



Feasibility Study of Options A, B & C Lake Street Shared Path, Merimbula



Prepared for Bega Valley Shire Council by:
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EXECUTIVE SUMMARY

Thompson Berrill Landscape Design Pty Ltd (TBLD) were engaged by Bega Valley Shire Council (BVSC) in November 2017 to undertake a Feasibility Study of 3 Options for Lake Street Shared Path in Merimbula. This study assesses the feasibility of a shared path along approximately 1.7km of Lake Street linking Rotary Park to Bar Beach and Merimbula Wharf. TBLD partnered with a specialist consultant support team providing input into the feasibility study from their dedicated fields of expertise;

- Ecologists – NGH Environmental (NGH)
- Structural, Civil & Geotechnical Engineers – Tasman Engineering Consultants (TEC)
- Traffic Engineers – O'Brien Traffic (OBT)
- Quantity Surveyors – MDA Australia (MDA)

The aim of this study is to prepare 3 options and select a preferred option for the design and construction of an all-access shared use path approximately 1.7km from Rotary Park to Merimbula Wharf via Bar Beach along Lake Street, within the available budget funding limitations. The proposed shared path works will address the significant public safety hazard for pedestrians, cyclists and motor vehicle users by creating a separate shared path along the Lake Street route.

The primary objectives of this Feasibility Study are to:

1. Outline issues and opportunities (environment, heritage, traffic, recreational experience, public safety, materials, constructability, geotechnical etc.) of the proposed shared path options.
2. Options analysis of the three options:
 - a. Option A – One Way Road with Separate Path (on closed road lane)
 - b. Option B – Two Way Road with Shared Path (on road shoulder)
 - c. Option C – Hybrid 2+1: Maintain two way road to Bar Beach, One way road from Bar Beach to Wharf Street
3. Quantity estimation of the 3 options

The options analysis will determine a preferred option for a feasible shared path alignment, concept and construction methodology to guide next stage of the project.

The Feasibility Study investigations include consideration of alignment alternatives, review of background information, and input from technical consultants including terrestrial ecologists, civil, structural and geotechnical engineers (with experience designing similar boardwalks), traffic engineers and quantity surveyors.

In summary, this report confirms Option A; the conversion of Lake Street to a one way road (southbound) with creation of a 1.7km on ground shared path along the existing northbound lane of Lake Street is the most feasible, viable and cost effective option for a shared path from Rotary Park to Merimbula Wharf.

As outlined in section 3.2 of this report, Option A is considered to be the most cost-effective solution for construction of a shared path at Lake Street, Merimbula and provides improved social and environmental benefits which surpass those of the alternative options. These benefits include: reduced environmental impacts (no removal of mature existing trees, minimal impact on terrestrial vegetation), lower construction impacts and duration, lowered traffic risk, improved amenity and social benefits (formal carparking, seating/rest areas/lookouts and opportunity for revegetation/ feature landscaping with local provenance terrestrial vegetation) and minimal impact on cultural heritage. It is therefore considered to be the preferred solution for the proposed Lake Street Shared Path project. Option A also meets the requirements set out by Bega Valley Shire Council to provide a Shared Path that will provide a safer route for all users within given budget limitations, improve recreational values for the public and protect environmental and cultural values along the proposed route.

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APPENDICES

- A Feasibility Study Plans and Typical Sections: Options A, B & C (by TBLD)
- B Environmental, Heritage & Socio-economic Constraints Analysis (by NGH Environmental)
- C Preliminary Traffic Engineering Comments (by O'Brien Traffic)
- D Options Analysis Concept Design Cost Estimate (by MDA Australia)
- E Preliminary Geotechnical Investigations Report (by Tasman Engineering Consultants)
- F BOAT Stakeholder Workshop Minutes

1. INTRODUCTION

1.1 Introduction

Lake Street is a winding two-way road approximately 1.7km long running from Rotary Park (northern end) to Merimbula Wharf (southern end) via Bar Beach, located within the Bega Valley Shire Government Area in Merimbula. The area to the east of Lake Street comprises residential properties which access Lake Street typically via steep angled driveways. The west side of Lake Street borders a dense bushland, Merimbula's Bar Beach and estuary with complex ecosystems, cultural values and one of the largest recreational attractions in the area. The aim of the Bega Valley Shire Council proposal is that the proposed Shared Path will provide a safer off road route for all users within set budget limitations, improve recreational values for the public and protect environmental and cultural values.

The shared trail will support and complement existing regional trail connection from Pambula via Merimbula airport, and the CBD to Spencer Park where the Lake Street Shared Path will begin.

Lake Street is approximately 7m wide and has recently undergone surface (asphalt) renewal from Cliff St (northern end) to Wyeebo St near Bar Beach. There are no known plans in the immediate future to complete resurfacing from Wyeebo St to the wharf. The current road conditions offer no defined pedestrian or cycle access along the length of the road with steep slope embankments and little or no shoulder in places. This causes conflict between pedestrians, cyclists and vehicle use, with poor sightlines along the length of the road.

TBLD understand that Merimbula Bar Beach is very popular during the warmer months and suffers from a lack of dedicated parking to service both locals and visitors. BVSC have suggested consideration of the creation of formal parking on Lake Street with an access path to increase local capacity for parking and provide safer accessibility to Bar Beach.

Existing informal walking trails run parallel to Lake Street along the foreshore without a connection to Merimbula Wharf which requires pedestrians to walk along road verge with no formal path. The connectivity of the informal trails would be carefully considered by our team during the detailed design phase, in collaboration with council officers, to integrate the trails systems with the new shared path.

Landscape Architectural consultants TBLD Pty Ltd, and a team of specialist technical consultants have undertaken detailed site investigations, high level desktop studies and project workshops prior to preparation of this study.

1.2 Key Users

Key users of Lake Street for access to water and land based activities are as follows.

Key water based key user groups and destinations identified include:

- Bar Beach for
 - Swimming
 - Surfing
 - Sunbaking
- Water Leisure Activates (Stand Up Paddlers, Kayakers, etc)
- Surf Life Saving Club

Key land based key user groups and destinations identified include:

- Cycling
- Walking/strolling/jogging
- Picnicking
- Bar Beach Kiosk
- Rotary Club Park
- Merimbula Wharf
- Merimbula Aquarium
- Bushwalking/Hiking
- Bird watching
- Whale/Dolphin watching
- Shore fishing
- Dog walking

During summer the increase tourism based population growth in the Merimbula township increases the demand for open space natural areas and water based activities, including use of Lake Street as a main access route for these activities. Bega Valley Shire Council's Operational Plan - An Accessible Place states:

"A2 - Facilities and services: Our infrastructure, facilities and services are strategically planned, located, designed and maintained to meet our local and visiting community needs."

Recent years have seen the increased use of Bar Beach by community users, community groups, sporting and recreational clubs and season tourists. The construction of a separate shared path along the length of Lake Street will improve safety, and further encourage a wide range of users to safely enjoy the recreational and environmental merits of the Bar Beach and the surrounding areas. The design would further enhance an appreciation of the natural environment and view sheds, and provide significant interpretive and educational opportunities, and cater for seasonal population growth.

2. METHODOLOGY

2.1 Background Information

The project is to be 100% funded by a \$2,000,000 grant from the NSW State Government – Roads and Maritime Services under 2017/18 Active Transport Funding.

2.2 Process

In early 2016, a Community Project Proposal was submitted to Bega Valley Shire Council for consideration by the community group Bureau of Accessible Tourism (BOAT). Preliminary reports in support of the project accompanied the submission along with supporting letters from the local community.

Preliminary Reports:

- Lake Street Walking Trail, Feasibility Assessment prepared by David Buckley (Dec 2016)
- Preliminary Flora & Fauna Assessment, Merimbula Estuary Walking Trail prepared by Local Environment Solutions (April 2017)

A grant of 100% of the project funds of \$2,000,000 was received from the NSW Government from the 2017-18 Active Transport Program. Funding will be split over the 2017/18 and 2018/19 financial years.

Landscape Architectural consultants (Thompson Berrill Landscape Design) and their team of specialist local subconsultants were engaged in November 2017 to undertake a site investigation and feasibility study of options to assist council determining an appropriate option and design response to the site conditions. This process involved detailed site investigations and assessment of site conditions, review of background information and development of a Feasibility Study Concept Designs for Option A, B & C in consultation with technical subconsultants and in consultation with council departments. The outcomes of this Report will be used to determine the preferred trail alignment for Lake Street.

In December 2017, Thompson Berrill Landscape Design undertook consultation with members of the community group Bureau of Accessible Tourism (BOAT) to gain their input on the strengths, issues and opportunities of the site and potential proposed options for the shared path.

Discussion and feedback from BOAT workshop indicated there was potential for inclusion of a third hybrid option (Option C) which would consider a Two Way road to Bar Beach, One way road from Bar Beach to Wharf Street.

The following options have now been included in the feasibility study following the BOAT workshop and further consultation with internal council departments.

1. Option A – One Way Road with Separate Path (on closed road lane)
2. Option B – Two Way Road with Shared Path (on road shoulder)
3. Option C – Hybrid 2+1: Maintain two way road to Bar Beach, One way road from Bar Beach to Wharf Street

3. CONCEPT DESIGN DEVELOPMENT

3.1 Existing Site Conditions

Lake Street is a two lane sealed road that travels approximately 1,700m metres from Cliff Street in the north (Rotary Park), along the Merimbula Lake Foreshore, to the Merimbula Wharf in the south. Due to the sloped topography the road is windy, narrow in places, and in locations has limited or no road shoulder.

The northern / eastern side of the road general consists of residential developments, and the ground rises steeply. The southern / western side is vegetated lake foreshore and the ground slopes down to the Lake, in places quite steeply. Lake Street currently has no defined provisions for pedestrians/cyclists and has high volumes of vehicular traffic especially during the tourist seasons creating significant risk for users. The risks are summarised below.

3.1.1 Road & Shoulder Width

The current road carriageway is approximately 7m wide with a varying road shoulder, ranging from no shoulder in constrained areas up to 9m wide in limited, less constrained areas. The road shoulder is often utilised as informal parking for Bar Beach during busy periods directly north and south of Bar Beach vehicle access road. These informal parking spaces have been used as default overflow parking during the tourism season. The narrow road width creates a dangerous environment for pedestrian/cyclist as there is limited sightlines and vehicles attempting to pass are required to move into the oncoming traffic lane (refer figure 2).

The Lake Street Road Reserve is significantly wider (30.175m) than the current road width allowing for provision to expand transport infrastructure (parking) without impacting on the adjacent to Environmental Conversation Area. It is worth noting a number of existing services including water, sewer and power are located within the road or road reserve which will require consideration of relocation and protection during any infrastructure construction.

2.5m is the minimum width that should be provided along Lake Street to comply with the Austroads Guidelines (Part 6A: Pedestrian and Cyclist Paths). In addition, a minimum 0.5m (1m preferred) offset is required to any obstacle (where an appropriate barrier has not been installed). 1.3m is the minimum height of barrier to any fall heights or obstacles (currently limited armco steel vehicle barriers are provided at southern end of Lake Street with an inadequate height of 600mm).



Figure 1 & 2: Narrow road with constrained shoulder (embankments/escapements).

3.1.2 Offset of Trail to Hazards

There is currently no protective barrier or the required minimum 0.5m offset between the road carriageway and the informal road shoulder utilised by pedestrians. There are numerous locations on the southern / western side of Lake Street where hazards occur for both pedestrians & cyclists. Hazards include; vertical falls (escarpments/retained edges), steep and eroding embankments and obstructions in close proximity to road carriageway (vegetation, trees, walls, signs, sewerage vents and power poles).

On the northern/eastern edge of Lake Street there is a steep embankment directly adjacent to the road which borders on residential properties, often with a deep drainage swale running parallel to the road. Along this edge of the existing trail there is no protective barrier and limited to no offset between the existing road and the adjacent embankment. Various steep driveways are angled to allow for private residential access when travelling southbound along Lake Street.

At select locations Lake Street comes into close proximity to near vertical escarpments which currently have limited safety infrastructure. Armco steel vehicle barriers are provided at southern end of Lake Street with a height of 600mm.



Figure 3: Example of widen shoulder.



Figure 4: Example of constrained retained road edge.

3.2 Consideration of Options

TBLD, in conjunction with council officers and technical subconsultants, undertook detailed site investigations and analysis to assess the physical, functional, environmental, cultural, traffic and visual qualities of the site. Careful consideration of these elements have are included in the following reports: NGH Environmental; High Level Traffic Assessment Report by OBT Traffic; Options Analysis Concept Design Cost Estimate by MDA Australia and the Preliminary Geotechnical & Structural Assessments by Tasman Engineering Consultants, informed the feasibility and concept design process.

3.2.1 Option A: One Way (Preferred)

Development of the preferred concept design and alignment for a shared path came about from consideration of a number of issues, including:

1. The requirement to create a functional and viable shared path to remove the identified risks associated with current Lake Street pedestrian/cyclist movement.
2. Consideration and protection of the existing terrestrial ecology.
3. Suitable alignment.
4. Construction methodology.
5. Suitable materials.
6. Cost considerations to the stated budget.
7. Operational and safety considerations.
8. Environmental considerations.
9. Social considerations.

Option A proposes conversion of Lake Street into one-way road (southbound only) and converting the existing northbound lane to a shared trail. The current road carriageway width of approximately 7 would be reduced to one-way (nominal 3m lane) to provide sufficient width for a 2.5m shared path with a 0.5m buffer, as well as provision for formalised parking, where possible and appropriate. This option proposes construction of a shared path (2.5m wide) laid over the existing retained asphalt surface to significantly lower construction costs. The proposed path material would be sand coloured concrete with a broom finish, 125mm thick, N40 concrete assumed SL82 mesh throughout with 25mm stabilised granitic subbase layer over retained asphalt surface (subject to engineering design). A 150mm stand up curb to the roadside would be used to effectively separate vehicle traffic from shared path users (refer figure 5).

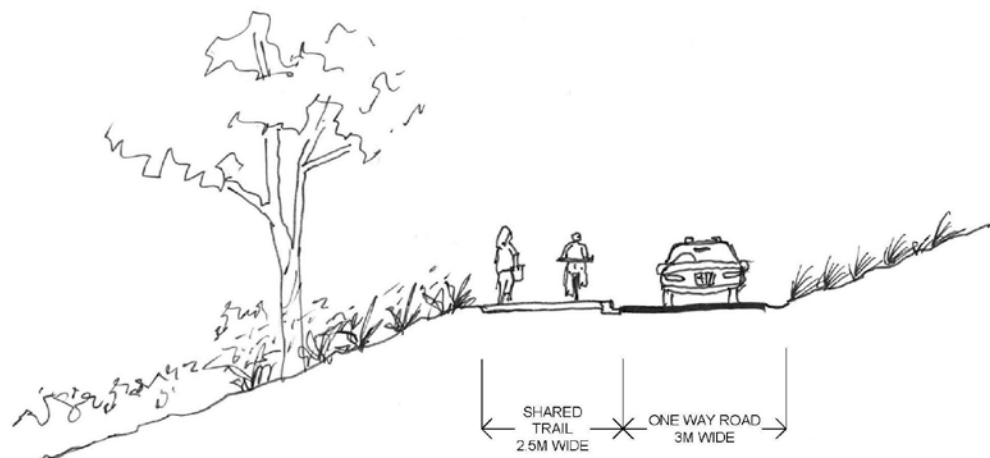


Figure 5: Typical cross section of Option A: One-way road, with concrete shared trail and stand up curb occupying existing vehicle lane.

There is no requirement for construction of a barrier along the roadside of the shared path (eastern edge) as the raised kerb will provide effective separation of vehicles and shared path users. A minimum offset of 500mm will be provided (1m where road carriageway permits) between the proposed shared path and southbound traffic lane. Subject to detailed design, barriers may be required in locations on the western edge, where the shared path comes in close proximity to hazards (physical obstructions, steep embankments, etc).

In areas where a widened road shoulder permits, there is opportunity for formalisation of off-street parking on the western side of Lake Street, adjacent Bar Beach (refer figure 6). In areas identified, the concrete shared path would utilise the widened road shoulder where possible and the proposed off-street parallel parking would utilise the existing northbound lane of Lake Street. Some areas identified with a widened road shoulder may not be appropriate for off-street parking, due to inadequate sight lines (subject to engineering design). These areas provide opportunities for provision of rest/seating areas, viewing points, landscaping and interpretative signage.

The conversion of Lake Street into a one-way road (southbound) will have an effect on residences along Lake Street. Many residences have steep angled driveways which allow for access when travelling southbound. These driveways may require modification of splays (subject to swept path analysis) in order to safely negotiate the proposed road configuration. There will also be an increased traffic volume to surrounding local streets for northbound traffic.

Other considerations of the conversion of Lake Street into a one-way (southbound) road would be reversal of the school bus service (i.e. southbound as opposed to northbound) along Lake Street in consultation with council and the school/bus operator.

The proposed shared trail construction would have minimal or no impact on the existing vegetation and terrestrial fauna habitat adjacent Lake Street, including no requirements for removal existing mature trees, removal of ground layer vegetation and disturbance of the existing bank conditions. *Note if the optional construction of 'Gully Boardwalks' is included in Option A additional assessment of required vegetation impacts will be required as part of the Review of Environmental Factors (refer below for 'Gully Boardwalk' details).*

There would be a range of environmental hazards to manage during construction the 2.5m wide concrete shared path in the proposed location, including silt control, management of overland stormwater flows and traffic control. Furthermore, the limited construction area would require traffic management that could present temporary changes to the local community traffic. This option involves minimal ground disturbance and is unlikely to impact on any Aboriginal Heritage. Where ground disturbance is proposed further investigation would be required as part of the Review of Environmental Factors to be undertaken by BVSC during the next stage of the project.

Preliminary geotechnical testing and consultant's local knowledge suggests Lake Streets road embankment has experienced stability problems in the past which have been addressed by the installation of slope retaining and drainage structures. The creation of a one-way vehicle lane and a shared pedestrian path would eliminate the motor vehicle loading on the outside lane and the risk of future embankment failure would therefore be reduced. Refer to the Preliminary Geotechnical Investigations Report prepared by TEC (Appendix E) for further details.

A 20km/h operational speed within a 40km/h shared zone will be considered for approval in all options from Wharf Street south to Merimbula Wharf. Rock formations and restricted road shoulders do not allow for continuation of the shared path to Merimbula Wharf. The most feasible option is consideration of a shared zone for slow moving vehicles with appropriate line marking and signage. All options will also consider the opportunity to reduce the standard vehicle speed of Lake Street to 40km/h to create a safer shared environment. RMS approval for both the shared zone and overall speed reduction is required.

Option A - Advantages

1. Cost effective option (within available funding budget)
2. Minimal disturbance to existing vegetation and terrestrial fauna habitat.
3. Minimal ground disturbance and potential to impact cultural heritage
4. Significantly lower construction cost
5. Shorter construction period
6. Lowers councils on-going maintenance of unstable bank by removing vehicle loading to western side of Lake Street.
7. Vehicle safety increases under one way option, due to removal of risk of head-on accidents on blind corners
8. Creates opportunities for creation of formal parking on Lake Street
9. Creates opportunities for for rest/seating areas, landscaping or interpretation

Option A - Disadvantages

1. One way road circulation may affect the current amenity of residents
2. Splays for existing driveways would need to be increased to ensure vehicles can enter or exit
3. Modified/increased traffic on surrounding local streets
4. Re-configuration of school bus stop and route required

Option A: Optional Value Adds (Subject to Detailed Design & Detailed Cost Analysis)

**Note future provision of the gully boardwalks, elevated lookout & landscape embellishments has not been included in the lump sum of the concept cost estimate for this option due to budget constraints but will be considered as a value add to the project if funding permits.*

Optional - Gully Boardwalk

Sharp hairpin turns in Lake Street offer opportunities for alternative short lengths of elevated boardwalks spanning across steep vegetated gullies. These localised gullies provide a reduced overall length of the elevated boardwalk and create a more exciting visitor experience. The gully boardwalk shared path will be 2.5m wide, ranging from 1.5-3m above the ground surface (refer figure 8) to maintain and match the grade of Lake Street. The design intent of the gully boardwalk is to bring pedestrians/cyclists away from Lake Street traffic, through mature native vegetation with potential glimpses of the estuary and Bar Beach. Coupled with on-ground concrete trail, provision of an elevated boardwalk would offer the local community and broader tourism market an enhanced visitor experience whilst aiming to stay within funding budget constraints.

Optional - Future Provision of Elevated Lookout Deck

Consideration for future opportunity to construct an elevated lookout deck at the sheer rock escapement (southwest end of Lake Street) has been included in all options. The lookout deck would include access, barriers, seating, and signage, and would provide panoramic views of Merimbula Bay.

Optional – Further Landscape Embellishments

The lower construction cost of Option A allows for consideration of further landscape embellishments to Lake Street including opportunity for recreational infrastructure, street furniture, signage, feature landscaping and revegetation.



Figure 6: Option A – Feasibility Study Plan (refer Appendix A for full size document).

3.2.2 Option B: Two Way

Option B proposes retention of Lake Street as a two-way road with creation of an elevated boardwalk shared path running along the western edge of Lake Street from Cliff Street (north) to Wharf Street (south). The elevated boardwalk shared path will be 2.5m wide (internal clearance), ranging from 0.5-3m above the ground surface (depending on bank gradient), running parallel to Lake Street on the road shoulder (refer figure 7). In areas where a widened road shoulder permits, there is opportunity for construction of an on-ground concrete path (as per Option A) to reduce overall project costs.

The proposed boardwalk barrier material is steel posts and vertical steel bar infill barriers to meet all relevant Austroads Guidelines and Australian Standards in regard to barrier design and safety. The structure will be H6 treated pine subfloor and H6 treated pine driven piles with FRP deck surface. Options for boardwalk foundations adjacent the road shoulder will be limited due to geotechnical conditions, accessibility and the steepness of the slope. Foundations would most practicably be driven piles or screwed piles socketed into solid natural ground. Refer to the Preliminary Geotechnical Investigations Report prepared by TEC (Appendix E) for further details.

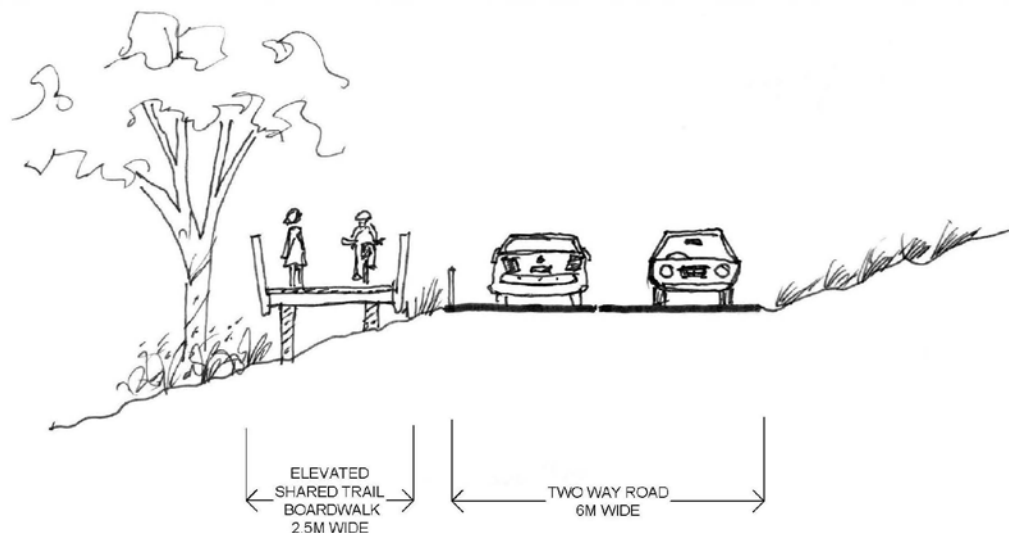


Figure 7: Typical cross section of Option B: Retaining the two-way road and providing a shared trail on a boardwalk western side (downslope) of Lake Street.

In this option there would be no changes to vehicle traffic flow, orientation of residential driveways or school bus services along Lake Street. During peak periods Bar Beach is extremely popular and has limited car parking space. Informal parking occurs in an ad-hoc manner in any area where room is available, usually along widened sections of the road shoulder. As these areas would be required and adopted for the on-ground concrete path to reduce construction costs they would be no longer available for overflow car parking during these peak periods and would be a significant loss of parking for the community.

Provision of an elevated boardwalk would offer the local community and broader tourism market an enhanced visitor experience over an on-ground trail. There is potential for increased tourism to the area with opportunities for views along the elevated structure. There would be a requirement for a major structural cantilevered boardwalk, along the sheer rock escapement (southwest end of Lake Street) due to the narrow road shoulder and steep rock cliff. This length of the shared path would offer a spectacular visitor

experience although substantial increased construction difficulty and structural requirements which would have significant cost implications impacting on the constrained project budget.

Sharp hairpin turns in Lake Street offer opportunities for alternative shortened lengths of boardwalks to span across steep vegetated gullies. These localised gullies provide a reduced overall length of the elevated boardwalk and create a more exciting visitor experience. The gully boardwalk shared path will be 2.5m wide (internal width), ranging from 1.5-3m above the ground surface (refer figure 8) to maintain and match the grade of Lake Street. The design intent of the gully boardwalk is to bring pedestrians/cyclists away from Lake Street vehicle traffic, through mature native vegetation with potential glimpses of the estuary and Bar Beach.

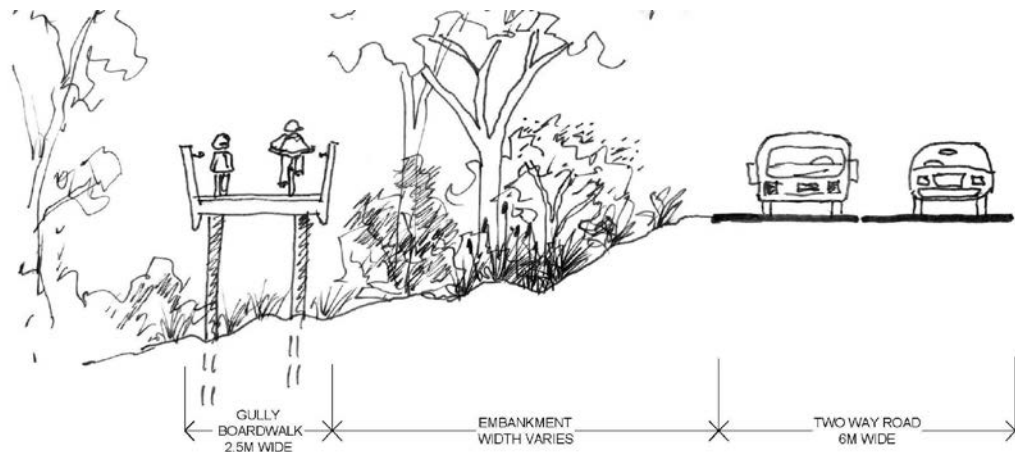


Figure 8: Typical cross section of Gully Boardwalk: Retaining the two-way road and providing an elevated boardwalk within dense indigenous vegetation and well offset from Lake Street traffic.

This option would require excavations works, vegetation clearing, and placement of fill to construct an elevated boardwalk along the road shoulder of Lake Street. The proposed elevated boardwalk shared path would create a range of impacts on the existing vegetation and terrestrial fauna habitat including possible removal of number of mature indigenous trees, removal of ground layer vegetation and disturbance of the existing bank conditions for construction of boardwalk piers. There would be a range of environmental hazards to manage during construction of the 2.5m wide elevated boardwalk on the proposed alignment, including silt control, management of overland stormwater flows and extended period of traffic control due the increased construction difficulty. Furthermore, the limited construction area would require increased traffic management that could present impacts on traffic to the local community and/or cost implications due to the requirement for out-of-hours construction.

A 20km/h operational speed within a 40km/h shared zone will be considered for approval in all options from Wharf Street south to Merimbula Wharf. Rock formations and restricted road shoulders do not allow for continuation of the shared path to Merimbula Wharf. The most feasible option is consideration of a shared zone for slow moving vehicles with appropriate line marking and signage. All options will also consider the opportunity to reduce the standard vehicle speed of Lake Street to 40km/h to create a safer shared environment. RMS approval for both the shared zone and overall speed reduction is required.

Option B - Advantages

1. Maintains status quo of two way road
2. Provides a safe elevated boardwalk for shared path users (risks associated with falls and vehicles on Lake Street removed).
3. Elevated boardwalk provides enhanced visitor experience
4. Utilise widened road shoulder for on ground sections of path to reduce costs
5. No change to Lake Street properties access
6. No increase to traffic load on surrounding local streets

Option B - Disadvantages

1. Cost exceeds available funding
2. Increased construction period
3. Increased construction difficulty
4. Restricted construction access
5. Increased environmental impacts
6. Increased chance of cultural impacts
7. Increase ecological / cultural heritage studies may lead to increased costs and increased project timeline
8. Removes current informal popular car parking adjacent Bar Beach
9. No opportunity for creation of formalisation of off-street parking

Option B: Optional Value Adds (Subject to Detailed Design & Detailed Cost Analysis)

Optional - Future Provision of Elevated Lookout Deck

*Consideration for future opportunity to construct an elevated lookout deck at the sheer rock escapement (southwest end of Lake Street) has been included in all options. The lookout deck would include access, barriers, seating, and signage, and would provide panoramic views of Merimbula Bay. *Note future provision of the lookout deck has not been included in the lump sum of the concept cost estimate for this option due to budget constraints.*

3.2.2 Option C: Hybrid of Option A & B

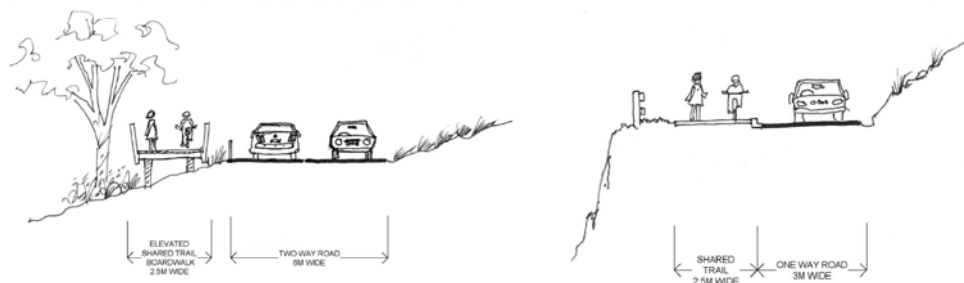
Option C proposes a hybrid of Option A and Option B which maintains Lake Street as a two-way road from Cliff Street to Bar Beach with conversion of Lake Street into a one-way road (southbound) utilising the existing northbound lane for an on-ground concrete shared trail from Bar Beach to Wharf Street.

Cliff Street to Bar Beach (refer Option B for methodology)

The elevated boardwalk shared path will be 2.5m wide (internal width), ranging from 0.5-3m above the ground surface, running parallel to Lake Street in the road shoulder. In areas where a widened road shoulder permits, there is opportunity for construction of an on-ground concrete path to reduce overall project costs.

Bar Beach to Wharf Street (refer Option A for methodology)

This construction of a sand coloured concrete shared path, 2.5m wide, laid over existing retained asphalt surface with a 150mm stand up curb to the roadside would be used to separate vehicle traffic from shared path users.



10a. Cliff Street to Bar Beach.

10b. Bar Beach to Wharf Street.

Figure 10: Option C – Hybrid 2+1: Maintain two-way to Bar Beach, One way from Bar Beach to Wharf St.

Option C offers significant benefits by combining the advantages of Option A and Option B although there is still a significant cost associated with the construction of this option.

Option C – Advantages (Comparable to Option A & B)

1. Reduces socio-economic disadvantages of making Lake Street one way
2. Maintains northbound access/exit from majority of properties for Lake Street residences
3. Combines cost efficiency of on ground concrete shared trail with increased visitor experience of an elevated boardwalk
4. Reduced cost for cantilevered boardwalk at sheer rock cliff at the southwest end of Lake Street
5. Utilise widened road shoulder for on ground sections of path to reduce costs
6. Creates some opportunity for formal parking on Lake Street
7. Reduced increase to traffic load on surrounding local streets

Option C – Disadvantages (Comparable to Option A)

1. Cost exceeds available funding
2. Increased construction period
3. Increased construction difficulty
4. Restricted construction access
5. Increased environmental impacts
6. Increased chance of cultural impacts
7. Increase ecological / cultural heritage studies may lead to increased costs and increased project timeline
8. Removes current informal popular car parking north of Bar Beach
9. Reduced opportunity for creation of formalisation of off-street parking

Option C: Optional Value Adds (Subject to Detailed Design & Detailed Cost Analysis)

Optional - Future Provision of Elevated Lookout Deck

*Consideration for future opportunity to construct an elevated lookout deck at the sheer rock escapement (southwest end of Lake Street) has been included in all options. The lookout deck would include access, barriers, seating, and signage, and would provide panoramic views of Merimbula Bay. *Note future provision of the lookout deck has not been included in the lump sum of the concept cost estimate for this option due to budget constraints.*

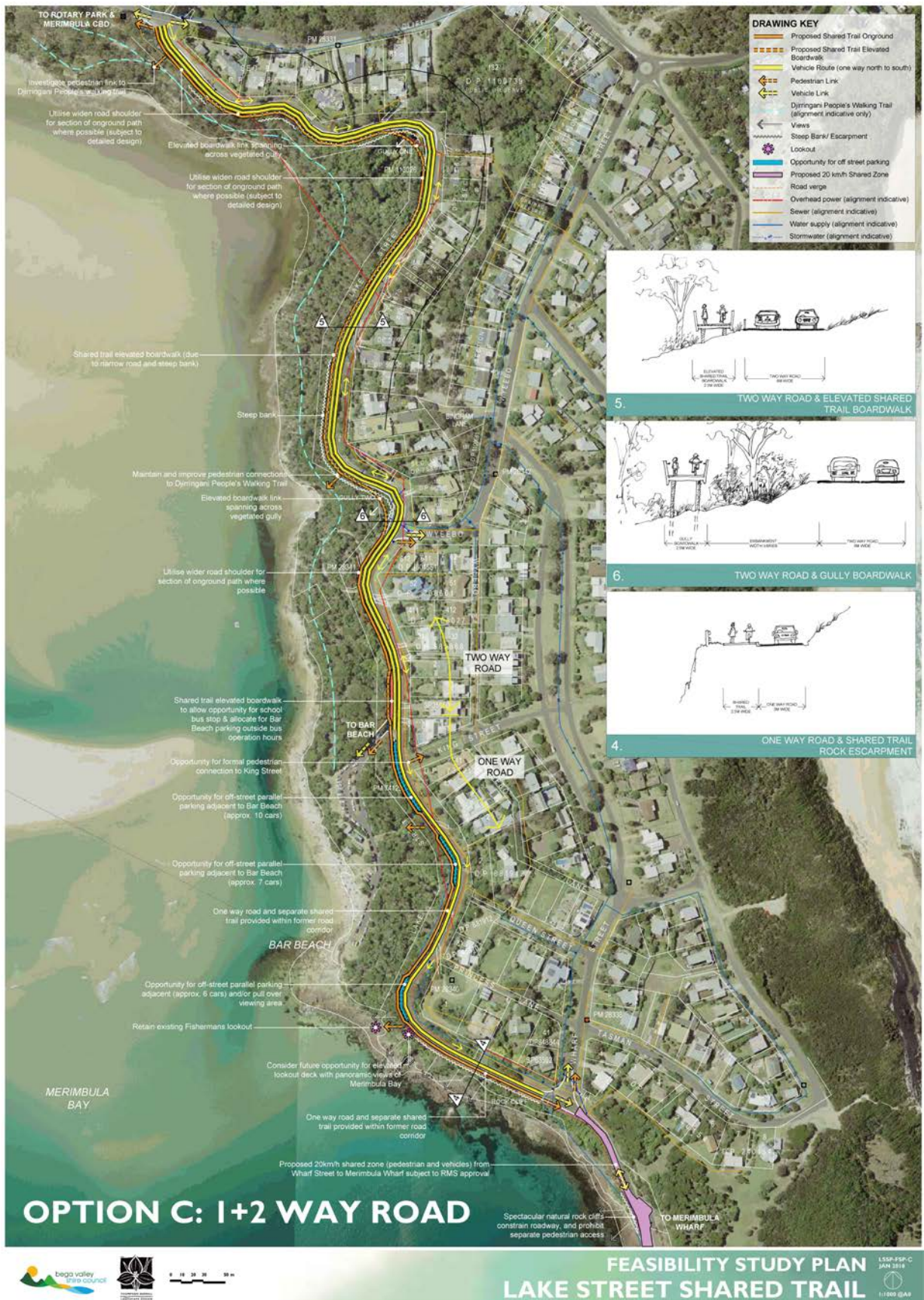


Figure 11: Option C – Feasibility Study Plan (refer Appendix A for full size document).

4. COST

4.1 Cost Estimate

A. OPTION A: ONE WAY ROAD	\$890,946 ex GST
B. OPTION B: TWO WAY ROAD	\$4,677,241 ex GST
C. OPTION C: 1 + 2 WAY ROAD	\$3,100,490 ex GST

The aim of the project is the design and construction of an all-access shared use path approximately 1.7km from Rotary Park to Merimbula Wharf via Bar Beach along Lake Street within the available funding budget constraints.

The project is to be 100% funded by a \$2,000,000 grant from the NSW State Government – Roads and Maritime Services under 2017/18 Active Transport Funding and currently has no additional funds available. The allocated cost of construction excluding feasibility and concept, community consultation, review of environmental factors, documentation and project management for the Lake Street Shared Path (Option A) is \$1,575,000.

The total cost estimate for the construction of the preferred option of Lake Street Shared Path works (Option A) is \$890,946 (refer Appendix D). The cost estimate was prepared by qualified quantity surveyors (MDA Australia) working in conjunction with TBLD.

As Option A falls below the allocated funding for construction of the shared path there is opportunity to investigate further landscape embellishments; feature landscaping, revegetation, street furniture, lookouts, feature boardwalks, etc. during the next stage of design.

Refer to Appendix D for Options A, B & C Cost Estimate Detailed Breakdown.

4.2 Cost Estimate Assumptions

- Prices are as of current market rates and no allowance has been made for escalation during construction
- Existing asphalt pavement to be overlaid with concrete Trail assumed to achieve desired load-carrying capacity and no further structural subbase required
- Allowed traffic control using portable traffic lights for a 6-month (Option A), 9-month (Option B & C) construction duration
- Allowed for batter along edges of new concrete path to existing ground surface level
- Allowed for 40mm thick AC paving over 200mm deep sub-base material to off-street parking
- Allowed for 50mm thick AC paving over 250mm deep sub-base material to bus pullover bay
- Scope of works for proposed 20km/h operational speed within a 40km/h shared zone only road markings and signage as per TBLD 9/02/2018
- Gully boardwalk optional in Option A but included in Option B & C (as required for two way road)
- Allowed for stainless steel sub-floor framing (based on Tathra Headland Walkway) and supports to cantilevered boardwalks (Option B)
- Allowed for 300mm diameter treated pine timber driven piles to elevated boardwalks
- Allowed for timber sub-floor framing and kick rails to elevated boardwalks
- Allowed for 38d FRP mesh deck to all boardwalks
- Allowed for stainless steel barrier along boardwalks comprising of posts and vertical infills

- Allowed for rock anchoring and shotcrete to banks along proposed location for cantilevered boardwalk (Option B)
- Allowed for concrete ground beams, piles and pile caps to road along proposed location for cantilevered boardwalk (Option B)
- Allowed for thermoplastic markings to concrete and bitumen pavings
- No cost allowed for stabilization of steep banks except for areas where cantilevered boardwalk shall be constructed
- Optional budget allocation (not included in sum) of \$300,000 for future lookout deck as per TBLD advise 13/02/2018

4.3 Cost Estimate Exclusions

- GST
- Authorities' fees
- Consultancy fees
- Project Management fee
- Disposal of any hazardous & contaminated materials (if found)
- Improvement of pedestrian connections to Djirringani Peoples Walking Trail
- Revegetation works
- Parking meters
- Guard rails

5. TECHNICAL REPORTS AND RESEARCH

5.1 Technical Reports

A team of specialist sub-consultants to TBLD have prepared technical reports for Lake Street Share Path to provide input into the feasibility study from their dedicated fields of expertise. These technical reports have considered the proposed Options (A, B & C) and have been integrated within the Consideration of Options (refer chapter 3.2).

The technical reports are outlined below and have been included in the Feasibility Study as appendices:

- Environmental, Heritage & Socio-economic Constraints Analysis by NGH Environmental (Appendix B)
- Preliminary Traffic Engineering Comments by O'Brien Traffic (Appendix C)
- Options Analysis Concept Design Cost Estimate by MDA Australia (Appendix D)
- Geotechnical Investigations Report by Tasman Engineering Consultants (Appendix E)

Additional preliminary reports considered during the preparation of this Feasibility Study include:

- High Level Environmental Desktop Study, Lake Street Shared Path, Merimbula by NGH Environmental (Nov 2017)
- Lake Street Walking Trail, Feasibility Assessment prepared by David Buckley (Dec 2016)
- Preliminary Flora & Fauna Assessment, Merimbula Estuary Walking Trail prepared by Local Environment Solutions (April 2017)
- Bega Valley Bike Plan Version 1, Bega Valley Shire Council (Date Unknown)

5.2 Construction Materials Investigations

5.2.1 Trail Types

As described under the options analysis, the preferred option (Option A) for Lake Street Shared Path consists of two trail types:

1. **On ground coloured concrete shared path;** This option proposes construction of a shared path (2.5m wide) laid over existing retained asphalt surface. The proposed path material would be sand coloured concrete with a broom finish, 125mm thick, N40 concrete assumed SL82 mesh throughout with 25mm stabilised granitic subbase layer over existing asphalt road surface (subject to engineering design). A 150mm stand up curb to the roadside would be used to effectively separate vehicle traffic from shared path users.
2. **Elevated gully boardwalk shared path (subject to detailed design and detailed cost analysis);**
The gully boardwalk shared path will be 2.5m (internal width) wide, ranging from 1.5-3m (refer figure 8) above the ground surface to maintain and match the grade of Lake Street. The proposed boardwalk material is steel posts and vertical steel bar infill barriers to meet all relevant Austroads Guidelines and Australian Standards in regard to barrier design and safety, H6 treated pine subfloor and H6 treated pine driven piles with FRP deck surface. Options for boardwalk foundations adjacent the road shoulder may be limited due to accessibility and the steepness of the slope. Foundations would most practicably be driven piles or screwed piles socketed into solid natural ground.

5.2.2 Seating (subject to detailed design and detailed cost analysis);

Seating will be of durable steel and timber construction for comfort and connectivity with the surrounding deck, and not pose a safety risk to trail users.

5.2.3 Signage Options

Traffic, wayfinding, regulatory and/or interpretive signage distribution and type to be determined by BVSC.

5.2.4 Feature Landscape Planting & Revegetation (subject to detailed design and detailed cost analysis);

All plant species will be indigenous and local provenance where available. Detailed planting plans of the immediate areas of impact will be prepared for the final documentation in collaboration with council, to specifically cater for the microclimate, soils, surrounding vegetation and the function of the planting (screening, supplementary planting or revegetation/habitat creation planting).

6. CONCLUSION

Following consideration of the 3 options, the preferred Option A for a shared path alignment along Lake Street was based on detailed review of background information, extensive site assessments, council and stakeholder consultation, technical subconsultant input, cost estimation, funding constraints and council's project objectives.

There are a range of additional works and studies required to develop the preferred Option A development including:

- Additional ecological investigations and reporting;
- Stakeholder (ie RMS) consultation;
- Detailed Documentation;
- Engineering design and certification;
- Geotechnical investigations and reporting;
- Preparation of Construction Environmental Management Plan (CEMP);
- Community consultation (by BVSC);
- Revised cost estimate to meet business case;
- Any other studies necessary; and
- Tendering and selection of suitable Contractor.

Subject to satisfactory completion of the above tasks, the preferred concept design (Option A) presented within this report is regarded as the most feasible option for a shared path alignment along Lake Street, Merimbula.

7. IMPLEMENTATION

Below is an indicative timeline for implementation of the Lake Street Share Path project (which has been prepared for planning purposes only), with Tender Documentation estimated to be completed September 2018, tendering advertising and assessment completed between September & October 2018, and construction anticipated to be completed between November 2018 and May 2019.

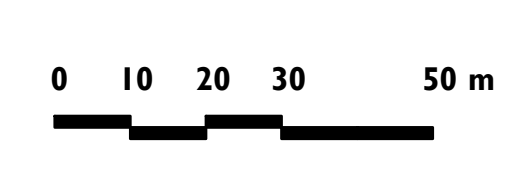
LAKE STREET SHARED PATH - TIMELINE (V4)	Duration	Target Date
Stage 1 – Design Options Task		
Appointment of Consultant		Complete
Inception phone conference with the PM	1 day	Complete
Background Document Review & Existing Conditions Plan	1 week	Complete
PWG Meeting #1 – Site Inspection with BVSC on Site	1 day	Complete
PWG Meeting #1 – Workshop with BVSC on Site	1 day	Complete
Additional Survey	1 week	Complete
Preliminary Geotechnical Investigations	1 week	Complete
Site Analysis/Opportunities & Constraints Plan	2 weeks	Complete
Environmental & Heritage Assessment (by NGH)	1 week	Complete
High Level Traffic Assessment (By OBT)	1 week	Complete
Additional Workshop with BOAT	1 day	Complete
Feasibility Study Option of A & B	2 weeks	Complete
Preliminary Cost Estimate for Options A & B (by MDA)	1 week	Complete
PWG Meeting #2 – Presentation of Design Options Study (05-09 March)	1 day	09/03/18
Review Period & Signoff of Preferred Option	1 week	09/03/18
Concept Design of Preferred Option	2 weeks	24/03/18
Visual Animation (by TBLD)	2 weeks	24/03/18
Completion of Stage 1	1 day	15/03/18
Community Consultation (By BVSC)		
Public Exhibition	3 weeks	15/04/18
Comments & Review	4 weeks	15/05/18
Stage 2 – Developed Design		
Approval to Commence	1 day	16/05/18
Draft Developed Design	2 weeks	30/05/18
Draft Developed Design Drawing to council for comment	4 week	28/06/18
Final Developed Design Drawings	1 week	12/06/18
Cost Estimate for Detailed Design at 50% (by MDA)	1 week	19/06/18
Pre-Construction Road Safety Audit Report (by OBT)	2 weeks	02/07/18
Completion of Stage 2	1 day	03/07/18
Stage 3 – Tender Documentation		
Approval to Commence	1 day	06/07/18
Draft Tender Documentation	1 week	13/07/18
Issue Draft Tender Documentation to council for comment	4 week	10/08/18
Final Tender Documentation	1 week	17/08/18
Technical specification	1 week	24/08/18
Detailed Pre Tender Cost Estimate (by MDA)	1 week	01/09/18
Completion of Stage 3	1 day	05/09/18
Tender		
Tender Period	3 weeks	26/09/18
Tender Award	2 weeks	10/10/18
Stage 4 – Construction		
Contract Period	25 weeks	17/04/19
Wet Weather Float	6 weeks	29/05/19
Completion		29/05/19

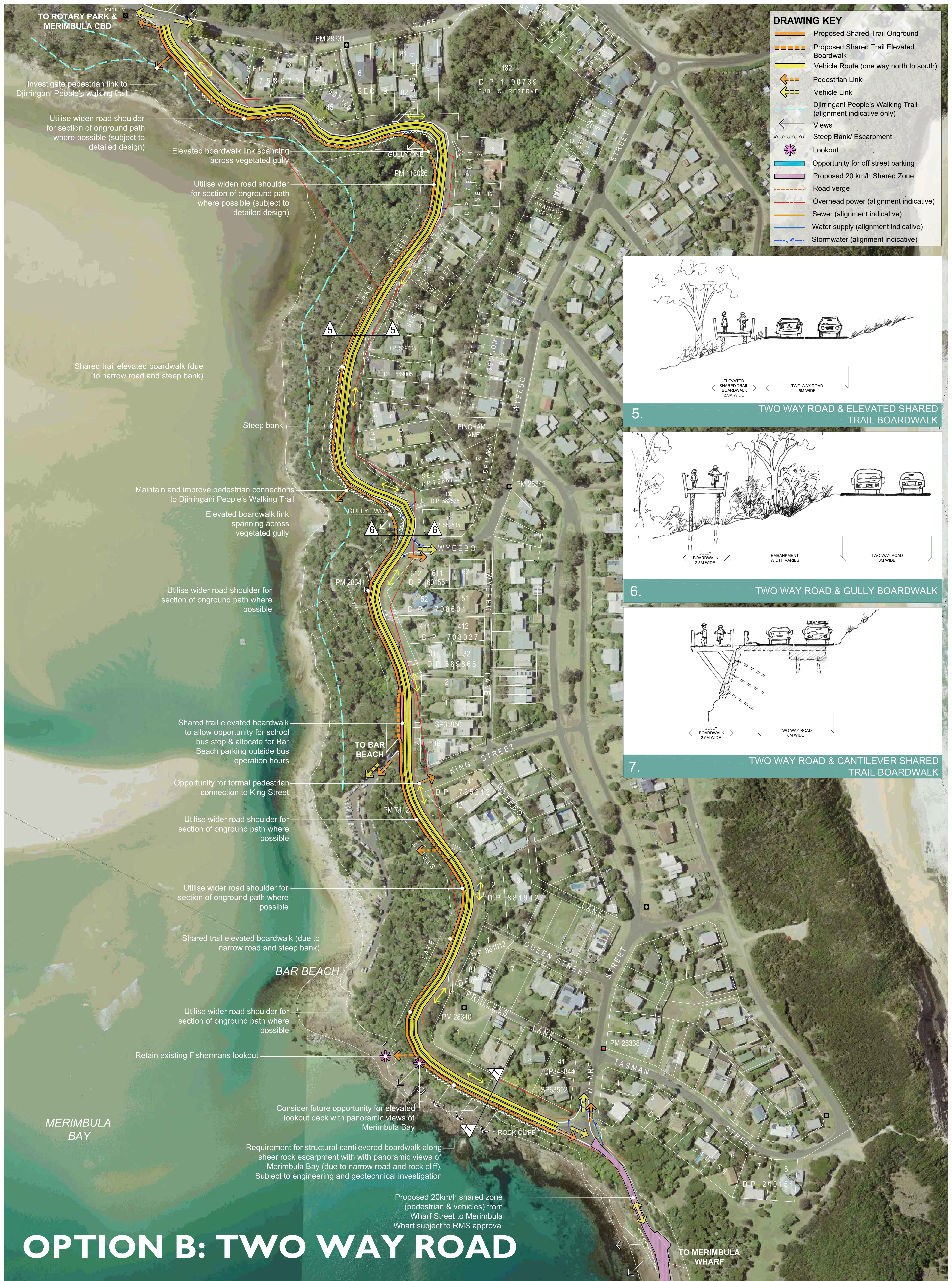
APPENDIX A

Feasibility Study Plans & Typical Sections: Options A, B & C (by TBLD)

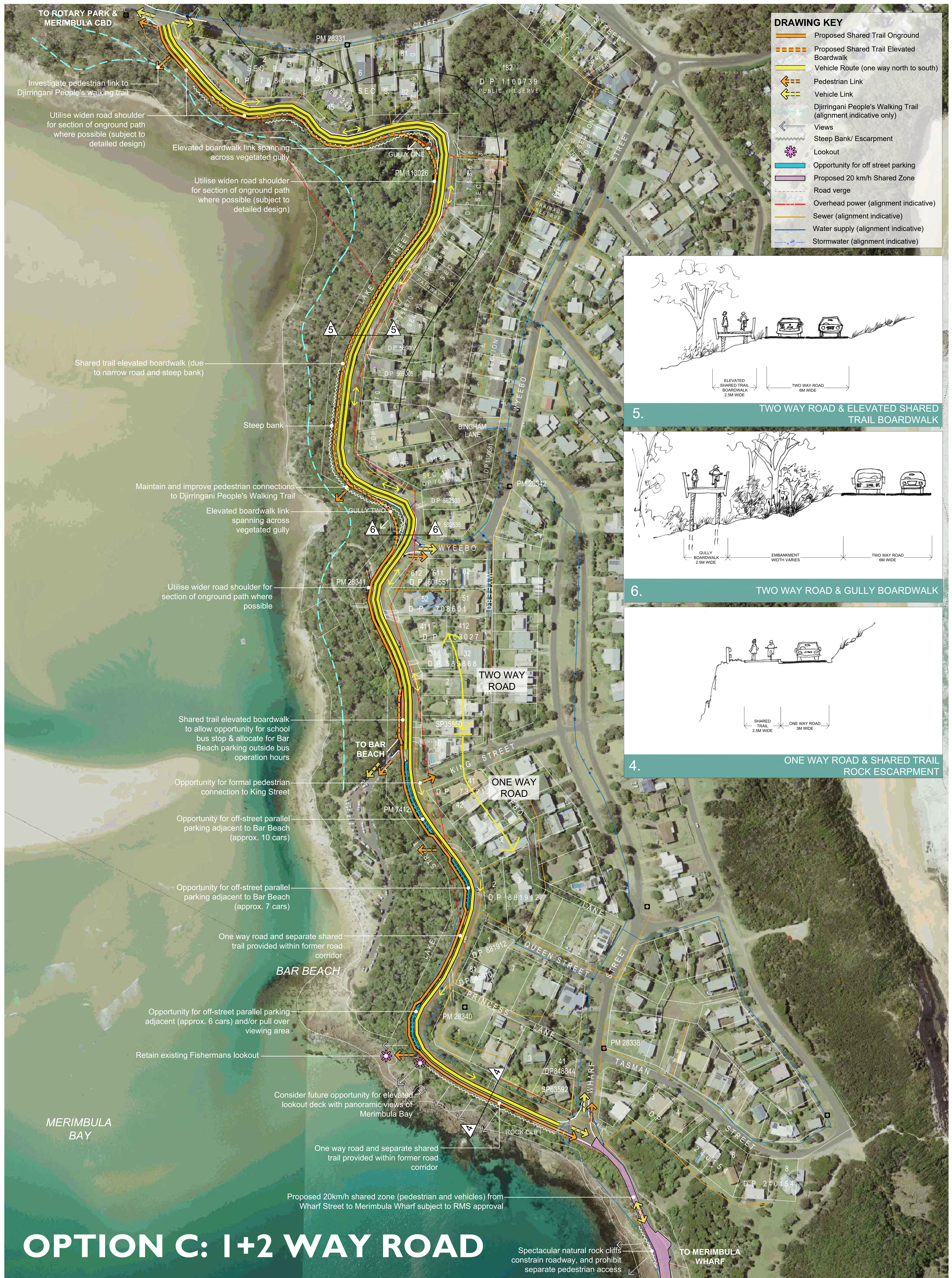


OPTION A: ONE WAY ROAD

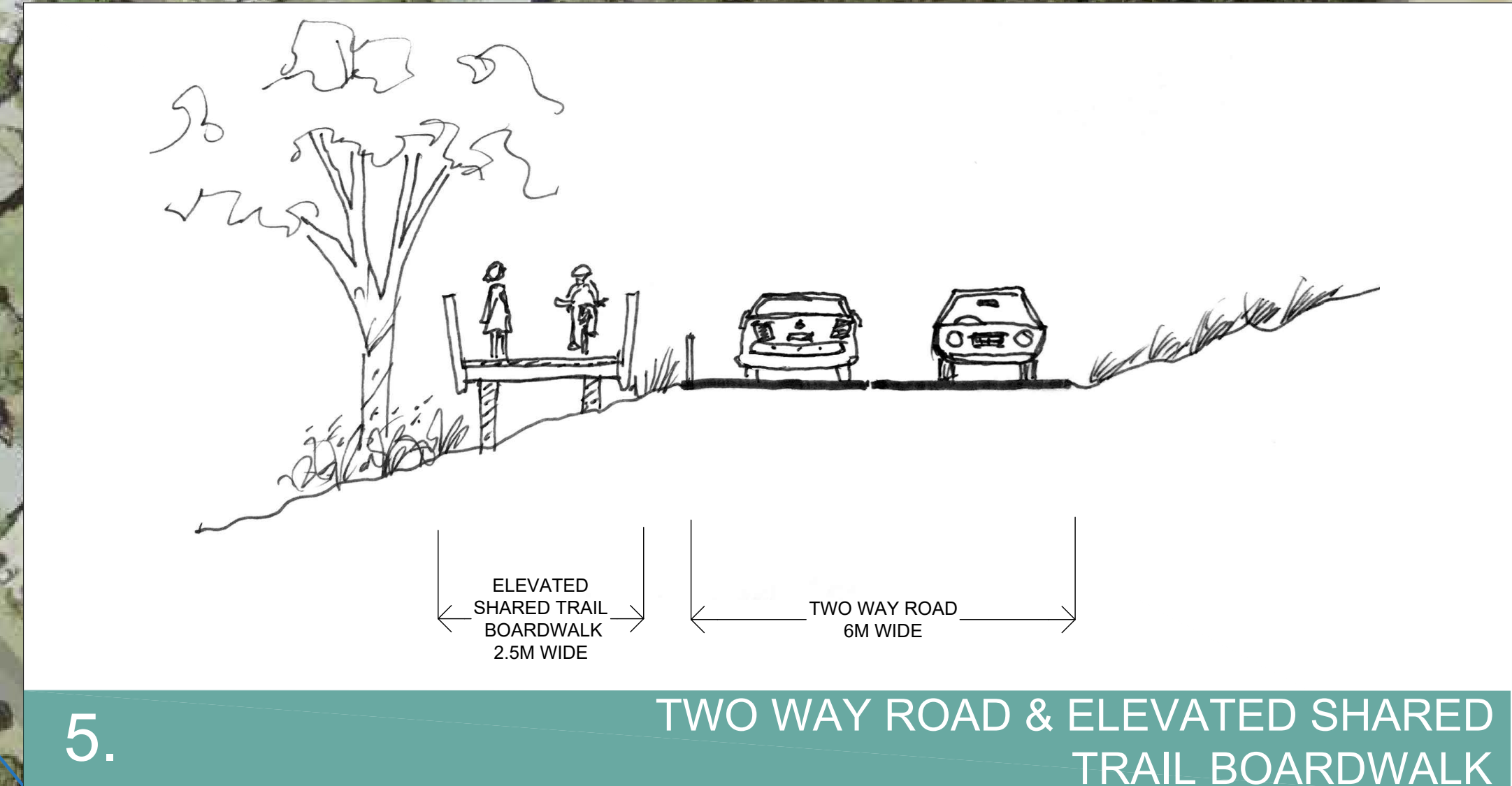




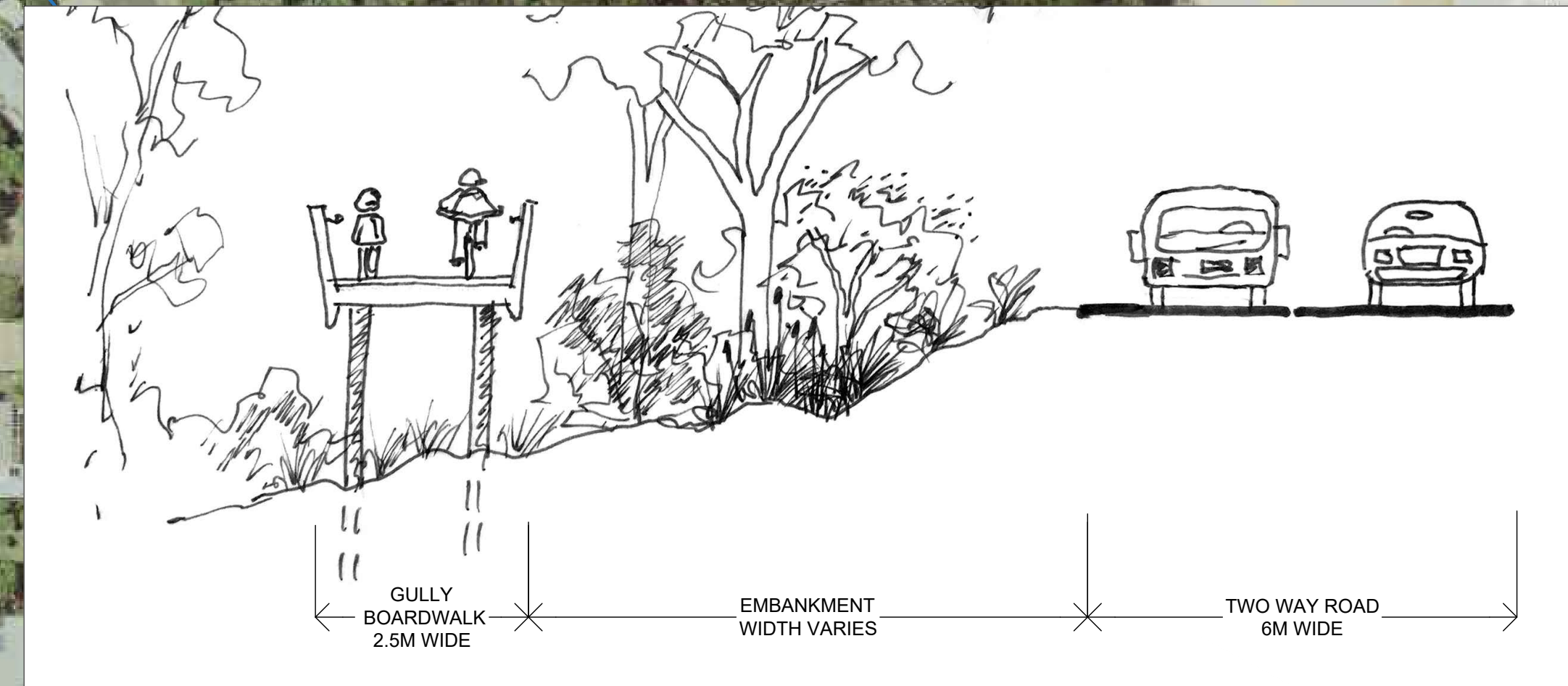
OPTION B: TWO WAY ROAD



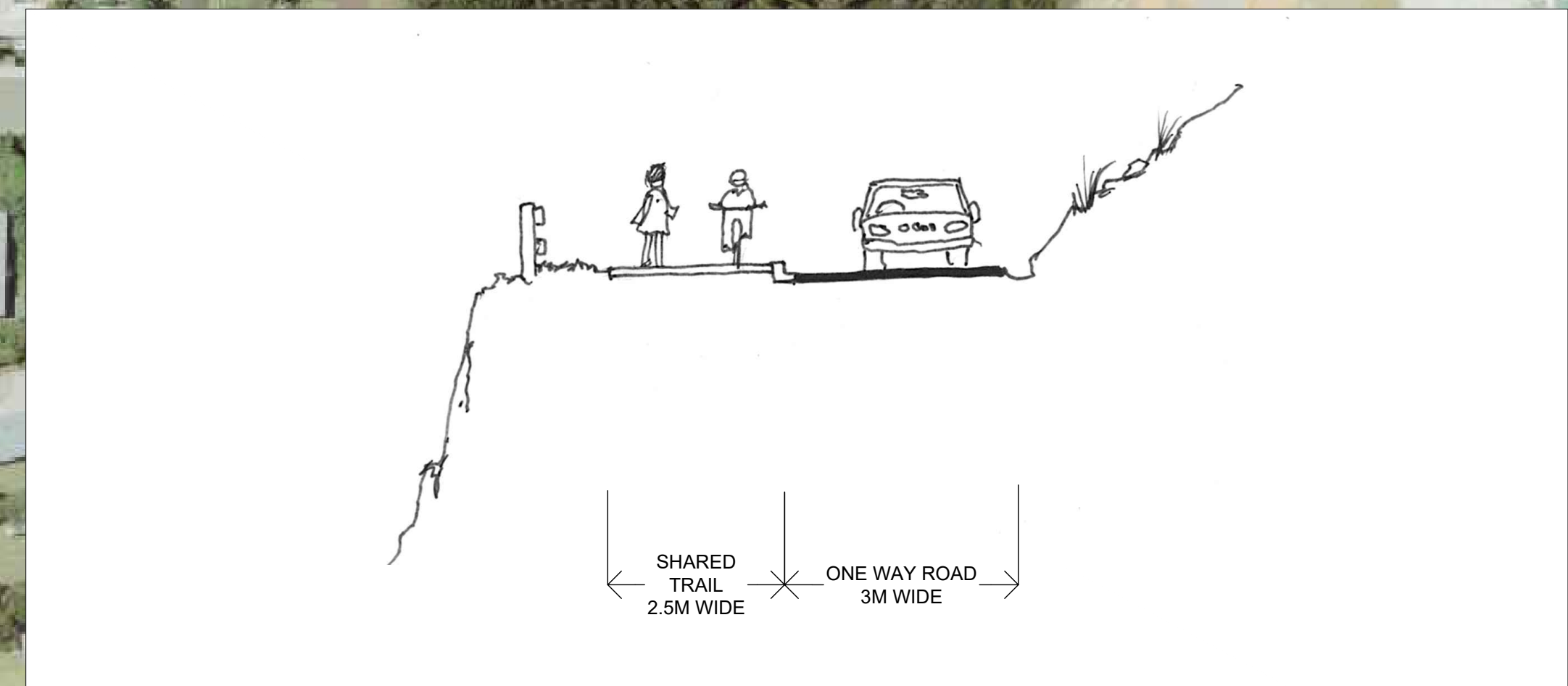
DRAWING KEY	
	Proposed Shared Trail Onground
	Proposed Shared Trail Elevated Boardwalk
	Vehicle Route (one way north to south)
	Pedestrian Link
	Vehicle Link
	Djirringani People's Walking Trail (alignment indicative only)
	Views
	Steep Bank/ Escarpment
	Lookout
	Opportunity for off street parking
	Proposed 20 km/h Shared Zone
	Road verge
	Overhead power (alignment indicative)
	Sewer (alignment indicative)
	Water supply (alignment indicative)
	Stormwater (alignment indicative)



5. TWO WAY ROAD & ELEVATED SHARED TRAIL BOARDWALK



6. TWO WAY ROAD & GULLY BOARDWALK



4. ONE WAY ROAD & SHARED TRAIL ROCK ESCARPMENT

OPTION C: 1+2 WAY ROAD

APPENDIX B

Environmental, Heritage & Socio-economic Constraints Analysis (by NGH Environmental)

Constraints Analysis

LAKE STREET SHARED PATH MERIMBULA



DECEMBER 2017



Document Verification



Project Title:

Lake Street Shared Path Merimbula

Project Number: 17-567

Project File Name: Constraints Analysis_final_v1

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Final V1	21/12/17	Jane Blomfield	Dave Maynard (minor changes)	

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ACRONYMS AND ABBREVIATIONS

AHD	Australian Height Datum
AHIMS	Aboriginal heritage information management system
BOM	Australian Bureau of Meteorology
BVSC	Bega Valley Shire Council
Cwth	Commonwealth
DPI	Department of Primary Industries
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
EPA	(NSW) Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwth)
ESD	Ecologically Sustainable Development
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
Heritage Act	<i>Heritage Act 1977</i> (NSW)
ISEPP	<i>State Environmental Planning Policy (Infrastructure) 2007</i> (NSW)
KFH	Key Fish Habitat
km	kilometres
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
m	Metres
MNES	Matters of National environmental significance under the EPBC Act (c.f.)
NPW Act	<i>National Parks And Wildlife Act 1974</i> (NSW)
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
PAD	Potential Archaeological Deposit
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy (NSW)
SEWPAC	(Cwth) Department of Sustainability, Environment, Water, Population and Communities
SHI	State Heritage Inventory
sp/spp	Species/multiple species
TBLD	Thompson Berrill Landscape Design
TEC	Threatened ecological community

1 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This constraints analysis has been prepared by NGH Environmental on behalf of Thompson Berrill Landscape Design (TBLD). The purpose of this report is to identify environmental aspects and constraints associated with two options proposed for an all-access, shared-use path along Lake Street, Merimbula. The findings of this constraints analysis will provide input into TBLD's Design Options Study Report being prepared for Bega Valley Shire Council (BVSC).

This report considers environmental legislation relevant to the proposal. It also considers general environmental, heritage (Aboriginal and historic) and socio-economic constraints of both options. It is structured as follows:

- Study area and proposal
- Legislative context
- Approach of this assessment
- Existing environment
- Constraints
- Opportunities
- Conclusion and recommendations

2 STUDY AREA AND PROPOSAL

2.1 STUDY AREA

The study area spans 1.7 kilometres (km) from Rotary Park to Merimbula Wharf via Bar Beach along Lake Street, Merimbula (Figure 2-1). Design options will consider the construction of a shared path along the current road reserve and the existing road shoulder with future provision of elevated boardwalk and/or viewing platforms connecting the existing walking tracks along the foreshore.

Lake Street is a two lane sealed road that travels approximately 1,650m metres from Main Street, along the Merimbula Lake Foreshore, to the Merimbula Wharf. The northern and eastern side of the road generally consists of residential developments and the ground rises steeply. The southern and western side is vegetated lake foreshore and the ground slopes down to the lake, in places quite steeply. The topography of the Lake Street road shoulder and road reserves is considerably varied along the length of the proposed walkway.

2.2 PROPOSAL

BVSC proposes to construct an all-access shared-use path adjacent to Lake Street, Merimbula, from Rotary Park to Merimbula Wharf via Bar Beach. The shared path is proposed to be an all-access, shared use walkway, for use by pedestrians, joggers, parents with prams, cyclist, disabled and mobility devices. Design options will consider the construction of a shared path along the current road reserve and the existing road shoulder with future provision of elevated boardwalk and/or viewing platforms connecting the existing walking tracks along the foreshore. Two design options have been proposed by BVSC:

- (a) One way road with separate path.
- (b) Two way road with shared path.

These options are outlined below.

2.2.1 *Option A – One way road with separated path*

This option would require the conversion of Lake Street into a one-way street from Cliff Street in an southerly direction to Merimbula Wharf. It would include a separated cycleway and footpath, located within the existing road formation and verges. Additional formalised parking spaces would be created on Lake Street enabling access to Bar Beach and Merimbula Wharf, where feasible.

2.2.2 *Option B – Two road with shared path*

This option would involve Lake Street remaining as a two way street. Works would require the construction of the shared pathway on the existing road shoulder and elevated boardwalks beyond the road shoulder. Parking spaces would be created on Lake Street to access Bar Beach and Merimbula Wharf, where feasible.

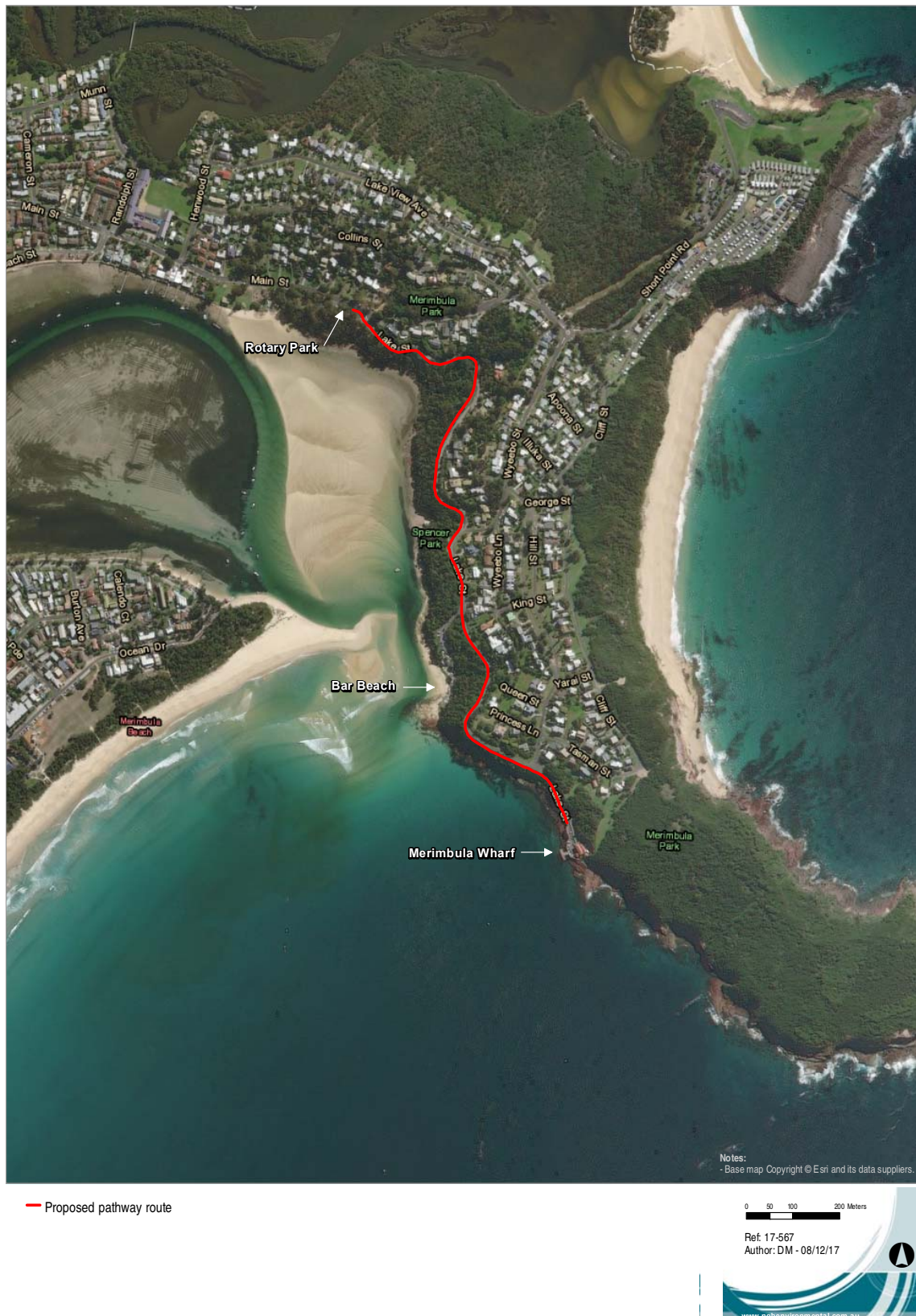


Figure 2-1 Site location.

3 LEGAL AND POLICY REQUIREMENTS

Law, Policy or Regulation	Objective	Requirement for the Proposal
State Law		
<i>Environmental Planning and Assessment Act 1979</i> (EP&A Act) <i>Environmental Planning and Assessment Regulation 2000</i> (EP&A Regulation)	Provides for a co-ordinated approach to development ensuring the proper management, development and conservation of natural and cultural resources and promoting social and economic welfare and a better environment.	Both options would be assessed under Part 5 of the EP&A Act with BVSC as the proponent and determining authority. A Review of Environmental Factors (REF) would be required to address statutory requirements in relation to Section 111 of the EP&A Act and other relevant legislation. The REF would need to describe the level of impact that the development may have.
<i>National Parks & Wildlife Act 1974</i> (NPWS Act)	The NPW Act establishes the fundamental functions of the NSW National Parks and Wildlife Service. These include the conservation of nature, objects, features, places and management of land reserved under the Act. The NPW Act also sets out to protect and preserve Aboriginal heritage values. Part 6 of this Act refers to Aboriginal objects and places and prevents persons from impacting on an Aboriginal place or relic, without consent or a permit. Part 12 sets out rights and obligations for leases, licences and easements.	If the proposal would involve impact on an aboriginal archaeological site or item, an Aboriginal Heritage Impact Permit (AHIP) may be required.
<i>Biodiversity Conservation Act 2016</i> (BC Act)	The Act repeals the <i>Threatened Species Conservation Act 1995</i> , the <i>Nature Conservation Trust Act 2001</i> and the animal and plant provisions of the <i>National Parks and Wildlife Act 1974</i> . The Act is administered by OEH with the purpose of maintaining 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. In particular, the Act aims to conserve biodiversity at bioregional and State scales.	An ecological assessment under the BC Act will be required if native vegetation clearing is required. This will include the need to consider species, populations and ecological communities listed on the BC Act, assess their potential to occur on the site and be adversely affected by the works. Where impact on species is predicted to occur as a result of the proposal, an Assessment of Significance in accordance with the BC Act will need to be completed. Depending on the amount of clearing, offsets and a detailed Biodiversity Development Assessment Report may be required.

Law, Policy or Regulation	Objective	Requirement for the Proposal
		This Constraints Analysis has included preliminary identification of BC matters, which are detailed as potential constraints to the proposal.
<i>Biosecurity Act 2015</i>	<p>The Biosecurity Act repeals the <i>Noxious Weeds Act 1993</i>. It streamlines and modernises the way all biosecurity risks (feral animals, plant and animal diseases, and weeds) are managed in NSW.</p> <p>The Biosecurity Act includes a number of mechanisms (regulatory tools) that can be used to manage weed risks. The Act and Regulations provide specific legal requirements for high risk activities and state level priority weeds. The Biosecurity Act introduces a General Biosecurity Duty (GBD): that all plants are regulated with a GBD to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as reasonably practicable.</p>	The environmental assessment for the works will need to include consideration of matters relevant to the Biosecurity Act and the South East Regional Strategic Weed Management Plan 2017 - 2022 (South East Local Land Services, 2017).
<i>Fisheries Management Act NSW 1994</i> (FM Act)	<p>This Act sets out to conserve fish stocks and key fish habitats, threatened species, populations and ecological communities of fish and marine vegetation and biological diversity. Further, it aims to promote viable commercial fishing, aquaculture industries and recreational fishing opportunities.</p> <p>In Section 198A of this Act, the definition of “dredging work” includes any work that involves excavating “water land”, where water land is defined as “land submerged by water... whether permanently or intermittently or whether forming an artificial or natural water body...”</p>	A permit may be required under the FM Act if reclamation works occur near or on the water’s edge and if such works also harm marine vegetation. This is considered unlikely due to the distance of both options from Merimbula Lake.
<i>Roads Act NSW 1993</i>	The Council of a local government area is the roads authority for all public roads within the area, other than any freeway, Crown road, or road for which some other public authority is declared to be the roads authority.	BVSC is the roads authority for Merimbula, which encompasses the study area. No RMS roads are relevant to the project.
<i>Heritage Act 1997</i>	This Act aims to conserve heritage values. The Act defines ‘environmental heritage’ as those places, buildings, works, relics, moveable objects and precincts listed in the Local or State Heritage Significance. A property is a heritage item if it is listed in the heritage	The environmental assessment for the works will need to include consideration of potential impacts on historic heritage items.

Law, Policy or Regulation	Objective	Requirement for the Proposal
	schedule of the local Council's Local Environmental Plan or listed on the State Heritage Register, a register of places and items of particular importance to the people of NSW.	A Statement of Heritage Impact (SoHI) is required by the NSW Heritage Branch (Department of Planning) if a listed heritage item is to be impacted by the proposal. It is considered unlikely either options would directly impact a listed heritage item.
<i>Coastal Management Act 2016</i>	The <i>Coastal Management Act 2016</i> provides the architecture for strategic management of our coastal areas into the future. The objectives of this Act are to manage the coastal environment of New South Wales in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State.	The environmental impact assessment will need to consider potential for impact on the coastal environment and strategic objectives of this act.
<i>Coastal Protection Act 1979</i>	The objects of this Act are to provide for the protection of the coastal environment for the benefit of present and future generations; to protect, enhance, maintain and restore the environment of the coast, its associated ecosystems, ecological processes and biological diversity, and water quality; to promote balanced utilisation and conservation of the coastal region with regard to the principles of ecologically sustainable development; to encourage the significant social and economic benefits from a sustainable coastal environment; to promote the public's right to access; to provide for acquisition of land to promote protection, enhancement, maintenance and restoration of the environment; to recognise the role of the community in resolving issues relating to the coastal environment, and; to ensure co-ordination of the policies and activities to facilitate the proper integration management activities.	The proposal site occurs on land defined as being within the "Coastal zone". The environmental impact assessment will need to consider potential for impact on the coast and the level of compliance with the Coastal Protection Act and SEPP 71, below.
<i>SEPP 71 - Coastal Protection</i>	This policy ensures that development in the NSW coastal zone is appropriate and suitably located, to ensure that there is a consistent and strategic approach to coastal planning and management and to ensure there is a clear development assessment framework for the coastal zone.	This will need to consider impact on coastal protection matters.

Law, Policy or Regulation	Objective	Requirement for the Proposal
<i>State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP 14)</i>	<p>The aim of this policy is to ensure that the coastal wetlands are preserved and protected in the environmental and economic interests of the State. The Consent Authority for the proposed development within land affected by the SEPP 14 would be the local Council, or in this case the BVSC. Under the SEPP, a person shall not:</p> <ul style="list-style-type: none"> (a) clear that land (b) construct a levee on that land (c) drain that land, or (d) fill that land, <p>except with the consent of the Council and the concurrence of the Director.</p>	Impacts on SEPP 14 wetlands trigger the requirement for the preparation of an Environmental Impact Statement. Neither option is located within SEPP 14 Wetlands.
<i>SEPP 26 Littoral Rainforest</i>	<p>The aim of this Policy is to provide a mechanism for the consideration of applications for development that is likely to damage or destroy littoral rainforest areas with a view to the preservation of those areas in their natural state.</p> <p>This Policy applies to:</p> <ul style="list-style-type: none"> (a) land enclosed by the outer edge of the heavy black line on the series of maps held in the Department and marked “State Environmental Planning Policy No 26—Littoral Rainforests (Amendment No 2)”, and (b) land not so enclosed but within a distance of 100 metres from the outer edge of that heavy black line except residential land and land to which State Environmental Planning Policy No 14—Coastal Wetlands applies. 	Vegetation that could be a Littoral rainforest community occurs adjacent to the proposal area within the gully around Chainage 290. Neither this area nor any other area along either route is identified on the series of maps held in the Department and marked “State Environmental Planning Policy No 26—Littoral Rainforests (Amendment No 2)”. As such, SEPP 26 does not apply to the proposal.
Commonwealth Law		
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	The Commonwealth EPBC Act operates in a similar manner to the BC Act, with the objective of protecting Matters of National Environmental Significance (MNES), including threatened and migratory species, communities and populations, and heritage places.	The environmental assessment for the works will need to include consideration of potential impacts on any <i>matters of national environmental significance</i> . If the assessment of significance finds that the proposal would have a significant effect on any <i>matter of national environmental significance</i> , a referral to the Federal Minister for the

Law, Policy or Regulation	Objective	Requirement for the Proposal
		<p>Environment would be referred, and further assessment and approvals are likely to be required.</p> <p>This Constraints Analysis has included preliminary identification of EPBC matters, which are detailed as potential constraints to the proposal.</p>
Local Law		
<i>Bega Valley Local Environment Plan 2013</i>	<p>The proposed work is located on land zoned:</p> <ul style="list-style-type: none"> • RE1 – Public recreation • E2 – Environmental Conservation 	<p>The proposed works would be considered an environmental facility under the Bega Valley LEP. Environmental facilities are buildings or places that provide for the recreational use or scientific study of natural systems, and includes walking tracks, seating, shelters, board walks, observation decks, bird hides or the like, and associated display structures.</p> <p>The proposal is permitted with consent within both land zonings, RE1 and E2.</p>
	The LEP lists heritage items within the Bega Valley which need to be considered during the impact assessment process.	<p>Listed heritage items have been identified as being close to the proposal area.</p> <p>Preliminary constraints advice regarding these has been included in this report.</p>

4 APPROACH

The investigation of constraints has included desktop and site inspection. Details of assessment methods are provided below.

4.1 DESKTOP ASSESSMENT

A desktop assessment of the study area was undertaken with reference to the following databases:

- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool.
- Office of Environment and Heritage (OEH) Atlas of NSW Wildlife database.
- Department of Primary Industries (DPI) Key Fish Habitat Mapping.
- Department of Primary Industries priority weed declarations.
- Commonwealth, national and state heritage databases. Database searches would include the Australian Heritage Database and the NSW Heritage Office State Heritage Register and State Heritage Inventory. AHIMS basic search.
- EPA's contaminated land register.
- Soil and geology maps.
- Merimbula and Pambula Rotary Lake Street Walkway Proposal Feasibility Assessment, D. Buckley 2016
- Preliminary Flora and Fauna Assessment Merimbula Estuary Walking Track, Local Environmental Solutions 2017

4.2 SITE ASSESSMENT

A site inspection was conducted by a senior environmental consultant ecologist on the 24 November 2017 with TBLD and client representatives. The aim of the site inspection was to assess the general environmental values of the study area and to identify any potential constraints or issues that could pose a risk to the proposal. The following values were a focus of the site inspection:

- Site topography, drainage lines, soils and their stability.
- Dominant plant species present and the potential for threatened ecological communities.
- The presence of threatened species habitats.
- Existing features of importance for near residents and recreational users of the area.
- Values that may be impacted on by the proposed options.

No detailed or targeted surveys were conducted as part of the site assessment.

5 EXISTING ENVIRONMENT

5.1 SOILS

The topography of the area is characterised by undulating hills to rolling hills. The project is on the foreshore of Merimbula Lake, approximately 12 to 30m Australian Height Datum (AHD). The site includes steep slopes and hazards including cliffs and drops off.

The Bega-Mallacoota 1:250,000 Geological Sheet shows the project area is near geology identified as undifferentiated sediments, conglomerate and alluvial and colluvial deposits (Lewis & Glen 1995).

The Bega – Goalen Point 1:100 000 Sheet Map shows the proposed works are located within one soil landscape, Yellow Pinch 'yp' (Tulau, 1997). The Yellow Pinch soil landscape is located on rolling to steep hills on conglomerates, sandstones and siltstones. Limitations for this soil landscape include:

- Steep slopes.
- Mass movement hazard.
- Minor to moderately severe water erosion hazard.
- Shallow soils.
- Non-cohesive sediments.
- Foundation hazard.
- Bedrock outcrops.

The site inspection of the proposal site identified steep slopes towards Merimbula Lake and evidence of erosion and slips (Figure 5-1). Examples of erosion can be seen at chainages 90 and 720. Stormwater and surface runoff from surrounding catchments and roads are a contributing factor to the erosion. Steep slopes were consistent along the proposal site, with slopes to the east towards Merimbula Lake. Steep slopes and high vertical cliffs are also dominant at the southern end of the proposal site, chainages 1360 to 1510 (Merimbula Wharf).

A large mound of recent (unknown source) fill at chainage 720 protrudes into bushland and is unstable and eroding.



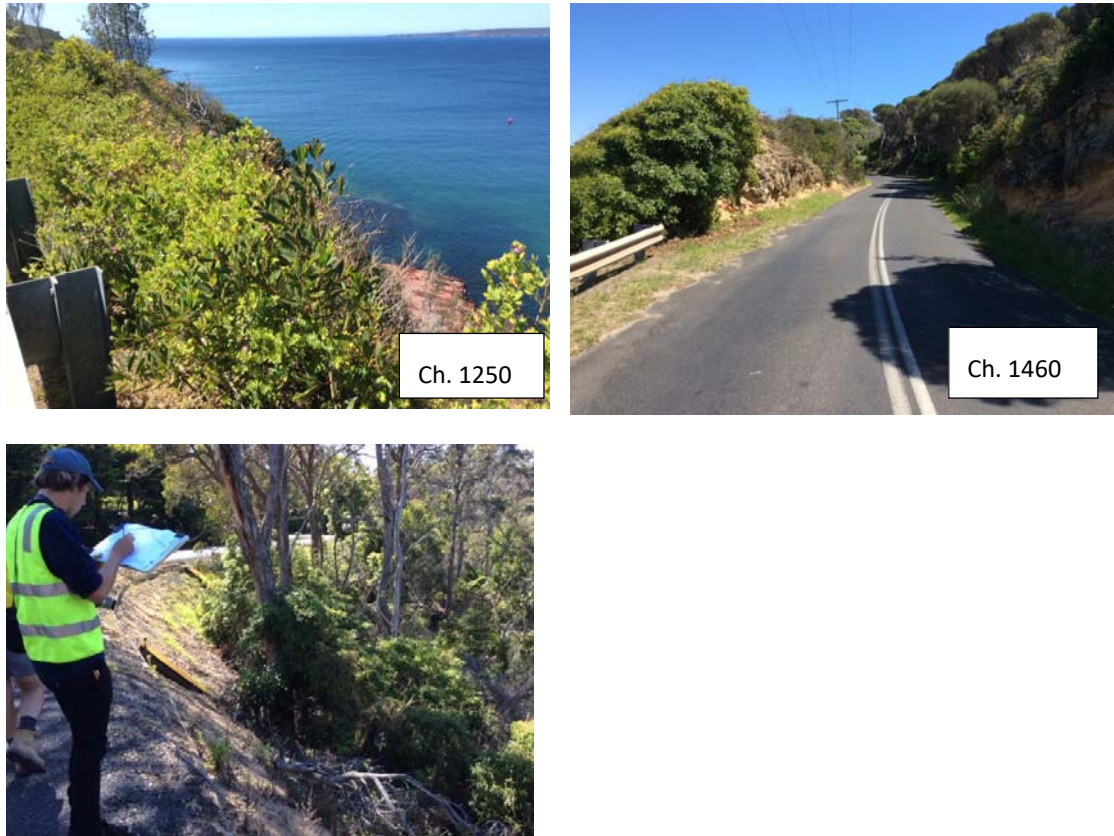


Figure 5-1 Slopes and erosion evidence onsite

A search of the NSW Environment Protection Authority (EPA) Contaminated land records on 21 November 2017 did not identify any sites listed within the Bega Valley (NSW Government, 2017b). A search of the List of NSW contaminated sites notified to EPA on 21 November 2017 identified two sites within Merimbula, however they are not in the project area (NSW Government, 2017a).

Acid Sulfate Soil mapping in the *Bega Valley Shire Local Environmental Plan 2013* identified the project area as having no Acid Sulfate Soils.

Roadsides can contain buried contaminants, due to past vehicle collisions. No evidence of recent collisions was identified during the site inspection.

During the site inspection it was identified that a landfill site is located at approximately chainage 720. (Figure 5-2). This has potential to contain contaminants.



Figure 5-2 Landfill site within the study area (Ch.720).

5.2 WATER

Merimbula Lake is located east of the project site. Merimbula Lake is an important feature for the area as it supports a diverse network of aquatic organisms and local industries including oysters and tourism. The water quality is deemed to be very similar to the ocean quality due to the weekly tidal flows equivalent to double the volume of the Merimbula Lake (Cardno 2017).

No waterways or drainage lines are mapped in the project site.

There are six wetlands around Merimbula Lake that are mapped as SEPP 14 Coastal Wetlands. The closest SEPP Coastal Wetland to the project site is approximately 1.9km east.

Assessment of the Bega Valley LGA key fish habitats (KFH) (DPI, 2017) identified Merimbula Lake, directly adjacent to the project site, to be classified as key fish habitat.

5.3 BIODIVERSITY

5.3.1 Background searches

A search of the OEH wildlife Atlas database was conducted on the 20 November 2017. The search was for threatened flora and fauna species and Threatened Ecological Communities (TECs) that occur in the South East Corner – South East Coastal Ranges IBRA Subregion. This search identified 150 communities / species have been recorded within the subregion, a full list is provided in Appendix A. This included:

- 58 flora species
- 6 amphibian species
- One reptile specie
- 55 bird species
- 30 mammal species

While no threatened species are identified in the database as having been recorded at the project site, within 1km of the site the following have been recorded:

- Merimbula Star-hair (*Astrotricha sp. Wallagaraugh*)
- Hooded Plover (*Thinornis rubricollis*)
- Pied Oystercatcher (*Haematopus longirostris*)
- New Zealand Fur Seal (*Arctocephalus forsteri*)

The OEH Wildlife Atlas search results for TECs that have the potential to occur in the South East Corner – South East Coastal Ranges IBRA Subregion identified 13 Threatened Ecological Communities (TECs). The EEC's with potential to occur within the study area are:

- Araluen Scarp Grassy Forest in the South East Corner Bioregion
- Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions
- Brogo Wet Vine Forest in the South East Corner Bioregion
- Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Dry Rainforest of the South East Forests 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
- Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions
- Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions
- White Box Yellow Box Blakelys Red Gum Woodland

An EPBC Protected Matters Search Tool, 10km buffer of the proposal site, identified three Endangered Ecological Communities, 47 migratory species and 68 threatened species that have potential to occur at the site.

A search of the Department of Primary Industries WeedWise identified 97 priority weeds for the Bega Valley Local Government Area.

5.3.2 Preliminary flora and fauna assessment key findings

Local Environmental Solutions (2017) undertook a Preliminary Flora and Fauna Assessment for the project which included background searches and a site inspection between 8- 11th of April 2017. Key findings of the site inspection are outlined below.

Vegetation and flora

Vegetation at the project site consisted of wet sclerophyll forest with some rainforest elements along the small drainage lines. Major tree species included Swamp Mahogany (*Eucalyptus robusta*), Sydney Blue Gum (*Eucalyptus. Saligna*), and Bangalay (*Eucalyptus botryoides*). The understorey includes Tea tree (*Melaleuca quinquenervia*), Swamp Oak (*Allocasuarina glauca*), Forest Oak (*Allocasuarina torulosa*) and Lily Pilly (*Acmena smithii*).

The area is heavily infested with introduced and native weeds including Privet (*Ligustrum lucidum*) and Sweet Pittosporum (*Pittosporum undulatum*). There are many weed species in the ground layer of vegetation including English Ivy (*Hedera helix*) and Fireweed (*Senecio madagascariensis*).

No threatened flora or TECs were identified at the project site.

Fauna and fauna habitat

No mature trees with visible hollows, were observed, but a small number of suitable recruit trees for the hollow resource (>50cm Diameter at Breast Height; DBH) were found. Dead fallen timber with hollows and dense ground litter, important habitat for ground-dwelling native fauna, was found scattered in the landscape. No feed trees for Glossy Black Cockatoo (*Calyptorhynchus lathami*) and Yellow-bellied Glider (*Petaurus australis*) were identified onsite.

Threatened bird species recorded during diurnal and nocturnal surveys included:

- Glossy Black Cockatoo (*Calyptorhynchus lathami*), Vulnerable *Biodiversity Conservation Act 2015* (BC Act).
- Square-tailed Kite (*Lophoictinia isura*), Vulnerable BC Act.
- Swift Parrot (*Lathamus discolor*) *Critically Endangered Environment Protection and Biodiversity Conservation Act 1999* (EPBC ACT).
- Powerful Owl (*Ninox strenua*), Vulnerable BC Act.
- Sooty Owl (*Tyto tenebricosa*), Vulnerable BC Act.

5.3.3 Site assessment results

Based on the site inspection in November 2017, the following observations were made specific to the two options being considered by TBLD.

Vegetation communities

Largely continuous native vegetation occurs along the western edge of Lake Street. Within the northern half, including Rotary Park (Figure 5-3) the dominant overstorey species is mostly *Eucalyptus botryoides*. Dominant midstorey species include *Exocarpos cupressiformis*, *Acacia subporosa*, *Pittosporum undulatum*, *Acacia implexa* and *Rhagodia candolleana*. *Themeda australis* is a common native component of the groundcover.



Figure 5-3 Vegetation within Rotary Park.

Around Chainage 200-300, a broad gully occurs and the species composition changes. The presence of species such as *Acmena smithii*, and *Ficus sp.*, suggest a forest type that could be part of a littoral rainforest community (Figure 5-4). Similarly, vegetation at the intersection of Wyebo Street (Ch 720) has elements of a rainforest community (Figure 5-5).



Figure 5-4 Potential Littoral Rainforest (Ch 200-300).



Figure 5-5 Vegetation at the intersection of Wyebo Street (Ch. 720).

Between chainage 850-900, *Melaleuca armillaris*, *Pittosporum undulatum* and *Acacia implexa* are the dominant species, with the invasive *Lonicera japonica* smothering much of the existing vegetation in places, refer to Figure 5-6.



Figure 5-6 Vegetation between Ch. 850-900.

Numerous exotic weed species were identified along the road verges. Kikuyu (*Pennisetum clandestinum*) is dominant along much of the immediate road verge as seen in Figure 5-7



Figure 5-7 Exotic weed species present in road verge (Ch. 510).

Threatened Ecological communities (TECs)

Further detailed flora survey is required to accurately determine the vegetation communities within the proposal area as part of an REF. However, none of the vegetation types present are typical of any of the TECs returned from the database searches and it is considered unlikely that any TECs occur.

SEPP 26 – Littoral Rainforest

Vegetation that could be a Littoral rainforest community occurs adjacent to the proposal area particularly within the gully around Chainage 290. This area nor any other area along the route, is not identified on the series of maps held in the Department and marked “State Environmental Planning Policy No 26—Littoral Rainforests (Amendment No 2)”. As such, SEPP 26 does not apply to the proposal.

Threatened flora habitat

No threatened flora species were identified during the site assessment. Habitat may be present for Bodalla Pomaderris (*Pomaderris bodalla*) which has been recorded approximately 1.7km west along the shores of Merimbula Lake. This species prefers moist open forest along sheltered gullies and has the potential to occur within the gully systems that occur along the proposed route.

Threatened fauna habitat

One hollow-bearing tree identified during the site inspection, however it is outside the proposal area. No other habitat features that would provide important habitat for any threatened fauna species were observed during the site assessment.

It is noted that the Preliminary Flora and Fauna Assessment LES (2017), identified five threatened bird species during surveys of the project site:

- Glossy Black Cockatoo (*Calyptorhynchus lathami*), Vulnerable *Biodiversity Conservation Act 2015* (BC Act).
- Square-tailed Kite (*Lophoictinia isura*), Vulnerable BC Act.
- Swift Parrot (*Lathamus discolor*) *Critically Endangered Environment Protection and Biodiversity Conservation Act 1999* (EPBC ACT).
- Powerful Owl (*Ninox strenua*), Vulnerable BC Act.
- Sooty Owl (*Tyto tenebricosa*), Vulnerable BC Act.

There is potential for important habitat resources for these species to occur in proximity to the proposal site and for indirect impacts to occur for these species. Further assessment would be required to accurately characterise the potential for impacts as part of an REF.

5.4 ABORIGINAL HERITAGE

The NSW Office of Environment and Heritage (OEH) maintains the AHIMS database. A search of the AHIMS register for Aboriginal sites and places provides an indication of the presence of previously recorder Aboriginal sites, these include:

- Information about Aboriginal objects that have been reported to the Director General, Department of Premier and Cabinet.
- Information about Aboriginal places which have been declared by the Minister for the Environment to have special significance with respect to Aboriginal culture.
- Archaeological reports

A register is not conclusive, as there are many parts of NSW that have not been subject to archaeological assessments or field surveys. The search indicates whether any sites are known within or adjacent to the search area.

A search of the Aboriginal Heritage Information Management System (AHIMS) on 20 November 2017 identified 19 Aboriginal sites and no Aboriginal places between -36.8985, 149.9108 and -36.8816, 149.9376 with a 50m buffer. An extensive search was requested on 27th November 2017. The extensive search identified four items including three shell sites and one Potential Archaeological Deposit (PAD) along Bar Beach and Bar Beach Road. There is no recorded items within the proposal site.

The Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW 2010) sets out the reasonable and practicable steps which individuals and organisations need to take in order to:

- Identify whether or not Aboriginal objects are, or are likely to be, present in an area.
- Determine whether or not their activities are likely to harm Aboriginal objects (if present).
- Determine whether an Aboriginal Heritage Impact Permit (AHIP) application is required.

The *Due Diligence Code* outlines a range of landscape features that have higher potential to contain Aboriginal objects. These include land that is:

- within 200m of water,
- located within a sand dune system,
- located on a ridge top, ridge line or headland,
- located within 200m below or above a cliff face, or
- within 20m of a cave, rock shelter or cave mouth

The project is located on a headland, within 200m of water and potentially located within 200m of a cliff face or 20m of a rock shelter or cave. The presence of these sites suggests that there is potential for undisturbed landscape deposits to occur and it is therefore possible that shell middens, burials and artefacts either as isolated finds or as scatters will occur within the project area.

As there is potential for artefacts to occur and be impacted by the works, a Due Diligence Assessment is recommended as part of the REF. This will provide mitigation measures to minimise impacts as well as a defence against impacting sites, should any be impacted. Ignorance is not a defence under the NPW Act .

5.5 HISTORIC HERITAGE

A desktop assessment was undertaken to determine the heritage values of any objects or places within the proposal area. Heritage database searches were conducted on 20 November 2017 and included:

- The NSW State Heritage Inventory (SHI) (for items listed on the State Heritage Register, Heritage and Conservation Registers of State Government agencies and local heritage items on the Bega Valley Shire Council Heritage Schedule).
- The Australian Heritage Database (for items listed in the National and Commonwealth Heritage Lists and World Heritage List).

The NSW Heritage Register identified one listed item under the NSW Heritage Act and 9 items listed under the Bega Valley LEP and by state agencies (ie. Roads and Maritime Services). Four of the listed items are located in close proximity to the proposal site including:

- Merimbula Wharf and cargo sheds, Wharf Street
- Old School Museum, 85-87 Main Street
- Residence, 2 Main Street
- Residence, 45 Main Street

One item is located within the proposal area, Fisherman's Lookout at approximately chainage 1200.

No items listed under the World, National and Commonwealth Heritage Lists occur onsite.

5.6 PUBLIC AMENITY AND SOCIO- ECONOMIC IMPACTS

The proposal site is located within Merimbula township. Vehicle and pedestrian traffic as well as residential and commercial land uses are relevant to the project. It is understood that TBLD has engaged a traffic engineer to assess the potential traffic impacts of the options.

The site is bounded by residences and road infrastructure to the north and west. While the south and east is occupied by Merimbula Lake, Bar Beach and native vegetation, there is visual evidence of recent farming, historical logging, digging and an old tram way through the forest.

The visual amenity of Merimbula Lake is considered very high for its natural and modified elements. Visual amenity features within the area include the Merimbula Lake, sandbars, the channel, native vegetation and coastal wetlands. Receivers for the project area includes residents and traffic along Lake Street, visitors to Merimbula Wharf and Bar Beach, and users of Merimbula Lake.

Lake Street is a two-lane sealed council road connecting Main Street to Merimbula Wharf. Due to the topography, the road is windy, narrow in places, and in locations has limited or no road shoulder. Existing underground and above ground services including water, sewer and power are located within the road or road verge (Figure 5-8). There are approximately twenty private driveways that access Lake Street. Some

of these driveways are designed to have traffic only enter/exit northwards to Merimbula (Figure 5-9). Whilst the majority enter directly square to Lake Street.

Djirringani People's Walking Trail is located in part of the proposal site, commencing from Rotary Park. The current pathway through this area is not compliant with current BVSC standards (Figure 5-10). There are no other formal paths in the proposal area. Currently people wanting to access Bar Beach or Merimbula Wharf by foot are required to walk along the road verges or road when no road shoulder is present.

Merimbula (state suburb SCC) had a population of 3,544 people in the (ABS) 2016 census. The predominate occupations within Merimbula area include Managers at 17%, Technicians and Trade Workers at 16.4%, Sales Workers 15.4%, and Professionals 13% (ABS, 2011). The leading industries of employment include the Accommodation industry at 11.5%, Cafes, Restaurants and Takeaway Food Services at 6.3% and Clubs (hospitality), Supermarket and Grocery Stores and School Education at 3.8% and 3.4% respectively (ABS, 2011). These industries are highly dependent on tourism that peaks in summer and warmer periods. The project site is part of popular destinations used for tourists and important to the local economy including Merimbula Lake, Bar Beach and Merimbula Wharf.



Figure 5-8 Existing services within the road Ch 110 and Ch 720.



Figure 5-9 Example of driveways along Lake Street, Ch. 300



Figure 5-10 Walking track from Rotary Park with steep path gradient (Ch. 00).

6 CONSTRAINTS

6.1 APPLICATION OF THE RISK MATRIX

The following comparative constraints analysis uses the risk assessment rating matrix below to rate each risk and identify 'key risks' associated with both design options. The risk rating is a factor of the **consequence** and the **likelihood** of the impact occurring. Depending on the combination of consequence and likelihood, the overall risk rating could be low to extreme (refer Table 5-1). High to extreme risks are considered to be 'key risks' and should be considered carefully.

The comparative constraints analysis addresses likely construction and operations impacts. Note, this assessment produces an '*unmitigated*' risk rating. That is, it assumes no mitigation measures are applied and therefore produces a worst case risk rating. With the application of appropriate management measures, many risks will be able to be substantially reduced.

Table 6-1 Risk assessment rating matrix

Likelihood	Consequence				
	Negligible	Minor	Moderate	Major	Catastrophic
Remote	Low	Low	Low	Medium	Medium
Unlikely	Low	Low	Medium	High	High
Possible	Low	Medium	High	Very High	Very High
Likely	Medium	High	Very High	Very High	Extreme
Almost certain/ inevitable	Medium	High	Very High	Extreme	Extreme

6.2 CONSTRAINTS RATINGS FOR OPTIONS A AND B

Relevant environmental aspect/constraints	Option A One way road with shared path		Option B Two way road with shared path	
	Analysis	Risk rating	Analysis	Risk rating
Topography and soil <ul style="list-style-type: none"> - Steep slopes - Cliff and drop off hazards - Erosive soils - Contamination 	Construction <p>This option has a minimal disturbance footprint as it would primarily use the existing road as path. This would reduce risks associated with constructing on steep slopes and erodible soils, such as land slips and sediment pollution into nearby waterways.</p> <p>Any disturbance will need to consider steep slopes and soil limitations to prevent further erosion.</p> <p>Unlikely to disturb containments such as buried at the old landfill due to minimal disturbance.</p>	High	Construction <p>This option would involve construction of a new path and/or elevated boardwalk(s) that would result in extensive disturbance through the use of excavators, boring, placement of fill, construction of concrete footings and clearing for work zones. On steep slopes, erodible soils and slip hazards are very high risks. Adequate engineering would be required as well as careful management of excavation impacts.</p> <p>The path option would also require the placement of fill. Sediment and unconsolidated fill can cause pollution into nearby waterways.</p> <p>Soil limitations will need to be addressed to stabilise areas and prevent further erosion.</p> <p>Potential to disturb containments such as buried at the old landfill.</p>	Very high

Relevant environmental aspect/constraints	Option A One way road with shared path		Option B Two way road with shared path	
	Analysis	Risk rating	Analysis	Risk rating
	Operation If runoff and stormwater is not managed erosion is likely to continue or to occur within the site.	Low	Operation If areas of disturbance are not appropriately rehabilitated erosion is likely to continue or to occur within the site. If runoff and stormwater is not managed erosion is likely to continue or to occur within the site.	Medium
Water - Merimbula Lake - Key Fish Habitat - SEPP 14 Wetlands	Construction This option involves minimal disturbance and use of machinery reducing the likelihood for contaminants to enter Merimbula Lake.	Medium	Construction This option would involve excavation works and use of machinery that have potential for contaminants to enter Merimbula Lake. Merimbula Lake is not located directly adjacent, however the topography of the site and importance of Merimbula Lake to the area increases the risk.	High
	Operation If runoff is not managed there is potential for contaminants from the road and path to enter Merimbula Lake.	Low	Operation If runoff is not managed there is potential for contaminants from the road and path to enter Merimbula Lake.	Low

Relevant environmental aspect/constraints	Option A One way road with shared path		Option B Two way road with shared path	
	Analysis	Risk rating	Analysis	Risk rating
Biodiversity <ul style="list-style-type: none"> - TECs - Threatened flora and fauna habitat 	Construction Minimal clearing of vegetation required.	Low	Construction Greater impact on flora and fauna anticipated due to clearing of vegetation. Potential for direct and indirect impact on potential threatened flora habitat and indirect impacts on identified threatened fauna species known to occur. Further investigations would be required.	High
	Operation Opportunities to plant native vegetation exist.	Low (and potential opportunity)	Operation Unlikely to have substantive impacts on biodiversity.	Low
Aboriginal heritage <ul style="list-style-type: none"> - Landscape features indicate Aboriginal sites may be present. 	Construction This option involves minimal ground disturbance and use of machinery due to the use of the existing road. If ground disturbance is required for road verges, further investigations would be required.	Medium	Construction This option would involve excavation works and use of machinery that have potential to impact unrecorded Aboriginal items. Further investigations would be required.	Very high
	Operation Unlikely to have an impact on Aboriginal Heritage.	Low	Operation Unlikely to have an impact on Aboriginal Heritage.	Low

Relevant environmental aspect/constraints	Option A One way road with shared path		Option B Two way road with shared path	
	Analysis	Risk rating	Analysis	Risk rating
Historic heritage <ul style="list-style-type: none"> - One listed item - Four listed items in close proximity 	Construction This option involves minimal disturbance and use of machinery due to the use of the existing road. There is unlikely to be an impact on any historic heritages items.	Low	Construction This option would involve excavation works and use of machinery that have potential to indirectly historic heritage items in close proximity through noise and vibration. This option will not directly impact on any historic heritage items.	Medium
	Operation Unlikely to have an impact on listed heritage items.	Low	Operation Unlikely to have an impact on listed heritage items.	Low

Relevant environmental aspect/constraints	Option A One way road with shared path		Option B Two way road with shared path	
	Analysis	Risk rating	Analysis	Risk rating
Public amenity <ul style="list-style-type: none"> - Sensitive receivers (residences and private access ways) - High visual amenity - Access to popular tourist sites - Local residents access on Lake Street 	Construction Reduced construction time and minimal disturbance to local residents and tourists through: <ul style="list-style-type: none"> - Limited ground disturbance and machinery present impacting visual amenity - Limited disruptions to traffic and access 	Medium	Construction This option will impact the local community through: <ul style="list-style-type: none"> - Ground disturbance, machinery and materials on site decreasing visual amenity. - Disruptions to traffic and access for local residents and access to Bar Beach and Merimbula Wharf. - Safety issues through the operation of machinery and excavation areas. - Noise generated through personal and use of machinery. - Potential reduced economic benefits. - Relocation of services will be required causing water, sewerage and power disruptions for local residents. 	High

Relevant environmental aspect/constraints	Option A One way road with shared path		Option B Two way road with shared path	
	Analysis	Risk rating	Analysis	Risk rating
	<p>Operation</p> <p>This option would have the following advantages:</p> <ul style="list-style-type: none"> - Safe walkway along Lake Street. - Creation of extra car parking spaces. - Elevated platforms utilising the visual amenity. <p>This option will involve making Lake Street a one way road. This would increase traffic in the surrounding streets. It will also require modification of some existing private driveways that are accessed from one side of the road.</p> <p>Cars and pedestrians will be on separate designated surfaces. Pedestrians and bikes will share the 'shared Trail' access.</p>	Medium	<p>Operation Advantages:</p> <p>This option would have the following advantages:</p> <ul style="list-style-type: none"> - Safe walkway along Lake Street. - Retains current two way road. - Off road elevated boardwalk. - No changes to property access would be required. - Separation of users reducing safety risks. <p>This option would not have additional off road car parking.</p>	Low (opportunity)

6.3 SUMMARY OF CONSTRAINTS

There are two distinct differences when comparing the two options in regards to environmental constraints:

- The level of disturbance, which relates to a number of environmental aspects
- Socio-economic impacts and benefits.

These are summarised below.

6.3.1 Level of disturbance

During construction, Option B will have a greater disturbance and therefore increased potential impact on environmental aspects than Option A. Option A would require minimal disturbance with the use of the existing road as the path. Option B would require excavations works, vegetation clearing, and placement of fill to construct a path or elevated boardwalk(s) adjacent to the existing Lake Street. The increased area of disturbance relevant to Option B generates higher environmental risks ratings for during construction:

- Topography and soils;
- Water;
- Biodiversity
- Aboriginal Heritage;
- Historic Heritage; and
- Public amenity and socio economic impacts.

While all of these impacts have potential for management to mitigate impacts, this may require additional environmental survey, assessment, mitigation strategies and approvals. It may affect the cost and timing of assessments and additional approvals. When progressing an option that has higher environmental risks, a strong justification must be included to show the risks are warranted and sufficient management can be undertaken.

During operation, both options had similar constraints levels. However, the disturbance area of Option B increases the risk of ongoing impacts to soils and water if rehabilitation is not undertaken appropriately.

6.3.2 Socio- economic

During construction, Option B would have a greater potential to impact the local community due to the area of disturbance *and construction time* being greater than Option A. Particularly, the increased time required to undertake the works will increase the following impacts on local residents and visitors:

- Construction equipment and disturbance decreasing visual amenity.
- Disruptions to traffic and access for local residents and access to Bar Beach and Merimbula Wharf.
- Safety issues through the operation of machinery and excavation areas.
- Noise generated through personal and use of machinery.
- Relocation of services causing water, sewerage and power disruptions for local residents.

In operation, both options would provide a safe shared path from Main Street to Merimbula Wharf. Option B would retain Lake Street as a two way road which would reduce the impact on local residents. Option A and B have similar safety benefits in regards to pedestrians and vehicles, with the shared path being physically separated from vehicles.

In terms of parking amenity, Option A has the potential to provide additional parking along Lake Street, which would not occur under Options B. Option A would also more economical to construct.

7 OPPORTUNITIES

In undertaking the assessment, several opportunities have been identified. These apply equally to both options A and B.

7.1.1 Construction

The following opportunities have been identified for the construction stage of the proposal:

- Given the sensitivity of the local area, there is an opportunity to both inform the construction contractors of their obligations regarding Aboriginal heritage impacts and involve the Local Aboriginal Land Council, by including Aboriginal heritage in tool box talks prior to impacts occurring.
- Given the high level of tourism and activity of community groups in the area, there is an opportunity to reflect local concerns in the final design of the works. Explaining any limitations and the overall objective of the works can assist in ensuring community expectations are aligned and building social licence to operate.
- The use of local contractors and businesses for materials and resources should be investigated to maximise the local economic benefits of the construction works.

7.1.2 Operation

The following opportunities have been identified for the operation stage of the proposal:

- Increased tourism to the area with opportunities for views along the path – there is greater potential for this under Option B or a hybrid design of Option A and B.
- Community interpretation signage discussing the high environmental values (particularly Aboriginal Heritage, flora and fauna) along the path – there is similar potential for this under both options.
- Landscaping within the area to improve amenity. This could be included in the rehabilitation of disturbed areas and aim to enhance biodiversity values as well as provide stabilisation and visual amenity. Option A demonstrates less disturbance to the environment.
- A hybrid design could utilise selected boardwalks to offer increased interpretive opportunities.

8 CONCLUSION

This constraints analysis has been prepared by NGH Environmental to identify environmental aspects and constraints associated with two options proposed for an all-access, shared-use path along Lake Street, Merimbula. The findings of this constraints analysis will provide input into TBLD's Design Options Study Report being prepared for Bega Valley Shire Council (BVSC).

This constraints analysis has been undertaken with reference to background research, site assessment and the current environmental legislative context of the site.

Generally, Option B would have a larger environmental impact footprint and construction duration than Option A. This results in higher risks to environmental (including heritage) aspects. However, this option also has potential for greater socio-economic benefits during operation, as it would retain Lake Street as a two way road which would reduce the impact on local residents. Both options will have shared trails physically separated from vehicles for improved safety.

Option A would have a minimal impact on environmental (including heritage) aspects due to the use of the existing road there are socio- economic disadvantages of making Lake Street one way, which would be offset with formalised car parking and lower traffic volumes.

There is an opportunity for a hybrid design of Option A and B, that would combine the benefits of both options. It could have sections of shared trail with Lake Street one way and sections of boardwalk.

9 REFERENCES

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APPENDIX A BACKGROUND SEARCHES



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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 20/11/17 15:05:51

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

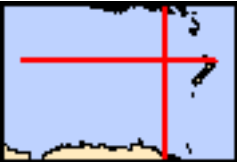
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental 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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	68
Listed Migratory Species:	47

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 environment anywhere.

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 Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	85
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	4
Regional Forest Agreements:	1
Invasive Species:	40
Nationally Important Wetlands:	3
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

Commonwealth Marine Area

[Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name

EEZ and Territorial Sea

Marine Regions

[Resource Information]

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name

[South-east](#)

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.

Name	Status	Type of Presence
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Lowland Grassy Woodland in the South East Corner Bioregion	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species

[Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within 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
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Fish		
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat may occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat known to occur within area
Litoria littlejohni Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within area
Mixophyes balbus Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
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
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within 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]	Vulnerable	Species or species habitat likely to occur within area
Potorous longipes Long-footed Potoroo [217]	Endangered	Species or species habitat likely to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat known to occur within area
Pseudomys fumeus Smoky Mouse, Konoom [88]	Endangered	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Acacia georgensis Bega Wattle [9848]	Vulnerable	Species or species habitat may occur within area
Astrotricha crassifolia Thick-leaf Star-hair [10352]	Vulnerable	Species or species habitat may occur within area
Correa baeuerlenii Chef's Cap [17007]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area
Leionema ralstonii [64926]	Vulnerable	Species or species habitat likely to occur within area
Pomaderris parrisiae Parris' Pomaderris [22119]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		
[Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within

Name	Threatened	Type of Presence area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour may occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Pandion haliaetus Osprey [952]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land	[Resource Information]
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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.

Name
Commonwealth Land - Australian Telecommunications Commission

Listed Marine Species	[Resource Information]
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* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Catharacta skua		
Great Skua [59472]		Species or species habitat may occur within

Name	Threatened	Type of Presence
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		area Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour may occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypselognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stigmatopora olivacea a pipefish [74966]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area

Name	Threatened	Type of Presence
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat likely to occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within

Name	Status	Type of Presence
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur

Name	Status	Type of Presence
Genista monspessulana		within area
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum		
African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana		
Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma		
Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp.		
Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata		
Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus		
Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus		
Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate		
Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii		
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis		
Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus		
Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Bondi Lake	NSW
Merimbula Lake	NSW
Pambula Estuarine Wetlands	NSW

Key Ecological Features (Marine)	[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
Upwelling East of Eden	South-east

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

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.

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

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-36.89168 149.92385

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.

Please feel free to provide feedback via the [Contact Us](#) page.

Bionet Atlas

Data from the BioNet BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°; ^^ rounded to 0.01°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Licensed Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Entities in South East Corner - South East Coastal Ranges IBRA Subregion. Report generated on 20/11/2017 3:07 PM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records
Animalia	Amphibia	Myobatrachidae	3042	<i>Heleioporus australiacus</i>		Giant Burrowing Frog	V,P	V	67
Animalia	Amphibia	Myobatrachidae	3073	^^ <i>Mixophyes balbus</i>		Stuttering Frog	E1,P,2	V	22
Animalia	Amphibia	Myobatrachidae	3075	^^ <i>Mixophyes iteratus</i>		Giant Barred Frog	E1,P,2	E	1
Animalia	Amphibia	Hylidae	3166	<i>Litoria aurea</i>		Green and Golden Bell Frog	E1,P	V	21
Animalia	Amphibia	Hylidae	3168	<i>Litoria booroolongensis</i>		Booroolong Frog	E1,P	E	1
Animalia	Amphibia	Hylidae	3039	<i>Litoria littlejohni</i>		Littlejohn's Tree Frog	V,P	V	9
Animalia	Reptilia	Cheloniidae	2008	<i>Eretmochelys imbricata</i>		Hawksbill Turtle	P	V	2
Animalia	Aves	Anseranatidae	0199	<i>Anseranas semipalmata</i>		Magpie Goose	V,P		1
Animalia	Aves	Anatidae	0216	<i>Oxyura australis</i>		Blue-billed Duck	V,P		2
Animalia	Aves	Columbidae	0023	<i>Ptilinopus superbus</i>		Superb Fruit-Dove	V,P		1
Animalia	Aves	Diomedidae	0086	<i>Diomedea exulans</i>		Wandering Albatross	E1,P	E,J	1
Animalia	Aves	Diomedidae	0847	<i>Diomedea gibsoni</i>		Gibson's Albatross	V,P	V	1
Animalia	Aves	Diomedidae	0091	<i>Thalassarche cauta</i>		Shy Albatross	V,P	V	5

Animalia	Aves	Diomedidae	0859	<i>Thalassarche impavida</i>	Campbell Albatross	P	V	1
Animalia	Aves	Diomedidae	0088	<i>Thalassarche melanophris</i>	Black-browed Albatross	V,P	V	2
Animalia	Aves	Procellariidae	0937	<i>Macronectes halli</i>	Northern Giant-Petrel	V,P	V	1
Animalia	Aves	Procellariidae	0955	<i>Pterodroma nigripennis</i>	Black-winged Petrel	V,P		1
Animalia	Aves	Procellariidae	0971	<i>Pterodroma solandri</i>	Providence Petrel	V,P	J	3
Animalia	Aves	Ardeidae	0197	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1,P	E	5
Animalia	Aves	Ardeidae	0196	<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		1
Animalia	Aves	Accipitridae	0218	<i>Circus assimilis</i>	Spotted Harrier	V,P		3
Animalia	Aves	Accipitridae	0226	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P	C	231
Animalia	Aves	Accipitridae	0225	<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		31
Animalia	Aves	Accipitridae	0230	<i>Lophoictinia isura</i>	Square-tailed Kite	V,P,3		27
Animalia	Aves	Accipitridae	8739	<i>Pandion cristatus</i>	Eastern Osprey	V,P,3		10
Animalia	Aves	Falconidae	0236	<i>Falco hypoleucos</i>	Grey Falcon	E1,P,2		1
Animalia	Aves	Falconidae	0238	<i>Falco subniger</i>	Black Falcon	V,P		1
Animalia	Aves	Burhinidae	0174	<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P		1
Animalia	Aves	Haematopodidae	0131	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V,P		29
Animalia	Aves	Haematopodidae	0130	<i>Haematopus longirostris</i>	Pied Oystercatcher	E1,P		231
Animalia	Aves	Charadriidae	0139	<i>Charadrius mongolus</i>	Lesser Sand-plover	V,P	E,C,J,K	1
Animalia	Aves	Charadriidae	0138	<i>Thinornis rubricollis</i>	Hooded Plover	E4A,P	V	58
Animalia	Aves	Jacaniidae	0171	<i>Irediparra gallinacea</i>	Comb-crested Jacana	V,P		2
Animalia	Aves	Scolopacidae	0166	<i>Calidris alba</i>	Sanderling	V,P	C,J,K	3
Animalia	Aves	Scolopacidae	0164	<i>Calidris canutus</i>	Red Knot	P	E,C,J,K	2
Animalia	Aves	Scolopacidae	0161	<i>Calidris ferruginea</i>	Curlew Sandpiper	E1,P	CE,C,J,K	9
Animalia	Aves	Scolopacidae	0152	<i>Limosa limosa</i>	Black-tailed Godwit	V,P	C,J,K	1

Animalia	Aves	Scolopacidae	0149	<i>Numenius madagascariensis</i>	Eastern Curlew	P	CE,C,J,K	31
Animalia	Aves	Laridae	0117	<i>Sternula albifrons</i>	Little Tern	E1,P	C,J,K	95
Animalia	Aves	Cacatuidae	0268	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3		641
Animalia	Aves	Cacatuidae	8857	<i>^^Calyptorhynchus banksii samueli</i>	Red-tailed Black-Cockatoo (inland subspecies)	V,P,2		1
Animalia	Aves	Cacatuidae	0265	<i>^^Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,P,2		1220
Animalia	Aves	Psittacidae	0260	<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		58
Animalia	Aves	Psittacidae	0309	<i>Lathamus discolor</i>	Swift Parrot	E1,P,3	CE	50
Animalia	Aves	Psittacidae	0302	<i>Neophema pulchella</i>	Turquoise Parrot	V,P,3		3
Animalia	Aves	Psittacidae	8913	<i>Pezoporus wallicus wallicus</i>	Eastern Ground Parrot	V,P,3		51
Animalia	Aves	Strigidae	0246	<i>Ninox connivens</i>	Barking Owl	V,P,3		27
Animalia	Aves	Strigidae	0248	<i>Ninox strenua</i>	Powerful Owl	V,P,3		926
Animalia	Aves	Tytonidae	0250	<i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		239
Animalia	Aves	Tytonidae	9924	<i>Tyto tenebricosa</i>	Sooty Owl	V,P,3		906
Animalia	Aves	Climacteridae	8127	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V,P		50
Animalia	Aves	Acanthizidae	0504	<i>Chthonicola sagittata</i>	Speckled Warbler	V,P		19
Animalia	Aves	Meliphagidae	0603	<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P	CE	8
Animalia	Aves	Meliphagidae	0448	<i>Epthianura albifrons</i>	White-fronted Chat	V,P		44
Animalia	Aves	Neosittidae	0549	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P		138
Animalia	Aves	Pachycephalidae	0405	<i>Pachycephala olivacea</i>	Olive Whistler	V,P		89
Animalia	Aves	Artamidae	8519	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V,P		181

Animalia	Aves	Petroicidae	8367	<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	V,P		17
Animalia	Aves	Petroicidae	0380	<i>Petroica boodang</i>	Scarlet Robin	V,P		275
Animalia	Aves	Petroicidae	0382	<i>Petroica phoenicea</i>	Flame Robin	V,P		76
Animalia	Aves	Petroicidae	0383	<i>Petroica rodinogaster</i>	Pink Robin	V,P		8
Animalia	Aves	Estrildidae	0652	<i>Stagonopleura guttata</i>	Diamond Firetail	V,P		24
Animalia	Mammalia	Dasyuridae	1008	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	434
Animalia	Mammalia	Dasyuridae	1017	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V,P		13
Animalia	Mammalia	Dasyuridae	1069	<i>Sminthopsis leucopus</i>	White-footed Dunnart	V,P		46
Animalia	Mammalia	Peramelidae	1710	<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E1,P	E	188
Animalia	Mammalia	Phascolarctidae	1162	<i>Phascolarctos cinereus</i>	Koala	V,P	V	949
Animalia	Mammalia	Burramyidae	1150	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		46
Animalia	Mammalia	Petauridae	1136	<i>Petaurus australis</i>	Yellow-bellied Glider	V,P		1996
Animalia	Mammalia	Petauridae	1137	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		3
Animalia	Mammalia	Pseudocheiridae	1133	<i>Petauroides volans</i>	Greater Glider population in the Eurobodalla local government area	E2,P	V	136
Animalia	Mammalia	Pseudocheiridae	1133	<i>Petauroides volans</i>	Greater Glider	P	V	595
Animalia	Mammalia	Potoroidae	1179	<i>Potorous longipes</i>	Long-footed Potoroo	E4A,P	E	14
Animalia	Mammalia	Potoroidae	1175	<i>Potorous tridactylus</i>	Long-nosed Potoroo	V,P	V	980
Animalia	Mammalia	Macropodidae	1215	<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E1,P	V	3
Animalia	Mammalia	Pteropodidae	1280	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	95
Animalia	Mammalia	Emballonuridae	1321	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V,P		4

Animalia	Mammalia	Molossidae	1329	<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V,P		20
Animalia	Mammalia	Vespertilionida e	1353	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V,P	V	1
Animalia	Mammalia	Vespertilionida e	1372	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V,P		123
Animalia	Mammalia	Vespertilionida e	1369	<i>Kerivoula papuensis</i>	Golden-tipped Bat	V,P		30
Animalia	Mammalia	Vespertilionida e	1346	<i>Miniopterus australis</i>	Little Bentwing-bat	V,P		2
Animalia	Mammalia	Vespertilionida e	1834	<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V,P		90
Animalia	Mammalia	Vespertilionida e	1357	<i>Myotis macropus</i>	Southern Myotis	V,P		42
Animalia	Mammalia	Vespertilionida e	1361	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		41
Animalia	Mammalia	Muridae	1458	<i>Pseudomys fumeus</i>	Smoky Mouse	E4A,P	E	113
Animalia	Mammalia	Dugongidae	1558	<i>Dugong dugon</i>	Dugong	E1,P		2
Animalia	Mammalia	Otariidae	1543	<i>Arctocephalus forsteri</i>	New Zealand Fur-seal	V,P		1
Animalia	Mammalia	Otariidae	1882	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V,P		5
Animalia	Mammalia	Balaenidae	1561	<i>Eubalaena australis</i>	Southern Right Whale	E1,P	E	1
Animalia	Mammalia	Balaenopterida e	1575	<i>Megaptera novaeangliae</i>	Humpback Whale	V,P	V	6
Animalia	Mammalia	Physeteridae	1578	<i>Physeter macrocephalus</i>	Sperm Whale	V,P		1
Plantae	Flora	Araliaceae	1200	<i>Astrotricha crassifolia</i>	Thick-leaf Star-hair	V,P	V	1
Plantae	Flora	Araliaceae	11915	<i>Astrotricha sp. Wallagaraugh</i>	Merimbula Star-hair	E1,P		34
Plantae	Flora	Asteraceae	1341	<i>Calotis glandulosa</i>	Mauve Burr-daisy	V,P	V	4

Plantae	Flora	Asteraceae	9071	<i>Leucochrysum albicans</i> <i>subsp. tricolor</i>	Hoary Sunray	P	E	1
Plantae	Flora	Asteraceae	1644	<i>Rutidosia leiolepis</i>	Monaro Golden Daisy	V,P	V	1
Plantae	Flora	Asteraceae	11378	<i>Xerochrysum palustre</i>	Swamp Everlasting	P	V	9
Plantae	Flora	Campanulaceae	9064	<i>Wahlenbergia</i> <i>scopulicola</i>	Rock-face Bluebell	E1,P		7
Plantae	Flora	Convolvulaceae	2234	<i>Wilsonia backhousei</i>	Narrow-leafed Wilsonia	V,P		26
Plantae	Flora	Euphorbiaceae	2739	<i>Monotaxis macrophylla</i>	Large-leafed Monotaxis	E1,P		10
Plantae	Flora	Euphorbiaceae	9467	<i>Pseudanthus ovalifolius</i>	Oval-leafed Pseudanthus	E1,P		1
Plantae	Flora	Fabaceae (Faboideae)	13786	<i>Bossiaea bombayensis</i>	Bombay Bossiaea	V,P		3
Plantae	Flora	Fabaceae (Faboideae)	2975	<i>Pultenaea baeuerlenii</i>	Budawangs Bush-pea	V,P	V	5
Plantae	Flora	Fabaceae (Faboideae)	12224	<i>Pultenaea parrisiae</i>	Parris' Bush-pea	V,P	V	5
Plantae	Flora	Fabaceae (Faboideae)	3008	<i>Pultenaea pedunculata</i>	Matted Bush-pea	E1,P		10
Plantae	Flora	Fabaceae (Mimosoideae)	3747	<i>Acacia constablei</i>	Narrabarba Wattle	V,P	V	76
Plantae	Flora	Fabaceae (Mimosoideae)	3782	<i>Acacia georgensis</i>	Bega Wattle	V,P	V	94
Plantae	Flora	Goodeniaceae	7440	<i>Dampiera fusca</i>	Kydra Dampiera	E1,P		1
Plantae	Flora	Haloragaceae	9512	<i>Haloragis exalata</i> subsp. <i>exalata</i>	Square Raspwort	V,P	V	7

Plantae	Flora	Lamiaceae	7832	<i>Westringia davidii</i>	David's Westringia	V,P	V	33
Plantae	Flora	Myrsinaceae	7073	<i>Lysimachia vulgaris</i> <i>subsp. davurica</i>	Yellow Loosestrife	E1,P,3		4
Plantae	Flora	Myrtaceae	4038	<i>Eucalyptus aggregata</i>	Black Gum	V,P	V	7
Plantae	Flora	Myrtaceae	4106	<i>Eucalyptus imlayensis</i>	Imlay Mallee	E4A,P,3	E	14
Plantae	Flora	Myrtaceae	4110	<i>Eucalyptus kartzoffiana</i>	Araluen Gum	V,P	V	90
Plantae	Flora	Myrtaceae	4134	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V,P	V	1
Plantae	Flora	Myrtaceae	9519	<i>Eucalyptus parvula</i>	Small-leaved Gum	E1,P	V	3
Plantae	Flora	Myrtaceae	4163	<i>Eucalyptus pulverulenta</i>	Silver-leafed Gum	V,P	V	1
Plantae	Flora	Myrtaceae	7598	<i>Eucalyptus recurva</i>	Mongarlowe Mallee	E4A,P	CE	1
Plantae	Flora	Myrtaceae	8382	<i>Eucalyptus saxatilis</i>	Suggan Buggan Mallee	E1,P		11
Plantae	Flora	Myrtaceae	8317	<i>Leptospermum</i> <i>thompsonii</i>	Monga Tea Tree	V,P	V	26
Plantae	Flora	Orchidaceae	4386	^^ <i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E1,P,2	V	1
Plantae	Flora	Orchidaceae	11649	^^ <i>Diuris ochroma</i>	Pale Golden Moths	E1,P,2	V	1
Plantae	Flora	Orchidaceae	8337	^^ <i>Genoplesium</i> <i>rhyoliticum</i>	Rhyolite Midge Orchid	E1,P,2	E	13
Plantae	Flora	Orchidaceae	11258	^^ <i>Genoplesium vernale</i>	East Lynne Midge Orchid	V,P,2	V	13
Plantae	Flora	Poaceae	9943	<i>Distichlis distichophylla</i>	Australian Saltgrass	E1,P		9
Plantae	Flora	Poaceae	5118	<i>Plinthanthesis rodwayi</i>	Budawangs Wallaby Grass	E1,P	V	16
Plantae	Flora	Polygonaceae	5280	<i>Persicaria elatior</i>	Tall Knotweed	V,P	V	3
Plantae	Flora	Proteaceae	8264	<i>Grevillea acanthifolia</i> <i>subsp. paludosa</i>	Bog Grevillea	E1,P	E	8
Plantae	Flora	Proteaceae	5394	<i>Grevillea renwickiana</i>	Nerriga Grevillea	E1,P		6

Plantae	Flora	Restionaceae	10608	<i>Baloskion longipes</i>	Dense Cord-rush	V,P	V	23
Plantae	Flora	Rhamnaceae	9857	<i>Pomaderris bodalla</i>	Bodalla Pomaderris	V,P		32
Plantae	Flora	Rhamnaceae	5576	<i>Pomaderris cotoneaster</i>	Cotoneaster Pomaderris	E1,P	E	10
Plantae	Flora	Rhamnaceae	9484	<i>Pomaderris elachophylla</i>	Lacy Pomaderris	E1,P		4
Plantae	Flora	Rhamnaceae	9528	<i>Pomaderris gilmourii</i> <i>subsp. cana</i>	Grey Deua Pomaderris	V,P	V	3
Plantae	Flora	Rhamnaceae	5588	<i>Pomaderris pallida</i>	Pale Pomaderris	V,P	V	3
Plantae	Flora	Rhamnaceae	8339	<i>Pomaderris parrisiae</i>	Parris' Pomaderris	V,P	V	9
Plantae	Flora	Rubiaceae	5680	<i>Galium australe</i>	Tangled Bedstraw	E1,P		3
Plantae	Flora	Rutaceae	5738	<i>Boronia deanei</i>	Deane's Boronia	V,P	V	7
Plantae	Flora	Rutaceae	5769	<i>Correa baeuerlenii</i>	Chef's Cap Correa	V,P	V	172
Plantae	Flora	Rutaceae	13752	<i>Correa lawrenceana</i> <i>subsp. genoensis</i>	Genoa River Correa	E1,P	E	2
Plantae	Flora	Rutaceae	10735	<i>Leionema ralstonii</i>	Ralston's Leionema	V,P	V	122
Plantae	Flora	Rutaceae	10741	<i>Nematolepis</i> <i>rhytidophylla</i>	Nalbaugh Nematolepis	V,P	V	12
Plantae	Flora	Rutaceae	8304	^^ <i>Zieria adenophora</i>	Araluen Zieria	E4A,P,2	E	4
Plantae	Flora	Rutaceae	9489	^^ <i>Zieria buxijugum</i>	Box Range Zieria	E4A,P,2	E	6
Plantae	Flora	Rutaceae	9492	^^ <i>Zieria formosa</i>	Shapely Zieria	E4A,P,2	E	12
Plantae	Flora	Rutaceae	9595	^^ <i>Zieria parrisiae</i>	Parris' Zieria	E4A,P,2	E	7
Plantae	Flora	Rutaceae	9530	<i>Zieria tuberculata</i>	Warty Zieria	V,P	V	38
Plantae	Flora	Santalaceae	5871	<i>Thesium australe</i>	Austral Toadflax	V,P	V	7
Plantae	Flora	Violaceae	9499	<i>Viola cleistogamoides</i>	Hidden Violet	E1,P,3		14

Community	<i>Araluen Scarp Grassy Forest in the South East Corner Bioregion</i>	Araluen Scarp Grassy Forest in the South East Corner Bioregion	E3		K
Community	<i>Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions</i>	Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions	E3		K
Community	<i>Brogo Wet Vine Forest in the South East Corner Bioregion</i>	Brogo Wet Vine Forest in the South East Corner Bioregion	E3		K
Community	<i>Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3	V	K
Community	<i>Dry Rainforest of the South East Forests in the South East Corner Bioregion</i>	Dry Rainforest of the South East Forests in the South East Corner Bioregion	E3		K
Community	<i>Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K
Community	<i>Lowland Grassy Woodland in the South East Corner Bioregion</i>	Lowland Grassy Woodland in the South East Corner Bioregion	E3	CE	K

Community	<i>Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions</i>	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	K
Community	<i>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K
Community	<i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K

Community	<i>Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions</i>	Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions	E3		K
Community	<i>Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions</i>	Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	E3		K
Community	<i>White Box Yellow Box Blakely's Red Gum Woodland</i>	White Box Yellow Box Blakely's Red Gum Woodland	E3	CE	K

Priority weeds for the South East

Note: this region includes the local council areas of Bega Valley, Eurobodalla, Goulburn Mulwaree, Hilltops (eastern), Kiama, Queanbeyan-Palerang Regional, Shellharbour, Shoalhaven, Snowy Monaro Regional, Upper Lachlan, Wingecarribee, Wollongong and Yass Valley.

[Select another region](#)

Weed

Duty

All plants

General Biosecurity Duty

All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

[African boxthorn](#)

Lycium ferocissimum

Prohibition on dealings

Must not be imported into the State or sold

[African lovegrass](#)

Eragrostis curvula

Regional Recommended Measure

Land managers should mitigate spread from their land.

[Alligator weed](#)

Alternanthera philoxeroides

Prohibition on dealings

Must not be imported into the State or sold

[Alligator weed](#)

Alternanthera philoxeroides

Biosecurity Zone

The Alligator Weed Biosecurity Zone is established for all land within the state except land in the following regions: Greater Sydney; Hunter (but only in the local government areas of City of Lake Macquarie, City of Maitland, City of Newcastle or Port Stephens).

Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

[Anchored water hyacinth](#)

Eichhornia azurea

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries



www.dpi.nsw.gov.au



[Home](#) > [Topics](#) > [Heritage places and items](#) > [Search for heritage](#)

Search for NSW heritage

[Return to search page where you can refine/broaden your search.](#)

Statutory listed items

Information and items listed in the State Heritage Inventory come from a number of sources. This means that there may be several entries for the same heritage item in the database. For clarity, the search results have been divided into three sections.

- **Section 1** - contains Aboriginal Places declared by the **Minister for the Environment** under the National Parks and Wildlife Act. This information is provided by the Heritage Division.
- **Section 2** - contains heritage items listed by the **Heritage Council of NSW** under the NSW Heritage Act. This includes listing on the State Heritage Register, an Interim Heritage Order or protected under section 136 of the NSW Heritage Act. This information is provided by the Heritage Division.
- **Section 3** - contains items listed by **local councils** on Local Environmental Plans under the Environmental Planning and Assessment Act, 1979 and **State government agencies** under s.170 of the Heritage Act. This information is provided by local councils and State government agencies.

Section 1. Aboriginal Places listed under the National Parks and Wildlife Act.

Your search did not return any matching results.

Section 2. Items listed under the NSW Heritage Act.

Your search returned 1 record.

Item name	Address	Suburb	LGA	SHR
Courunga	Monaro Street	Merimbula	Bega Valley	00235

Section 3. Items listed by Local Government and State Agencies.

Your search returned 9 records.

Item name	Address	Suburb	LGA	Information source
Courunga House and grounds	20 Monaro Street	Merimbula	Bega Valley	LGOV
Fishermen's Lookout	Lake Street	Merimbula	Bega Valley	LGOV
Merimbula Wharf and cargo sheds	Wharf Street on Long Point	Merimbula	Bega Valley	LGOV
Mitchie's wharf and shed	Fishpen	Merimbula	Bega Valley	LGOV
Old School Museum	85-87 Main Street	Merimbula	Bega Valley	LGOV
Residence	2 Main Street	Merimbula	Bega Valley	LGOV
Residence	45 Main Street	Merimbula	Bega Valley	LGOV
Trolley Way Mirador Tramway, Pages Creek Dam	Off Mirador Drive	Merimbula	Bega Valley	LGOV
Twyford Hall	16 Market Street	Merimbula	Bega Valley	LGOV

There was a total of 10 records matching your search criteria.

Key:

LGA = Local Government Area

GAZ= NSW Government Gazette (statutory listings prior to 1997), HGA = Heritage Grant Application, HS = Heritage Study,

LGOV = Local Government, SGOV = State Government Agency.

Note: While the Heritage Division seeks to keep the Inventory up to date, it is reliant on State agencies and local councils to provide their data. Always check with the relevant State agency or local council for the most up-to-date information.

Search Results

4 results found.

Bournda National Park		Tathra, NSW, Australia	(Interim List) Register of the National Estate (Non-statutory archive)
Bournda Nature Reserve	Kalaru Merimbula Rd	Wolumla, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
Courunga House, Grounds and Trees	Monaro St	Tura Beach, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)
School and Residence (former)	85-87 Main St	Merimbula, NSW, Australia	(Registered) Register of the National Estate (Non-statutory archive)

Report Produced: Mon Nov 20 15:12:51 2017

Nghenvironmental-Bega

Date: 20 November 2017

PO 470

Bega New South Wales 2550

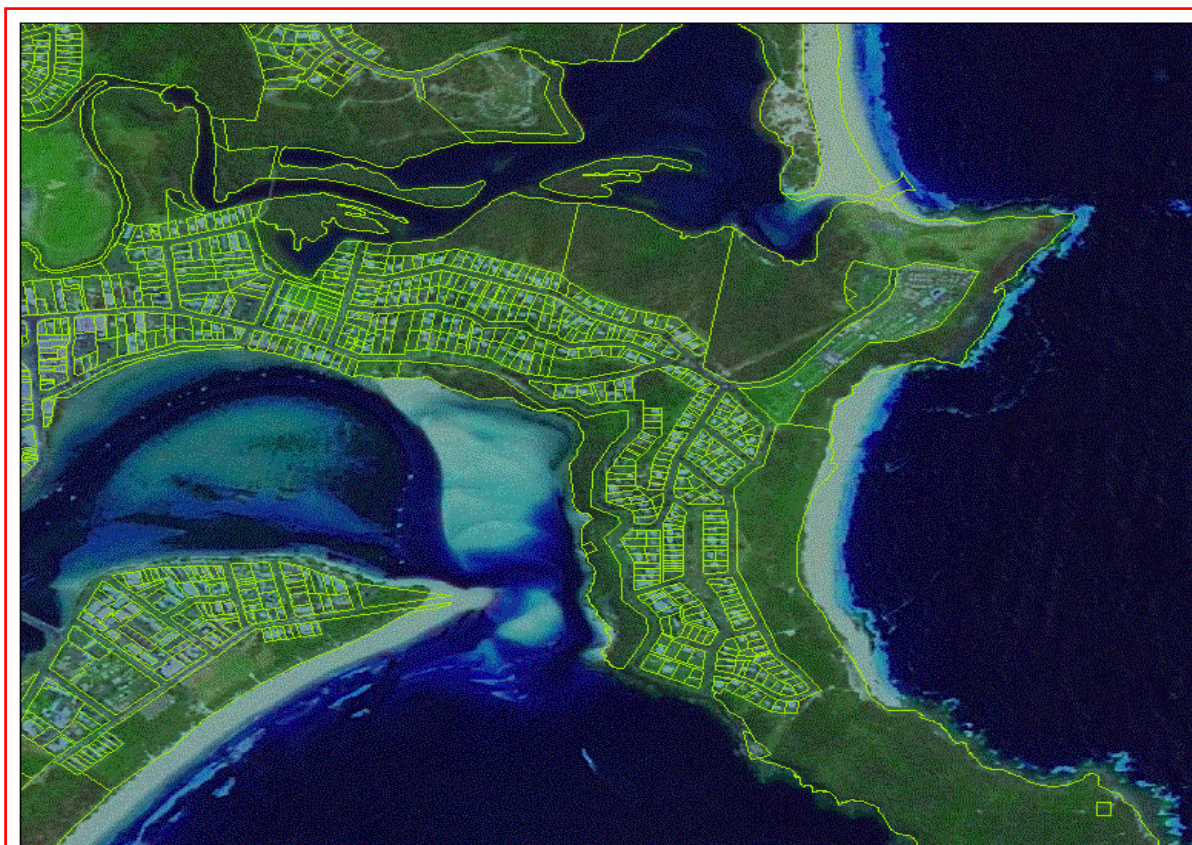
Attention: Jane Blomfield

Email: jane.b@nghenvironmental.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -36.8985, 149.9108 - Lat, Long To : -36.8816, 149.9376 with a Buffer of 50 meters, conducted by Jane Blomfield on 20 November 2017.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

19	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(http://www.nsw.gov.au/gazette\)](http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

APPENDIX C

Preliminary Traffic Engineering Comments (by O'Brien Traffic)



Suite 2.03, 789 Toorak Road
Hawthorn East Victoria 3123

T: +61 3 9804 3610
W: obrientraffic.com

21 December 2017

Glenn Berrill
TBLD
gberrill@tbld.com.au

Dear Glenn

LAKE STREET SHARED TRAIL, MERIMBULA

I refer to your request for an initial assessment of existing conditions and shared trail options for Lake Street in Merimbula.

THE PROJECT

Bega Valley Shire Council requires a design options study and related design works for the provision of approximately 1.7km long shared-use trail adjacent to Lake Street, Merimbula from Rotary Park to Merimbula Wharf.

The proposal will be an all-access trail for use by pedestrians, cyclists, joggers, parents with prams, disabled and mobility devices.

Two options are currently being considered:

- Option A: One-way road (southbound) and using the northbound lane for a shared trail
- Option B: Retaining the two-way road and providing a shared trail on a boardwalk (or similar)

EXISTING CONDITIONS

Following inspection of the site and review of data, the following comments are offered in relation to existing conditions:

- Default urban speed limit of 50km/h
- Carriageway width of approximately 7 – 7.3m
- No footpaths along Lake Street within the subject area

- Traffic data provided by Council (collected in July 2017) indicates:
 - Lake Street (50m south of Main Street)
 - 671 vehicles per day (374 northbound, 297 southbound)
 - 85th percentile speed: 46km/h northbound, 45km/h southbound

85TH PERCENTILE SPEED = 85% OF VEHICLES TRAVEL AT OR BELOW THIS SPEED (AN INDICATION OF SPEED LIMIT ADHERENCE)

- Lake Street (100m south of Wharf Street)
 - 384 vehicles per day (191 northbound, 193 southbound)
 - 85th percentile speed: 48km/h northbound, 46km/h southbound

The volume data indicates:

- The traffic volume in the southern section of Lake Street is approximately 57% of the traffic volume in the northern section;
- Lake Street is operating within its operational capacity along the entire length;
- Speed limit adherence is good;

It is noted that traffic volumes would be expected to increase during peak periods (i.e. summer etc).

- Along Lake Street, various driveways are angled to allow for convenient access when travelling southbound (see **Figure 1**). It is understood that the vehicles associated with many of these dwellings can turn around on their property and exit in a forward direction



FIGURE 1: LAKE STREET DRIVEWAY ORIENTATION (PHOTO TAKEN LOOKING SOUTH)

- A school bus service operates along Lake Street. We have been advised by Council that this service is circular and only travels northbound along Lake Street. An existing

bus stop is provided just north of the Bar Beach car park access (see **Figure 2**). It is noted that informal / illegal parking occurred adjacent this bus stop which would impact the ability for a bus to stop and for students to board / alight.



FIGURE 2: BUS STOP LOCATED ON LAKE STREET

- Council advises that service vehicles up to 8.8 metres are expected to utilise Lake Street (together with the school bus).
- No designated parking is provided along Lake Street. It is understood that at peak periods (summer etc), parking demands are very high particularly near Bar Beach and the Wharf. Parking occurs in an ad-hoc manner in any area where room is available (see **Figure 3**). Some signage such as “No Stopping Any Time” and “P” has been erected.



FIGURE 3: EXAMPLE OF AD-HOC PARKING ALONG LAKE STREET

- It is noted that there are some significant drop offs that are unstable and steep located in close proximity to the edge of carriageway. **Figure 4** provides an example.



FIGURE 4: EXAMPLE OF DROP OFF (ADJACENT TO CARRIAGEWAY)

- The intersection of Lake Street and the Bar Beach car park provides poor grading (see **Figure 5**).



FIGURE 5: LAKE STREET / BAR BEACH CAR PARK INTERSECTION FACING SOUTH

- Wharf Street / Lake Street has an extensive area of paving (See **Figures 6 and 7**). This amount of pavement is not required to cater for the vehicle types using the intersection and encourages increased vehicle speeds entering and exiting Wharf Street. It is recommended that this intersection should be upgraded to reduce the amount of paving and improve lane discipline regardless of the option selected.



FIGURE 6: WHARF STREET / LAKE STREET INTERSECTION FACING WEST



FIGURE 7: WHARF STREET / LAKE STREET INTERSECTION

- The sheer rock formations along Lake Street leading to the Wharf (see **Figure 8**) means that the road area is unable to be widened and therefore a shared area should be considered regardless of the option selected. Shared zones will be considered for approval where adequate footpaths cannot be provided within the road reserve and where there are very low numbers of slow moving vehicles. It is considered that this location would warrant a shared zone treatment. RMS approval for a shared zone (which includes a 10km/h speed limit) is required (Technical Direction TTD 2016/001 – *Design and implementation of shared zones including provision for parking* provides guidance on design and process).



FIGURE 8: LAKE STREET - LOOKING NORTH FROM THE WHARF

- Under existing conditions, the Wharf can be accessed via Lake Street or via Cliff Street / Wyeeboo Street / Hill Street (see **Figure 9**). It is noted that residents of Hill Street are currently provided with a pseudo one-way operation due to the large central median provided (see **Figure 10**).



FIGURE 9: EXISTING ROUTES TO THE WHARF



FIGURE 10: PSEUDO ONE WAY OPERATION OF HILL STREET

OPTION A – SOUTHBOUND ONE-WAY (SHARED PATH USING NORTHBOUND LANE)

The following impacts on existing conditions would be experienced if Option A was to be adopted:

- Default urban speed limit of 50km/h – No change however there is potential for a future speed limit reduction to 40km/h if the road environment is further calmed.
- Carriageway width of approximately 7 – 7.3m would be reduced to one-way to provide sufficient width for a shared path as well as some provision for formalised parking. The existing carriageway width could be used without the need for a boardwalk.
- Orientation of driveways – splays for existing driveways may need to be increased to ensure vehicles can enter or exit to the required direction. Alternatively, exiting vehicles may need to overhang the proposed shared path (swept path analysis will confirm this).
- School bus service along Lake Street – the operation would need to be reversed (i.e. southbound as opposed to northbound) in consultation with the school / bus operator. Appropriate bus bays on the east side of Lake Street would need to be provided to ensure students have a safe location to wait and board.
- No formalised parking – any excess road width could be converted to formalised parking which is expected to increase the overall supply and improve safety. Parallel parking on both side of the road or angle parking could be parking facility options. It is noted that as Lake Street has various bends and some areas may not be appropriate to

provide formalised parking as sight lines may not be adequate (see **Figure 11** as an example – Chainage 310).



FIGURE 11: LOOKING NORTH (CHAINAGE 310) - OBSTRUCTED SIGHT LINES OF SOUTHBOUND TRAFFIC

- Vehicles wishing to travel to the north will be diverted to Cliff Street / Wyeeboo Street / Hill Street (see options to access these streets from Lake Street in **Figure 12**). This will increase the existing volumes by up to 374 vehicles per day (based on July 2017 volumes). Although this increase is expected to be readily absorbed, existing traffic volumes in these streets will require confirmation.

OPTION B – MAINTAIN TWO WAY (SHARED PATH ON SEPARATE BOARDWALK OR TRAIL)

- Default urban speed limit of 50km/h – No change however there is potential for a future speed limit reduction to 40km/h if the road environment is further calmed.
- Carriageway width of approximately 7 – 7.3m – No change
- Orientation of driveways – No change

- School bus service along Lake Street – No change
- No formalised parking – No change
- Traffic volumes – No change

OPTION TO CLOSE PART OF LAKE STREET

An option to close part of Lake Street (north of Wharf Street) has been suggested.

The following issues are noted:

- Access to residential properties will need to be retained (i.e. vehicles will still need to utilise some of the area)
- A turning area at both ends of the closure would need to be provided. It is unlikely that sufficient space would be able to be provided.
- Closing a road is a statutory process. The NSW Department of Industry (Lands) provides some guidance for timing. An example is provided on their website for closure of a Crown road. The estimated time to undertake the closure process is 10 – 11 months.

Should you have any queries, please do not hesitate to contact me on 9804-3610.

Yours sincerely

O'BRIEN TRAFFIC

A handwritten signature in black ink, appearing to read 'Matt Harridge'.

Matt Harridge
Director

APPENDIX D

Options Analysis Concept Design Cost Estimate (by MDA Australia)

14 February 2018

Address	Level 3, 160 Pacific Highway North Sydney NSW 2060
Phone	61 2 9929 8000
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Email	sydney@mda-aust.com.au
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Joshua Marinoni
Landscape Architect
Thompson Berrill Landscape Design P/L
PO Box 665 | Manly, NSW 2095

Dear Joshua,

LAKE STREET SHARED PATH, MERIMBULA

CONCEPT ESTIMATE

Please find attached Concept Estimate for the Lake Street Shared Path, Merimbula for your perusal.

If you require further clarifications regarding this report, please do not hesitate to contact the undersigned.

Yours faithfully,

A handwritten signature in black ink, appearing to read "Bernard Panganiban".

BERNARD PANGANIBAN
Quantity Surveyor

**LAKE STREET SHARED PATH
MERIMBULA**

for

Thompson Berrill Landscape Design P/L

CONCEPT ESTIMATE

14 February 2018

Prepared for: Joshua Marinoni
Thompson Berrill Landscape Design P/L
PO Box 665 | Manly, NSW 2095

Prepared by: MDA AUSTRALIA PTY LTD
Level 3, 160 Pacific Highway
North Sydney, NSW 2060
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- 1.0 Summary
- 2.0 Scope of Work
- 3.0 Documentation
- 4.0 Notes and Assumptions
- 5.0 Exclusions

APPENDICES

- Appendix A COST ESTIMATE SUMMARY
- Appendix B COST ESTIMATE DETAIL BREAKUP

1.0 SUMMARY

This Concept Estimate is prepared for Joshua Marinoni based on the current documentation provided for the design development phase and is priced at current market rates.

The total estimated cost for the proposed options in this Concept Estimate, for Lake Street Shared Path, are \$890,946.00(Option A), \$4,677,241.00(Option B) & \$3,100,490.00(Option C) (excl. GST).

Your attention is drawn to the notes, assumptions and exclusions noted below which may require further consideration.

2.0 SCOPE OF WORK

The scope of work included within this estimate comprises but not limited to the following:-

Option A

- Construction of on-ground concrete path over existing asphalt surface and shoulder
- Construction of concrete stand up kerb
- AC paving to street parking locations and reconfiguration of school bus stop & pullover bay
- Supply & installation of roadmarkings and signage
- Minor service pits protection and lifting including drainage pipe repairs and outlets

Option B

- Piling works to underside of ground beams including pile caps
- Construction of ground beams along road adjacent to cantilevered boardwalk
- AC paving restoration to locations of ground beams
- Shotcreting and rock anchoring to slopes along cantilevered boardwalk
- Construction of elevated & gully boardwalks comprising of steel posts, vertical infills, FRP deck, kick rails, timber sub-floor and timber piles
- Construction of cantilevered boardwalks comprising of steel posts, vertical infills, FRP deck, kick rails, stainless steel sub-floor structure and posts
- Construction of on-ground concrete path over existing asphalt surface and shoulder
- Construction of concrete stand up kerb
- AC paving to street parking locations and reconfiguration of school bus stop & pullover bay
- Supply & installation of roadmarkings and signage
- Minor service pits protection and lifting including drainage pipe repairs and outlets

Option C

- Construction works based on the hybrid of Options A & B, where Lake Street remains two way road to Bar Beach (as per Option B) and one way road from Bar Beach to Wharf Street (as per Option A)

3.0 DOCUMENTS USED

The following documents were used in the costing of this Concept Estimate:-

- TBLD comments dated 13/02/2018
- TBLD Lake Street Shared Trail Feasibility Study Plan received 6 January 2018 (Option A, B & C).

4.0 NOTES AND ASSUMPTIONS

- Prices are as of current market rates and no allowance has been made for escalation during construction
- Existing asphalt pavement to be overlaid with concrete Trail assumed to achieve desired load-carrying capacity and no further repairs required
- Allowed traffic control using portable traffic lights for a 6-month (Option A), 9-month (Option B & C) construction duration
- Allowed for batter along edges of new concrete path to existing ground surface level
- Allowed for 40mm thk AC paving over 200mm deep sub-base material to off-street parking
- Allowed for 50mm thk AC paving over 250mm deep sub-base material to bus pullover bay
- Scope of works for proposed 20km/hr shared zone only roadmarkings and signage as per TBLD 9/02/2018
- Gully boardwalk optional in Option A but included in Option B & C
- Allowed for stainless steel sub-floor framing (based on Tathra Headland Walkway) and supports to cantilevered boardwalks (Option B)
- Allowed for 300mm diameter timber driven piles to elevated boardwalks
- Allowed for timber sub-floor framing and kick rails to elevated boardwalks
- Allowed for 38d FRP mesh deck to all boardwalks
- Allowed for stainless steel barrier along boardwalks comprising of posts and vertical infills
- Allowed for rock anchoring and shotcrete to banks along proposed location for cantilevered boardwalk (Option B)
- Allowed for concrete ground beams, piles and pile caps to road along proposed location for cantilevered boardwalk (Option B)
- Allowed for thermoplastic markings to concrete and bitumen pavings
- No cost allowed for stabilization of steep banks except for areas where cantilevered boardwalk shall be constructed
- Optional budget allocation (not included in sum) of \$300,000 for future lookout deck as per TBLD 13/02/2018

5.0 EXCLUSIONS

- GST
- Authorities' fees
- Consultancy fees
- Project Management fee
- Disposal of any hazardous & contaminated materials (if found)
- Improvement of pedestrian connections to Djirringani Peoples Walking Trail
- Revegetation works
- Parking meters
- Guard rails
- Electrical services and street lightings

APPENDIX A

COST ESTIMATE SUMMARY

Lake Street Shared Path

Job Name : 4835 CONCEPT R1
Client's Name: TBLD

Job Description

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Trd No.	Trade Description	Trade %	Cost/m2	Trade Total
1	OPTION A: ONE WAY ROAD	10.28		890,946
2	OPTION B: TWO WAY ROAD	53.96		4,677,241
3	OPTION C: 1 + 2 WAY ROAD	35.77		3,100,490
4				
5	EXCLUSIONS:-			
6	- GST			
7	- Authorities fees			
8	- Consultancy fees			
9	- Project Management fee			
10	- Disposal of any hazardous & contaminated materials (if found)			
11	- Improvement of pedestrian connections to Djirringani Peoples Walking Trail			
12	- Revegetation works			
13	- Parking meters			
14	- Guard rails			
15	- Electrical services and street lightings			
16				
17	DOCUMENTS USED:-			
18	- TBLD comments dated 13/02/2018			
19	- TBLD Lake Street Shared Trail Feasibility Study Plan received 6 January 2018 (Option A, B & C)			
20				
21	NOTES & ASSUMPTIONS:-			
22	- Prices are as of current market rates and no allowance has been made for escalation during construction			
23	- Existing asphalt pavement to be overlaid with concrete trail assumed to achieve desired load-carrying capacity and no further repairs required			
24	- Allowed traffic control using portable traffic lights for a 6-month (Option A), 9-month (Option B & C) construction duration			
25	- Allowed for batter along edges of new concrete path to existing ground surface level			
26	- Allowed for 40mm thk AC paving over 200mm deep sub-base material to off-street parking			
27	- Allowed for 50mm thk AC paving over 250mm deep sub-base material to bus pullover bay			
28	- Scope of works for proposed 20km/hr shared zone only roadmarkings and signage as per TBLD 9/02/2018			

Lake Street Shared Path

Job Name :	<u>4835 CONCEPT R1</u>	Job Description
Client's Name:	<u>TBLD</u>	Concept Estimate
		Lake Street Shared Path
		Merimbula
		14 February 2018

Trd No.	Trade Description	Trade %	Cost/m2	Trade Total
29	- Gully boardwalk optional in Option A but included in Option B & C			
30	- Allowed for stainless steel sub-floor framing (based on Tathra Headland Walkway) and supports to cantilevered boardwalks (Option B)			
31	- Allowed for 300mm diameter timber driven piles to elevated boardwalks			
32	- Allowed for timber sub-floor framing and kick rails to elevated boardwalks			
33	- Allowed for 38d FRP mesh deck to all boardwalks			
34	- Allowed for stainless steel barrier along boardwalks comprising of posts and vertical infills			
35	- Allowed for rock anchoring and shotcrete to banks along proposed location for cantilevered boardwalk (Option B)			
36	- Allowed for concrete ground beams, piles and pile caps to road along proposed location for cantilevered boardwalk (Option B)			
37	- Allowed for thermoplastic markings to concrete and bitumen pavings			
38	- No cost allowed for stabilization of steep banks except for areas where cantilevered boardwalk shall be constructed			
39	- Optional budget allocation (not included in sum) of \$300,000 for future lookout deck as per TBLD 13/02/2018			
		100.00		8,668,677

Final Total : \$ 8,668,677

APPENDIX B

COST ESTIMATE DETAIL BREAKUP

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 1 <u>OPTION A: ONE WAY ROAD</u>					
	<u>DEMOLITION & SITE PREPARATION</u>				
1	Note: Existing asphalt pavement is assumed to achieve desired load-carrying capacity and no further repair or patching works is required		Note		
2	Note: Retain existing drainage pits and pipes		Note		
3	Saw cut existing asphalt pavement to make way for stripping	1,345.00	m	8.00	10,760.00
4	Strip off existing asphalt paving and dispose off-site	1,192.00	m2	30.00	35,760.00
5	Allow for removal of existing road signage	1.00	Item	1,200.00	1,200.00
6	Allow for clearing of site vegetation and cart away	1.00	Item	2,065.00	2,065.00
7	Allow for making good adjacent road & walkways	1.00	Item	5,000.00	5,000.00
8	Subtotal to DEMOLITION & SITE PREPARATION				<u>54,785.00</u>
	<u>FOUNDATIONS & EARTHWORKS</u>				
9	Note: Other scope for foundation and earthworks measured within 'EXTERNAL STRUCTURES'		Note		
10	Excavate trenches allow installation of stand-up kerb, assume 200Wx200D	54.00	m3	60.00	3,240.00
11	Excavate to reduce levels (to shared trail along off-street parking)	255.00	m3	30.00	7,650.00
12	Balanced cut & fill including compaction over existing site (to proposed off-street parking and bus stop)	215.00	m3	25.00	5,375.00
13	Subtotal to FOUNDATION & EARTHWORKS				<u>16,265.00</u>
	<u>EXTERNAL STRUCTURES</u>				
	<u>On-ground Shared Trail 2.5m Wide (A-CH.00 to 1340)</u>				
14	Note: To be laid over existing asphalt surface		Note		
15	Stabilised granitic sub-base layer	2,300.00	m2	4.00	9,200.00
16	Allow for sub-base to stand-up kerb, assume 150mm deep	185.00	m2	18.00	3,330.00
17	On-ground sand coloured concrete path with broom finish N40 2.5m wide 125mm thick including joints, assume SL82 mesh throughout	2,300.00	m2	100.00	230,000.00
18	Concrete stand-up kerb 150mm high	920.00	m	89.00	81,880.00
19	Allow for batter along edges of concrete path to existing ground surface level	920.00	m	20.00	18,400.00
20	Subtotal				<u>342,810.00</u>

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 1 <u>OPTION A: ONE WAY ROAD</u> (Continued)					
	On-ground Shared Trail 2.5m Along Off-Street Parking & Bus stop (A-CH.300 to 360, A-CH.705 to 850, A-CH.850 to 900, A-CH.915 to 985, A-CH.1005 to 1065, A-CH.1165 to 1200)				
21	Note: To be constructed on existing road shoulder		Note		
22	Allow for compaction of existing subgrade	1,050.00	m2	4.00	4,200.00
23	Allow for sub-base material to on-ground concrete path, assume 150mm deep	1,050.00	m2	18.00	18,900.00
24	On-ground sand coloured concrete path with broom finish N40 2.5m wide 125mm thick including joints, assume SL82 mesh throughout	1,050.00	m2	100.00	105,000.00
25	Concrete stand-up kerb 150mm high	420.00	m	89.00	37,380.00
26	Subtotal				<u>165,480.00</u>
	Off-Street Parking 2.4m (A-CH.300 to 360, A-CH.705 to 850, A-CH.915 to 985, A-CH.1005 to 1065, A-CH.1165 to 1200)				
27	Allow for compaction of existing subgrade	888.00	m2	4.00	3,552.00
28	Allow for sub-base material to on-ground concrete path, assume 200mm deep	888.00	m2	23.00	20,424.00
29	AC paving comprising of bitumen sealing and hot bituminous concrete including tack coat, assume 3-coat seal & 40mm thick AC wearing course	888.00	m2	35.00	31,080.00
30	Subtotal				<u>55,056.00</u>
	Bus Stop Pullover Bay (A-CH.850 to 900)				
31	Allow for compaction of existing subgrade	120.00	m2	4.00	480.00
32	Allow for sub-base material to on-ground concrete path, assume 250mm deep	120.00	m2	28.00	3,360.00
33	AC paving comprising of bitumen sealing and hot bituminous concrete including tack coat, assume 3-coat seal & 50mm thick AC wearing course	120.00	m2	38.00	4,560.00
34	Subtotal				<u>8,400.00</u>
	Proposed 20km/hr Shared Zone (200m - From Wharf St. to Merimbula Wharf)				
35	Note: Scope of works only roadmarkings and signage, refer to 'ROADMARKINGS & SIGNAGE' below		Note		
36	Subtotal				<u>0.00</u>
37	Subtotal to EXTERNAL STRUCTURES				<u>571,746.00</u>

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 1 OPTION A: ONE WAY ROAD (Continued)					
	<u>ROADMARKINGS & SIGNAGE</u>				
	Roadmarkings				
38	Allow for thermoplastic marking of bitumen paving (A-CH.00 to 1340)	1.00	Item	5,000.00	5,000.00
39	Allow for thermoplastic marking of concrete path (ditto)	1.00	Item	3,500.00	3,500.00
40	Allow for round markings to proposed 20km/hr Shared Zone	1.00	Item	1,600.00	1,600.00
41	Subtotal				<u>10,100.00</u>
	Signage				
42	Allow signage for roadway, parking, bus, etc. (assume 15 signage including concrete base)	1.00	Item	6,000.00	6,000.00
43	Allow signage to proposed 20km/hr Shared Zone (assume 2 signage including concrete base)	1.00	Item	800.00	800.00
44	Subtotal				<u>6,800.00</u>
45	Subtotal to ROADMARKINGS & SIGNAGE				<u>16,900.00</u>
	<u>STREET FURNITURE</u>				
46	Allow for timber bench seating to Bus Stop area	1.00	no	3,500.00	3,500.00
47	Subtotal to STREET FURNITURE				<u>3,500.00</u>
	<u>EXTERNAL SERVICES</u>				
48	Note: No works for electrical services including street lightings required		Note		
49	Allow for minor service pit protection & lifting (electric/water/sewer)	1.00	Item	10,000.00	10,000.00
50	Allow for drainage pipe repairs and outlets	1.00	Item	5,000.00	5,000.00
51	Subtotal to EXTERNAL SERVICES				<u>15,000.00</u>
52	NET CONSTRUCTION COST				<u>678,196.00</u>
53	Contingency (10%)	1.00	Item	67,819.60	67,819.60
54	Preliminaries OH&P (incl. traffic control for 6 months)	1.00	Item	144,930.00	144,930.00
55	TOTAL CONSTRUCTION COST				<u>890,945.60</u>
56	Professional Fees (excl.)				EXCL
57	TOTAL CONCEPT ESTIMATE (excl. GST)				<u>890,945.60</u>
58					
59	OPTIONAL (not included in sum)				
60	Gully Boardwalk 2.5m Wide (A-CH.240 to 330, A-CH.650 to 720)		Item	431,209.00	

Lake Street Shared Path

Job Name :	<u>4835 CONCEPT R1</u>	<u>Job Description</u>
Client's Name:	<u>TBLD</u>	Concept Estimate Lake Street Shared Path Merimbula 14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 1 <u>OPTION A: ONE WAY ROAD</u> (Continued)					
61	Future elevated lookout deck including barriers, access, seating & signages		Item	300,000.00	
<u>OPTION A: ONE WAY ROAD</u> Total :					890,945.60

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 2 <u>OPTION B: TWO WAY ROAD</u>					
	<u>DEMOLITION & SITE PREPARATION</u>				
1	Note: Existing asphalt pavement is assumed to achieve desired load-carrying capacity and no further repair or patching works is required		Note		
2	Note: Retain existing drainage pits and pipes		Note		
3	Saw cut existing asphalt pavement to make way for stripping	905.00	m	8.00	7,240.00
4	Strip off existing asphalt paving and dispose off-site	299.00	m2	30.00	8,970.00
5	Allow for removal of existing road signage	1.00	Item	1,200.00	1,200.00
6	Allow for clearing of site vegetation including tree removal and trimming and cart away	1.00	Item	10,000.00	10,000.00
7	Allow for making good adjacent road & walkways	1.00	Item	5,000.00	5,000.00
8	Subtotal DEMOLITION & SITE PREPARATION				<u>32,410.00</u>
	<u>FOUNDATIONS & EARTHWORKS</u>				
9	Note: Other scope for foundation and earthworks measured within 'EXTERNAL STRUCTURES'		Note		
10	Excavate trenches allow installation of stand-up kerb, assume 200Wx200D	18.00	m3	60.00	1,080.00
11	Excavate to reduce levels (to on-ground shared trail and bus pullover bay)	337.00	m3	30.00	10,110.00
	<u>Ground beams 300x300</u>				
12	Excavate trenches allow installation of ground beams in rock	106.00	m3	100.00	10,600.00
13	Allow for concrete piles to underside of ground beams, assume 450mm dia bored piles at 75kg/m3 ratio	376.00	m	272.00	102,272.00
14	Allow for concrete pile caps, assume 2500x500x500 N40 at 90kg/m3 ratio	30.00	m3	1,250.00	37,500.00
15	Concrete beams 300x300mm spaced at 3m c/c as shown in Section 7 of Option B drawing including reinforcement, formwork, planking and strutting, assume N40 & 90kg/m3 ratio (to location of cantilevered boardwalk)	53.00	m3	1,250.00	66,250.00
16	Rock anchors at including recessed fixing plates & connections as shown in Section 7, assume 3000mm c/c anchor spacing and 340-770kN working load (A-CH.1200 to 1340)	141.00	no	1,265.00	178,365.00
17	Provide shotcrete wall, assume N40 3500Hx150T with SL92 mesh (ditto)	490.00	m2	85.00	41,650.00
18	Subtotal				<u>436,637.00</u>
19	Subtotal FOUNDATION & EARTHWORKS				<u>447,827.00</u>

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 2 <u>OPTION B: TWO WAY ROAD</u> (Continued)					
	EXTERNAL STRUCTURES				
	Low Elevated Boardwalk 2.5m Wide (A-CH.75 to 90, A-CH.115 to 240, A-CH.350 to 520, A-CH.520 to 650, A-CH.850 to 900, A-CH.985 to 1010, A-CH.1070 to 1160)				
20	H6 driven piles, assume 300mm dia. pile at 4m c/c with 4000mm maximum penetration depth from ground	1,520.00	m	256.00	389,120.00
21	Elevated boardwalk 2.5m wide fixed to existing ground, constructed of H6 treated pine sub-floor with 38d FRP deck including kick rails and all necessary fixings, max 1m from ground surface (Gully 1 & 2)	605.00	m	1,357.00	820,985.00
22	Allow for 1200mm high barrier comprising of 50mm dia. SS top rail, 80x80 SS SHS barrier posts spaced at 1760 max, infill panels in SS frame and vertical bars (to both sides of boardwalk)	605.00	m	1,310.00	792,550.00
23	Subtotal				<u>2,002,655.00</u>
	Gully Boardwalk 2.5m Wide (A-CH.240 to 330, A-CH.650 to 720)				
24	H6 driven piles, assume 300mm dia. pile at 4m c/c with 4000mm maximum penetration depth from ground	403.00	m	256.00	103,168.00
25	Gully boardwalk 2.5m wide fixed to existing ground, constructed of H6 treated pine sub-floor with 38d FRP deck including kick rails and all necessary fixings, 1.5-3m from ground surface (Gully 1 & 2)	123.00	m	1,357.00	166,911.00
26	Allow for 1200mm high barrier comprising of 50mm dia. SS top rail, 80x80 SS SHS barrier posts spaced at 1760 max, infill panels in SS frame and vertical bars (to both sides of boardwalk)	123.00	m	1,310.00	161,130.00
27	Subtotal				<u>431,209.00</u>
	On-ground Shared Trail 2.5m Wide (A-CH.0 to 75, A-CH.90 to 115, A-CH.330 to 350, A-CH.720 to 850, A-CH.900 to 985, A-CH.1010 to 1070, A-CH.1160 to 1200)				
28	Note: To be constructed on existing road shoulder		Note		
29	Allow for compaction of existing subgrade	1,088.00	m2	4.00	4,352.00
30	Allow for sub-base material to on-ground concrete path, assume 150mm deep	1,088.00	m2	18.00	19,584.00

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 2 OPTION B: TWO WAY ROAD (Continued)					
31	On-ground sand coloured concrete path with broom finish N40 2.5m wide 125mm thick including joints, assume SL82 mesh throughout	1,088.00	m2	100.00	108,800.00
32	Concrete stand-up kerb 150mm high	435.00	m	89.00	38,715.00
33	Subtotal				<u>171,451.00</u>
	Cantilevered Boardwalk 2.5m Wide (A-CH.1200 to 1340)				
34	Cantilevered boardwalk 2.5m wide comprising of stainless steel sub-floor structure with 38d FRP deck including kick rails and all necessary fixings	140.00	m	2,650.00	371,000.00
35	Allow for 1200mm high barrier comprising of 50mm dia. SS top rail, 80x80 SS SHS barrier posts spaced at 1760 max, infill panels in SS frame and vertical bars (to both sides of boardwalk)	140.00	m	1,310.00	183,400.00
36	Subtotal				<u>554,400.00</u>
	AC Paving Restoration (To areas where ground beams are to be installed)				
37	Note: Demolition to existing asphalt paving included in 'DEMOLITION & SITE PREPARATION'		Note		
38	Note: Excavation included in 'FOUNDATION & EARTHWORKS'		Note		
39	Note: Concrete beams included in 'FOUNDATION & EARTHWORKS'		Note		
40	Allow for sub-base material over concrete beams prior to bitumen installation, assume 200mm thick	200.00	m2	23.00	4,600.00
41	AC paving comprising of bitumen sealing and hot bituminous concrete including tack coat, assume 3-coat seal & 50mm thick AC wearing course	200.00	m2	38.00	7,600.00
42	Subtotal				<u>12,200.00</u>
	Bus Stop Pullover Bay (A-CH.850 to 900)				
43	Allow for compaction of existing subgrade	120.00	m2	4.00	480.00
44	Allow for sub-base material to on-ground concrete path, assume 250mm deep	120.00	m2	28.00	3,360.00
45	AC paving comprising of bitumen sealing and hot bituminous concrete including tack coat, assume 3-coat seal & 50mm thick AC wearing course	120.00	m2	38.00	4,560.00
46	Subtotal				<u>8,400.00</u>

Lake Street Shared Path

Job Name :	<u>4835 CONCEPT R1</u>	Job Description
Client's Name:	<u>TBLD</u>	Concept Estimate Lake Street Shared Path Merimbula 14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 2 <u>OPTION B: TWO WAY ROAD</u> (Continued)					
	Proposed 20km/hr Shared Zone (200m - From Wharf St. to Merimbula Wharf)				
47	Note: Scope of works only roadmarkings and signage, refer to 'ROADMARKINGS & SIGNAGE' below		Note		
48	Subtotal				0.00
49	Subtotal EXTERNAL STRUCTURES				3,180,315.00
	<u>ROADMARKINGS & SIGNAGE</u>				
	Roadmarkings				
50	Allow for thermoplastic marking concrete shared paths and bus pullover bay	1.00	Item	2,500.00	2,500.00
51	Allow for round markings to proposed 20km/hr Shared Zone	1.00	Item	1,600.00	1,600.00
52	Subtotal				4,100.00
	Signage				
53	Allow signage for roadway, parking, bus, etc. (assume 15 signage including concrete base)	1.00	Item	6,000.00	6,000.00
54	Allow signage to proposed 20km/hr Shared Zone (assume 2 signage including concrete base)	1.00	Item	800.00	800.00
55	Subtotal				6,800.00
56	Subtotal ROADMARKINGS & SIGNAGE				10,900.00
	<u>STREET FURNITURE</u>				
57	Allow for timber bench seating seating to Bus Stop area	1.00	no	3,500.00	3,500.00
58	Subtotal STREET FURNITURE				3,500.00
	<u>EXTERNAL SERVICES</u>				
59	Note: No works for electrical services including street lightings required		Note		
60	Allow for minor service pit protection & lifting (electric/water/sewer)	1.00	Item	10,000.00	10,000.00
61	Allow for drainage pipe repairs and outlets	1.00	Item	5,000.00	5,000.00
62	Subtotal EXTERNAL SERVICES				15,000.00
63	NET CONSTRUCTION COST				3,689,952.00
64	Contingency (10%)	1.00	Item	368,995.20	368,995.20
65	Preliminaries OH&P (incl. traffic control for 9 months)	1.00	Item	618,293.00	618,293.00
66	TOTAL CONSTRUCTION COST				4,677,240.20
67	Professional Fees (excl.)				EXCL
68	TOTAL CONCEPT ESTIMATE (excl. GST)				4,677,240.20

Lake Street Shared Path

Job Name :	<u>4835 CONCEPT R1</u>	<u>Job Description</u>
Client's Name:	<u>TBLD</u>	Concept Estimate Lake Street Shared Path Merimbula 14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 2 <u>OPTION B: TWO WAY ROAD</u> (Continued)					
69					
70	OPTIONAL (not included in sum)				
71	Future elevated lookout deck including barriers, access, seating & signages		Item	300,000.00	
<u>OPTION B: TWO WAY ROAD</u> Total :					4,677,240.20

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 3 <u>OPTION C: 1 + 2 WAY ROAD</u>					
	<u>DEMOLITION & SITE PREPARATION</u>				
1	Note: Existing asphalt pavement is assumed to achieve desired load-carrying capacity and no further repair or patching works is required		Note		
2	Note: Retain existing drainage pits and pipes		Note		
3	Saw cut existing asphalt pavement to make way for stripping	695.00	m	8.00	5,560.00
4	Strip off existing asphalt paving and dispose off-site	479.00	m2	30.00	14,370.00
5	Allow for removal of existing road signage	1.00	Item	1,200.00	1,200.00
6	Allow for clearing of site vegetation and cart away	1.00	Item	7,500.00	7,500.00
7	Allow for making good adjacent road & walkways	1.00	Item	4,000.00	4,000.00
8	Subtotal DEMOLITION & SITE PREPARATION				<u>32,630.00</u>
	<u>FOUNDATIONS & EARTHWORKS</u>				
9	Note: Other scope for foundation and earthworks measured within 'EXTERNAL STRUCTURES'		Note		
10	Excavate trenches allow installation of stand-up kerb, assume 200Wx200D	28.00	m3	60.00	1,680.00
11	Excavate to reduce levels (to on-ground shared trail and bus pullover bay)	331.00	m3	30.00	9,930.00
12	Balanced cut & fill including compaction over existing site (to proposed off-street parking and bus stop)	78.00	m3	39.00	3,042.00
13	Subtotal FOUNDATIONS & EARTHWORKS				<u>14,652.00</u>
	<u>EXTERNAL STRUCTURES</u>				
	Low Elevated Boardwalk 2.5m Wide (A-CH.75 to 90, A-CH.115 to 240, A-CH.350 to 520, A-CH.520 to 650, A-CH.850 to 900)				
14	H6 driven piles, assume 300mm dia. pile at 4m c/c with 4000mm maximum penetration depth from ground	1,230.00	m	256.00	314,880.00
15	Elevated boardwalk 2.5m wide fixed to existing ground, constructed of H6 treated pine sub-floor with 38d FRP deck including kick rails and all necessary fixings, max 1m from ground surface (Gully 1 & 2)	490.00	m	1,357.00	664,930.00
16	Allow for 1200mm high barrier comprising of 50mm dia. SS top rail, 80x80 SS SHS barrier posts spaced at 1760 max, infill panels in SS frame and vertical bars (to both sides of boardwalk)	490.00	m	1,310.00	641,900.00

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 3 <u>OPTION C: 1 + 2 WAY ROAD</u> (Continued)					
17	Subtotal				<u>1,621,710.00</u>
	Gully Boardwalk 2.5m Wide (A-CH.240 to 330, A-CH.650 to 720)				
18	H6 driven piles, assume 300mm dia. pile at 4m c/c with 4000mm maximum penetration depth from ground	403.00	m	256.00	103,168.00
19	Gully boardwalk 2.5m wide fixed to existing ground, constructed of H6 treated pine sub-floor with 38d FRP deck including kick rails and all necessary fixings, 1.5-3m from ground surface (Gully 1 & 2)	123.00	m	1,357.00	166,911.00
20	Allow for 1200mm high barrier comprising of 50mm dia. SS top rail, 80x80 SS SHS barrier posts spaced at 1760 max, infill panels in SS frame and vertical bars (to both sides of boardwalk)	123.00	m	1,310.00	161,130.00
21	Subtotal				<u>431,209.00</u>
	On-ground Shared Trail 2.5m Wide (A-CH.0 to 75, A-CH.90 to 115, A-CH.330 to 350, A-CH.720 to 850, A-CH.900 to 920)				
22	Note: To be constructed on existing road shoulder		Note		
23	Allow for compaction of existing subgrade	675.00	m2	4.00	2,700.00
24	Allow for sub-base material to on-ground concrete path, assume 150mm deep	675.00	m2	18.00	12,150.00
25	On-ground sand coloured concrete path with broom finish N40 2.5m wide 125mm thick including joints, assume SL82 mesh throughout	675.00	m2	100.00	67,500.00
26	Concrete stand-up kerb 150mm high	270.00	m	89.00	24,030.00
27	Subtotal				<u>106,380.00</u>
	On-ground Shared Trail 2.5m Wide (A-CH.985 to 1015, A-CH.1065 to 1160, A-CH.1200-1340)				
28	Note: To be laid over existing asphalt surface		Note		
29	Stabilised granitic sub-base layer	663.00	m2	4.00	2,652.00
30	Allow for sub-base to stand-up kerb, assume 150mm deep	53.00	m2	18.00	954.00
31	On-ground sand coloured concrete path with broom finish N40 2.5m wide 125mm thick including joints, assume SL82 mesh throughout	663.00	m2	100.00	66,300.00
32	Concrete stand-up kerb 150mm high	265.00	m	89.00	23,585.00
33	Allow for batter along edges of concrete path to existing ground surface level	265.00	m	20.00	5,300.00

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 3 <u>OPTION C: 1 + 2 WAY ROAD</u> (Continued)					
34	Subtotal				<u>98,791.00</u>
	On-ground Shared Trail 2.5m Along Off-Street Parking(A-CH.920 to 985, A-CH.1015 to 1065, A-CH.1160 to 1200)				
35	Note: To be constructed on existing road shoulder		Note		
36	Allow for compaction of existing subgrade	388.00	m2	4.00	1,552.00
37	Allow for sub-base material to on-ground concrete path, assume 150mm deep	388.00	m2	18.00	6,984.00
38	On-ground sand coloured concrete path with broom finish N40 2.5m wide 125mm thick including joints, assume SL82 mesh throughout	388.00	m2	100.00	38,800.00
39	Concrete stand-up kerb 150mm high	155.00	m	89.00	13,795.00
40	Subtotal				<u>61,131.00</u>
	Bus Stop Pullover Bay (A-CH.850 to 900)				
41	Allow for compaction of existing subgrade	120.00	m2	4.00	480.00
42	Allow for sub-base material to on-ground concrete path, assume 250mm deep	120.00	m2	28.00	3,360.00
43	AC paving comprising of bitumen sealing and hot bituminous concrete including tack coat, assume 3-coat seal & 50mm thick AC wearing course	120.00	m2	38.00	4,560.00
44	Subtotal				<u>8,400.00</u>
	Off-Street Parking 2.4m (A-CH.920 to 985, A-CH.1015 to 1065, A-CH.1160 to 1200)				
45	Allow for compaction of existing subgrade	372.00	m2	4.00	1,488.00
46	Allow for sub-base material to on-ground concrete path, assume 200mm deep	372.00	m2	23.00	8,556.00
47	AC paving comprising of bitumen sealing and hot bituminous concrete including tack coat, assume 3-coat seal & 40mm thick AC wearing course	372.00	m2	35.00	13,020.00
48	Subtotal				<u>23,064.00</u>
	Proposed 20km/hr Shared Zone (200m - From Wharf St. to Merimbula Wharf)				
49	Note: Scope of works only roadmarkings and signage, refer to 'ROADMARKINGS & SIGNAGE' below		Note		
50	Subtotal				<u>0.00</u>
51	Subtotal EXTERNAL STRUCTURES				<u>2,350,685.00</u>
	<u>ROADMARKINGS & SIGNAGE</u>				

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
Trade : 3 <u>OPTION C: 1 + 2 WAY ROAD</u> (Continued)					
	Roadmarkings				
52	Allow for thermoplastic marking of bitumen paving (A-CH.00 to 1340)	1.00	Item	2,500.00	2,500.00
53	Allow for thermoplastic marking of concrete path (ditto)	1.00	Item	3,500.00	3,500.00
54	Allow for round markings to proposed 20km/hr Shared Zone	1.00	Item	1,600.00	1,600.00
55	Subtotal				<u>7,600.00</u>
	Signage				
56	Allow signage for roadway, parking, bus, etc. (assume 15 signage including concrete base)	1.00	Item	6,000.00	6,000.00
57	Allow signage to proposed 20km/hr Shared Zone (assume 2 signage including concrete base)	1.00	Item	800.00	800.00
58	Subtotal				<u>6,800.00</u>
59	Subtotal ROADMARKINGS & SIGNAGE				<u>14,400.00</u>
	<u>STREET FURNITURE</u>				
60	Allow for timber bench seating to Bus Stop area	1.00	no	3,500.00	3,500.00
61	Subtotal STREET FURNITURE				<u>3,500.00</u>
	<u>EXTERNAL SERVICES</u>				
62	Note: No works for electrical services including street lightings required		Note		
63	Allow for minor service pit protection & lifting (electric/water/sewer)	1.00	Item	10,000.00	10,000.00
64	Allow for drainage pipe repairs and outlets	1.00	Item	5,000.00	5,000.00
65	Subtotal EXTERNAL SERVICES				<u>15,000.00</u>
66	NET CONSTRUCTION COST				<u>2,411,567.00</u>
67	Contingency (10%)	1.00	Item	243,086.70	243,086.70
68	Preliminaries OH&P (incl. traffic control for 9 months)	1.00	Item	426,536.00	426,536.00
69	TOTAL CONSTRUCTION COST				<u>3,100,489.70</u>
70	Professional Fees (excl.)				EXCL
71	TOTAL CONCEPT ESTIMATE (excl. GST)				<u>3,100,489.70</u>
72					
73	OPTIONAL (not included in sum)				
74	Future elevated lookout deck including barriers, access, seating & signages		Item	300,000.00	

Lake Street Shared Path

Job Name : 4835 CONCEPT R1

Job Description

Client's Name: TBLD

Concept Estimate
Lake Street Shared Path
Merimbula
14 February 2018

Item No.	Item Description	Quantity	Unit	Rate	Amount
<u>OPTION C: 1 + 2 WAY ROAD</u> Total :					3,100,489.70

APPENDIX E

Preliminary Geotechnical Investigations Report (by Tasman Engineering Consultants)

Structural	Buildings Bridges Towers Equipment
Civil	Roads Drainage Water Supply Sewerage Subdivisions
Geotechnical	Site Assessment Soil Testing and Stability
Construction	Project Managers Inspections Supervision Plans

15 February 2018

Mr. Glenn Berrill
Thompson Berrill Landscape Architects P/L
P.O. Box 665
Manly NSW 2095

Telephone: (02) 9977-6444
Email: Glenn Berrill <gberrill@tblld.com.au>

Re: Preliminary Geotechnical Investigation Lake Street Shared Trail, Merimbula NSW.

1.0 Introduction

At the request of Thompson Berrill Landscape Architects P/L (Client) Tasman Engineering Consultants has conducted a preliminary geotechnical investigation of embankment conditions along the proposed Lake Street shared trail alignment in Merimbula NSW. The site and proposed alignment is shown in **Figure 1 – Site & Vicinity Map**.

Proposed options for the shared trail include three options as follows.

Option A: One way roadway with a concrete shared trail occupying the existing adjacent lane;

Option B: Two way road with elevated boardwalks on road shoulder;

Option C: 1+2 way road with concrete shared trail and elevated boardwalks on road shoulder.

The scope of work has included subsurface soil investigation at five (5) locations as shown in **Figure 2- Detailed Site Map**. At each of the above locations subsurface conditions were investigated by driving a hand held Dynamic Cone Penetrometer (DCP) probe to approximately 3 m or refusal. Additionally soils at each location were observed by digging a shallow test pit using hand digging equipment. Logs which document DCP results and subsurface conditions have been prepared for each sampling location and are included as an attachment.

Digital photos at each sample location were also gathered and are included as an attachment.

2.0 Site Conditions

At all five sample locations sampling was conducted on the edge of the road shoulder at the top of the embankment. Generally the embankment slope at each location is steep and continues to the intersection of the natural slope below. A detailed description of site observations at each sampling location is as follows.

Location TP1

TP1 is located at approximately CH 110 on the southern side of Lake Street. The road shoulder is approximately 2.7 m wide and then drops off steeply to the natural slope below. DCP results are included as an attachment. The results for TP1

show moderate resistance to penetration to approximately 800 mm below ground surface then a soft layer from 800 mm to 1100 mm. The remainder of the test showed increasing resistance to penetration to the total depth explored of 2900 mm. Subsurface soils were observed by digging a shallow test pit to approximately 800 mm BGS. Surface soils in this location consist of a reddish brown silty sandy clay fill.

Location TP2

TP2 is located at approximately CH 275 on the southern shoulder of Lake Street. The road shoulder at this location is approximately 2.5 wide and then drops off steeply over a concrete retaining wall. The slope below falls off steeply into a rainforest gully. A DCP test was conducted on the uphill side of the retaining wall and revealed moderate resistance to penetration to a depth of approximately 300 mm followed by a soft layer between 300 mm BGS and 900 mm BGS followed by increasing resistance to penetration to the total depth explored of 2900 mm. Surface soils in this location consist of yellowish brown silty sandy clay fill material.

Location TP3

TP3 is located at approximately CH 670 on the west shoulder of Lake Street. The road shoulder in this location is approximately 2.8 m wide and then drops off steeply to the natural slope below. DCP results for this location showed moderate penetration resistance to a depth of approximately 700 mm BGS with a soft layer between 700 mm and 1600 mm BGS. Below 1600 mm the test showed increasing resistance to penetration to refusal at a depth of approximately 1900 mm BGS. Surface soils in this location consist of a yellowish brown silty sandy clay fill material.

Location TP4

TP4 is located at approximately CH 870 on the west shoulder of the road. This location is also designated as a bus stop. The road shoulder in this location is approximately 6.8 mm wide including the width of the bus stop. The embankment drops off steeply to the natural surface below. DCP results showed decreasing resistance to penetration to a depth of 500 mm BGS then increasing resistance to penetration to refusal at a total depth explored on 2000 mm BGS. Surface soils in this location consist of a reddish brown silty sandy gravel fill material.

Location TP5

TP5 is located at approximately CH 1210 on the southern shoulder of Lake Street. This location is adjacent to a rock cliff which drops off vertically to the shore below. DCP results showed increasing resistance to penetration to refusal at a total depth explored of approximately 400 mm BGS. Surface soils in this location consist of shallow medium brown silty sandy clay.

3.0 Summary and Recommendations

With the exception of sample location TP5 DCP results indicate compacted fill material to depths varying from 0.5 m to 1.1 m BGS. The depth of compacted fill material is most likely to be coincident with the soft layers identified at depth at each sampling location. Sampling locations which terminate with refusal including TP3, TP4 & TP5; would most likely indicate the depth to natural rock which is likely to consist of moderate to low strength highly weathered sandstone, siltstone or mudstone.

With respect to the above noted soft subsurface layers, these layers are likely to have a significant influence on the overall stability of the embankment. Based on local knowledge of the site the embankment has experienced stability problems in the past which have been addressed by the installation of slope retaining and drainage structures. Of the proposed shared trail options Option 1 which incorporates a one way vehicle lane and a shared pedestrian path would eliminate the motor vehicle loading on the outside lane and the risk of embankment failure would therefore be reduced.

Slope angles beyond the shoulder of Lake Street are generally steep with little evidence of erosion or bank instability. Slopes beyond the toe of fill in general are vegetated with little evidence of bank erosion.

Options for boardwalk foundations adjacent to the road shoulder may be limited due to accessibility and the steepness of the slope. An elevated boardwalk structure would require foundations for each post or column. It is recommended that all foundations be extended to and socketed into solid natural ground. The most practical foundations for posts or columns would be drilled piers or concrete pads supported by driven piles or screw piers. All potential foundation treatments should be subject to an engineering design.

Widening of the road shoulder may also be an option using a reinforced soil technology such as a reinforced earth embankment with a concrete panel face or a gabion basket wall incorporating a geogrid soil reinforcement.

4.0 General

This Geotechnical Investigation Report has been prepared for Thompson Berrill Landscape Architects P/L (Client) for the proposed Lake Street shared trail in Merimbula NSW. This report is intended for use by the Client and their assigns and may not be relied upon by any other party without the consent of both the Client and TEC. This report is based on field and laboratory observations, using commonly accepted engineering practices and standards. To the best of our knowledge these findings represent general conditions at the times and places stated. The report should be read in its entirety. Excavation logs, test results, site photos, and figures should not be separated from the report. The findings of this report should not be used to infer conditions for any other time or location except as specifically addressed in the report. Questions regarding this report, its findings or applicability to conditions not specifically addressed in the report should be directed to TEC.

Regards

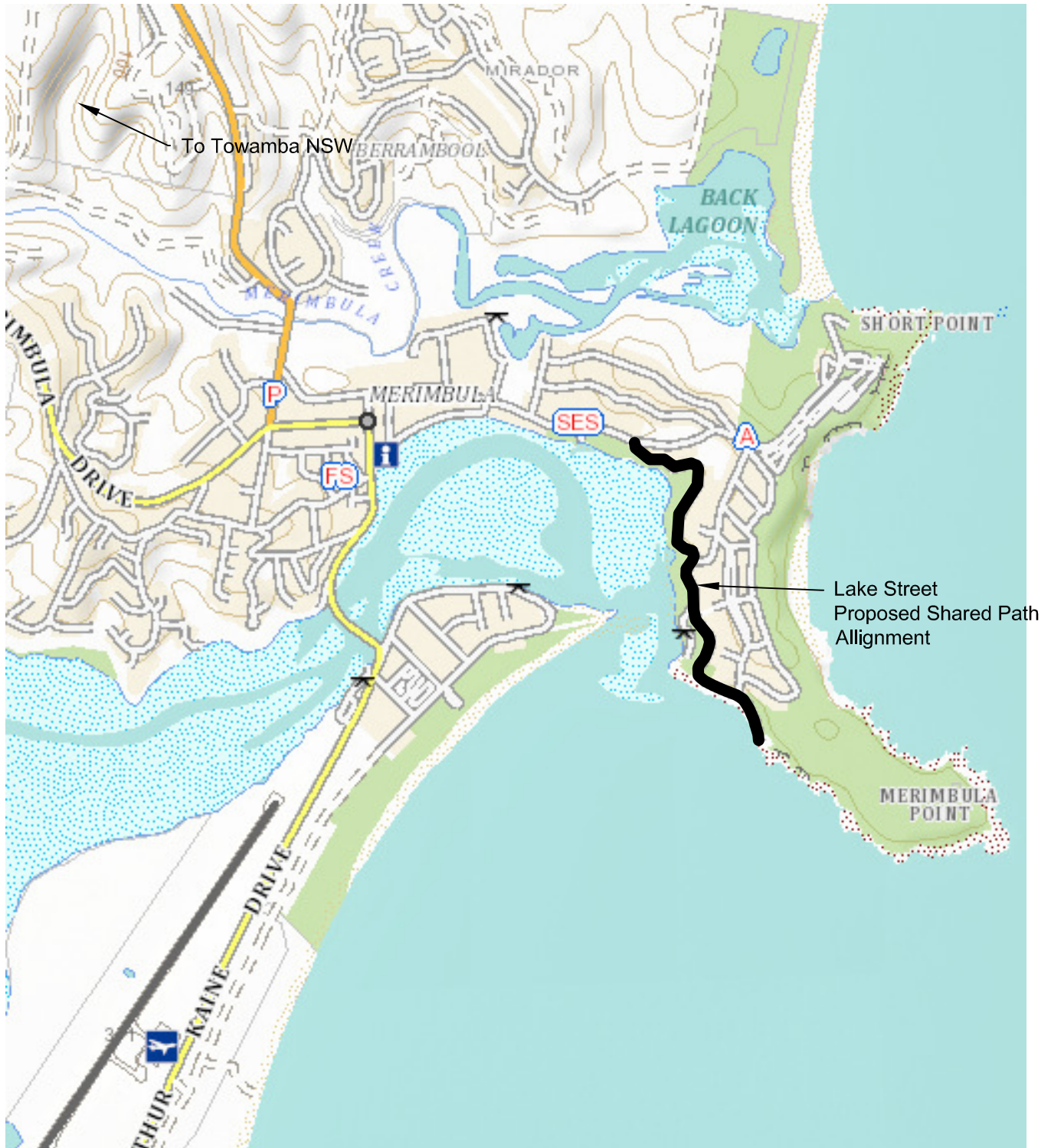
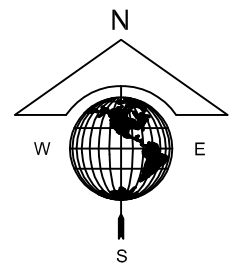
Tasman Engineering Consultants

Austin F. Legler

(Chartered Professional Engineer, C.P.Eng. M.I.E.Aust)

Attachments:

- Figures
- Site Photos
- Test Pit Logs and DCP Results



TASMAN ENGINEERING CONSULTANTS

STRUCTURAL, CIVIL, ENVIRONMENTAL
& GEOTECHNICAL ENGINEERS

ABN 87 083 813 556

Office 1 Main Street Centre, 62 Main Street Merimbula NSW, P.O. Box 79 Merimbula 2548

Ph : 02 6495 4776


Figure 1- Site & Vicinity

Lake Street Shared Trail
Merimbula NSW

DESIGN: _____
DRAWN: af
CHECKED: _____
SCALE: none
DATE: 22-1-18



LEGEND


TP = Sample Location

TASMAN ENGINEERING CONSULTANTS

STRUCTURAL, CIVIL, ENVIRONMENTAL
& GEOTECHNICAL ENGINEERS

ABN 87 083 813 556

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Ph : 02 6495 4776

Figure 2- Sample Location Map

Lake Street Shared Trail
Merimbula NSW

DESIGN: _____
 DRAWN: af
 CHECKED: _____
 SCALE: none
 DATE: 22-1-18



TP1 Location



TP1 Excavated soils



TP2 Location



TP2 Excavated soils



TP3 Location



TP3 Excavated soils



TP4 Location



TP4 Excavated soils



TP5 Location



TP5 Excavated soils

FIELD DYNAMIC CONE PENETROMETER LOG**Site Name : Lake Street, Merimbula****Project No: T-259****Test Pit No : TP1****Engineer : Austin Legler & Adam Helak****Date : 23.12.2017****Total Depth: 2.9 m**

Depth (mm)	Soil Consistency: (Type, consistency, moisture, color)	DCP Blows / 100mm	Rec. (mm)	Other
0	Silty sandy clay, medium, mottled light reddish brown, dry.			
100		6		
200		9		
300		4		
400		7		
500		5		
600		5		
700		5		
800	Bottom of test pit	4		
900		2		
1000		1		
1100		2		
1200		6		
1300		8		
1400		7		
1500		9		
1600		10		
1700		6		
1800		6		
1900		6		
2000		5		
2100		6		
2200		6		
2300		6		
2400		6		
2500		7		
2600		13		
2700		12		
2800		11		
2900	End of probing	13		
3000				

FIELD DYNAMIC CONE PENETROMETER LOG**Site Name : Lake Street, Merimbula****Project No: T-259****Test Pit No : TP2****Engineer : Austin Legler & Adam Helak****Date : 23.12.2017****Total Depth: 2.9 m**

Depth (mm)	Soil Consistency: (Type, consistency, moisture, color)	DCP Blows / 100mm	Rec. (mm)	Other
0	Bitumen			
100	Decomposed granite gravel, medium, moist, yellowish brown.	5		
200		4		
300		3		
400		3		
500		2		
600		1		
700		1		
800		2		
900	Silty sandy gravel, medium, dry, light brown	3		
1000	Bottom of test pit	6		
1100		8		
1200		10		
1300		10		
1400		9		
1500		8		
1600		8		
1700		6		
1800		4		
1900		6		
2000		10		
2100		10		
2200		12		
2300		14		
2400		12		
2500		11		
2600		2		
2700		14		
2800		15		
2900	End of probing	7		
3000				

FIELD DYNAMIC CONE PENETROMETER LOG**Site Name : Lake Street, Merimbula****Project No: T-259****Test Pit No : TP3****Engineer : Austin Legler & Adam Helak****Date : 23.12.2017****Total Depth: 1.9 m**

Depth (mm)	Soil Consistency: (Type, consistency, moisture, color)	DCP Blows / 100mm	Rec. (mm)	Other
0	Bitumen			
100	Decomposed granite gravel, medium, moist, yellowish brown.	5		
200		8		
300		6		
400		5		
500		4		
600	Bottom of test pit	3		
700		3		
800		2		
900		2		
1000		2		
1100		1		
1200		2		
1300		5		
1400		3		
1500		3		
1600		4		
1700		11		
1800		18		
1900	End of probing	20		REFUSAL
2000				
2100				
2200				
2300				
2400				
2500				
2600				
2700				
2800				
2900				
3000				

FIELD DYNAMIC CONE PENETROMETER LOG**Site Name : Lake Street, Merimbula****Project No: T-259****Test Pit No : TP4****Engineer : Austin Legler & Adam Helak****Date : 23.12.2017****Total Depth: 2.0 m**

Depth (mm)	Soil Consistency: (Type, consistency, moisture, color)	DCP Blows / 100mm	Rec. (mm)	Other
0				
100	Silty sandy gravel fill, medium, moist, light reddish brown.	3		
200		3		
300		2		
400		2		
500		1		
600		4		
700		3		
800		2		
900		2		
1000	Sand, medium moist black.	5		
1100	Bottom of test pit	5		
1200		7		
1300		7		
1400		6		
1500		8		
1600		7		
1700		7		
1800		10		
1900		14		
2000	End of probing	20		REFUSAL
2100				
2200				
2300				
2400				
2500				
2600				
2700				
2800				
2900				
3000				

FIELD DYNAMIC CONE PENETROMETER LOG**Site Name : Lake Street, Merimbula****Project No: T-259****Test Pit No : TP5****Engineer : Austin Legler & Adam Helak****Date : 23.12.2017****Total Depth: 0.4 m**

Depth (mm)	Soil Consistency: (Type, consistency, moisture, color)	DCP Blows / 100mm	Rec. (mm)	Other
0				
100	Silty sandy gravel fill, medium, dry, medium brown	2		
200		6		
300		15		
400	Refusal on rock, end of test pit, end of probing	20		REFUSAL
500				
600				
700				
800				
900				
1000				
1100				
1200				
1300				
1400				
1500				
1600				
1700				
1800				
1900				
2000				
2100				
2200				
2300				
2400				
2500				
2600				
2700				
2800				
2900				
3000				

APPENDIX F

BOAT Stakeholder Workshop Minutes (by TBLD)



MINUTES

Lake Street Shared Path, Merimbula Stakeholder Workshop

Tuesday 19th December, 12pm – 2pm Bega Valley Regional Learning Centre, Merimbula

Attendance:

Daryl Dobson (DD)	BOAT representative
Colin Dunn (CD)	BOAT representative
Steve Goodchild (SG)	BOAT representative
Bruce Eaton (BE)	BOAT representative
Ron Finneran (RF)	BOAT representative
Tarryn Lucas (TL)	BOAT representative
Daniel Djikic (DD)	Manager Project Development, BVSC
Cassandra Margules (CM)	Communications, BVSC
Shaun Bell (SB)	Senior Design Officer, BVSC

Apologies:

Lynette Davies (LD)	BOAT representative
Anne Cleverley (AC)	Community Development Coordinator, BVSC

1.0 Workshop outcomes

Strengths

- Precedents exist for similar shared trails
- Tourism boost
 - Emphasises Merimbula as a tourism destination
 - Actively promotes NSW and VIC tourism
- Creation of a shared trail separated from vehicles would significantly improve safety for pedestrians & cyclists
- Opportunity to improve safety for vehicles on Lake Street
- Access for all improvements
- The natural even gradient
- The lack of steps
- Positive for families
- Lifestyle
- Good for kids on bikes with surfboards to move off roadway
- Improve pedestrian and cycle access to Bar Beach thereby reducing the need for parking
- Walk rather than drive
- Natural beauty of area
- Scenic beauty of Merimbula Lake
- Adds to network of walks
- Compliments Merimbula as an accessible community (NDIS)
- Provides 1.7km trail from town to Rotary Park then 1.7km to wharf
- Community asset – that all users can access

Issues

- Available budget of maximum \$2M must be used within grant conditions or be lost
- One way would be less convenient for access and egress to resident driveways
- Speed of vehicles on Lake Street
- No speed humps have been allowed previously by council
- Achieving a balance of what can be achieved within the budget whilst managing community expectations is a challenge
- High cliff directly adjacent to roadway in lower part of trail
- Cultural values European and Indigenous
- Environmental values
- Engineering challenges of constructing the pathway
- Bank stability and geotechnical challenges
- Construction Cost and difficulty of constructing elevated boardwalks on steep slopes
- Accessibility – target gradient of path is informed by the given site slope and limited budget
- Existing parking patterns are ad hoc & present safety, access and amenity issues
- Surfaces are important and FRP (fibre reinforced plastic) grating is an option
- Services (sewer, stormwater, power), poles, pits and location conflicts
- Balance of achieving quality asset for available budget of \$2 million
- Quality of build equals lower on-going maintenance costs for council
- Need for shared zone from Wharf Street to wharf recognised
- Wharf street intersection design could be reviewed
- Multiple entry and access points to Lake Street
- Current road alignment is fixed
- Surface drainage and stormwater outlets

Opportunities

- All age & ability access recreational asset
- Locals fundraising opportunities to cover maintenance costs – identify projects
- Shared zone at wharf (10km/hr)
- Increased commercial opportunities for Bar Beach kiosk and wharf
- Educational opportunities (cultural and environmental) for local schools who visit sites
- Share beauty of foreshore and tourism destination
- Improve safety for all users – cars/pedestrians/cyclists
- Reduce reliance on cars
- Improve coastal path networks
- Prepare map of coastal path ways for tourism – identify the missing links
- Education / interpretation of cultural history
- Creation of destination icon
- Creates new experience
- Improve local amenity
- Maintain the current standard of service for infrastructure

2.0 Option A – One Way (north to wharf) (Shared path on other closed lane)

Comments

- One way road circulation may affect the current amenity of residents
- Longer drive for residents to access properties
- Safety increases under one way, due to removal of risk of head-on accidents on blind corners
- Significantly lower cost of construction offers opportunities for hybrid design
- Possibly decreases attraction for users as not on a boardwalk all the way
- Hybrid design could be a solution with selected elevated boardwalks at corners and where there are attractive forest and ocean views, and on ground for remainder using one way road
- Lowers councils on-going road maintenance of the unstable bank by removal of the two-way road on downside

3.0 Option B – Two Way (Shared path on elevated boardwalk or on ground trail)

Comments

- Maintains the stratus quo
- No change for residents
- Stay two-way may be slower as motorists expect on coming cars, but may be more dangerous for head-on accidents
- Could lead to 'hoons' driving faster on one way road (if speed humps are installed this could address this issue)
- Elevated boardwalk provides exciting visitor experience (eg Byron Bay)
- There is limited good views to the coast due to the dense tree vegetation, which limits the visitor experience
- Significantly higher cost of elevated boardwalk may lead to funding shortfall
- Elevated boardwalk through bushland will have conflicts with vegetation and tree removal requirements, EIS studies, costs and delays