concerns (extremely limited room, no way to delineate car run-off from bike path). Moving the alignment down onto the floodplains below the bridge was also not considered, as the potential for the bike path to be inundated on a regular basis would sever the effectiveness of the alignment.

4.6 SITE E – CULVERT EXTENSION OVER CREEK

4.6.1 Chainage 4900m to 4950m Tathra Rd, Bega

At this site, there is a narrow culvert crossing a creek with no shoulders or verges. It is proposed that the culvert crossing be extended to allow for the bike path to run parallel to the existing road. It is assumed that 3/600mm RCP cells is the current drainage infrastructure underneath the crossing. Works would include extending these culverts by an additional cell, building up the embankment and installing the bike path parallel to the road.

Shifting the bike path alignment further into the floodplain was not considered, as extensive drainage works would have to be undertaken irrespective of where the alignment crosses this creek. Creating a shared bike path on the existing road was not considered, as there is not sufficient space for cars to pass safely around any cyclists.

4.7 SITE F – DUAL-SPAN PEDESTRIAN BRIDGE OVER MEAKERS GULLY

4.7.1 Chainage 5200m to 5350m Tathra Rd, Bega

The existing road across Meakers Gully traverses two separate culvert spans with sealed shoulders either side. While one of these shoulders would have sufficient width for a bike path, cyclist safety would be at risk, especially in any dense traffic situations. It is therefore proposed to build a dual-span pedestrian bridge across Meakers Gully. The first section would span approximately 40m, leading from the approach to Meakers Gully to a natural earth embankment in the middle of the crossing. The path would then follow this earth embankment for approximately 30m before starting the second bridge span. This bridge section would cross the narrower crossing at or above the existing culvert crown height.

Works would include expanding the road corridor to allow for the new approaches, constructing the approaches and abutments and installing the pedestrian bridge sections.

4.8 SITE G – CLEAR VEGETATION AND WIDEN EMBANKMENT

4.8.1 Chainage 5500m to 5800m Tathra Rd, Bega

The existing road alignment follows an embankment through the Jellat Jellat flats. The existing road shoulders are not currently wide enough to support the 2.5m bike path alignment. It is proposed that the existing vegetation down the Northern side of the road be cleared and the embankment widened. With the vegetation cleared, it is not envisioned that the road corridor fence line will have to be moved.

Widening the existing seal and delineating an on-road bike path was not considered for this section. Due to the constraints of the narrow alignment, cyclist safety would be endangered if this option was executed.

4.9 SITE H – CULVERT EXTENSION OVER WATER BODY

4.9.1 Chainage 5750m to 5800m Tathra Rd, Bega

If the works described in Site G are constructed, it will be necessary to extend the cells of existing culverts over a creek crossing. Works will include de-silting the surrounds and the approaches, de-watering the construction site, installing the culvert bases, installing the culvert cells and constructing the embankment/approaches.

The option of constructing a pedestrian bridge over this section of the alignment was not considered, as the option of widening the existing cells provided a more economical solution. Further, adoption of the existing road vertical geometry allows for the existing cattle crossing to be maintained at approximately Ch 6,000.

4.10 SITE I – WIDEN EXISTING CUT ALONG ROAD ALIGNMENT

4.10.1 Chainage 6500m to 6650m Tathra Rd, Bega

The existing road alignment passes through a cutting that is currently too narrow to support the bike path alignment. It is proposed that the existing embankment undergo additional excavation to make appropriate room for the bike path alignment. Works will include vegetation clearing, excavation of cut and preparation of subgrade surface. Geofabric reinforcement of the cutting may be necessary to due to the increase in slope length.

Widening the seal and delineating an on-road bike path was not considered, as there is not enough physical space currently to allow for such a shared carriageway.

Moving the alignment on top of the existing embankment was not considered, as private property runs all the way along the existing embankment, right to the edge of the cut.

4.11 SITE J – PEDESTRIAN BRIDGE OVER GOWING CREEK

4.11.1 Chainage 6850m to 6950m Tathra Rd, Bega

The existing road alignment converges on a narrow bridge across Gowing Creek. This bridge has no shoulders or verges; and would be uneconomical to extend or replace the existing road bridge to accommodate the new bike path. It is therefore proposed that a new pedestrian bridge be constructed to allow for the bike path alignment to continue.

The pedestrian bridge would need to span approximately 45m; and would require adjusting the existing road corridor boundary to allow for a smooth approach. The option to alter the horizontal alignment of the bike path was not considered, as culverts or bridges will need to be installed regardless of the creek crossing location. Further, the property downstream is private and would need to be resumed in order to accommodate the new alignment.

As the introduction of an additional obstruction in the waterway has the potential to impact upstream properties, further flood assessment is required to determine the appropriate configuration of the waterway crossing.

4.12 SITE K – BRIDGE OVER JELLAT JELLAT CREEK

4.12.1 Chainage 8000m to 8100m Tathra Rd, Bega

The existing bridge across Jellat Jellat Creek is not sufficient width to support the proposed bike path alignment. To cross the Jellat Jellat flats it has been proposed that a pedestrian bridge be constructed on the northern side of the existing road to service the proposed pathway. The pedestrian bridge would have to span approximately 35m; and could be installed level to the adjacent embankments (lower than the existing bridge deck). The bridge would ideally be installed in the existing road corridor

Construction works would involve constructing approaches, constructing abutments and installing the pedestrian bridge span.

As the introduction of an additional obstruction in the waterway has the potential to impact upstream properties, further flood assessment is required to determine the appropriate configuration of the waterway crossing.

4.13 SITE L – CLEAR VEGETATION AND WIDEN VERGE EMBANKMENT

4.13.1 Chainage 11400m to 11747m Tathra Rd, Kalaru

The section of road above does not currently have sufficient width on the southern side to accommodate the proposed bike path alignment. It is proposed that existing vegetation be removed and the existing verge be widened to accommodate the new bike path construction.

While there is sufficient room on the opposite side of the road, no suitable crossing location has been identified. Therefore, conducting any treatments on the norther side of the road have not been considered.

It is understood that design has recently been undertaken in this area as part of a major drainage upgrade project. The proposed widening would need to take into consideration these proposed works.

5 COST ESTIMATE

5.1 PROPOSED EXECUTION STRATEGY

As per council advice, it has been assumed that the proposed works are to be executed by the Council Works Department, utilising Council plant. Due to the regional nature of the works, Council have historically found it difficult to attract larger contractors from major centres due to the mobilisation, accommodation, and additional overhead costs associated with undertaking works in the Bega region.

5.2 TOTAL ESTIMATED COSTS

The total estimated construction cost for this project is $ 18,806,252.

This includes:

- Direct Construction Costs equal to $ 14,187,912
- Indirect Construction Costs (Overheads) equal to $ 1,071,362
- Contingency Costs equal to $ 3,546,978

Please refer to Appendix C – Bill of Quantities for a detailed view of the schedule.

The remainder of this section will detail how rates for individual line items were built up and factored to suit the project location and scale.

5.3 BULK ITEM COSTS

Table 5.1 details the estimated cost of the bulk construction items for this project.

Table 5.1: Bulk Construction Item Costs

Project Item	Qty	Unit	Total Costs
Concrete Cost	3,967	m^3	$ 6,516,724
Land Clearing Costs	6	ha	$ 32,076
Total Earthworks Cost	9,718	m^3	$ 882,870
Boardwalk Costs	525	m^2	$ 4,523,717
Culvert Costs	34	m	$ 101,547

5.4 BASIS OF ESTIMATE: DIRECT COST - RATES BREAKDOWN

Construction rates for direct costs were derived from rates prescribed in Rawlinsons Australian Construction Handbook (2021). Additional factors were then applied to these rates to account for construction escalation, location of works and for post-pandemic stimulus funding expected to restrict supply of labour and materials. A breakdown of rates, escalation factors and engineer overrides are detailed below in Table 5.2.

Further, where applicable, current council workforce rates have been adopted to align with the construction methodology proposed by council.

Rates for the procurement of an Environmental Management Plan, Traffic Management Plan and Cultural Heritage Plan were based on consultant rates from previous projects.

Table 5.2: – Direct Cost Rates

Construction Cost	Description	Unit	Rate	Source
Clear and Grub	Run grader over areas to strip less than 75mm of topsoil	ha	$ 5,346.00	Rawlinsons
Tree Clearing	Pull out and burn trees/thick vegetation	Each	$ 348.00	Rawlinsons
Cut to Fill	Bulk Earthworks, excavate to alignment height	m^3	$ 50.00	BVSC
Import to Fill	Supply, deliver and fill to alignment height	m^3	$ 120.00	BVSC
Box-out of alignment	Excavate 150mm along new path alignment	m^3	$ 34.67	Rawlinsons
Trim Alignment	Trim surface to vertical alignment	m^2	$ 4.97	Rawlinsons
Compact Alignment	Compact subgrade to 97% compaction	m^2	$ 4.05	Rawlinsons
Formwork	Supply, erect, maintain and deconstruct formwork	m^2	$ 32.40	Rawlinsons
Concrete	Supply, deliver and pour N32 fibre-reinforced concrete	m^3	$ 1,642.63	Rawlinsons verified against BVSC projects
Broom Finish	All concrete works including stiff broom finish of poured concrete	m^2	$ 9.56	Rawlinsons
Saw Cut	Full-width saw cut expansion joint (50mm deep)	Each	$ 20.25	Rawlinsons
Expansion Joint	Rubber-sealed expansion joint	Each	$ 20.25	Rawlinsons
Bridge Decking	Supply and install pedestrian bridge decking	m^2	$ 6,521.20	BVSC
Bridge Abutments	Supply, trim and compact abutments and approaches, including concrete	m^3	$ 1,642.63	As per concrete above
RCP (450mm)	Supply and install 450mm Reinforced Concrete Pipe (RRJ – 2.4m cells)	Each	$ 1,377.00	Rawlinsons
RCP (600mm)	Supply and install 600mm Reinforced Concrete Pipe (RRJ – 2.4m cells)	Each	$ 1,782.00	Rawlinsons
RCBC (2400 x 2100mm)	Supply and install pre-cast RCBC cells and headwall	Each	$ 8,896.33	Supplier pricing
Culvert Bases	Cast in-situ concrete culvert bases	m^2	$ 137.80	As per concrete above
Bulk Excavate Silt	Excavate and remove silt deposits	m^3	$ 250.00	BVSC

5.5 BASIS OF ESTIMATE: INDIRECT COSTS

The indirect costs of this project consist of Contractor Site Overheads, Supervision and QA, Certification and project contingencies. The rates for the indirect costs were established on the basis of an assumed project duration.

5.5.1 Project Duration

The project duration was estimated using the assumed productivity rates for the following activities multiplied out by the respective quantities of work in the project.

- Clear and Grub = 200m/day
- Cut and Fill = 100m/day
- Subgrade Treatment = 100m/day
- Boxing-out of footpath = 50m/day
- Pour and install concrete = 50m/day
- Install culverts and bases = 80 days total
- Install bridges and boardwalks = 120 days total

From these production rates an estimated project length of 285 working days was calculated, which approximates to twelve calendar months and three calendar weeks.

5.5.2 Indirect Costs Breakdown

The indirect costs were derived by applying a day rate for each component by a percentage of how long each resource would be required for on-site. The resources and their costs are detailed below in Table 5.

Table 5.3: – Indirect Costs and Breakdowns

Overhead Name	Overhead Description/Composition	Estimated % Time-on-project	Day Rate	Total Overheads
Traffic Control	4 x Labourer, 8 hrs/day	60%	$1,800.00	$ 280,800.00
Quality Control Officer	1 x QA Officer, 8 hrs/day	20%	$800.00	$ 31,200.00
Onsite supervisor	1 x Supervisor, 8.5 hrs/day	33%	$1,440.00	$ 92,664.00
Contractors Site Facilities	1x Toilet, Lunchroom and Site Office	100%	$300	$ 58,500.00
Mobilisation/Demobilisation	Move all plant, materials to/from site plus final clean up	-	$22,000.00	$ 22,000.00
Final Certification	Onsite survey, as-constructed drawings and certification	-	$70,939.56	$ 70,939.56

The Day Rates for each resource was calculated using the estimating methods below:

- Labourer hourly rate is estimated to be charged out at $75.00/hour from previous Local Council rates including oncosts.
- Quality Control officer rates are based off Technical Officer rates for similar projects at $100.00/hour.
- Supervisor rates are estimated off previous Local Council rates at $120.00 per hour from similar projects.
- Contractor site facilities are based off supply and installation of site offices in previous projects.
- Excluding external electricity supply, internet access or the provision of hooking up to the activities.
- Mobilisation/Demobilisation rates are based off previous lump sums for Mob/Demob and site clean-up from previous projects supplied by BVSC.
- Certification is based off previous lump sums for review and certification from previous projects supplied by BVSC.

5.6 BASIS OF ESTIMATES: CONTINGENCIES

Contingencies were applied for this cost estimate. The contingencies applied were:

- $200,000 contingency to cover any price difference with respect to bridge construction. As geotechnical information is unknown, the accuracy of the bridge rate might not be sufficient to cover real-world expenses.
- An additional contingency of $31,500.00 was applied to cover any stand-down during rain or flood events. This cost is based on seven days of stand-down for a construction crew costing $4500.00 per day. As costs are assumed based on self-execution by BVSC, it is assumed that personnel may be redeployed to alternative works during extended periods of wet weather.
- A 25% contingency has been applied to the direct job costs, totalling $14,187,912.00. This contingency was applied due to recent volatility brought in by the pandemic, the remote location of the project works and recent trends in uncompetitive contractor pricing.

5.7 COST BENEFIT ANALYSIS

Based on the above cost estimate a cost benefit analysis (CBA) of the project was conducted to determine the likely return on investment for the project. The detailed CBA is included in Appendix D.

At the selected real discount rate of 7% for this project, the analysis yields a Net Present Value (NPV) of -$9.5 million and a Benefit Cost Ratio (BCR) of 0.52 meaning that it is not economically desirable and does not provide a net benefit. At the 7% discount rate, for every $1 in costs associated with the project, there is $0.52 of benefit. The analysis returns a negative NPV across all discount rates applied and yields an Internal Rate of Return (IRR) of 0.5%.

Under the Base Case scenario (without Project scenario), none of the identified benefits would be captured nor any of the costs incurred. As such, the scenario with the Project does not provide positive net economic and social benefits.

5.8 POTENTIAL STAGING

Further to the above, a sensitivity assessment was also completed assuming initial construction of the eastern and western ends of the bike path initially, to minimise construction through waterways at significant cost. For the purposes of sensitivity, the assumed costs were as listed in Table 5.4 with further detail provided in Appendix A.

Table 5.4: Sensitivity Assessment

Segment	Length (m)	Cost
Western Segment: Bega to Thornhill Road	5,050	$ 5,260,890
Eastern Segment: Tathra to Ike Game Road	3,250	$ 4,088,746

The CBA results indicate:

- The Western Segment is socio-economically desirable at a 7% discount rate. The CBA returns an NPV of $0.1 million and a BCR of 1.01, indicating a present value return of $1.01 for every dollar of cost. The Western Section returns a negative NPV at a 10% discount rate and an IRR of 7.1%.
- The Eastern Segment is socio-economically desirable at a 3% discount rate. The CBA returns an NPV of $0.2 million and a BCR of 1.01, indicating a present value return of $1.05 for every dollar of cost. The Eastern Section returns a negative NPV at the 7% and 10% discount rates and an IRR of 3.5%.

6 PROJECT RISKS AND OPPORTUNITIES

6.1 KEY RISKS

There are several key risks to be considered if Bega Valley Shire Council wishes to continue with this project. A high-level risk summary has been provided below.

1. The remaining budget from Phase 1 of the works may not be sufficient to cover the extent of works detailed in the Bill of Quantities.
2. If the allocated funds are not sufficient to cover the extent of works in the Bill of Quantities, further investigation may be required in order to effectively reduce the Scope of Works or to compete a new, cost-effective design alignment.
3. The costs involved in extending the culverts or constructing bridges/boardwalks may differ greatly from what was estimated if geotechnical conditions on-site are poorer than what was estimated.
4. Flood immunity has not been modelled for this design alignment. Further investigation will be required in order to determine actual flood immunity of specified sections.
5. Several sections of the works extend outside the DCDB gazetted road corridor. Land acquisitions, cattle grid sizing and placement, re-fencing costs and livestock considerations have not been included in this investigation. These items have potential significant influence on project cost and schedule.
6. Pedestrian volumes and shared-use facilities requirements are based on forecast numbers and have been used to inform the proposed design width. Potential variation in numbers and potential trigger for greater footpath width have not been considered in this design.

6.2 KEY OPPORTUNITIES

By taking on this design alignment, Bega Valley Shire Council stands to gain from realising the following opportunities:

1. Bega Valley SC can provide an uninterrupted, safe and scenic cycleway from Kalaru to Bega with this alignment.
2. Due to the location of this alignment, the views and atmosphere would be a great drawcard for cycling tourism.
3. All cycleway users would be insulated from traffic (except for the two designated road crossings). This could potentially reduce harmful crashes and reduce fatalities on the Bega-Kalaru Road.
4. If completed, this project will be a major piece of infrastructure for the region; creating jobs and growth for local contractors, local suppliers and Council personnel.
5. This piece of infrastructure has the potential to be the cornerstone of an extended, interconnected bicycle path for the whole region; greatly increasing the scope for further cycleway projects.

7 FORWARD WORK PLAN

The following forward-works plan is proposed if the contents of this report are accepted:

1. Acceptance of proposed design alignment and acceptance of suitable cost-benefit analysis.
2. Commission and undertake a detailed survey of the site extents.
3. Commission and undertake a detailed geological investigation along the proposed alignment and especially in key Civil Works areas.
4. Commission and undertake a detailed design of the alignment suitable for construction.
5. Commission and undertake a flood impact assessment of the detailed design alignment to confirm potential impacts on surrounding properties.
6. Issue and accept Fit-For-Construction (IFC) Drawings.

8 QUALIFICATIONS

a) In preparing this document, including all relevant calculation and modelling, Engeny Water Management (Engeny) has exercised the degree of skill, care and diligence normally exercised by members of the engineering profession and has acted in accordance with accepted practices of engineering principles.

b) Engeny has used reasonable endeavours to inform itself of the parameters and requirements of the project and has taken reasonable steps to ensure that the works and document is as accurate and comprehensive as possible given the information upon which it has been based including information that may have been provided or obtained by any third party or external sources which has not been independently verified.

c) Engeny reserves the right to review and amend any aspect of the works performed including any opinions and recommendations from the works included or referred to in the works if:

    i) Additional sources of information not presently available (for whatever reason) are provided or become known to Engeny; or

    ii) Engeny considers it prudent to revise any aspect of the works in light of any information which becomes known to it after the date of submission.

d) Engeny does not give any warranty nor accept any liability in relation to the completeness or accuracy of the works, which may be inherently reliant upon the completeness and accuracy of the input data and the agreed scope of works. All limitations of liability shall apply for the benefit of the employees, agents and representatives of Engeny to the same extent that they apply for the benefit of Engeny.

e) This document is for the use of the party to whom it is addressed and for no other persons. No responsibility is accepted to any third party for the whole or part of the contents of this Report.

f) If any claim or demand is made by any person against Engeny on the basis of detriment sustained or alleged to have been sustained as a result of reliance upon the Report or information therein, Engeny will rely upon this provision as a defence to any such claim or demand.

g) This Report does not provide legal advice.

Appendix A:
Proposed Civil Works Site Locations

A.1 SITE A – EXISTING FOOTPATH WIDTH RESTRICITON

A.2 SITE B – EXCAVATE VEGETATION AND WIDEN VERGE

A.3 CONSTRUCT BOARDWALK AND CULVERT STRUCTURE OVER PARBERY CREEK

Note: Guardrails have been replaced.


Bega - Kalaru Bikepath
Site C End (Ch. 2900m)
Legend
Google Earth
©2021 Google
1.51 m
N

A.4 SITE D – WIDEN BRIDGE EMBANKMENT AND EXTEND CULVERT

Note: Guardrails have been replaced.

A.5 SITE E – CULVERT EXTENSION OVER CREEK

A.6 SITE F – DUAL-SPAN BRIDGE OVER MEAKERS GULLY

A.7 SITE G – CLEAR VEGETATION AND WIDEN EMBANKMENT

A.8 SITE H – CULVERT EXTENSION OVER WATE BODY

A.9 SITE I – WIDEN EXISTING CUT ALONG ROAD ALIGNMENT

A.10 SITE J – PEDESTRIAN BRIDGE OVER GOWING CREEK

A.11 SITE K – BRIDGE OVER JELLAT JELLAT CREEK

Note: Bridge replacement complete.

A.12 SITE L – CLEAR VEGETATION AND WIDEN VERGE EMBANKMENT

Note: Drainage upgrade proposed in this area.

Appendix B:
Basis of Design

Project Basis of Design

Job No.:	M7309	**Project Manager:**	MS	**Client:**	PSA Consulting	**Revision:**	B
Project:	Bega-Kalaru Bike Path Design Review	**Project Director:**	JO	**Client Contact:**		**Date:**	27-May-22

Item No.	Design Criteria	Source
Bega-Kalaru Bikepath Design Inputs		
Input Data		
Survey Data	Public GIS Data	ELVIS DEM
Geotechnical Data	Regional Geological Maps	https://www.regional.nsw.gov.au/meg/geoscience/
Flood Data	Council Flood Mapping	Bega Valley Shire Council
Modelling Software	12D	
Contract Structure	Council Works Department	Bega Valley Shire Council
Design Standards		
Loading		
Design Vehicle	Light vehicle	Assumed - Verge crossing requirement
Subgrade CBR	CBR<3	Assumed - Flood plain deposition
Bikepath Horizontal Alignment		
Alignment	As close as possible to Option 1	PSA
Preferred Earthworks Method	Minimal earthworks. Fill preferred over cut due to regional geology	PSA / Bega Valley Shire Council
Key Notes	Parallel Road where possible at the same height. Deviate north to maintain acceptable grade Drop to existinng cattle tracks where significant fill required	PSA / Bega Valley Shire Council
Bikepath Vertical Alignment		
Min Grade	0.30%	RMS
Desirable Max Grade	5%	RMS
Absolute Max Grade	10%	Assumed
Crossfall	2-4%	Assumed
Type Cross Section A	2.5m wide fibre-reinforced concrete footpath	Bega-Kalaru Bikepath Project Proposal Specifications
Type Cross Section B	Remove and replace existing footpath	Bega Valley Shire Council
Bridge Concept Design		
Type	Reinforced Concrete Box Culverts	Assumed - Extension of existing infrastructure
Standard	TfNSW NB80 Guide to QA Specification B80 for Concrete Works for Bridges TfNSW R16 Precast Reinforced Concrete Box Culverts	
Boardwalk Concept Design		
Type	Composite Fibre Technologies prefabricated - Wagners (Pty.Ltd)	Bega Valley Shire Council
Standard	Supplier standard	Wagners
Culvert Design	TfNSW R16 Precast Reinforced Concrete Box Culverts	RMS Assumed - Extension of existing infrastructure
Civil Works		
Clearing and Grubbing	TfNSW G40 - Clearning and Grubbing	RMS
General Earthworks	TfNSW QA Specification R44	RMS
Construction of Verges	TfNSW QA Specification R49	RMS
Concrete Works		
General Concrete Works	QA Specification R53	Bega Valley Shire Council
Fibre-Reinforced Concrete	MRTS273 Fibre-Reinforced Concrete	TMR
General Concrete Paving	TfNSW	RMS

Appendix C:
Cost Estimate

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WATER MANAGEMENT

Bill of Quantities

Kalura to Bega Bike Path

Date:	31/01/2022
Revision:	3
Work By:	MS
Reviewed:	LB

	Description	Unit	Qty	Rate	Total
Direct Costs					**$ 14,187,912**
1.0 Project Documntation					**$ 48,000**
1.1	Traffic Management Plan	Lump Sum	1.0	$ 12,000.00	$ 12,000
1.2	Enviromental Management Plan	Lump Sum	1.0	$ 20,000.00	$ 20,000
1.3	Cultural Heritage Plan	Lump Sum	1.0	$ 16,000.00	$ 16,000
2.0 Widen Existing Bikeway Network (Chainage 0m to 750m)					**$ 566,364**
2.1	Box-out Alignment for footpath extensions	m2	2,100	$ 34.67	$ 72,803
2.2	Compact subgrade of alignment to 97% compaction	m2	2,100	$ 4.05	$ 8,505
2.3	Erect Formwork	m2	1,575	$ 32.40	$ 51,030
2.4	Supply and Pour N32 Concrete, including supply and incorporation of reinforcing fibres	m3	236	$ 1,642.63	$ 388,071
2.5	Work and screed concrete including a stiff broom finish	m2	1,575	$ 9.56	$ 15,054
2.6	Installation of flexible expansion joint, every 12m	Each	88	$ 20.25	$ 1,782
2.7	Saw-cut minimum 50mm deep across full footpath width, every 3m	Each	262	$ 20.25	$ 5,306
2.8	Prepare, sleeve and install 300mm N12 dowel between new and existing footpath @ 500mm ctrs	Each	2,100	$ 11.34	$ 23,814
3.0 Construct 2.5m Footpath on new Alignment (Chainage 1800m to 11747m)					**$ 13,519,148**
3.1	Clear and Grub <50mm of topsoil and vegetation, 6m wide	ha	6.0	$ 5,346.00	$ 32,076
3.2	Tree Clearing along alignment	Each	480.0	$ 348.00	$ 167,040
3.3	Cut to Fill - Excavate quantities and transport to embankment quantities, includes shaping and compaction	m3	4,047.0	$ 50.00	$ 202,350
3.4	Import to Fill - Import best local material to site, includes shaping and compaction	m3	5,671.0	$ 120.00	$ 680,520
3.5	Trim Alignment - Final trim of alignment to design height	m2	59,682.0	$ 4.97	$ 296,620
3.6	Box-out of alignment - Excavate out 150mm alignment	m3	4,477.0	$ 34.67	$ 155,209
3.7	Surface Treatment - Compact alignment subgrade to 97% compaction	m2	29,841.0	$ 4.05	$ 120,856
3.8	Formwork - Erect formwork and boxing along new alignment	m2	24,868.0	$ 32.40	$ 805,723
3.9	Supply and pour N32 Concrete, including supply and incorporation of reinforcing fibres	m3	3,731.0	$ 1,642.63	$ 6,128,653
3.10	Work and screed concrete including a stiff broom finish	m2	24,868.0	$ 9.56	$ 237,688
3.11	Installation of flexible expansion joint, every 12m	Each	830.0	$ 20.25	$ 16,808
3.12	Saw-cut minimum 50mm deep across full footpath width, every 3m	Each	2,486.0	$ 20.25	$ 50,342
3.13	Bridge - Supply and install bridge pedestrian bridge decking (Provisional)	m2	525.0	$ 6,521.20	$ 3,423,630
3.14	Bridge Abutments - Supply and construct bridge abutments and embankments leading to (Provisional)	m3	640.0	$ 1,642.63	$ 1,051,283
3.15	Bridge Piles - Suppply and install bridge piles, complete including drill, form, reinforcing, pour and cure.	No	84.0	$ 581.00	$ 48,804
3.16	RCP (450mm) Supply and Install 450mm Reinforced Concrete Pipe (2.4m Cells)(Provisional)	Each	9.0	$ 1,377.00	$ 12,393
3.17	RCP (600mm) Supply and Install 600mm Reinforced Concrete Pipe (2.4m Cells)(Provisional)	Each	3.0	$ 1,782.00	$ 5,346
3.18	RCBC - (2400mm x 2100mm) - Supply and install pre-cast base, RCBC Cells and Headwall (2.4m Cells) (Provisional)	Each	2.0	$ 8,896.33	$ 17,793
3.19	Culvert Bases - Prepare subgrade, erect formwork and supply/install N32 Concrete and reinforcement as per RMS Standard drawings	m2	11.0	$ 137.80	$ 1,516
3.20	Bulk Excavate Silt - Excavate silt and remove from site	m3	258.0	$ 250.00	$ 64,500
4.0 Signage and Safety					**$ 4,400**
4.1	Install signage and pedestrian management devices as required	Lump Sum	1.0	$ 4,400.00	$ 4,400
5.0 Miscellaneous					**$ 30,000**
5.1	Service relocation	Lump Sum	1.0	$ 30,000.00	$ 30,000
5.2	ESC	Lump Sum	1.0	$ 20,000.00	$ 20,000
Indirect Costs				.	**$ 1,071,362**
	Contractor Preliminaries (Mobilisation, Demobilisation, Traffic Control, etc.)				**$ 361,300.00**
	Supervision and QA				**$ 123,864.00**
	Engineering			**1%**	**$ 141,879.12**
	Certification			**0.5%**	**$ 70,939.56**
	Survey and Geotech			**1.0%**	**$ 141,879.12**
	Allowances				**$ 231,500.00**
	Contingency (25% Direct costs)				**$ 3,546,978.11**
	Land Acquisition	m2			
Total Costs					**$ 18,806,252**

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Bill of Quantities

Kalura to Bega Bike Path

Western Segment Bega to Thornhill Road - 5,050m

Date:	31/01/2022
Revision:	3
Work By:	MS
Reviewed:	LB

	Description	Unit	Qty	Rate	Total
Direct Costs					**$ 3,822,853**
1.0 Project Documntation					**$ 48,000**
1.1	Traffic Management Plan	Lump Sum	1.0	$ 12,000.00	$ 12,000
1.2	Enviromental Management Plan	Lump Sum	1.0	$ 20,000.00	$ 20,000
1.3	Cultural Heritage Plan	Lump Sum	1.0	$ 16,000.00	$ 16,000
2.0 Widen Existing Bikeway Network (Chainage 0m to 750m)					**$ 566,364**
2.1	Box-out Alignment for footpath extensions	m2	2,100	$ 34.67	$ 72,803
2.2	Compact subgrade of alignment to 97% compaction	m2	2,100	$ 4.05	$ 8,505
2.3	Erect Formwork	m2	1,575	$ 32.40	$ 51,030
2.4	Supply and Pour N32 Concrete, including supply and incorporation of reinforcing fibres	m3	236	$ 1,642.63	$ 388,071
2.5	Work and screed concrete including a stiff broom finish	m2	1,575	$ 9.56	$ 15,054
2.6	Installation of flexible expansion joint, every 12m	Each	88	$ 20.25	$ 1,782
2.7	Saw-cut minimum 50mm deep across full footpath width, every 3m	Each	262	$ 20.25	$ 5,306
2.8	Prepare, sleeve and install 300mm N12 dowel between new and existing footpath @ 500mm ctrs	Each	2,100	$ 11.34	$ 23,814
3.0 Construct 2.5m Footpath on new Alignment (Chainage 1800m to 11747m)					**$ 3,189,089**
3.1	Clear and Grub <50mm of topsoil and vegetation, 6m wide	ha	2.0	$ 5,346.00	$ 10,425
3.2	Tree Clearing along alignment	Each	100.0	$ 348.00	$ 34,800
3.3	Cut to Fill - Excavate quantities and transport to embankment quantities, includes shaping and compaction	m3	1,322.0	$ 50.00	$ 66,100
3.4	Import to Fill - Import best local material to site, includes shaping and compaction	m3	2,603.4	$ 120.00	$ 312,413
3.5	Trim Alignment - Final trim of alignment to design height	m2	19,500.0	$ 4.97	$ 96,915
3.6	Box-out of alignment - Excavate out 150mm alignment	m3	1,462.5	$ 34.67	$ 50,702
3.7	Surface Treatment - Compact alignment subgrade to 97% compaction	m2	9,750.0	$ 4.05	$ 39,488
3.8	Formwork - Erect formwork and boxing along new alignment	m2	8,125.0	$ 32.40	$ 263,250
3.9	Supply and pour N32 Concrete, including supply and incorporation of reinforcing fibres	m3	1,218.8	$ 1,642.63	$ 2,001,955
3.10	Work and screed concrete including a stiff broom finish	m2	8,125.0	$ 9.56	$ 77,659
3.11	Installation of flexible expansion joint, every 12m	Each	271.2	$ 20.25	$ 5,492
3.12	Saw-cut minimum 50mm deep across full footpath width, every 3m	Each	812.3	$ 20.25	$ 16,448
3.13	Bridge - Supply and install bridge pedestrian bridge decking (Provisional)	m2	0.0	$ 6,521.20	$ -
3.14	Bridge Abutments - Supply and construct bridge abutments and embankments leading to (Provisional)	m3	90.0	$ 1,642.63	$ 147,837
3.15	Bridge Piles - Suppply and install bridge piles, complete including drill, form, reinforcing, pour and cure.	No	0.0	$ 581.00	$ -
3.16	RCP (450mm) Supply and Install 450mm Reinforced Concrete Pipe (2.4m Cells)(Provisional)	Each	8.0	$ 1,377.00	$ 11,016
3.17	RCP (600mm) Supply and Install 600mm Reinforced Concrete Pipe (2.4m Cells)(Provisional)	Each	3.0	$ 1,782.00	$ 5,346
3.18	RCBC - (2400mm x 2100mm) - Supply and install pre-cast base, RCBC Cells and Headwall (2.4m Cells) (Provisional)	Each	2.0	$ 8,896.33	$ 17,793
3.19	Culvert Bases - Prepare subgrade, erect formwork and supply/install N32 Concrete and reinforcement as per RMS Standard drawings	m2	6.0	$ 137.80	$ 827
3.20	Bulk Excavate Silt - Excavate silt and remove from site	m3	122.5	$ 250.00	$ 30,625
4.0 Signage and Safety					**$ 4,400**
4.1	Install signage and pedestrian management devices as required	Lump Sum	1.0	$ 4,400.00	$ 4,400
5.0 Miscellaneous					**$ 10,000**
5.1	Service relocation	Lump Sum	1.0	$ 10,000.00	$ 10,000
5.2	ESC	Lump Sum	1.0	$ 5,000.00	$ 5,000
Indirect Costs				.	**$ 482,324**
	Contractor Preliminaries (Mobilisation, Demobilisation, Traffic Control, etc.)				**$ 115,616.00**
	Supervision and QA				**$ 39,636.48**
	Engineering			**1%**	**$ 38,228.53**
	Certification			**0.5%**	**$ 19,114.27**
	Survey and Geotech			**1.0%**	**$ 38,228.53**
	Allowances				**$ 231,500.00**
	Contingency (25% Direct costs)				**$ 955,713.28**
	Land Acquisition	**m2**			
Total Costs					**$ 5,260,890**

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WATER MANAGEMENT

Bill of Quantities

Kalura to Bega Bike Path

Eastern Segment Tathra to Ike Game Road - 3,250m

Date: 31/01/2022
Revision: 3
Work By: MS
Reviewed: LB

	Description	Unit	Qty	Rate	Total
Direct Costs					**$ 2,903,524**
1.0	**Project Documntation**				**$ 48,000**
1.1	Traffic Management Plan	Lump Sum	1.0	$ 12,000.00	$ 12,000
1.2	Enviromental Management Plan	Lump Sum	1.0	$ 20,000.00	$ 20,000
1.3	Cultural Heritage Plan	Lump Sum	1.0	$ 16,000.00	$ 16,000
2.0	**Widen Existing Bikeway Network (Chainage 0m to 750m)**				**$ -**
2.1	Box-out Alignment for footpath extensions	m2		$ 34.67	$ -
2.2	Compact subgrade of alignment to 97% compaction	m2		$ 4.05	$ -
2.3	Erect Formwork	m2		$ 32.40	$ -
2.4	Supply and Pour N32 Concrete, including supply and incorporation of reinforcing fibres	m3		$ 1,642.63	$ -
2.5	Work and screed concrete including a stiff broom finish	m2		$ 9.56	$ -
2.6	Installation of flexible expansion joint, every 12m	Each		$ 20.25	$ -
2.7	Saw-cut minimum 50mm deep across full footpath width, every 3m	Each		$ 20.25	$ -
2.8	Prepare, sleeve and install 300mm N12 dowel between new and existing footpath @ 500mm ctrs	Each		$ 11.34	$ -
3.0	**Construct 2.5m Footpath on new Alignment (Chainage 1800m to 11747m)**				**$ 2,836,124**
3.1	Clear and Grub <50mm of topsoil and vegetation, 6m wide	ha	1.9	$ 5,346.00	$ 10,415
3.2	Tree Clearing along alignment	Each	60.0	$ 348.00	$ 20,880
3.3	Cut to Fill - Excavate quantities and transport to embankment quantities, includes shaping and compaction	m3	1,320.8	$ 50.00	$ 66,039
3.4	Import to Fill - Import best local material to site, includes shaping and compaction	m3	1,577.0	$ 120.00	$ 189,238
3.5	Trim Alignment - Final trim of alignment to design height	m2	19,482.0	$ 4.97	$ 96,826
3.6	Box-out of alignment - Excavate out 150mm alignment	m3	1,461.2	$ 34.67	$ 50,655
3.7	Surface Treatment - Compact alignment subgrade to 97% compaction	m2	9,741.0	$ 4.05	$ 39,451
3.8	Formwork - Erect formwork and boxing along new alignment	m2	8,117.5	$ 32.40	$ 263,007
3.9	Supply and pour N32 Concrete, including supply and incorporation of reinforcing fibres	m3	1,217.6	$ 1,642.63	$ 2,000,107
3.10	Work and screed concrete including a stiff broom finish	m2	8,117.5	$ 9.56	$ 77,587
3.11	Installation of flexible expansion joint, every 12m	Each	270.9	$ 20.25	$ 5,486
3.12	Saw-cut minimum 50mm deep across full footpath width, every 3m	Each	811.5	$ 20.25	$ 16,433
3.13	Bridge - Supply and install bridge pedestrian bridge decking (Provisional)	m2	0.0	$ 6,521.20	$ -
3.14	Bridge Abutments - Supply and construct bridge abutments and embankments leading to (Provisional)	m3	0.0	$ 1,642.63	$ -
3.15	Bridge Piles - Suppply and install bridge piles, complete including drill, form, reinforcing, pour and cure.	No	0.0	$ 581.00	$ -
3.16	RCP (450mm) Supply and Install 450mm Reinforced Concrete Pipe (2.4m Cells)(Provisional)	Each	0.0	$ 1,377.00	$ -
3.17	RCP (600mm) Supply and Install 600mm Reinforced Concrete Pipe (2.4m Cells)(Provisional)	Each	0.0	$ 1,782.00	$ -
3.18	RCBC - (2400mm x 2100mm) - Supply and install pre-cast base, RCBC Cells and Headwall (2.4m Cells) (Provisional)	Each	0.0	$ 8,896.33	$ -
3.19	Culvert Bases - Prepare subgrade, erect formwork and supply/install N32 Concrete and reinforcement as per RMS Standard drawings	m2	0.0	$ 137.80	$ -
3.20	Bulk Excavate Silt - Excavate silt and remove from site	m3	0.0	$ 250.00	$ -
4.0	**Signage and Safety**				**$ 4,400**
4.1	Install signage and pedestrian management devices as required	Lump Sum	1.0	$ 4,400.00	$ 4,400
5.0	**Miscellaneous**				**$ 10,000**
5.1	Service relocation	Lump Sum	1.0	$ 10,000.00	$ 10,000
5.2	ESC	Lump Sum	1.0	$ 5,000.00	$ 5,000
Indirect Costs				.	**$ 459,341**
	Contractor Preliminaries (Mobilisation, Demobilisation, Traffic Control, etc.)				**$ 115,616.00**
	Supervision and QA				**$ 39,636.48**
	Engineering			**1%**	**$ 29,035.24**
	Certification			**0.5%**	**$ 14,517.62**
	Survey and Geotech			**1.0%**	**$ 29,035.24**
	Allowances				**$ 231,500.00**
	Contingency (25% Direct costs)				**$ 725,881.10**
	Land Acquisition	m2			
Total Costs					**$ 4,088,746**

Appendix D:
Cost Benefit Analysis

Bega Active Transport Corridor

COST BENEFIT ASSESSMENT

Feb 2022

GROWING COMMUNITIES

Regional Economic Advisory

Revision History

Version	Date	Approved by	Reviewed by
Draft V1.0	20/12/2021	Matthew Kelly	Sean Kelly
Final	03/02/2022	Matthew Kelly	Sean Kelly

Prepared By

Author	20/12/2021
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Executive Summary

Background and Purpose

Regional Economic Advisory (REA) has been engaged by Bega Valley Shire Council (Council) as part of a consortium led by PSA Consulting and Engeny to conduct this Cost Benefit Analysis (CBA) of the proposed upgrade to the Bega Active Transport Corridor (the Project). The transport link represents a significant improvement to the current bicycle and pedestrian paths.

The $18.8 million Project will widen existing bikeways and build new footpaths which will allow for greater ease of pedestrian/ bicycle travel from Upper Street in Bega to Armstrong Drive in Kalaru.

This CBA considers the long term benefits and costs the Project will impart on the Bega Valley Shire community. This includes an analysis of potential tourism and local recreation/commuter use, in addition to health benefits to commuters changing from vehicle to active transport. The findings will be used to support funding applications and advocacy efforts for the Project.

Key Findings

The 30 year cost-benefit analysis identified and examined the following costs and benefits:

- Costs:
  - Construction and development costs.
  - Ongoing operational and maintenance costs.
- Benefits:
  - Health and community benefits from additional active recreation.
  - Enhanced safety outcomes for active transport users.
  - Value add from supported tourism activity.

At the selected real discount rate of 7% for this project, the analysis yields a Net Present Value (NPV) of -$9.5 million and a Benefit Cost Ratio (BCR) of 0.52 meaning that it is not economically desirable and does not provide a net benefit. At the 7% discount rate, for every $1 in costs associated with the project, there is $0.52 of benefit. The analysis returns a negative NPV across all discount rates applied and yields an Internal Rate of Return (IRR) of 0.5%.

Table ES.1: CBA Results

Discount Rate	Present Value Costs ($M)	Present Value Benefits ($M)	Net Present Value ($M)	Benefit Cost Ratio
3%	$21.8	$16.6	-$5.2	0.76
7%	**$19.7**	**$10.2**	**-$9.5**	**0.52**
10%	$18.7	$7.6	-$11.1	0.41

Note: Totals may not sum due to rounding.
Source: REA

Under the Base Case scenario (without Project scenario), none of the identified benefits would be captured nor any of the costs incurred. As such, the scenario with the Project does not provide positive net economic and social benefits.

In addition to the costs and benefits included in the assessment above, the Project can be expected to have a broad range of positive impacts which have not been included within the CBA analysis. These include:

- **Travel time savings for active travellers:** Reductions in travel time have long been a fundamental element of the economic case for various transport infrastructure investments. Reducing the amount of time spent on travel enables transport users to spend the time they have saved more productively or more enjoyably. For active travellers, however reduced travel time/distance has an offsetting impact on the recreational and health benefits achieved. Recreational active travellers, in particular, may choose to travel further due to the increased amenity provided by reduced commutes. Therefore, potential time travel savings have been conservatively excluded from the CBA.

- **Increase in business confidence:** The Project will help underpin confidence in the viability and sustainability of Bega Valley Shire, including positive economic impacts during construction and ongoing tourism impacts once operational. These impacts may support further investment and employment in the area. As a new tourism experience, the Project will support the recovery in visitation post the current COVID-19 pandemic.
- **Increase in liveability and community amenity:** The Project will support liveability outcomes for local residents and enhance community amenity and pride. Improved walking and cycling conditions, increased non-motorised travel and reductions in motorised travel all tend to increase community liveability (Queensland Government, 2011). Walking and cycling provide a more intimate connection between people and their surroundings than can generally occur when people drive.

These impacts are substantially positive and would increase the CBA results, if they were quantified.

Table of Contents

1. Introduction

1.1 Background

Regional Economic Advisory (REA) has been engaged by Bega Valley Shire Council (Council) as part of a consortium led by PSA Consulting and Engeny to conduct this Cost Benefit Analysis (CBA) of the proposed upgrade to the Bega Active Transport Corridor (the Project). The transport link represents a significant improvement to the current bicycle and pedestrian paths.

The $18.8 million Project will widen existing bikeways and build new footpaths which will allow for greater ease of pedestrian/ bicycle travel from Upper St in Bega to Armstrong Drive in Kalaru.

This CBA considers the long term benefits and costs the Project will impart on the Bega Valley Shire community. This includes an analysis of potential tourism and local recreation/commuter use, in addition to health benefits to commuters changing from vehicle to active transport. The findings will be used to support funding applications and advocacy efforts for the Project.

1.2 Structure and Approach

The remainder of this CBA is structured as follows:

- Chapter 2: Provides a brief overview of the Project and its importance to the local economy and community.
- Chapter 3: Provides a Cost Benefit Assessment (CBA) of the Project, considering the net socio-economic impacts of the Project over a 30-year period.

2. Project Context

The following sections provide a brief overview of the Bega region and the Project to provide context for the CBA.

2.1 Bega Local Government Area

Bega Valley Shire is 6,040km^2 in size with a coastline of 225km. The Shire borders Victoria to the south with Canberra located to the north-west and Sydney to the north. The town of Bega itself is approximately 2 hours and 45 minutes drive from Canberra and approximately 5 and a half hours drive from Sydney.

The climate is temperate with picturesque mountains, beaches, temperate rainforests, rivers and lakes. The majority of the Shire is conservation land, with 78% of the area is national parks and state forest. Timber production also makes up a notable portion of land use.

Figure 2-1: Bega Valley Shire

Source: Google Maps (2021)

Bega Valley Shire hosts a significant regional economy, producing Gross Regional Product (GRP) of $1.6 billion during 2019/20, with growth average 0.3% per annum over the past five years.

The major employment sectors in Bega Valley Shire include (.id, 2021):

- Health care and social assistance (1,383 Full Time Equivalent (FTE) jobs, 12.6% of regional employment) The Shire acts as a significant regional health care hub, with the hospital a major local employer.
- Agriculture, forestry and fishing (1,339 FTE jobs, 12.2% of regional employment). The Shire is a highly productive agricultural centre including dairy and beef cattle farming alongside significant timber and fishing industries.
- Retail trade (1,259 FTE, 10.6% of regional employment). The Shire hosts a notable retail presence and is also a significant tourist destination as part of the NSW Sapphire Coast.

Like many regional agricultural centres, the shire has an older demographic, with a median age of 51 years compared to the NSW average of 37 years. The majority of residents (approximately 70%) drive to work, with 5.6% using active transport (walking and/or cycling).

Table 2-1: Key Statistics for the Region

Indicator	Bega Valley Shire
GRP (2019/20)	$1.6 billion (0.3% per annum growth five 5 years)
Tourist Visitation (2019/20)	3.2 million visitor days/nights (4.2% per annum growth over five years)
Population (2019/20)	34,727 (0.6% per annum growth over five years)
Unemployment (June 2021)	6.8% (1.7ppt higher than NSW average)
Top 3 Industries by Employment (FTE)	Health Care & Social Assistance 1,383 (12.6%) Agriculture, Forestry & Fishing 1,339 (12.2%) Retail Trade 1,259 (10.6%)
Median Age (2016)	51 (13 years higher than NSW average)
Median Weekly Household Income (2016)	$986 (66.4% of NSW average)
Method of Travel to Work (2016)	Drive/car passenger (69.2%) Did not go to work (12.7%) Work from home (7.9%) Walk (5.1%) Cycle (0.5%) Motorbike/scooter (0.5%) Bus (0.4%)

Source: ABS (2016,2021), .id (2021)

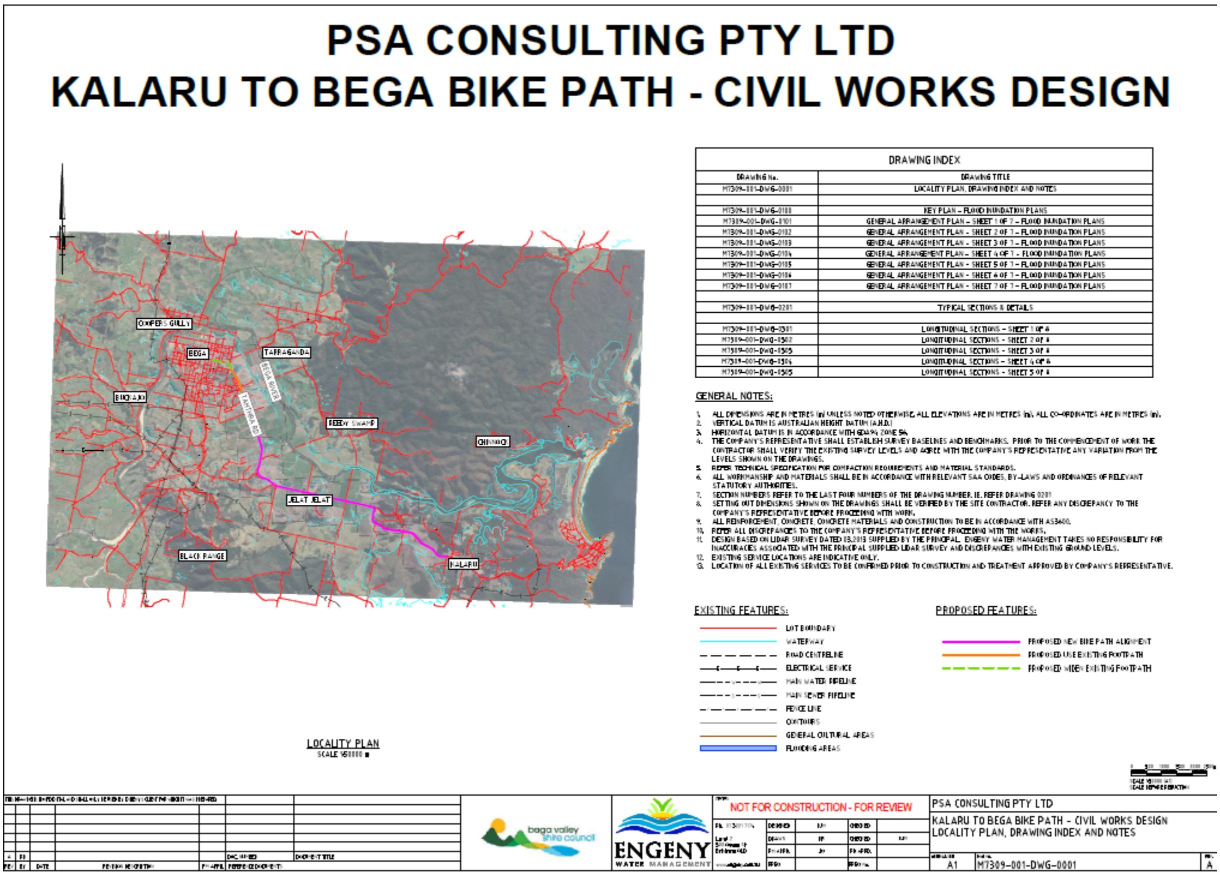
2.2 Proposed Active Transport Corridor

The active transport corridor will link from the corner of Upper and Gipps Street, close to the centre of Bega through to Armstrong drive, along Tathra Road in Kalaru. The majority of the corridor will be along Tathra Road, as it heads to Kalaru, connecting the two urban areas.

Key aspects of the project include:

- The Project site is approximately 11.7km in length.
- Passes close to the hospital (one of the largest employers in the region).
- Allows users to take in the sights of the Jellat Flats as they approach Kalaru.
- Increase the accessibility of walking/cycling as a healthy alternative to non-active transport.
- Passes by the show grounds and Glebe Park.

Figure 2-2: Proposed Active Transport Corridor



Source: PSA Consulting (2021)

The proposed $18.8 million corridor will be comprised of upgrades (widening) to the existing bicycle path of 900m and construction of approximately 10km of new pedestrian paths and is projected to be developed during 2022/23. The cost breakdown for the Project is provided in the table below.

Table 2-2: Capital Costs

Item	Cost ($)
Project documentation comprising Traffic Management, Environmental Management & Cultural Heritage plan	$48,000
Widen existing bikeway network	$566,364
Construction of a 2.5m wide footpath on new alignment	$13,519,148
Signage and Safety & Misc.	$54,400
Indirect Costs	$1,071,362
Contingency	$3,546,978
Total	**$18,806,252**

Source: Engeny (2021)

2.3 Projected Usage

Estimates of current and future usage for the active transport corridor have been developed by PSA Consulting (2021) based on existing count data and surveys, Census journey to work data, relevant Council plans and comparative research of similar paths.

The estimates represent average daily demand for people cycling and walking within and between the townships of Kalaru and Bega at different points along the proposed path alignment:

Current estimated usage:

- Cyclists: <10 trips per day.

- Pedestrians: <5 trips per day.
- Total: <15 trips per day.

Potential future usage (post project):

- Cyclists: 45 trips per day.
- Pedestrians: 25 trips per day.
- Total: 70 trips per day.

Given the overall length of the path (>10km) individuals will generally not travel the entire length of the corridor. To account for this, the total number of users across the entire corridor within a day has been doubled, resulting in annual totals as presented in Table 2.3.

Table 2-3: Projected Usage Demand (Local Annual Usage)

Demand Group	Cyclists	Pedestrians	Total
Average Usage (Points Along Path)			
Current Usage	3,650	1,825	5,475
Future Usage (Residents)	16,425	9,125	25,550
Net Increase	***12,775***	***7,300***	***20,075***
Total Path Usage			
Current Usage	7,300	3,650	10,950
Future Usage (Residents)	32,850	18,250	51,100
Net Increase	***25,550***	***14,600***	***40,150***

Source: PSA Consulting (2021), REA

In addition to the above local usage, it should be noted that Bega Valley is a popular tourist destination (part of the NSW Sapphire Coast) and the Project will have a further impact on tourism demand. This analysis applies a modest[1] (+0.25%) net increase in visitation to Bega Valley LGA, resulting in an annual increase of approximately 6,900 visitor nights and 1,100 day trips (.id, 2021) or approximately 20% of total usage of the corridor during the year.

This estimate allows for general tourism usage and the potential to host additional running and cycling events along the corridor during the year which have the capacity to drive significant tourist visitation.

[1] Alternative assessments of active transport infrastructure apply notable visitation impacts, including:

- Projected 7% higher visitor expenditure by 2025, rising to 32% higher visitor expenditure by 2040 for the Huon River Shared Pathway project (SGS, 2020).
- Increased cyclist visitation of 15,400 p.a. associated with $1.05 million in trail upgrades and enhancements to the Forrest Mountain Bike Trails in Colac Otway Shire (a 45% increase in cycling visitation above the base case (MacroPlanDimasi, 2016)).
- A range of increases from 2.7% - 11.4% increase in day trips and 11% - 24% increase in overnight visitation associated with addressing the missing links in the Mornington Peninsula Bay Trail at a cost of $22.5 million (Urban Enterprise, 2019).

3. Cost Benefit Assessment

3.1 Modelling Approach

Cost-Benefit Analysis (CBA) is an analytical tool used to inform decisions regarding complex investment projects. A CBA has advantages over other modelling techniques (e.g. an Economic Impact Assessment), in that a CBA seeks to measure not just the net benefits but also the net costs of a project. Equally, through a CBA framework, it is possible to measure multiple costs and benefits derived from a project (as opposed to just the economic components).

This CBA was carried out using a discounted cashflow (DCF) approach to analyse all costs and benefits that would occur if the Project were to proceed. In this sense, two scenarios were considered:

- **A baseline ('without the project') scenario:** Which assumes that the active transport corridor does not go ahead, meaning no changes to benefits or costs to the community.
- **A 'with the project' scenario:** Which assumes the active transport corridor proceeds, supporting improved access to active transport options, improving community health and safety outcomes and attracting additional visitors to the region.

The CBA considered the effect of real costs and benefits (which excludes inflation) over a period of 30 years (from YE June 2023 to YE June 2052) at a range of real discount rates (3%, 7%, and 10%).

The geographic boundary for this assessment is the Bega Valley Shire.

In a CBA framework, decisions are made based on two criteria, Net Present Value (NPV) and the Benefit Cost Ratio (BCR). The NPV shows the difference between the present value of all future benefits and all future costs. The BCR is calculated by dividing the present value of future benefits by the present value of the future costs. A project is deemed 'desirable' if the NPV is positive and the BCR is above '1'. In general, if the NPV is negative and the BCR is below '1', the Project is deemed as undesirable as the future costs will outweigh the benefits.

3.2 Definition of Costs and Benefits

The following costs and benefits have been considered and are described in more detail in the following sections.

- Costs:
  - Construction and development costs.
  - Ongoing operational and maintenance costs.
- Benefits:
  - Health and community benefits from additional active recreation.
  - Enhanced safety outcomes for active transport users.
  - Value add from supported tourism activity.

3.3 Costs

Construction and Development Costs

Construction and development costs for the Project are estimated at $18.8 million and are expected to be completed during 2022/23.

Ongoing Operational and Maintenance Costs

Allowance for upkeep of the pathway has been included at 1% of the initial capital cost per year (approximately $190,000) from 2023/24 based on AECOM (2010).

3.4 Benefits

Benefits of Increased Active Transport

Transitioning to active transport (e.g. walking or cycling) results in a broad range of community benefits, including:

- **Health Benefits**: Including reduced risk of obesity, heart attack, high cholesterol, blood pressure, type two diabetes, some forms of cancer, improved muscle and joint flexibility. Extensive prior research exists showing that people who participate in sports and/or active recreational activity enjoy better mental health and self-esteem, are more alert, and more resilient against the stresses of modern living (NAJA Business Consulting Services, 2019; Frontier Economics, 2009; KPMG, 2018).
- **Financial Benefits:** Including reduced car operating and road maintenance costs.
- **Environmental benefits:** Reduced air/water pollution and Greenhouse Gas (GHG) emissions from vehicle travel.

This study applies the following range of benefits associated with active travel, based on TfNSW (2020) guidelines. Benefits from urban separation and noise pollution have been conservatively excluded due to the regional/rural location of the Project. Cycling or walking incurs greater accident costs compared to cars, as there are more cycling accidents than vehicle accidents per kilometre travelled, resulting in a dis-benefit. Specific safety benefits which will reduce the active transport risk associated with the Project are considered in the next section.

Table 3-1: Benefits of Active Travel ($2021/22)

Benefit	Cycling ($/km)	Walking ($/km)	Benefit Applies to
Health	$1.26	$1.89	Former Car and Public Transport Users
Congestion cost saving	$0.47	$0.47	Former Car Users
Vehicle operating cost savings	$0.22	$0.28	Former Car Users
Accident cost (disbenefit)	-$0.25	-$0.12	Former Car Users
Air pollution	$0.03	$0.03	Former Car Users
GHG emissions	$0.03	$0.03	Former Car Users
Noise	Excluded	Excluded	Former Car Users
Water Pollution	$0.01	$0.01	Former Car Users
Nature and Landscape	$-	$ -	Former Car Users
Urban separation	Excluded	Excluded	Former Car Users
Roadway provision cost savings	$0.04	0.04	Former Car Users
Parking cost savings	$0.01	$0.01	Former Car Users
Net Benefit	**$1.82**	**$2.64**	-

Source: TfNSW (2020)

Benefits have been applied to 70% of new local active transport corridor users[2] calculated based on an estimated average distance travelled of 3km/ pedestrian and 7km/cyclist (ABS, 2016, REA estimate).

Table 3-2: Active Travel Annual Benefit

User	Annual Benefit ($2021/22)
Cyclists	$227,855
Pedestrians	$80,942
Total	**$308,797**

Source: REA

[2] Allowing for recreational usage that may not replace car travel. Only 0.4% of Bega Valley Shire residents currently travel to work using public transport (ABS, 2016).

Enhanced Safety for Active Travellers

Transport infrastructure works, including intersection works, pedestrian crossings, separated pedestrian and cycleway infrastructure are accepted to reduce the risk of accidents/injury for vehicle occupants and active travellers.

Socio-economic benefits of the proposed safety improvements include limiting material damage, medical costs, productivity loss, human costs, and legal/settlement costs.

Transport for NSW (TfNSW) (2020) recommends valuing the cost of crashes based on average crash incidents and associated human costs per km travelled. Cycling (0.28c/km) or walking (0.16c/km) crash risk ($2021/22) incurs greater accident costs compared to cars (0.03c/km), as cycling and pedestrian accidents are typically more common.

The community benefits of interventions which improve safety outcomes are measured by the estimated % reduction in crash risk and multiplied by the cost per km of travel, length of travel, and number of travellers over the analysis period. This analysis applies an 80% crash reduction risk factor. An 80% crash reduction factor can be applied for initiatives which achieve a high degree of separation of active transport users from the road (Transport and Infrastructure Council, 2016).

Safety benefits have been calculated based on an estimated average distance travelled of 2.5km/ pedestrian and 6.3km/cyclist[3].

Table 3-3: Annual Safety Benefits ($2021/22)

User	Annual Benefit ($2021/22)
Cyclists	$46,358
Pedestrians	$5,840
Total	**$52,198**

Source: REA

Value Add from Supported Tourism Activity

As identified in the Section 2.3, the Project is projected to generate additional tourism usage which in turn will generate an economic impact through additional tourist expenditure within the local community.

To model these impacts, average Destination NSW (2021) visitor expenditure ($168 per visitor night and $94 per day trip) were applied to the projected visitation increase of approximately 6,900 visitor nights and 1,100 day trips. The associated annual tourism spend of approximately $1.3 million was converted to a direct value added estimate for inclusion as a net benefit stream using TRA (2022) expenditure categories[4] and direct turnover to value added multipliers from the REA proprietary Input-Output model.

The resulting annual benefit of approximately $530,000 was applied within the CBA from 2023/24.

3.5 Costs and Benefits Not Included

The following benefits have not been included and would serve to improve the outcomes of the CBA analysis, if they were quantified:

- **Travel time savings for active travellers:** Reductions in travel time have long been a fundamental element of the economic case for various transport infrastructure investments. Reducing the amount of time spent on travel enables transport users to spend the time they have saved more productively or more enjoyably. For active travellers, however reduced travel time/distance has an offsetting impact on the recreational and health benefits achieved. Recreational active travellers, in particular, may choose to travel further due to the increased amenity provided by reduced commutes. Therefore, potential time travel savings have been conservatively excluded from the CBA.
- **Increase in business confidence:** The Project will help underpin confidence in the viability and sustainability of Bega Valley Shire, including positive economic impacts during construction and ongoing tourism impacts once operational. These impacts may support further investment and employment in the area. As a new tourism experience, the Project will support the recovery in visitation post the current COVID-19 pandemic.

[3] ABS (2016) estimates of 7km/cyclist and 3km/pedestrian have been reduced to allow for the existing pathway for approx. 17% of the corridor (which has been conservatively excluded from the safety benefit).
[4] Some national expenditure categories were excluded to account for spend unlikely to occur in the local community (e.g. airfares).

- **Increase in liveability and community amenity:** The Project will support liveability outcomes for local residents and enhance community amenity and pride. Improved walking and cycling conditions, increased non-motorised travel and reductions in motorised travel all tend to increase community liveability (Queensland Government, 2011). Walking and cycling provide a more intimate connection between people and their surroundings than can generally occur when people drive.

3.6 Results

The results of the CBA for the Project are highlighted in the following table (Table 3.4).

Table 3-4: Present Values of Costs and Benefits

Discount Rate	Present Value Costs ($M)	Present Value Benefits ($M)	Net Present Value ($M)	Benefit Cost Ratio
3%	$21.8	$16.6	-$5.2	0.76
7%	**$19.7**	**$10.2**	**-$9.5**	**0.52**
10%	$18.7	$7.6	-$11.1	0.41

Note: Totals may not sum due to rounding.
Source: REA

At the selected real discount rate of 7% for this project, the analysis yields a NPV of -$9.5 million and a BCR of 0.52 meaning that it is not economically desirable and does not provide a net benefit. At the 7% discount rate, for every $1 in costs associated with the project, there is $0.52 of benefit. The analysis returns a negative NPV across all discount rates applied and yields an Internal Rate of Return (IRR) of 0.5%.

Under the Base Case scenario (without Project scenario), none of the identified benefits would be captured nor any of the costs incurred. As such, the scenario with the Project does not provide positive economic and social benefits.

3.7 Sensitivity Testing

Sensitivity testing was undertaken using a Monte Carlo simulation, which tests the impact of changes in input assumptions thousands of times based on a defined probability distribution. The simulation tested each of the variables in isolation with all other inputs held constant, with the results reported in the following table in terms of the modelled change in NPV resulting from the variance in the base assumptions at a discount rate of 7%. The final row of the table examines each assumption simultaneously to provide a 'combined' or overall sensitivity of the model findings to the assumptions used.

The sensitivity analysis applied the following variable distributions:

- Costs: Maximum 30% higher and lower than the base values.
- Benefits: A normal distribution with a standard deviation of 0.2.

The table below outlines the distribution of NPV allowing for a 10% confidence interval, with the '5%' and '95%' representing a 90% probability that the NPV will be within the range outlined in the table.

The table below shows, at a discount rate of 7%, there is a 90% probability the Project will provide an NPV of between -$13.6 million and -$5.5 million. Sensitivity testing returned a negative NPV across 100% of the 5,000 iterations run in the Monte Carlo analysis.

Table 3-5: Monte Carlo Simulation

Cost/Benefit ($M)	NPV ($M) 7% Discount Rate	
	5th Percentile	95th Percentile
Costs		
Construction and Development Costs	-$12.8	-$6.2
Ongoing Operational and Maintenance Costs	-$9.9	-$9.1
Benefits		
Benefits of Increased Active Transport	-$10.7	-$8.3
Enhanced Safety for Active Travellers	-$9.7	-$9.3
Value Add from Supported Tourism Activity	-$11.5	$7.6
Combined	**-$13.6**	**-$5.5**

Source: REA

References

AECOM (2010). *Inner Sydney Regional Bicycle Network Demand Assessment and Economic Appraisal.* AECOM, Sydney.

Australian Bureau of Statistics. (2017). *Census of Population and Housing, 2016*. www.abs.gov.au.

Economy.id. (2021). *Bega Valley Shire Economic Profile*. https://economy.id.com.au/bega-valley/.

Destination NSW (2021). *South Coast Visitor Profile YE June 2021*. https://www.destinationnsw.com.au/wp-content/uploads/2021/11/south-coast-visitor-profile-ye-june-2021.pdf.

Engeny Water Management (2021). *Bill of Quantities*. Engeny Water Management.

Frontier Economics. (2009). *The Economic Contribution of Sport to Australia*. Prepared for The Australian Sports Commission.

KPMG (2018). *The Value of Community Sport Infrastructure*. Available from: https://www.sportaus.gov.au/__data/assets/pdf_file/0005/974948/KPMG_Value_of_Community_Sport_Infrastructure_final.pdf.

MacroPlanDimasi (2016). *Forrest Mountain Bike Trail Economic Cost Benefit Analysis*. MacroPlanDimasi.

NAJA Business Consulting Services. (2019). *Cost Benefit Analysis Report for the Report for the Shire of Wyndham East Kimberley Kununurra Aquatic & Leisure Centre Redevelopment*. https://www.swek.wa.gov.au/council-meetings/ordinary-council-meeting/ordinary-council-meeting-kununurra/72/documents/120312-kununurra-aquatic-and-leisure-centre-cost-benefit-analysis-report.pdf.

PSA Consulting (2021). *Bega Valley Active Transport Corridor*. PSA Consulting.

Queensland Government (2011*). Cost and Health Benefits of Active Transport in Queensland*. https://sensibletransport.org.au/wp-content/uploads/2015/10/QLD-Health-Stage-1-Report-Full-10.09.11.compressed.pdf.

SGS (2020). Cost benefit Analysis and Economic Impact Assessment of the Huon River Foreshore Shared Pathway. https://www.huonvalley.tas.gov.au/wp-content/uploads/2019/12/SGS-Cost-Benefit-Economic-Impact-Report.pdf.

TfNSW. (2020). *Economic Parameter Values.* https://www.transport.nsw.gov.au/news-and-events/reports-and-publications/tfnsw-economic-parameter-values.

TRA (2022). *National and International Visitor Surveys*. https://www.tra.gov.au/.

Transport and Infrastructure Council. (2016). *Australian Transport Assessment and Planning Guidelines.* http://atap.gov.au/.

Urban Enterprise (2019). *Mornington Peninsula Bay Trail Market and Economic Assessment*. Urban Enterprise, Brunswick.

Appendix A: Active Transport Corridor Sections CBA

An additional high-level CBA analysis has been applied considering sub-sections of the active transport corridor to understand the impact on economic viability. The following sections were considered:

- **Western Segment:** Bega to Thornhill Road - 5,050m (capex $5.3 million).
- **Eastern Segment:** Tathra to Ike Game Road - 3,250m (capex $4.1 million).

The analysis was undertaken using the same underlying assumptions as for the full corridor, with the following adjustments based on the assumed share of total benefits attributed to the segment (given the length and potential usage level):

- **Western Segment:** 55% of total corridor benefit.
- **Eastern Segment:** 30% of total corridor benefit.

Results of the sub-segment CBA analysis are presented in the table below.

Table A-1: CBA Results (Sub-Segments)

Discount Rate	Present Value Costs ($M)	Present Value Benefits ($M)	Net Present Value ($M)	Benefit Cost Ratio
Western Segment				
3%	$6.1	$9.1	$3.0	1.49
7%	**$5.6**	**$5.6**	**$0.1**	**1.01**
10%	$5.3	$4.2	-$1.1	0.79
Eastern Segment				
3%	$4.7	$5.0	$0.2	1.05
7%	**$4.3**	**$3.1**	**-$1.2**	**0.71**
10%	$4.1	$2.3	-$1.8	0.56

Source: REA

The CBA results indicate:

- The Western Segment is socio-economically **desirable at a 7% discount rate**. The CBA returns an NPV of $0.1 million and a BCR of 1.01, indicating a present value return of $1.01 for every dollar of cost. The Western Section returns a negative NPV at a 10% discount rate and an IRR of 7.1%.
- The Eastern Segment is socio-economically **desirable at a 3% discount rate**. The CBA returns an NPV of $0.2 million and a BCR of 1.01, indicating a present value return of $1.05 for every dollar of cost. The Eastern Section returns a negative NPV at the 7% and 10% discount rates and an IRR of 3.5%.

GROWING COMMUNITIES

Regional Economic Advisory

ENGENY
WATER MANAGEMENT

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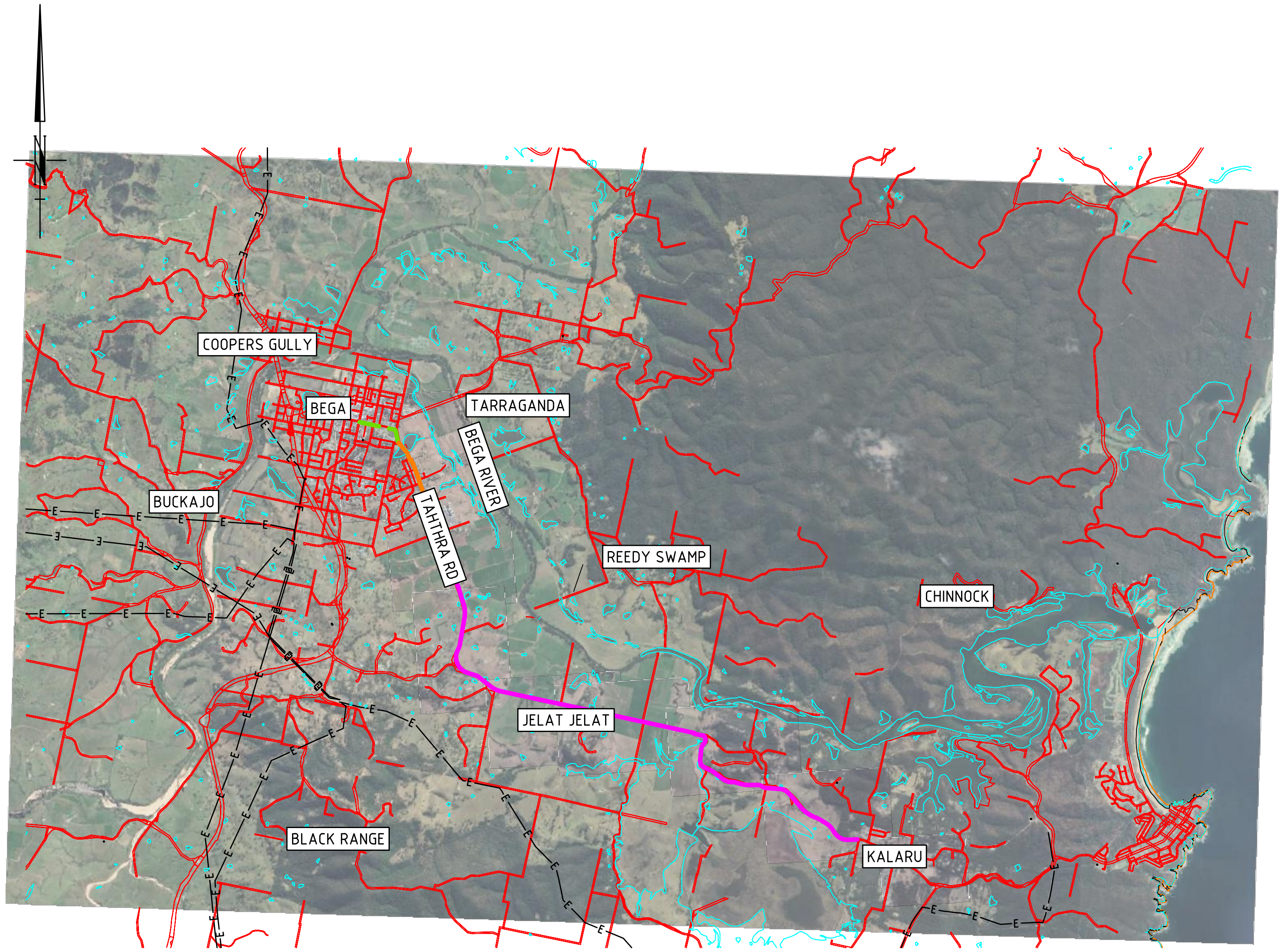

LOCALITY PLAN
SCALE 1:50000 m

DRAWING INDEX	
DRAWING No.	DRAWING TITLE
M7309-001-DWG-0001	LOCALITY PLAN, DRAWING INDEX AND NOTES
M7309-001-DWG-0100	KEY PLAN - FLOOD INUNDATION PLANS
M7309-001-DWG-0101	GENERAL ARRANGEMENT PLAN - SHEET 1 OF 7 - FLOOD INUNDATION PLANS
M7309-001-DWG-0102	GENERAL ARRANGEMENT PLAN - SHEET 2 OF 7 - FLOOD INUNDATION PLANS
M7309-001-DWG-0103	GENERAL ARRANGEMENT PLAN - SHEET 3 OF 7 - FLOOD INUNDATION PLANS
M7309-001-DWG-0104	GENERAL ARRANGEMENT PLAN - SHEET 4 OF 7 - FLOOD INUNDATION PLANS
M7309-001-DWG-0105	GENERAL ARRANGEMENT PLAN - SHEET 5 OF 7 - FLOOD INUNDATION PLANS
M7309-001-DWG-0106	GENERAL ARRANGEMENT PLAN - SHEET 6 OF 7 - FLOOD INUNDATION PLANS
M7309-001-DWG-0107	GENERAL ARRANGEMENT PLAN - SHEET 7 OF 7 - FLOOD INUNDATION PLANS
M7309-001-DWG-0201	TYPICAL SECTIONS & DETAILS
M7309-001-DWG-0301	LONGITUDINAL SECTIONS - SHEET 1 OF 8
M7309-001-DWG-0302	LONGITUDINAL SECTIONS - SHEET 2 OF 8
M7309-001-DWG-0303	LONGITUDINAL SECTIONS - SHEET 3 OF 8
M7309-001-DWG-0304	LONGITUDINAL SECTIONS - SHEET 4 OF 8
M7309-001-DWG-0305	LONGITUDINAL SECTIONS - SHEET 5 OF 8
M7309-001-DWG-0401	CROSS SECTIONS - SHEET 1 OF 2
M7309-001-DWG-0402	CROSS SECTIONS - SHEET 1 OF 2

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METRES (m) UNLESS NOTED OTHERWISE. ALL ELEVATIONS ARE IN METRES (m). ALL CO-ORDINATES ARE IN METRES (m).
2. VERTICAL DATUM IS AUSTRALIAN HEIGHT DATUM (A.H.D.)
3. HORIZONTAL DATUM IS IN ACCORDANCE WITH GDA94 ZONE 56.
4. THE COMPANY'S REPRESENTATIVE SHALL ESTABLISH SURVEY BASELINES AND BENCHMARKS. PRIOR TO THE COMMENCEMENT OF WORK THE CONTRACTOR SHALL VERIFY THE EXISTING SURVEY LEVELS AND AGREE WITH THE COMPANY'S REPRESENTATIVE ANY VARIATION FROM THE LEVELS SHOWN ON THE DRAWINGS.
5. REFER TECHNICAL SPECIFICATION FOR COMPACTION REQUIREMENTS AND MATERIAL STANDARDS.
6. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH RELEVANT SAA CODES, BY-LAWS AND ORDINANCES OF RELEVANT STATUTORY AUTHORITIES.
7. SECTION NUMBERS REFER TO THE LAST FOUR NUMBERS OF THE DRAWING NUMBER. IE. REFER DRAWING 0201
8. SETTING OUT DIMENSIONS SHOWN ON THE DRAWINGS SHALL BE VERIFIED BY THE SITE CONTRACTOR. REFER ANY DISCREPANCY TO THE COMPANY'S REPRESENTATIVE BEFORE PROCEEDING WITH WORK.
9. ALL REINFORCEMENT, CONCRETE, CONCRETE MATERIALS AND CONSTRUCTION TO BE IN ACCORDANCE WITH AS3600.
10. REFER ALL DISCREPANCIES TO THE COMPANY'S REPRESENTATIVE BEFORE PROCEEDING WITH THE WORKS.
11. DESIGN BASED ON LiDAR SURVEY DATED 03.2013 SUPPLIED BY THE PRINCIPAL. ENGENY WATER MANAGEMENT TAKES NO RESPONSIBILITY FOR INACCURACIES ASSOCIATED WITH THE PRINCIPAL SUPPLIED LiDAR SURVEY AND DISCREPANCIES WITH EXISTING GROUND LEVELS.
12. EXISTING SERVICE LOCATIONS ARE INDICATIVE ONLY.
13. LOCATION OF ALL EXISTING SERVICES TO BE CONFIRMED PRIOR TO CONSTRUCTION AND TREATMENT APPROVED BY COMPANY'S REPRESENTATIVE.

EXISTING FEATURES:

LOT BOUNDARY
WATERWAY
ROAD CENTRELINE
ELECTRICAL SERVICE
MAIN WATER PIPELINE
MAIN SEWER PIPELINE
FENCE LINE
CONTOURS
GENERAL CULTURAL AREAS
FLOODING AREAS

PROPOSED FEATURES:

PROPOSED NEW BIKE PATH ALIGNMENT
PROPOSED USE EXISTING FOOTPATH
PROPOSED WIDEN EXISTING FOOTPATH

0 500 1000 1500 2000 2500m
SCALE 1:50000 (A1)
SCALE BEFORE REDUCTION

CAD REF:M:\PROJECTS\M7000_MISCELLANEOUS CLIENTS\M7309_001 BEGA BIKEWAY\05 DESIGN\AUTOCAD\DRAWINGS\M7309-001-DWG-0001.DWG
LAST MODIFIED:30/5/2022 1:22 PM

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B	RR	30.05.22	FINAL	JO
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RPEQ		RPEQ No.	

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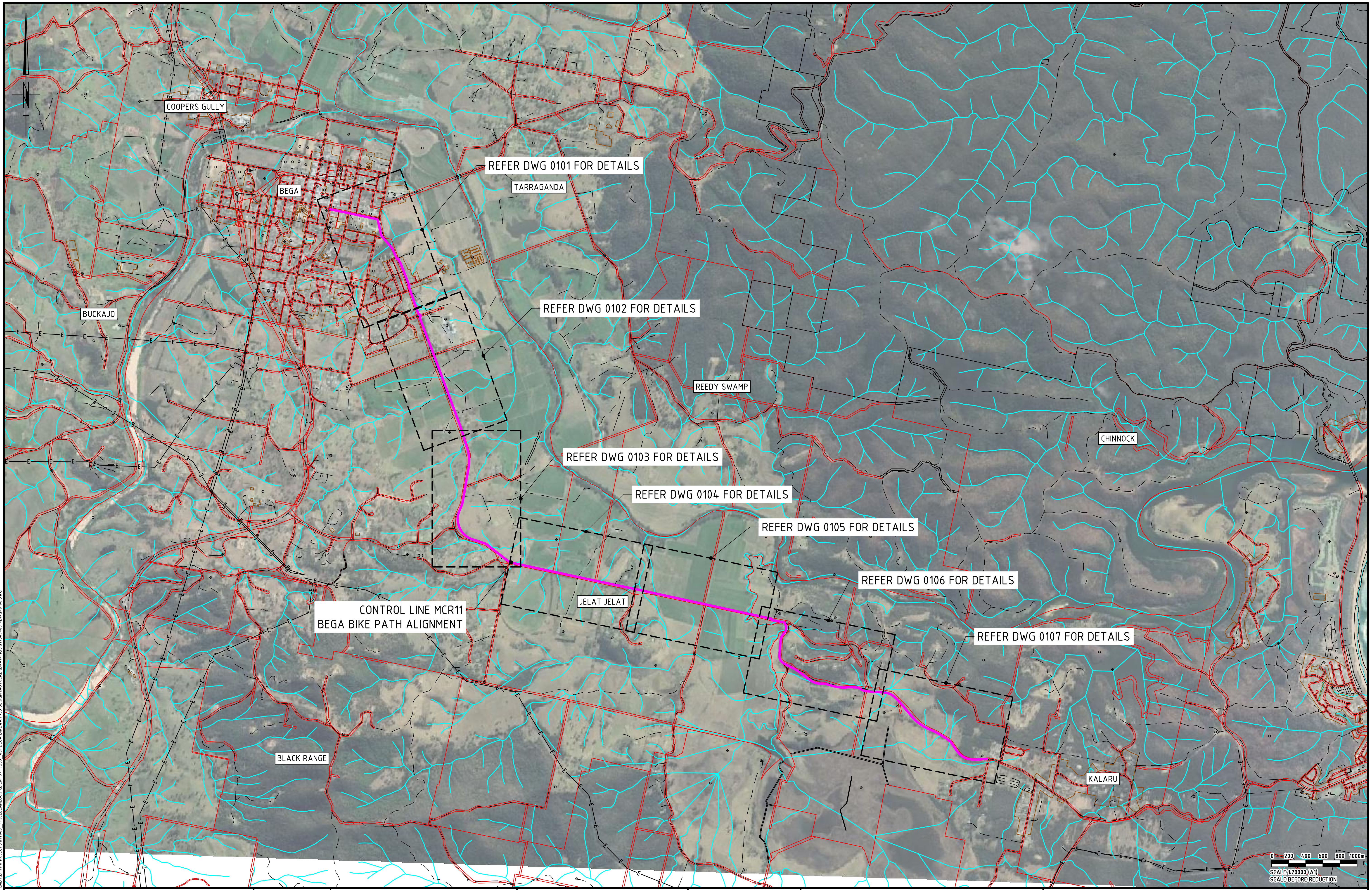
KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
LOCALITY PLAN, DRAWING INDEX AND NOTES

ORIGINAL SIZE	DWG NO.	REV.
A1	M7309-001-DWG-0001	B



CAD REF:M:\PROJECTS\M7309_001 BEGA BIKEWAYS\05 DESIGN\AUTOCAD\DRAWINGS\M7309-001-DWG-0100.DWG
LAST MODIFIED:30/5/2022 1:22 PM

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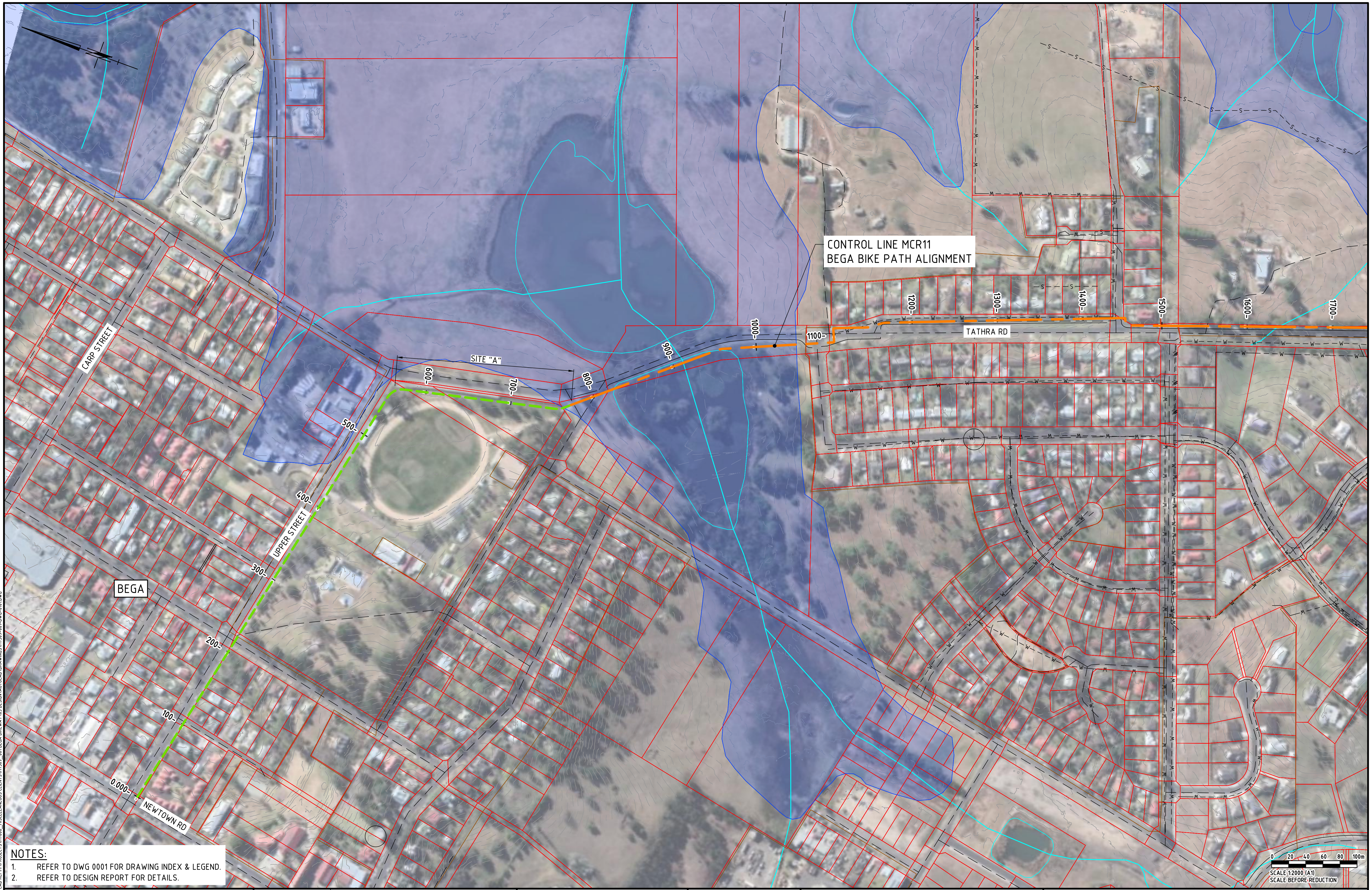
KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
KEY PLAN
FLOOD INUNDATION PLANS

ORIGINAL SIZE	DWG NO.	REV.
A1	M7309-001-DWG-0100	B



NOTES:
1. REFER TO DWG 0001 FOR DRAWING INDEX & LEGEND.
2. REFER TO DESIGN REPORT FOR DETAILS.

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KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
GENERAL ARRANGEMENT PLAN - SHEET 1 OF 7
FLOOD INUNDATION PLANS

ORIGINAL SIZE: A1
DWG NO.: M7309-001-DWG-0101
REV.: B

CAD REF:M:\PROJECTS\M7300_MISCELLANEOUS CLIENTS\M7309_001 BEGA BIKEWAYS\05 DESIGN\AUTOCAD\DRAWINGS\M7309-001-DWG-0101.DWG
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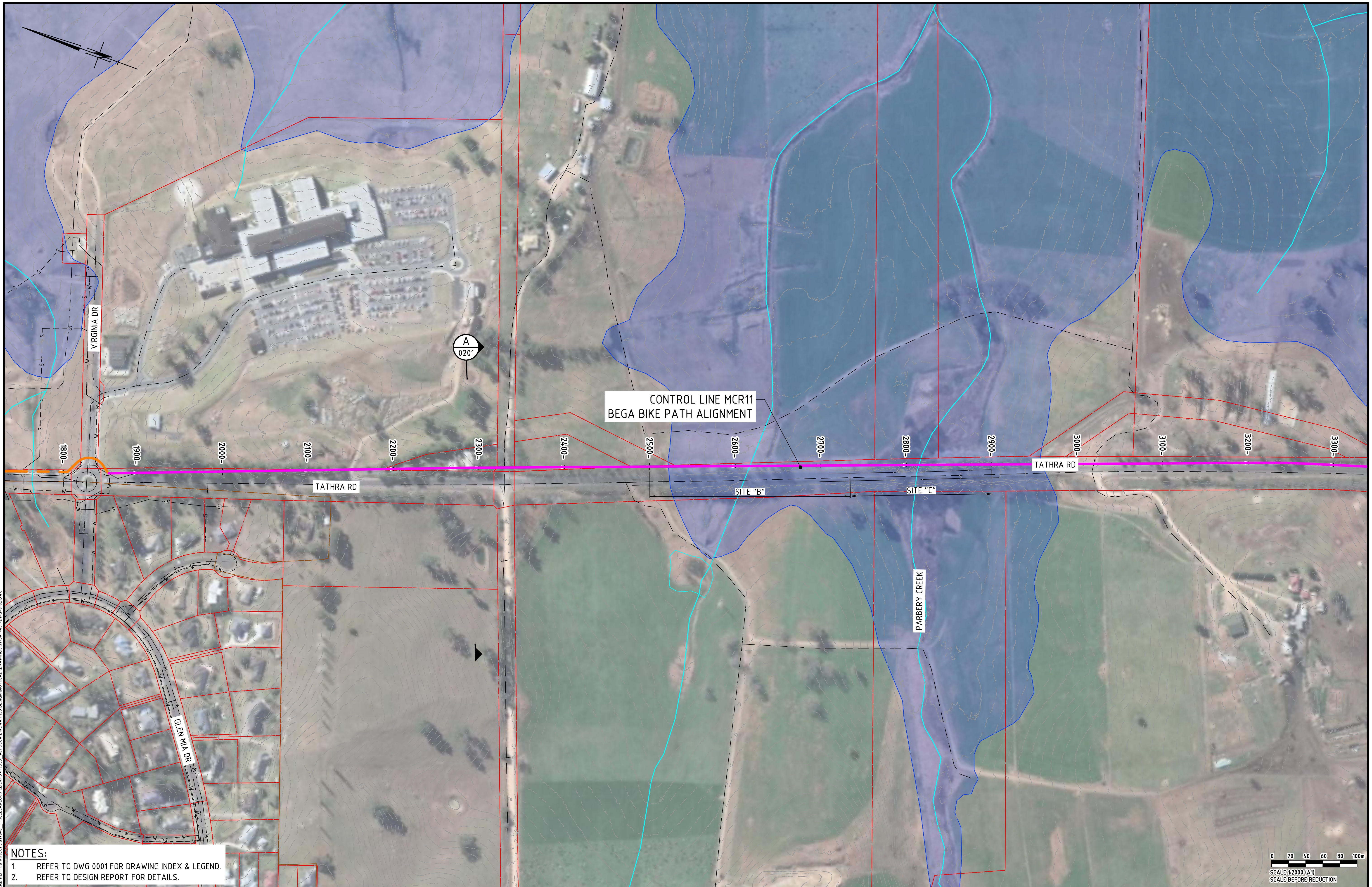

NOTES:

1. REFER TO DWG 0001 FOR DRAWING INDEX & LEGEND.
2. REFER TO DESIGN REPORT FOR DETAILS.

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KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
GENERAL ARRANGEMENT PLAN - SHEET 2 OF 7
FLOOD INUNDATION PLANS

ORIGINAL SIZE	DWG NO.	REV.
A1	M7309-001-DWG-0102	B

NOTES:

1. REFER TO DWG 0001 FOR DRAWING INDEX & LEGEND.
2. REFER TO DESIGN REPORT FOR DETAILS.

CAD REF:M:\PROJECTS\M7000_MISCELLANEOUS CLIENTS\M7309_001 BEGA BIKEWAY\05 DESIGN\AUTOCAD\DRAWINGS\M7309-001-DWG-0103.DWG

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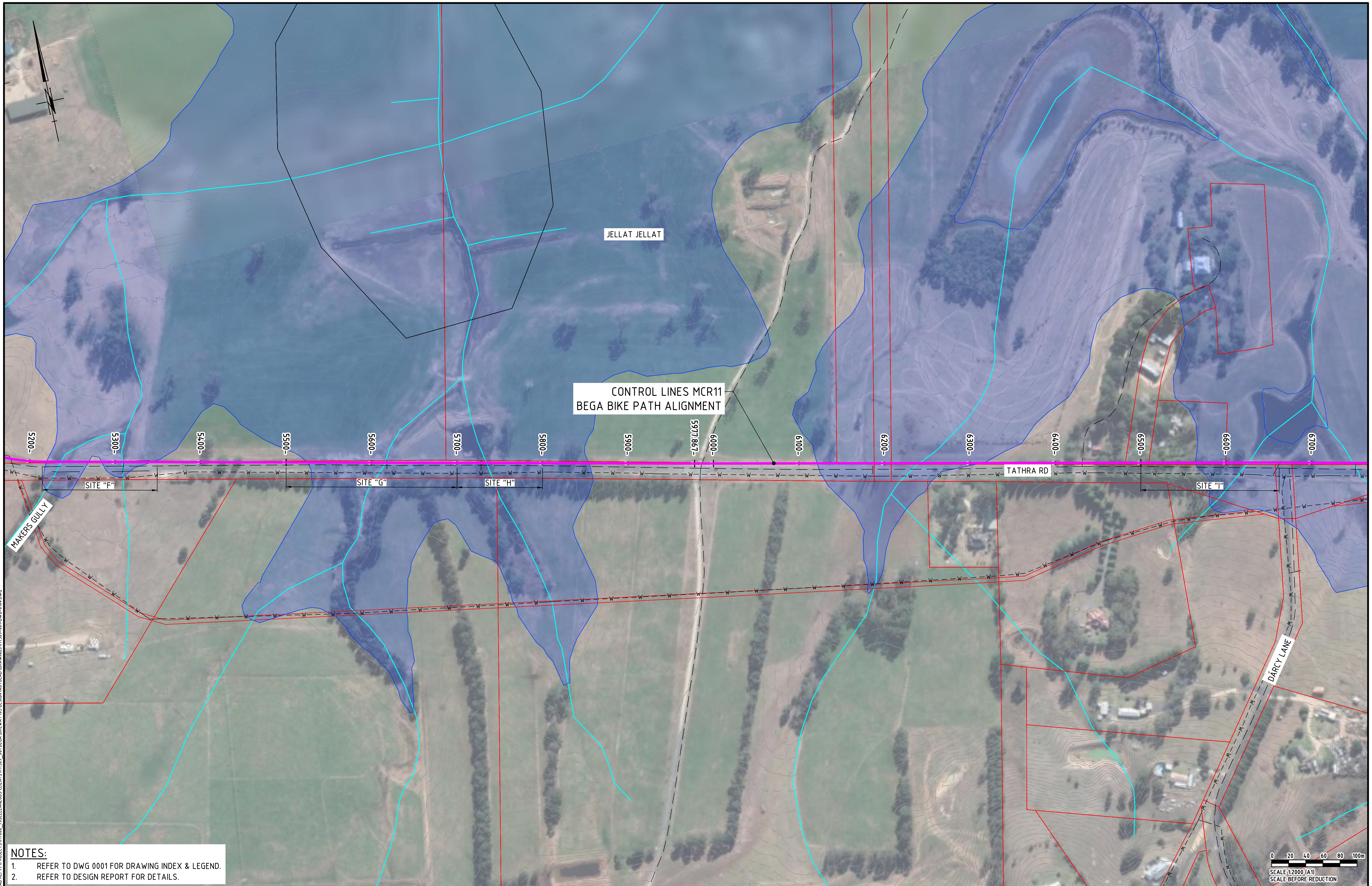
KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
GENERAL ARRANGEMENT PLAN - SHEET 3 OF 7
FLOOD INUNDATION PLANS

ORIGINAL SIZE	DWG NO.	REV.
A1	M7309-001-DWG-0103	B



NOTES:
1. REFER TO DWG 0001 FOR DRAWING INDEX & LEGEND.
2. REFER TO DESIGN REPORT FOR DETAILS.

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KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
GENERAL ARRANGEMENT PLAN - SHEET 4 OF 7
FLOOD INUNDATION PLANS

ORIGINAL SIZE	DWG No.	REV.
A1	M7309-001-DWG-0104	B

NOTES:

1. REFER TO DWG 0001 FOR DRAWING INDEX & LEGEND.
2. REFER TO DESIGN REPORT FOR DETAILS.

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KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
GENERAL ARRANGEMENT PLAN - SHEET 5 OF 7
FLOOD INUNDATION PLANS

ORIGINAL SIZE	DWG NO.	REV.
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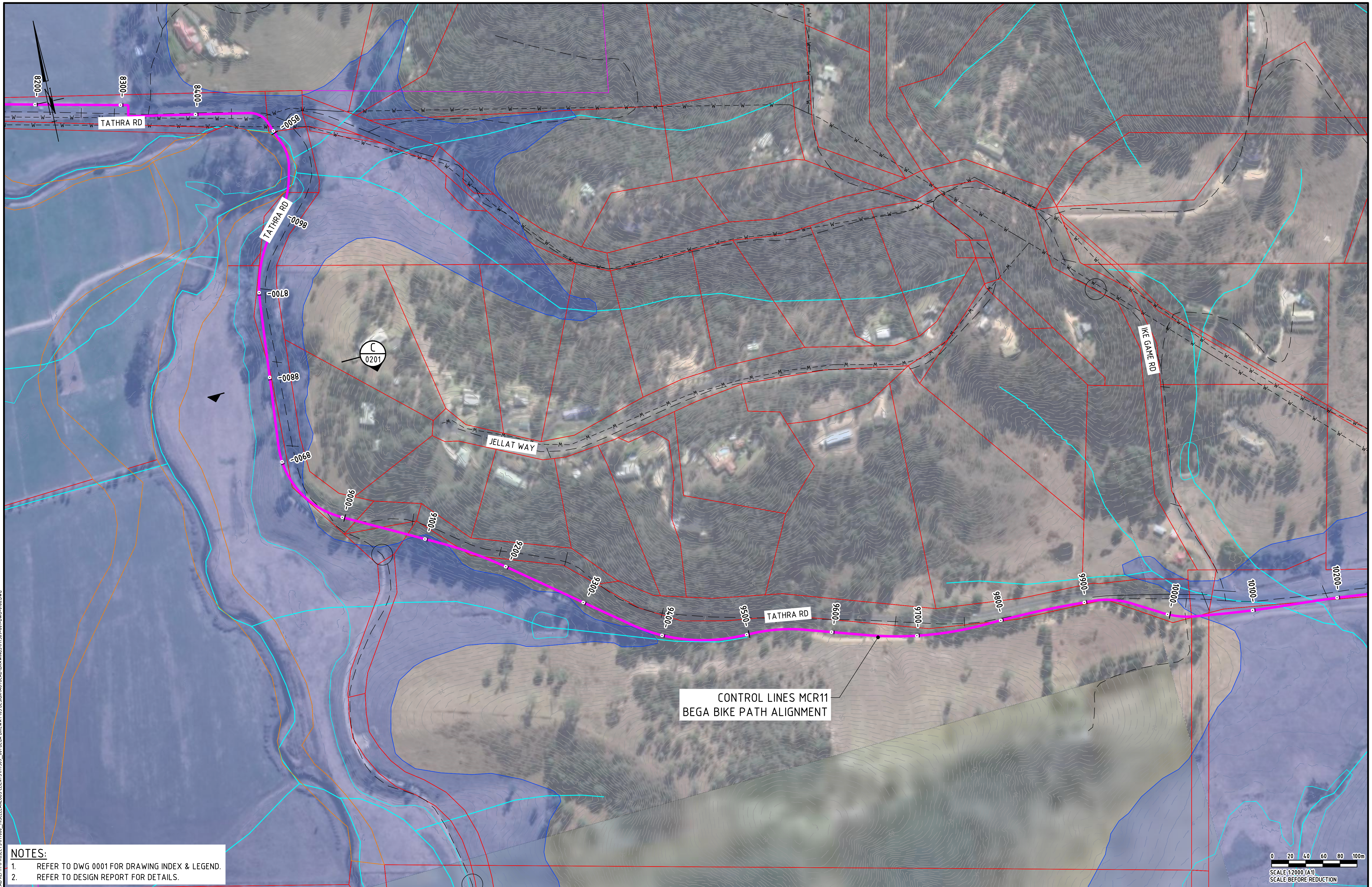

NOTES:

1. REFER TO DWG 0001 FOR DRAWING INDEX & LEGEND.
2. REFER TO DESIGN REPORT FOR DETAILS.

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KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
GENERAL ARRANGEMENT PLAN - SHEET 6 OF 7
FLOOD INUNDATION PLANS

ORIGINAL SIZE	DWG NO.	REV.
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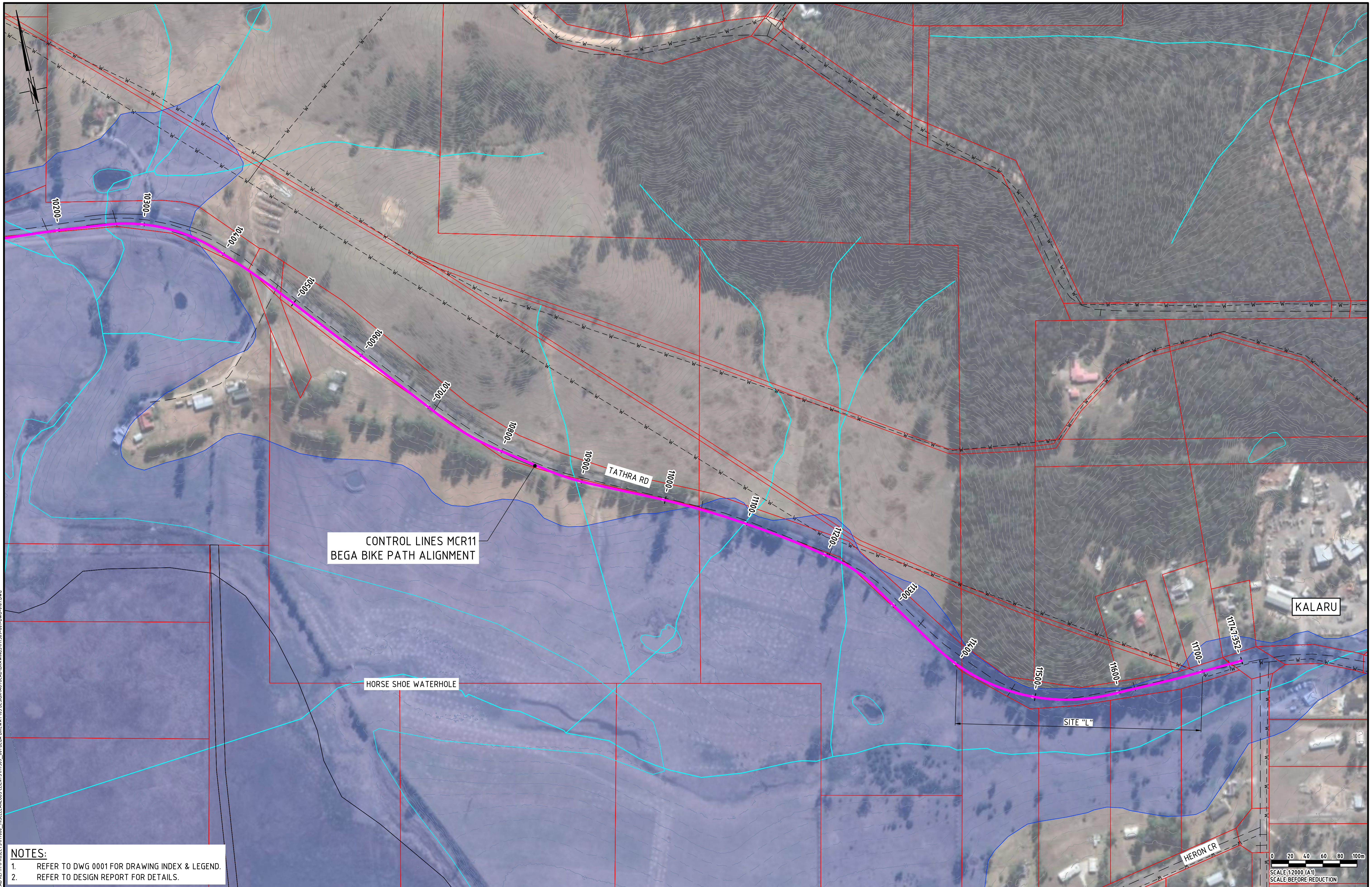

NOTES:

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2. REFER TO DESIGN REPORT FOR DETAILS.

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KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
GENERAL ARRANGEMENT PLAN - SHEET 7 OF 7
FLOOD INUNDATION PLANS

ORIGINAL SIZE	DWG NO.	REV.
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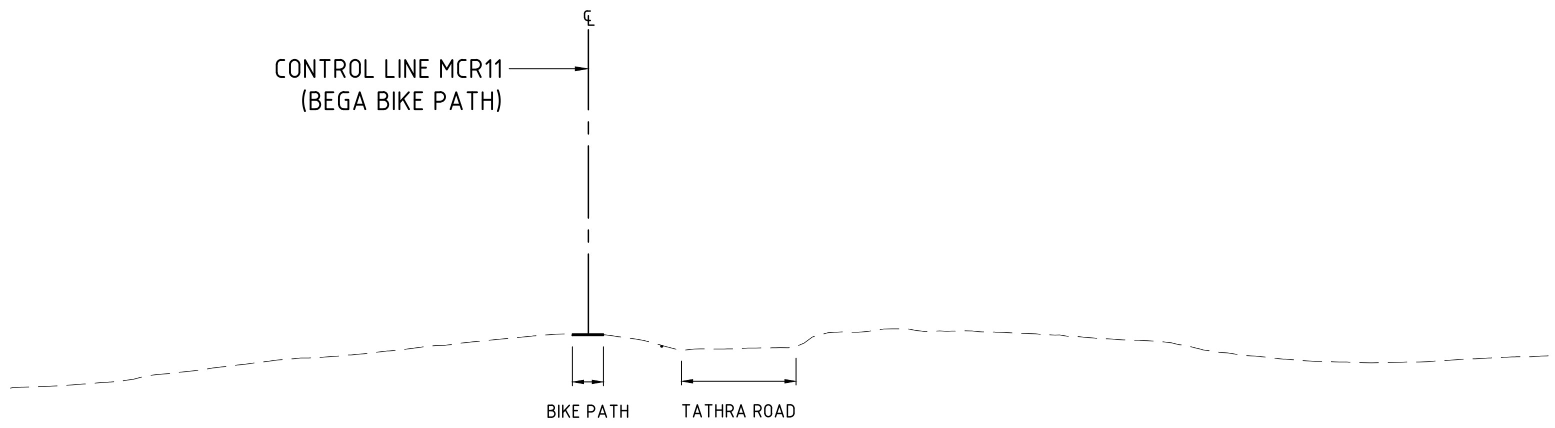

SECTION A
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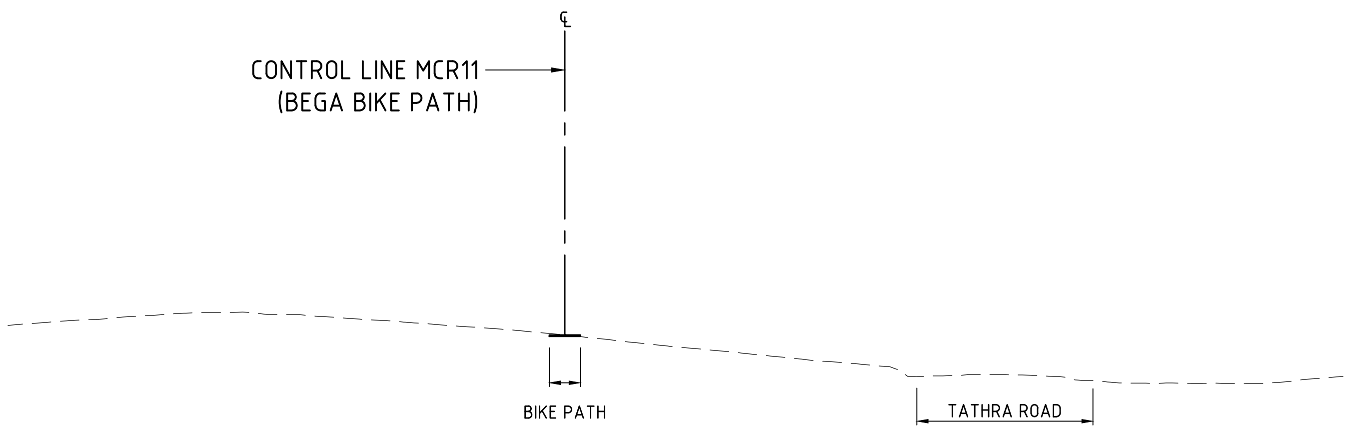

SECTION B
SCALE 1:500
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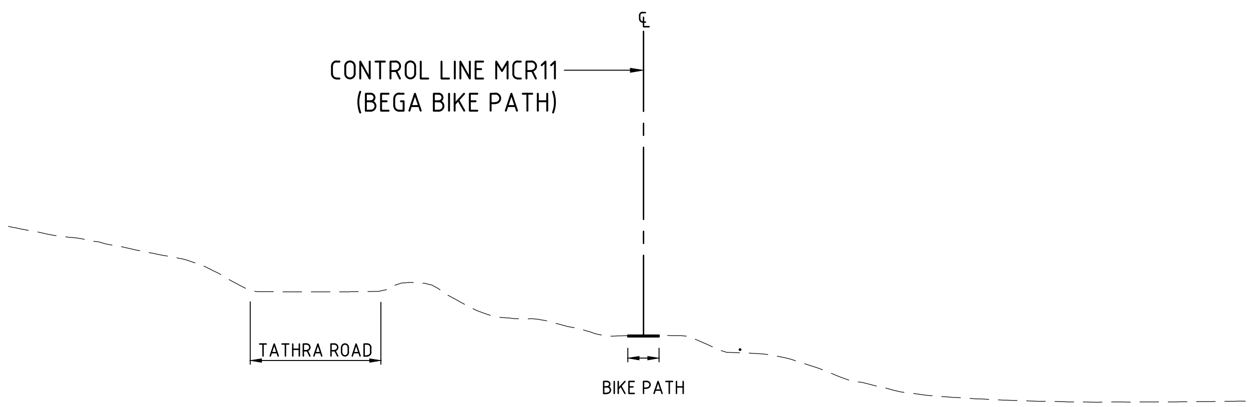
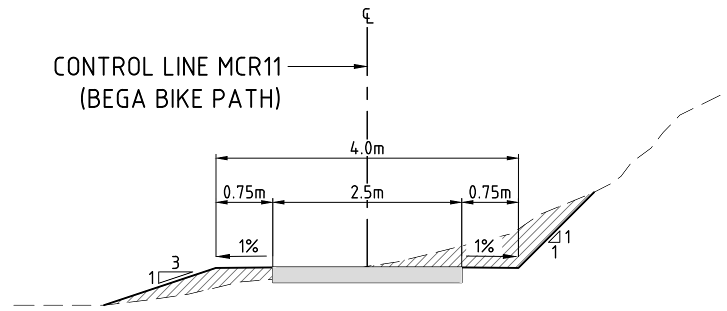
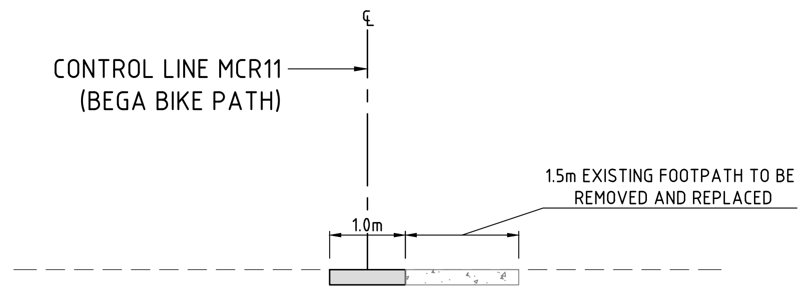


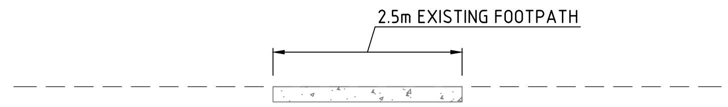
SECTION C
SCALE 1:500
0106



NEW BIKE PATH - TYPICAL DETAIL A
SCALE 1:50



WIDEN EXISTING FOOTPATH - TYPICAL DETAIL B
SCALE 1:50



USE EXISTING FOOTPATH - TYPICAL DETAIL C
SCALE 1:50

LEGEND

EXISTING SURFACE

DESIGN SURFACE

NOTE:

REFER TO DWG 0002 FOR GENERAL NOTES AND LEGEND.

0 0.5 1.0 1.5 2.0 2.5m
SCALE 1:50 (A1)
SCALE BEFORE REDUCTION

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

CAD REF:M:\PROJECTS\M7000_MISCELLANEOUS CLIENTS\M7309_001 BEGA BIKEWAY\05 DESIGN\AUTOCAD\DRAWINGS\M7309-001-DWG-0201.DWG

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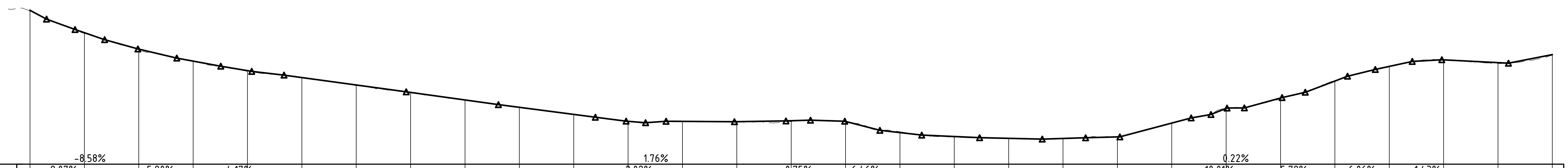
KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
TYPICAL SECTIONS & DETAILS

ORIGINAL SIZE: A1
DWG NO.: M7309-001-DWG-0201
REV.: B



DATUM 1.0

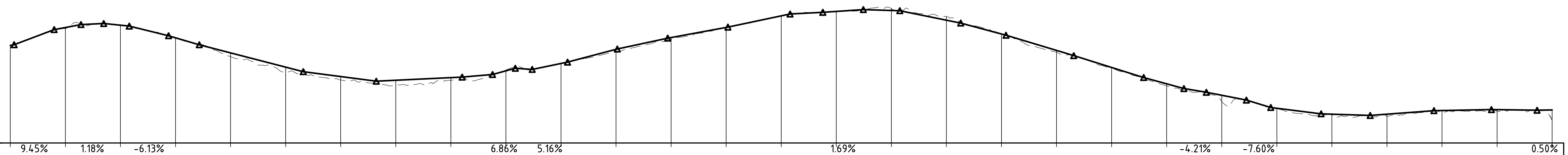
VERT. DETAILS: -13.32%, -9.07%, -8.58%, -6.96%, -5.90%, -4.61%, -4.17%, -2.91%, -3.41%, -3.48%, -3.25%, -3.17%, -2.02%, 1.76%, -0.15%, 0.37%, 0.75%, -0.78%, -6.46%, -2.86%, -1.11%, -0.56%, 0.76%, 0.66%, 6.64%, 4.30%, 10.01%, 0.22%, 6.84%, 5.79%, 9.47%, 6.06%, 5.45%, 1.43%, -1.30%, 4.87%

HORIZ. DETAILS: L=558.345, R=20.0, L=173.254, R=-25.0, L=197.063, R=20.0, L=127.261, L=10.319, R=-3.0, R=3.0, L=35.428, L=8.759, R=-25.0, R=25.0, L=109.813, R=2000.0, L=160.368

CHAINAGES	DEPTHS	DESIGN LEVELS	EXISTING SURFACE
0.000	-0.184	36.360	36.176
50.000	-0.179	31.219	31.040
100.000	-0.093	27.447	27.354
150.000	-0.048	24.690	24.643
200.000	-0.114	22.493	22.380
250.000	-0.062	20.907	20.845
300.000	-0.155	19.201	19.046
350.000	-0.047	17.492	17.445
400.000	-0.024	15.754	15.730
450.000	0.090	14.059	14.149
500.000	-0.070	12.434	12.364
550.000	-0.003	10.852	10.849
600.000	0.090	10.835	10.925
650.000	-0.023	10.770	10.747
700.000	-0.190	10.974	10.784
750.000	-0.001	10.815	10.814
800.000	0.198	8.248	8.446
850.000	-0.145	7.342	7.198
900.000	-0.105	6.935	6.831
950.000	0.007	6.908	6.915
1000.000	-0.103	7.260	7.157
1050.000	0.006	10.445	10.451
1100.000	0.054	13.809	13.863
1150.000	0.036	16.202	16.239
1200.000	0.147	20.114	20.261
1250.000	0.044	23.464	23.508
1300.000	0.020	24.983	25.004
1350.000	-0.203	24.335	24.132
1400.000	-0.108	26.175	26.067

CONTROL LINE MCR11 (BEGA BIKE PATH)

SCALE 1:2000 HORZ.
SCALE 1:500 VERT.



DATUM 4.0

VERT. DETAILS: 4.87%, 9.45%, 4.70%, 1.18%, -2.57%, -6.13%, -7.37%, -6.48%, -3.28%, 1.20%, 2.13%, 6.86%, -1.68%, 5.16%, 6.61%, 5.40%, 4.59%, 5.29%, 1.29%, 1.69%, -0.78%, -5.08%, -6.72%, -7.53%, -7.86%, -6.85%, -4.21%, -4.86%, -7.60%, -3.15%, -0.85%, 1.88%, 0.48%, -0.37%, 0.50%

HORIZ. DETAILS: L=160.368, L=4.824, R=-3.0, R=3.0, L=140.748, R=1000.0, L=196.301, L=13.330, R=-5.0, R=20.0, L=7.136, R=-5.0, L=222.555, R=5000.0, L=149.820, R=-4000.0, L=274.696, R=5000.0, L=142.445

CHAINAGES	DEPTHS	DESIGN LEVELS	EXISTING SURFACE
1400.000	-0.108	26.175	26.067
1450.000	-0.244	30.258	30.014
1500.000	-0.049	30.777	30.728
1550.000	-0.041	27.920	27.879
1600.000	-0.826	24.487	23.662
1650.000	-1.184	21.246	20.062
1700.000	-0.779	19.094	18.315
1750.000	-1.039	18.249	17.210
1800.000	-0.591	18.850	18.259
1850.000	0.187	20.394	20.581
1900.000	0.102	22.070	22.172
1950.000	-0.468	25.287	24.819
2000.000	-0.487	27.976	27.489
2050.000	0.006	30.270	30.276
2100.000	0.045	32.901	32.946
2150.000	-0.075	33.916	33.842
2200.000	0.453	34.135	34.589
2250.000	0.837	31.922	32.759
2300.000	0.064	28.773	28.837
2350.000	-0.401	25.039	24.639
2400.000	-0.153	21.161	21.009
2450.000	-0.467	17.444	16.978
2500.000	-1.450	14.836	13.386
2550.000	-0.077	11.892	11.816
2600.000	-0.162	10.542	10.380
2650.000	-0.452	10.534	10.082
2700.000	-0.348	11.373	11.024
2750.000	-0.333	11.568	11.235
2800.000	-1.589	11.500	9.911

CONTROL LINE MCR11 (BEGA BIKE PATH)

SCALE 1:2000 HORZ.
SCALE 1:500 VERT.

0 5 10 15 20 25m — SCALE 1:500 (A1) SCALE BEFORE REDUCTION

0 20 40 60 80 100m — SCALE 1:2000 (A1) SCALE BEFORE REDUCTION

CAD REF: M:\PROJECTS\M7000_ MISCELLANEOUS CLIENTS\M7309_ 001 BEGA BIKEWAY\05 DESIGN\AUTOCAD\DRAWINGS\M7309-001-DWG-0301.DWG

LAST MODIFIED:30/5/2022 1:21 PM

REV	BY	DATE	REVISION DESCRIPTION	PM APPD.
B	RR	30.05.22	FINAL	JO
A	RR	21.12.21	ISSUED FOR REVIEW	JO

DOC. NUMBER	DOCUMENT TITLE
REFERENCE DOCUMENTS	

bega valley shire council

ENGENY WATER MANAGEMENT

STATUS: NOT FOR CONSTRUCTION - FOR REVIEW

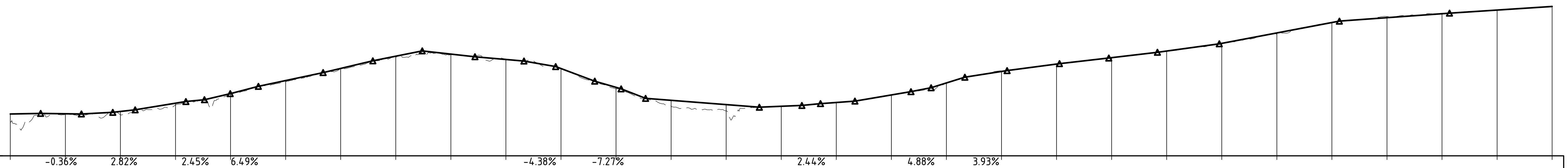
Ph. 07 3221 7174
Level 2
500 Queen St
Brisbane QLD
www.engeny.com.au

DESIGNED	MS	CHECKED	JO
DRAWN	RR	CHECKED	RJM
PM APPD.	JO	PD APPD.	JO
RPEQ		RPEQ No.	

PSA CONSULTING PTY LTD

KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
LONGITUDINAL SECTIONS - SHEET 1 OF 8

ORIGINAL SIZE: A1 | DWG NO.: M7309-001-DWG-0301 | REV.: B



DATUM 2.0

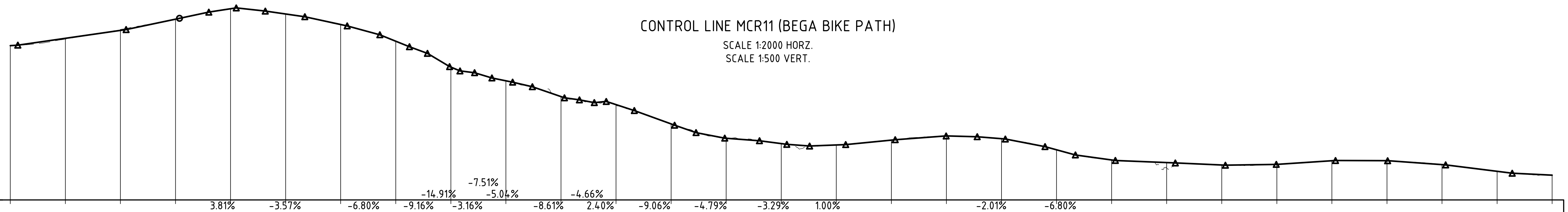
VERT. DETAILS: 0.50% -0.36% 1.29% 2.82% 4.10% 2.45% 5.85% 6.49% 5.31% 5.93% 5.04% -2.79% -2.18% -4.38% -9.34% -7.27% -9.71% -1.95% 1.05% 2.44% 1.83% 4.21% 4.88% 7.78% 3.93% 3.31% 2.86% 2.95% 3.43% 4.73% 1.80% 1.64%

HORIZ. DETAILS: L=142.445 R=-1000.0 L=30.259 R=1000.0 L=311.899 R=1000.0 L=155.929 R=1000.0 L=79.115 R=400.0 L=2.730 R=-1000.0 L=375.711 R=300.0 L=46.746

CHAINAGES	DEPTHS	DESIGN LEVELS	EXISTING SURFACE
2800.000	-1.589	11.500	9.911
2850.000	-0.194	11.558	11.364
2900.000	-0.740	12.071	11.331
2950.000	-0.404	13.951	13.546
3000.000	-0.153	16.140	15.987
3050.000	-0.259	19.094	18.835
3100.000	-0.398	21.848	21.450
3150.000	-0.115	24.628	24.513
3200.000	-0.156	25.115	24.959
3250.000	0.104	23.891	23.995
3300.000	0.013	21.822	21.834
3350.000	-0.318	17.553	17.234
3400.000	-1.322	14.605	13.283
3450.000	-1.435	13.632	12.198
3500.000	0.018	13.253	13.271
3550.000	-0.061	14.124	14.064
3600.000	0.000	15.827	15.827
3650.000	0.025	18.550	18.575
3700.000	0.142	21.163	21.305
3750.000	0.018	22.852	22.869
3800.000	-0.041	24.297	24.256
3850.000	-0.088	25.814	25.725
3900.000	-0.023	27.555	27.532
3950.000	-0.293	29.918	29.624
4000.000	0.057	32.280	32.338
4050.000	0.269	33.382	33.651
4100.000	-0.015	34.284	34.269
4150.000	0.019	35.117	35.136
4200.000	-0.068	35.939	35.871

CONTROL LINE MCR11 (BEGA BIKE PATH)

SCALE 1:2000 HORZ.
SCALE 1:500 VERT.



DATUM 1.0

VERT. DETAILS: 1.64% 3.59% 5.27% 5.28% 3.81% -2.73% -3.57% -5.39% -6.80% -10.08% -9.16% -14.91% -10.26% -3.16% -7.51% -5.04% -5.78% -8.61% -3.42% -4.66% 2.40% -8.07% -9.06% -8.67% -4.79% -1.86% -3.29% -1.84% 1.00% 2.46% 1.84% -0.64% -2.01% -4.80% -6.80% -3.46% -1.03% -1.11% 0.39% 1.64% -0.10% -1.79% -3.12% -1.24%

HORIZ. DETAILS: L=46.746 R=-250.0 L=147.195 R=100.0 L=288.517 R=-202.8 L=763.258

CHAINAGES	DEPTHS	DESIGN LEVELS	EXISTING SURFACE
4200.000	-0.068	35.939	35.871
4250.000	-0.186	37.600	37.413
4300.000	0.212	39.393	39.605
4350.000	-0.002	41.940	41.938
4400.000	0.007	44.289	44.295
4450.000	-0.042	43.105	43.063
4500.000	-0.145	40.728	40.583
4550.000	0.055	36.936	36.991
4600.000	-0.012	31.073	31.061
4650.000	-0.101	27.978	27.877
4700.000	0.016	24.397	24.413
4750.000	-0.120	22.577	22.458
4800.000	-0.033	18.211	18.178
4850.000	-0.082	14.961	14.879
4900.000	0.049	13.748	13.797
4950.000	-0.065	13.442	13.377
5000.000	0.048	14.546	14.594
5050.000	0.024	15.479	15.503
5100.000	0.028	14.859	14.886
5150.000	0.048	12.347	12.394
5200.000	-0.076	10.043	9.966
5250.000	-1.264	9.444	8.180
5300.000	0.010	8.897	8.907
5350.000	0.006	9.048	9.055
5400.000	0.040	9.867	9.907
5450.000	0.008	9.873	9.881
5500.000	0.062	8.987	9.049
5550.000	-0.044	7.470	7.426
5600.000	-0.072	6.590	6.518

CONTROL LINE MCR11 (BEGA BIKE PATH)

SCALE 1:2000 HORZ.
SCALE 1:500 VERT.

0 5 10 15 20 25m SCALE 1:500 (A1) SCALE BEFORE REDUCTION

0 20 40 60 80 100m SCALE 1:2000 (A1) SCALE BEFORE REDUCTION

CAD REF: M:\PROJECTS\M7000_MISCELLANEOUS CLIENTS\M7309_001 BEGA BIKEWAY\05 DESIGN\AUTOCAD\DRAWINGS\M7309-001-DWG-0302.DWG

LAST MODIFIED:30/5/2022 1:21 PM

REV	BY	DATE	REVISION DESCRIPTION	PM APPD.
B	RR	30.05.22	FINAL	JO
A	RR	21.12.21	ISSUED FOR REVIEW	JO

DOC. NUMBER	DOCUMENT TITLE

REFERENCE DOCUMENTS

bega valley shire council

ENGENY WATER MANAGEMENT

STATUS: NOT FOR CONSTRUCTION - FOR REVIEW

Ph. 07 3221 7174
Level 2
500 Queen St
Brisbane QLD
www.engeny.com.au

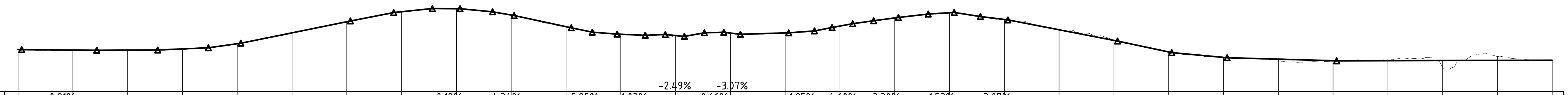
DESIGNED	MS	CHECKED	JO
DRAWN	RR	CHECKED	RJM
PM APPD.	JO	PD APPD.	JO
RPEQ		RPEQ No.	

PSA CONSULTING PTY LTD

KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
LONGITUDINAL SECTIONS - SHEET 2 OF 8

ORIGINAL SIZE: A1 DWG NO. M7309-001-DWG-0302 REV. B

DATUM -3.0



VERT. DETAILS: -1.24% -0.21% 0.08% 1.14% 3.48% 5.07% 4.83% 2.59% -0.12% -2.35% -4.34% -5.34% -5.25% -1.95% -1.03% 0.94% -2.49% 4.51% 0.66% -3.07% 0.77% 1.85% 4.76% 4.60% 3.55% 3.30% 2.86% 1.53% -3.85% -3.07% -4.81% -5.34% -2.29% -0.70% 0.06%

HORIZ. DETAILS: L=763.258 L=687.882 R=1000.0 L=816.543

CHAINAGES	DEPTHS	DESIGN LEVELS	EXISTING SURFACE
5600.000	-0.072	6.590	6.518
5650.000	-0.076	6.451	6.374
5700.000	-0.118	6.428	6.310
5750.000	-0.160	6.709	6.549
5800.000	-0.036	7.895	7.858
5850.000	-0.104	10.375	10.271
5900.000	-0.003	12.908	12.905
5950.000	0.045	15.169	15.214
6000.000	0.028	15.868	15.896
6050.000	0.013	14.428	14.441
6100.000	0.032	11.784	11.816
6150.000	-0.020	10.044	10.024
6200.000	-0.110	9.754	9.644
6250.000	-0.052	10.314	10.262
6300.000	0.012	10.351	10.363
6350.000	-0.010	11.906	11.896
6400.000	-0.045	13.754	13.710
6450.000	0.047	14.942	14.988
6500.000	-0.089	13.413	13.324
6550.000	0.041	11.066	11.107
6600.000	0.171	8.662	8.833
6650.000	-0.039	6.008	5.969
6700.000	-0.053	4.778	4.725
6750.000	-0.424	4.377	3.953
6800.000	-0.139	4.029	3.890
6850.000	0.306	4.036	4.341
6900.000	-1.536	4.068	2.533
6950.000	0.905	4.100	5.006
7000.000	-0.009	4.133	4.123

CONTROL LINE MCR11 (BEGA BIKE PATH)
SCALE 1:2000 HORZ.
SCALE 1:500 VERT.

DATUM -5.0

VERT. DETAILS: 0.06% 0.09% -0.66% 2.46% -0.47% -2.88% 0.40% -0.66% 1.18% -0.76% -0.10% -0.44% -0.35% -0.83% 4.41% 0.11%

HORIZ. DETAILS: L=816.543 R=1000.0 L=813.038 L=6.840 L=138.784 R=3.0 3.0

CHAINAGES	DEPTHS	DESIGN LEVELS	EXISTING SURFACE
7000.000	-0.009	4.133	4.123
7050.000	0.715	4.175	4.890
7100.000	0.244	4.217	4.461
7150.000	0.159	4.260	4.419
7200.000	0.080	4.303	4.383
7250.000	-0.129	3.996	3.867
7300.000	0.238	5.151	5.389
7350.000	0.089	5.048	5.137
7400.000	-0.040	3.790	3.750
7450.000	-0.187	3.620	3.433
7500.000	-0.009	3.820	3.811
7550.000	0.094	3.527	3.621
7600.000	0.001	3.199	3.200
7650.000	0.613	3.728	4.341
7700.000	0.038	4.318	4.356
7750.000	0.164	4.003	4.166
7800.000	-0.002	3.624	3.622
7850.000	-0.011	3.550	3.539
7900.000	0.007	3.499	3.506
7950.000	-0.182	3.292	3.110
8000.000	-0.076	3.074	2.997
8050.000	-1.775	2.896	1.121
8100.000	-0.009	2.721	2.712
8150.000	-0.025	2.323	2.298
8200.000	-0.009	1.909	1.900
8250.000	-0.020	1.495	1.476
8300.000	-0.383	1.927	1.544
8350.000	-0.038	2.957	2.919
8400.000	-0.044	3.010	2.966

CONTROL LINE MCR11 (BEGA BIKE PATH)
SCALE 1:2000 HORZ.
SCALE 1:500 VERT.

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

0 20 40 60 80 100m
SCALE 1:2000 (A1)
SCALE BEFORE REDUCTION

CAD REF: M:\PROJECTS\M7000_MISCELLANEOUS CLIENTS\M7309_001 BEGA BIKEWAY\05 DESIGN\AUTOCAD\DRAWINGS\M7309-001-DWG-0303.DWG
LAST MODIFIED: 30/5/2022 1:23 PM

REV	BY	DATE	REVISION DESCRIPTION	PM APPD.
B	RR	30.05.22	FINAL	JO
A	RR	21.12.21	ISSUED FOR REVIEW	JO

DOC. NUMBER	DOCUMENT TITLE
REFERENCE DOCUMENTS	

bega valley shire council

ENGENY WATER MANAGEMENT

STATUS: NOT FOR CONSTRUCTION - FOR REVIEW

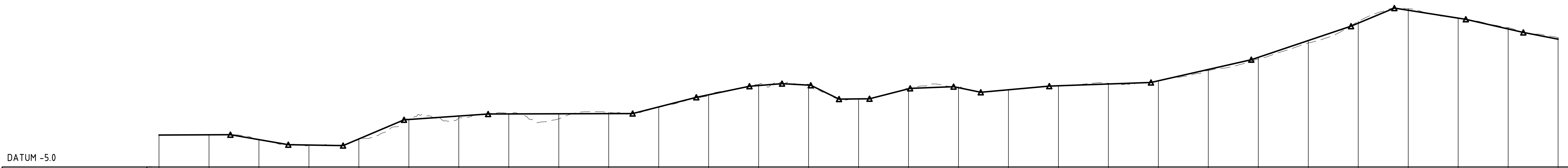
Ph. 07 3221 7174
Level 2
500 Queen St
Brisbane QLD
www.engeny.com.au

DESIGNED	MS	CHECKED	JO
DRAWN	RR	CHECKED	RJM
PM APPD.	JO	PD APPD.	JO
RPEQ		RPEQ No.	

PSA CONSULTING PTY LTD

KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
LONGITUDINAL SECTIONS - SHEET 3 OF 8

ORIGINAL SIZE: A1
DWG NO.: M7309-001-DWG-0303
REV.: B



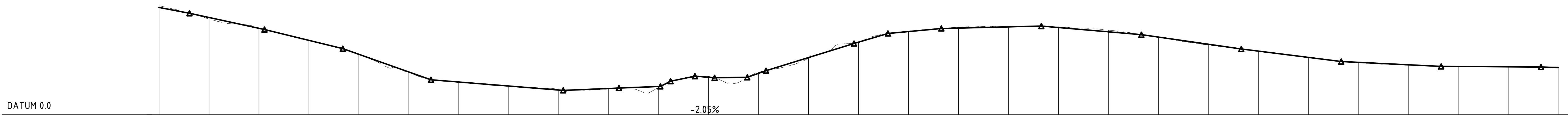
VERT. DETAILS: 0.11% | -4.32% | -0.40% | 10.59% | 1.72% | 0.08% | 6.36% | 5.23% | 2.01% | -1.46% | -12.25% | 0.29% | 6.40% | 0.98% | -5.20% | 2.26% | 0.89% | 5.68% | 8.41% | 10.47% | -3.93% | -5.73% | -4.83%

HORIZ. DETAILS: L=138.784 | R=25.0 | L=29.229 | R=50.0 | L=11.992 | R=100.0 | L=23.911 | R=-145.1 | L=180.696 | R=-98.7 | L=137.730 | R=500.0 | L=51.695 | R=1000.0 | L=39.253 | R=-200.0 | L=36.322 | R=100.0 | L=11.640 | R=-300.0 | L=78.532 | R=300.0 | L=11.165 | R=-300.0

DEPTHS	-0.044	-0.050	-0.104	-0.005	-0.278	0.076	-0.494	-0.039	-1.280	0.291	-0.123	-0.340	0.261	0.218	-0.212	0.094	0.227	0.012	-0.013	0.184	0.037	-0.242	-0.412	-0.610	0.447	0.398	-0.089	0.354	0.400
DESIGN LEVELS	3.010	3.063	1.852	0.501	2.035	6.904	7.763	8.285	8.326	8.367	10.046	13.088	15.407	15.491	12.056	14.587	14.862	14.330	15.336	15.784	16.585	19.424	22.454	26.658	31.009	34.249	32.285	29.558	27.007
EXISTING SURFACE	2.966	3.013	1.748	0.496	1.758	6.980	7.269	8.245	7.046	8.658	9.923	12.748	15.668	15.709	11.844	14.681	15.089	14.342	15.323	15.967	16.622	19.182	22.042	26.048	31.456	34.646	32.196	29.913	27.407
CHAINAGES	8400.000	8450.000	8500.000	8550.000	8600.000	8650.000	8700.000	8750.000	8800.000	8850.000	8900.000	8950.000	9000.000	9050.000	9100.000	9150.000	9200.000	9250.000	9300.000	9350.000	9400.000	9450.000	9500.000	9550.000	9600.000	9650.000	9700.000	9750.000	9800.000

CONTROL LINE MCR11 (BEGA BIKE PATH)

SCALE 1:2000 HORZ.
SCALE 1:500 VERT.



VERT. DETAILS: -4.83% | -5.44% | -6.14% | -8.86% | -2.02% | 1.06% | 0.99% | 12.88% | 5.15% | -2.05% | 0.40% | 8.82% | 7.76% | 7.45% | 2.32% | 0.61% | -2.16% | -3.60% | -3.15% | -1.22% | -0.14% | -0.93%

HORIZ. DETAILS: R=-300.0 | L=43.976 | R=-200.0 | L=56.438 | R=50.0 | L=66.451 | R=-50.0 | L=65.788 | R=1000.0 | L=117.702 | R=200.0 | L=48.173 | R=600.0 | L=54.215 | R=1000.0 | L=93.245 | R=-300.0 | L=66.570 | R=-250.0 | L=68.648 | R=1000.0 | L=8.033 | R=1000.0

DEPTHS	0.400	-0.369	0.102	-0.052	-0.132	-0.011	-0.012	-0.099	0.172	-0.085	-0.161	0.207	0.257	-0.060	-0.039	0.122	0.211	0.167	0.172	0.448	-0.027	-0.209	0.022	-0.060	-0.088	-0.062	0.047	-0.008	0.171
DESIGN LEVELS	27.007	24.473	21.751	18.719	15.212	10.782	8.259	7.250	6.242	6.635	7.138	9.441	10.451	14.410	18.277	20.946	21.813	22.117	21.948	20.868	19.544	17.746	16.023	14.446	13.198	12.585	12.158	12.090	11.885
EXISTING SURFACE	27.407	24.104	21.853	18.667	15.080	10.771	8.247	7.151	6.414	6.550	6.978	9.648	10.708	14.351	18.238	21.068	22.024	22.284	22.120	21.316	19.517	17.537	16.044	14.386	13.110	12.523	12.205	12.081	12.056
CHAINAGES	9800.000	9850.000	9900.000	9950.000	10000.000	10050.000	10100.000	10150.000	10200.000	10250.000	10300.000	10350.000	10400.000	10450.000	10500.000	10550.000	10600.000	10650.000	10700.000	10750.000	10800.000	10850.000	10900.000	10950.000	11000.000	11050.000	11100.000	11150.000	11200.000

CONTROL LINE MCR11 (BEGA BIKE PATH)

SCALE 1:2000 HORZ.
SCALE 1:500 VERT.

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

0 20 40 60 80 100m
SCALE 1:2000 (A1)
SCALE BEFORE REDUCTION

REV	BY	DATE	REVISION DESCRIPTION	PM APPD.
B	RR	30.05.22	FINAL	JO
A	RR	21.12.21	ISSUED FOR REVIEW	JO

DOC. NUMBER	DOCUMENT TITLE
REFERENCE DOCUMENTS	

bega valley shire council

ENGENY WATER MANAGEMENT

STATUS
NOT FOR CONSTRUCTION - FOR REVIEW

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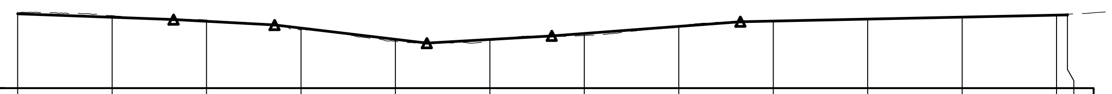
Level 2
500 Queen St
Brisbane QLD
www.engeny.com.au

DESIGNED	MS	CHECKED	JO
DRAWN	RR	CHECKED	RJM
PM APPD.	JO	PD APPD.	JO
RPEQ		RPEQ No.	

PSA CONSULTING PTY LTD

KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
LONGITUDINAL SECTIONS - SHEET 4 OF 8

ORIGINAL SIZE: A1 | DWG NO.: M7309-001-DWG-0304 | REV.: B



DATUM 2.0

VERT. DETAILS: -0.93% | -1.34% | -3.00% | 1.46% | 1.89% | 0.52%

HORIZ. DETAILS: L=17.105, R=1000.0 | R=150.0 | L=100.715 | R=-220.0 | L=58.497 | R=-1000.0 | L=64.236

DEPTHS	0.171	0.221	0.167	-0.233	-0.215	-0.166	-0.290	0.088	-0.038	-0.000	0.004	0.072	0.104
DESIGN LEVELS	11.885	11.419	10.883	9.981	8.480	8.467	9.271	10.217	10.924	11.185	11.446	11.707	11.737
EXISTING SURFACE	12.056	11.640	11.050	9.748	8.265	8.302	8.981	10.305	10.886	11.185	11.451	11.779	11.841
CHAINAGES	11200.000	11250.000	11300.000	11350.000	11400.000	11450.000	11500.000	11550.000	11600.000	11650.000	11700.000	11750.000	11755.785

CONTROL LINE MCR11 (BEGA BIKE PATH)

SCALE 1:2000 HORZ.
SCALE 1:500 VERT.

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

0 20 40 60 80 100m
SCALE 1:2000 (A1)
SCALE BEFORE REDUCTION

REV	BY	DATE	REVISION DESCRIPTION	PM APPD.
B	RR	30.05.22	FINAL	JO
A	RR	21.12.21	ISSUED FOR REVIEW	JO

REFERENCE DOCUMENTS	
DOC. NUMBER	DOCUMENT TITLE

STATUS
NOT FOR CONSTRUCTION - FOR REVIEW

ENGENY WATER MANAGEMENT
Ph. 07 3221 7174
Level 2
500 Queen St
Brisbane QLD
www.engeny.com.au

DESIGNED	MS	CHECKED	JO
DRAWN	RR	CHECKED	RJM
PM APPD.	JO	PD APPD.	JO
RPEQ		RPEQ No.	

PSA CONSULTING PTY LTD

KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
LONGITUDINAL SECTIONS - SHEET 5 OF 8

ORIGINAL SIZE: A1
DWG NO.: M7309-001-DWG-0305
REV.: B

CAD REF: M:\PROJECTS\M7000_MISCELLANEOUS CLIENTS\M7309_001 BEGA BIKEWAY\05 DESIGN\AUTOCAD\DRAWINGS\M7309-001-DWG-0305.DWG
LAST MODIFIED: 30/5/2022 1:21 PM

E:754956.504
N:5936254.054 Datum 29

DESIGN HEIGHT	31.443	30.777	30.777	30.777	30.636
DEPTH	0	0.458	-0.049	-0.14	-0.094
EXISTING SURFACE	31.443	31.235	30.728	30.637	30.636
DESIGN OFFSET	-2.666	-2.000	0.000	2.000	2.141

CHAINAGE 1500.000

E:755632.957
N:5934387.301 Datum 12

DESIGN HEIGHT	12.993	13.253	13.253	13.253	13.357
DEPTH	-0.173	-0.245	0.018	0.105	0
EXISTING SURFACE	12.993	13.008	13.271	13.358	13.357
DESIGN OFFSET	-2.260	-2.000	0.000	2.000	2.104

CHAINAGE 3500.000

E:756444.190
N:5932984.378 Datum 8

DESIGN HEIGHT	9.298	8.987	8.987	8.987	9.093
DEPTH	0	0.236	0.062	0.099	0
EXISTING SURFACE	9.298	9.223	9.049	9.087	9.093
DESIGN OFFSET	-2.311	-2.000	0.000	2.000	2.106

CHAINAGE 5500.000

E:758399.468
N:5932563.851 Datum 2

DESIGN HEIGHT	3.659	3.820	3.820	3.820	3.950
DEPTH	-0.107	-0.159	-0.009	0.125	0
EXISTING SURFACE	3.659	3.661	3.811	3.945	3.95
DESIGN OFFSET	-2.161	-2.000	0.000	2.000	2.130

CHAINAGE 7500.000

E:759761.772
N:5931632.715 Datum 21

DESIGN HEIGHT	22.486	22.454	22.454	22.454	21.911
DEPTH	0	0.032	-0.412	-0.636	-0.362
EXISTING SURFACE	22.486	22.486	22.042	21.818	21.911
DESIGN OFFSET	-2.032	-2.000	0.000	2.000	2.543

CHAINAGE 9500.000

E:754775.682
N:5936695.194 Datum 5

DESIGN HEIGHT	8.170	7.260	7.260	7.260	6.623
DEPTH	0	0.683	-0.103	-0.603	-0.424
EXISTING SURFACE	8.17	7.944	7.157	6.657	6.623
DESIGN OFFSET	-2.910	-2.000	0.000	2.000	2.637

CHAINAGE 1000.000

E:755470.421
N:5934859.776 Datum 14

DESIGN HEIGHT	15.440	16.140	16.140	16.140	16.417
DEPTH	-0.466	-0.626	-0.153	0.271	0
EXISTING SURFACE	15.44	15.513	15.987	16.41	16.417
DESIGN OFFSET	-2.700	-2.000	0.000	2.000	2.277

CHAINAGE 3000.000

E:755987.747
N:5933162.560 Datum 13

DESIGN HEIGHT	14.210	14.546	14.546	14.546	14.648
DEPTH	-0.224	-0.27	0.048	0.1	0
EXISTING SURFACE	14.21	14.275	14.594	14.646	14.648
DESIGN OFFSET	-2.336	-2.000	0.000	2.000	2.102

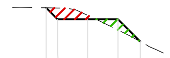
CHAINAGE 5000.000

E:757910.992
N:5932670.580 Datum 3

DESIGN HEIGHT	4.103	4.133	4.133	4.133	4.358
DEPTH	0	-0.03	-0.009	0.225	0
EXISTING SURFACE	4.103	4.103	4.123	4.358	4.358
DESIGN OFFSET	-2.030	-2.000	0.000	2.000	2.225

CHAINAGE 7000.000

E:759324.712
N:5931862.841 Datum 12



DESIGN HEIGHT	16.174	15.407	15.407	15.407	13.924
DEPTH	0	0.754	0.261	-0.711	0
EXISTING SURFACE	16.174	16.161	15.668	14.696	13.924
DESIGN OFFSET	-2.767	-2.000	0.000	2.000	3.483

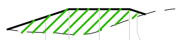
CHAINAGE 9000.000

E:754523.967
N:5937087.661 Datum 11

DESIGN HEIGHT	12.368	12.434	12.434	12.434	12.622
DEPTH	-0.044	-0.071	-0.07	0.167	0
EXISTING SURFACE	12.368	12.363	12.364	12.601	12.622
DESIGN OFFSET	-2.066	-2.000	0.000	2.000	2.188

CHAINAGE 500.000

E:755290.934
N:5935326.413 Datum 12



DESIGN HEIGHT	13.265	14.836	14.836	14.836	14.332
DEPTH	-1.047	-1.691	-1.45	-0.691	-0.336
EXISTING SURFACE	13.265	13.145	13.386	14.145	14.332
DESIGN OFFSET	-3.570	-2.000	0.000	2.000	2.503

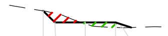
CHAINAGE 2500.000

E:755566.629
N:5933415.531 Datum 39

DESIGN HEIGHT	40.841	40.728	40.728	40.728	40.295
DEPTH	0	0.1	-0.145	-0.387	-0.289
EXISTING SURFACE	40.841	40.828	40.583	40.34	40.295
DESIGN OFFSET	-2.113	-2.000	0.000	2.000	2.433

CHAINAGE 4500.000

E:757422.234
N:5932775.993 Datum 12



DESIGN HEIGHT	14.185	13.413	13.413	13.413	13.065
DEPTH	0	0.611	-0.089	-0.336	-0.232
EXISTING SURFACE	14.185	14.024	13.324	13.076	13.065
DESIGN OFFSET	-2.772	-2.000	0.000	2.000	2.348

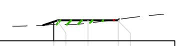
CHAINAGE 6500.000

E:759354.405
N:5932329.234 Datum 0

DESIGN HEIGHT	1.988	1.852	1.852	1.852	1.807
DEPTH	0	0.12	-0.104	-0.048	0
EXISTING SURFACE	1.988	1.972	1.748	1.804	1.807
DESIGN OFFSET	-2.136	-2.000	0.000	2.000	2.045

CHAINAGE 8500.000

E:754033.598
N:5937185.324 Datum 35



DESIGN HEIGHT	36.087	36.360	36.360	36.360	36.423
DEPTH	-0.182	-0.272	-0.184	0.053	0
EXISTING SURFACE	36.087	36.087	36.176	36.412	36.423
DESIGN OFFSET	-2.273	-2.000	0.000	2.000	2.063

CHAINAGE 0.000

E:755118.596
N:5935795.748 Datum 26

DESIGN HEIGHT	27.998	27.976	27.976	27.976	27.455
DEPTH	0	0.016	-0.487	-0.581	-0.347
EXISTING SURFACE	27.998	27.993	27.489	27.395	27.455
DESIGN OFFSET	-2.022	-2.000	0.000	2.000	2.521

CHAINAGE 2000.000

E:755603.940
N:5933894.775 Datum 31

DESIGN HEIGHT	32.264	32.280	32.280	32.280	32.343
DEPTH	-0.005	-0.016	0.057	0.064	0
EXISTING SURFACE	32.264	32.265	32.338	32.344	32.343
DESIGN OFFSET	-2.016	-2.000	0.000	2.000	2.062

CHAINAGE 4000.000

E:756932.970
N:5932879.051 Datum 15

DESIGN HEIGHT	15.868	15.868	15.868	15.970
DEPTH	-0	0.028	0.099	0
EXISTING SURFACE	15.868	15.896	15.967	15.97
DESIGN OFFSET	-2.000	0.000	2.000	2.102

CHAINAGE 6000.000

E:758887.899
N:5932456.913 Datum 2

DESIGN HEIGHT	2.954	3.074	3.074	3.074	3.167
DEPTH	-0.080	-0.111	-0.076	0.086	0
EXISTING SURFACE	2.954	2.963	2.997	3.16	3.167
DESIGN OFFSET	-2.120	-2.000	0.000	2.000	2.094

CHAINAGE 8000.000

LEGEND

EXISTING SURFACE
DESIGN SURFACE

0 2.5 5.0 7.5 10.0 12.5m
SCALE 1:250 (A1)
SCALE BEFORE REDUCTION

CAD REF:M:\PROJECTS\M7000_MISCELLANEOUS CLIENTS\M7309_001 BEGA BIKEWAY\05 DESIGN\AUTOCAD\DRAWINGS\M7309-001-DWG-0401.DWG
LAST MODIFIED:30/5/2022 1:21 PM

REV	BY	DATE	REVISION DESCRIPTION	PM APPD.
B	RR	30.05.22	FINAL	JO
A	RR	21.12.21	ISSUED FOR REVIEW	JO

DOC. NUMBER	DOCUMENT TITLE
REFERENCE DOCUMENTS	

STATUS
NOT FOR CONSTRUCTION - FOR REVIEW

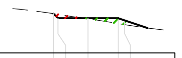
Ph. 07 3221 7174
Level 2
500 Queen St
Brisbane QLD
www.engeny.com.au

DESIGNED	MS	CHECKED	JO
DRAWN	RR	CHECKED	RJM
PM APPD.	JO	PD APPD.	JO
RPEQ		RPEQ No.	

PSA CONSULTING PTY LTD

KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
CROSS SECTIONS - SHEET 1 OF 2

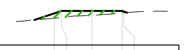
ORIGINAL SIZE A1 | DWG NO. M7309-001-DWG-0401 | REV. B



E:760702.260
N:5931391.806 Datum 16

DESIGN HEIGHT	18.575	18.277	18.277	18.277	17.847
DEPTH	0	0.249	-0.039	-0.356	-0.287
EXISTING SURFACE	18.575	18.526	18.238	17.922	17.847
DESIGN OFFSET	-2.298	-2.000	0.000	2.000	2.430

CHAINAGE 10500.000



E:761458.204
N:5930762.432 Datum 7

DESIGN HEIGHT	8.790	9.271	9.271	9.271	9.147
DEPTH	-0.321	-0.434	-0.29	-0.135	-0.083
EXISTING SURFACE	8.79	8.837	8.981	9.136	9.147
DESIGN OFFSET	-2.481	-2.000	0.000	2.000	2.124

CHAINAGE 11500.000

E:760246.548
N:5931545.627 Datum 14

DESIGN HEIGHT	15.018	15.212	15.212	15.212	15.217
DEPTH	-0.129	-0.2	-0.132	0.005	0
EXISTING SURFACE	15.018	15.012	15.08	15.217	15.217
DESIGN OFFSET	-2.194	-2.000	0.000	2.000	2.006

CHAINAGE 10000.000

E:761083.014
N:5931078.239 Datum 12

DESIGN HEIGHT	13.193	13.198	13.198	13.198	13.104
DEPTH	0	-0.005	-0.088	-0.086	-0.062
EXISTING SURFACE	13.193	13.193	13.11	13.112	13.104
DESIGN OFFSET	-2.005	-2.000	0.000	2.000	2.093

CHAINAGE 11000.000

E:761711.238
N:5930750.700 Datum 10

DESIGN HEIGHT	11.822	11.737	11.737	11.737	11.817
DEPTH	0	0.093	0.104	0.08	0
EXISTING SURFACE	11.822	11.83	11.841	11.818	11.817
DESIGN OFFSET	-2.084	-2.000	0.000	2.000	2.079

CHAINAGE 11755.785

LEGEND

EXISTING SURFACE

DESIGN SURFACE

0 2.5 5.0 7.5 10.0 12.5m
SCALE 1:250 (A1)
SCALE BEFORE REDUCTION

REV	BY	DATE	REVISION DESCRIPTION	PM APPD.
B	RR	30.05.22	FINAL	JO
A	RR	21.12.21	ISSUED FOR REVIEW	JO

REFERENCE DOCUMENTS

DOC. NUMBER	DOCUMENT TITLE

STATUS
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Ph. 07 3221 7174
Level 2
500 Queen St
Brisbane QLD
www.engeny.com.au

DESIGNED	MS	CHECKED	JO
DRAWN	RR	CHECKED	RJM
PM APPD.	JO	PD APPD.	JO
RPEQ		RPEQ No.	

PSA CONSULTING PTY LTD

KALARU TO BEGA BIKE PATH - CIVIL WORKS DESIGN
CROSS SECTIONS - SHEET 1 OF 2

ORIGINAL SIZE	DWG NO.	REV.
A1	M7309-001-DWG-0402	B