Proposed Shared Path - Barrenjoey Road to The Serpentine

Review of Environmental Factors

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Executive Summary

The proposal

Northern Beaches Council proposes to construct an off-road shared path from Barrenjoey Road, Newport (opposite Neptune Road), to The Serpentine, Bilgola Beach to provide safe pedestrian and cycle access for members of the public.

The proposed shared path is located on the headland between Newport and Bilgola Beaches, within the Northern Beaches local government area (LGA).

The works would primarily be undertaken on land identified as Lot 7327 DP1164236, namely the land parcel that encompasses the land adjacent to the Barrenjoey Road and that contains Eric Green Reserve. The subject land is Crown land that is managed by Northern Beaches Council for the purpose of public recreation.

Need for the proposal

The section of Barrenjoey Road within the study area has a narrow shoulder and does not have sufficient provision for pedestrians or cyclists to seek refuge from traffic or safely travel, discouraging active transport. There is an existing coastal walk between Newport Beach and Bilgola Beach; however, it is unsealed and is not of sufficient width and appropriate grades for use by cyclists. If the works were not to proceed, cyclists would continue to only be able to ride on Barrenjoey Road. Given the unsealed nature of the existing coastal walk, pedestrians may also choose to walk along the side of the road, which presents a significant safety risk. Safe access is required for pedestrians and cyclists at this location.

Proposal objectives

The objectives of the proposal are to:

- Provide improved active transport connections between local communities and environments as part of the broader *Connecting the Northern Beaches* program;
- Improve pedestrian and cyclist safety;
- Encourage active transport as a means to promote and support community health, recreational and social benefits; and
- To minimise the environmental impacts of the proposal.

Options considered

In considering solutions for a shared path in the proposed location, two alternatives were considered:

- 'Do nothing' – do not proceed with the proposal; or
- Proceed with the Newport to The Serpentine Shared Path section (the proposal).

The alternative options were evaluated with respect to their environmental, social and transport outcomes.

Considering the lack of a suitable existing sealed shared path at the locality and risk to road users associated with cyclists and pedestrians using Barrenjoey Road (pavement and/or shoulder), the 'do nothing' option was not considered a feasible alternative.

In addition, to the safety issues, the lack of a suitable shared path discourages active transport in the locality, cycling in particular, with implications for community health and wellbeing. Ongoing issues with erosion and sedimentation and impacts to vegetation due to community use of the existing unsealed coastal track would also be ongoing.

Hence, the proposed Newport to The Serpentine shared path, is the preferred option. It facilitates and encourages active transport participation by providing a shared path separate from the road and vehicular traffic. The works would have short-term impacts such as noise, traffic impacts and erosion and sedimentation, but it is considered that these impacts could be appropriately managed provided the mitigation measures in this REF are implemented. The vegetation clearing for the works would be somewhat offset by the implementation of landscaping as part of the project. On balance, the proposal is considered to provide a net benefit.

Environmental impacts

The key potential environmental impacts of the proposal include:

- Short term loss of access to the existing coastal walk and part of the Newport Beach carpark (during the works);
- Short-term traffic impacts to road users on Barrenjoey Road during the works;
- Short-term noise and vibration impact during the works;
- Short-term impacts to visual amenity during the works; and
- Clearing of less than 0.03 ha of native vegetation across three Plant Community Types (PCTs), including less than 0.01 ha of Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898), which corresponds to the Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner bioregions Threatened Ecological Community (TEC).

It is considered that these impacts can be appropriately managed through implementation of the safeguards and mitigation measures in this REF.

The key benefits relate to the provision of a shared path that is safe for the community to use for public recreational and active transport.

Justification and conclusion

The need for the proposal is considered justified on the basis of the socio-economic benefits of reduced risk to the community members who would use the shared path and associated facilities and promotion of active transport. The assessment of environmental and social impacts has determined the proposal is not likely to have a significant impact and therefore assessment under Division 5.2 of the EP&A Act is not required.

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Abbreviations

Term / Acronym	Abbreviation
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit (under the NP&W Act)
ASS	Acid Sulfate Soils
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BDAR	Biodiversity Development Assessment Report
BoM	Bureau of Meteorology
CEMP	Construction environmental management plan
NSW DCCEEW	NSW Government Department of Climate Change, Energy, the Environment and Water (formerly part of DPE)
DCCEEW	Australian Government Department of Climate Change, Energy, the Environment and Water
DCP	Development Control Plan
DPE	NSW Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure (formerly part of DPE)
EIA	Environmental impact assessment
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
ESCP	Erosion and Sediment Control Plan
FM Act	*Fisheries Management Act 1994* (NSW)
LEP	Local Environmental Plan
LGA	Local Government Area
LG Act	*Local Government Act 1993* (NSW)
MNES	Matters of national environmental significance under the EPBC Act
NML	Noise Management Level
NP&W Act	*National Parks and Wildlife Act 1974* (NSW)
NSW DPI	NSW Department of Primary Industries
PCT	Plant community type
PoEO Act	*Protection of the Environment Operations Act 1997* (NSW)
REF	Review of environmental factors
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
RHSEPP	State Environmental Planning Policy (Resilience and Hazards) 2021
TISEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021
SIS	Species Impact Statement
SPL	Sound Power Level
TEC	Threatened Ecological Community
TfNSW	Transport for NSW

1 Introduction

1.1 Proposed Activity

Northern Beaches Council (hereafter, 'Council') proposes to construct an off-road shared path along the eastern side of Barrenjoey Road in Newport (from the northern end of the beach carpark, across from Neptune Street) to the southern end of The Serpentine in Bilgola Beach, to provide safe access for pedestrians and cyclists.

The proposal includes a 710 m length of shared path (a mix of on-grade and suspended or bridged structure) as well as some sections of staircases (pedestrians only) to allow for connection to the existing unsealed coastal walk. Seating would also be installed at selected locations along the alignment.

The location of the proposal is shown in **Figure 1-1** and **Section 3** describes the proposal in more detail.

1.2 Proposal Location

The proposed shared path would commence adjacent to Barrenjoey Road at Neptune Road, continue through Eric Green Reserve, terminating at the southern end of The Serpentine at the existing staircase to the coastal walk, within the Northern Beaches local government area (LGA).

The location of the proposal is shown in **Figure 1-1**. The project footprint includes a two metre buffer either side of the shared path and inter-connecting pedestrian paths for constructability.

A schedule of lots comprising the works footprint is provided in **Table 1-1** and **Figure 1-1**, identifying the land tenure. The works would primarily be undertaken on Lot 7327 DP1164236, namely the land parcel adjacent to the Barrenjoey Road, which includes Eric Green Reserve (Council land).

Table 1-1: Schedule of Land Parcels within Project Footprint

Lot and DP	Land Tenure	Description
Unallocated land that comprises the road reserve	N/A	The road reserve as mapped in the cadastre intersects the site and encompasses parts of the Barrenjoey Road corridor, The Serpentine road corridor and parts of the public reserve.
Lots 43, 44, 45 and 46, Section 6, DP6248	Crown land	Forms part of Farrells Lagoon Reserve (R60118), for which Council is the Crown Land Manager. These lots would be used for purposes of establishing the main site compound.
Part of Lot 7327 DP1164236	Crown land	Forms part of Bilgola Beach Reserve (R58243), for which Council is the Crown Land Manager.
Part of Lot 7023 DP1059268	Crown land	Public reserve (R79011), for which both Council and the Minister are identified as the relevant Crown Land Managers

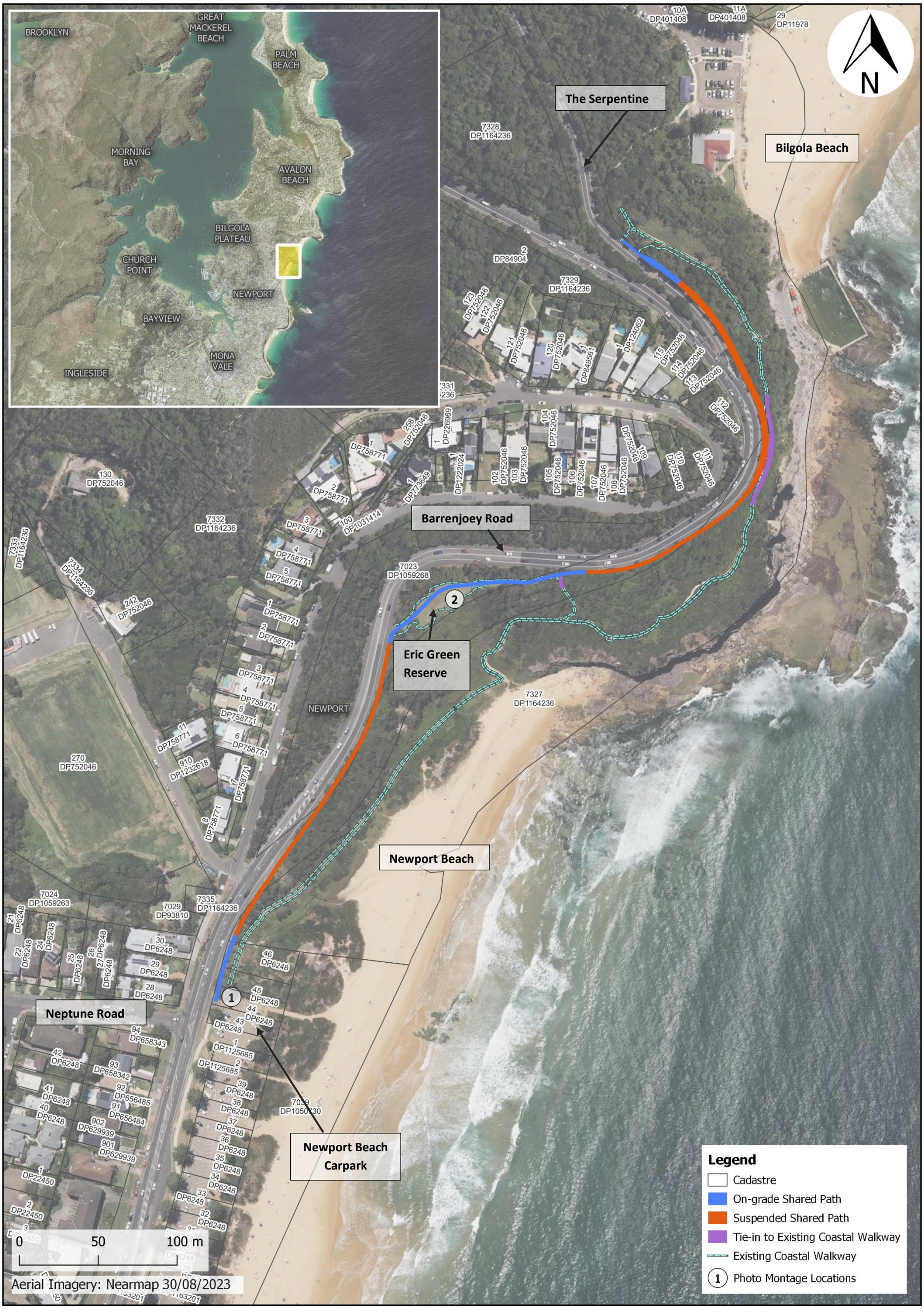

Figure 1-1: Locality Plan and Key Elements of the Proposed Shared Path

1.3 Purpose of this Report

This Review of Environmental Factors (REF) has been prepared by Rhelm Pty Ltd (Rhelm) on behalf of Council. For the purposes of the works, Council is both the proponent and determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of this report, the REF, is to describe the proposal and consider the likely impacts of the proposal on the environment and the community, and to identify the environmental safeguards and mitigation measures that will be implemented during the works.

The description of the proposal and associated environmental impact assessment has been prepared in accordance with the requirements of section 171 of the *Environmental Planning and Assessment Regulation* 2021, the *Guidelines for Division 5.1 assessments* (DPE, 2022a), the *Fisheries Management Act 1994* (FM Act), *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In doing so, the REF fulfils the requirements of Section 5.5 of the EP&A Act with respect to Council's obligation to examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF will be considered when evaluating:

- Whether the proposal is likely to have a significant impact on the environment and, therefore, whether an environmental impact statement is required, and approval should be sought from the Minister for Planning under Division 5.2 of the EP&A Act;
- The significance of any impact on threatened species or endangered populations or communities listed under the BC Act and/or the FM Act, in Section 1.7 of the EP&A Act and therefore the requirement for a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR);
- The significance of any impact on Matters of National Environmental Significance (MNES) listed under the EPBC Act and the need to make a referral to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

2 Project Need and Options Considered

2.1 Strategic Alignment

The alignment of the proposal with relevant local and NSW Government strategies and plans is discussed in this section.

2.1.1 Northern Beaches Community Strategic Plan 2040

The *Northern Beaches Community Strategic Plan* (NBC, 2022) sets out Council's vision for the Northern Beaches as 'a safe, diverse, inclusive and connected community that lives in balance with [its] extraordinary coastal and bushland environment'.

The plan presents the community's goals and strategies to achieve eight identified community outcomes. The proposal contributes to several goals and outcomes including:

- Community Outcome: Housing, places and spaces
  - Goal 12: 'Our community has access to spaces that enable healthy and active living and allow for a broad range of creative, sporting and recreational opportunities to be enjoyed'
- Community Outcome: Transport, Technology and Connectivity
  - Goal 16: 'Our integrated transport networks meet the needs of our community and reduce carbon emissions'
  - Goal 17: 'Our community can safely and efficiently travel within and beyond Northern Beaches'.

2.1.2 Connecting the Northern Beaches

Through a partnership between the NSW Government and Council, the Connecting the Northern Beaches initiative aims to connect communities and link to major B-Line transport hubs and services (Council, undated). The program includes 36 km of continuous all-weather coastal walkways from Manly to Palm Beach, and 36 km of new cycleways and shared paths connecting north-south and east-west across the LGA (refer **Figure 2-1** and **Figure 2-2**). The proposal would complete a section of the Bilgola Bends Shared Path. It would improve road safety for cyclists, motorists and pedestrians on a challenging stretch of Barrenjoey Road.

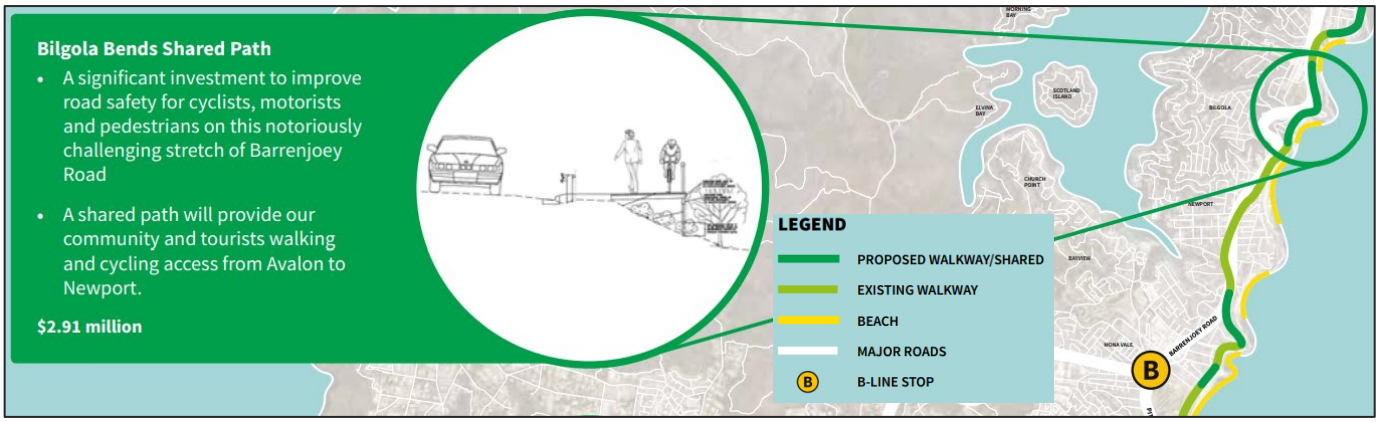

Figure 2-1: Proposed coastal walkway and major investments (after: Council, undated)

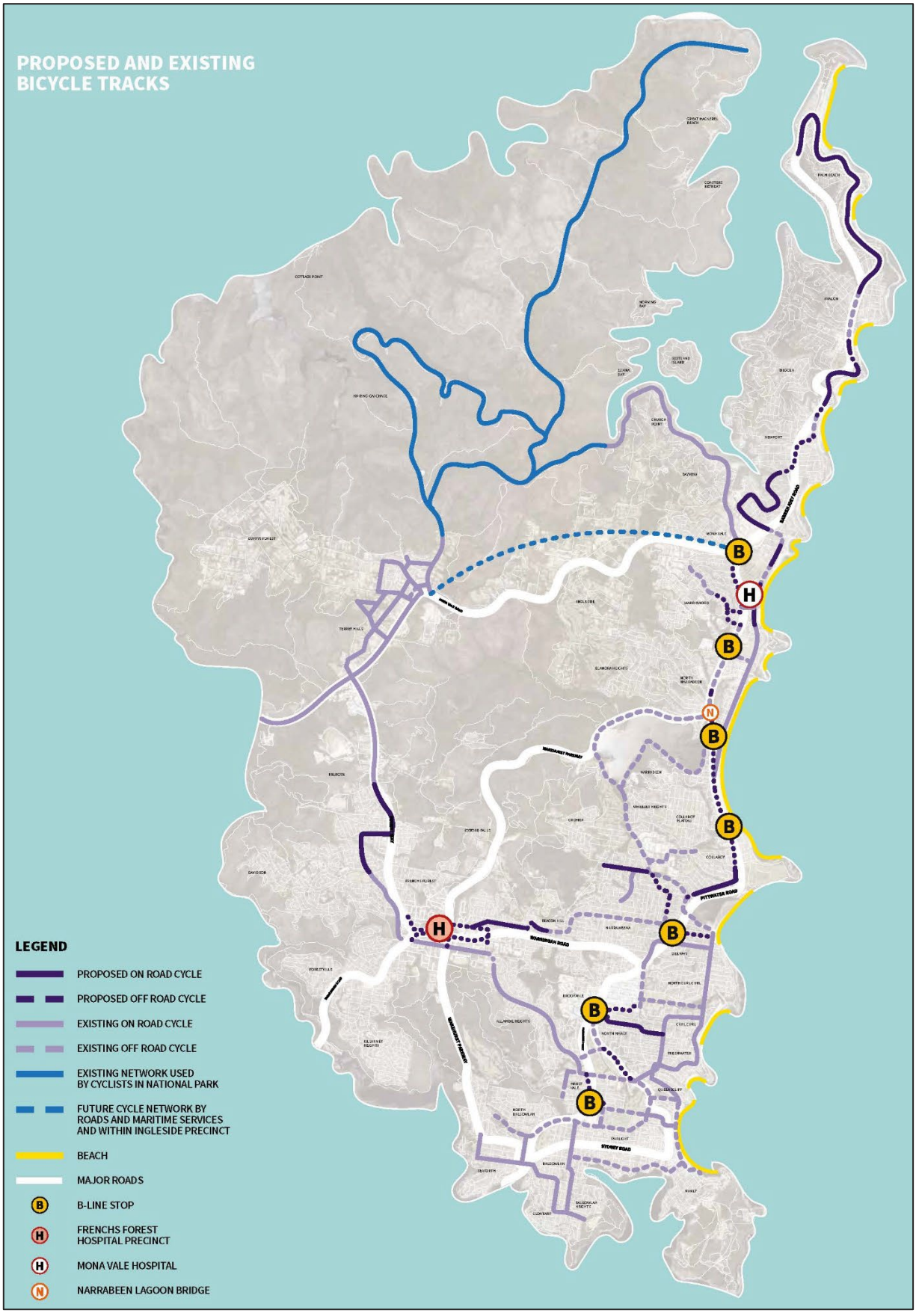

Figure 2-2: Proposed and existing bicycle tracks (Source: Council, undated)

2.1.3 Future Transport Strategy

The Future Transport Strategy (TfNSW, 2023) sets the strategic directions for continuing to improve the transport system for the benefit of the State's customers, community and economy. The strategy replaces the previous Future Transport Strategy 2056. It provides three key outcomes underpinned by 14 strategic directions.

The proposal would directly contribute to achieving the following outcomes and strategic directions:

- Connecting our customers' whole lives
  - C1: Connectivity is improved across NSW
  - C2: Multimodal mobility supports end-to-end journeys
  - C3: Equitable, accessible and secure transport for all
- Successful places for communities
  - P2: Transport infrastructure makes a tangible improvement to places
  - P4: Transport minimises environmental impacts.

2.1.4 Greater Sydney Services and Infrastructure Plan

The Greater Sydney Services and Infrastructure Plan (Transport for NSW, 2018) is the 40-year blueprint for transport in Sydney. The outcomes of the plan support the Future Transport Strategy. This includes building infrastructure to encourage people to walk and cycle. The proposal contributes to achieving 'Successful Places' and 'A Strong Economy' outcomes.

2.1.5 Greater Sydney Region Plan: A Metropolis of Three Cities

A Metropolis of Three Cities (Greater Cities Commission, 2018a) is built on a vision of three cities where most residents live within 30 minutes of their jobs, education and health facilities, services and great places. The proposal aligns with the following objectives:

- Direction: A city of people
  - Objective 7: Communities are healthy, resilient and socially connected
- Direction: A city in its landscape
  - Objective 31: Public open space is accessible, protected and enhanced;
  - Objective 32: The Green Grid links parks, open spaces, bushland and walking and cycling paths.

2.1.6 North District Plan

The North District Plan (Greater Cities Commission, 2018b) is a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision for Greater Sydney. It is a guide for implementing the Greater Sydney Region Plan: A Metropolis of Three Cities, at a district level and is a bridge between regional and local planning.

The project aligns with Planning Priority N4: Fostering healthy, creative, culturally rich and socially connected communities.

2.2 Need for the Proposal and Proposal Objectives

The section of Barrenjoey Road within the study area has narrow shoulders and does not support safe active transport use, discouraging both pedestrian and cycling activity. There is an existing coastal path between Newport Beach and Bilgola Beach; however, it is unsealed and is not of sufficient width and appropriate grades for use by cyclists.

The objectives of the proposal are to:

- Provide improved active transport connections between local communities and environments as part of the broader Connecting the Northern Beaches program;
- Improve pedestrian and cyclist safety;
- Encourage active transport as a means to promote and support community health, recreational and social benefits;
- Minimise the environmental impacts of the proposal.

2.3 Alternatives Considered

In 2018 Council considered a Newport to Avalon Shared Path and coordinated upgrade works along Barrenjoey Road in Newport, The Serpentine in Bilgola Beach, Surfside Avenue and Avalon Parade in Avalon Beach. The project included various footpaths and shared paths that, once constructed and connected to existing paths, would provide pedestrian and cyclist access between Newport and Avalon Beach.

In considering solutions for a shared path in the proposed location, two alternatives were considered:

- 'Do nothing' – do not proceed with the proposal; or
- Proceed with the Newport to The Serpentine Shared Path section (the proposal).

The alternative options were evaluated with respect to their environmental, social and transport outcomes.

2.4 Preferred Option

Considering the lack of a suitable existing sealed shared path at the locality and risk to road users associated with cyclists and pedestrians using Barrenjoey Road (pavement and/or shoulder), the 'do nothing' option was not considered a feasible alternative.

In addition, to the safety issues, the lack of a suitable shared path discourages active transport in the locality, cycling in particular, with implications for community health and wellbeing. Ongoing issues with erosion and sedimentation and impacts to vegetation due to community use of the existing unsealed coastal track would also be ongoing.

Hence, the proposed Newport to The Serpentine shared path, is the preferred option. It facilitates and encourages active transport participation by providing a shared path separate from the road and vehicular traffic. The works would have short-term impacts such as noise, traffic impacts and erosion and sedimentation, but it is considered that these impacts could be appropriately managed provided the mitigation measures in this REF are implemented. The vegetation clearing for the works would be somewhat offset by the implementation of landscaping as part of the project. On balance, the proposal is considered to provide a net benefit.

3 Description of the Proposal

3.1 Overview

The proposal comprises an off-road shared path between Newport and The Serpentine, running east of Barrenjoey Road from the end of the Newport Beach car park (opposite Neptune Road) to the southern end of The Serpentine and travelling via Eric Green Reserve (refer **Figure 1-1**).

The shared path seeks to provide a better connection between Newport Beach and Bilgola Beach, providing access to Bilgola Beach for pedestrians via an existing staircase and for cyclists along The Serpentine.

3.2 Key Features

The key features of the proposal are shown in the drawings provided in **Appendix A** and include (from south to north):

- A 1.5 m wide pedestrian footpath to tie in with the existing path located on the east side of Barrenjoey Road (near the Neptune Road intersection);
- A 3.0 m wide on-grade shared path where the topography permits (e.g. flatter sections through Eric Green Reserve), with a transition to a 3.5 m suspended (fibre reinforced concrete panels on posts and piers) shared path where the topography is more variable and to allow extra space for uphill cyclists as indicated in plan on **Figure 1-1;**
- The shared path would have balustrades and handrails;
- Construction of new steps to connect to the proposed shared path to the existing coastal walk and a 1.5 m wide pedestrian footpath to join with existing concrete path and stair to existing coastal walk.

Typical cross-sections are provided in **Figure 3-1** to **Figure 3-3**.

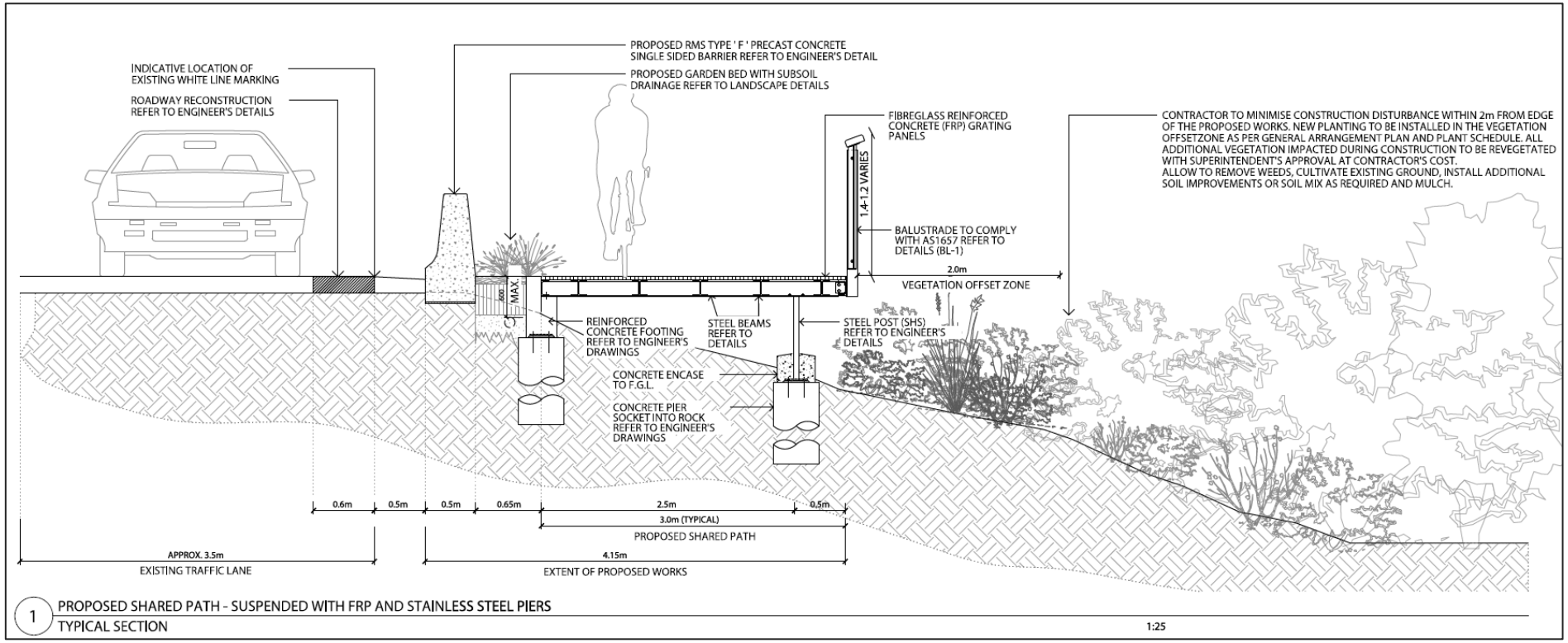

Figure 3-1: Typical section: Suspended shared path (Tract Consultants, Drawing No. 0218-0497-01 DD-300 Rev 3, 21/12/2018) (Note: The type 'F' barrier has been replaced with a steel guard rail)

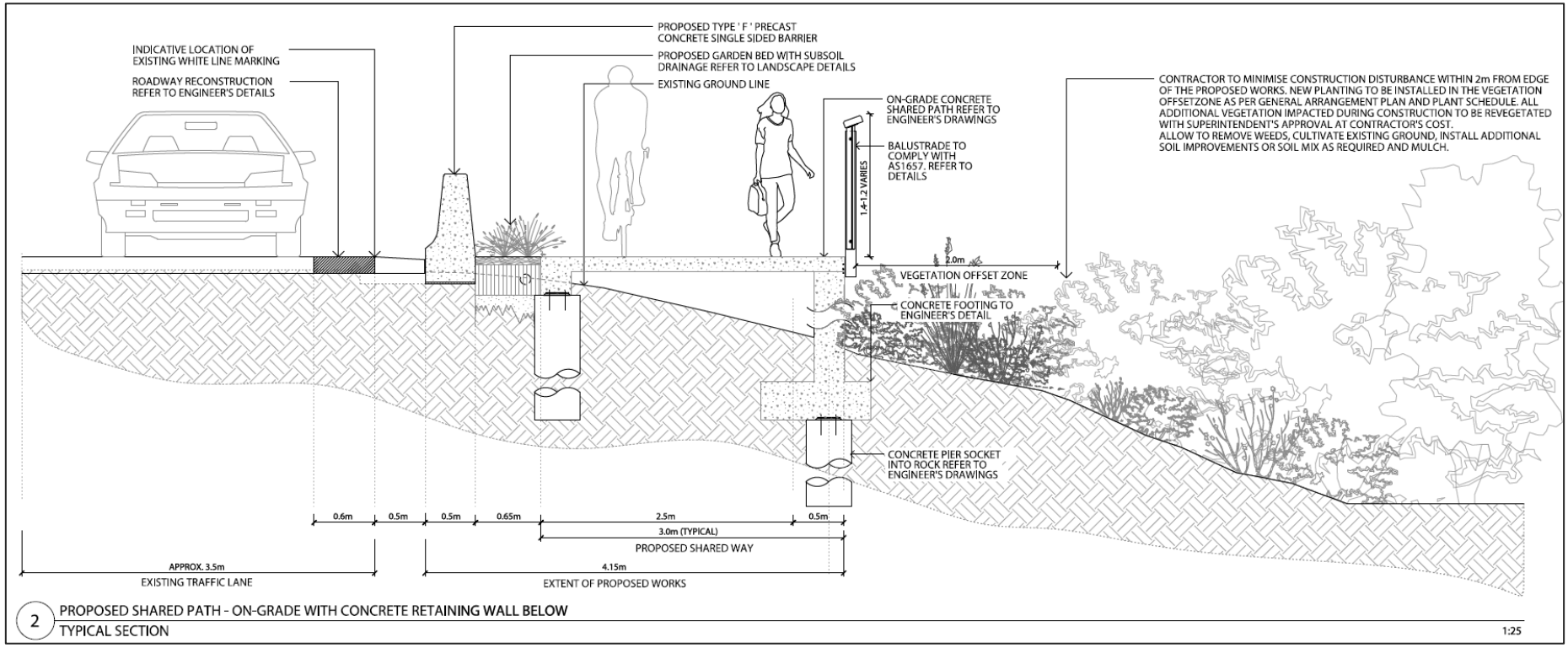

Figure 3-2: Typical section: On-grade shared path (Tract Consultants, Drawing No. 0218-0497-01 DD-300 Rev 3, 21/12/2018)
(Note: The type 'F' barrier has been replaced with a steel guard rail)

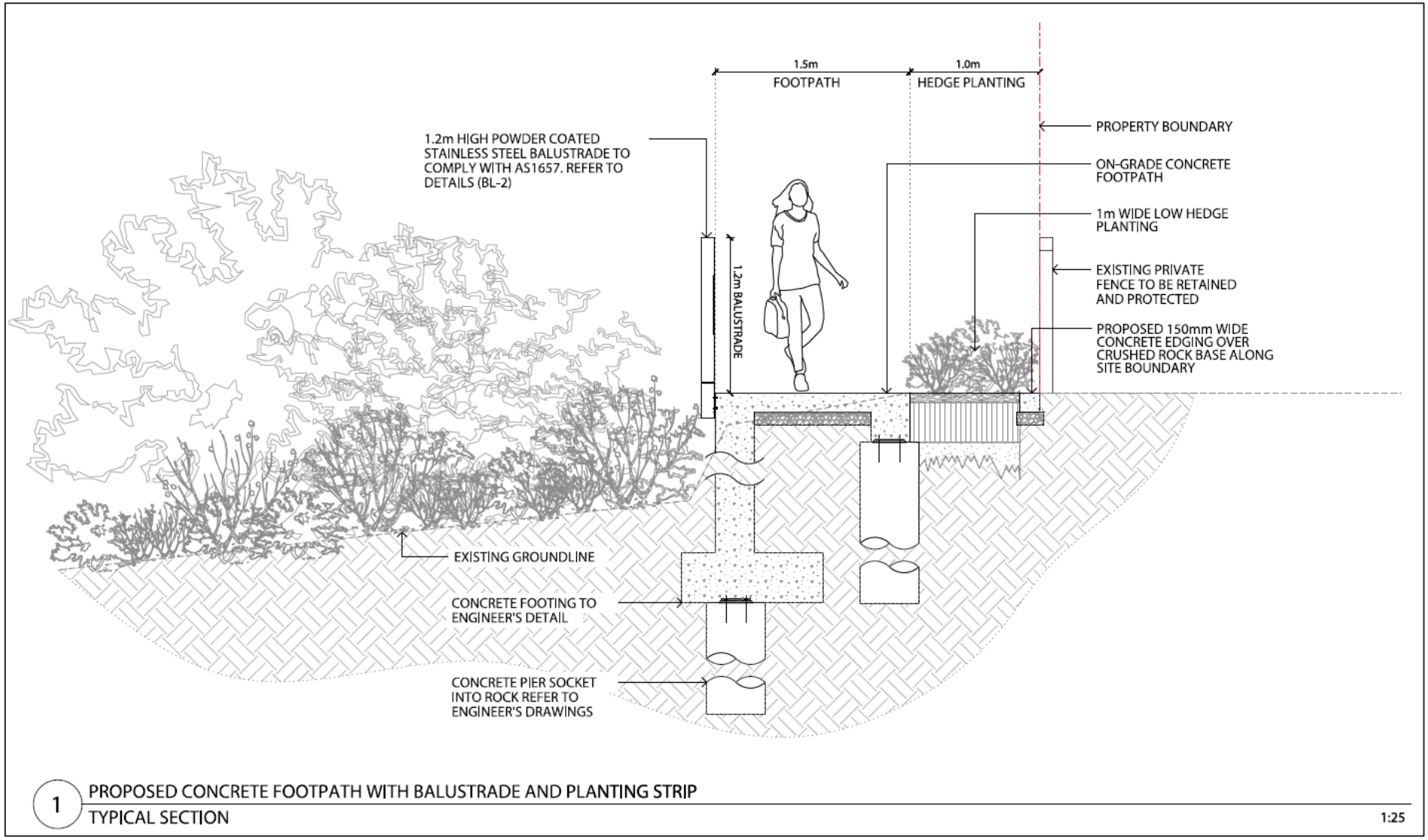

Figure 3-3: Typical section: Concrete footpath (Tract Consultants, Drawing No. 0218-0497-01 DD-302 Rev 4, 11/03/2019)

3.3 Construction Methodology

The construction of the proposal would involve:

- Site establishment and implementation of site fencing and erosion and sediment controls;
- Removal of existing vegetation and protection of vegetation to be retained, as indicated in the design drawings (refer **Appendix A**);
- Utility adjustments (e.g. relocation of light poles etc.);
- Demolition of sections of the existing footpath along Barrenjoey Road and other existing infrastructure where required (e.g. guard rails, etc.);
- Construction of new shared path and pedestrian footpaths (including balustrades, handrails and bollards, where required) with connections to existing infrastructure;
- Construction of new road safety barriers, retaining walls, kerb and gutters, drainage as required;
- New line marking (on shared path and for the portion of on-road cycleway along The Serpentine) and installation of street furniture (e.g. new seating) and signage, as indicated in the design drawings (refer **Appendix A**);
- Site reinstatement and landscaping works, including screening; and
- Site demobilisation.

The proposed construction footprint (including a 2 m buffer on the project alignment) and location of proposed site compound and ancillary site in Eric Green Reserve are shown in **Figure 3-4**.

Additional detail on the key construction phases is provided below.

It is noted that this is an indicative construction methodology and would be finalised upon selection of a preferred Contractor.

Site Establishment Phase

The Contractor would prepare a Construction Environmental Plan (CEMP), which would be approved by Council prior to commencement of the works. Site establishment would involve the following activities:

- Establish site compound;
- Progressive establishment of site fencing and signage as the works progress;
- Implement environmental safeguards, including erosion and sediment control measures, and traffic control measures;
- Delivery of plant, equipment and materials to the site compound(s).

A Traffic Management Plan would be prepared by the Contractor as a sub-plan to the CEMP. The plan would detail processes and responsibilities to minimise traffic delays and disruptions and identify and mitigate changes in road safety. The plan would provide measures to provide safe routes for pedestrians and cyclists during construction, as well as ensuring the safety of construction personnel. This is discussed further in **Section 6.2.**

Deliveries would access the main site compound via Barrenjoey Road and enter the site using the existing access at the northern end of the Newport Beach car park.

Car park users would be advised of changes to the availability of parking and expected duration of works.

Construction Phase

Figure 3-4 shows the construction footprint. The construction works would be undertaken from within this footprint, although some construction works from the road may be required.

The construction phase would include the following activities:

- Vegetation clearing as indicated in the design drawings (refer **Appendix A**);
- Demolition works;
- Utility adjustments;
- Earthworks;
- Construction of piers and footings for the shared path;
- Construction of the concrete footpaths, stairs and shared path, including new safety barriers, retaining walls, balustrades and handrails; and
- Landscaping works as indicated in the design drawings (refer **Appendix A**).

The Contractor would confirm the construction methodology for installation of the piers and footings during the detailed design phase. This REF has assumed piling would be required as a 'worst case scenario'; however, strip or pad footing is an option that would be considered by the Contractor.

De-mobilisation Phase

Upon completion of the works, site fencing and other environmental safeguards would be removed. The site compound would be dis-established and any plant and equipment de-mobilised from the site. The worksite would be restored to its pre-works condition, including reinstatement of bollards/vehicle gates, and rectifying any damage as required.

3.4 Site Compounds and Laydown Areas

The main site compound would be located at the northern end of the Newport Beach car park (refer **Figure 3-4**) and would be used for the site office and to store any plant, equipment or materials as required.

In the event the use of the site compound coincides with the use of this part of the car park for organised sports (primarily in winter), the sports would be relocated within the car park, or alternative arrangements made with the sports clubs for the duration of the works.

A laydown area would be established in Eric Green Reserve as required to increase efficiency of the construction works and to reduce potential traffic impacts associated with use of the main construction compound (e.g. to get materials, etc.). Scheduling would ensure works at this site are minimised to allow for use of the reserve by the community as much as possible.

3.5 Construction Hours and Duration

It is anticipated that work would commence in the second half of 2024 and take around three months to complete.

Works would generally be undertaken during standard construction hours, that is:

- Monday to Friday 7 am to 5 pm;
- Saturdays from 8 am to 1 pm.

No work would be undertaken on Sundays or public holidays.

However, works outside of standard construction hours may be required for sections of the shared path along Barrenjoey Road where the road is limited to two vehicular lanes in order to minimise disruptions to traffic. Any works that would impact on traffic would be undertaken outside the AM and PM peak period for traffic in so far is as is reasonable and feasible.

In addition, deliveries may be required outside these standard construction hours. Where that is the case, the approval of Council's Superintendent for the works would be required.

If required, works outside of standard hours would be undertaken in accordance with mitigation measures discussed in **Section 6.4.4**.

3.6 Workforce

The construction workforce would comprise around twelve people.

Construction personnel travelling to the site may travel by vehicle and could park in the Newport Beach car park. Personnel would also be encouraged to arrive to site by public transport.

3.7 Plant and Equipment

A list of the plant and equipment likely to be used to construct the proposal is provided below and would be confirmed by the Contractor:

- Light vehicles;
- 20T truck;
- Road/delivery truck;
- Powered hand tools;
- 4-5 hp chainsaw;
- 40-50 hp tub grinder and mulcher;
- Front end loader;
- Backhoe;
- Tracked excavator;
- Fixed crane;
- Vacuum truck;
- Road sweeper;
- Compactor;
- Pneumatic jackhammer;
- Compressor;
- Generator(s);
- Concrete saw;
- Road profiler; and
- Lighting towers.

3.8 Materials

The source and quantity of materials would be confirmed by the Contractor. It is anticipated that the following materials would be required for the proposed works:

- Concrete;
- Steel;
- Asphalt;

- Sand, gravel and aggregate;
- Prefabricated elements; and
- Various plant and tree species.

3.9 Operation of the proposal

Council would maintain the shared path and associated landscaping in the operational phase.

Maintenance activities would include:

- Cleaning of shared path to remove leaf litter and rubbish;
- Review and pruning of vegetation to ensure 2.4 m clearance on shared path and to ensure signs are visible for motorist and cyclists;
- Watering, mulching, weed removal, plant replacement and fertilising as required; and
- Maintain visibility of on road and on path markings.

Figure 3-4: Construction footprint and proposed construction compound locations

4 Statutory and Planning Framework

This section provides a review of the statutory and planning framework for the proposal and considers the provisions of relevant state environmental planning policies (SEPPs), local environmental plans (LEPs) and other legislation. The results documented in this section are current as of the date of this report, noting that there may be future updates to the legislation that could affect the below.

4.1 NSW Environmental Planning and Assessment Act 1979

This REF has been prepared in accordance with Sections 5.5 and 5.7 of the EP&A Act, which requires that the determining authority consider, to the fullest extent possible, all matters affecting or likely to affect the environment due to the proposed activity. Consideration of the factors listed under Clause 171(2) of the EP&A Regulation has been used to assist in assessing the significance of the development (refer **Appendix B**).

4.1.1 State Environmental Planning Policies

State Environmental Planning Policy (Transport and Infrastructure) 2021

Chapter 2 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (TISEPP) aims to enable the effective delivery of infrastructure across the State.

Section 2.72(3)(a)(i)) of TISEPP states: "development for the purpose of roads, pedestrian pathways, cycleways, single storey car parks, ticketing facilities, viewing platforms and pedestrian bridges may be carried out by or on behalf of a public authority without consent on land owned or controlled by the public authority."

Based on the review of land tenure (refer **Table 1-1**) falling within the project footprint, Council is (wholly or in part) the manager of the subject land. As such, the proposal would therefore be permissible without consent and fall under Division 5.1 of the EP&A Act.

Consultation requirements under the SEPP are discussed in **Section 5**.

State Environmental Planning Policy (Resilience and Hazards) 2021

The proposal footprint incorporates land falling within the Coastal Use Area and the Coastal Environment Area coastal management areas mapped under *State Environmental Planning Policy (Resilience and Hazards) 2021* (RHSEPP). However, the provisions of Divisions 3 and 4 of the Resilience and Hazards SEPP are not relevant to the proposed activity as it does not require consent. Nonetheless, the related provisions have effectively been addressed in **Table 4-1** and **Table 4-2**.

The proposal further incorporates land in the proximity area for Littoral Rainforest in the northern part of the site. Section 2.8(1) of the Resilience and Hazards SEPP states that development consent must not be grated to development on land within the proximity area for Littoral Rainforest 'unless the consent authority is satisfied that the proposed development will not significantly impact on –

(a) The biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or
(b) The quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest'.

No such impacts are anticipated as a result of the proposal. The nearest patch of Littoral Rainforest is located around 320 m distant from the proposed works near the Bilgola Beach SLSC. No Littoral

Rainforest would be directly impacted to facilitate the works. The proposal is not expected to indirectly impact the nearby Littoral Rainforest, as it would not result in any material changes in surface or groundwater flows to the subject vegetation, comprising as it does at that location a footpath.

Division 5 of the RHSEPP contains general provisions relating to development in the coastal zone. Section 2.12 provides that 'Development consent must not be granted on land within the coastal zone unless the consent authority is satisfied that the proposed development is not likely to increase the risk of coastal hazards on that land or other land'. There is no coastal vulnerability area mapping for the locality and so other sources of information were considered to evaluate the risk of coastal hazards. The land is shown as being located outside of the Northern Beaches Coastal Risk Planning Map area (refer **Section 6.9**) and therefore the proposed works are not anticipated to increase the risk of coastal hazards.

Section 2.13 of the RHSEPP requires that the consent authority take 'into consideration the relevant provisions of any certified Coastal Management Program that applies to the land'. There is no Coastal Management Program currently in place for the subject land.

Table 4-1: Management objectives for Coastal Use Area under the *Coastal Management Act 2016*

Objectives	Relevance to the Proposal
9(2)(a) to protect and enhance the scenic, social and cultural values of the coast by ensuring that— *(i) the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast, and* *(ii) adverse impacts of development on cultural and built environment heritage are avoided or mitigated, and* *(iii) urban design, including water sensitive urban design, is supported and incorporated into development activities, and* *(iv) adequate public open space is provided, including for recreational activities and associated infrastructure, and* *(v) the use of the surf zone is considered.*	The proposal would protect and enhance the scenic, social and cultural values of the coast by: (i) The development would have minimal impact on the natural scenic quality of the coast. Once established, the landscaping works would compensate for the vegetation cleared for the works; (ii) The development is unlikely to impact on cultural or built environmental heritage; (iii) The development would provide a sealed pathway, landscaping and furniture. (iv) The proposal would support cycling and walking, with improved access to public open space areas. Minor impacts to public open space would occur during construction; (v) The surf zone would not be impacted by the development.
9(2)(b) to accommodate both urbanised and natural stretches of coastline.	The proposal is mostly adjacent to an existing road and would have minimal impact on the coastline.

Table 4-2: Management objectives for Coastal Environment Area under the *Coastal Management Act 2016*

Objectives	Relevance to the Proposal
8(2)(a) to protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and coastal lagoons, and enhance natural character, scenic value, biological diversity and ecosystem integrity	The proposal would not significantly impact coastal environmental values nor the natural processes of coastal waters. Some areas of native vegetation would be removed to facilitate the works, but these impacts would be ameliorated by the implementation of landscaping works following completion of construction. The proposed

Objectives	Relevance to the Proposal
	alignment of the shared path is mostly adjacent to an existing road and is unlikely to adversely impact the character or scenic value of the site. Provided the safeguards and mitigation measures in this REF are implemented, adverse impacts to biological diversity and ecosystem integrity are unlikely.
8(2)(b) to reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change	The proposal is not expected to impact coastal waters or estuaries. The risk of incidents would be minimised through the implementation of the safeguards and mitigation measures in this REF.
8(2)(c) to maintain and improve water quality and estuary health	The proposal is not expected to change the existing level of impact to coastal waters arising from use of the existing Coastal Walk. Provision of a sealed shared path has potential to reduce any existing level of impact from erosion and sedimentation from the unsealed Coastal Walk. The risk of incidents during construction would be minimised through the implementation of the safeguards and mitigation measures in this REF.
8(2)(d) to support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons	The proposal would support social values of coastal waters through provision of a shared path, pedestrian footpaths connecting to the existing Coastal Walk, and additional seating that meets current engineering standards and is safe to use.
8(2)(e) to maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place	The shared path would have negligible impact on dunes and would not impact any beaches, noting it is located outside the Coastal Risk Planning Area Map under the LEP. Hence, no impacts to beach systems are anticipated. Similarly, the works are not anticipated to adversely impact the natural foreshore feature that comprises Bilgola South Headland.
8(2)(f) to maintain and, where practicable, improve public access, amenity and use of beaches, foreshores, headlands and rock platforms	The proposal would provide improved public access for cyclists and pedestrians.

4.1.2 Local Environmental Plan

The proposal is located in the Northern Beaches LGA and the Pittwater Local Environmental Plan 2014 (PLEP2014) applies to the subject land. Under the PLEP 2014, the subject land is zoned SP2 – Infrastructure (Classified Road) and C2 – Environmental Conservation (refer **Figure 4-1**).

The relevant land use zones are listed in **Table 4-3**. The proposal is consistent with the land use zonings.

As the proposal is permitted without consent under the TISEPP, the consent provisions of the PLEP2014 do not apply to the proposal.

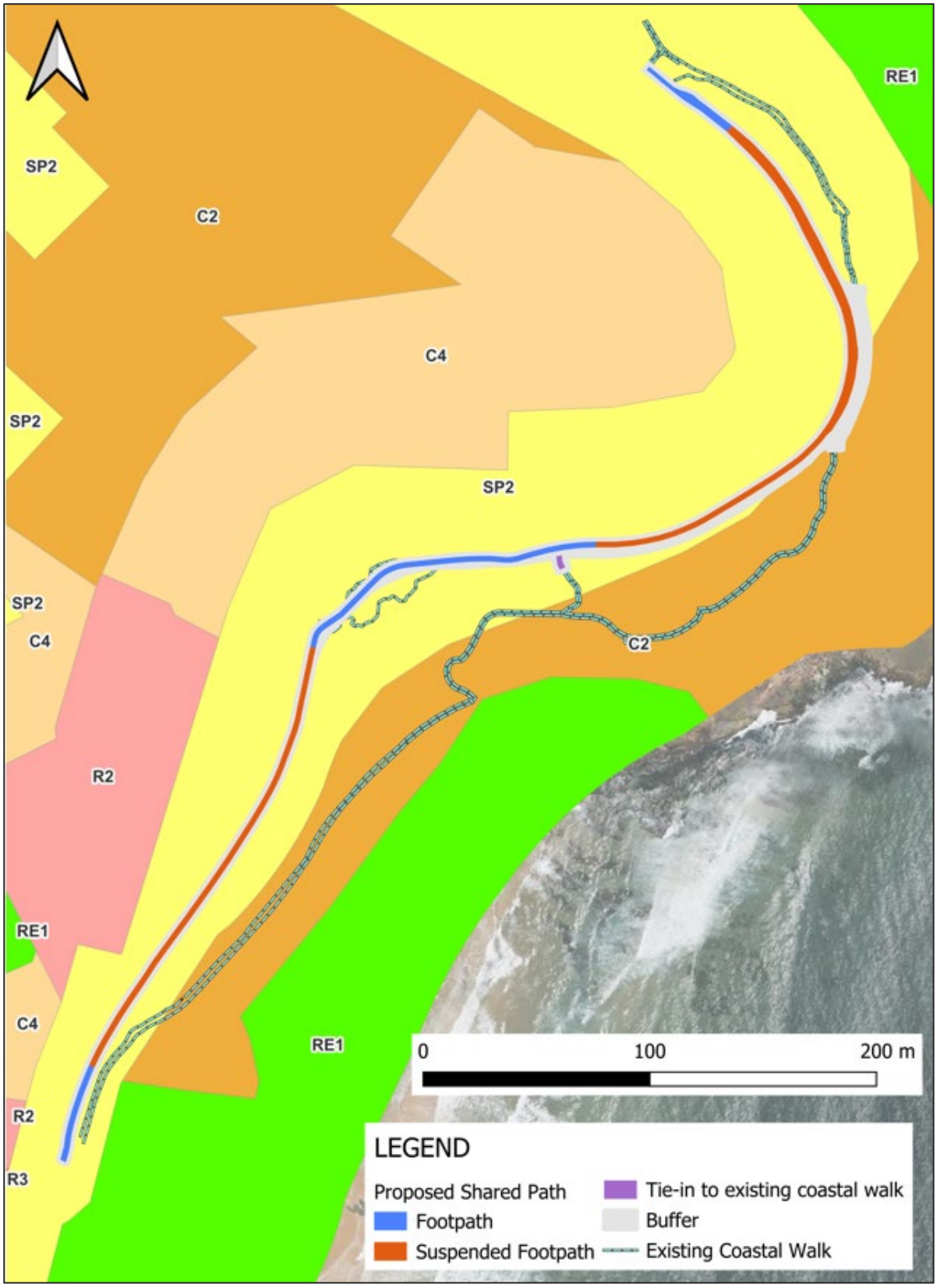

Figure 4-1 Land use zoning

Table 4-3: Land use zonings

Zoning	Objectives
SP2 – Infrastructure (Classified Road)	The objectives of this zone are: • To provide for infrastructure and related uses. • To prevent development that is not compatible with or that may detract from the provision of infrastructure.
C2 – Environmental Conservation	The objectives of this zone are: • To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values. • To prevent development that could destroy, damage or otherwise have an adverse effect on those values. • To ensure the continued viability of ecological communities and threatened species. • To protect, manage, restore and enhance the ecology, hydrology and scenic values of riparian corridors and waterways, groundwater resources, biodiversity corridors, areas of remnant native vegetation and dependent ecosystems.

4.2 Crown Land Management Act 2016

The objects of the *Crown Land Management Act 2016* are to provide for the ownership, use and management of the Crown land of New South Wales, to provide clarity concerning the law applicable to Crown land, to require environmental, social, cultural heritage and economic considerations to be taken into account in decision-making about Crown land, to provide for the consistent, efficient, fair and transparent management of Crown land for the benefit of the people of NSW, and to provide for the management of Crown land having regard to the principles of Crown land management.

The tenure of the land within the proposal footprint is discussed in **Table 1-1**. Most of the land within the proposal footprint falls on land for which Council is the nominated Crown Land Manager. Under section 3.21 of the Act, where a Council is the Crown Land Manager, Councils manage Crown land as if it were public land under the *Local Government Act 1993* and no landowners' consent is required.

The land for which Council is the Crown Land Manager is subject to the *Ocean Beaches Plan of Management: Newport Beach* (Pittwater Council, 2006) is mapped in **Figure 4-2**. 'Footpaths, boardwalks, minor bridges, multi-use pathways and tracks (other than for motor vehicles)' are categorised in the PoM as 'minor works' that are permissible without consent. That portion of the project subject to the PoM includes land categorised under the PoM as General Community Use, Park, Natural Area – Escarpment land, and a small area of land categorised as Natural Area – Foreshore. It is considered that the proposal is consistent with the objectives of the Sections 36E, 36G, 36I, 36L and 36N of the LG Act, as relevant to the land use categories under the PoM.

For that portion of the works located within Bilgola Beach Reserve, both Council and the Minister are identified as being joint Crown Land Managers.

It is recommended that Council consult with Crown lands to confirm this status and whether a Crown Land licence / landowner consent is required for the proposal.

With respect to the portion of the proposal falling within Bilgola Beach Reserve, the consistency of the proposal with the *Crown Land Management Act 2016* can be determined by the existing use of the land and the gazetted reserve purpose, which is nominated as 'Public Recreation'. The existing use of the

land includes the existing coastal walking path, shown as a blue dashed line in **Figure 4-2.** Other existing uses include public recreation and enjoyment. It is therefore considered that the proposal is consistent with the relevant objects of the Act as they would not adversely affect the environmental, social, cultural and economic values of the reserve and are consistent with the dedicated reserve purpose.

Figure 4-2: Pittwater Ocean Beaches PoM - Newport Chapter land categorisation (source: Pittwater Council, 2006)

4.3 Other Relevant NSW Legislation

Table 4-4 lists the NSW legislation relevant to the proposal or the land on which the proposed works would be undertaken.

Table 4-4: Other relevant NSW legislation

Legislation and Application	Relevance to the Proposal
Biodiversity Conservation Act 2016 **(BC Act):** provides for a strategic approach to conservation in NSW. It includes provisions for risk-based assessment of native plant and animal impacts, including a Biodiversity Assessment Method (BAM) to assess the impact of actions on threatened species, threatened ecological communities and their habitats.	Under the BC Act, an assessment of significance must be completed to determine the significance of impacts to threatened species, populations and/or communities or their habitat. As discussed in **Section 6.5**, there are five species of bird, and six mammals listed under the BC Act that have potential to occur in the proposal area. In addition, one TEC, Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898), also occurs in the study area and will be subject to some direct impacts. However, the Assessments of Significance (refer **Section 6.5 and Appendix D**) concluded the proposal is unlikely to significantly impact these threatened species or the TEC, and hence a BDAR or SIS is not required.
Biosecurity Act 2015: The object of this Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.	Reporting and managing biosecurity risks in the environment is considered a general biosecurity duty under the Act. Any weeds encountered during the works, and the risk of import of pests or weeds, would be managed in accordance with the safeguards and mitigation measures in **Section 6.5.3** of this REF.
Protection of the Environment Operations Act 1997 (PoEO Act): focuses on environmental protection and provisions for the reduction of water, noise and air pollutions and the storage, treatment and disposal of waste. Introduces licencing provisions for scheduled activities that are of a nature and scale that have potential to cause environmental pollution. Also includes measures to limit pollution and manage waste.	The proposal would not involve the undertaking or carrying out of a Scheduled Activity under Schedule 1 of the Act. Therefore no Environmental Protection Licence would be required for the proposed works. If the safeguards and mitigation measures in this REF are implemented and monitored, there is unlikely to be any material harm, water, noise or air pollution impact (refer to **Section 7.2**). This would include controls to manage the risk of accidental spills or releases of fuel, or other contaminants to the environment.
Roads Act 1993: provides for the construction and maintenance of public roads. Requires consent to dig up, erect a structure or carry out work in, on or over a road.	Barrenjoey Road is a classified road managed by TfNSW. An approval from TfNSW is required for the works in accordance with Section 138 of the Act. A Road Occupancy Licence may also be required for the use of roads to (if required) undertake the construction works from Barrenjoey Road.
Contaminated Land Management Act 1997: Must report to EPA if contaminated land is encountered during the works that meets the duty to report contamination requirements under section 60 of this Act.	As discussed in **Section 6.1.2**, there is a low likelihood of encountering contaminated material during the works. Safeguards have been included in this REF to manage contaminated material if identified during construction (refer **Section 6.1.3**).

Legislation and Application	Relevance to the Proposal
Aims to establish a process for investigating and (where appropriate) remediating land that the EPA considers to be contaminated significantly enough to require regulation under Division 2 of Part 3. The Act aims to set out accountabilities for managing contamination if the EPA considers the contamination is significant enough to require regulation under Division 2 of Part 3.	
***Heritage Act 1977*:** provides for the protection of conservation of buildings, works, maritime heritage (wrecks), archaeological relics and places of heritage value through their listing on various State and local registers. Makes it an offence to harm any non-Aboriginal heritage values without permission.	The proposal is unlikely to impact any State heritage listed sites (refer **Section 6.6**).
***National Parks and Wildlife Act 1974* (NP&W Act):** provides for the protection of Aboriginal heritage values, national parks and ecological values. Makes it an offence to harm Aboriginal objects, places or sites without permission.	A search of the Aboriginal Heritage Information Management System (AHIMS) indicates some sites in the general locality; however, these sites are unlikely to be adversely impacted by the proposal due to their distance from the proposal footprint (refer **Section 6.6**). An Aboriginal Heritage Impact Permit (AHIP) is not required for the proposal. An Unexpected Finds Protocol will be prepared to assist with managing the risk of works affecting objects.

4.4 Commonwealth Legislation

4.4.1 Environment Protection and Biodiversity Conservation Act 1999

Under the EPBC Act, a referral to the Commonwealth is required for proposed 'actions that have the potential to significantly impact on matters of national environmental significance (MNES) or the environment of Commonwealth land'.

MNES are considered in **Sections 6.5** and **6.6**, **Appendices B** and **D** of this REF.

The assessment of the proposal's impact on MNES and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant MNES or on Commonwealth land. Accordingly, the proposal has not been referred to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the EPBC Act.

4.4.2 Native Title Act 1993

The *Native Title Act 1993* recognises and protects native title. A review of the National Native Title Tribunal's Native Title Vision online database of claims undertaken on 6 March 2024 indicated there are no active native title claims for the Northern Beaches LGA.

4.5 Confirmation of Statutory Position

The proposal is categorised as development for the purpose of pedestrian pathways and cycleways and is being carried out by or on behalf of a public authority. Under section 2.73(3(a)(i)) of TISEPP, the

proposal is permissible without consent. The proposal is not State significant infrastructure and is subject to environmental impact assessment under Division 5.1 of the EP&A Act.

Accordingly, Northern Beaches Council is the determining authority for the proposal, with this REF fulfilling the obligation under section 5.5 of the EP&A Act 'to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity'.

5 Consultation

5.1 TISEPP Consultation

Division 1 of the TISEPP details the consultation requirements relating to activities falling under the SEPP. The proposal triggers the notification requirements under Sections 2.10 to 2.12 in relation to:

- Development with impacts on council-related infrastructure or services;
- Development with impacts on local heritage; and
- Development with impacts on flood liable land.

However, Section 2.17(b) states that Sections 2.10-2.15 do not apply with respect to development that would require notice of the intention to carry out development to a council or public authority that is carrying out the development.

The proposal is not located on land reserved under the *National Parks and Wildlife Act* 1974 or on land zoned C1 National Parks and Nature Reserves and therefore does not trigger consultation requirements under clause 2.15 of the TISEPP.

5.2 Community and Stakeholder Engagement

In 2018 Council consulted with community and key stakeholders on a series of proposed designs connecting Newport to Avalon on a mixture of new footpaths, shared paths and on-road cycleways.

Feedback collected during the first stage of consultation was used to further refine the designs. Following extensive consultation with key stakeholder groups, the revised design plans were also presented to local resident's associations representatives for initial feedback prior to public exhibition.

The proposal was exhibited as 'Section 1' of the overall Newport to Avalon Pedestrian and Cycle Link project. The community feedback collected during public consultation of Section 1 between 23 October and 6 December 2020 revealed a general level of support for the proposed shared path (refer **Figure 5-1**), with comments citing the anticipated benefits of improved access and safety. A total of 116 submissions were received.

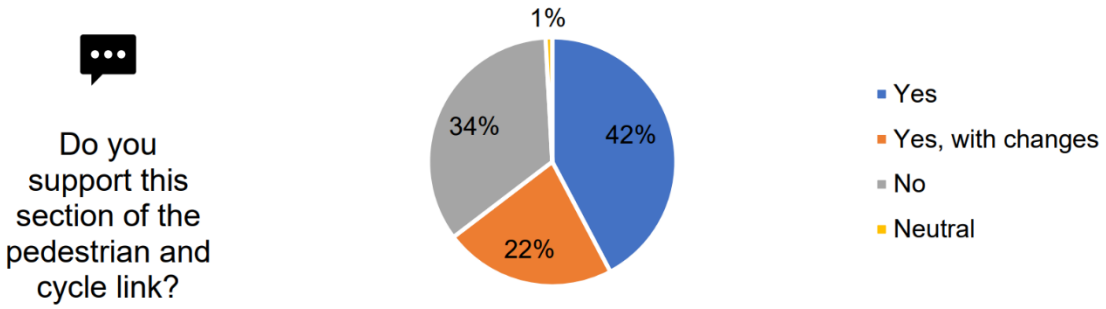

Figure 5-1: Support for the proposal (Source: Council, 2021)

Key findings from the engagement conducted are presented in **Table 5-1**.

Table 5-1: Community and Stakeholder Engagement Findings (Source: Council, 2021)

Theme	Comments	Council's Response
Pedestrian access and safety	Those who were supportive indicated that segregating the path from Barrenjoey Road would improve safety for pedestrian and cyclists. Those who were not supportive noted that the path would become similar to that of Narrabeen Lake, with cyclists travelling at fast speeds, increasing risk to pedestrians. As a way to further improve pedestrian access and safety, some respondents suggested the design provide two lanes, one dedicated to cyclists and the other for pedestrians only.	The segregation of cyclists from pedestrians requires an increase in width, the width was previously reduced to minimise impact on the landscape, however due to the grade and the desire for segregation of pedestrians and cyclists the width of the path will be widened to accommodate the segregations and improve safety.
Accessibility	Some respondents welcome the wider path based on improved access for those with additional mobility needs and parents with prams. Some comments considered that the design would not accommodate those with accessibility requirements.	The provision of the path greatly improves accessibility in that the only other existing path around the headland is through the bush track, with stairs and terrain inaccessible for prams and motorised scooters.
Aesthetics and materials	Respondents identified the natural aesthetics of this area as being important to pedestrians, cyclist and commuters. Many respondents, including those who were supportive of the proposal indicated that the proposed concrete barriers would change the natural aesthetics of the area. Requests to explore the use of alternate materials that integrate and compliment the local environment have been noted.	A design alteration comprising installation of a steel guard rail similar to the existing was included through shifting the path slightly and providing additional room between the road and the path.
Natural environment	Concerns were raised regarding the potential impacts that the project would have on flora and fauna.	A preliminary environmental investigation was commissioned, and the report did not identify any significant impact to existing vegetation or wildlife corridors. The outcomes of that investigation, along with the findings of this REF in relation to biodiversity, are summarised in **Section 6.5**. Provided the mitigation measures in this REF are implemented, it is considered that the impacts to biodiversity can be appropriately mitigated and managed.
Gradient and typography	Many respondents indicated that the gradient and typography of the area is not suited for casual cycling and limits accessibility.	Whilst there are short steep sections, the approximate average grade for the proposed path between Neptune Road and The Serpentine is 6%. This grade is less than the grade required for wheelchair accessible ramps of 1 in 14 (or 7%)

Theme	Comments	Council's Response
	Questions were also received in relation to feasibility of the design on the basis of gradient and typography.	and is considered appropriate for the proposed use.
Project cost	Respondents who mentioned the cost of the project noted it is not the best use of ratepayer money, with some suggesting the money could be better used upgrading existing infrastructure within the area.	The project is funded by the NSW Government for the provision of cycling infrastructure. This funding is specifically tied to this project and not transferrable across projects.
Requested infrastructure upgrades	A number of respondents, predominately those who were not in favour of the project , would rather see the upgrade of existing infrastructure. Suggestions were also received regarding the upgrade and widening of Barrenjoey Road would help address safety and access for cyclists.	The project has funding which is provided for the provision of new cycling infrastructure and would not be transferable to the upgrade of existing headland walk. Barrenjoey Road is a State Road managed by Transport for NSW. Any upgrade or widening is not within the scope of this project or the remit of Council.
Why undertake this project	A number of community members raised question about the reasoning and rationale of the project.	This section of path is a missing link in Council's cycle network connecting Palm Beach with Manly. This project also provides a safe walking path between Newport and The Serpentine, Bilgola. As part of Council's program of works to connect previously unconnected town and village centres, Council has committed funding towards the completion of missing links across the Northern Beaches.

6 Environmental Impact Assessment

This section describes the existing environment to the proposal, the potential impacts of the construction and operation of the proposal on the existing environment and provides mitigation measures to manage those impacts. The results documented in this section are current as of the date of this report, noting that there may be subsequent updates to the information contained in the online databases utilised that could affect the reliability of the outcomes of the environmental impact assessment.

6.1 Geology and Soils

A *Report on Geotechnical Investigation* was prepared by Douglas Partners (2018) for the proposed coastal walkway from Bilgola Beach to Palm Beach and including the proposal (refer **Appendix C**). The investigation obtained geotechnical information on subsurface conditions at borehole sites at three locations of which Location 3 – Bilgola Beach Headland (Borehole No. 6) is of relevance to the proposal.

6.1.1 Existing Environment

Topography, Geology and Soils

Douglas Partners (2018) noted the following:

- The coastal bluff between Newport and Bilgola Beaches reaches a maximum height of around 30 m and, at its closest approach is approximately 10 m from the existing and proposed walkway route;
- The southern section of the bluff is generally well vegetated with slope angles of 35° to 50° with a few outcrops of highly to moderately weathered, interbedded sandstone and siltstone bedrock. The central and northern sections of the bluff are higher, sub-vertical to over-hanging and generally rocky with vegetation largely restricted to along the crest;
- Upslope of the coastal bluff, the natural slopes are typically well vegetated with slope angles ranging from 10° to 20°;
- Reference to the Sydney 1:100 000 Geological Series Sheet 9130 indicates that the site is underlain by the Newport Formation of Triassic age, which comprises interbedded sandstone, siltstone and shale. Exposures of weathered siltstone and sandstone bedrock on the coastal bluff and the excavated batter along the high (western) side of Barrenjoey Road Drive are considered to be consistent with the Newport Formation.

Douglas Partners (2018) reported the following general characteristics for the project locality:

- Construction of Barrenjoey Road appears to have involved a side cut into the natural slope with bedrock on the upslope side and some filling on the downslope side;
- There is interbedded sandstone and siltstone bedrock exposed within an eroded storm water channel to the north of the Newport Beach car park; and
- The crest of the coastal bluff along the edge of Barrenjoey Road is well vegetated. There is no evidence of significant slope instability that could adversely affect the proposed pathway.

The subsurface profile at the Newport Beach headland borehole (BH6) is summarised by Douglas Partners (2018) as follows:

- Colluvium: Encountered in BH6 comprising clayey sand to 1.0 m depth;
- Bedrock: Encountered at 1.0 m depth comprising low strength sandstone.

A review of the eSPADE portal (DPIE, 2023) indicated:

- The land in the northern half (approx.) of the proposal site is mapped as Watagan soils (9130wn);
- The land in the southern half of the site is mapped as Narrabeen soils (9130na).

A review of ASS mapping available on the Sharing and Enabling Environmental Data (SEED) Portal indicates acid sulfate soils (ASS) do not occur within the project footprint.

Contamination

A search of the Environment Protection Agency's (EPA) contaminated land record conducted on 4 December 2023 did not identify any contaminated sites in the suburbs of Newport or Bilgola Beach.

6.1.2 Potential Impact

The potential impacts of the proposal on geology and soils during the construction phase include:

- Erosion and sedimentation from exposed areas of soils;
- There is a low risk of encountering ASS; and
- Although a low risk, there remains a possibility of encountering unexpected contamination during the works.

No adverse operational phase impacts on geology and soils are anticipated.

6.1.3 Mitigation Measures

The following measures and safeguards will be adopted to minimise the potential impacts of the proposal on geology and soils:

- An Erosion and Sediment Control Plan (ESCP) shall be prepared and implemented in accordance with the requirements of Landcom (2004) Managing Urban Stormwater: Soils and Construction.
- Erosion and sediment controls will be checked and maintained on a regular basis and records of such inspections kept and provided upon request.
- Erosion and sediment control measures are not to be removed until the works are complete and areas are stabilised.
- Work areas are to be stabilised progressively during the works.
- If unexpected contamination is encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Council's Site Superintendent and/or the EPA.

6.2 Hydrology and Water Quality

6.2.1 Existing Environment

The nearest watercourse to the proposal footprint is an unnamed, non-perennial watercourse that flows from Attunga Reserve, through Potter Reserve and into the ocean via the dunes to the north of the Newport Beach car park.

Existing Council stormwater drainage is mapped in **Figure 6-1**.

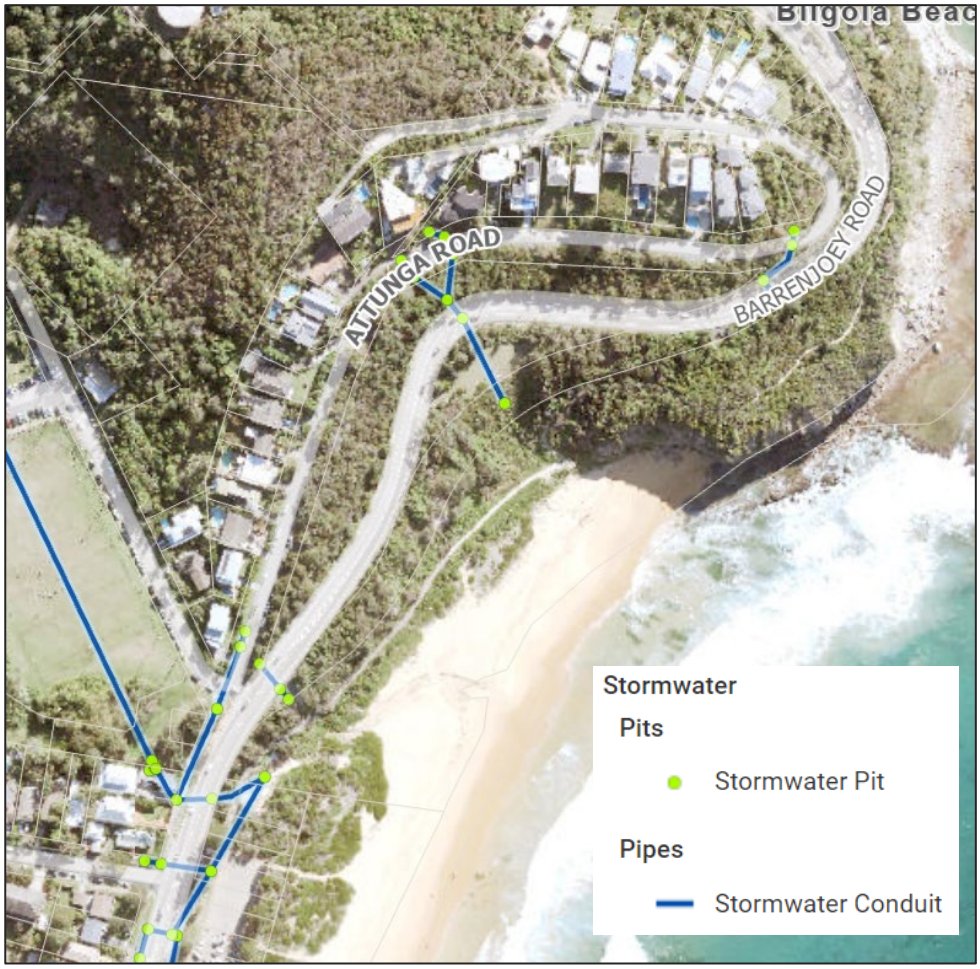

Figure 6-1: Existing Council Stormwater Drainage (source: Northern Beaches Council Online Map Viewer)

6.2.2 Potential Impact

There is an elevated risk of water quality impacts arising from the construction works during rainfall events. The main construction activities with the potential to cause water quality impacts include:

- Demolition of a section of the existing coastal walkway;
- Excavation of soils;
- Temporary stockpiling of materials and equipment;
- On-site movements of vehicles and machinery.

There is also a risk of accidental spills of fuel or hydraulic fluids from hand tools or other chemicals used on site, or from re-fuelling of machinery on site. However, provided the mitigation measures and safeguards in **Section 6.2.3** are implemented, the risk is considered low.

The concept design indicates stormwater drainage from the proposed kerb and gutter would connect and discharge into the existing drainage channel.

6.2.3 Mitigation Measures

The following measures and safeguards will be adopted to minimise the potential impacts of the proposal on flooding and water quality:

- There is to be no release of dirty water into drainage lines and/or waterways;
- Water quality control measures are to be used to prevent any materials (e.g. concrete, grout, or sediment) entering drain inlets or waterways;
- Any fuels and other hazardous liquids shall be stored at the designated construction compound within an impervious bunded area with sufficient capacity to hold 120% of the stored liquids;
- Refuelling of plant and equipment is to occur in impervious bunded areas, preferably located a minimum of 50 metres from drainage lines or waterways;
- Appropriate emergency spill kits are to be kept on site at all times and maintained throughout construction The spill kit must be appropriately sized and of a type suitable for the volume of substances at the work site;
- The CEMP will include an accidental spill emergency response procedure and all construction personnel will be trained in the management and clean-up of accidental spills;
- Vehicles and plant must be properly maintained and regularly inspected for fluid leaks;
- Workers are to be made aware of the provisions of Section 120 of the POEO Act with regards to water pollution. Notification to the EPA in accordance with Part 5.7 of the POEO Act will be undertaken where a pollution incident occurs in the course of an activity such that material harm to the environment is caused or threatened.
- The CEMP will include a procedure for the event of a heavy rainfall event that affects the main construction compound or any work areas.

6.3 Traffic, Transport and Access

6.3.1 Existing Environment

Traffic

Barrenjoey Road is the access road to the subject site. It is a classified road (state road) managed by TfNSW. It is a two-lane single-carriageway road from Avalon Beach to Newport, with a posted speed limit of 60 km/hr. There is a right-turn lane for southbound vehicles to turn into Neptune Road.

At Newport, Barrenjoey Road widens to a four-lane, dual-carriageway road, then widens to six lanes terminating at Mona Vale. Barrenjoey Road is the main road servicing the northern area of the Northern Beaches LGA.

No parking is permitted on Barrenjoey Road. Newport Beach carpark is at the southern end of the project footprint.

Pedestrian and cyclist access

There is a pedestrian pathway on the eastern side of Barrenjoey Road, which terminates at the intersection with Neptune Road. There is pedestrian access from Newport Beach to Bilgola Beach along an existing coastal walk, which also provides access to a cleared area with public benches within Eric Green Reserve.

There are no existing on or off-road cycleways or shared user paths.

Public transport

There are two bus routes that run along Barrenjoey Road: the 199 Palm Beach to Manly via Mona Vale and Dee Why, and the 190X North Avalon to City Wynyard (Express Service). There are bus stops located south of the intersection with Neptune Road (south of the subject site), and north of the intersection with The Serpentine (north of the subject site).

The 199 service runs 24 hours a day, 7 days a week. The service operates at a 10-minute frequency across the day to Palm Beach and at least every 20 minutes overnight to Avalon Beach. The 190X service operates on a 10-minute frequency during the weekday peaks.

6.3.2 Potential Impact

The potential impacts of the proposal on traffic and access during the construction phase include:

- There would be a temporary loss of parking (approx. 20 spaces) in the Newport Beach car park due to the installation of the construction compound and plant and materials storage. This impact is considered low due to the total number of parking spaces in the Newport Beach carpark and the availability of street parking on local roads.
- The use of the northern portion of the car park for the construction compound may impact the use of this area for sports. If this is the case, the sports would be relocated within the car park or alternative suitable arrangements made for the duration of construction.
- Traffic would be impacted due to the presence of construction vehicles. This impact is considered minor considering the scale of the project.
- Due to site constraints, sections of the alignment may need to be constructed from the southbound lane of Barrenjoey Road with a lane closure in place. This impact could be medium to major depending on the traffic volumes during the works.
- Existing pedestrian access along the coastal walkway and to Eric Green Reserve would be disrupted during the works, particularly for works at the pedestrian tie-ins to the existing coastal walkway and within the reserve.

The proposal would have a positive impact during the operational phase in providing safe access for pedestrians and cyclists between Newport Beach and The Serpentine. The proposal would result in increased road safety with community members using the shared path instead of the road.

6.3.3 Mitigation Measures

The following measures and safeguards will be adopted to minimise the potential impacts of the proposal on traffic and access:

- The CEMP will include a Traffic, Transport and Access Management Plan (CTTAMP) which will detail the construction traffic management measures to be implemented during the works.
- Where feasible, construction of the proposal will take place outside of the summer high period (December to February).
- Should the use of the Newport Beach car park for a construction compound coincide with the use of that area for sports, Council would either temporarily relocate the sports within the car park or make appropriate alternative arrangements in consultation with the affected sports groups.
- Prior to the commencement of works on site, Council will inform the nearby residents, emergency services, bus service operators and other key road user groups of the proposed works, traffic impacts and project contact information.

- Prior to the commencement of works, Council will liaise with TfNSW regarding any impacts to the operation of Barrenjoey Road and obtain Road Occupancy Licences as required.
- The Contractor will demonstrate consideration of construction methodologies and staging options to minimise the duration of closure of the southbound lane on Barrenjoey Road during the construction phase.
- Any works requiring closure of the southbound lane of Barrenjoey Road will be carried out outside of the morning and afternoon peak periods, where possible.
- Where possible, property accesses would be maintained during the works. In the event of works that impact property accesses, prior notification of the affected parties will occur, and the access will be reinstated at the conclusion of each day's work or alternative access provided, as agreed with the affected landholder.
- Construction compounds and laydown areas will be fenced to prevent public access.
- Signage will be erected notifying the public of any parking or access changes in the affected locations. Public access along the existing coastal walkway and to Eric Green Reserve will be maintained, where possible.
- Delivery of plant, equipment and materials to the site would be undertaken outside of morning and afternoon peak periods to minimise impacts on traffic, where feasible.

6.4 Noise and Vibration

6.4.1 Existing Environment

The subject site is bound by Barrenjoey Road to the east and Eric Green Reserve to the west. There are residences to the west of Barrenjoey Road, primarily west of Attunga Road, which runs adjacent to Barrenjoey Road. It is anticipated that the local noise environment would generally be representative of a coastal residential environment and anthropogenic noise would be dominated by vehicular traffic.

At the southern end of the works footprint near the main site compound in the Newport Beach car park, the nearest receivers are:

- Residential receivers, the closest of which is 33 m from the site compound;
- The Potter Reserve playing fields, which are 70 m from the works footprint;
- A commercial shopping precinct on Barrenjoey Road/Coles Parade which is around 320 m away; and
- Pittwater Presbyterian Church, which is located about 500 m from the site compound (but is shielded by other buildings).

Between Burke Street and The Serpentine, the closest receivers are residential dwellings on Attunga Street, the closest of which is located approximately 40 m from the works footprint.

6.4.2 Criteria

The EPA's *Draft Construction Noise Guideline* (2020) provides noise management levels (NMLs) for residences as summarised in **Table 6-1**.

Table 6-1: Noise management levels for residential receivers (Source: EPA, 2020)

Time of day	Noise management level ($L_{Aeq, 15\ min}$)
Recommended standard hours: • Monday to Friday 7am to 6pm	Noise affected RBL + 10dB

Time of day	Noise management level ($L_{Aeq, 15\ min}$)
• Saturday 8am to 1pm • No work Sundays or public holidays	Highly noise affected 75 dB(A)
Outside of recommended standard hours	Noise affected RBL + 5dB
	Highly noise affected 65 dB(A)

For purposes of this assessment, the local noise environments at the proposal location have been characterised using the TfNSW Construction Noise Estimation Tool (DMS-FT-150) as R1, for which the representative noise environment has background noise levels of:

- 40 dB(A) during the day (7am to 6pm);
- 35 dB(A) in the evening (6pm to 10pm); and
- 30 dB(A) during the night (10pm to 7am).

These values are used as the Rating Background Levels (RBLs) for residential receivers in the study area.

The noise criteria for the relevant types of sensitive receivers are provided in **Table 6-2**. It is noted that the NMLs for residential receivers are applied at the façade of the residence, whereas the noise criteria for sensitive receivers may be applied at either externally or internally, depending on the receiver type. Insertion losses, which are the reduction in noise levels as measured external to a building versus internally, are generally around 10 dB(A).

Table 6-2: Noise criteria sensitive receivers (Source: EPA, 2020)

Receiver type	Noise management level ($L_{Aeq, 15\ min}$)
Active recreation areas	External noise level 65 dB(A)
Passive recreation areas	External noise level 60 dB(A)
Places of worship	Internal noise level 45 dB(A)
Offices and retail outlets	External noise level 70 dB(A)

6.4.3 Potential Impact

During construction there would be noise associated with the operation of trucks, plant and machinery. The sound power levels (SPLs) associated with the expected plant and machinery are provided in **Table 6-3.**

Table 6-3: Plant and associated sound power levels

Plant	SPL (L_{Aeq}, dB(A))
Chainsaw	114
Concrete saw	118
Excavator 10T	100
Franna – crane	98
Front end loader	112
Hand power tools (2-3 items)	110

Plant	SPL (L_{Aeq}, dB(A))
Light construction vehicles	88
Pavement profiler	117
Piling rig – driven	116
Piling rig – bored	112
Pneumatic hammer	113
Power generator	103
Road truck / delivery truck	108
Tube grinder/mulcher	116
Vacuum truck/Sweeper	109

A distance-based assessment was undertaken for the noisiest plant (i.e. the concrete saw) using the TfNSW Noise Estimator Tool and assuming a direct line of sight to the receiver.

During the day, the works would be audible for a distance of over 500 m. Assuming a direct line of site, noise levels would be categorised as 'highly intrusive' (i.e. be ≥75 dB(A)) for residences located within 50 m of the works, 'moderately intrusive' for residences around 90 m from the works, and may be 'audible' for up to 250 m from the works depending on topography and any shielding (e.g. by other residences).

Any out of hours works would exceed the evening and night NML of 40 dB(A) and 35 dB(A). Noise levels would be considered 'highly intrusive' (i.e. be ≥65 dB(A)) for residences located within 150 m of the works, and 'moderately intrusive' for other residences up 250 m distant, assuming a direct line of site from the noise source.

The works would exceed the criteria for passive and active recreational areas located within 250 m and about 160 m of the works (respectively). With respect to the church and retail premises in Newport, no exceedances of the noise criteria are expected.

With respect to vibration, it is likely that the works, which would involve piling, would result in vibration levels that may be perceivable by people nearby, and that people in close proximity to the works may experience some discomfort. Damage to structures is unlikely to result from vibration associated with the works.

In the operational phase, levels of noise associated with the use of the shared path are not expected to materially differ to those currently experienced by nearby receivers.

6.4.4 Mitigation Measures

The following measures and safeguards will be adopted to minimise the potential impacts of noise and vibration associated with the construction of the proposal on receivers:

- Works are to be carried out during standard construction hours, where possible.
- Noise impacts are to be minimised in accordance with the *Draft Construction Noise Guideline* (EPA, 2020). The CEMP will include a Noise and Vibration Management Plan which details reasonable and feasible measures to reduce noise and vibration impacts to receivers, including:
    - Where practicable, adopting quieter work methods and using quieter plant and equipment;

- Operating plant and equipment in a quiet and efficient manner (e.g. use non-tonal reversing alarms, turning equipment off when not in use);
- Regularly inspecting and maintaining equipment to ensure it is in good working order;
- Limiting the idling of trucks as much as possible;
- Taking care when unloading trucks to minimise noise.

The Plan will be approved by Council prior to the commencement of construction.

- The Noise and Vibration Management Plan will include an out of hours works procedure that includes:
  - Residents will be provided notification of out of hours works at least seven days prior to those works commencing;
  - Measures to minimise the duration of out of hours work and undertaking the noisiest work prior to midnight;
  - Respite periods, that is programming of night works to minimise the number of consecutive nights work impacting the same receivers;
  - Additional measures to reduce noise emissions (e.g. noise blankets or screens, etc.);
  - Undertake noise monitoring at residences in the vicinity of the works to confirm noise levels and that appropriate mitigation measures have been implemented.
- The local community (including residences within 500 m of the works) would be notified of the commencement of works via direct mail-out, on Council's webpage and via the local media. A contact should be provided to enable them to make further enquiries or complaints.
- Signage will be erected at the works sites with the relevant contact details of the person(s) to whom community members can make complaints or enquiries.
- A complaints register will be established for the duration of the works to record any noise or other complaints related to the works. Any complaints received shall be responded to promptly and appropriately.
- Should any noise or vibration complaints be received, the need for additional mitigation measures would be investigated and implemented where reasonable and feasible.

6.5 Biodiversity

A preliminary ecological assessment was undertaken for the proposal by Niche Environment and Heritage (2018; refer **Appendix D**). This section summarises the findings of the report and provides additional evaluation of biodiversity based on database searches undertaken in October and November 2023, including:

- NSW BioNet / Atlas of NSW Wildlife database search (adopting a 10 by 10 km search area) (refer **Appendix E**);
- EPBC Act Protected Matters Search Tool (adopting a 5km buffer) (refer **Appendix E**);
- A review of the Native Vegetation of the Sydney Metropolitan Area mapping – Version 3.1 (OEH, 2016);
- A review of the BioNet Vegetation Classification (VIS) system;
- NSW Threatened Species Profiles; and
- Review of mapping for Key Fish Habitat Types and threatened species listings under the FM Act.

It is noted that the Niche (2018) assessment evaluated the Newport to Avalon Shared Path, of which the proposal is only a part. Where relevant, the results have been translated as relevant to the proposal.

6.5.1 Existing Environment

Protected areas

There are no Coastal Wetland or Littoral Rainforests, as defined in the RHSEPP, present in the proposal area. However, a portion of the proposal intersects the proximity area for Littoral Rainforests in the northern part of the site. As discussed in **Section 4.1.1,** it is not anticipated that the proposal would impact the Littoral Rainforest area.

There are no nationally important wetlands or Ramsar Wetlands in the study area or the wider project locality.

No National Parks, Nature Reserves, Aquatic Reserves or Marine Parks occur within the proposal area. Reserves within a 5 km radius of the site include the Ku-ring-gai Chase National Park and Narrabeen Aquatic Reserve.

There are no Areas of Outstanding Biodiversity Value or BioBanking sites in the proposal area.

The Biodiversity Values Map does not identify any high conservation value land within the proposal footprint.

Terrestrial vegetation

The database searches identified eight threatened ecological communities (TECs) listed under the BC Act and/or the EPBC Act that may or are likely to occur within 5 km of the proposal footprint, listed in **Table 6-1**.

Table 6-4: Threatened ecological communities within 5 km of the works site

Threatened ecological community	BC Act Listing	EPBC Act Listing
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community / Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	E
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland / Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	E
Coastal Upland Swamps in the Sydney Basin Bioregion	E	E
Eastern Suburbs Banksia Scrub of the Sydney Region / Eastern Suburbs Banksia Scrub in the Sydney Basin Bioregion	CE	CE
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia / Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CE	CE
Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion	-	E
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria / River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CE	CE

Threatened ecological community	BC Act Listing	EPBC Act Listing
Subtropical and Temperate Coastal Saltmarsh / Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	V

CE = Critically Endangered, E = Endangered, V = Vulnerable

Vegetation communities present in the proposal area are mapped in **Figure 6-2**.

A review of the mapping of Native Vegetation of the Sydney Metropolitan Area (Version 3.1 (OEH, 2016) VIS_ID 4489) available on the SEED portal mapped three Plant Community Types (PCTs) in the proposal area, all of which were confirmed via ground-truthing by Niche (2018):

- Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817);
- Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778); and
- Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin) Bioregion and South East Corner Bioregion (PCT 898).

PCT 898 is identified in the VIS as having an associated with the Themeda grassland on seacliffs and coastal headlands in the NSW North Coast, Sydney Basin and South East Corner bioregions TEC the under the BC Act and was confirmed as comprising the TEC by Niche (2018).

The vegetation communities present within the vicinity of the works footprint are generally in good condition as a result of bush regeneration and maintenance works carried out by Council (Niche Environment and Heritage, 2018).

There is a section of exotic species which does not align to any PCTs between Barrenjoey Road and the cleared area in Eric Green Reserve.

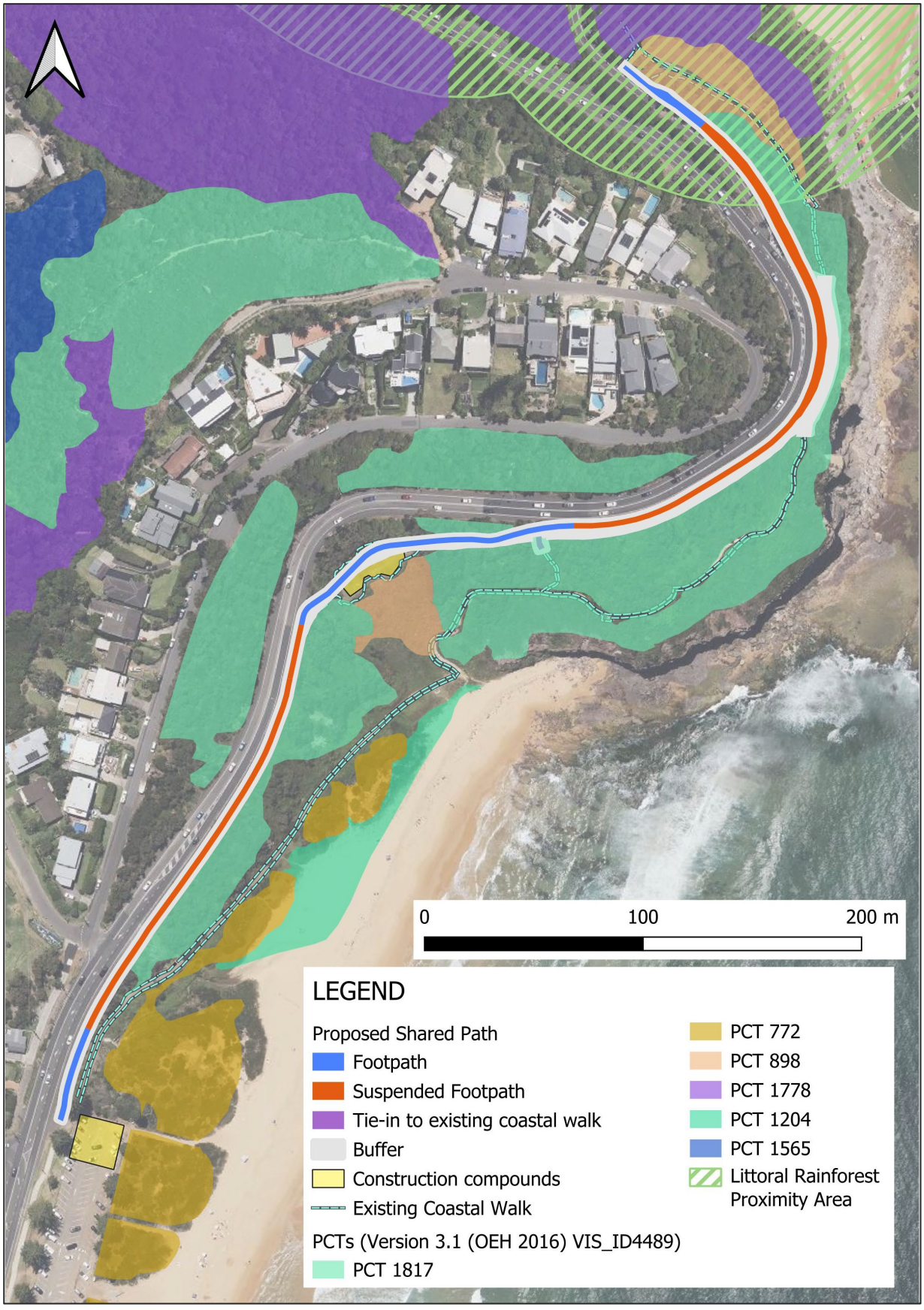

Figure 6-2 PCT Mapping for the Proposal Area

Threatened Species

Searches of the FM Act listings, BioNet Wildlife Atlas and EPBC Act Protected Matters Search Tool were conducted to identify threatened species with potential to occur in the project area. The BioNet Wildlife Atlas search returned a total of 94 threatened or migratory fauna listed under the BC Act, including 17 plant species, three amphibians, five reptiles, 47 bird species, 17 terrestrial mammal species and five marine mammal species. The Protected Matters Search returned a total of 109 threatened species and 63 migratory species listed under the EPBC Act. The results for these two database searches are provided in **Appendix E**.

The discussion below focusses on terrestrial flora and fauna that have a moderate to high likelihood of occurrence, or are known to occur, in the proposal area and that may be impacted by the proposal. The relevant species are listed in **Table 6-5**.

The remaining threatened fauna species with potential habitat or previous recordings within 10 km of the proposal site were attributed 'low' or 'no' likelihood of occurrence (refer **Appendix D** and **Appendix F**).

No threatened flora or fauna species were recorded during the field survey (Niche Environment and Heritage, 2018).

Table 6-5: Threatened species likely to occur in the project area

Common Name	Species Name	Statutory Listing*		No. of Records
		BC Act	EPBC Act	
Powerful Owl	*Ninox strenua*	V	-	548
White bellied sea eagle	*Haliaeetus leucogaster*	V	-	47
Latham's Snipe	*Gallinago hardwickii*	-	M	1
Eastern Osprey	*Pandion cristatus, Pandion haliaetus*	V	-	30
Australian Painted Snipe	*Rostratula australis*	E	E	3
Little Bentwing-bat	*Miniopterus australis*	V	-	N/A
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	V	CE	N/A
Eastern Coastal Freetail-bat	*Mormopterus norfolkensis*	V	-	17
Southern Myotis	*Myotis Macropus*	V	-	29
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	-	2
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	-	7

CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory

Wildlife Corridors

The locality provides a wildlife corridor along the coast connecting several reserves; however, the project does not fragment this corridor such that wildlife connectivity would be impacted (Niche Environment and Heritage, 2018).

6.5.2 Potential Impacts

The Preliminary Ecological Assessment (Niche, 2018) identified the following impacts associated with the proposal:

- Clearing of less than 0.01 ha of Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) TEC and non-permanent impacts (trampling) to an additional 0.02 ha;
- Clearing of less than 0.02 ha of Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817);
- Clearing of less than 0.00001 ha of Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778);
- Short-term impacts (trampling) to up to 0.12 ha of native vegetation within the proposal buffer area;
- Clearing of up to 0.25 ha of exotic vegetation;
- Indirect impacts to fauna during construction, such as noise and light impacts, or general disturbance; and
- Potential for sediment run-off into drainage lines and into intertidal habitats.

As previously discussed, the alignment considered by Niche (2018) extended to Avalon, therefore clearing estimates for the proposal are expected to be less than those presented above.

Impacts to the Kangaroo Gass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) TEC were not found to be significant by way of an Assessment of Significance (Niche, 2018; refer **Appendix D**).

Of the species listed in **Table 6-5**, all were determined to have a 'low' likelihood of being significantly impacted by the proposal. While these threatened species may use the proposal area as marginal foraging habitat, the area would not provide any limiting habitat for these species (Niche Environment and Heritage, 2018).

Threatened flora and fauna are unlikely to be impacted by the operation of the proposal.

Conclusion on significance of impacts

The proposal is not likely to significantly impact threatened species, populations or ecological communities or their habitats, within the meaning of the BC Act or FM Act and therefore a Species Impact Statement or Biodiversity Development Assessment Report is not required.

The proposal is not likely to significantly impact threatened species, populations, ecological communities or migratory species, within the meaning of the EPBC Act. A referral to the Australian Government DCCEEW is not required for biodiversity matters.

6.5.3 Mitigation Measures

The following mitigation measures and safeguards will be adopted to mitigate impacts to biodiversity:

- Clearing will be restricted to that located within the buffer and that is required to facilitate construction works;
- The detailed design and construction of the proposal shall demonstrate avoidance (where possible) or minimisation of impacts to native vegetation, in particular the TEC (PCT 898) located near The Serpentine;
- The CEMP will include a Construction Flora and Fauna Management Plan (CFFMP), prepared by a suitably qualified and experience professional. The CFFMP will include (but not be limited to) the following considerations:

  - Documenting and establishing the construction footprint and establishing no go zones;
  - Pre-clearing survey requirements;
  - An unexpected finds protocol in the event of encountering a previously unanticipated threatened species or endangered community;
  - Protocols to manage weeds and pests.
- As far as possible, ensure works are consistent with the objectives and recommendations in the Native Fauna Management Plan for Pittwater (Pittwater Council, 2011) and the Pittwater Native Vegetation Management Plan (Pittwater Council, 2012);
- For trees located in proximity to the works, tree protection measures will be established in accordance with Australian Standard *AS4670-2009 Protection of trees on development sites*;
- A pre-clearing survey be undertaken to ensure all hollow-bearing trees occurring within or in proximity to the clearing footprint are marked and protected. The ecologist would also check any trees and hollows for resident fauna and translocate them to nearby suitable habitat; and
- Plant and equipment will be cleaned and inspected prior to entering the construction footprint.

In the operational phase, the ongoing maintenance and management of the shared path will be undertaken under Council's Asset Management Program and include rubbish collection and vegetation management.

6.6 Heritage

An Aboriginal Objects Due Diligence Assessment was prepared for the proposal by Niche Environment and Heritage (2018; refer **Appendix G**). This section summarises the findings of the assessment report and provides additional evaluation of heritage based on recent database searches in October and November 2023. Listed Aboriginal and non-Aboriginal cultural heritage sites and places were identified via a search of the relevant State and federal statutory and non-statutory registers, including:

- Aboriginal Heritage Information Management System (AHIMS).
- Pittwater Local Environmental Plan (LEP) 2014;
- EPBC Act Protected Matters Search Tool;
- Australian Heritage Database;
- State Heritage Register;
- TfNSW and Sydney Water Section 170 Heritage and Conservation Registers.

6.6.1 Existing Environment

An extensive AHIMS search was conducted on 4 October 2023 (AHIMS Client Service ID # 825452) with a buffer of 1 km around Lot 7327, DP1164236 (the lot on which most of the construction footprint sits). The search returned 16 Aboriginal sites within the buffer area. There are no recorded sites located within the proposal area. There is one isolated site less than 100 m from the proposal area as outlined in **Table 6-6**.

Table 6-6: Listed Aboriginal Sites in the vicinity of the proposal area

Site ID	Site name	Site features	Site types
45-6-0855	Bilgola Beach	Shell, Artefact	Midden

There are no items listed on the Pittwater LEP 2014 within the proposal area. Local heritage items in proximity to the works are listed in **Table 6-7**.

Table 6-7: Pittwater LEP 2014 Heritage Items in the vicinity of the proposal area

Suburb	Item Name	Address	Significance	SHI No.
Bilgola Beach	Ocean rock pool	-	Local	2270120
Bilgola Beach	Grove of Cabbage Tree Palms (*Livistona australis*)	The Serpentine and Barrenjoey Road (Bilgola Valley)	Local	2270031
Bilgola Beach	Sandstone retaining wall	The Serpentine (western side near Barrenjoey Road)	Local	2270032

The EPBC Act Protected Matters Search Tool identified Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves as a National Heritage Place within the 5 km radius of the proposal area.

There were no items listed on the World Heritage, Commonwealth Heritage, National Heritage, State Heritage or Section 170 Registers in proximity to the proposed works.

The Register of the National Estate (RNE) was closed in 2007 and is no longer a statutory list. The RNE is maintained on a non-statutory basis as a publicly available archive and educational resource. The Register of National Estate identified the Bilgola Rock Pool, The Serpentine (Place ID: 103467) as an Indicative place, i.e. the decision on its inclusion in the RNE was not reached prior to RNE closure.

6.6.2 Potential Impacts

No direct impacts to heritage listed sites, including AHIMS sites, are anticipated as a result of the proposal.

There is a low potential that Aboriginal objects have survived within the proposal area due to the high level of disturbance and modification to the ground surface. The land modification practices associated with the existence of roads and pathways within the Subject Area has disrupted the ground surface to such an extent that the possibility of in situ deposits is low (Niche Environment and Heritage, 2018).

No Aboriginal heritage constraints were identified for the proposed activity and no further investigation or impact assessment is required (Niche Environment and Heritage, 2018).

It is unlikely that the proposal area falls within the visual catchment of any nearby heritage items (Niche Environment and Heritage, 2018).

No operational phase impacts to items of Aboriginal or non-Aboriginal cultural heritage significance are anticipated.

6.6.3 Mitigation Measures

The following measures and safeguards will be adopted to minimise the potential impacts of the proposal on Aboriginal and non-Aboriginal cultural heritage:

- No works shall be undertaken outside the proposal footprint.
- The CEMP will include a procedure for managing unexpected heritage finds during construction, including heritage items, relics, archaeological material and human remains. The procedure will include:

- If any Aboriginal objects are found, all activities must stop and an appropriately qualified archaeologist engaged to assess the findings, and notification is provided to the NSW DCCEEW;
- If any 'relics' are encountered during excavation, a Section 146 relics notification will be forwarded to NSW DCCEEW. 'Relics' cannot be impacted without appropriate approvals under the *Heritage Act 1977*.
- If human remains are found, stop work, secure the site (including 20 m curtilage) and notify the NSW Police and NSW DCCEEW.

- All construction personnel will be inducted on their responsibilities in relation to heritage items and sites, informing them of the unexpected finds procedure in the CEMP.

6.7 Landscape Character and Visual Amenity

6.7.1 Existing Environment

The proposal area consists of a coastal residential suburban landscape character. Newport Beach and Bilgola Beach are to the east of the site, Barrenjoey Road and a low-density residential neighbourhood is to the west of the site. The environment comprises both urban and natural elements, including pedestrian footpath and carpark, main road, cleared area with public seating, and an unsealed coastal walkway, and mostly native vegetation.

The project locality is generally a coastal suburban environment, with views to and along Newport Beach and the coastline. The coastal views are a key component of the high visual amenity of the locality.

6.7.2 Potential Impacts

The potential impacts of the proposal on landscape character and visual amenity during the construction phase include short-term visual impacts due to the presence of plant, machinery and vehicles during construction, and the use of fencing to preclude access to the site compound(s) and works areas.

Figure 6-3 and Figure 6-4 provide comparisons of the existing site conditions with photomontages showing the proposed shared path (refer **Figure 1-1** for photo montage locations).

Trees and vegetation would be removed to facilitate the construction of the proposal. This impact would be reduced by the landscaping that would be undertaken as part of the works. The works provide an opportunity to enhance the landscape through selection of suitable species and ongoing maintenance of the site during the operational phase of the project.

In addition, the proposal would provide additional viewpoints that would allow the coastal views to be enjoyed by community members.

Figure 6-3: Photomontage 1 – Existing (left) and proposed shared path (right) at intersection of Barrenjoey and Neptune Roads (Source: Community Consultation Plan prepared by Tract, dated 8/10/2018)

Figure 6-4: Photomontage 2 – Existing (left) and proposed on-grade shared path (right) through Eric Green Reserve (Source: Community Consultation Plan prepared by Tract, dated 8/10/2018)

6.7.3 Mitigation Measures

The following measures and safeguards will be adopted to minimise the impacts of the proposal on the visual amenity of the locality:

- No works shall be undertaken outside the proposal footprint.
- The site compound would be fenced and screened, where possible.
- The works area will be kept clean and tidy for the duration of the works.
- Urban design and landscaping requirements will be incorporated into the detailed design in accordance with Council's requirements.
- The landscaping works will be undertaken in accordance with the approved landscape plans.

6.8 Socio-Economic

6.8.1 Existing Environment

The Australian Bureau of Statistics (ABS) 2021 Census Community Profile for the Northern Beaches LGA (ABS, 2023) records a population of 263,554 people, of which 0.6% identify as Aboriginal and/or Torres Strait Islanders. Portuguese, Italian and Spanish are the three languages other than English most commonly spoken in the home.

The ABS Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA) 2021 data identified that as at 2021:

- Newport had a population of 9,659;
- Newport had a SEIFA score of 1,124, placing it in the 98th percentile of all communities across Australia;
- The Index of Relative Socio-Economic Advantage and Disadvantage places Newport in the 5th quintile ('least disadvantaged');
- Newport was identified as falling within the 5th quintile ('most advantaged') with respect to the Index of Economic Resources; and
- Newport falls within the 5th quintile ('most advantaged') with respect to the Index of Education and Occupation.

These results indicate that the local community on average comprises a highly advantaged community on a socio-economic basis, with very low levels of disadvantage and high levels of education.

The main land use types near to the proposal footprint include classified road, environmental conservation, recreation, residential and environmental living.

Eric Green Reserve is used for recreational activities such walking and general enjoyment of the natural environment. The reserve is also used by the Sydney Paragliding and Hang Gliding Club as a take-off point.

There is an existing coastal walk providing access from Newport Beach to Bilgola Beach, where community members enjoy aquatic recreational activities.

6.8.2 Potential Impact

During the works there would be short-term, minor impacts on the recreational use of the public reserve. The potential impacts on traffic and public access are discussed in **Section 6.3.2**. There may also be some disruption to the community associated with noise during the works, as detailed in **Section**

6.4.3. Visual impacts are discussed in **Section 6.7.2**. Impacts to local businesses are not anticipated as a result of the works.

In the operational phase, the proposal will provide improved pedestrian and cyclist safety, accessibility and amenity. The proposal provides greater connectivity in the Northern Beaches LGA, which aligns with key objectives outlined in local and State strategic plans. The proposal is expected to generate positive socio-economic impacts.

6.8.3 Mitigation Measures

Mitigation measures included in **Sections 6.3.3, 6.4.4 and 6.7.3** would contribute to reducing any potential socio-economic impacts of the proposal**.** In addition, the following measures and safeguards will also be adopted:

- Council will prepare a community engagement plan prior to the commencement of works, to be implemented during construction to provide timely and up to date information to the community during construction. It would include, as a minimum:
    - Mechanisms to provide details and timing of proposed activities to affected residents and any local businesses, including changes to traffic and access;
    - A contact name and telephone number for complaints. Contact details will be clearly displayed at the works site.
- A webpage and telephone number will be established for enquiries regarding the proposal and will remain active for the duration of the works.
- All enquiries and complaints will be tracked through a tracking system and be acknowledged within 24 hours of being received.

6.9 Hazards and Risk

6.9.1 Existing Environment

Flood Hazard

A review of the mapping provided in the Newport Flood Study (Catchment Simulation Solutions, 2019) indicates that parts of the proposal footprint fall within the Probable Maximum Flood extent and are therefore within the floodplain. This relates primarily to the southern extent of the project, including the proposed site compound location in Newport Beach car park. The other affected land within the proposal footprint is generally impacted by local stormwater drainage issues.

However, the proposal footprint falls outside the main flood extent in the 20% and up to the 5% Annual Exceedance Probability (AEP) events (refer **Figure 6-5**) and is only impacted by local stormwater drainage issues in specific locations (mostly adjacent to Barrenjoey Road). Hence, the proposed construction compound is located outside the 5% AEP extent.

Coastal Hazard

As discussed in **Section 4.1.1**, the land is shown as being located outside of the Northern Beaches Coastal Risk Planning Map area and therefore the proposed works are not anticipated to increase the risk of coastal hazards.

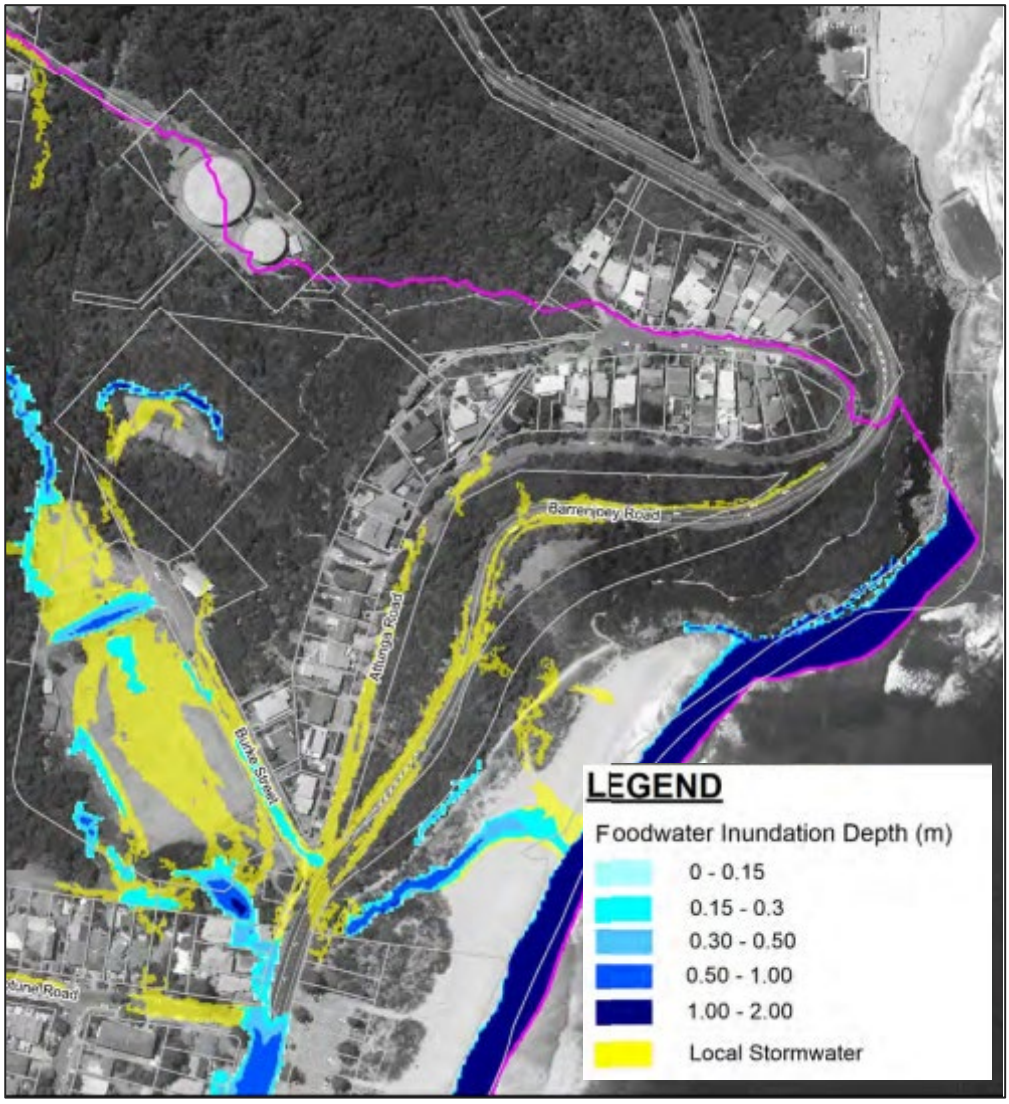

Figure 6-5: Peak flood depths for the 5% AEP flood event (excerpt from: CSS, 2019)

Geotechnical Hazard

A review of geotechnical hazard mapping under the PLEP 2014 shows the proposal site is mapped as falling within Geotechnical Hazard H1 land (refer **Figure 6-6**).

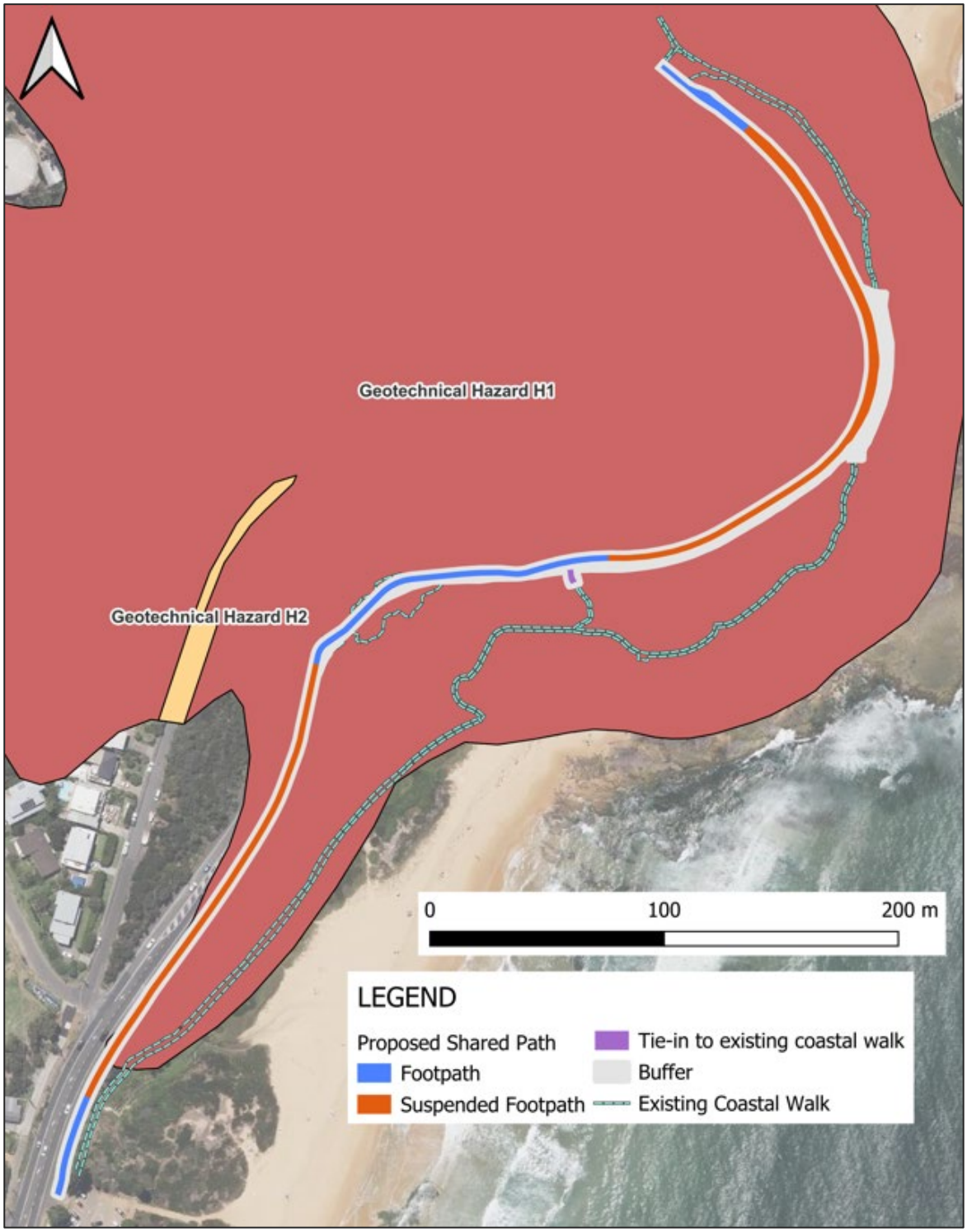

Figure 6-6 Geotechnical hazard mapping (after: PLEP 2014)

Bushfire Hazard

The proposal area is identified as bushfire prone land by the NSW Rural Fire Service (refer **Figure 6-7**). The red areas are Vegetation Category 1 areas that are the highest bushfire risk to surrounding development. The orange areas next to The Serpentine is Vegetation Category 2 land (light orange) and Vegetation Category 3 (darker orange); these areas are lower bushfire risk. The pale areas comprise

Vegetation Buffer and are mapped within 100 m of Vegetation Category 1 or 30 m of Vegetation Categories 2 or 3 lands.

The mapping indicates a bushfire hazard associated with the vegetation present on the site.

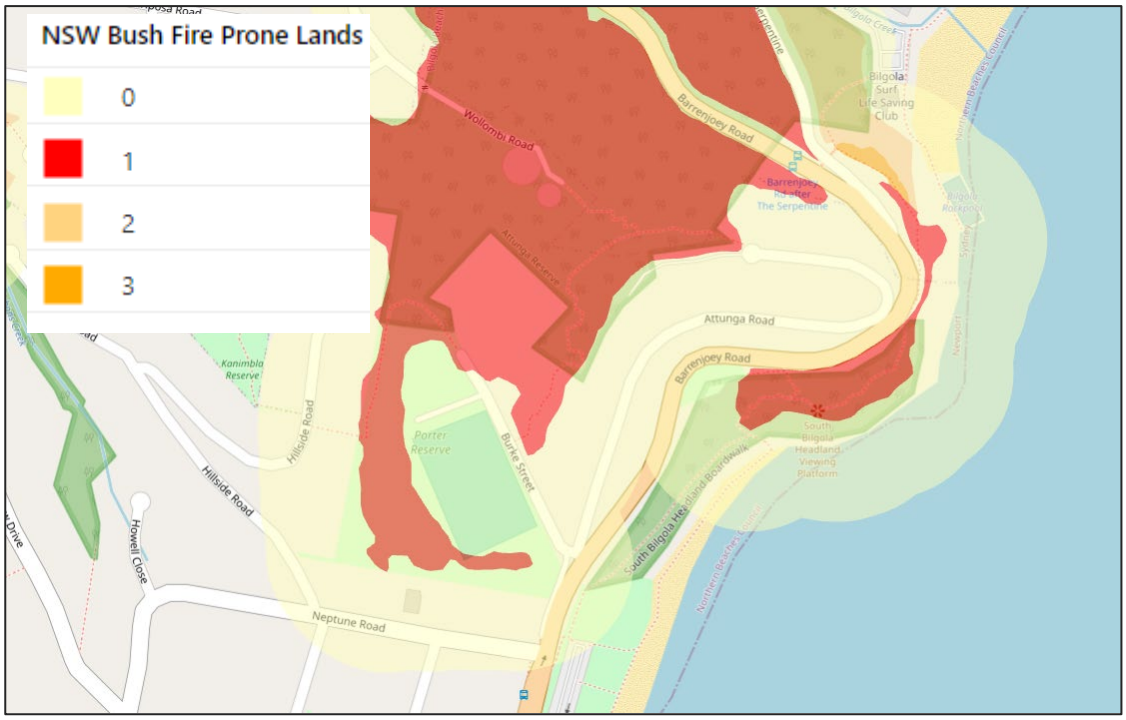

Figure 6-7: NSW Rural Fire Service Bushfire Prone Land (source: SEED Portal, accessed 12 March 2024)

Utilities and Services

A Dial Before You Dig Australia (DBYDA) search identified the following utilities and services that intersect the proposal footprint:

- Council stormwater drainage (refer **Figure 6-1**);
- Telstra telecommunications services; and
- Sydney Water sewerage and potable water mains.

No investigations have been undertaken to confirm the location of utilities and services.

6.9.2 Potential Impact

Flood Hazard

The works would have a minor impact on the existing landform due to removal of vegetation, installation of paved sealed surfaces, associated drainage and landscaping. Hence it is considered that the proposal is unlikely to modify flood behaviour during the construction or operational phase and is therefore considered unlikely to negatively impact public safety or property.

Bushfire Hazard

There is potential for a bushfire to occur during the works, placing at risk the safety of the construction personnel and representing a risk to construction plant and machinery, and therefore the environment.

In addition, there is a risk that activities undertaken during the construction of the proposal (e.g. any hot works such as welding or grinding) could start a fire, placing construction workers, the community

and adjacent land at risk from bushfire. It is considered that this risk is low provided the safeguards detailed in **Section 6.9.3** are implemented.

Geotechnical Hazard

Douglas Partners (2018) undertook an evaluation of risk from potential geotechnical hazards and concluded that the construction of the proposal is feasible provided the new works are designed and construction in accordance with their recommendations.

The potential risk to property and life arising from geotechnical hazards along the proposed shared path route was assessed by Douglas Partners (2018) in accordance with the general methodology outlined the Australian Geomechanics Society Landslide Risk Management guidance. The assessment concluded that the proposal met the "Acceptable Risk Management' criteria with respect to both property and life and under current and foreseeable conditions (Douglas Partners, 2018). It is considered that the proposal would not represent an unacceptable level of geotechnical risk to the public or adjacent development.

Utilities and Services

There is potential for the works to impact utilities and services located in the proposal footprint, including previously unknown services.

No operational phase impacts on utilities or services are anticipated.

6.9.3 Mitigation Measures

The following measures and safeguards will be adopted to minimise the impacts of the proposal on utilities and services:

- The Contractor's CEMP will include an emergency response procedure for activation in the event of an incident such as a bushfire or flood occurring during the works.
- Emergency contacts (including the contact details for Council's Superintendent and the emergency services) will be recorded in the CEMP and kept in an easily accessible location on key plant and in the site office.
- The Contractor must obtain a hot works permit prior to undertaking any hot works. The permit will detail any controls required for undertaking the task.
- The Contractor will maintain on-site portable fire extinguishers and fire blankets as appropriate to types of materials and activities to be undertaken on site.
- The recommendations made by Douglas Partners (2018) for the design and construction of the works shall be adopted.
- The location of utilities and services within the proposal footprint, or with potential to be impacted by the works, will be confirmed by the Contractor prior to the commencement of works to enable further assessment and mitigation of any potential impacts to utilities.

6.10 Waste Management

6.10.1 Existing Environment

Section 143 of the PoEO Act requires waste to be transported to a place that can lawfully accept it and that the owner of the waste and the transporter are responsible for ensuring that waste is transported to a suitable waste facility. Principles of waste management and the Resource Management Hierarchy

(e.g. avoid, reduce, reuse, dispose) are also embodied in the *Waste Avoidance and Resource Recovery Act 2001*.

6.10.2 Potential Impacts

Potential waste streams associated with the construction works include, but are not limited to:

- Demolition and disposal of a section of the existing coastal walk;
- Demolition and disposal of existing W beam barriers;
- Removal of vegetation;
- Generation of spoil due to excavation of soils and rock;
- General construction waste, which may include:
  - Packaging waste;
  - Chemical / spill clean-up waste;
  - Water from any washdowns;
  - Excess construction materials; and
  - General rubbish such as paper, plastic bottle, cans and food waste.

Waste generation would occur during the operational phase associated with both the maintenance and use of the shared path. Collection of waste from rubbish bins would be undertaken by Council. Any maintenance related waste would be disposed of appropriately.

6.10.3 Mitigation Measures

The following measures and safeguards will be adopted to minimise the impacts of the proposal with respect to waste management and resource use:

- The CEMP will identify potential waste streams associated with the works. The CEMP will include measures to minimise waste, outline methods of disposal, re-use and recycling and monitoring, as appropriate, and in accordance with Council's Waste Management Plan;
- Any excavated material that requires off-site disposal will be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) and disposed of at a suitably licenced waste management facility where an appropriate beneficial re-use cannot be identified.

6.11 Cumulative Impacts

6.11.1 Existing Environment

It is possible that there would also be other projects under construction at the same time as the proposed works.

As discussed in **Section 2.4**, Council has prioritised two other sections of the Newport to Avalon coast walk and cycleway, that is:

- Bilgola Foreshore Link – improved pedestrian connection from Bilgola carpark to Allen Avenue; and
- Pedestrian safety upgrade at the top of Allen Avenue stairs – improved pedestrian connection on The Serpentine.

Pending the availability of funding, these works could be undertaken concurrently with the proposal.

A review of Council's Development Applications (DA) register identified that, as of 10 January 2024, there are several recently determined DAs for properties in the locality. These are shown on a map in **Figure 6-8.** Many applications are for alterations and additions to a dwelling house, or demolition and

construction. There is also a DA for the construction of a telecommunications facility (DA2022/1370) to the north-west of the site. It is consistent with the current zoning for that land.

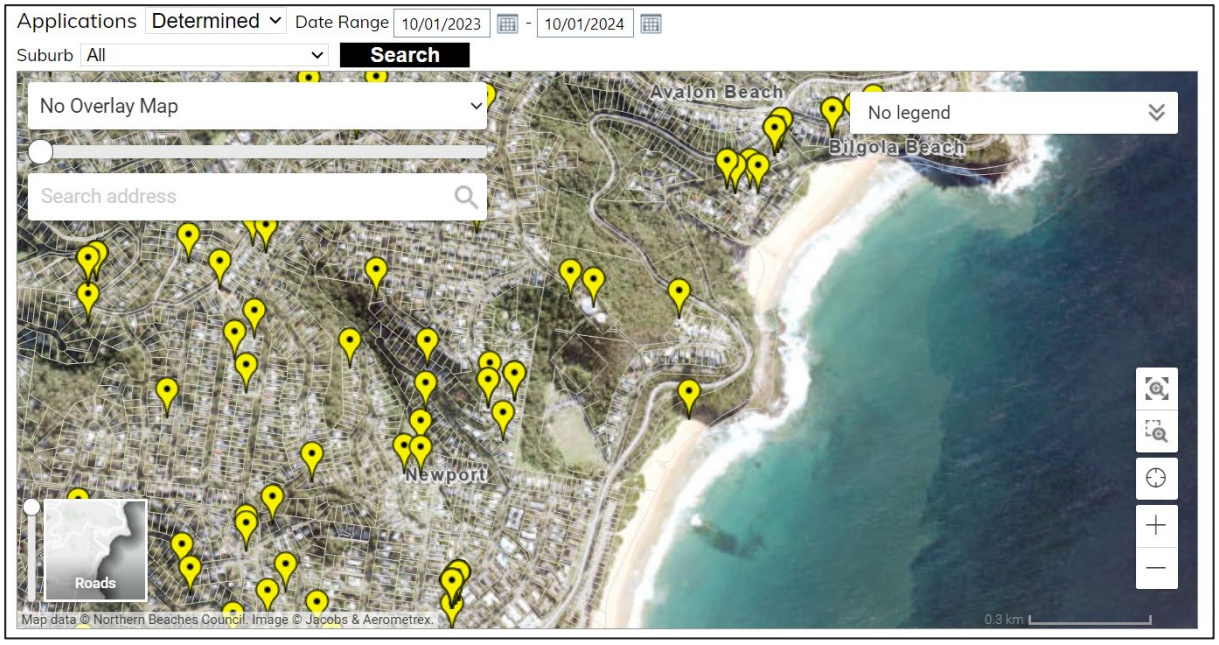

Figure 6-8: Determined DAs in the locality (Council, accessed 10 January 2024)

A search of the major projects NSW Planning Portal undertaken on 10 January 2024 did not identify any other State Development or State Significant Applications for the general locality.

6.11.2 Potential Impact

There is potential for the construction works associated with other Council projects and DAs and the proposed works to be undertaken concurrently. Should this occur, cumulative impacts may include:

- Short-term, temporary impacts to traffic and access on the affected roads and footpaths associated with respective projects; and
- Cumulative noise and vibration impact to local residents.

Given the scale of the other projects and distance from the proposed works, any cumulative impacts are expected to be minimal.

6.11.3 Mitigation Measures

The following measures will be adopted to minimise the cumulative impacts of the proposal on the locality:

- Prior to the commencement of works, Council will coordinate with any other local developments in an effort to minimise cumulative impacts to the community associated with traffic, noise, etc.

7 Environmental Management

7.1 Environmental Management Plan

A Construction Environmental Management Plan (CEMP) will be prepared to manage the impacts identified in this REF (refer **Section 6**). The CEMP would provide a framework for establishing how the prescribed safeguards and mitigation measures (refer **Table 7-2**) would be implemented and who would be responsible for their implementation should the proposal proceed.

The CEMP will be prepared prior to the commencement of works and must be reviewed and approved by Council prior to the commencement of any on-site work.

The CEMP should generally conform to the structure shown in **Table 7-1**. The plan will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements.

The following plans would be prepared as sub-plans to the CEMP as specified by the mitigation measures in relevant sections of this REF:

- Traffic and Access Management Sub-Plan
- Flora and Fauna Management Sub-Plan.

Table 7-1: Construction Environmental Management Plan Structure

Background	• Introduction • Proposal Description • EMP Context • EMP Objectives • Environmental Policy
Environmental Management	• Environmental Management Structure and Responsibility • Approval and Licensing Requirements • Reporting • Environmental Training • Emergency Contacts and Response
Implementation	• Risk Assessment • Environmental Management • Environmental Management Activities and Controls • Environmental Management Plans and Maps • Environmental Schedules
Monitor and Review	• Environmental Monitoring • Environmental Auditing • Corrective Action • EMP Review

7.2 Summary of Safeguards and Mitigation Measures

The safeguards and mitigation measures detailed in this REF are summarised in **Table 7-2**.

Table 7-2: Summary of safeguards and mitigation measures

No.	Environmental safeguards	Responsibility	Timing
GEN1	A CEMP will be prepared prior to the commencement of works and must be reviewed and approved by Northern Beaches Council prior to the commencement of works. As a minimum, the CEMP will address the following: • Any requirements associated with statutory approvals; • Details of how the project will implement the identified safeguards outlined in the REF; • Issue-specific environmental management plans (if required); • Roles and responsibilities; • Communication requirements; • Induction and training requirements; • Procedures for monitoring and evaluating environmental performance, and for corrective action; • Reporting requirements and record-keeping; • Procedures for emergency and incident management; and • Procedures for audit and review. The approved CEMP will be implemented during the undertaking of the activity.	Contractor	Pre-construction
GEN2	All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular 'toolbox' style briefings.	Contractor	Pre-construction / Construction
GEN3	No works shall be undertaken outside the construction footprint.	Contractor	Construction
GEN4	Local weather forecasts provided by the Bureau of Meteorology (BoM) would be monitored daily for the duration of the works.	Contractor	Construction
Geology and Soils			
GS1	An Erosion and Sediment Control Plan (ESCP) shall be prepared and implemented in accordance with the requirements of Landcom (2004) Managing Urban Stormwater: Soils and Construction.	Contractor	Construction
GS2	Erosion and sediment controls will be checked and maintained on a regular basis and records of such inspections kept and provided upon request.	Contractor	Construction
GS3	Erosion and sediment control measures are not to be removed until the works are complete and areas are stabilised.	Contractor	Construction
GS4	Work areas are to be stabilised progressively during the works.	Contractor	Construction
GS4	If unexpected contamination is encountered during construction, appropriate control measures will be implemented to manage the immediate risks of contamination. All other works that may impact on the contaminated area will cease until the nature and extent of the contamination has been confirmed and any necessary site-specific controls or further actions identified in consultation with the Council's Site Superintendent and/or the EPA.	Contractor	Construction
Hydrology and Water Quality			
WQ1	There is to be no release of dirty water into drainage lines and/or waterways.	Contractor	Construction

No.	Environmental safeguards	Responsibility	Timing
WQ2	Water quality control measures are to be used to prevent any materials, including sediment, entering drain inlets or waterways.	Contractor	Construction
WQ3	Any fuels and other hazardous liquids shall be stored at the designated construction compound within an impervious bunded area with sufficient capacity to hold 120% of the stored liquids.	Contractor	Construction
WQ4	Refuelling of plant and equipment is to occur in impervious bunded areas, preferably located a minimum of 50 metres from drainage lines or waterways.	Contractor	Construction
WQ5	Appropriate emergency spill kits are to be kept on site at all times and maintained throughout the construction work. The spill kit must be appropriately sized for the volume of substances at the work site.	Contractor	Construction
WQ6	The CEMP will include an accidental spill emergency response procedure and all construction personnel will be trained in the management and clean-up of accidental spills.	Contractor	Construction
WQ7	Vehicles and plant must be properly maintained and regularly inspected for fluid leaks	Contractor	Construction
WQ8	Workers are to be made aware of the provisions of Section 120 of the POEO Act with regards to water pollution. Notification to the EPA in accordance with Part 5.7 of the POEO Act will be undertaken where a pollution incident occurs in the course of an activity such that material harm to the environment is caused or threatened.	Contractor	Construction
WQ9	The CEMP will include a procedure for the event of a flood that affects the main construction compound or any work areas	Contractor	Construction
Traffic and Access			
TA1	The CEMP will include a Traffic, Transport and Access Management Plan (CTTAMP) which will detail the construction traffic management measures to be implemented during the works.	Contractor	Pre-construction
TA2	Where feasible, construction of the proposal will take place outside of the summer high period (December to February).	Council	Pre-construction
TA3	Prior to the commencement of works on site, Council will inform the nearby residents, emergency services, bus service operators and other key road user groups of the proposed works, traffic impacts and project contact information.	Council	Pre-construction
TA4	Prior to the commencement of works, Council will liaise with TfNSW regarding any impacts to the operation of Barrenjoey Road and obtain Road Occupancy Licences as required.	Council	Pre-construction
TA5	The Contractor will demonstrate consideration of construction methodologies and staging options to minimise the duration of closure of the southbound lane on Barrenjoey Road during the construction phase.	Contractor	Pre-construction
TA6	Any works requiring closure of the southbound lane of Barrenjoey Road will be carried out outside of the morning and afternoon peak periods, where possible.	Contractor	Construction

No.	Environmental safeguards	Responsibility	Timing
TA7	Where possible, property accesses would be maintained during the works. In the event of works that impact property accesses, prior notification of the affected parties will occur and the access will be reinstated at the conclusion of each day's work or alternative access provided, as agreed with the affected landholder.	Contractor	Construction
TA8	Construction compounds and laydown areas will be fenced to prevent public access.	Contractor	Pre-construction
TA9	Signage will be erected notifying the public of any parking or access changes in the affected locations. Public access along the existing coastal walkway and to Eric Green Reserve will be maintained, where possible.	Contractor	Construction
TA10	Delivery of plant, equipment and materials to the site would be undertaken outside of morning and afternoon peak periods to minimise impacts on traffic, where feasible.	Contractor	Construction
TA11	Should the use of the Newport Beach car park for a construction compound coincide with the use of that area for sports, Council would either temporarily relocate the sports within the car park or make appropriate alternative arrangements in consultation with the affected sports groups.	Council	Pre-construction / construction
Noise and Vibration			
NV1	Works are to be carried out during standard construction hours, where possible.	Contractor	Construction
NV2	Noise impacts are to be minimised in accordance with the Draft Construction Noise Guideline (EPA, 2020). The CEMP will include a Noise and Vibration Management Plan which details reasonable and feasible measures to reduce noise impacts to receivers, including: • Where practicable, adopting quieter work methods and using quieter plant and equipment; • Operating plant and equipment in a quiet and efficient manner (e.g. minimising reversing alarms, turning equipment off when not in use); • Regularly inspecting and maintaining equipment to ensure it is in good working order; • Limiting the idling of trucks as much as possible; • Taking care when unloading trucks to minimise noise. The Plan will be approved by Council prior to the commencement of construction.	Contractor	Pre-construction
NV3	The Noise and Vibration Management Plan will include an out of hours works procedure that includes: • Residents will be provided notification of out of hours works at least seven days prior to those works commencing; • Measures to minimise the duration of out of hours work and undertaking the noisiest work prior to midnight; • Respite periods, that is programming of night works to minimise the number of consecutive nights work impacting the same receivers; • Additional measures to reduce noise emissions (e.g. noise blankets or screens, etc.);	Contractor	Pre-construction

No.	Environmental safeguards	Responsibility	Timing
	• Undertake noise monitoring at residences in the vicinity of the works to confirm noise levels and that appropriate mitigation measures have been implemented.		
NV4	The local community (including residences within 500 m of the works) would be notified of the commencement of works via direct mail-out, on Council's webpage and via the local media. A contact should be provided to enable them to make further enquiries or complaints.	Council	Pre-construction
NV5	Signage will be erected at the works sites with the relevant contact details of the person(s) to whom community members can make complaints or enquiries.	Contractor	Pre-Construction
NV6	A complaints register will be established for the duration of the works to record any noise or other complaints related to the works. Any complaints received shall be responded to promptly and appropriately.	Contractor	Construction
NV7	Should any noise or vibration complaints be received, the need for additional mitigation measures would be investigated and implemented where reasonable and feasible.	Contractor	Construction
Biodiversity			
BD1	Clearing will be restricted to that located within the buffer and that is required to facilitate construction works.	Contractor	Pre-Construction
BD2	The detailed design and construction of the proposal shall demonstrate avoidance (where possible) or minimisation of impacts to native vegetation, in particular the TEC (PCT 898) located near The Serpentine.	Contractor	Detailed design / Pre-construction
BD3	The CEMP will include a Construction Flora and Fauna Management Plan (CFFMP), prepared by a suitably qualified and experience professional. The CFFMP will include (but not be limited to) the following considerations: • Documenting and establishing the construction footprint and establishing no go zones; • Pre-clearing survey requirements; • An unexpected finds protocol in the event of encountering a previously unanticipated threatened species or endangered community; • Protocols to manage weeds and pests.	Contractor	Pre-construction
BD4	As far as possible, ensure works are consistent with the objectives and recommendations in the Native Fauna Management Plan for Pittwater (Pittwater Council, 2011) and the Pittwater Native Vegetation Management Plan (Pittwater Council, 2012).	Contractor	Pre-construction / Construction
BD5	For trees located in proximity to the works, tree protection measures will be established in accordance with Australian Standard *AS4670-2009 Protection of trees on development sites*.	Contractor	Pre-construction
BD6	A pre-clearing survey be undertaken to ensure all hollow-bearing trees occurring outside the clearing footprint are marked and protected.	Contractor	Pre-construction

No.	Environmental safeguards	Responsibility	Timing
BD7	Plant and equipment will be cleaned and inspected prior to entering the construction footprint.	Contractor	Construction
Heritage			
HE1	No works shall be undertaken outside the proposal footprint.	Contractor	Construction
HE2	The CEMP will include a procedure for managing unexpected heritage finds during construction, including heritage items, relics, archaeological material and human remains. The procedure will include: • If any Aboriginal objects are found, all activities must stop and an appropriately qualified archaeologist engaged to assess the findings, and notification is provided to the NSW DCCEEW; • If any 'relics' are encountered during excavation, a Section 146 relics notification will be forwarded to NSW DCCEEW. 'Relics' cannot be impacted without appropriate approvals under the *Heritage Act 1977.* • If human remains are found, stop work, secure the site (including 20 m curtilage) and notify the NSW Police and NSW DCCEEW.	Contractor	Pre-construction
HE3	All construction personnel will be inducted on their responsibilities in relation to heritage items and sites, informing them of the unexpected finds procedure in the CEMP.	Contractor	Pre-construction
Landscape Character and Visual Amenity			
VA1	No works shall be undertaken outside the proposal footprint.	Contractor	Construction
VA2	The site compound would be fenced and screened, where possible.	Contractor	Pre-Construction
VA3	The works area will be kept clean and tidy for the duration of the works.	Contractor	Construction
VA4	Urban design and landscaping requirements will be incorporated into the detailed design in accordance with Council's requirements.	Council	Detailed Design
VA5	The landscaping works will be undertaken in accordance with the approved landscape plans.	Contractor	Construction
Socio-economic			
SE1	Northern Beaches Council will prepare a community engagement plan prior to the commencement of works, to be implemented during construction to provide timely and up to date information to the community during construction. It would include, as a minimum: • Mechanisms to provide details and timing of proposed activities to affected residents and any local businesses, including changes to traffic and access; and • A contact name and telephone number for complaints. Contact details will be clearly displayed at the works site.	Council	Pre-construction
SE2	A webpage and telephone number will be established for enquiries regarding the proposal and will remain active for the duration of the works.	Council	Pre-construction
SE3	All enquiries and complaints will be tracked through a tracking system and be acknowledged within 24 hours of being received.	Council	Construction

No.	Environmental safeguards	Responsibility	Timing
Hazards and Risk			
HR1	The Contractor's CEMP will include an emergency response procedure for activation in the event of an incident such as a bushfire or flood or landslip occurring during the works.	Contractor	Pre-Construction
HR2	Emergency contacts (including the contact details for Council's Superintendent and the emergency services) will be recorded in the CEMP and kept in an easily accessible location on key plant and in the site office.	Contractor	Construction
HR3	The Contractor must obtain a hot works permit prior to undertaking any hot works. The permit will detail any controls required for undertaking the task.	Contractor	Construction
HR4	The Contractor will maintain on-site portable fire extinguishers and fire blankets as appropriate to types of materials and activities to be undertaken on site.	Contractor	Construction
HR5	The recommendations made by Douglas Partners (2018) for the design and construction of the works shall be adopted.	Contractor / Council	Detailed Design / Construction
HR6	The location of utilities and services within the proposal footprint, or with potential to be impacted by the works, will be confirmed by the Contractor prior to the commencement of works to enable further assessment and mitigation of any potential impacts to utilities.	Contractor	Pre-construction
Waste Management			
WM1	The CEMP will identify potential waste streams associated with the works. The CEMP will include measures to minimise waste, outline methods of disposal, re-use and recycling and monitoring, as appropriate, and in accordance with Council's Waste Management Plan.	Contractor	Pre-construction
WM2	Any excavated material that requires off-site disposal will be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) and disposed of at a suitably licenced waste management facility where an appropriate beneficial re-use cannot be identified.	Contractor	Construction
Cumulative Impacts			
CI1	Prior to the commencement of works, Council will coordinate with any other local developments in an effort to minimise cumulative impacts to the community associated with traffic, noise, etc.	Council	Pre-construction

7.3 Licencing and Approvals

A summary of licences and approvals required for the proposal is provided below:

- Concurrence under Section 138 of the Roads Act is required from Transport for NSW;
- Pending confirmation with DPHI – Crown lands, a Crown Lands licence may also be required for the works.

8 Justification and Conclusions

8.1 Justification

The section of Barrenjoey Road within the study area has narrow shoulders and does not support safe active transport use, discouraging both pedestrian and cycling activity. There is an existing coastal path between Newport Beach and Bilgola Beach; however, it is unsealed and is not of sufficient width and appropriate grades for use by cyclists.

If the proposal did not proceed, cyclists would continue to ride on Barrenjoey Road, which is a road safety concern. Pedestrians may also choose to walk along the side of the road which presents a significant safety risk. Safe alternative access is required for pedestrians and cyclists at this location.

The objectives of the proposal are to:

- Provide improved active transport connections between local communities and environments as part of the broader Connecting the Northern Beaches program;
- Improve pedestrian and cyclist safety;
- Encourage active transport as a means to promote and support community health, recreational and social benefits;
- Minimise the environmental impacts of the proposal.

8.2 Objects of the EP&A Act

The objects of the EP&A Act are considered with respect to the project in **Table 8-1**.

Table 8-1: Objects of the EP&A Act and the Project

Object	Comment
1.3(a) To promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources.	The proposal facilitates improved social and economic welfare for the community through the provision of safe infrastructure that is fit for purpose. The proposal would not result in significant impact on any natural or other resources.
1.3(b) To facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment.	The proposal objectives and options evaluation considered social, economic and environmental outcomes in selection of the preferred option. **Section 6** identified potential impacts arising from the works and details mitigation measures and safeguards to manage the identified risks.
1.3(c) To promote the orderly and economic use and development of land.	Not relevant to the proposal.
1.3(d) To promote the delivery and maintenance of affordable housing.	Not relevant to the proposal.
1.3(e) To protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats.	A Preliminary Ecological Assessment (Niche, 2018) was undertaken for the proposal (**Appendix D**) and was updated based on new searches of the databases, as documented in **Section 6.5**. The assessment concluded that no significant impact to threatened flora or fauna would result from the proposal, provided the mitigation measures and safeguards in this REF are implemented.

Object	Comment
1.3(f) To promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).	The proposal is not expected to adversely impact any Aboriginal or non-Aboriginal heritage sites or items. The mitigation measures in **Section 6.6.3** would manage the risk of impact to previously unidentified heritage.
1.3(g) To promote good design and amenity of the built environment.	The proposal design has responded to environmental constraints and community concerns. It includes landscaping which would increase the amenity of the site. It also provides seating for community members to enjoy the coastal views.
1.3(h) To promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants.	Not relevant to the proposal.
1.3(i) To promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State.	Not relevant to the proposal.
1.3(j) To provide increased opportunity for community participation in environmental planning and assessment.	Council consulted with community and key stakeholders on a series of proposed designs in 2018, as discussed in **Section 5.2**. Community engagement with the community and key stakeholders would continue through the construction phase, as recommended in this REF.

8.3 Conclusion

The proposed Newport to The Serpentine shared path and associated infrastructure are subject to assessment under Division 5.1 of the EP&A Act. This REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

This has included consideration (as relevant) of impacts on threatened species and ecological communities and their habitats and other protected fauna and native plants. It has also considered potential impacts to MNES listed under the Commonwealth EPBC Act.

A number of potential construction phase environmental impacts from the proposal will be avoided or reduced through the adoption of safeguards and mitigation measures as recommended in this REF. This includes the preparation of a CEMP and relevant sub-plans.

The proposal as described in the REF best meets the project objectives but would still result in some impacts on traffic and transport, public access, noise and vibration, biodiversity and visual amenity. Safeguards and management measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would provide a shared path for the community that meets current engineering standards and is safe to use. On balance the proposal is considered justified.

9 Certification

This REF provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.

Tanja Mackenzie

Principal Environmental Scientist (CEnvP 0447)

Rhelm Pty Ltd

5 August 2024

I have examined this REF and accept it on behalf of Northern Beaches Council.

Name:

Role:

Northern Beaches Council

Date:

10 References

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Niche Environment and Heritage [Niche] (2018) - *Aboriginal Objects Due Diligence Assessment Newport to Avalon Shared Pathway Avalon, NSW*, prepared for Tract Consultants on behalf of Northern Beaches Council.

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Appendix A

Design Drawings

NORTHERN BEACHES COUNCIL

NEWPORT TO AVALON SHARED PATH

DRAWING REGISTER

GENERAL DRAWINGS

0218-0497-01 DD-000	COVER SHEET
0218-0497-01 DD-001	LEGEND AND GENERAL NOTES
0218-0497-01 DD-002	LEGEND AND GENERAL NOTES

SURVEY

0218-0497-01 DD-100	SURVEY
0218-0497-01 DD-101	SURVEY
0218-0497-01 DD-102	SURVEY
0218-0497-01 DD-103	SURVEY
0218-0497-01 DD-104	SURVEY
0218-0497-01 DD-105	SURVEY
0218-0497-01 DD-105a	SURVEY
0218-0497-01 DD-106	SURVEY
0218-0497-01 DD-107	SURVEY
0218-0497-01 DD-108	SURVEY
0218-0497-01 DD-109	SURVEY
0218-0497-01 DD-109a	SURVEY
0218-0497-01 DD-110	SURVEY
0218-0497-01 DD-111	SURVEY
0218-0497-01 DD-112	SURVEY
0218-0497-01 DD-113	SURVEY
0218-0497-01 DD-114	SURVEY
0218-0497-01 DD-115	SURVEY
0218-0497-01 DD-116	SURVEY
0218-0497-01 DD-117	SURVEY

GENERAL ARRANGEMENT PLANS

0218-0497-01 DD-200	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-201	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-202	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-203	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-204	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-205	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-205a	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-206	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-207	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-208	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-209	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-209a	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-210	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-211	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-212	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-213	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-214	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-215	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-216	GENERAL ARRANGEMENT PLAN
0218-0497-01 DD-217	GENERAL ARRANGEMENT PLAN

SECTIONS

0218-0497-01 DD-300	SECTIONS
0218-0497-01 DD-301	SECTIONS
0218-0497-01 DD-302	SECTIONS

DETAILS

0218-0497-01 DD-600	DETAILS
0218-0497-01 DD-601	DETAILS
0218-0497-01 DD-602	DETAILS
0218-0497-01 DD-603	DETAILS
0218-0497-01 DD-604	DETAILS
0218-0497-01 DD-605	DETAILS

ROADMARKING AND SIGNAGE DRAWINGS

TX.00	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.01	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.02	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.03	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.04	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.05	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.06	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.07	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.08	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.09	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.10	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.11	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.12	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.13	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.14	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.15	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.16	SHARED PATH - SIGNS AND LINE MARKING PLAN
TX.17	SHARED PATH - SIGNS AND LINE MARKING PLAN

CIVIL DRAWINGS

C100	STANDARD NOTES AND DRAWING LIST
C101	CIVIL WORKS PLAN - SHEET 1
C102	CIVIL WORKS PLAN - SHEET 2
C103	CIVIL WORKS PLAN - SHEET 3
C104	CIVIL WORKS PLAN - SHEET 4
C105	CIVIL WORKS PLAN - SHEET 5
C106	CIVIL WORKS PLAN - SHEET 6
C106A	CIVIL WORKS PLAN - SHEET 6A
C107	CIVIL WORKS PLAN - SHEET 7
C108	CIVIL WORKS PLAN - SHEET 8
C109	CIVIL WORKS PLAN - SHEET 9
C110	CIVIL WORKS PLAN - SHEET 10
C110A	CIVIL WORKS PLAN - SHEET 10A
C111	CIVIL WORKS PLAN - SHEET 11
C112	CIVIL WORKS PLAN - SHEET 12
C113	CIVIL WORKS PLAN - SHEET 13
C114	CIVIL WORKS PLAN - SHEET 14
C115	CIVIL WORKS PLAN - SHEET 15
C116	CIVIL WORKS PLAN - SHEET 16
C117	CIVIL WORKS PLAN - SHEET 17
C118	CIVIL WORKS PLAN - SHEET 18
C119	CROSS SECTIONS - SHEET 1
C120	CROSS SECTIONS - SHEET 2
C121	CROSS SECTIONS - SHEET 3
C122	CROSS SECTIONS - SHEET 4
C123	CROSS SECTIONS - SHEET 5
C124	LONG SECTION - SHEET 1
C125	LONG SECTION - SHEET 2
C126	STEEL WALKWAY PLANS AND DETAILS
C127	CIVIL WORKS DETAILS - SHEET 1
C128	CIVIL WORKS DETAILS - SHEET 2
C129	CIVIL WORKS DETAILS - SHEET 3

REVISIONS

REV	DESCRIPTION	DATE	DRAWN	CHKD
1	90% DD ISSUE	21.01.19	KG/AR	LH
2	ISSUE FOR COMMENTS	10.04.19	KG/AR	LH
3	100% DD ISSUE	24.04.19	KG/BH	LH

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4. LOCATE AND PROTECT ALL UNDERGROUND SERVICES PRIOR TO ANY EXCAVATION. MAKE GOOD ALL DAMAGE TO EXISTING WORKS CAUSED BY THE ACTIVITY OF THESE WORKS.
5. THESE DRAWINGS ARE TO BE PRINTED IN COLOUR

northern beaches council

PROJECT
NORTHERN BEACHES COUNCIL
NEWPORT TO AVALON SHARED PATH

CLIENT
NORTHERN BEACHES COUNCIL

PRELIMINARY NOT FOR CONSTRUCTION

COVER SHEET

DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-000	3	KG	LH	JL

SCALE 1:5000 @ A1
0 100 200 500m

DATE 21.12.2018

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GENERAL ARRANGEMENT LEGEND

GENERAL

LIMIT OF WORKS

PROPERTY BOUNDARY

EXISTING DRIVEWAY / FOOTPATH TO BE DEMOLISHED

ex33.34 •
APPROX. EXISTING SPOT LEVELS
REFER TO SURVEY AND ENGINEERS DRAWINGS

40.39 •
PROPOSED LEVELS
REFER TO ENGINEERS DRAWINGS

EXISTING DRIVEWAY / FOOTPATH TO BE DEMOLISHED

CH 140.0
CHAINAGE LINE AS PER ENGINEER'S DRAWING

KERBS AND ROADS

K&G
PROPOSED KERB AND GUTTER
IN ACCORDANCE WITH COUNCIL STANDARD DETAIL
REFER TO ENGINEER'S DRAWINGS

KO
PROPOSED KERB ONLY
IN ACCORDANCE WITH COUNCIL STANDARD DETAIL
REFER TO ENGINEER'S DRAWINGS

FK
PROPOSED FLUSH KERB
IN ACCORDANCE WITH COUNCIL STANDARD DETAIL
REFER TO ENGINEER'S DRAWINGS

EK
PROPOSED ELSHOLZ KERB
IN ACCORDANCE WITH COUNCIL STANDARD DETAIL
REFER TO ENGINEER'S DRAWINGS

BA-G
PROPOSED RMS (TYPE 'F'-SINGLE SIDED) BARRIER + GUTTER
IN ACCORDANCE WITH COUNCIL AND RMS STANDARD DETAIL
REFER TO ENGINEER'S DRAWINGS

BA
PROPOSED RMS (TYPE 'F'-SINGLE SIDED) BARRIER
IN ACCORDANCE WITH COUNCIL AND RMS STANDARD DETAIL
REFER TO ENGINEER'S DRAWINGS

DK
PROPOSED DOWELLED KERB
IN ACCORDANCE WITH COUNCIL STANDARD DETAIL

OSP
PROPOSED SHARED PATH - ON-GRADE
STANDARD GREY CONCRETE SHARED PATH WITH MIN.0.5m CLEARANCE OF STRUCTURES/OBSTACLES ON BOTH SIDE.
REFER TO ENGINEER'S DETAILS

SSP
PROPOSED SHARED PATH - SUSPENDED
FIBERGLASS REINFORCED PLASTIC SHARED PATH WITH STAINLESS STEEL STRUCTURE WITH MIN.0.5m CLEARANCE OF STRUCTURES/OBSTACLES ON BOTH SIDE. REFER TO ENGINEER'S DETAILS

SFP
PROPOSED PEDESTRIAN FOOTPATH - SUSPENDED
FRP FOOTPATH WITH STAINLESS STEEL STRUCTURE WITH MIN. 0.5m CLEARANCE OF STRUCTURES / OBSTACLES ON BOTH SIDES. REFER TO ENGINEER'S DETAILS AND SPECIFICATION

CFP
PROPOSED PEDESTRIAN FOOTPATH - ON GRADE - COLOURED
COLOUR: SANDSTONE AS PER COUNCILS STANDARDS
REFER TO DETAILS AND SPECIFICIATION

FP
PROPOSED PEDESTRIAN FOOTPATH - ON GRADE - STANDARD
STANDARD CONCRETE FOOTPATH AS PER COUNCIL STANDARDS
REFER TO DETAILS AND SPECIFICATION

KR
PROPOSED KERB RAMP
IN ACCORDANCE WITH COUNCIL STANDARD DETAIL

VC
PROPOSED VEHICULAR CROSSOVER
WITH REINFORCED CONCRETE SLAB IN ACCORDANCE WITH COUNCIL STANDARD DETAIL

NOTE: FOR ALL NEW KERB AND GUTTER CONSTRUCTION, ALLOW FOR 600mm WIDE SECTION OF NEW ASPHALTIC ROAD PAVEMENT REFER TO ENGINEER'S DRAWINGS AND SPECIFICATION.

SOFTWORKS

EXISTING TREES AND SHRUBS
TO BE RETAINED AND PROTECTED AS SPECIFIED

EXISTING TREES AND SHRUBS TO BE REMOVED
REMOVE ALL ROOT SYSTEMS AND DISPOSED OFF SITE.

PROPOSED TREES
REFER TO GENERAL ARRANGEMENT PLAN AND PLANT SCHEDULE

GARDEN BED TYPE 1
FOR ALL VEGETATION OFFSET ZONES
100mm CONSOLIDATED MULCH AS SPECIFIED
300mm SOIL MIX TYPE A
150mm CULTIVATED SUBGRADE.
REFER TO DETAILS AND SPECIFICATION

GARDEN BED TYPE 2
FOR ALL OTHER PROPOSED GARDEN BED AREAS
100mm CONSOLIDATED MULCH AS SPECIFIED
300mm SOIL MIX TYPE A
150mm CULTIVATED SUBGRADE.
REFER TO DETAILS AND SPECIFICATION

NEW TURF / TURF MAKE GOOD AREA
ROLLED TURF AS SPECIFIED.
LAID OVER 150mm TURF UNDERLAY OVER CULTIVATED SUBGRADE. REFER TO SPECIFICATION

SUBSOIL DRAINAGE
100mm PVC SLOTTED SUBSOIL DRAINS WRAPPERED IN GEOFABRIC LAID IN GRAVEL TRENCH AND CONNECTED TO STORMWATER SYSTEM. REFER TO ENGINEER'S DRAWING.

LIGHTING AND ELECTRICAL

ELP
EXISTING STREET LIGHTS TO BE RETAINED AND PROTECTED DURING CONSTRUCTION WORKS

ESL-R
EXISTING STREET LIGHTS TO BE SALVAGED AND REINSTATED

ESL-N
PROPOSED LOCATION OF RELOCATED LIGHT POLES

•S
EXISTING SIGNPOST AND SIGNS RETAINED
REFER TO SIGNS AND LINEMARKING DRAWINGS

•NS
NEW SIGNPOST AND SIGNS
REFER TO SIGNS AND LINEMARKING DRAWINGS

•R
EXISTING SIGNPOST AND SIGNS DEMOLISHED
REMOVED AND DELIVERED TO COUNCIL DEPOT
REFER TO SIGNS AND LINEMARKING DRAWINGS

GENERAL NOTES:
ALL OTHER WORKS OUTSIDE THE LANDSCAPE ARCHITECTURAL SCOPE, AND AS REPRESENTED ON THE LANDSCAPE ARCHITECTURAL DRAWINGS ARE FOR REFERENCE AND COORDINATION OF EXTERNAL ELEMENTS. REFER TO RELEVANT SPECIALIST CONSULTANT DOCUMENTATION FOR SPECIFIC ELEMENTS. WHERE INFORMATION CONFLICTS, REFER TO PRINCIPALS REPRESENTATIVE FOR REMEDIAL ACTION PRIOR TO CONSTRUCTION. THIS INCLUDES BUT IS NOT LIMITED TO:
_REFER CIVIL ENGINEERS DRAWING PACKAGE FOR ALL FINISHED SURFACE LEVELS, EARTHWORKS, STORMWATER DRAINAGE AND ASSOCIATED DETAILS, WHERE EXTERNAL FINISHED LEVELS CONFLICT, CONFIRM WITH PRINCIPALS REPRESENTATIVE FOR REMEDIAL ACTION PRIOR TO CONSTRUCTION;
_REFER TO STRUCTURAL ENGINEERING DRAWING PACKAGE FOR ALL RELATED WORKS INCLUDING WALLING, FOOTING TO STRUCTURES AND ASSOCIATED DETAILS; AND
_REFER TO ELECTRICAL ENGINEERING DRAWING PACKAGE FOR ALL RELATED WORKS INCLUDING LIGHTING, SERVICING AND CONNECTIONS.

EXISTING TREES TO BE REMOVED TO BE MARKED ON SITE AND CONFIRMED BY PRINCIPAL'S REPRESENTATIVE FOR APPROVAL PRIOR TO REMOVAL.

SET OUT OF ALL EXTERNAL ELEMENTS TO THE APPROVAL OF THE PRINCIPALS REPRESENTATIVE PRIOR TO COMMENCEMENT.

HARDWORKS

NEW ASPHALT ROAD PAVEMENT
TO ENGINEERS DRAWINGS AND SPECIFICATION

NEW ROAD PAVEMENT TREATMENT
STREETPRINT(TM) STAMPED ASPHALT PAVEMENT WITH HERRINGBONE PATTERN AND YELLOW OXIDE DOUBLE STACKED BRICK BORDERS REFER TO SPECIFICATION

NEW NATURAL STONE PAVEMENT (TBC)
SANDSTONE PAVERS (OR APPROVED EQUIVALENT)
400x200x40mm NATURAL STONE PAVER OVER 30mm MORTAR BED
OVER 110mm FIBRE REINFORCED CONCRETE SLAB
OVER 100mm COMPACTED DGB20 BASECOURSE
OVER COMPACTED SUBGRADE.
REFER TO DETAILS AND SPECIFICATION

EXISTING CONCRETE DRIVEWAY
TO BE RECONSTRUCTED TO SUIT PROPOSED SHARED PATH LEVELS.
REFER TO ENGINEER'S DRAWINGS AND SPECIFICATION

CU
PROPOSED CONCRETE UPSTAND / RETAINING WALL
REFER TO ENGINEER'S DRAWINGS
MAX. 1m HIGH FOR CONCRETE UPSTANDS

SR1
NEW SANDSTONE BLOCK WALL - TYPE 1
500x650x1000mm REUSE EXISTING SANDSTONES WHERE POSSIBLE. REFER TO DETAILS AND SPECIFICATION

SR2
NEW SANDSTONE BLOCK WALL - TYPE 2
400x400x600mm SANDSTONE BLOCK IN STRETCHER BOND PATTERN, REFER TO DETAILS AND SPECIFICATION

NEW STEPS WITH HANDRAILS / BALUSTRADES
REFER TO GENERAL ARRANGEMENT PLAN FOR FINISHES
REFER TO BALUSTRADE SCHEDULE FOR BALUSTRADE TYPES
ALL STEPS AND HANDRAIL TO COMPLY WITH AS 1428.2-2009 AND AS 1657:2018 (FOR WALKWAY THROUGH PUBLIC RESERVE AT BILGOLA HEADLAND)

SHARED PATH LINE MARKING
REFER TO LINEMARKING AND SIGNAGE DRAWINGS

ON-ROAD CYCLEWAY PAVEMENT SYMBOLS
REFER TO LINEMARKING AND SIGNAGE DRAWINGS

EXISTING SPEED HUMPS ALONG THE SERPENTINE
TO BE RETAINED AND PROTECTED

EXISTING SPEED HUMPS ALONG THE SERPENTINE
TO BE RETAINED AND PROTECTED. INSTALL NEW STREETPRINT(TM) STAMPED ASPHALT PAVEMENT WITH HERRINGBONE PATTERN AND YELLOW OXIDE DOUBLE STACKED BRICK BORDERS REFER TO SPECIFICATION.

PROPOSED CONCRETE SPEED CUSHIONS ALONG THE SERPENTINE
REFER TO LINEMARKING AND SIGNAGE DRAWINGS FOR LOCATION
REFER TO ENGINEER'S DRAWINGS FOR DETAILS

PAVING JOINTS

d
DUMMY JOINT
REFER TO CIVIL ENGINEERS DRAWINGS

k
DOWEL JOINTS
REFER TO CIVIL ENGINEERS DRAWINGS

e
EXPANSION JOINTS
REFER TO CIVIL ENGINEERS DRAWINGS

sc
SAW CUT JOINTS
REFER TO CIVIL ENGINEERS DRAWINGS

FURNITURE

OSP | SSP
PROPOSED BALUSTRADE ALONG SHARED PATH
REFER TO BALUSTRADE SCHEDULE

SFP | CFP | FP
PROPOSED BALUSTRADE ALONG FOOTPATH
REFER TO BALUSTRADE SCHEDULE

BALUSTRADE SCHEDULE

REFER TO GENERAL ARRANGEMENT PLAN FOR BALUSTRADE LOCATIONS AND QUANTITY
REFER TO LANDSCAPE DETAIL PACKAGE FOR BALUSTRADE DESIGN AND CIVIL ENGINEER'S DRAWINGS FOR FIXING / STRUCTURAL DETAILS.

BL-1 — **BALUSTRADE TYPE 1**
1.2m-1.4m HIGH BLACK POWDER COATED STAINLESS STEEL BALUSTRADE WITH ANGLED TIMBER TOP RAIL.

BL-2 — **BALUSTRADE TYPE 2**
1.2m HIGH BLACK POWDER COATED STAINLESS STEEL BALUSTRADE.

BL-2H — **BALUSTRADE TYPE 2 + HANDRAIL**
STAINLESS STEEL HANDRAIL FIXED TO TYPE 2 BALUSTRADE POST PLATE TO COMPLY WITH AS 1428.2-2009

BL-2S — **BALUSTRADE TYPE 2 + SCREEN BATTERNS + HANDRAIL**
STAINLESS STEEL HANDRAIL AND ALUMINIUM BATTERNS FIXED TYPE 2 BALUSTRADE TO COMPLY WITH AS 1428.2-2009

BL-3 — **BALUSTRADE TYPE 3**
1.4m HIGH RMS PEDETRIAN FENCING R0800 - 15 AS PER RMS STANDARD DETAILS.

•B
PROPOSED STAINLESS STEEL BOLLARDS
SUBSURFACE FIXINGS REFER TO SPECIFICATION

SW
SANDSTONE BLOCK SEATING WALL
500(W)x650(H)x1000mm(L) SANDSTONE BLOCKS WITH 700mm(W) x 250mm(DEEP) CONCRETE FOOTING BELOW. BLOCK TO BE INSTALLED 500mm ABOVE FINISHED GROUND. REFER TO SPECIFCIATION FOR SANDSTONE .

CW
INSITU CONCRETE SEAT WALL WITH BENCH SEATS
REFER TO DETAIL

SE
BENCH SEAT (2000mm LENGTH)
SUB-SURFACE MOUNT. REFER TO SPECIFICATION

SE-1
BENCH SEAT (MODIFIED LENGTH)
SUB-SURFACE MOUNT. REFER TO SPECIFICATION

SE-R
EXISTIG BENCH SEAT RELOCATED - BILGOLA CARPARK
FIX TO CONCRETE PAVING BELOW.

BK
PROPOSED BIKE RACKS
SUBSURFACE FIXING
REFER TO DETAILS AND SPECIFICATION

DF
PROPOSED DRINKING FOUNTAIN
REFER TO SPECIFICATION
LOCATION: BILGOLA BEACH CARPARK

BIN
EXISTING BINS RELOCATED
TBC BY COUNCIL
LOCATION: BILGOLA BEACH CARPARK

SP
PROPOSED SHOWER POST
REFER TO SPECIFICATION
LOCATION: BILGOLA BEACH CARPARK

SERVICES

NEW STORMWATER KERB INLET PIT
REFER TO ENGINEER'S DRAWINGS FOR LOCATION AND LEVELS

NEW STORMWATER PIT
REFER TO ENGINEER'S DRAWINGS FOR LOCATION AND LEVELS

EXISTING STORMWATER SERVICE
TO BE RETAINED AND PROTECTED

NEW CHANNEL BREAK IN CONCRETE BARRIER
REFER TO CIVIL ENGINEERS DRAWINGS

EXISTING STORMWATER PIPE AND PITS
REFER TO CIVIL ENGINEERS DRAWINGS

NEW STORMWATER PIPE
REFER TO CIVIL ENGINEERS DRAWINGS

REVISIONS

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LEGEND AND GENERAL NOTES

DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-001	3	KG	LH	JL

SCALE AS SHOWN A1

DATE 21.12.2018

Tract
Landscape Architects
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P: 02 9954 3733 www.tract.net.au

GENERAL NOTES:

1. SETOUT OF NEW POLES, DRAINAGE PITS, STORMWATER LINES AND SUBSOIL DRAINS TO BE CONFIRMED ON SITE WITH SUPERINTENDENT.

2. SETOUT OF ALL PROPOSED STRUCTURES INCLUDING BUT NOT LIMITED TO: SHARED PATH, FOOT PATH, STAIRS, SEATING, RETAINING WALLS, BALUSTRADE AND HANDRAILS. ETC TO BE CONFIRMED ON SITE WITH SUPERINTENDENT PRIOR TO COMMENCEMENT OF CONSTRUCTION.

3. DRAWINGS SHOULD BE READ IN CONJUNCTION WITH SPECIFICATION AND ALL OTHER DOCUMENTS PROVIDED IN THE D&C TENDER PACKAGE.

4. DO NOT SCALE FROM THE DRAWINGS. REPORT ANY DISCREPANCIES TO THE SITE SUPERINTENDENT IMMEDIATELY.

5. PROTECT ALL ADJOINING PROPERTY - BUILDINGS, WALLS, FENCING AND PAVING. DAMAGED ELEMENTS ARE TO BE REPLACED.

6. CONTRACTOR IS TO INSPECT SITE AND SATISFY THEMSELVES OF ALL EXISTING SURFACE FEATURES, SUCH AS SERVICE PITS/COVERS, DOWNPIPES AND OUTLETS, KERBS, RAMPS, SIGNS ETC. AND ALL OVERHEAD FEATURES SUCH AS AWNINGS.

7. SHOULD ANY AMBIGUITY, ERROR, OMISSION, DISCREPANCY, INCONSISTENCY OR OTHER FAULT EXIST OR SEEM TO EXIST IN THE CONTRACT DOCUMENTS, IMMEDIATELY NOTIFY IN WRITING TO THE SUPERINTENDENT.

8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE STABILITY OF ANY STRUCTURE UNTIL ITS COMPLETION. TEMPORARY BRACING/SHORING SHALL BE PROVIDED BY THE CONTRACTOR AT ALL TIMES, ENSURING THAT NO PART OF THE DOCUMENTED STRUCTURE BECOMES OVERSTRESSED. FOR ALL TEMPORARY BATTERS OBTAIN GEOTECHNICAL ENGINEERS RECOMMENDATIONS. FOR ALL STRUCTURAL ELEMENTS OBTAIN STRUCTURAL ENGINEERS RECOMMENDATIONS.

9. INVESTIGATION POTHOLING IS TO BE UNDERTAKEN OF ALL NEW DRAINAGE PITS AND DRAINAGE PIPELINES 7 DAYS PRIOR TO ORDERING ASSOCIATED DRAINAGE PITS/PIPES (AND PRIOR TO COMMENCEMENT OF ANY EXCAVATION FOR THE DRAINAGE PITS/PIPES)- SO AS TO PHYSICALLY EXPOSE AND SURVEY UNDERGROUND SERVICES/STRUCTURES (POTHOLING TO BE UNDERTAKEN AT MAXIMUM 1.0m SPACING FOR DRAINAGE PIPELINES).

10. SURVEY (LOCATION, DEPTH AND SIZE) UNCOVERED EXISTING SERVICES/ STRUCTURES AND FURNISH SUPERINTENDENT WITH SURVEY DATA WITHIN 24 HOURS. SUPERINTENDENT IS TO CONFIRM AND MODIFY AS NECESSARY THE DRAINAGE SYSTEM DESIGN PRIOR TO ORDERING ASSOCIATED SYSTEM MATERIALS.

11. FULL EXCAVATION IS TO BE UNDERTAKEN ALONG COMPLETE LENGTH OF NEW DRAINAGE PIPELINES AND ALL EXISTING SERVICES/STRUCTURES ARE TO BE EXPOSED AND SURVEYED (LOCATION, DEPTH AND SIZE), 3 WORKING DAYS PRIOR TO CONSTRUCTION OF THE DRAINAGE PIPELINE, SUPERINTENDENT IS TO CONFIRM AND MODIFY AS NECESSARY THE DRAINAGE SYSTEM DESIGN PRIOR TO COMMENCING CONSTRUCTION OF THE PIPELINE.

12. BACKFILL VOIDS REMAINING AFTER SERVICE PITS ARE DEMOLISHED/ DECOMMISSIONED WITH STABILIZED SAND (20:1 SAND: CEMENT).

13. SET OUT OF BALUSTRADE PANELS ON DRAWINGS INDICATIVE ONLY. CONTRACTOR TO SET OUT ON SITE AND CONFIRM WITH SUPERINTENDENT.

14. RADIAL CURVE DATA, COMPRISING RAD, ARC, TAN REFER TO RADIUS(M) AND ARC LENGTH(M) BETWEEN TANGENT POINTS OF THE CURVE, AND REFER TO THE TANGENT LENGTH(M) RESPECTIVELY.

15. FLUSH KERBS CONTAINING A TANGENT POINT WITHIN THE KERB LENGTH ARE TO BE MADE OF ONE COMPLETE LENGTH, COMPRISING A STRAIGHT SECTION AND A RADIAL SECTION.

EXPLORATORY EXCAVATION AT NEW POLES, TREE PITS, DRAINAGE STRUCTURE, NEW STORMWATER CONNECTIONS AND OTHER STRUCTURES

1. POLE FOOTINGS, TREE PITS, DRAINAGE STRUCTURES, NEW STORMWATER CONNECTIONS AND OTHER SPECIFIED STRUCTURES MAY BE IN THE VICINITY OF EXISTING IN-GROUND SERVICES SUCH AS GAS, WATER, SEWERAGE, STORMWATER, TELECOMMUNICATIONS AND ELECTRICITY.

2. ALLOW FOR EXPLORATORY HAND EXCAVATION IN THE LOCATION OF ALL POLES, TREE PITS, DRAINAGE STRUCTURES, PROPOSED STORMWATER, SUBSURFACE DRAINAGE AND OTHER SPECIFIED STRUCTURES WELL IN ADVANCE OF PILING AND EXCAVATION SO AS TO ENABLE REDESIGN WORK FOR FOOTINGS, TREE PITS, DRAINAGE STRUCTURES, STORMWATER DESIGN AND OTHER SPECIFIED STRUCTURES TO AVOID DELAYS. DETERMINE THE PRECISE LOCATION, CONTENT AND DEPTH OF SERVICES, RECORD AND PLOT THE RESULTS ON DRAWINGS USING AN APPROVED REGISTERED SURVEYOR, BACKFILL PIT AND SAND, CART AWAY SURPLUS EXCAVATION, MAKE GOOD SURFACE TO MATCH EXISTING AND INCLUDE ALL TEMPORARY WORK.

3. POLE FOOTING EXPLORATORY HAND EXCAVATION TO BE THE MINIMUM PAD FOOTING SIZE REQUIRED FOR EACH POLE SIZE.

4. WHERE SIGNPOSTING IS REMOVED, MAKE GOOD PAVEMENT AROUND BASE.

CO-ORDINATION WITH AUSGRID

1. ALLOW TO CO -ORDINATE AND PROGRAM WORKS WITH AUSGRID ON SITE.

CO -ORDINATION WITH SERVICE AUTHORITIES AND OTHER CONTRACTORS

1. THE CONTRACTOR SHALL ALLOW TO CO -ORDINATE WITH ALL RELEVANT SERVICE AUTHORITIES AS REQUIRED.

2. THE CONTRACTOR SHALL ALLOW TO CO -ORDINATE WITH ALL OTHER CONTRACTOR WHO ARE AS REQUIRED.

TELSTRA

1. ALL TELSTRA ASBESTOS PITS TO BE REMOVED AND REPLACE WITH NEW PITS. CONFIRM AND IDENTIFY ALL ASBESTOS PITS ON SITE PRIOR TO DEMOLITION WORKS.

2. TELSTRA INFRASTRUCTURE – ALL WORKS ON TELSTRA INFRASTRUCTURE CAN ONLY BE CARRIED OUT BY TELSTRA. TELSTRA'S QUOTE FOR THE KNOWN WORKS IS INCLUDED FOR TENDER TO INCLUDE IN THEIR PRICE. TELSTRA WILL BE THE NOMINATED SUBCONTRACTOR
TO THE CONTRACTOR FOR ALL WORKS REQUIRED ON TELSTRA INFRASTRUCTURE.

SYDNEY WATER

1. EXISTING SYDNEY WATER PITS TO BE REPLACED WITH DUCTILE IRON PIT LIDS AS SPECIFIED. CONFIRM ON SITE.

2. ALL MINOR ADJUSTMENTS TO SYDNEY WATER SEWER MANHOLES AND LIDS TO BE CARRIED OUT BY AN
APPROVED SYDNEY WATER MINOR WORKS CONTRACTOR.

3. MAINTAIN ACCESS TO HYDRANTS FOR SYDNEY WATER THROUGHOUT CONSTRUCTION PERIOD.
SYDNEY WATER FITTINGS – INSTALL TOP OF PIT COVER OVER MIDDLE OF FITTINGS.

4. ALL HYDRANT PIT COVERS TO BE ADJUSTED TO MATCH FINISHED PAVING LEVELS.

ADDITIONAL NOTES FOR SERVICE PITS

GENERAL
1. ALL PITS ARE TO BE INSTALLED WITHOUT CONCRETE SURROUNDS. THE EXISTING CONCRETE SURROUNDS TO EXISTING STOP VALVES AND GAS VALVES TO BE REPLACED WITH NEW DUCTILE FRAMES.

2. REFER TO SPECIFICATION FOR ALL NEW PIT LID TYPES.

3. THE PIT SIZE ON THE SCHEDULE AND DRAWINGS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL SITE MEASURE THE SIZES OF EXISTING PITS AND SELECT A LID TO SUIT EACH PIT.

4. (*) NOT IN SCOPE

5. ALL PIT COVERS WITHIN DRIVEWAYS AND ARE TO BE CLASS D AND IN COMPLIANCE TO SERVICE AUTHORITY STANDARDS.

6. PROPOSED PITS LOCATED WITHIN ROADWAY TO BE CLASS D PIT FRAME AND COVER.

7. ALL NEW PITS AND INFILL PIT LIDS TO BE PROVIDED BY THE CONTRACTOR.

8. ALL UNKNOWN PITS ARE TO BE CONFIRMED ON SITE AND THE CONTRACTOR TO LIAISE WITH RELEVANT AUTHORITY FOR ADJUSTMENTS.

9. ALL PITS ARE TO BE REALIGNED IN THE DIRECTION OF PAVING WHEREVER POSSIBLE.

10. THE CONTRACTOR WILL REPLACE ROUND PITS WITH RECTILINEAR PITS WHEREVER POSSIBLE TO ALIGN WITH THE FOOTPATH PAVING LAYOUT.

11. ALL REDUNDANT PITS ARE TO BE REMOVED.

TRAFFIC SIGNAL INFRASTRUCTURE

1. THE CONTRACTOR IS TO PROVIDE AND INSTALL ALL NEW SIGNAGE IN ACCORDANCE WITH COUNCIL REQUIREMENTS AND MANUFACTURER'S SPECIFICATION. CONTRACTOR TO PROVIDE NEW POLES FOR ALL NEW SIGNAGE. REFER TO SPECIFICATION AND DETAILS.

2. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH RMS APPROVED TRAFFIC SIGNAL PLANS. RMS APPROVED PLANS HAVE PRECEDENT OVER SIGN AND LINEMARKING DRAWINGS.

3. CONTRACTOR TO OBTAIN "AS BUILT" DRAWINGS FROM RMS AND PRICE FOR ALL THE CHANGES THAT ARE REQUIRED TO CONSTRUCT THE WORKS AS SHOWN IN THE TENDER DOCUMENTS.

4. CONTRACTOR TO COMPLY FULLY WITH THE RMS "SITCS 8". EXEMPTIONS AND EXCLUSIONS BY CONTRACTOR IN THE TENDER WILL NOT BE VALID REASON FOR VARIATION TO THE CONTRACT SUM QUOTED BY THE CONTRACTOR.

5. CONTRACT TO INCLUDE ALL WORKS REQUIRED TO SUIT NEW APPROVED TRAFFIC SIGNAL PLANS. CONTRACTOR TO SUPPLY EXISTING TRAFFIC SIGNAL PLANS AND APPROVED TRAFFIC SIGNAL PLANS FOR ALL NEW ITEMS TO BE INCLUDED FOR COSTING.

TREE PROTECTION NOTES:

1. THE TREE PROTECTION ZONE (TPZ) IS A RADIAL DISTANCE MEASURED FROM THE CENTRE OF THE TRUNK OF THE TREE AND CALCULATED IN ACCORDANCE WITH AS 4970-2009 (PROTECTION OF TREES ON DEVELOPMENT SITES)

2. THE STRUCTURAL ROOT ZONE (SRZ) PROVIDES THE BULK OF MECHANICAL SUPPORT AND ANCHORAGE FOR A TREE. THIS IS ALSO A RADIAL DISTANCE MEASURED FROM THE CENTRE OF THE TRUNK AND CALCULATED IN ACCORDANCE WITH AS 4970-2009 (PROTECTION OF TREES ON DEVELOPMENT SITES).

3. INCURSIONS WITHIN THE SRZ ARE NOT RECOMMENDED AS THEY ARE LIKELY TO RESULT IN THE SEVERANCE OF WOODY ROOTS WHICH MAY COMPROMISE THE STABILITY OF THE TREE OR LEAD TO ITS DECLINE AND DEMISE.

4. TREE PROTECTION SHALL BE IN ACCORDANCE WITH AS 4970-2009 (PROTECTION OF TREES ON DEVELOPMENT SITES)

5. TREE PROTECTION FENCE
ALL TREES WITHIN THE SITE TO BE RETAINED SHALL BE PROTECTED PRIOR TO AND DURING CONSTRUCTION FROM ALL ACTIVITIES THAT MAY RESULT IN DETRIMENTAL IMPACT BY ERECTING A SUITABLE PROTECTIVE FENCE BENEATH THE CANOPY TO THE FULL EXTENT OF THE TREE PROTECTION ZONE.

6. AS A MINIMUM, THE FENCE SHOULD CONSIST OF TEMPORARY CHAIN WIRE PANELS OF 1.8 METRES IN HEIGHT, SUPPORTED BY STEEL STAKES AS REQUIRED AND FASTENED TOGETHER AND SUPPORTED TO PREVENT SIDEWAYS MOVEMENT USING CORNER BRACES WHERE REQUIRED. THE FENCE SHALL BE ERECTED PRIOR TO THECOMMENCEMENT OF ANY WORK ON-SITE AND SHALL BE MAINTAINED IN GOOD CONDITION FOR THE DURATION OF
CONSTRUCTION. WHERE TREE PROTECTION ZONES MERGE TOGETHER A SINGLE FENCE ENCOMPASSING THE AREA IS DEEMED TO BE ADEQUATE. EXISTING SITE BOUNDARY FENCES MAY FORM PART OF THE ENCLOSURE.

7. TREE PROTECTION SIGNS
SIGNS SHALL BE INSTALLED ON THE TREE PROTECTION FENCE TO PREVENT UNAUTHORISED MOVEMENT OF PLANT AND EQUIPMENT OR ENTRY TO THE TREE PROTECTION ZONE. THE SIGNS SHALL BE SECURELY ATTACHED TO THE FENCE USING CABLE TIES OR EQUIVALENT. SIGNS SHALL BE PLACED AT MINIMUM 10 METRE INTERVALS. THE WORDING AND LAYOUT OF THE SIGN SHALL COMPLY WITH AS 4970-2009

8. TRUNK PROTECTION
WHERE PROVISION OF TREE PROTECTION FENCING IS IN IMPRACTICAL DUE TO ITS PROXIMITY TO THE PROPOSED BUILDING FOOTPRINT, TRUNK PROTECTION SHALL BE ERECTED AROUND NOMINATED TREES TO AVOID ACCIDENTAL DAMAGE.THE TRUNK PROTECTION SHALL CONSIST OF A LAYER OF CARPET UNDERFELT (OR SIMILAR) WRAPPED AROUND THE TRUNK, FOLLOWED BY 1.8 METRE LENGTHS OF SOFTWOOD TIMBERS (90 X 45MM IN SECTION) ALIGNED VERTICALLY AND SPACED EVENLY AROUND THE TRUNK AT 150MM CENTRES (I.E. WITH A 50MM GAP) AND SECURED TOGETHER WITH 2MM GALVANISED WIRE OR GALVANISED HOOP STRAP. RECYCLED TIMBER (SUCH AS DEMOLITION WASTE) MAY BE SUITABLE FOR THIS PURPOSE, SUBJECT TO THE APPROVAL OF THE PROJECT ARBORIST. THE TIMBERS SHALL BE WRAPPED AROUND THE TRUNK (OVER THE CARPET UNDERFELT), BUT NOT FIXED TO THE TREE TO AVOID MECHANICAL INJURY OR DAMAGE TO THE TRUNK. TRUNK PROTECTION SHOULD BE INSTALLED PRIOR TO ANY SITE WORKS AND MAINTAINED IN GOOD CONDITION FOR THE DURATION OF THE CONSTRUCTION PERIOD. CARPET UNDERFELT (ALONE) IS SUFFICIENT FOR TREES WITH A TRUNK DIAMETER OF LESS THAN 200MM

9. DEMOLITION AND EXCAVATION WITHIN THE TREE PROTECTION ZONES OF TREES TO BE RETAINED SHALL BE UNDERTAKEN UNDER THE SUPERVISION OF THE SITE ARBORIST

10. TREE DAMAGE
CARE SHALL BE TAKEN WHEN OPERATING CRANES, DRILLING RIGS AND SIMILAR EQUIPMENT NEAR TREES TO AVOID DAMAGE TO TREE CANOPIES (FOLIAGE AND BRANCHES). UNDER NO CIRCUMSTANCES SHALL BRANCHES BE TORN-OFF BY CONSTRUCTION EQUIPMENT. WHERE THERE IS POTENTIAL CONFLICT BETWEEN TREE CANOPY AND CONSTRUCTION ACTIVITIES, THE ADVICE OF THE SITE ARBORIST MUST BE SOUGHT.

11. IN THE EVENT OF ANY TREE BECOMING DAMAGED FOR ANY REASON DURING THE CONSTRUCTION PERIOD ACONSULTING ARBORIST [AUSTRALIAN QUALIFICATION FRAMEWORK LEVEL 5] SHALL BE ENGAGED TO INSPECT AND PROVIDE ADVICE ON ANY REMEDIAL ACTION TO MINIMISE ANY ADVERSE IMPACT. SUCH REMEDIAL ACTION SHALL BE IMPLEMENTED AS SOON AS PRACTICABLE AND CERTIFIED BY THE ARBORIST.

NEW SIGNAGE POLE
PROVIDE NEW SIGN POSTS AND SIGNS AS SHOWN ON SIGNS AND LINEMARKING DRAWINGS. CONFIRM EXACT LOCATION ON SITE WITH THE SITE SUPERVISOR PRIOR TO INSTALLATION. ALIGN POLES WITH PAVING JOINTS AS SHOWN ON THE DRAWINGS AND DETAILED. ALL SIGNAGE IS TO BE INSTALLED TO THE ORIENTATION AND HEIGHTS IN ACCORDANCE WITH RMS STANDARDS.

HEIGHT: 2.5M HIGH ABOVE THE FOOTPATH LEVEL, TO SUIT RMS AND COUNCIL SIGNS.
USE 3.2M POLES WHEN REQUIRED FOR POLES THAT CARRY MULTIPLE SIGNS.
MATERIAL: GALVANISED STEEL CIRCULAR HOLLOW SECTION.
SIZE: 48M DIAMETER STEEL CNS. WALL THICKNESS OF 2.3M
FINISH: GALVANISED STEEL
POST FOOTING SOCKET: FOR EACH SIGN POLE PROVIDES A CAST-IN SOCKET TO ALLOW REMOVAL OF THE POLE IF REQUIRED. THE SOCKET SHALL BE MADE FROM UPVC WITH A HOT DIP GALVANISED STEEL COLLAR, AND A GALVANISED WEDGE PIN. SIZE THE SOCKET TO SUIT THE DIAMETER OF THE SIGN POLE.

LOCATE THE TOP OF THE POST-FOOTING SOCKET FLUSH WITH THE SURFACE OF THE PAVING. PROVIDE A 10MM SEALANT JOINT BETWEEN THE SOCKET AND THE ADJACENT PAVING.

PLANT SCHEDULE - NBC NEWPORT TO AVALON SHARED PATH

CODE	BOTANICAL NAME	COMMON NAME	MATURE HEIGHT	MATURE WIDTH	DENSITY	CONTAINER SIZE	QUANTITY
PROPOSED VEGETATION OFFSET ZONE - Plant Community Type (PCT) 1817							
MIX 1	**Trees**						
	Acacia longifolia	Sydney Golden Wattle	5-8m	4m		35lt	2
	Banksia integrifolia	Coast Banksia	5-15m	2-4m		35lt	3
						Total	5
	Shrubs						
	Grevillea sericea	Silky Grevillea	1-2m	1-2m	20%	200mm	342
	Hakea teretifolia	Needlebush	1-3m	0.5-2.5m	20%	200mm	342
	Lomandra longifolia 'Nyalla'	Coastal Rosemary	1.5-2m	1.5m	20%	200mm	343
					1.5/LM	**Total**	**1027**
	Groundcovers						
	Dianella caerulea	Blue Flax-lily	0.5-1m	0.5-1m	30%	150mm	3168
	Lomandra longifolia	Basket Grass	1.2m	1m	30%	150mm	3167
	Lomandra multiflora	Many-flowered Mat-rush	0.3-1m	0.3-0.5m	40%	150mm	4224
					$4/m^2$	**Total**	**10559**
PROPOSED VEGETATION OFFSET ZONE - Plant Community Type (PCT) 1778							
MIX 2	**Trees**						
	Allocasuarina littoralis	She-oak	8-12m	4-7m		35lt	0
	Banksia integrifolia	Coast Banksia	5-15m	2-4m		35lt	0
						Total	0
	Shrubs						
	Breynia oblongifolia	Coffee Bush	3m	3m	10%	150mm	36
	Correa alba	Correa	1-1.5m	1-1.5m	25%	150mm	74
	Westringia fruticosa	Coastal Rosemary	1.5-2m	1.5m	25%	150mm	74
					1.5/LM	**Total**	**184**
	Groundcovers						
	Dianella caerulea	Blue Flax-lily	0.5-1m	0.5-1m	30%	150mm	724
	Entolasia stricta	Wiry Panic	0.8-1.5m	0.2-0.3	30%	150mm	725
	Lomandra longifolia	Spiny-head Mat-rush	1.2m	1m	40%	150mm	967
					$4/m^2$	**Total**	**2416**
PROPOSED VEGETATION OFFSET ZONE - Plant Community Type (PCT) 898							
MIX 3	**Trees**						
	Banksia integrifolia subsp. Integrifolia	Coast Banksia	25m	4-6m		35lt	4
						Total	4
	Shrubs						
	Acacia sophorae	Sydney Golden Wattle	3-5m	4m	20%	150mm	24
	Westringia fruticosa	Coastal Rosemary	1.5-2m	1.5m	40%	150mm	93
					1.5/LM	**Total**	**117**
	Groundcovers						
	Cynodon dactylon	Couch Grass	0.3m		25%	150mm	261
	Hibbertia vestita	Hairy Guinea Flower	0.3m	0.4-0.5m	25%	150mm	262
	Pimelea linifolia	Slender Rice Flower	0.5-1.5m	0.5-1.5m	15%	150mm	157
	Poa poiformis	Coast Tussock-grass	1m	0.5m	15%	150mm	157
	Pultenaea maritima	Coastal Bush-pea	0.3m		20%	150mm	209
					$4/m^2$	**Total**	**1046**
PROPOSED GARDEN BED							
	Trees						
AIL	*Allocasuarina littoralis*	She-oak	8-12m	4-7m		100lt	2
Bal	*Banksia integrifolia subsp. Integrifolia*	Coast Banksia	25m	4-6m		400lt	17
						Total	19
	Shrubs						
WeF	*Westringia fruticosa*	Coastal Rosemary	1.5-2m	1.5m		150mm	104
						Total	104
MIX 4 (Avalon Carpark & Bilgola Beach Carpark)	*Poa poiformis*	Coast Tussock-grass	1m	0.5m	10%	150mm	252
	Carpobrotus glaucescens 'Aussie Rambler'	Pigface	0.2m	2m	15%	150mm	378
	Dianella caerulea 'Breeze'	Native Flax	0.6m	0.6m	20%	150mm	504
	Gazania hybrid 'Double Gold'	Cimmaron Ash	0.2m	0.5m	10%	150mm	252
	Lomandra longifolia 'Nyalla'	Mat Rush	0.75m	0.75m	30%	150mm	756
	Westringia fruticosa 'Mundi'	Coastal Rosemary	0.4-0.5m	1.5m	15%	150mm	378
					$4/m^2$	**Total**	**2520**
MIX 5 (native residential)	*Acacia sophorae*	Sydney Golden Wattle	3-5m	4m	15%	150mm	158
	Casuarina glauca 'Cousin It'	Cousin It	0.15	3m	20%	150mm	210
	Carpobrotus glaucescens 'Aussie Rambler'	Pigface	0.2m	2m	20%	150mm	210
	Lomandra longifolia 'Nyalla'	Mat Rush	0.75m	0.75m	30%	150mm	316
	Westringia fruticosa	Coastal Rosemary	1.5-2m	1.5m	15%	200mm	158
					$4/m^2$	**Total**	**1052**
MIX 6 (exotic residential)	Carpobrotus glaucescens 'Aussie Rambler'	Pigface	0.2m	2m	10%	150mm	178
	Dianella caerulea 'Breeze'	Native Flax	0.6m	0.6m	30%	150mm	534
	Metrosideros 'Crimson Glory'	New Zealand Christmas Bush	3m	2m	15%	200mm	267
	Syzygium 'Cascade'	Lilly Pilly	2-3m	1-2m	15%	200mm	267
	Westringia fruticosa	Coastal Rosemary	1-1.5m	0.3-1.3m	30%	200mm	534
					$4/m^2$	**Total**	**1780**
MIX 7 (shared path)	*Poa poiformis*	Coast Tussock-grass	1m	0.5m	30%	150mm	380
	Carpobrotus glaucescens 'Aussie Rambler'	Cimmaron Ash	0.2m	0.5m	20%	150mm	253
	Lomandra longifolia 'Nyalla'	Mat Rush	0.75m	0.75m	50%	150mm	634
					4/LM	**Total**	**1267**
MIX 8 (shared path)	*Dianella caerulea 'Breeze'*	Native Flax	0.6m	0.6m	30%	150mm	711
	Carpobrotus glaucescens 'Aussie Rambler'	Cimmaron Ash	0.2m	0.5m	10%	150mm	237
	Lomandra longifolia 'Nyalla'	Mat Rush	0.75m	0.75m	40%	150mm	948
	Westringia fruticosa 'Aussie Box'	Coastal Rosemary	0.4-0.6m	0.75-0.9m	20%	150mm	474
					4/LM	**Total**	**2370**
PROPOSED TURF							
TU	Pennisetum clandestinum	Kikuyu Grass	0.1-0.15m		As shown	Turf Rolls	0
						Total	**800m2**

* Note:
1. Plant selections include 70% local species, 20% far away, and 10% from further away (climate analogues found on the CSIRO website) as per instructed by Northern Beaches Council.
2. Planting species selected is in accordance with key dominant species recorded within the vegetation communities in the study area as per Preliminary Biodiversity Assessment prepared by Niche-eh in Nov 2018.
3. Contractors to confirm community seedling collection process with Northern Beaches Council prior to plant purchase.
4. Plant quantity shown as indicative only. Allow for additional vegetation offset planting to all disturbed vegetation areas during construction.

REVISIONS

REV	DESCRIPTION	DATE	DRAWN	CHKD
1	90% DD ISSUE	21.01.19	KG/AR	LH
2	ISSUE FOR COMMENTS	10.04.19	KG/AR	LH
3	100% DD ISSUE	24.04.19	KG/BH	LH

GENERAL NOTES

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2. ANY DISCREPANCIES MUST BE REPORTED IMMEDIATELY TO THE SUPERINTENDENT.
3. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE DETAILS, SPECIFICATIONS AND ENGINEERING DOCUMENTS.
4. LOCATE AND PROTECT ALL UNDERGROUND SERVICES PRIOR TO ANY EXCAVATION. MAKE GOOD ALL DAMAGE TO EXISTING WORKS CAUSED BY THE ACTIVITY OF THESE WORKS.
5. THESE DRAWINGS ARE TO BE PRINTED IN COLOUR

northern beaches council

PROJECT
NORTHERN BEACHES COUNCIL
NEWPORT TO AVALON SHARED PATH

CLIENT
NORTHERN BEACHES COUNCIL

PRELIMINARY NOT FOR CONSTRUCTION

LEGEND AND GENERAL NOTES

DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-002	3	KG	LH	JL

SCALE AS SHOWN A1

DATE 21.12.2018

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PROPOSED ON-GRADE SHARED PATH SETTING OUT FROM EXISTING WHITE LINE MARKING (WIDTH):
- 0.5m GUTTER
- 0.5m 'F' BARRIER
- 0.65m PLANTING + CONCRETE EDGE
- 3m SHARED PATH WITH BALUSTRADE AND HANDRAIL
- 2m VEGETATION OFFSET ZONE

EXISTING WHITE LINEMARKING (EDGE OF TRAFFIC LANE)

SHARED PATH WIDTH INCREASED TO 3.5m TO ALLOW EXTRA SPACE FOR UPHILL CYCLISTS

EXISTING GUARD RAIL TO BE DEMOLISHED AND DISPOSED OFF SITE

MIX 7 | 132
MIX 7 | 104
MIX 1
Shrub | 81
Groun | 636
MIX 7 | 112

NEPTUNE ROAD
BARRENJOEY ROAD
NO. 329
NO. 331
NO. 337
NO. 339
NO. 441
NO. 8A

CH 600
CH 620
CH 800
CH 1000
CH 120.0

27.86m SHARED PATH 3m WIDE
32.55m SHARED PATH TRANSITION TO 3.5m WIDE
29.77m SHARED PATH 3.5m WIDE
BA-G
K&G
VC
OSP
SSP
sc
d
k
NS

APPROX. 31x1.4m HIGH BALUSTRADE PANELS BL-1
APPROX 16x1.2m HIGH BALUSTRADE PANELS BL-1
APPROX. 3 TRANSITION BALUSTRADE PANELS BL-1
3.00m R
2.40m R
2.50m

ex6.77 ex7.37 ex8.75 ex10.10 ex10.83 ex11.18 ex11.53 ex12.48 ex12.80 ex13.00 ex13.34 ex13.98 ex14.33 ex6.45 ex6.47

LIMIT OF WORKS

PROPOSED KERB AND GUTTER TO JOIN WITH EXISTING KERB AND GUTTER

EXISTING POLE AND SIGNAGE TO BE RETAINED AND PROTECTED

EXISTING CONCRETE PATH TO BE RETAINED

BEGINNING OF PROPOSED CONCRETE SHARED PATH (ON GRADE) TO JOIN WITH EXISTING CONCRETE PATH

EXISTING BITUMEN DRIVEWAY TO BE RETAINED FOR ACCESS.

EXISTING ARAUCARIA TREE SRZ APPROX.2.4m TO BE RETAINED AND PROTECTED. CONTRACTOR TO SEEK ABORIST ADVICE ON TREE PROTECTION METHODS.

START OF EXISTING COASTAL WALK (NOT IN SCOPE)

EXISTING ARAUCARIA TREE SRZ APPROX.3m TO BE RETAINED AND PROTECTED. CONTRACTOR TO SEEK ABORIST ADVICE ON TREE PROTECTION METHODS.

EXISTING VEGETATION ALONG SHARED PATH TO BE REMOVED. INSTALL NEW VEGETATION WHERE POSSIBLE.

INDICATIVE LOCATION OF EXISTING COASTAL WALK (NOT IN SCOPE)

PROPOSED BALUSTRADE AND HANDRAIL TO COMPLY WITH AS1657 REFER TO DETAIL (BL-1)

continues on DD-201

REVISIONS

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NEWPORT TO AVALON SHARED PATH

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GENERAL ARRANGEMENT PLAN SHEET 1 OF 20

DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-200	3	KG	LH	JL

SCALE 1:200 @ A1
0 2 4 10m

DATE 21.12.2018

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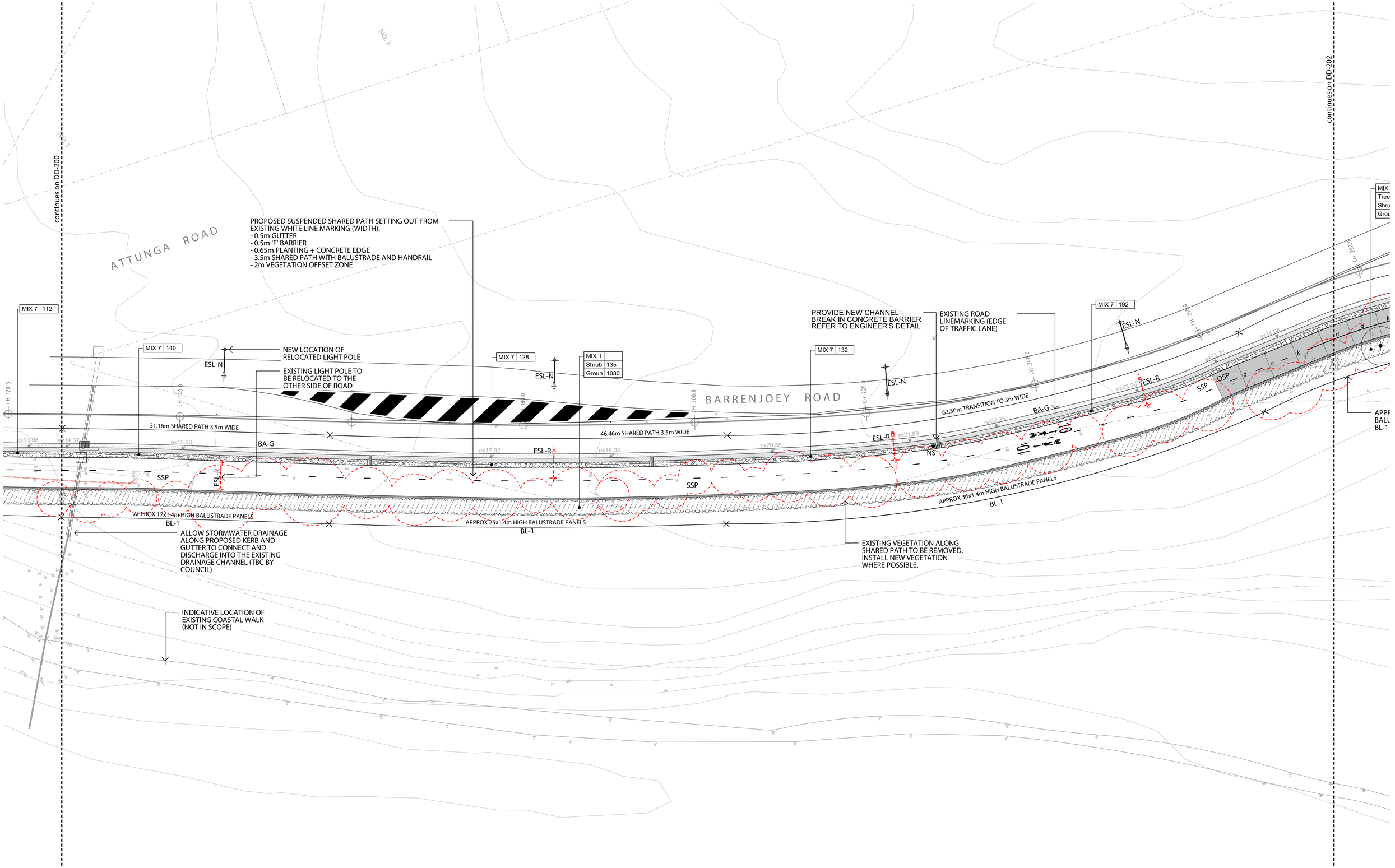

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PRELIMINARY NOT FOR CONSTRUCTION

GENERAL ARRANGEMENT PLAN
SHEET 2 OF 20

DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-201	3	KG	LH	JL

SCALE 1:200 @ A1
0 2 4 10m

DATE
21.12.2018

Tract
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BARRENJOEY ROAD

EXISTING ROAD SHOULDER TO BE RETAINED

EXISTING TIMBER GUARD RAIL TO BE RETAINED

MIX 1	
Trees	5
Shrub	23
Groun	198

MIX 7	136

MIX 3	
Trees	4
Shrub	88
Groun	790

PROPOSED SINGLE SIDED F BARRIER TO TAPER DOWN TO RMS STANDARDS.

EXISTING VEGETATION ALONG SHARED PATH TO BE REMOVED. INSTALL NEW VEGETATION WHERE POSSIBLE.

CH 280.0

CH 300.0

CH 320.0

CH 340.0

CH 360.0

CH 380.0

CH 400.0

CH 420.0

CH 440.0

104.31m SHARED PATH 3m WIDE

BA-G

ex25.12

OSP

NS

INDICATIVE TERMINATION OF PROPOSED BALUSTRADE (TBC)

ALLOW FOR MAKE UP PANELS MIN 1m

BL-1

APPROX 14x1.4m HIGH BALUSTRADE PANELS BL-1

PROPOSED ON-GRADE SHARED PATH THROUGH ERIC GREEN RESERVE (WIDTH):
- 2m VEGETATION OFFSET ZONE
- 0.5m CLEARANCE ZONE WITH LOW GROUNDCOVER ADJACENT TO SHARED PATH
- 3m SHARED PATH
- TURF MAKE GOOD AREA

EXISTING SEATS AT ERIC GREEN RESERVE TO BE RETAINED

BARRENJOEY ROAD

ATTUNGA ROAD

NO.35

NO.37

NO.39

31.90m SHARED PATH 3m WIDE

MIX 1	
Shrub	14
Groun	145

23.78m SHARED PATH 3m WIDE

APPROX 8x1.2m HIGH PANELS BL-1

APPROX 5x1.2m HIGH BALUSTRADE PANELS BL-1

ALLOW FOR INSTALLATION OF NEW STEPS AT THE END OF EXISTING COASTAL WALK TO ALLOW FOR CONNECTION TO PROPOSED SHARED PATH.

INDICATIVE LOCATION OF EXISTING COASTAL WALK (NOT IN SCOPE)

continues on DD-201

continues on DD-203

PROPOSED SINGLE SIDED F BARRIER TO TERMINATE AND TAPER DOWN TO RMS STANDARDS
REFER TO ENGINEER'S DRAWINGS

MIX 8	204

EXISTNG W BEAM BARRIERS TO BE DEMOLISHED AND DISPOSED OFF SITE. INSTALL PROPOSED TYPE 'F' BARRIER TO ALIGN WITH EXISTING W BEAM BARRIERS TO MAINTAIN ROAD CLEARANCE

42.37m TRAN

REVISIONS

REV	DESCRIPTION	DATE	DRAWN	CHKD
1	90% DD ISSUE	21.01.19	KG/AR	LH
2	ISSUE FOR COMMENTS	10.04.19	KG/AR	LH
3	100% DD ISSUE	24.04.19	KG/BH	LH

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NEWPORT TO AVALON SHARED PATH

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GENERAL ARRANGEMENT PLAN SHEET 3 OF 20

DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-202	3	KG	LH	JL

SCALE 1:200 @ A1
0 2 4 10m

DATE

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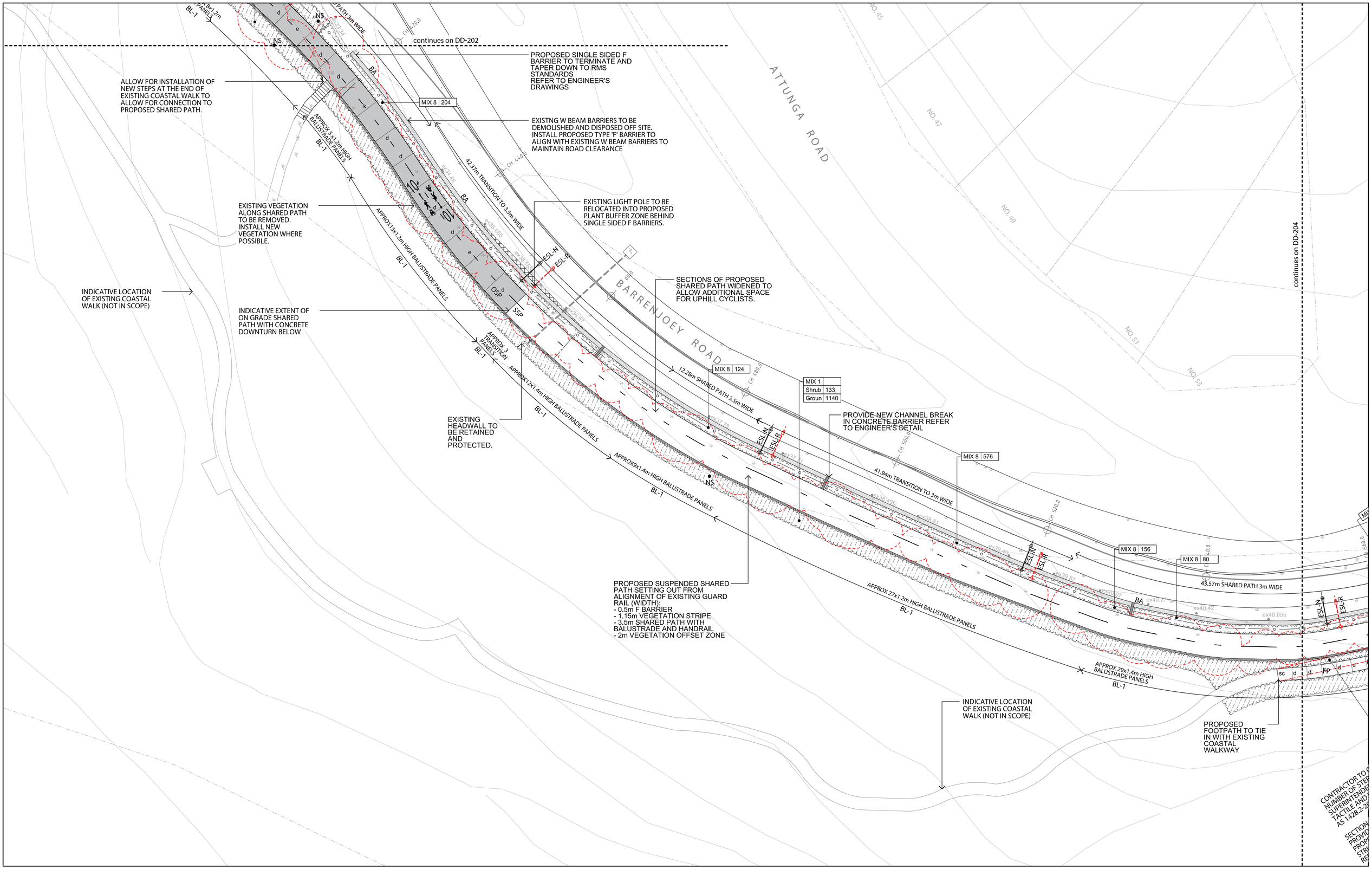

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GENERAL ARRANGEMENT PLAN SHEET 4 OF 20

DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-203	3	KG	LH	JL

SCALE 1:200 @ A1
0 2 4 10m

DATE 21.12.2018

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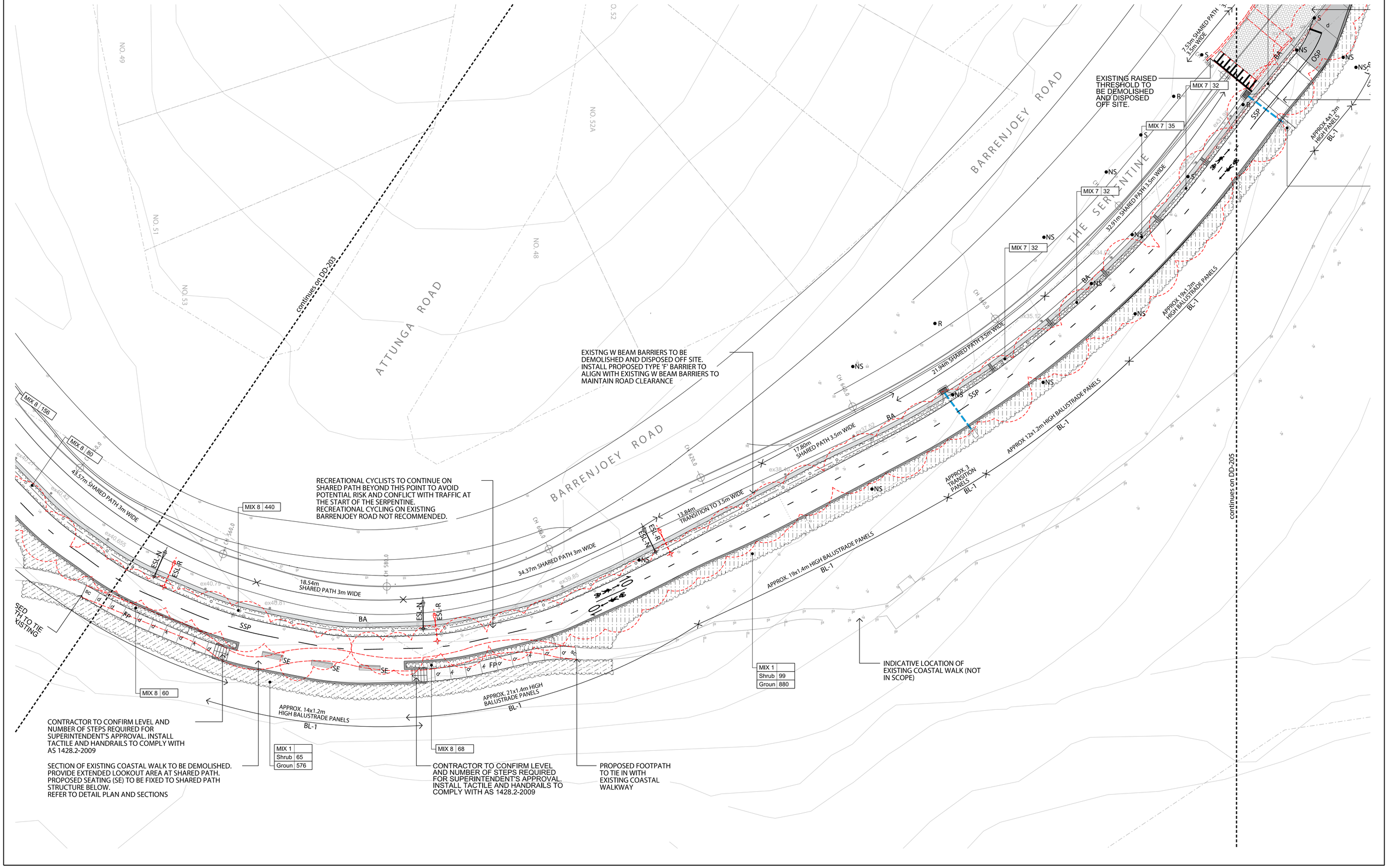

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GENERAL ARRANGEMENT PLAN
SHEET 5 OF 20

DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-204	3	KG	LH	JL

SCALE 1:200 @ A1
0 2 4 10m

DATE
21.12.2018

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continues on DD-204

BARRENJOEY ROAD

THE SERPENTINE

continues on DD-206

continues on DD-205a

PROPOSED PEDESTRIAN FOOTPATH TO JOIN WITH EXISTING CONCRETE PATH AND STAIR TO THE COASTAL WALK

EXISTING STAIR TO BARRENJOEY ROAD TO BE RETAINED AND PROTECTED.

PROPOSED SPEED CUSHIONS REFER TO SIGNAGE AND LINEMARKING PACKAGE

EXISTING VEGETATION TO BE DEMOLISHED FOR VISUAL CLEARANCE

ON-ROAD CYCLEWAY ALONG THE SERPENTINE WITH PROPOSED LINE MARKING

EXISTING LIGHT POLE TO BE RETAINED AND PROTECTED

EXISTING TREE TO BE REMOVED

EXISTING TIMBER FENCE TO BE DEMOLISHED AND DISPOSED OFF SITE.

PROPOSED RAISED THRESHOLD WITH CONTRASTING PAVEMENT TO WARN ROAD USER OF CYCLIST ENTERING ROAD. INSTALL STREETPRINT STAMPED ASPHALT PAVEMENT WITH TERRACOTTA HERRINGBONE PATTERN AND YELLOW OXIDE DOUBLE STACKED BRICK BORDERS REFER TO SPECIFICATION.

PROPOSED SHARED PATH RAMPS TO SLOW CYCLISTS. INSTALL CYCLIST STOP SIGNS PRIOR TO EXIT SHARED PATH TO CONTINUE ON ROAD. REFER TO SIGNS AND LINE MARKING DRAWINGS.

INDICATIVE LOCATION OF EXISTING COASTAL WALK (NOT IN SCOPE)

MIX 3	
Shrub	29
Groun	256

RECONSTRUCT BOTTOM STEP OF EXISTNG CONCRETE STAIRS TO ALLOW FOR CONSISTENT TREAD WIDTH AND RISER. INSTALL NEW STAINLESS STEEL HANDRAIL ON BOTH SIDES OF STAIRS AND TACTILE PAVERS AT TOP AND BOTTOM OF STEPS TO COMPLY WITH AS 1428.2-2009. CONFIRM ON SITE DIMENSIONS AND LAYOUT.

PROPOSED CONCRETE FOOTPATH TO CONNECT TO EXISTING COASTAL WALK

GRASS MAKE UP ZONE

NEW RAISED CONCRETE THRESHOLD

PROPOSED 2m WIDE CONCRETE FOOTPATH. ALLOW FOR GRASSED EMBANKMENT MAX. 1:3 TO TIE IN WITH ADJACENT GRASS AREA. ALLOW MIN. 0.4m WIDE LEVELED GRASS SHOULDER ALONG FOOTPATH.

INDICATIVE NEW LINEMARKING AND DIRECTIONAL ARROWS REFER TO SIGNS AND LINE MARKING DRAWINGS.

REVISIONS

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GENERAL ARRANGEMENT PLAN SHEET 6 OF 20

DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-205	3	KG	LH	JL

SCALE 1:200 @ A1 (0 2 4 10m)

DATE 21.12.2018

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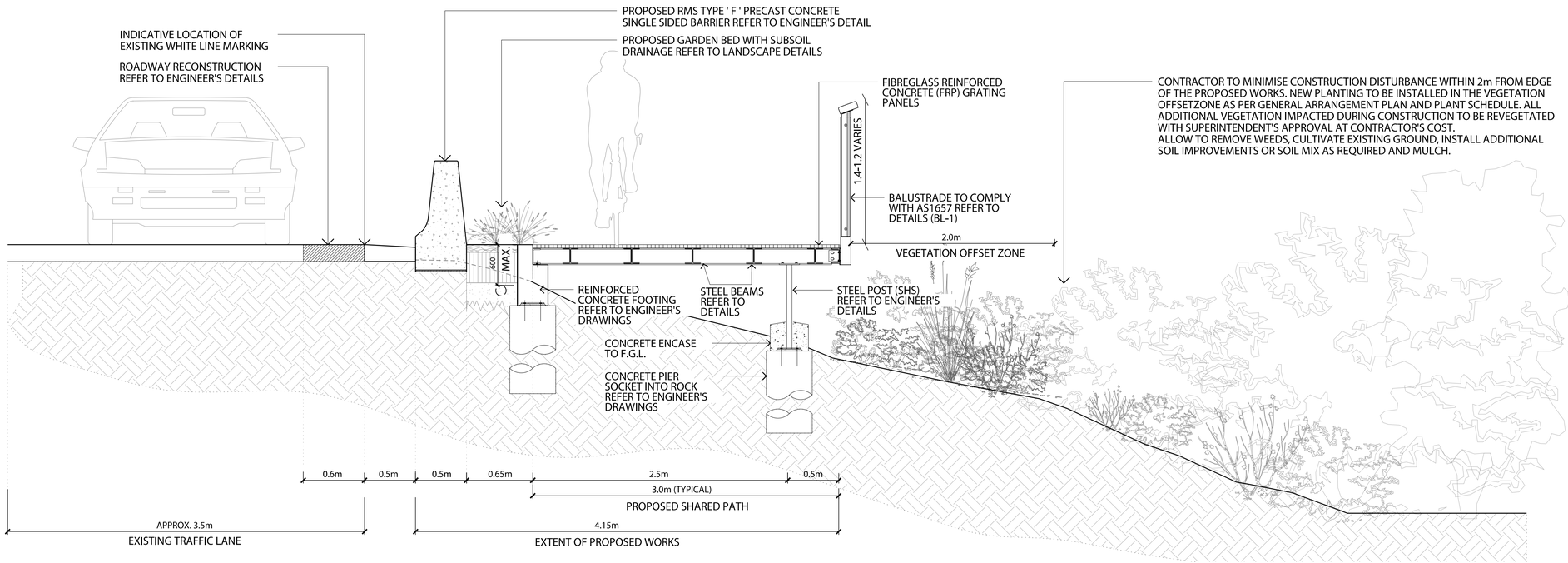
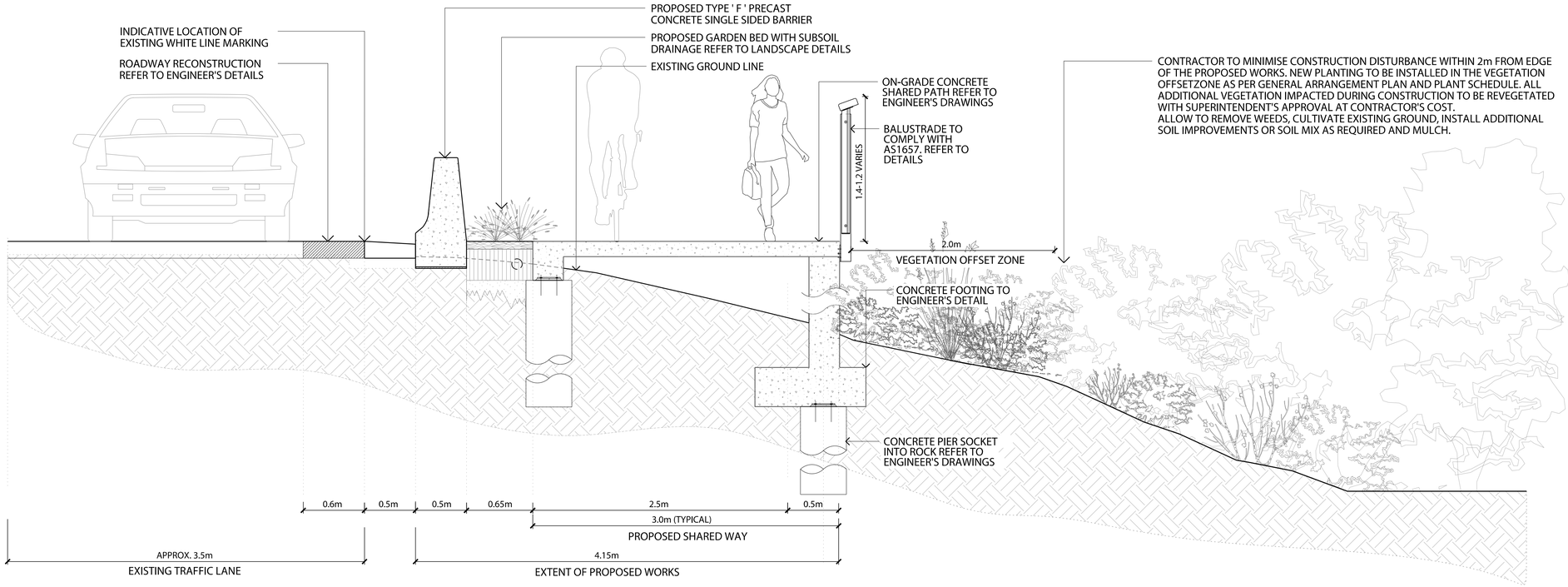


1 PROPOSED SHARED PATH - SUSPENDED WITH FRP AND STAINLESS STEEL PIERS
TYPICAL SECTION

1:25



2 PROPOSED SHARED PATH - ON-GRADE WITH CONCRETE RETAINING WALL BELOW
TYPICAL SECTION

1:25

REVISIONS

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SECTIONS

DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-300	3	KG	LH	JL

SCALE AS SHOWN A1

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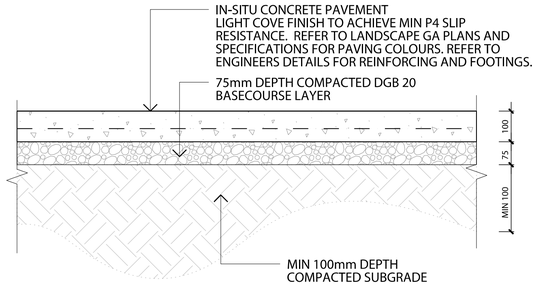
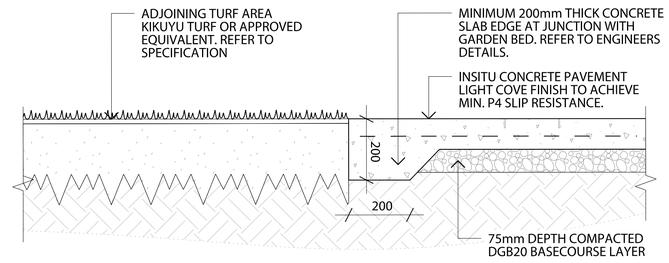
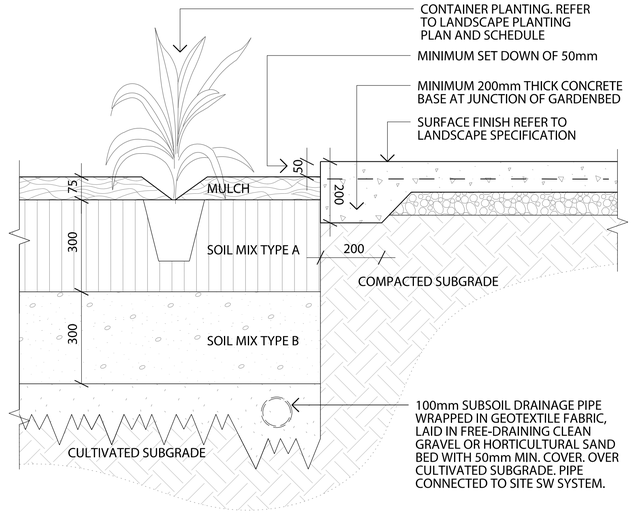


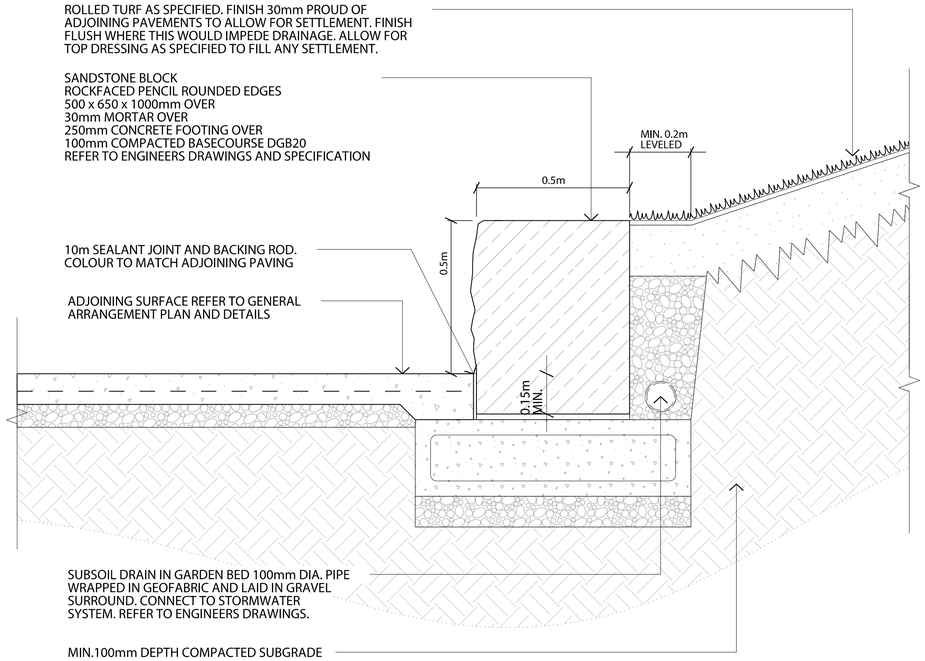
1 CONCRETE PAVING
TYPICAL DETAIL
1:10@A1



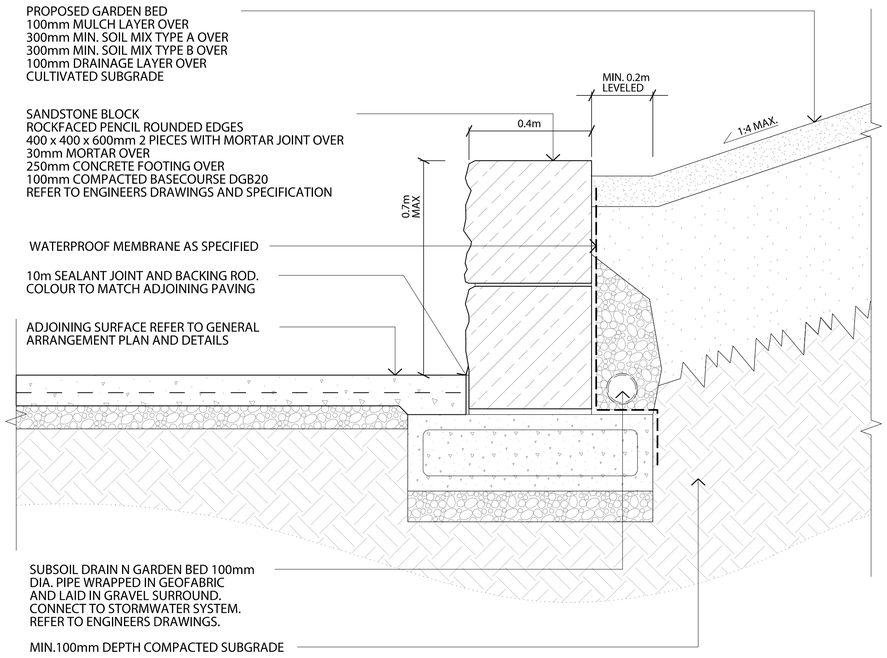
2 CONCRETE PAVING JUNCTION WITH TURF
TYPICAL DETAIL
1:10@A1



3 CONCRETE PAVING JUNCTION WITH GARDEN BED
TYPICAL DETAIL
1:10@A1



4 SANDSTONE BLOCK WALL - SR1
TYPICAL DETAIL
1:10@A1



5 SANDSTONE BLOCK WALL - SR2
TYPICAL DETAIL
1:10@A1

REVISIONS

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DRAWING No.	REV	DRN	CHKD	APPD
0218-0497-01 DD-600	3	KG	LH	JL

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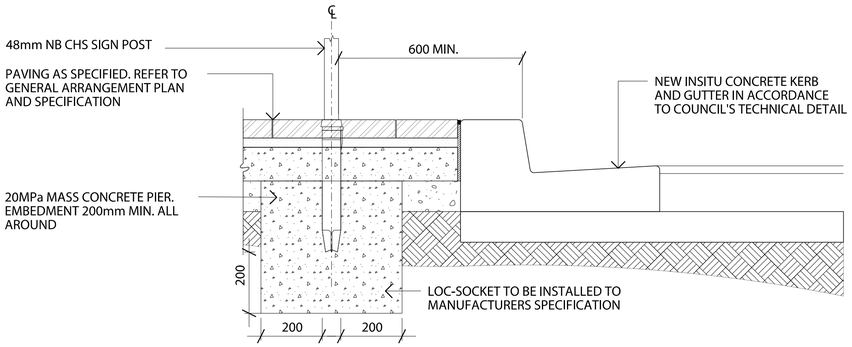
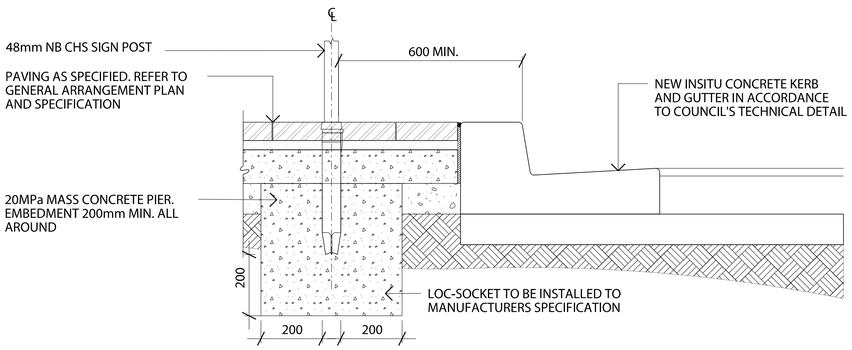
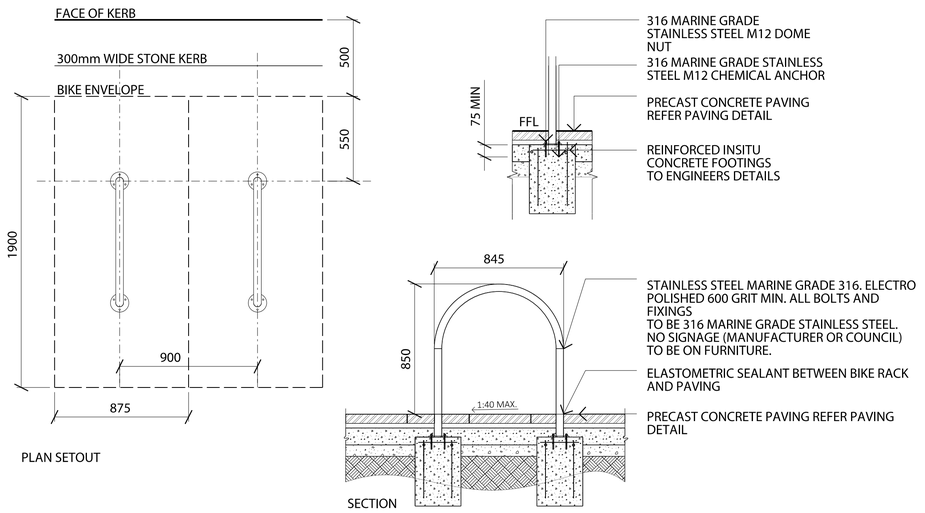


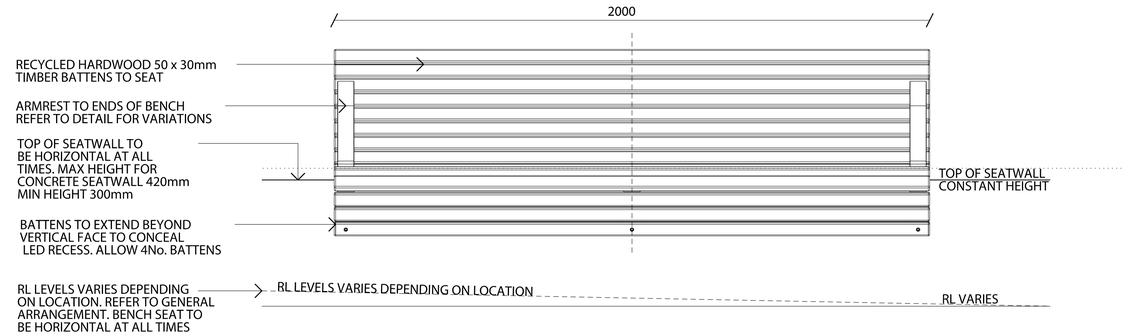
1 SIGN LOKSOCKET - PAVING
TYPICAL DETAIL
1:10@A1



2 SIGN LOKSOCKET - TURF
TYPICAL DETAIL
1:10@A1

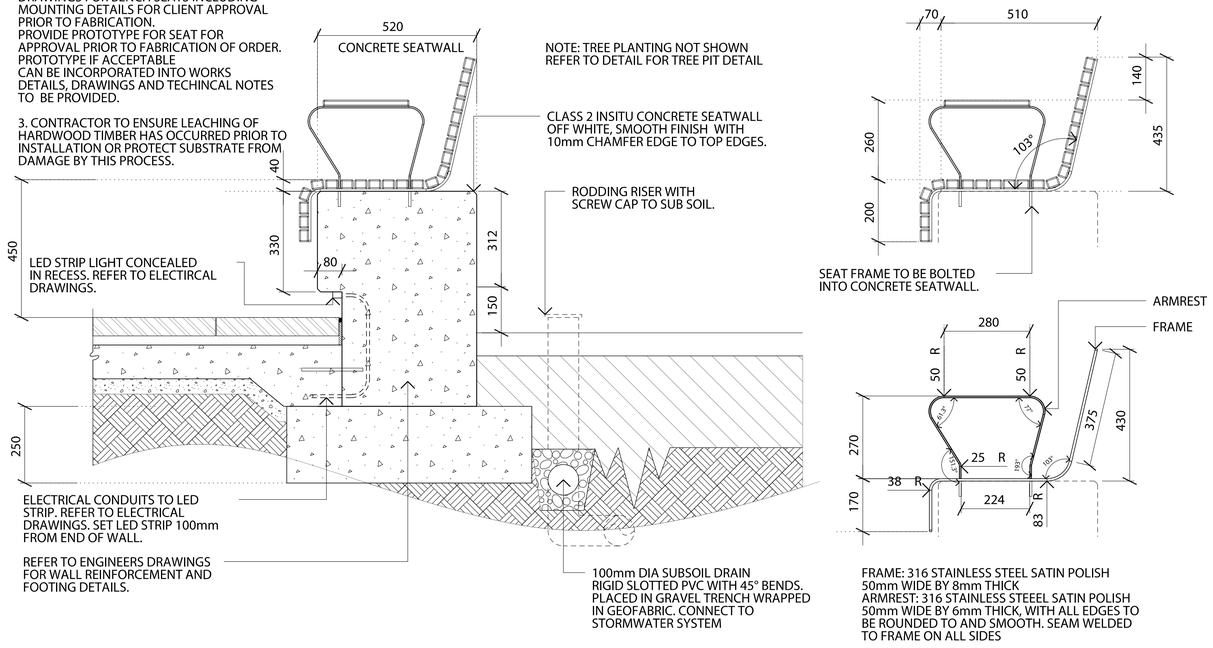


3 BIKE HOOP
TYPICAL DETAIL
1:20@A1



FRONT ELEVATION

NOTE:
1. DESIGN IS MODIFIED DESIGN BASED ON TOWN AND PARK PLINTH SEAT BS-A.
2. CONTRACTORS TO PROVIDE SHOP DRAWINGS FOR BENCH SEATS INCLUDING MOUNTING DETAILS FOR CLIENT APPROVAL PRIOR TO FABRICATION.
PROVIDE PROTOTYPE FOR SEAT FOR APPROVAL PRIOR TO FABRICATION OF ORDER. PROTOTYPE IF ACCEPTABLE CAN BE INCORPORATED INTO WORKS DETAILS, DRAWINGS AND TECHINCAL NOTES TO BE PROVIDED.
3. CONTRACTOR TO ENSURE LEACHING OF HARDWOOD TIMBER HAS OCCURRED PRIOR TO INSTALLATION OR PROTECT SUBSTRATE FROM DAMAGE BY THIS PROCESS.



FRAME: 316 STAINLESS STEEL SATIN POLISH
50mm WIDE BY 8mm THICK
ARMREST: 316 STAINLESS STEEEL SATIN POLISH
50mm WIDE BY 6mm THICK, WITH ALL EDGES TO BE ROUNDED TO AND SMOOTH. SEAM WELDED TO FRAME ON ALL SIDES

4 INSITU CONCRETE SEAT WALL WITH BENCH SEATS
DETAIL
1:10@A1

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NEWPORT TO AVALON SHARED PATH

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PRELIMINARY NOT FOR CONSTRUCTION

DETAILS

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0218-0497-01 DD-601	3	KG	LH	JL

SCALE AS SHOWN

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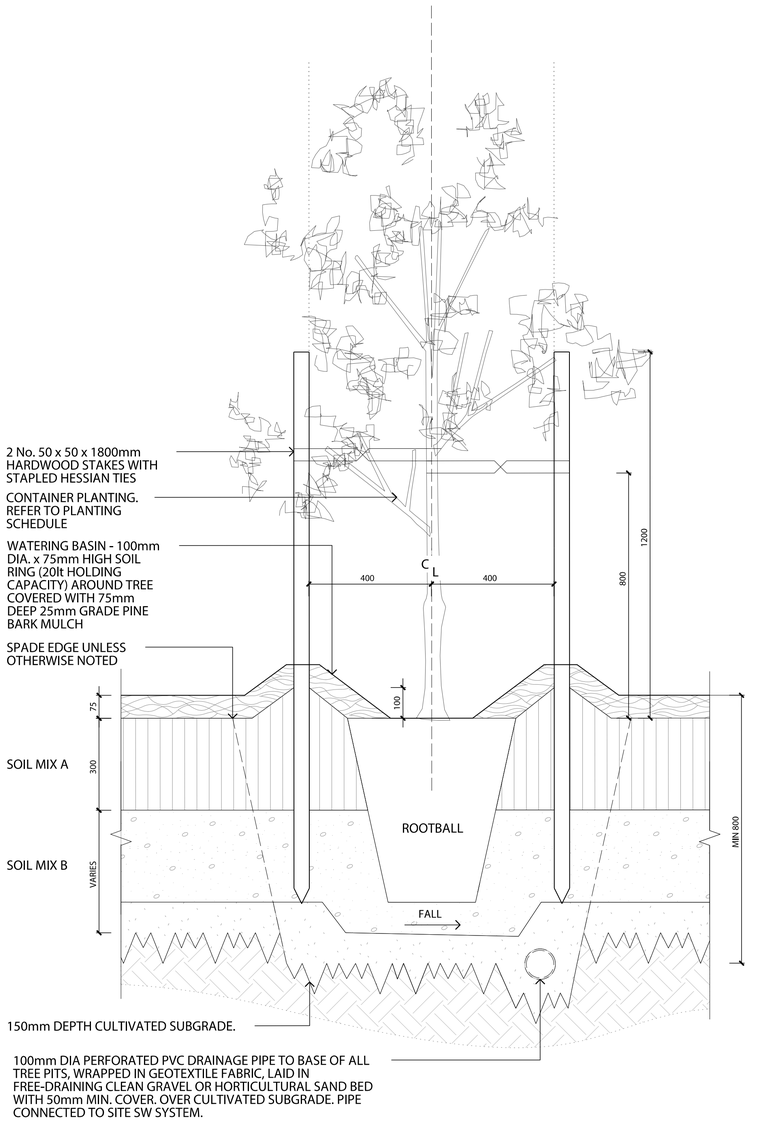
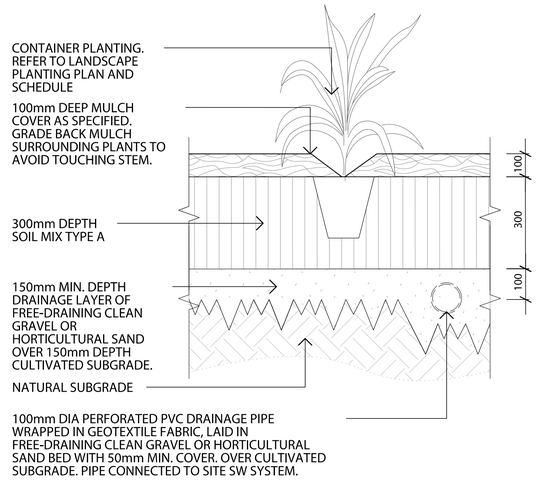
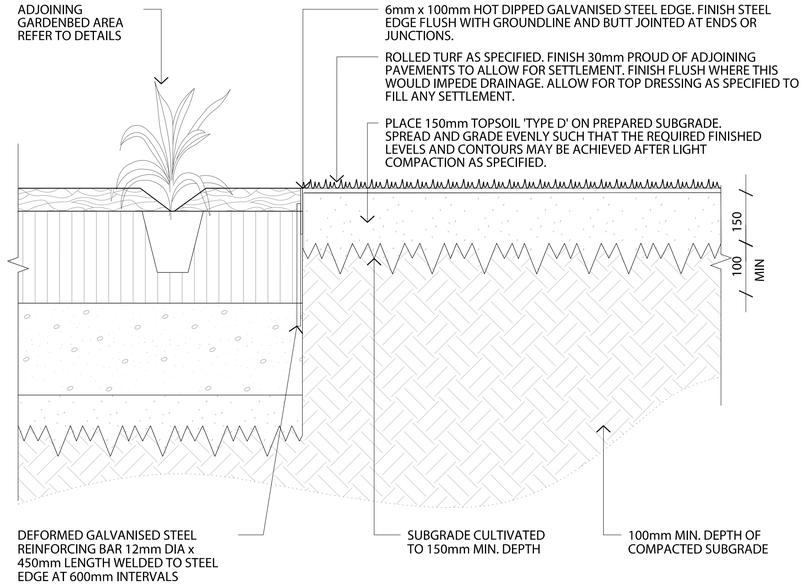


1 TREE PLANTING IN GARDEN BED
TYPICAL DETAIL
1:10@A1



2 GARDEN BED
TYPICAL DETAIL
1:10@A1



3 TURF
TYPICAL DETAIL
1:10@A1

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SCALE AS SHOWN

DATE 21.12.2018

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Appendix B

Consideration of Clause 171(2) Factors and MNES and Commonwealth Land

Clause 171(2) Checklist

In addition to the requirements of the *Is an EIS required? guideline* (DUAP 1996) as detailed in the REF, the following factors, listed in clause 171(2) of the *Environmental Planning and Assessment Regulation 2021*, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

Environmental factor	Impact
(a) The environmental impact on the community,	
During the works there would be works-related noise and visual impacts to surrounding receivers and impacts to traffic and access associated with the temporary closure of the existing coastal walk. Impacts would be minimised through implementation of the mitigation measures in **Section 7.2** of this REF.	Moderate, short-term negative
In the operational phase there would be a benefit to the community through provision of a shared path and associated infrastructure that is safe to use and fit for purpose.	Long-term positive
(b) The transformation of the locality,	
The impact of the proposal on visual amenity and landscape character is considered minor and would be associated with the construction activities and associated fencing, which would disrupt views across the headland to the coast.	Minor, short-term negative
In the operational phase, existing vegetation would be removed, and there would be a shared path in its place. Landscaping associated with the works is expected to improve the visual amenity of the site.	Long-term positive
(c) The environmental impact on the ecosystems of the locality,	
There may be some temporary non-direct impacts to fauna during the construction works. The biodiversity assessment concluded that the proposal is unlikely to impact on threatened flora and fauna species.	Minor, short-term negative
Native vegetation would be removed for the proposal, however it is not expected to impact species' habitat.	Negligible long-term
(d) Reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality,	
There would be temporary aesthetic impacts during the works, including elevated noise levels and disruptions to public access.	Moderate, short-term negative
Landscape character and visual impacts have been assessed as minor.	Minor, short-term
Positive impacts to environmental quality and value are anticipated, including provision of shared path and seating that can be used for recreational purposes, and landscaping associated with the proposal that would enrich the aesthetic quality of the site.	Long-term positive
(e) The effects on any locality, place or building that has – (i) Aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance, or (ii) Other special value for present or future generations,	Negligible short to long term
Impacts to listed heritage sites and items are not anticipated.	
(f) The impact on the habitat of protected animals, within the meaning of the Biodiversity Conservation Act 2016,	
In-direct impacts to biodiversity would occur during construction, e.g. disturbance due to noise and vibration.	

Environmental factor	Impact
No significant impacts to threatened flora or fauna species is expected. Clearing of native vegetation including one TEC would be required. The assessment concluded that these impacts are minor in the context of the available habitat in the locality and would be manageable through implementation of the mitigation measures in this REF.	Minor, short-term negative Negligible to minor, long-term
(g) The endangering of a species of animal, plant or other form of life, whether living on land, in water or in the air, An assessment of significance undertaken for the Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) TEC concluded significant impacts to this conservation significant species was unlikely. Provided the safeguards and management measures identified in **Section 7.2** of the REF are implemented, the proposal is unlikely to endanger any species of animal, plant or other form of life, whether living on land, in water or in the air.	Minor long-term negative
(h) Long-term effects on the environment, Clearing of 0.03ha of native vegetation would be required, however landscaping would ensure appropriate species are planted along the alignment.	Negligible to minor long-term negative
(i) Degradation of the quality of the environment, The proposal would result in localised sediment disturbance during the works, which has the potential to result in temporary impacts to water quality. There is also potential for accidental spills/leaks of fuel, oil or other chemicals to impact water quality during construction. Impacts would be minor with implementation of the safeguards and mitigation measures identified in **Section 7.2.**	Minor, short-term negative
(j) Risk to the safety of the environment, Construction related activities pose potential risks to the safety of the environment through spills/leaks of fuel, oil or other chemicals. The risk is considered low provided the safeguards and management measures identified in **Section 7.2** of the REF are implemented.	No impact
(k) Reduction in the range of beneficial uses of the environment, Following the proposal, there would be no reduction in the range of beneficial uses of the environment.	Long-term positive impact
(l) Pollution of the environment, Construction related activities may result in pollution of the environment through spills/leaks of fuel, oil or other chemicals, air and noise emissions, and temporary increase in suspended sediments. Impacts would be minor with implementation of the safeguards and management measures identified in **Section 7.2** of the REF.	Minor, short-term negative
(m) Environmental problems associated with the disposal of waste, All wastes generated by the proposal would be disposed of at an off-site facility which is licenced to receive such waste. There would be no significant environmental problems associated with waste disposal.	Negligible, short-term

Environmental factor	Impact
(n) Increased demand on natural or other resources that are, or are likely to become, in short supply, The proposal involves the use of materials including concrete, steel, asphalt and gravel associated with the construction of the shared path and pedestrian paths/staircases. All resources required by the proposal are readily available and are not likely to become in short supply.	No impact
(o) The cumulative environmental effect with other existing or likely future activities, Assessment of cumulative impacts for the proposal is provided in **Section 6.11**. Other projects with the same timing of this proposal are unlikely to result in any material cumulative impact on the locality.	Negligible
(p) The impact on coastal processes and coastal hazards, including those under projected climate change conditions, No significant impacts to coastal processes are anticipated for the proposal.	No impact
(q) Applicable local strategic planning statements, regional plans or district strategic plans made under the Act, Division 3.1, The proposal's strategic alignment is discussed in **Section 2.1**. The proposal aligns with the Shape 2028: Northern Beaches Community Strategic Plan, and forms part of the Connecting the Northern Beaches Program. The proposal directly supports objectives in State strategies and plans by creating active transport linkages along the coastline. The North District Plan prepared by the Greater Sydney Commission includes Planning Priority N4: Fostering healthy, creative, culturally rich and socially connected communities.	The proposal aligns with applicable strategies and plans
(r) Other relevant environmental factors.	In considering the potential impacts of this proposal all relevant environmental factors have been considered, refer to **Section 6** of this assessment.

Matters of National Environmental Significance and Commonwealth land

Under the environmental assessment provisions of the EPBC Act, the following MNES and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government DCCEEW.

A referral is not required for proposed actions that may affect nationally listed threatened species, endangered ecological communities and migratory species. Impacts on these matters are still assessed as part of the REF in accordance with Australian Government significant impact criteria and taking into account relevant guidelines and policies.

Environmental factor	Impact
(a) Any impact on a World Heritage property?	No impact
(b) Any impact on a National Heritage place?	No impact
(c) Any impact on a wetland of international importance?	No impact
(d) Any impact on a listed threatened species or community? Clearing of up to 0.03ha of one threatened community, Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) TEC, would be required for the proposal. An Assessment of Significance concluded that the proposal is unlikely to significantly impact on this TEC.	Minor long-term
(e) Any impacts on listed migratory species? There are several migratory bird species that may potentially occur in the proposal area from time to time. While these species may use the proposal area as marginal foraging habitat, the area would not provide any limiting habitat for these species. It is considered that impacts to listed migratory species would be in-direct during the construction phase.	Minor, short-term
(f) Any impact on a Commonwealth marine area?	No impact
(g) Does the proposal involve a nuclear action (including uranium mining)?	No
(h) Additionally, any impact (direct or indirect) on the environment of Commonwealth land?	No

Appendix C

Report on Geotechnical Investigation

Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on Geotechnical Investigation

Proposed Coastal Walkway Bilgola Beach to Palm Beach

Prepared for
Northern Beaches Council

Project 86342.00
May 2018

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author	PH per JB	1 May 2018
Reviewer	JBraybrooke	1 May 2018

bsi. ISO 9001 Quality Management

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1. Introduction

This report presents the results of a geotechnical investigation conducted for a proposed coastal walkway extending from Bilgola Beach to Palm Beach. The investigation was carried out at the request of the Northern Beaches Council (NBC) and is understood to be required for design purposes.

The pathway will be constructed along the coastline, typically adjacent to roads that hug the coast but also within easements and along existing walking tracks.

This investigation was concentrated at six sites only, spread across the following three locations:

Location 1 – Whale Beach Road (between Palm Beach and Whale Beach);

Location 2 – Bilgola Beach, and

Location 3 – Bilgola Beach Headland.

The investigation comprised borehole drilling, dynamic cone penetrometer (DCPs) tests, mapping, inspection and photography at the six subject sites.

The information supplied for use in the investigation comprised:

- **Location 1 – Whale Beach Road**
  - One satellite image indicating the locations of Sites 1, 2 and 3; and
  - Whale Beach Road Survey Plan by Northern Beaches Council (Plan No. 2017-21, Sheet , Rev 7 dated July 2017).
- **Location 2 – Bilgola Beach**
  - One satellite image indicating the locations of Sites 1 and 2; and
  - Bilgola Beach North Survey Plan by Survey Scope (dated February 2014).
- **Location 3 – Bilgola Beach Headland**
  - One satellite image indicating the location of Site 1.

Comments relating to geotechnical design issues and constraints are given below and are based on the results of the investigation and the information shown in the above documents.

2. Site Description and Geology

2.1 Location 1 – Whale Beach Road

The proposed walkway at Location 1, Whale Beach Road, will be located on the eastern side of Whale Beach Road and will extend for a length of about 850 m beside the road, from South Palm Beach headland to the North Whale Beach headland. Most of the walkway will be located on the eastern side of the road, at the crest of an approximately 2 m high, well-vegetated side cast fill batter along the outer edge of Whale Beach Road. At Site 3, however, the walkway will deviate away from the road and into a vegetated gully about 15 m east of the road (i.e. closer to the coastal bluff).

Whale Beach Road generally appears to have been constructed as a cut to fill road with some drystone block retaining walls. It is likely that the road was constructed around 1945 (based on the date of manufacture stamped on the bases of some glass bottles found strewn across the embankment).

The natural slopes are typically well vegetated with slope angles ranging from 10° to 30°. Sandstone outcrop is exposed on the uphill side of the road where it has been cut in places into the original hillside.

Reference to the Sydney 1:100 000 Geological Series Sheet 9130 indicates that the site is underlain by the Newport Formation of Triassic age, which comprises interbedded sandstone, siltstone and shale. Exposures of weathered siltstone and sandstone bedrock on the coastal bluff are considered to be consistent with the Newport Formation. Sandstone exposed within the road cutting along the high (western) side of Whale Beach Road, however, comprises Hawksbury Sandstone which is shown to be present further west (uphill) of Whale Beach Road on the mapping sheet.

2.2 Location 2 – Bilgola Beach

The area investigated for the proposed walkway at Location 2, Bilgola Beach, comprise two sites which are both located close to, or within, an existing storm water easement that extends from The Serpentine to the beach below.

The general slope at Site 1 which is located on the southern side of the houses that front Bilgola Beach falls gently southwards, that is, towards the beach, at about 7°. Site 1 comprises an existing gravel pathway (refer Photo 5) which, based on the location of access pits, appears to be situated above a storm water pipe along most of its extent. The pathway is located between the beachfront houses and the cliff line which was estimated to be between about 5 m and 15 m away, however, this could not be confirmed due to the thick vegetation cover.

Site 2 is located between No. 52 and 54 The Serpentine, and falls towards the beach to the south at between about 10° and 20°. An open, natural drainage gully which is about 2 m wide and 1 m deep is located within this site and has been partially stabilized with cement sand bags (refer Photo 7).

Reference to the Sydney 1:100 000 Geological Series Sheet 9130 indicates that the site is underlain by the Newport Formation of Triassic age, which comprises interbedded sandstone, siltstone and

shale. Exposures of weathered siltstone and sandstone bedrock within the cliff face below the two sites are considered to be consistent with the Newport Formation.

2.3 Location 3 – Bilgola Beach Headland

The route of the walkway on the headland between Bilgola Beach and Newport Beach (Site 1) will follow the approximate alignment of the existing (unsealed) coastal track (refer Photo 9). The coastal bluff between Newport and Bilgola Beaches reaches a maximum height of around 30 m and, at its closest approach is approximately 10 m from the existing and proposed walkway route.

The southern section of the bluff is generally well vegetated with slope angles of 35° to 50° with a few outcrops of highly to moderately weathered, interbedded sandstone and siltstone bedrock. The central and northern sections of the bluff are higher, sub-vertical to over-hanging and generally rocky with vegetation largely restricted to along the crest.

Upslope of the coastal bluff, the natural slopes are typically well vegetated with slope angles ranging from 10° to 20°.

There are no residential developments close to this section of proposed walkway route.

Reference to the Sydney 1:100 000 Geological Series Sheet 9130 indicates that the site is underlain by the Newport Formation of Triassic age, which comprises interbedded sandstone, siltstone and shale. Exposures of weathered siltstone and sandstone bedrock on the coastal bluff and the excavated batter along the high (western) side of Barrenjoey Road Drive are considered to be consistent with the Newport Formation.

3. Field Work Methods

The field work comprised:

- An inspection of the site by a senior engineer geologist;
- Drilling of six boreholes (BH1 to BH6); and
- Six dynamic penetrometer tests (DCPs 1 to 6).

The boreholes were either drilled with a man-portable drilling rig or with hand-tools (dependant on access). The man-portable drilled boreholes (BH1 to BH4) were initially drilled through the surface soils to a depth of between 1.0 m and 1.6 m using a hand auger and advanced through the underlying soils and bedrock using NMLC size (50 mm diameter) diamond core drilling equipment to the termination depths of between 4.35 m and 4.80 m.

Disturbed auger samples were collected at regular depth intervals within the soils to assist in strata identification.

The boreholes drilled using hand-tools (BH5 and BH6) were carried out using a hand-auger to auger refusal typically encountered at shallow depths within the soil profile.

A dynamic cone penetrometer (DCP) test was also conducted adjacent to each borehole location to determine the strength of the soil profile as well as probing the depth to bedrock. A DCP test involves driving a 20 mm diameter, cone tipped steel rod into the soil using a 9 kg hammer dropping through a standard distance of 510 mm. The number of blows required to drive the rod each 150 mm is recorded and used to estimate the consistency of the soils. The depth of refusal is often inferred as being the "top of rock".

Boreholes and DCPs that were conducted at the same locations have corresponding numbers (e.g. BH6 and DCP6).

Mapping and inspection of the slope and surrounds as well as the cliff faces below the sites was also conducted where access was possible, to assess the stability and geology of the sites.

The locations of the tests, selected site features and photo locations are shown on Drawing 1 (Location 1 - Whale Beach Road), Drawing 2 (Location 2 – Bilgola Beach) and Drawing 3 (Location 3 – Newport Beach) in Appendix C. The ground surface levels have not been determined at the test locations.

4. Field Work Results

The borehole logs, core photographs and DCP result sheets are included in Appendix D, together with notes defining classification methods and terms used to describe the soils and rocks.

4.1 Location 1 – Whale Beach Road

4.1.1 Site Observations / Geological Inspection

The main site observations made during the inspection were that:

- A newly built retaining wall exists at the northern end (eastern side) of Whale Beach Road, close to Site 1, and comprises a concrete wall between about 2 m and 6 m high situated on the eastern (downhill) side of the road (refer Photo 1). The construction methodology of this wall is unknown and it appears that the wall was built as part of the construction for the new house located nearby. The condition of the wall appeared sound;
- Older retaining walls are located around the storm-water culverts that direct water run-off below the road within some original drainage gullies. These walls are between about 2 m and 4 m high and up to 15 m long and have been constructed as drystone block (sandstone) retaining walls;
- Road cuttings exist within some areas on the western (uphill) side of the road. The rock cuttings within sandstone bedrock are typically sub-vertical and between about 1 m and about 3 m high and generally appeared stable albeit for some loose blocks and small undercuts;
- Sandstone rock boulders and blocks between 1 m and 2 m in size are located on the downhill side of the road and were assessed as either being put there as part of the road construction or in some cases where the boulders are well rounded and located away from the road, having rolled downslope (colluvium). Rock outcrop was not observed away from the culverts/gullies due to thick vegetation;

- Significant filling along the walkway route appears to be limited to a 1 m to 2 m high side cast fill embankment located along sections of the outer (eastern) edge of Whale Beach Road. Further, the width between the crash barrier and the top of the slope is generally less than 1.5 m wide; and
- The slope below the road (i.e. between the road and the coastal bluff) is well vegetated. There is no evidence of significant slope instability that could adversely affect the proposed walkway, however there is evidence of minor retaining wall failure (refer Photo 3) close to Site 2, which is likely to have failed due to poor construction methodology rather than slope instability.

4.1.2 Borehole Drilling and Dynamic Cone Penetrometer Test Results

The subsurface profile at the Whale Beach Road site can be summarised as follows:

COLLUVIUM	Comprising clayey sand and sandy clay encountered in BH3 only (this borehole was drilled on the natural slope 15 m downslope of the road) to 2.65 m depth;
FILLING	Encountered in BH1 and BH2 (these two boreholes were drilled on the eastern side of the road verge at pavement level), comprising poorly compacted clayey sand filling with sandstone cobbles and gravels to between 1.9 m and 2.15 m depth) overlying;
BEDROCK	Encountered in BH1, BH2 and BH3 comprising extremely low, low and medium strength, extremely weathered to moderately weathered sandstone extending from between 1.9 m to 2.15 m depth.

DCP tests (DCP1, DCP2 and DCP3) were carried out adjacent to BH1, BH2 and BH3, respectively, to refusal depths ranging from 0.6 m to 1.65 m. DCP refusal either represents the level of the top of rock/bedrock or refusal on obstructions within the filling.

No significant signs of gross contamination were observed during drilling within the filling.

4.2 Location 2 – Bilgola Beach

The main site observations made during the inspection were that:

- A 10 m to 15 m high, vegetated, sub-vertical cliff face is located above the beach (refer Photo 6). The cliff face comprises interbedded sandstone and siltstone which also shows some evidence of differential weathering resulting in some minor undercuts to about 0.5 m depth. Evidence of small rock falls from the cliff line are were also observed, however, there is no evidence of significant slope instability that could adversely affect the proposed walkway;
- Sandstone bedrock is exposed within the base of the drainage gully (refer Photo 7) at Site 2 and also as rock outcrop towards the bottom of Site 2 (refer Photo 8); and
- Sandstone floaters exist within various locations across the slope.

4.2.1 Borehole Drilling and Dynamic Cone Penetrometer Test Results

The subsurface profile at the Bilgola Beach site can be summarised as follows:

FILLING — Encountered in BH4 and BH5, comprising poorly compacted brown silty sand filling with some sandstone gravel to between 0.6 m and 1.2 m depth) overlying;

COLLUVIUM — Encountered in BH4 only comprising stiff sandy clay to 3.0 m depth; overlying

BEDROCK — Encountered in BH4 only initially comprising extremely low and low strength sandstone and siltstone (then high strength sandstone below 4.23 m depth) to 4.8 m depth.

DCP tests (DCP4 and DCP5) were carried out adjacent to BH4 and BH5, respectively, and encountered refusal at depths ranging from 1.35 m (DCP4) to 1.5 m (DCP5).

No significant signs of gross contamination were observed during drilling within the filling.

4.3 Location 3 – Bilgola Beach Headland

The main site observations made during the inspection were that:

The main site observations made during the inspection were that:

- Construction of Barrenjoey Road appears to have involved a side cut into the natural slope with bedrock on the upslope side and some filling on the downslope side;
- There is interbedded sandstone and siltstone bedrock exposed within an eroded storm water channel to the north of the Newport Beach car park; and
- The crest of the coastal bluff along the edge of Barrenjoey Road is well vegetated. There is no evidence of significant slope instability that could adversely affect the proposed pathway.

4.3.1 Borehole Drilling and Dynamic Cone Penetrometer Test Results

The subsurface profile at the Newport Beach headland site can be summarised as follows:

COLLUVIUM — Encountered in BH6 comprising clayey sand to 1.0 m depth; overlying

BEDROCK — Encountered at 1.0 m depth comprising low strength sandstone

DCP6 refused on weathered bedrock at 1.0 m depth.

5. Laboratory Testing

Laboratory testing comprised point load strength testing (Is_{50}) of the rock core samples recovered in boreholes BH1, BH2, BH3 and BH4. The results of the point load tests are shown on the borehole logs in Appendix B and indicated values generally ranging from 0.2 MPa to 1.6 MPa which correspond to low and high strength rock. Unconfined compressive strengths (UCS) for the sandstone, ranging from 4 MPa to 32 MPa are inferred using a ratio of 20:1 for Is_{50}: UCS.

6. Proposed Development

The design of the walkway is at a preliminary stage only and the exact details of construction methods or final levels have yet to be determined.

It is envisaged that much of the walkway will be constructed as a concrete path at grade. Some sections of suspended structure may be required, possibly where the path crossess existing gullies such as Whale Beach Site 3, or where the road shoulder is too narrow to permit construction of a concrete path at grade.

The suspended structure will need to be supported by piles taken to found in strata of suitable bearing capacity (weathered bedrock). Some retaining walls may also be required in places alongside the new pathway to achieve acceptable longitudinal and cross grades.

Minimal excavation below existing levels is anticipated apart from that required for new footings for suspended structures and retaining walls or for minor regrading of uneven surfaces.

The approximate alignment of the proposed new pathway is shown on Drawings 1, 2 and 3.

7. Comments

7.1 Geological Model

The interpreted geological model for the sites generally comprises moderately steep natural slopes above sub-vertical, rocky coastal bluffs, with some sections consisting of filling or colluvium to depths of between about 2.0 and 3.0 m below existing surface levels. The deep colluvial or residual clayey sand soil profile (containing some cobble sized sandstone fragments), generally overlies extremely low, low and then medium strength, inter-bedded siltstone and sandstone bedrock.

For the sites and areas located adjacent to existing roads (e.g. Whale Beach Road), the natural soil profile is mantled by filling forming the 2 m to 3 m high embankment alongside sections of the outer (eastern) edge of the road. The filling was probably excavated and side-cast material from the hillside during the construction or subsequent widening of the road.

It is likely that bedrock levels step down the slope, potentially resulting in highly variable foundation conditions over relatively short lateral distances.

Perched groundwater would normally be expected just above the level of bedrock, but higher groundwater levels could be encountered following heavy or extended rainfall.

7.2 Stability Assessment and Site Drainage

From a geotechnical and slope risk perspective, it is considered that the proposed pathway construction is feasible, provided that the new works are designed and constructed in accordance with the general recommendations provided in this report.

It is important that any new filling required for this project is supported by retaining walls founded on undisturbed bedrock of at least very low strength. Similarly, any new structures such as the proposed suspended footpath or lookouts should be supported on piles taken down into bedrock to avoid placing any additional load on the existing natural slopes or filled embankments.

Inspection of the general slope above the coastal bluff generally indicated little evidence of defects attributable to significant slope instability in the recent past along the proposed walkway route.

Sea level rose to and stabilised at its present level approximately 6000 years ago. Assuming that the 70 m wide wave-cut platform located below the South Bilgola headland coastal bluff represents the total width of coastal regression during that period, it follows that the average regression rate of the bluff is in the order of 1 m to 1.5 m per 100 years.

Based on the above, any failure of the various over-hangs noted along the coastal bluffs or the development of new over-hangs would not be expected to adversely affect the existing coastal track or the proposed new pathway in the foreseeable future.

7.3 Slope Risk Analysis

The potential geotechnical hazards along the proposed walkway route have been assessed for risk to property and life using the general methodology outlined by the Australian Geomechanics Society (Landslide Risk Management AGS Subcommittee 2007).

For the purposes of this assessment, an acceptable level of geotechnical risk for property has been taken as “Low” while an accepted annual probability of loss of life is 1×10^{-6}, following the (former) Pittwater Risk Management Policy. A tolerable level of geotechnical risk for property is taken as “Moderate” with a tolerable probability of loss of life being 1×10^{-5}.

Identified hazards within and adjacent to the footpath route are summarised in Table 1, together with qualitative assessments of likelihood, consequence and slope instability risk to the existing residential structures after completion of construction which has had appropriate engineering design and construction methodologies.

Table 1: Property Slope Instability Risk Assessment for Proposed and Existing Structures

Hazard	Likelihood	Consequence	Risk
Slow settlement or downhill movement of the filled embankment alongside Whale Beach Road (Location 1) and Barrenjoey Road (Location 3) affecting a new walkway constructed at grade	Possible	Minor	Moderate
Slow settlement or downhill movement of new footings supporting suspended sections of the walkway and new retaining walls	Unlikely – if foundations are extended to strata inspected and confirmed with respect to allowable bearing pressure by geotechnical personnel	Medium	Low
Rapid collapse of the coastal bluff undermining proposed walkway	Barely Credible within the next 100 years	Major	Very Low

For loss of life, the individual risk can be calculated from:

$R_{(LoL)} = P_{(H)} \times P_{(S:H)} \times P_{(T:S)} \times V_{(D:T)}$

where:

- $R_{(LoL)}$ is the risk (annual probability of loss of life (death) of an individual)
- $P_{(H)}$ is the annual probability of the hazardous event occurring (failure of structure)
- $P_{(S:H)}$ is the probability of spatial affect by the hazard (e.g. of the failure undermining the footpath, taking into account the distance of a given event from the footpath)
- $P_{(T:S)}$ is the temporal probability (e.g. of the footpath being occupied by the individual) at the time of the spatial affect
- $V_{(D:T)}$ is the vulnerability of the individual (probability of loss of life of the individual given the event).

The assessed individual risk to life (person most at risk) resulting from slope instability is summarised in Table 2.

Table 2: Life Risk Assessment for Proposed and Existing Structures

Hazard	$P_{(H)}$	$P_{(S:H)}$	$P_{(T:S)}$	$V_{(D:T)}$	Risk $R_{(LoL)}$
Slow settlement or downhill movement of the filled embankment alongside Barrenjoey Road affecting a new pathway constructed at grade	10^{-3}	1	0.03	0.001	3×10^{-8}
Slow settlement or downhill movement of new footings supporting suspended sections of the footpath and new retaining walls	10^{-4}	1	0.03	0.001	3×10^{-9}
Rapid collapse of the coastal bluff undermining proposed pathway	10^{-6}	1	0.03	1	3×10^{-8}

When compared to the requirements of the (former) Pittwater Council and the AGS, it is considered that the proposed footpath construction meets 'Acceptable Risk Management' criteria with respect to both property and life under current and foreseeable conditions.

A tolerable level of risk for damage to a rigid (concrete) footpath constructed at grade exists if the walkway is built on filling above a steep slope which is susceptible to slow downhill creep. The use of a less rigid pavement, a reinforced concrete pavement, or downslope retaining walls would be expected to reduce this risk to an acceptable level.

7.4 Foundations

All foundations for the proposed retaining walls or suspended walkway structures should be socketed into *in-situ* weathered sandstone or siltstone bedrock of at least very low strength and proportioned for an allowable bearing capacity of 750 kPa. An allowable shaft adhesion of 100 kPa (compression) and 75 kPa (uplift) for sockets greater than 500 mm long is recommended in the same strata.

Based on the results of the investigation, it is anticipated that weathered bedrock of suitable bearing capacity should be intersected at between about 2 m and 3 m below existing ground surface levels at the Whale Beach Road sites. It is anticipated that bedrock of suitable bearing capacity at the Bilgola Beach should be intersected between about 1.0 m and 3.0 m depth and even shallower, at about 1.0 m depth, at the South Bilgola Beach Headland site. It is noted that the depth to suitable bedrock will vary away from the test locations and that an allowance for deeper drilling should be considered.

All excavations for proposed footings should be inspected by an engineering geologist prior to placement of reinforcement and concrete pouring, to confirm that intact strata of sufficient bearing capacity and stability have been reached.

8. Limitations

Douglas Partners (DP) has prepared this report for this project between Palm Beach and Newport Beach in accordance with DP's proposal SYD180201 dated 6 February 2018 and email acceptance received from Mr Gynt Drinan dated 8 March 2018. The work was carried out Northern Beaches Council Contract. This report is provided for the exclusive use of the Northern Beaches Council for this project only and for the purposes as described in the report. It should not be used by or be relied upon for other projects or purposes on the same or another site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.
The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The scope for work for this investigation/report did not include the assessment of surface or sub-surface materials or groundwater for contaminants, within or adjacent to the site. Should evidence of filling of unknown origin be noted in the report, and in particular the presence of building demolition materials, it should be recognised that there may be some risk that such filling may contain contaminants and hazardous building materials.

The contents of this report do not constitute formal design components such as are required, by Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction of all works (not just geotechnical components) and the controls required to mitigate risk. This report does, however, identify hazards associated with the geotechnical aspects of development and presents the results of risk assessment associated with the management of these hazards. It is suggested that the developer's principal design company may wish to include the geotechnical hazards and risk assessment information contained in this report, in their own Safety Report. If the principal design company, in the preparation of its project Design Report, wishes to undertake such inclusion by use of specific extracts from this subject DP report, rather than by appending the complete report, then such inclusion of extracts should only be

undertaken with DP's express agreement, following DP's review of how any such extracts are to be utilised in the context of the project Safety Report. Any such review shall be undertaken either as an extension to contract for the works associated with this subject DP report or under additional conditions of engagement, with either option subject to agreement between DP and the payee.

Douglas Partners Pty Ltd

Appendix A

About This Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix B

Site Photographs

Photo 1: View (looking north) of the top of a newly constructed retaining wall at Whale Beach Site 1

Photo 2: View (looking north) of sandstone cutting on the uphill side of the road

Photo 3: View of a failed retaining wall at the Whale Beach Site 1

Photo 4: View of a dry-block sandstone retaining wall at Whale Beach Site 1

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Northern Beaches Council		TITLE: **Geotechnical Investigation (Location 1-Whale Beach): Photos 1 - 4**	PROJECT No: 86342
	OFFICE: Sydney	DRAWN BY: PGH	**Proposed Coastal Walkway**	PLATE No: 1
	SCALE: N/A	27-Apr-18	**Palm Beach to Bilgola Beach**	REVISION: 0

Photo 5: View (looking east) of the gravel pathway at Bilgola Beach Site 1

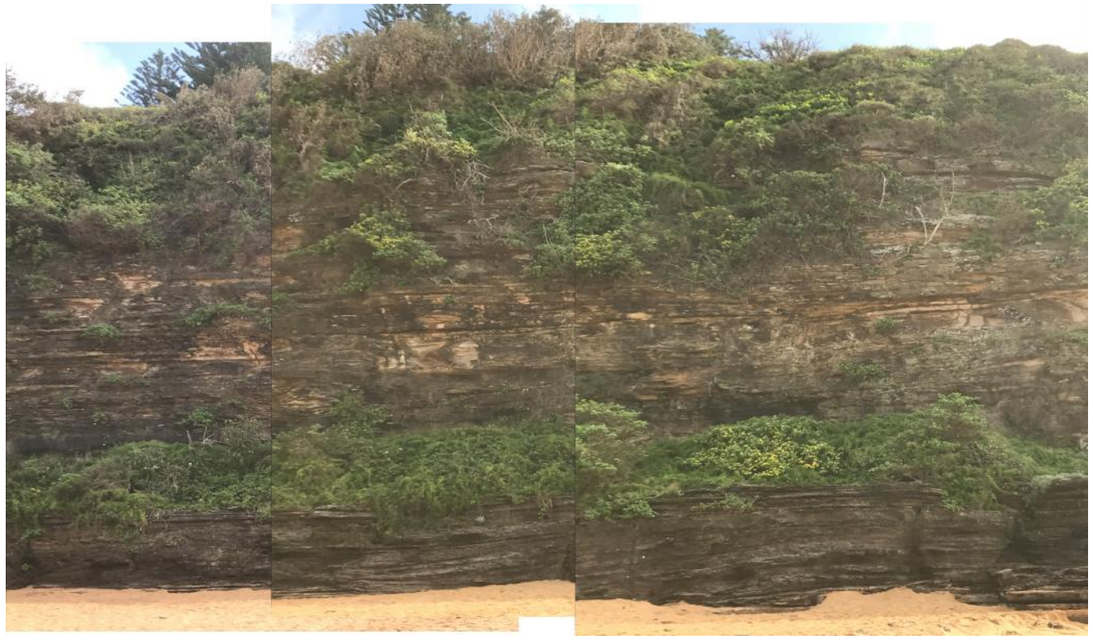


Photo 6: View (looking north) of the cliff face below Bilgola Beach Site 1

Photo 7: View of a failed retaining wall at Bilgola Beach Site2

Photo 8: Sandstone outcrop at Bilgola Beach Site 2

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Northern Beaches Council		TITLE: **Geotechnical Investigation (Location 2:Bilgola Beach): Photos 5 - 8**	PROJECT No: 86342
	OFFICE: Sydney	DRAWN BY: PGH	**Proposed Coastal Walkway**	PLATE No: 2
	SCALE: N/A	27-Apr-18	**Palm Beach to Bilgola Beach**	REVISION: 0

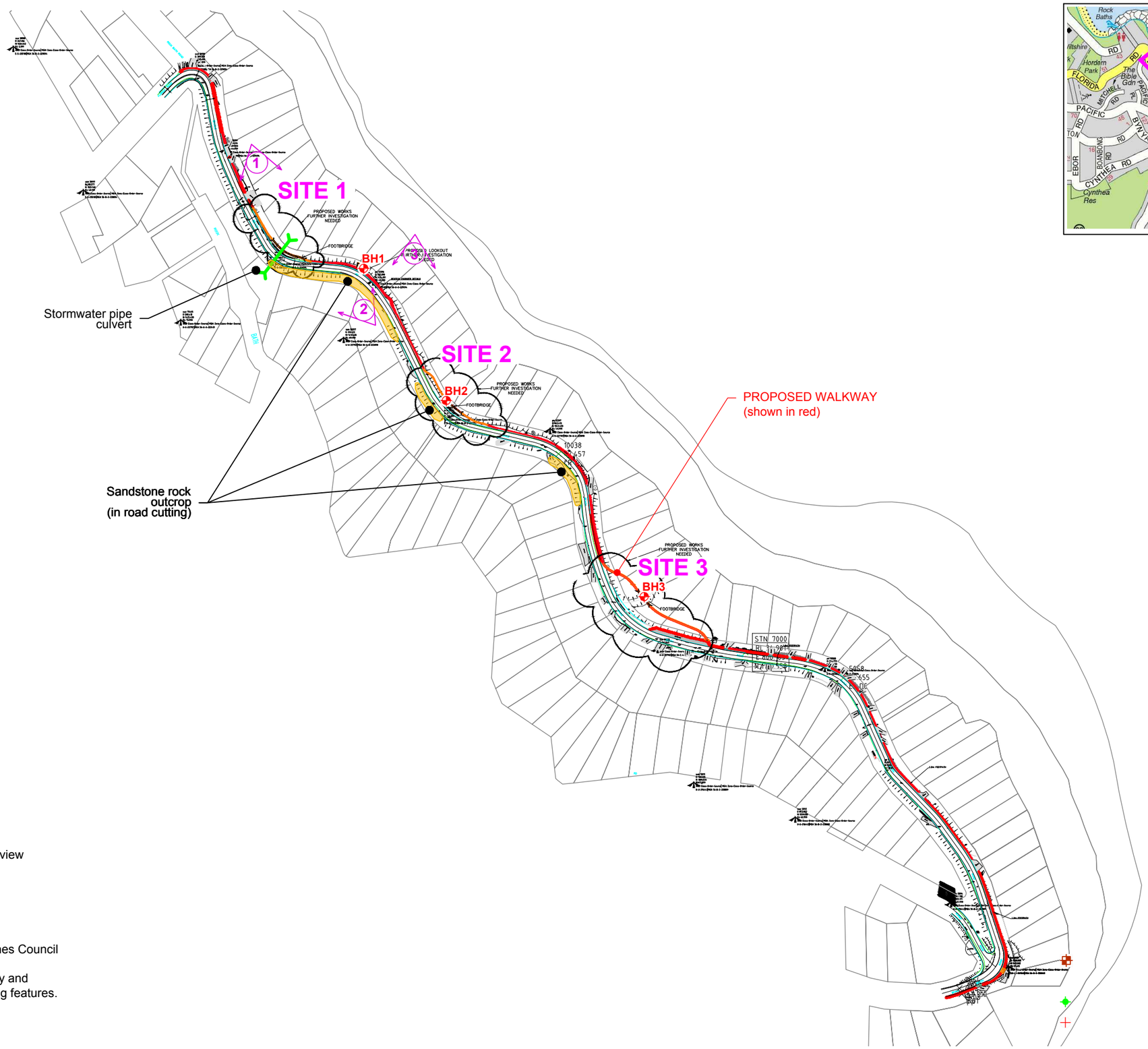
Photo 9: View (looking south) of the existing coastal track at Newport Beach Site 1

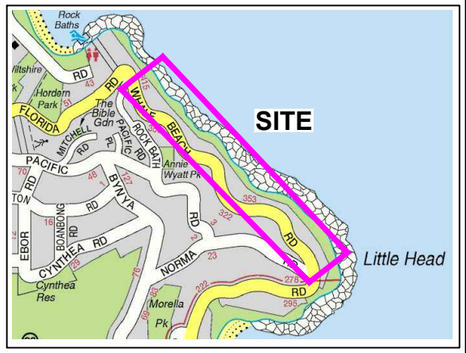
Photo 10: View (looking south) of the Barrenjoey Road embankment at Newport Beach Site 1

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Northern Beaches Council		TITLE: **Geotechnical Investigation (Location 3:Newport Beach): Photos 9 - 10** **Proposed Coastal Walkway** **Palm Beach to Bilgola Beach**	PROJECT No:	86342
	OFFICE: Sydney	DRAWN BY: PGH		PLATE No:	3
	SCALE: N/A	27-Apr-18		REVISION:	0

Appendix C

Drawings





Locality Plan

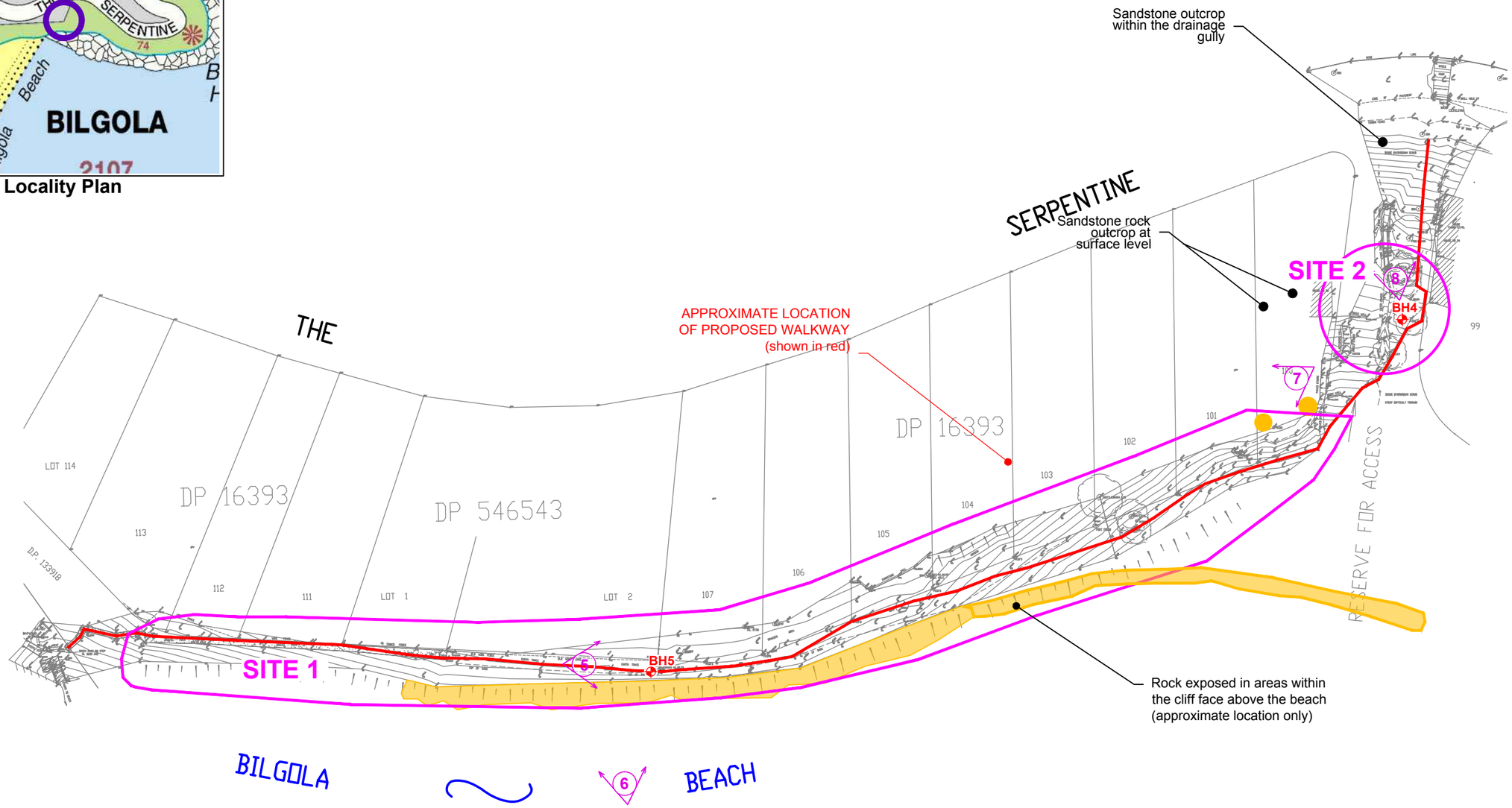
LEGEND

- Borehole location
- Sandstone outcrop
- 1 Photo number with direction of view

NOTE:
1: Base drawing from Northern Beaches Council (Plan 2017-21, dated July 2017)
2: Test locations are approximate only and are shown with reference to existing features.

Douglas Partners *Geotechnics / Environment / Groundwater*	CLIENT: Northern Beaches Council	TITLE: **Location 1- Location of Tests, Photographs and Site Features Whale Beach Road, PALM BEACH**	PROJECT No: 86342.00
	OFFICE: Sydney / DRAWN BY: PSCH		DRAWING No: 1
	SCALE: N.T.S. / DATE: 24.4.2018		REVISION: 0

Locality Plan



NOTE:
1: Base drawing from Survey Scope (Dated February 2014)
2: Test locations are approximate only and are shown with reference to existing features.

LEGEND

- Borehole location
- Sandstone outcrop
- Photo number with direction of view

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Northern Beaches Council	TITLE: **Location 2 - Bilgola Beach** **Location of Tests, Photographs and Site Features** **Whale Beach Road, PALM BEACH**	PROJECT No: 86342.00
	OFFICE: Sydney / DRAWN BY: PSCH		DRAWING No: 2
	SCALE: N.T.S. / DATE: 24.4.2018		REVISION: 0

NOTE:
1: Base image from Nearmap.com
(Dated 20.1.2018)
2: Test locations are approximate only and
are shown with reference to existing features.

LEGEND

Borehole location

1 Photo number with direction of view

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Northern Beaches Council		TITLE: **Location 3 - Bilgola Beach Headland** **Location of Tests, Photographs and Site Features** **Whale Beach Road, PALM BEACH**
OFFICE: Sydney	DRAWN BY: PSCH	
SCALE: 1:2000 @ Ae	DATE: 24.4.2018	

N

PROJECT No:	86342.00
DRAWING No:	3
REVISION:	0

Appendix D

Fieldwork Results

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

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Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726-1993, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 2007. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approximate Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and longer sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq 100 \text{ mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

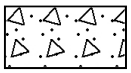
Symbols & Abbreviations

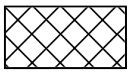
Graphic Symbols for Soil and Rock

General

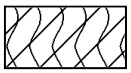

Asphalt


Road base


Concrete


Filling

Soils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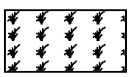
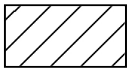
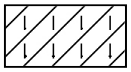
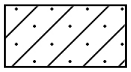
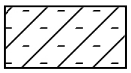

Peat

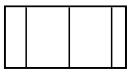

Clay

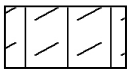

Silty clay

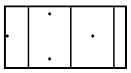

Sandy clay

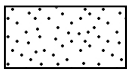

Gravelly clay

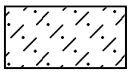

Shaly clay

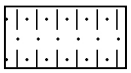

Silt


Clayey silt


Sandy silt

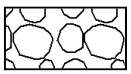

Sand

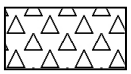

Clayey sand


Silty sand


Gravel

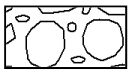

Sandy gravel


Cobbles, boulders

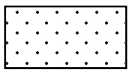

Talus

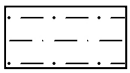
Sedimentary Rocks

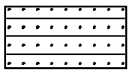

Boulder conglomerate

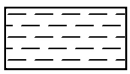

Conglomerate


Conglomeratic sandstone

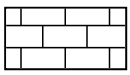

Sandstone


Siltstone

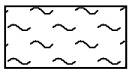

Laminite

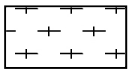

Mudstone, claystone, shale

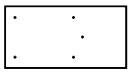

Coal


Limestone

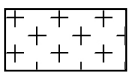
Metamorphic Rocks

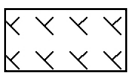

Slate, phyllite, schist

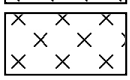

Gneiss

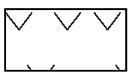

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

BOREHOLE LOG

CLIENT: Northern Beaches Council
PROJECT: Proposed Coastal Walkway
LOCATION: Whale Beach Road, Palm Beach

SURFACE LEVEL: --
EASTING: 345081
NORTHING: 628730
DIP/AZIMUTH: 90°/--

BORE No: BH1
PROJECT No: 86342.00
DATE: 29/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		FILLING - poorly compacted clayey sand filling with sandstone cobbles and boulders, dry										
	1.9	CORE LOSS						1.9m: CORE LOSS: 180mm				
	2.08	SANDSTONE - low strength, moderately weathered, fractured, orange brown, medium grained sandstone						2.57m: J 60°, p, ro, fr	C	83	80	PL(A) = 0.2
								3.33 to 3.73m: J90°, p, ro, cln				
	3.7	SANDSTONE - medium strength, slightly to moderately weathered, slightly fractured, grey medium grained sandstone						3.83 to 4.23M J85°-90°, p, ro, cln	C	100	100	PL(A) = 0.4
												PL(A) = 0.5
	4.6	Bore discontinued at 4.6m										

RIG: Proline **DRILLER:** Ian Drever **LOGGED:** PGH **CASING:** HQ to 1.5m

TYPE OF BORING: Hand auger to 1.0m; HQ advancer to 1.9m; NMLC Coring 4.6m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Borehole located approximately 2 m east of crash barrier

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BORE: 1 PROJECT: PALM BEACH – NEWPORT BEACH APRIL 2018

1.9 – 4.6m

BOREHOLE LOG

CLIENT: Northern Beaches Council
PROJECT: Proposed Coastal Walkway
LOCATION: Whale Beach Road, Palm Beach

SURFACE LEVEL: --
EASTING: 345150
NORTHING: 6280624
DIP/AZIMUTH: 90°/--

BORE No: BH2
PROJECT No: 86342.00
DATE: 28/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
	0.0	FILLING - poorly compacted clayey sand filling with some crushed sandstone gravel and cobbles, dry										
	1.6	FILLING - medium strength sandstone boulder (400mm thick) and clayey sand							C	100	0	
	2.15	CORE LOSS						2.15m: CORE LOSS: 300mm	C	45	50	
	2.45	SANDSTONE - extremely low and medium strength, moderately weathered, brown fine grained sandstone							C	100	100	PL(A) = 0.6
	3.0	CORE LOSS						3m: CORE LOSS: 150mm				
	3.15	SANDSTONE - extremely low and medium strength, moderately weathered, brown fine grained sandstone						3.43m: J, 45°, cly	C	81	42	PL(A) = 0.9
									C	100	100	
	4.65	Bore discontinued at 4.65m										

RIG: Proline **DRILLER:** Ian Drever **LOGGED:** PGH **CASING:** HQ to 2.6m

TYPE OF BORING: Hand auger to 1.6m; NMLC Coring to 4.65m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Borehole located 1.3m east of the road barrier fence (chainlink)

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BORE: 2 PROJECT: PALM BEACH – NEWPORT BEACH APRIL 2018

1.6 – 4.65m

BOREHOLE LOG

CLIENT: Northern Beaches Council
PROJECT: Proposed Coastal Walkway
LOCATION: Whale Beach Road, Palm Beach

SURFACE LEVEL: --
EASTING: 345628
NORTHING: 6280542
DIP/AZIMUTH: 90°/--

BORE No: BH3
PROJECT No: 86342.00
DATE: 28/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Type	Core Rec. %	RQD %	Test Results & Comments
		CLAYEY SAND (Colluvium) - orange brown clayey sand, dry										
	0.5	SANDY CLAY (Colluvium) - stiff to hard, orange brown-grey orange sandy clay										
	1							Unless otherwise stated	C	100	0	pp = 300-350 pp = 300-370
	2.0	CORE LOSS						2m: CORE LOSS: 250mm				
	2.25	SANDY CLAY (Colluvium) - stiff to hard, orange brown-grey orange sandy clay										pp = 350-370
	2.65	SANDSTONE - low and medium strength, moderately weathered, fractured, orange brown fine grained sandstone with distinct to indistinct sub-horizontal cross beds						2.83 to 2.87m: J 80°, 2.89m: J 70°, 2.89 to 2.95m: Cs 3.12 to 3.17m: cly 3.27 to 3.32m: cly	C	84	83	PL(A) = 0.2 PL(A) = 0.8
	3.5	CLAY - very stiff, grey and orange grey clay						3.48m: B 20°	C	100	28	pp = 300-350
	4.12	SANDSTONE - medium strength, moderately weathered, fractured, orange brown fine grained sandstone with distinct to indistinct sub-horizontal cross beds						4.12m: B 15° 4.15 to 4.24m: B(x4) 0-2°				PL(A) = 1.0
	4.35	Bore discontinued at 4.35m										

RIG: Proline **DRILLER:** Ian Drever **LOGGED:** PGH **CASING:** HQ to 1.5m

TYPE OF BORING: Hand auger to 1.0m; NMLC Coring to 4.35m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Borehole located approximately within a gully 20 m east of Whale Beach Road and about 4 below the road level

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BORE: 3 PROJECT: PALM BEACH – NEWPORT BEACH APRIL 2018

1.0 – 4.35m

BOREHOLE LOG

CLIENT: Northern Beaches Council
PROJECT: Proposed Coastal Walkway
LOCATION: The Serpentine, Bilgola Beach

SURFACE LEVEL: --
EASTING: 345234
NORTHING: 3280153
DIP/AZIMUTH: 90°/--

BORE No: BH4
PROJECT No: 86342.00
DATE: 29/3/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		FILLING - poorly compacted brown silty sand filling, moist										
	0.4	FILLING - poorly compacted dark brown clay filling with some sandstone gravel, dry										
1	1.0	FILLING - sand and sandstone gravel filling										
	1.2	SANDY CLAY (Colluvium) - orange brown sandy clay										
								Unless	C	100	0	pp = 100-120 pp = 100-150 pp = 100-140 pp = 100-150
2												
3	3.0	SANDSTONE - extremely low strength, extremely weathered grey and orange medium grained sandstone and shale										
	3.6	SILTSTONE - low strength, moderately fractured and weathered fine grained sandstone interbedded (horizontal) with shale lamination						3.5m: J 60°, cly 3.9m: Sz 3.95 to 4.0m: cly 50mm	C	100	40	PL(A) = 0.3
4								4m: 4 J 45°, p, ro, cln 4.2 to 4.23m: cly 30mm				
	4.23	SANDSTONE - high strength, moderately weathered, slightly fractured medium grained sandstone							C	100	72	PL(A) = 1.6
	4.8	Bore discontinued at 4.8m										

RIG: Proline **DRILLER:** Ian Drever **LOGGED:** PGH **CASING:** HQ to 1.4m

TYPE OF BORING: Hand auger to 1.0m; HQ advancer to 1.4m; NMLC Coring to 4.8m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Borehole located approximately 3 m east of the drainage channel

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BORE: 4 PROJECT: PALM BEACH – NEWPORT BEACH MARCH 2018

1.4 – 4.8m

BOREHOLE LOG

CLIENT: Northern Beaches Council
PROJECT: Proposed Coastal Walkway
LOCATION: The Serpentine, Bilgola Beach

SURFACE LEVEL: --
EASTING: 345039
NORTHING: 6276114
DIP/AZIMUTH: 90°/--

BORE No: BH5
PROJECT No: 86342.00
DATE: 4/4/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		CLAYEY SAND - Dense clayey sand, dry										
	1											
	1.3	Bore discontinued at 1.3m Borehole refusal on sandstone bedrock										
	2											
	3											
	4											

RIG: Hand tools **DRILLER:** PGH **LOGGED:** PGH **CASING:** N/A

TYPE OF BORING: Hand auger to 1.3 m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Borehole locatedabout 2 m east of the gravel track

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: Northern Beaches Council
PROJECT: Proposed Coastal Walkway
LOCATION: Barrenjoey Road, Newport (Bilgola Headland)

SURFACE LEVEL: --
EASTING: 344876
NORTHING: 6275597
DIP/AZIMUTH: 90°/--

BORE No: BH6
PROJECT No: 86342.00
DATE: 4/4/2018
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Degree of Weathering (EW HW MW SW FS FR)	Graphic Log	Rock Strength (Ex Low, Very Low, Low, Medium, High, Very High, Ex High)	Water	Fracture Spacing (m) (0.01, 0.05, 0.10, 0.50, 1.00)	Discontinuities (B - Bedding J - Joint S - Shear F - Fault)	Sampling & In Situ Testing: Type	Core Rec. %	RQD %	Test Results & Comments
		CLAYEY SANDY GRAVEL - Very dense brown clayey sandy gravel, dry										
	1.0	Bore discontinued at 1.0m Borehole refusal on sandstone bedrock										

RIG: Hand tools **DRILLER:** PGH **LOGGED:** PGH **CASING:** N/A

TYPE OF BORING: Hand auger to 1.0 m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS: Borehole located 1 m east of the existing walking track

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Results of Dynamic Penetrometer Tests

Client Northern Beaches Council

Project Proposed Coastal Walkway

Location Palm Beach to Bilgola Beach

Project No. 86342.00

Date 01/05/18

Page No. 1 of 1

Test Location	1	2	3	4	5	6				
RL of Test (AHD)										
Depth (m)	**Penetration Resistance** Blows/150 mm									
0 - 0.15	2	2	1	2	1	4				
0.15 - 0.30	3	2	3	2	7	4				
0.30 - 0.45	4	2	4	4	6	10				
0.45 - 0.60	5	2	4	5	4	8				
0.60 - 0.75	5	3	3	6	4	10				
0.75 - 0.90	R	3	3	4	7	7				
0.90 - 1.05		3	5	6	11	10				
1.05 - 1.20		4	7	6	18	R				
1.20 - 1.35		9	7	R	20					
1.35 - 1.50		7	9		R					
1.50 - 1.65		8	12							
1.65 - 1.80		R	11							
1.80 - 1.95			8							
1.95 - 2.10			16							
2.10 - 2.25			12							
2.25 - 2.40										
2.40 - 2.55										
2.55 - 2.70										
2.70 - 2.85										
2.85 - 3.00										
3.00 - 3.15										
3.15 - 3.30										
3.30 - 3.45										
3.45 - 3.60										

Test Method AS 1289.6.3.2, Cone Penetrometer ☑

AS 1289.6.3.3, Flat End Penetrometer ☐

Tested By PGH

Checked By PGH

Remarks Ref = Refusal, 24/110 indicates 25 blows for 110 mm penetration

Appendix D

Preliminary Ecological Assessment Report

niche
Environment and Heritage

Newport to Avalon Shared Pathway
Preliminary Ecological Assessment

Preliminary Biodiversity Assessment

Prepared for Tract consultants

November 2018

Document control

Project no.:	4235
Project client:	Northern Beaches Council
Project office:	Sydney
Document description:	Preliminary environmental assessment of the Newport to Avalon Shared Bike Path
Project Director:	Rhidian Harrington
Project Manager:	Cairo Forrest
Authors:	Cairo Forrest
Internal review:	Evelyn Craigie
Document status:	Final
Document address:	P:\Projects\4000s\4200s\4235 Avalon Shared Pathway DD and Eco Assessment\Report\Drafts
Local Government Area:	Northern Beaches Council

Document revision status

Author	Revision number	Internal review	Date issued
Cairo Forrest	D1	Evelyn Craigie	29/11/2018

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Cover photograph: Avalon Beach, NSW

Executive summary

Niche was commissioned by Tract Consultants Pty Ltd, on behalf of Northern Beaches Council (Council) to prepare a Preliminary Biodiversity Assessment for the proposed Newport to Avalon Shared Bike Track project (the project).

The project involves the construction of a shared pathway from Newport Beach to Avalon Beach in NSW. For the most part, the shared pathway would follow existing roads and trails but will bisect some existing reserve land also (see Figure 3). Altogether, the shared pathway will involve the following components:

- Shared paths (suspended)
- Shared paths (on-ground)
- Footpaths (suspended)
- Footpaths (on-ground)

Along with vegetation clearing for these components, buffer areas of 2 metres either side of all shared paths and footpaths will be required for the movement and storage of equipment during construction and will likely impose temporary impacts to local flora in the form of trampling.

Purpose and objectives

The purpose of this report is to identify potential biodiversity constraints and further investigations required for the development of the project.

This assessment has taken into consideration species, populations and ecological communities listed as threatened under the *Biodiversity Conservation Act 2016* (BC Act) and *Fisheries Management Act 1994* (FM Act), and Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Field survey

Niche completed a field survey on the 6th of July, 2018. Dr Cairo Forrest (Ecologist and Acredted Assessor) conducted a survey across the study area and verified existing vegetation with the use of a series of Random Data Points (RDPs), threatened plant surveys and fauna habitat surveys.

Biodiversity constraints

Three native vegetation communities have been mapped within the study area:

- Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817)
- Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778)
- Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin)Bioregion and South East Corner Bioregion (PCT 898)

PCT 898 is listed as a Threatened Ecological Community (TEC) under the BC Act.

These communities are generally in good condition as a result of bush regeneration and maintenance works carried out by Council.

No threatened flora or fauna species were recorded during the field survey. Threatened flora and fauna are unlikely to be impacted by the project.

Records of six threatened fauna species were found within the subject site (locality), however, no threatened fauna species with a 'low-Moderate' or higher likelihood of occurrence are thought to have limiting habitat within the study area and are therefore unlikely to be significantly impacted by the proposal.

Corridors

The locality provides a wildlife corridor along the coast connecting several reserves, however the project does not fragment this corridor such that wildlife connectivity would be impacted.

Areas of Outstanding Biodiversity Value

Areas of Outstanding Biodiversity Value (AOBVs) are special areas that contain irreplaceable biodiversity values that are important to the whole of NSW, Australia or globally. AOBVs will be a priority for investment in private land conservation. No AOBVs occur within the study area.

Biodiversity Values Map

The Biodiversity Values Map (BVM) identifies land with high biodiversity value, as defined by the *Biodiversity Conservation Regulation 2017*. Whilst one creek (Bilgola Creek) intersecting the Serpentine Rd and running through the study area is mapped on the BVM (Figure 7), no new works will be occurring near this BV such that any direct or indirect impacts to it would be felt. As such, this project will have no impacts on any BVs.

BioBanking sites

Biobank sites have an existing legal commitment to be managed for conservation purposes in-perpetuity and therefore are not available for future urban development or infrastructure unless special legislative provisions are enacted. The study area does not contain any Biobank sites.

Potential impacts

The Project is likely to result in impacts to the following biodiversity values:

- Clearing of 0.03 ha of native vegetation across three PCTs
- Non permanent impacts (trampling) to 0.12 ha of native vegetation within buffer area
- Clearing of 0.01 ha of Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) TEC and non permanent impacts (trampling) to another 0.02 ha.
- Potential for sediment run-off into drainage lines and into intertidal habitats.

Impact assessment pathways

The project is to be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). A Review of Environmental Factors (REF) or Environmental Impact Statement is required, incorporating a biodiversity impact assessment that applies five-part tests in accordance with Section 7.3 of

the BC Act to determine whether significant impacts on threatened biodiversity are likely. If a significant impact is deemed likely, the proponent can either prepare a Biodiversity Development Assessment Report (BDAR) utilising the Biodiversity Assessment Methodology (BAM) or prepare a Species Impact Statement (SIS)

Given that there are no threatened ecological communities or threatened species likely to be impacted by the proposed works (5-part tests of Significance), and BOS native vegetation thresholds for clearing do not apply to Part 5 assessments, no further studies or offsetting requirements are required for this proposal.

Impacts are also required to be assessed under the EPBC Act. If Commonwealth Assessments of significance find that a TEC or threatened species is likely to be significantly impacted by the proposed works, a Referral to the Commonwealth Department of the Environment and Energy (DoEE) is be required. Given that no significant impacts on any MNES are likely as a result of the project, a Referral is not required.

Recommendations

Recommendations would be developed further at the impact assessment stage of the project, but the following should be considered as a minimum:

- Apply the avoid, mitigate and offset principles.
- Ensure any works are consistent with the objectives, recommendations and compensation requirements of the Pittwater Council (2011) Native Fauna Management Plan for Pittwater and Pittwater Council (2012) Pittwater Native Vegetation Management Plan.
- Offsetting under the BC and EPBC Acts are not required as impacts to the one threatened entity within the proposal footprint: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) TEC, were found to be insignificant by way of a 5-part test (BC Act Assessment of Significance).

Glossary and abbreviations

AOBV	Areas of Outstanding Biodiversity Value, as defined by the BC Act
BC Act	NSW *Biodiversity Conservation Act 2016*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
Local population	The population of a particular threatened species that occurs in the locality
Locality	The area within 10 km of the study area
Local occurrence	Refers to the distribution of an ecological community within the study area and continuous with it
Matters of NES	Matters of national environmental significance
OEH	Office of Environment and Heritage
TEC	Threatened ecological community as listed on the BC Act and or EPBC Act. Collective term to describe vulnerable, endangered and critically endangered ecological communities
Threatened biodiversity	Threatened species, populations and ecological communities as listed on the BC and or EPBC Acts
SEPP	State Environment Planning Policy

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1. Introduction

1.1 Context

Niche were commissioned by Tract Consultants Pty Lts, on behalf of Northern Beaches Council to prepare a preliminary biodiversity assessment for the proposed shared pathway from Newport Beach to Avalon Beach, NSW (the Project).

The Project involves the construction of a shared pathway from Newport Beach to Avalon Beach in NSW. The shared pathway would largely follow existing roads (Serpentine rd and Barrenjoey Rd), but will bisect some existing reserve land also (see Figure 3). Altogether, the shared pathway would involve the construction of the following components:

- Suspended Shared paths for bikes and pedestrians with a total of length 391 m of new build
- Shared path (on-ground) for bikes and pedestrians, with a total length of 748 m of new build
- Suspended Footpaths for pedestrians, with a total length of 171 m of new build
- Footpath (on-ground) for pedestrians, with a total length of 739 m of new build

While the on-ground components of the share path would require clearing of vegetation, the suspended components would likely shade out and restrict water to vegetation beneath them, effectively having the same impact as clearing. For the purposes of this assessment, both on-ground and suspended components of the share path will be assumed to clear the vegetation they impact and will be referred to as the Study Area.

In total, the four components comprising the new build for the shared pathway would result in clearing of 0.48 hectares of native vegetation as well as some areas of pre-existing road verge and manicured gardens.

The widths and lengths and total areas of of the four components of the Project, as well as the width and total area of buffer areas required for construction of these components, are summarised in Table 1 below:

Table 1: Specifications of the components of the project

Componant	Total length across project (m)	Width (m)	Area (ha)	Width of Buffer area for construction access (m)		Area of Buffer area (ha)	Total area (footprint plus buffer (ha)
				Left side	Right side		
Shared path (on-ground)	748	3	0.22	2	2	0.1	0.32
Shared path (suspended)	391	3	0.12	2	2	0.08	0.2
Footpath (on-ground)	739	1.5	0.11	2	2	0.07	0.18
Footpath (suspended)	171	1.5	0.03	2	2	0.07	0.1

Total	**2049**	**-**	**0.48**	**-**	**-**	**0.32**	**0.8**

1.2 Purpose and objectives

The purpose of this report is to identify potential biodiversity constraints and further investigations required for the development of the project.

This assessment has detailed the species, populations and ecological communities listed as threatened under the *Biodiversity Conservation Act 2016* (BC Act) and *Fisheries Management Act 1994* (FM Act), and Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), that may occur or have habitat within the study area.

1.3 The subject site and study area

The Subject site occurs within the Northern Beaches Council local government area in NSW, within a strip of coastal land running from Newport to Avalon alongside Serpentine Road and Barrenjoey Road for the largest proportion of it's length. Some existing walking tracks and minor roads are on the western side and coastal sand dunes are on the eastern side (Figure 1 and Figure 2). The study area is defined in this report as the footprint of the project (Figure 3).

A summary of the major geophysical features of the subject site is presented in Table 2. below.

Table 2. Geophysical context of the subject site

Geographical feature	Description
Bioregion	Sydney Basin
LLS region	Greater Sydney
Local government area	Northern Beaches Council
Watercourses	Bilgola Creek runs from high ground to the east of the study area and empties on to Bilgola beach.
Nearby conservation areas	Little Head Reserve, Bangalley Headland, Avalon Headland, Bilgola South Headland, Bungan Head and Barrenjoey Headland are all local conservation areas.

1.4 Legislative context

The following legislation has been considered in this assessment:

- NSW *Environmental Planning and Assessment Act 1979* (EP&A Act)
- NSW *Biodiversity Conservation Act 2016* (BC Act)
- State Environmental Planning Policy No. 44 – Koala Habitat Protection
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.6.1 EP&A Act

The EP&A Act provides an assessment framework (in concert with the BC Act) for the consideration of impacts to threatened biodiversity. The project is to be assessed under Part 5 of the EP&A Act. A Review of Environmental Factors (REF) or Environmental Impact Statement is required, incorporating a biodiversity impact assessment that applies five-part tests in accordance with Section 7.3 of the BC Act to determine whether significant impacts on threatened biodiversity are likely. If a significant impact is deemed likely,

the proponent can either prepare a Biodiversity Offset Strategy utilising the Biodiversity Assessment Methodology (BAM) or prepare a Species Impact Statement (SIS).

1.6.2 BC Act

In 2016 the NSW Government introduced the *Biodiversity Conservation Act* (BC Act) and *Local Land Services Amendment Act* (LLSA Act), which changes the way projects are assessed with respect to ecological impacts. This new legislation repeals the *Threatened Species Conservation Act 1995* (TSC Act), the *Nature Conservation Trust Act 2001* (NCT Act), parts of the *National Parks and Wildlife Act 1974* (NPWS Act), and the *Native Vegetation Act 2003* (NV Act). The new legislation is supported by the *Biodiversity Conservation Regulations*, a new Biodiversity Assessment Method (BAM), offsetting rules, sensitive biodiversity mapping, credit pricing spreadsheet and other guidance documents.

1.6.3 EPBC Act

The purpose of the EPBC Act is to ensure that actions likely to cause a significant impact on MNES undergo an assessment and approval process. Under the EPBC Act, an action includes a project, undertaking, development or activity. An action that 'has, will have or is likely to have a significant impact on MNES' is deemed to be a controlled action and may not be undertaken without prior approval from the Commonwealth Minister for the Department of Environment (DoE).

The EPBC Act identifies MNES as:

- World heritage properties
- National heritage places
- Wetlands of international importance (Ramsar wetlands)
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- Nuclear actions (including uranium mining)
- The Great Barrier Reef Marine Park
- A water resource, in relation to coal seam gas development and large coal mining development.

Listings deemed relevant to the proposal are to be assessed in accordance with relevant guidelines. It is unlikely the project will require Referral to the Commonwealth Department of the Environment and Energy (DoEE) for approval given the low likelihood of impacts to MNES.

1.6.4 Planning controls

State Environmental Planning Policy No. 44 – Koala Habitat Protection

State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline by:

- Requiring the preparation of plans of management before development consent can be granted in relation to areas of core Koala habitat
- Encouraging the identification of areas of core Koala habitat
- Encouraging the inclusion of areas of core Koala habitat in environment protection zones.

While SEPP 44 does not apply under Part 5 of the EP&A Act, consideration has been given to the intent of the SEPP. The Koala would also be independently considered as a listed species under implementation of the BC Act and EPBC Act.

Bionet (Atlas) searches found no Koala sightings within 10 km of the study area and no core Koala habitat exists within the impact area (Study area). Therefore, impacts to Koala are not expected by the proposed works.

Location map

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 1

Subject Site

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 2

Imagery: (c) LPI 2018-08-30

Study Area

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 3

Imagery: (c) NearMap 2018-01-20

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2. Methodology

The following section outlines the methods used to obtain and consolidate information on the biodiversity values present within the study area. This includes desktop based reviews, site inspection and data analysis.

2.1 Database and literature sources

Database searches for a 10 km radius around the study area were conducted in February 2018 to identify threatened biodiversity and migratory species with known or predicted occurrences in the locality. The following databases were used for this purpose:

- BioNet, Atlas of NSW Wildlife (OEH 2018a)
- EPBC Act Protected Matters Report (DoEE 2018a)
- Threatened Species Profiles for threatened species, endangered populations and threatened ecological communities (TECs) listed under the BC Act (OEH 2018b)
- Species Profile and Threats Database (DoEE 2018b)

Key pieces of literature that were reviewed in preparation of this report include:

- Pittwater Council (1995) Habitat and Wildlife Corridors strategy
- Pittwater Council (2011) Native Fauna Management Plan for Pittwater
- Pittwater Council (2012) Pittwater Native Vegetation Management Plan
- Warringah Council (2007) Local Habitat Corridors Strategy.
- Warringah Council (2008) Threatened Bushland Reserves (Duffy Forest Ecological Community) Plan of Management.
- Warringah Council (2005) Vegetation History and Wildlife Corridors.
- OEH Vegetation mapping for the location (2016)

2.2 Site inspection

A field survey was undertaken on 6th July 2018 by Dr Cairo Forest (Ecologist and Acredited Assessor).

The length of the study area was traversed on foot, stopping opportunistically to take notes and photographs at key points along the route, particularly where locations of potential impact to biodiversity were identified.

Data to validate the existing OEH (2016) vegetation mapping was collected with the use of Random Data Points (RDPs). RDPs take a snap shot of the dominant species within view of a given point that can be used to characterise the vegetation community present at that point.

Threatened flora searches were undertaken during the site inspection by undertaking a random meander throughout the proposed footprint and buffer areas.

The presence of the following fauna habitat features was also recorded:

- Hollow bearing trees
- Nests
- Large logs and leaf litter
- Rocky outcrops and caves

Photos of the proposed path and the vegetation communities in the Study Area can be viewed in Appendix 2.

2.3 Threatened flora and fauna likelihood of occurrence

A list of subject threatened flora and fauna within the locality (10 km radius) was determined from database searches (Appendix 1). The list of potentially impacted (affected) species is determined by considering the likelihood of occurrence of these species. One of five categories for 'likelihood of occurrence' (Table 3) were attributed to each species after consideration of criteria such as known records, likely presence or absence of important habitat features in the study area and professional judgement.

Species that would need to be considered further in formal assessments of significance (BC Act, EPBC Act) were those in the 'Known', 'High' or 'Moderate' categories and where impacts for the species could reasonably occur from the development. Species listed as a 'Low' or 'None' likelihood of occurrence are those for which there is limited or no habitat present within the Study Area.

Table 3: Likelihood of occurrence criteria

Likelihood rating	Threatened flora criteria	Threatened and migratory fauna criteria
Known	The species has been previously observed within the study area.	The species has been previously observed within the study area.
High	It is likely that a species inhabits or utilises habitat within the study area.	It is likely that a species inhabits or utilises habitat within the study area.
Moderate	Potential habitat for a species is likely to occur in the study area. Adequate field survey would determine if there is a 'high' or 'low' likelihood of occurrence for the species within the study area.	Potential habitat for a species is likely to occur in the study area and the species may occasionally utilise that habitat. Species unlikely to be wholly dependent on the habitat present within the study area.
Low	It is unlikely that the species inhabits the study area.	It is unlikely that the species inhabits the study area. If present, the species would likely be a transient visitor. The site is likely to contain only very common habitat for this species which the species would not rely on for its on-going local existence.
None	The habitat within the study area is unsuitable for the species.	The habitat within the study area is unsuitable for the species.

2.4 Limitations

Numerous threatened plant and animal species are cryptic or difficult to detect. For instance, some cryptic plant species are more easily detected at certain times of the year, such as during flowering events. Some fauna can only be detected during certain seasons (e.g. migration patterns or intra-torpor periods). These limitations are reduced by undertaking a habitat assessment, and assuming cryptic species are present if suitable habitat is present within the study area.

Fauna survey was limited to assessment of habitat values. Habitat assessments are conservative and default to an assumed presence where there is insufficient knowledge to determine otherwise. Assumed presence of a species requires the impact of the development/activity on that species to be assessed.

3. Results

3.1 Vegetation communities

Previous vegetation mapping (OEH 2016) has mapped nine native vegetation communities as occurring in the Subject Site:

- Coast Banksia - Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 772)
- Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin)Bioregion and South East Corner Bioregion (PCT 898)
- Lilly Pilly littoral rainforest of the southern Sydney Basin Bioregion and South East Corner Bioregion (PCT 910)
- Spinifex beach strand grassland, Sydney Basin Bioregion and South East Corner Bioregion (PCT 1204)
- Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion (PCT 1214)
- Turpentine - Rough-barked Apple - Forest Oak moist shrubby tall open forest of the Central Coast (PCT 1565)
- Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778)
- Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817)
- Lilly Pilly - Cabbage Tree Palm littoral rainforest on escarpment slopes and gullies of the Sydney basin (PCT 1833)

The rest of the Subject Site is mapped as either cleared, urban exotic/ native (gardens), weeds and exotics or undifferentiated regenerating shrubs and do not align to any PCT.

The Study Area was mapped by OEH (2016) as containing three native vegetation communities:

- Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817)
- Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778)
- Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin)Bioregion and South East Corner Bioregion (PCT 898)

Field validation confirmed that the existing mapping (OEH 2016) was accurate and the presence of these three vegetation communities, and non-native areas dominated by exotic vegetation / exotic and native plantings within the study area (Table 4).

The key dominant species recorded within the vegetation communities in the study area are provided below:

- **Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath onclay soils on headlands around Sydney and the Central Coast (PCT1817):** The overstorey and midstorey are dominated by *Banksia integrifolia* and *Acacia longifolia* while the dominant understorey and

ground cover species are *Dianella caerulea, Lomandra longifolia, Lomandra multiflora, Hibbertia empetrifolia* and *Westringia fruticosa*.

- **Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778):** The overstorey and midstorey are dominated by *Banksia integrifolia*, young *Eucalyptus botryoides*, *Glochidion ferdinandi , Pittosporum undulatum* , young *Allocasuarina littoralis* and *Breynia oblongifolia*. The dominant understorey and groundcover species are *Dianella caerulea, Pteridium esculentum, Lomandra longifolia* and *Entolasia stricta*.

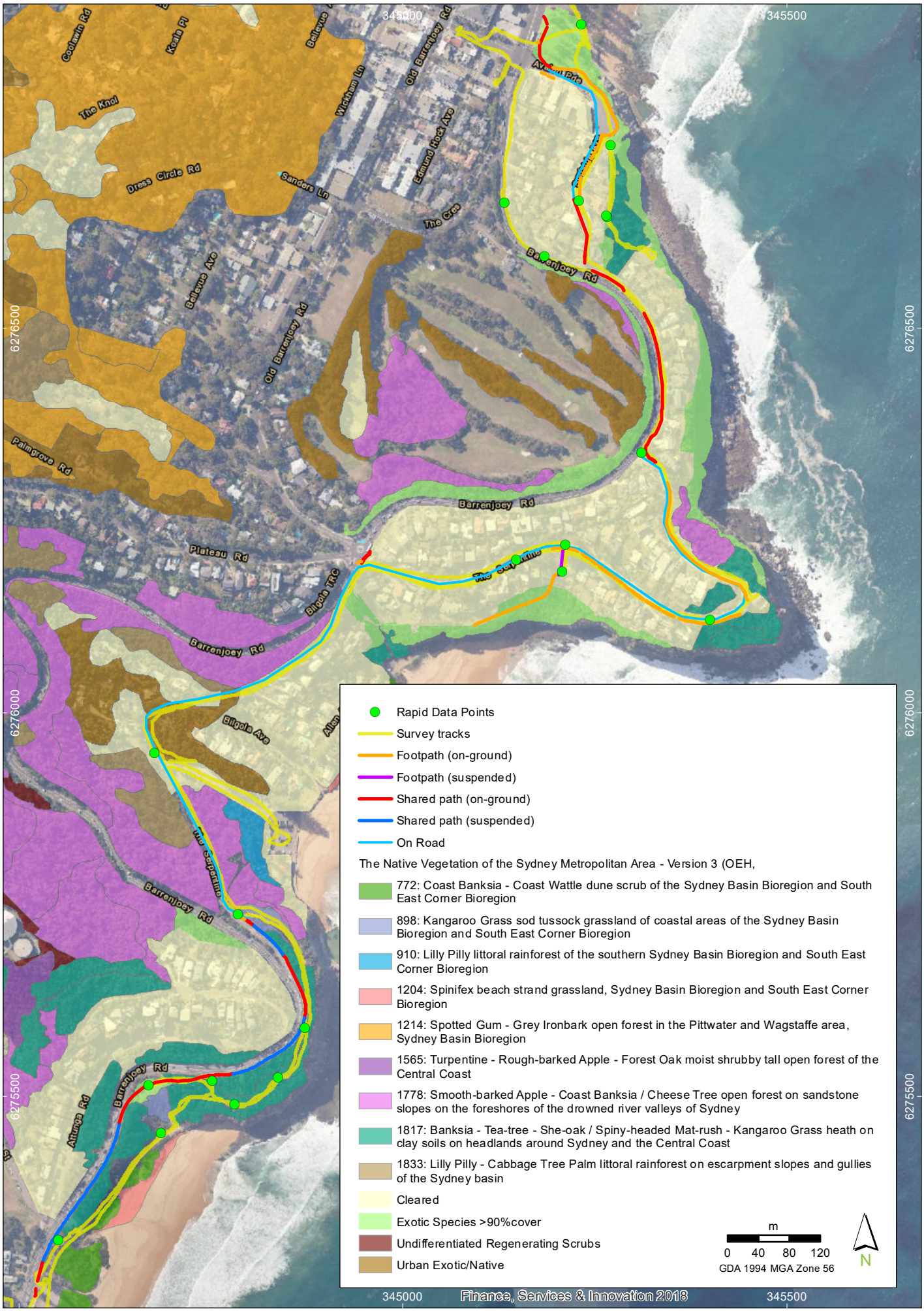
- **Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898):** The overstorey and midstorey are dominated by *Banksia integrifolia* subsp. *integrifolia*, *Westringia fruticosa* and *Acacia* sophorae. The understorey is dominated by *Pimelea linifolia, Hibbertia vestita, Pultenaea maritime, Westringia fruticosa, Poa poiformis, Zoysia macarantha* and *Cynodon dactylon*.

Table 4: Native vegetation communities found within the study area

Plant Community Type Name (Vegetation Community)	Plant Community Type (PCT) Number	Threatened Ecological Community	Area (ha)
Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast	1817	No	**0.02**
Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	1778	No	**0.00001**
Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion	898	Yes	**0.011**
Exotic vegetation / garden plantings (exotic / native) & Cleqared land	N/A	-	0.25
Total			**0.28**

3.2 Threatened ecological communities

One threatened ecological community (TEC) as listed under the BC Act occures within the study area: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898).



Vegetation Mapping and survey effort

Newport to Avalon Shared pathway - Ecological Assessment

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FIGURE 4

Imagery: (c) LPI 2018-08-30

3.1 Threatened Flora

A total of 28 threatened flora listed on the BC and/or EPBC Act were identified as subject species in this assessment (Appendix 1). This list was derived from the database searches within the locality (10km radius), outlined in section 2.1.

Only seven threatened flora species have been previously recorded within the Subject Site: *Asterolasia elegans, Callistemon linearifolius, Chamaesyce psammogeton, Eucalyptus nicholii, Genoplesium bauri, Persoonia* were *hirsuta and Syzygium paniculatum* (Figure 5).

No threatened flora were recorded in the Study Area during the site survey and suitable habitat does not occur. Threatened flora will not be considered further with respect to this proposal.

3.2 Threatened Fauna

A total of 95 threatened or migratory fauna listed on the BC and/or EPBC Act were identified as subject species in this assessment (Appendix 1). This list was derived from the database searches within the locality (10km radius), outlined in section 2.1 and included five amphibian species, 53 bird species, two freshwater fish species, 21 terrestrial mammal species, seven marine mammal species and seven reptile species.

Thirty threatened fauna species have been previously recorded within 10km of the Study Area (Figure 6).

After consideration of the habitats present within the study area and previous records of threatened species sightings, eleven species were considered to have a 'Low-Moderate' or higher likelihood of occurrence, within the Study Area:

- *Ninox strenua* (Powerful Owl)
- *Haliaeetus leucogaster* (White bellied sea eagle)
- *Gallinago hardwickii (Latham's Snipe)*
- *Pandion cristatus, Pandion haliaetus* (Eastern Osprey)
- *Rostratula australis* (Australian Painted Snipe)
- *Miniopterus australis* (Little Bentwing-bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Mormopterus norfolkensis* (Eastern Freetail-bat)
- *Myotis macropus* (Southern Myotis)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat)

The remaining threatened fauna species with potential habitat or previous recordings within 10 km of the Study Area were given a 'Low' or 'No' likelihood of occurrence (Appendix 1).

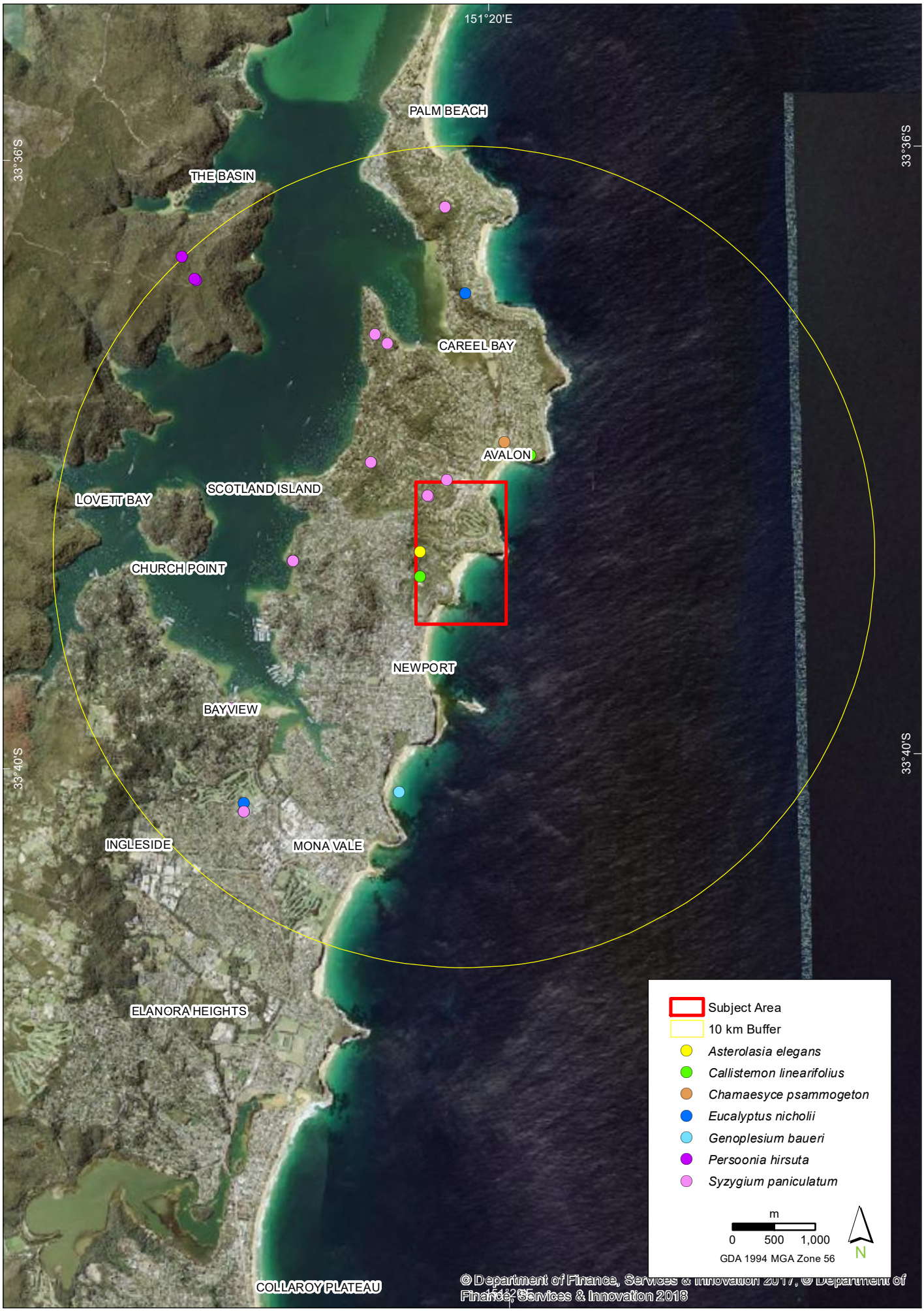
Of these eleven species, all were determined to have a 'low' likelihood of being significantly impacted by the proposal. While these threatened species may use the study area as marginal foraging habitat, the Study Area would not provide any limiting habitat for these species (i.e.,Given that no trees with hollows were found within the Study Area, there are no suitable roosting sites for the Powerful Owl or tree roosting microbat species. The Study Area also lacks caves and man made structures required as roosting habitat for the cave dwelling microbat species. Furthermore, no White-bellied Sea-eagle / Osprey nests were observed within the Study Area during the site inspection). As such, impacts to the Study Area will not remove any limiting habitat for these species and therefore would not result in a significant impact. Moreoever, there are areas of equal or better habitat for these species to forage within adjacent to the Study Area and much larger woodland areas suitable for foraging and roosting.

No threatened fauna were observed in the Study Area or broader Subject Site during the site survey.

3.4.1 Koala

Five Koala records were found within the 10km of the study area (Figure 6). Whilst Bionet (Atlas) data base searches found Koala records and habitat within 10km of the study area, these records and habitat are located in Woodland (Coatal Enriched Sandstone Dry Forest (PCT 1776)) further west of the Study Area (approximately 200m outside the Subject Site and approximately 1 km from the Study Area). Moreoever, the overstorey Eucalypts that are required to provide feed/ habitat for Koala are not present within the Study Area.

It is unlikely Koalas occur within the study area and therefore, impacts to the Koala are very unlikely and will not be considered further in this assessment.



Threatened flora within 10km of the study area

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 5

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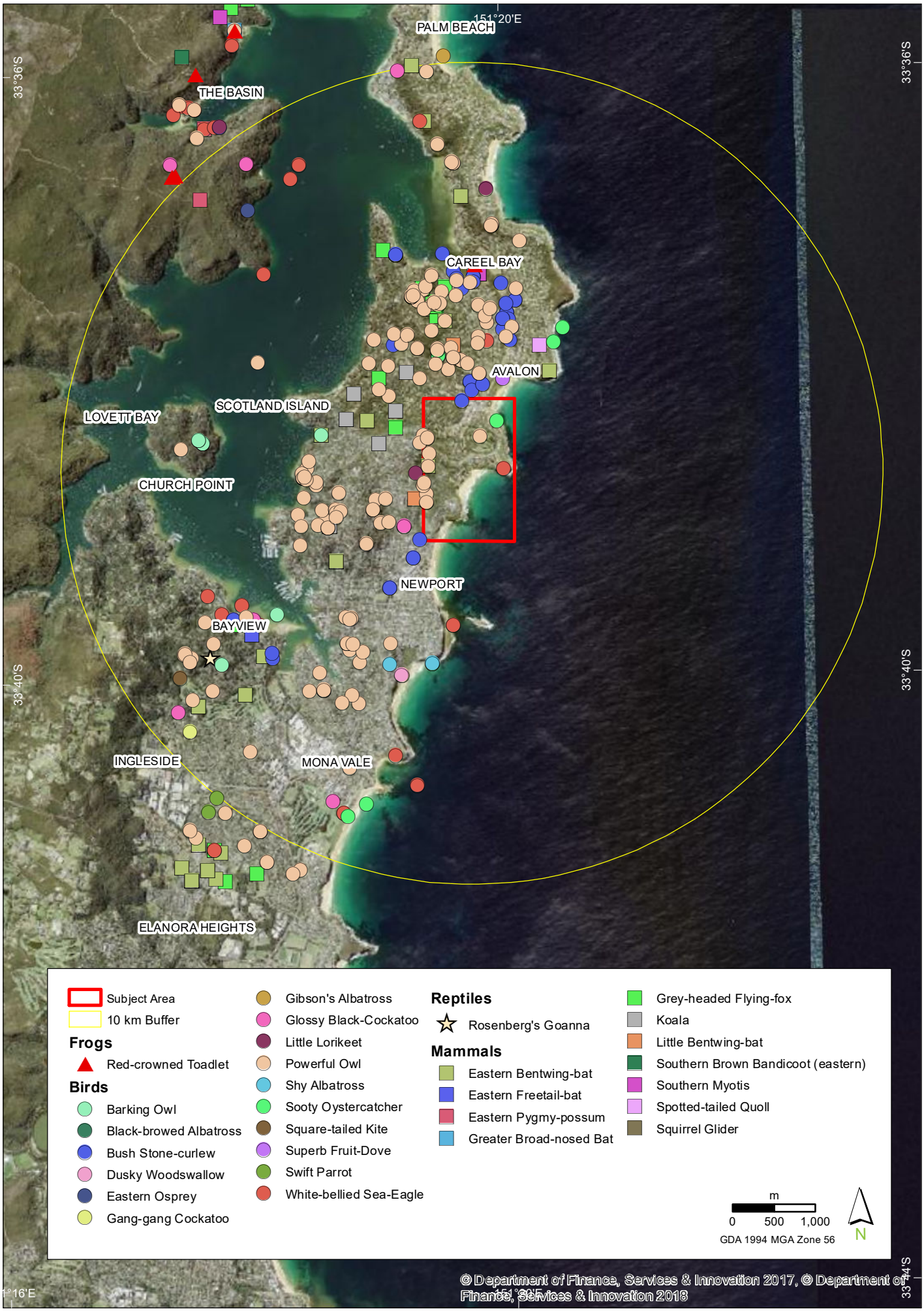

Bionet 10 km Threatened Species Search - Fauna

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 6

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3.3 Corridors

The study area occurs within a coastal wildlfie corridor that was recognised by Pittwater Council (now Northern Beaches Council) as running along the beaches and headlands from Newport Beach to Avalon Beach. This corridor includes several nature researves (Little Head Reserve, Bangalley Headland, Avalon Headland, Bilgola South Headland, Bungan Head and Barrenjoey Headland) that are connected by thin strips of coastal vegetation along beaches and cliff lines. Threatened fauna such as White-bellied Sea Eagle, Glossy Black-cockatoo, Bentwing-bats, Grey-headed Flying-fox, Long-nosed Bandicoots and Squirrel Gliders occur in some of these reserves. This wildlife corridor also links to larger patches of bushland to the west along several creek lines.

3.4 Areas of Outstanding Biodiversity Value

The BC Act gives the Minister for the Environment the power to declare Areas of Outstanding Biodiversity Value (AOBV). AOBVs are special areas that contain irreplaceable biodiversity values that are important to the whole of NSW, Australia or globally. AOBVs will be a priority for investment in private land conservation.

Areas of declared critical habitat under the TSC Act have become the first AOBVs in NSW with the commencement of the BC Act, i.e. Little Penguin and Wollemi Pine declared areas.

No AOBVs occur within the study area.

3.5 Biodiversity Values Map

The Biodiversity Values Map (BV Map) identifies land with high biodiversity value, as defined by the Biodiversity Conservation Regulation 2017. Certain development applications will require entry into the Biodiversity Offsets Scheme (BOS) if they occur on land mapped on the BV Map. This is not applicable to Part 5 assessments, however, it is noted Bilgola Creek is identified on the BV Map and intersects Serptentine Road within the Study Area (Figure 7).

3.6 BioBank sites

Biobank sites have an existing legal commitment to be managed for conservation purposes in-perpetuity and therefore are not available for future urban development or infrastructure, unless special legislative provisions are enacted to remove or alter the Biobank site. The study area or even the broader study area does not contain any sites registered as a Biobank Site under the TSC Act.

Biodiversity Values Map

Newport to Avalon Shared pathway - Ecological Assessment

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FIGURE 7

Imagery: (c) LPI 2018-08-30

4. Potential Impacts

4.1 Overview

The potential impacts discussed in this section are based on database research, existing mapping and a site visit including detailed on ground mapping and collection of data on biodiversity values within the Study Area (using RDPs).

4.1 Vegetation and threatened ecological communities

A total of approximately 0.03 ha of native vegetation will be permanantly impacted as a result of the Project through clearing (see Table 5), however, most of this clearing will involve the removal of only shrubs and the ground layer along the edge of existing trails and roads. Overstorey trees will be pruned back where they impede construction but retained wherever possible.

The Project has the potential to cause indirect impacts to a further 0.12 ha of native bushland if a buffer area of 2 metres of vegetation around the proposed paths is to be assumed vulnerable. Whilst temporary impacts such as inadvertent trampling and sedimentation to native vegetation adjacent to the areas of vegetation being cleared are a possible outcome of the propsed construction works, these impacts can also be avoided by implementing the avoidance and mitigation strategies outlined in section 5.2 of this report.

A total of 0.01 ha of the TEC: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) will be cleared and another 0.02 ha temporarily impacted (trampled) within the construction buffer area during construction works.

A breakdown of these impacts is detailed in Table 5 below. Representative pictures of vegetation communities to be impacted by the project are shown in in Appendix 3.

Table 5: Native vegetation communities impacted by the project footprint and buffer areas

Plant Community Type Name (Vegetation Community)	Plant Community Type Number	Threatened Ecological Community	Path Type interescting	Area directly cleared (ha)	Total area of clearing (ha)	Buffer area (non permanent impacts of construction process) (ha)	Total area of Buffer area impacts (ha)	Total area of impacts (clearing and non permanent construction impacts) (ha)	Total area of permanent and non permanent impacts (ha)
Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast	1817	No	Shared path (on-ground)	0.01	0.02	0.04	0.1	0.05	0.12
			Shared path (suspended)	0.01		0.05		0.06	
			Footpath (on-ground)	0		0.01		0.01	
Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney	1778	No	Footpath (on-ground)	0.00001	0.00001	0.00005	0.00005	0.00006	0.00006
Kangaroo Grass sod tussock grassland of	898	Yes	Shared path (on-ground)	0	0.011	0.01	0.024	0.01	0.031

Plant Community Type Name (Vegetation Community)	Plant Community Type Number	Threatened Ecological Community	Path Type interescting	Area directly cleared (ha)	Total area of clearing (ha)	Buffer area (non permanent impacts of construction process) (ha)	Total area of Buffer area impacts (ha)	Total area of impacts (clearing and non permanent construction impacts) (ha)	Total area of permanent and non permanent impacts (ha)
coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion			Shared path (suspended)	0.01		0.01		0.02	
			Footpath (on-ground)	0.001		0.004		0.001	
Exotic / plantings/ cleared	N/A	-	Shared path (on-ground)	0.13	0.25	0.29	0.74	0.42	0.99
			Shared path (suspended)	0.11		0.43		0.54	
			Footpath (suspended)	0.01		0.02		0.03	
Total					**0.28**		**0.86**		**2.0**

The project will impact on one TECs listed under the BC Act: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898). A total of 0.1 hectares of this TEC will be cleared under the current proposed footprint, with another likely to be temporarily impacted (trampled) during the construction phase in buffer areas.

4.2 Threatened species

The proposal is unlikely to impact on habitat for any threatened species. Threatened flora were not recorded in the Study Area during targeted surveys, despite several threatened species having been recorded in the general location previously.

Of the eleven threatened fauna species that have been recorded previously or have potential habitat within the Study Area or broader Subject Site, none are likely to be significantly impacted by the proposed project. All threatened fauna species with a low-moderate or higher likelihood of occurrence in the Study Area or surrounding land had a low likelihood of impacts occurring to them as a result of the Project as no limiting habitat will be removed (See Appendix 1). As such, assessments of significance (BC Act and EPBC Act) were not deemed necessary for any threatened fauna species that may occur within the Study Area or broader Subject Site.

Moreover, the vegetation directly adjacent to the Study Area is of equal or better quality (less disturbed) than within the Study Area and would provide any threatened fauna with equivalent or better foraging and nesting opportunities.

4.3 Biodiversity Values Map

The Serpentine Road already crosses Bilgola Creek (ephemeral creek) (Figure 7) and no new works will be occurring near this BV such that any direct or indirect impacts to it would occur. As such, this project will have no impacts on any BVs. Furthermore, consideration of the BV Map is not required for Part 5 assessments.

4.4 Corridors

Impacts of the Project on the 'local' wildlife corridor will be minimal for the following reasons:

- Only a small proportion of the wildlife corridor will be impacted / cleared (less than 1%)
- Clearing will take place for the most part along the edge of existing roads and residential properties, as well as along the corridor rather than across it and will therefore not fragment the corridor and reduce connectivity
- Compensatory planting will be conducted wherever there is a net loss of overstorey and midstorey trees as detailed in section 5.2 below.
- Fauna will have ample area of equivalent or better vegetation adjacent to the Study Area to continue to move freely during the construction phase of the project and after its completion.

5. Recommendations

5.1 Overview

Recommendations would be developed further at the stage of the Biodiversity Impact Assessment, but the following should be considered as a minimum:

- Avoid, mitigate and offset principles should be applied as detailed in Section 5.2.
- As far as possible, ensure any works are consistent with the objectives, recommendations and compensation requirements of the Northern Beaches Bushland strategies (https://www.northernbeaches.nsw.gov.au/council/publications/strategies-and-plans) which include:
  - -Habitat and Wildlife Corridors strategy (1995)(former Pittwater Council document)
  - -Native Fauna Management Plan for Pittwater (2011) (former Pittwater Council document)
  - -Pittwater Native Vegetation Management Plan (2012) (former Pittwater Council document)

5.2 Avoid, mitigate offset

Conceptually, the best approach to managing the impacts of development on biodiversity starts by examining the potential for impact avoidance. Once exhausted, impact minimisation represents the next level of consideration. The last and least preferable option is the use of biodiversity offsets. The following sections provide a broad narrative for the consideration of this conceptual framework.

5.2.1 Impact avoidance

The following recommendations should be considered to avoid impacts to flora, fauna and their habitats.

- Clearing be restricted to the vegetation occurring within the development footprint. Surrounding bushland areas should not be impacted as part of the project.
- Adjusting the footprint of the path if possible, to avoid impacting the Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin) Bioregion and South East Corner Bioregion TEC.
- A pre-clearing survey be undertaken to ensure all hollow-bearing trees occurring outside the clearing footprint are marked and protected.
- An appropriately skilled ecologist be on site during clearing operations to ensure habitat trees outside the development footprint are protected from construction impacts. The ecologist would also check any hollows for resident fauna prior to any felling that might be required, to minimise the risk of resident fauna being harmed during the clearing process by safely removing and translocating them.

5.2.2 Impact minimisation

The following recommendations should be considered at the impact assessment stage to minimise impacts to flora, fauna and their habitats.

- A Flora and Fauna Management Plan be prepared with reference to the Roads and Maritime's Biodiversity Guidelines: Protecting and Managing Biodiversity on RTA Projects (RTA, 2011) and implemented as part of the CEMP. It would include, but not be limited to:
  - plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas
  - requirements set out in the Landscape Guideline (RTA, 2008)
  - pre-clearing survey requirements
  - procedures for unexpected threatened species finds and fauna handling
  - procedures addressing relevant matters specified in the Policy and guidelines for fish habitat conservation and management (DPI Fisheries, 2013)

- Protocols to manage weeds and pathogens.

- Measures to further avoid and minimise the construction footprint and native vegetation or habitat removal should be investigated during detailed design and implemented where practicable and feasible.
- If unexpected threatened fauna or flora species are discovered, stop works immediately and follow the RMS Unexpected Threatened Species Find Procedure in the RMS Biodiversity Guidelines Guide 1 (Pre-clearing process) (RTA 2011a).
- To prevent the spread of weed seed, all weed material removed should be disposed of in a suitable waste facility and not mulched on site. This is to avoid the reintroduction and further spread of weeds in the area. Weed management should be undertaken in accordance with RMS Biodiversity Guidelines - Guide 6 (Weed management) (RTA 2011a).
- Machinery be washed following best practice hygiene protocols prior to being bought to site to prevent the spread of weed seed, pathogens and fungi. Hygiene protocols should be undertaken in accordance with the requirements of the RMS Biodiversity Guidelines - Guide 7 (Pathogen management) (RTA 2011a).
- Sediment barriers should be placed along the edge of any drainage lines that are in close proximity to works to avoid run off into coastal waters which could impact intertidal flora and fauna.
- Buffer areas required for construction (moving machinery through) that will be trampled should be restored (revegitated) to their natural state using local species to maintain local provenance.

5.2.3 Connectivity strategy

Given clearing is unlikely to impact the function of the broader area as a wildlife corridor, measures such as the installation of wildlife exclusion fencing, glider poles or other permanent structures are not recommended. Revegetation and compensatory plantings on temporarily cleared and impacted areas using local species is recommended post clearing to provide cover within the study area for smaller animals that might be exposed to high rates of predation whilst exposed. Northern Beaches Council have advised that compensatory planting and revegetation efforts will be undertaken.

5.2.4 Offsetting

Offsetting is required under the BC and EPBC Acts when impacts to native vegetation and threatened species breach thresholds discussed below:

BC Act

Given the Project is likely to be assessed under Part 5 of the EP&A Act, offsets would be required if it was to have a significant impact on threatened biodiversity (determined though application of the 5-part test under the BC Act). While no threatened species are expected to be impacted, 0.01 ha of a single TEC (Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898)) will be permanently impacted and another 0.02 ha may be impacted in buffer areas during construction works. A 5-part test (Assessment of Significance, under the BC Act) was completed for this TEC and concluded that the proposal would impart an insignificant impact on it (Appendix 3).

EPBC Act

Offsetting under the EPBC Act is required if the residual impacts of the proposal are significant as defined in the significant impact guidelines (DEWHA 2012).

No EPBC Assessments of significance were required as no threatened species are expected to be impacted and the only TEC to be impacted (Kangaroo Grass sod tussock grassland of coastal areas of the Sydney

Basin Bioregion and South East Corner Bioregion (PCT 898)) is not listed under the EPBC Act. As such, a referral to the Commonwealth and offsetting requirements are not required for this Project.

6. Conclusion

The project has the potential to permanently impact a total of 0.03 ha and temporarily impact (trample) another 0.12 ha of the following native vegetation communities:

- Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817)
- Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778)
- Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin)Bioregion and South East Corner Bioregion (PCT 898)

Temporary impacts such as trampling of vegetation, accidental damage to vegetation outside clearing limits and sedimentation, will be avoided by undertaking avoidance and mitigation strategies detailed in section 5.2 of this report.

Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 898) is listed as a TEC under the BC Act. The Project will permanently impact 0.01 ha and temporarily impact (trampling) another 0.02 ha of this TEC.

None of the vegetation to be impacted is listed as a TEC under the EPBC Act.

No threatened flora were recorded within the Study Area. Threatened flora are unlikely to be impacted by the Project.

The Study Area may offer some marginal foraging habitat, however, this is unlikely to affect threatened fauna in the area as the areas to be permanently altered represent a very small proportion of the surrounding habitat, are largely thin strips adjacent to existing roads and active regeneration and compensatory planting will take place after the construction phase.

Minor impacts associated with the Project to one single TEC (Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregio (PCT 898)) listed under the BC Act, are expected under the current proposed footprint. If this impact can not be avoided by alteration to the path, a 5-part test (BC Act Assessment of Signifcnace) will need to be completed for this impact. Given the marginal impact to this TEC however (0.01 ha of permanent and 0.02 ha of temporary impact), it is likely that this will not be a significant impact that would trigger a BDAR and require offsetting.

No EPBC Act assessments of significance are deemed necessary for this project. Furthermore, an EPBC Act Referral is not required for the Project.

Recommendations would be developed further at the impact assessment stage of the project, but the following should be considered as a minimum:

- Avoid, mitigate and offset principles should be applied
- Ensure any works are consistent with the objectives, recommendations and compensation requirements of the Northern Beaches Bushland and Biodiversity Strategies (https://www.northernbeaches.nsw.gov.au/council/publications/strategies-and-plans).
- Offsetting under the BC and EPBC Acts is not required given a 5-part part test for the one TEC impacted by the proposal (Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregio (PCT 898)) concluded that the proposal would not have a

significant impact on this TEC. Nevertheless, if impacts to this TEC can be avoided, it is strongly advised.

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Appendix 1: Threatened biodiversity likelihood of occurrence table

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Amphibians						
Heleioporus australiacus	Giant Burrowing Frog	V	V	The Giant Burrowing Frog has been recorded breeding in a range of water bodies associated with sandy environments of the coast and adjacent ranges from the Sydney Basin south the eastern Victoria. It breeds in hanging swamps, perennial non-flooding creeks and occasionally permanent pools, but permanent water must be present to allow its large tadpoles time to reach metamorphosis.	Low-no habitat	Low
Litoria aurea	Green and Golden Bell Frog	E	V	Inhabits a very wide range of water bodies including marshes, dams and streams, particularly those containing emergent vegetation such as bullrushes or spikerushes. It also inhabits numerous types of man-made water bodies including quarries and sand extraction sites. Optimum habitat includes water-bodies that are un-shaded, free of predatory fish such as Plague Minnow, have a grassy area nearby and diurnal sheltering sites available.	Low-no habitat	Low
Litoria littlejohni	Littlejohn's Tree Frog	V	V	Occurs in wet and dry sclerophyll forests and heathland associated with sandstone outcrops between 280 and 1000 m on the eastern slopes of the Great Dividing Range from the Central Coast down into Victoria. Individuals have been collected from a wide range of water bodies that includes semi-permanent dams, permanent ponds, temporary pools and permanent streams, with calling occurring from fringing vegetation or on the banks. Individuals have been observed sheltering under rocks on high exposed ridges during summer and within deep leaf litter adjacent to the breeding site. Calling occurs in all months of the year, often in association with heavy rains. The tadpoles are distinctive, being large and very dark in colouration.	Low-no habitat	Low
Mixophyes balbus	Stuttering Frog	E	V	Associated with streams in dry sclerophyll and wet sclerophyll forests and rainforests of more upland areas of the Great Dividing Range of NSW and down into Victoria. Breeding occurs along forest streams	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
				with permanent water where eggs are deposited within nests excavated in riffle zones by the females and the tadpoles swim free into the stream when large enough to do so. Outside of breeding, individuals range widely across the forest floor and can be found hundreds of metres from water.		
Pseudophryne australis	Red-crowned Toadlet	V	-	Occurs on wetter ridge tops and upper slopes of sandstone formations on which the predominant vegetation is dry open forests and heaths. This species typically breeds within small ephemeral creeks that feed into larger semi-perennial streams. After rain these creeks are characterised by a series of shallow pools lined by dense grasses, ferns and low shrubs and usually contain leaf litter for shelter. Eggs are terrestrial and laid under litter, vegetation or rocks where the tadpoles inside will reach a relatively late stage of development before waiting for flooding waters before hatching will occur.	Low-no habitat	Low
Birds						
Actitis hypoleucos	Common Sandpiper	-	M, MA	Utilises a wide range of coastal wetlands and some inland wetlands, mostly found around muddy margins or rocky shores. Forages in shallow water and on soft mud, roosts on rocks or vegetation such as mangroves. Northern hemisphere breeding.	Low-no habitat	Low
Anthochaera phrygia	Regent Honeyeater	CE	CE	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests.	Low-no habitat	Low
Apus pacificus	Fork-tailed Swift	-	M	The Fork-tailed Swift is almost exclusively aerial, flying from less than one metre to at least 300 m above ground and probably much higher.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Ardea alba	Great Egret	-	M	Great Egrets prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands.	Low-no habitat	Low
Ardea ibis	Cattle Egret	-	M	The Cattle Egret is found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor.	Low-no habitat	Low
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	Often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests.	Low-no habitat	Low
Botaurus poiciloptilus	Australasian Bittern	E	E	The Australasian Bittern is widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes.	Low-Moderaste no habitat	Low
Burhinus grallarius	Bush Stone-curlew	E	-	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights.	Low-no habitat	Low
Calidris acuminata	Sharp-tailed Sandpiper	-	M	Prefers muddy edges of shallow or brackish wetlands, with inundated or emergent sedges, saltmarsh or other low vegetation. Also found foraging in sewage ponds and flooded paddocks. Northern hemisphere breeding.	Low-no habitat	Low
Calidris canutus	Red Knot	-	M, E	Usually found foraging in soft substrate near the edge of the water on intertidal mudflats. Also have been recorded at nearby lakes, sewage ponds and floodwaters. Roosts on sandy beaches, spits and islands. Northern hemisphere breeding.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Calidris ferruginea	Curlew Sandpiper	E	CE, M	It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes the inland. Northern hemisphere breeding.	Low-no habitat	Low
Calidris melanotos	Pectoral Sandpiper	-	M	Prefers shallow fresh to saline wetlands, found at coastal lagoons, estuaries, bays, swamps, inundated grasslands, saltmarshes and artificial wetlands. Northern hemisphere breeding.	Low-no habitat	Low
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine snow gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	Low-no habitat	Low
Callocephalon fimbriatum	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai local government areas	EP	-	The population is believed to be largely confined to an area bounded by Thornleigh and Wahroonga in the north, Epping and North Epping in the south, Beecroft and Cheltenham in the west and Turramurra/South Turramurra to the east. Usually frequents forested areas with old growth attributes required for nesting and roosting purposes.	Low-no habitat	Low
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	-	Inhabits forest with low nutrients, characteristically with key Allocasuarina spp. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina.	Low-no habitat	Low
Calyptorhynchus lathami	Glossy Black-Cockatoo, Riverina population	EP	-	Inhabits forest with low nutrients, characteristically with key Allocasuarina spp. Tends to prefer drier forest types with a middle stratum of Allocasuarina below Eucalyptus or Angophora. Often	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
				confined to remnant patches in hills and gullies. Breed in hollows stumps or limbs, either living or dead. Endangered population in the Riverina.		
Cuculus optatus, Cuculus saturatus	Oriental Cuckoo	-	M, MA	Mainly inhabits coniferous, deciduous and mixed forests. Breeds in northern hemisphere. Brood parasite, laying eggs in nests of other birds.	Low-no habitat	Low
Dasyornis brachypterus	Eastern Bristlebird	E	E	Found in coastal woodlands, dense scrub and heathlands, particularly where it borders taller woodlands.	Low	Low
Diomedea antipodensis	Antipodean Albatross	V	V, M, MA	The species ranges across the southern Pacific Ocean, east to the coast of Chile and west to eastern Australia. The Antipodean Albatross breeds biennially in colonies on ridges, slopes and plateaus of isolated subantarctic islands, usually in vegetation such as grass tussocks. This species regularly occurs in small numbers off the NSW south coast from Green Cape to Newcastle during winter where they feed on cuttlefish.	Low-no habitat	Low
Diomedea exulans	Wandering Albatross	E	V, M, MA	The Wandering Albatross is marine, pelagic and aerial. The Wandering Albatross visits Australian waters from Fremantle, Western Australia to northern New South Wales between June and September each year.	Low-no habitat	Low
Diomedea gibsoni, Diomedea antipodensis gibsoni	Gibson's Albatross	V	V, M, MA	The species is regularly encountered on trans-Tasman shipping routes and at seas off Sydney, and regularly occurs off the NSW coast usually between Green Cape and Newcastle. This species is known only to breed on the Adams, Disappointment and Auckland Islands in the subantarctic Auckland Island group. Potential forage in NSW waters during the winter is considered significant for the species.	Low-no habitat	Low
Eudyptula minor	Little Penguin in the Manly Point area	EP	-	This endangered population occurs from just north of Smedley's Point to Cannae Point, North Sydney Harbour and Manly. Only known breeding population on the mainland in NSW. A range of nest sites are utilised by the penguins at Manly including under rocks on the foreshore, under seaside houses and structures, such as stairs, in	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
				wood piles and under overhanging vegetation including lantana and under Coral Tree roots.		
Gallinago hardwickii	Latham's Snipe	-	M	Latham's Snipe is a non-breeding migrant to the south east of Australia including Tasmania, passing through the north and New Guinea on passage. Latham's Snipe breed in Japan and on the east Asian mainland. Seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration.	Low-Medium	Low
Glossopsitta pusilla	Little Lorikeet	V	-	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.	Low-no habitat	Low
Grantiella picta	Painted Honeyeater	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits boree, brigalow and box-gum woodlands and box-ironbark forests.	Low-no habitat	Low
Haematopus fuliginosus	Sooty Oystercatcher	V	-	In NSW the Sooty Oystercatcher occupies rocky headlands, reefs and offshore islands along the entire coast, apparently as a single continuous population.	Low-no habitat	Low
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	MA	Inhabits coastal and near coastal areas, building large stick nests, and feeding mostly on marine and estuarine fish and aquatic fauna.	High	Low
Hieraaetus morphnoides	Little Eagle	V	-	Most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. May nest in farmland, woodland and forest in tall trees.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Hirundapus caudacutus	White-throated Needletail	-	M, MA	An aerial species found in feeding concentrations over cities, hilltops and timbered ranges.	Low-no habitat	Low
Lathamus discolor	Swift Parrot	E	CE	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and also nomadic, moving about in response to changing food availability.	Low-no habitat	Low
Limosa lapponica baueri	Bar-tailed Godwit	-	M, V	Bar-tailed Godwit (spp baueri) is the eastern Australian / New Zealand sub species. Mainly found in coastal habitats such as intertidal sand flats, mudflats, estuaries, inlets, coastal lagoons and bays. Often found around beds of seagrass and saltmarsh. Northern hemisphere breeding.	Low-no habitat	Low
Limosa lapponica menzbieri	Bar-tailed godwit	-	M, CE	Bar-tailed Godwit (spp menzbieri) is the western Australian sub species. Mainly found in coastal habitats such as intertidal sand flats, mudflats, estuaries, inlets, coastal lagoons and bays. Often found around beds of seagrass and saltmarsh. Northern hemisphere breeding.	Low-no habitat	Low
Lophoictinia isura	Square-tailed Kite	V	-	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Woollybutt, Spotted Gum, River Peppermint or Gully Gum. Individuals appear to occupy large hunting ranges of more than 100km^2. They require large living trees for breeding, particularly near water with surrounding woodland-forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	Low-no habitat	Low
Macronectes giganteus	Southern Giant Petrel	E	E	The Southern Giant Petrel has a circumpolar pelagic range from Antarctica to approximately 20 S and is a common visitor off the coast of NSW. Over summer, the species nests in small colonies amongst open vegetation on antarctic and subantarctic islands, including Macquarie and Heard Islands and in Australian Antarctic territory.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Macronectes halli	Northern Giant-petrel	V	V	Breeding in Australian territory is limited to Macquarie Island and occurs during spring and summer.	Low-no habitat	Low
Monarcha melanopsis	Black-faced Monarch	-	M	Found along the coast of eastern Australia, becoming less common further south. Inhabits rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	Low-no habitat	Low
Monarcha trivirgatus	Spectacled Monarch	-	M	Coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales. Prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves.	Low-no habitat	Low
Motacilla flava	Yellow Wagtail	-	M	Breeds in temperate Europe and Asia. The Yellow Wagtail is a regular wet season visitor to northern Australia. Increasing records in NSW suggest this species is an occasional but regular summer visitor to the Hunter River region. The species is considered a vagrant to Victoria, South Australia and southern Western Australia. Habitat requirements for the Yellow Wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves.	Low-no habitat	Low
Myiagra cyanoleuca	Satin Flycatcher	-	M	The Satin Flycatcher is found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. Found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	Low-no habitat	Low
Ninox connivens	Barking Owl	V	-	Generally found in open forests, woodlands, swamp woodlands and dense scrub. Can also be found in the foothills and timber along watercourses in otherwise open country.	Low-no habitat	Low
Ninox strenua	Powerful Owl	V	-	Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully	Medium-High	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
				areas. It is most commonly recorded within turpentine tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.		
Numenius madagascariensis	Eastern Curlew	-	CE, MA, M	A primarily coastal distribution. Found in all states, particularly the north, east, and south-east regions including Tasmania. Rarely recorded inland. Mainly forages on soft sheltered intertidal sand flats or mudflats, open and without vegetation or cover. Breeds in the northern hemisphere.	Low-no habitat	Low
Pandion cristatus, Pandion haliaetus	Eastern Osprey	V	M, MA	Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	Low-Medium	Low
Phoebetria fusca	Sooty Albatross	V	-	In Australian waters, this species is generally recorded in winter off the south coast from Tasmania to Western Australia, while there are occasional sightings off the NSW coast, north of Grafton. This pelagic or ocean-going species inhabits subantarctic and subtropical marine waters, spending the majority of its time at sea, and rarely occurs in continental shelf waters.	Low-no habitat	Low
Pterodroma neglecta neglecta	Kermadec Petrel (west Pacific subspecies)	V	V	Typically nests on the surface in loose colonies among rocks and vegetation. On Ball's Pyramid it nests only on steep cliffs above 400 m. On Phillip I. it nests under stands of African Olive. This species is marine and highly pelagic, rarely approaching land except at colonies.	Low-no habitat	Low
Ptilinopus superbus	Superb Fruit-dove	V	-	The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
				south as Moruya. There are records of vagrants as far south as eastern Victoria and Tasmania. Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.		
Rhipidura rufifrons	Rufous Fantail	-	M	Found along the east coast of Australia from far northern Queensland to Tasmania, including south-eastern South Australia. Inhabits tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	Low-no habitat	Low
Rostratula australis	Australian Painted Snipe	E	E, MA	In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	Low-Medium	Low
Sternula albifrons	Little Tern	E	M	In Australia, Little Terns inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand-spits, and also on exposed ocean beaches.	Low-no habitat	Low
Sternula nereis nereis	Fairy Tern	-	V	Distribution includes the southern half of NSW coast. Fairy Terns utilise a variety of habitats including offshore, islands in estuaries or lakes, wetlands, beaches and spits.	Low-no habitat	Low
Thalassarche cauta (sensu stricto), Thalassarche cauta cauta	Shy Albatross, Tasmanian Shy Albatross	V	V, M, MA	The Shy Albatross is a marine species occurring in subantarctic and subtropical waters, reaching the tropics in the cool Humboldt Current off South America.	Low-no habitat	Low
Thalassarche chrysostoma	Grey-headed Albatross	-	E, M, MA	The Grey-headed Albatross is marine, pelagic and migratory. In Australian territory, Grey-headed Albatross breed on the southern and western flanks of Petrel Peak, Macquarie Island. Birds disperse widely across the Southern Ocean, at more southerly latitudes in	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
				summer than in winter, when they frequent the waters off southern Australia and New Zealand.		
Thalassarche melanophris	Black-browed Albatross	V	V, M, MA	The Black-browed Albatross has a circumpolar range over the southern oceans, and are seen off the southern Australian coast mainly during winter. Inhabits antarctic, subantarctic, subtropical marine and coastal waters over upwellings and boundaries of currents.	Low-no habitat	Low
Tringa nebularia	Common Greenshank	-	M	Variety of inland wetlands and sheltered coastal habitats of varying salinity. Found on mudflats, saltmarsh, mangroves in embayments, harbours, deltas and lagoons. Breeds in northern hemisphere.	Low-no habitat	Low
Tyto novaehollandiae	Masked Owl	V	-	Inhabits a diverse range of wooded habitat that provide tall or dense mature trees with hollows suitable for nesting and roosting. Mostly recorded in open forest and woodlands adjacent to cleared lands. Nest in hollows, in trunks and in near vertical spouts or large trees, usually living but sometimes dead. Nest hollows are usually located within dense forests or woodlands. Masked Owls prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet.	Low-no habitat	Low
Fish						
Macquaria australasica	Macquarie Perch	E (FM Act)	E	Macquarie perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury and Shoalhaven. Macquarie perch are found in both river and lake habitats, especially the upper reaches of rivers and their tributaries	Low-no habitat	Low
Prototroctes maraena	Australian Grayling	-	V	Historically, this species occurred in coastal streams from the Grose River Valley, southwards through NSW, Vic. and Tas. It also occasionally occurred high upstream in the Snowy R. A single juvenile specimen was collected from Lake Macquarie in 1974. This species spends only part of its lifecycle in freshwater. The Tambo River population inhabits a clear, gravel-bottomed stream with alternating pools and riffles, and granite outcrops. It has also been associated	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
				with clear, gravel-bottomed habitats in the Mitchell & Wonnangatta Rivers but was present in a muddy-bottomed, heavily silted habitat in the Tarwin R.		
Mammals						
Cercartetus nanus	Eastern Pygmy-possum	V	-	Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree hollows, but can also construct its own nest. Because of its small size it is able to utilise a range of hollow sizes including very small hollows. Individuals will use a number of different hollows and an individual has been recorded using up to 9 nest sites within a 0.5 ha area over a 5 month period.	Low-no habitat	Low
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range. Can also be found on the edges of rainforests and in wet sclerophyll forests. This species roosts in caves and mines in groups of between 3 and 37 individuals.	Low-no habitat	Low
Dasyurus maculatus maculatus	Spotted-tailed Quoll	V	E	Spotted-tailed Quoll are found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Low-no habitat	Low
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether or not this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor. This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites.	Low-no habitat	Low
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E	E	Prefers sandy soils with scrubby vegetation and-or areas with low ground cover that are burn from time to time. A mosaic of post fire vegetation is important for this species.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Miniopterus australis	Little Bentwing-bat	V	-	Coastal north-eastern NSW and eastern Queensland. The Little Bentwing-bat is an insectivorous bat that roost in caves, in old mines, in tunnels, under bridges, or in similar structures. They breed in large aggregations in a small number of known caves and may travel hundreds of kilometres from feeding home ranges to breeding sites. They have a preference for moist eucalypt forest, rainforest or dense coastal banksia scrub where it forages below the canopy for insects.	High	Low
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	Eastern Bentwing-bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.	High	Low
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species' habits.	Medium-High	Low
Myotis macropus	Southern Myotis	V	-	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage.	Medium-High	Low
Petauroides volans	Greater Glider population in the Eurobodalla local government area	EP	-	This population of Greater Gliders on the south coast of NSW is bounded by the Moruya River to the north, Coila Lake to the south and the Princes Highway and cleared land exceeding 700 m in width to the west. The Greater Glider occurs in eucalypt forests and woodlands.	Low-no habitat	Low
Petauroides volans	Greater Glider	-	V	The Greater Glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Petaurus norfolcensis	Squirrel Glider	V	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	Low-no habitat	Low
Petaurus norfolcensis	Squirrel Glider in the Wagga Wagga local government area	EP	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	Low-no habitat	Low
Petaurus norfolcensis	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	EP	-	Generally occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow bearing trees and a mix of eucalypts, banksias and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	Low-no habitat	Low
Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves and crevices.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Phascolarctos cinereus	Koala	V	V	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate and rainfall.	Low-no habitat	Low
Potorous tridactylus tridactylus	Long-nosed Potoroo	V	V	Inhabits coastal heath and wet and dry sclerophyll forests. Generally found in areas with rainfall greater than 760 mm. Requires relatively thick ground cover where the soil is light and sandy.	Low-no habitat	Low
Pseudomys novaehollandiae	New Holland Mouse	-	V	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Low-no habitat	Low
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km.	Low-no habitat	Low
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Medium-High	Low
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m. In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat. This species roosts in hollow tree trunks and branches.	Low-medium	Low
Marine mammals						
Arctocephalus forsteri	New Zealand Fur-seal	V	-	Prefers rocky parts of islands with jumbled terrain and boulders.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Arctocephalus pusillus	Australian Fur-seal	V	-	Prefers rocky parts of islands with flat, open terrain. They occupy flatter areas than do New Zealand Fur-Seals where they occur together.	Low-no habitat	Low
Balaenoptera musculus	Blue Whale	E	E	Breeds in warm water at low latitudes, preferring open seas rather than coastal waters.	Low-no habitat	Low
Dugong dugon	Dugong	E	-	Extends south from warmer coastal and island waters of the Indo-West Pacific to northern NSW, where it's known from incidental records only. Major concentrations of Dugongs occur in wide shallow protected bays, wide shallow mangrove channels and in the lee of large inshore islands. Will also occupy deeper waters if their seagrass food is available.	Low-no habitat	Low
Eubalaena australis	Southern Right Whale	E	E	Migrate between summer feeding grounds in Antarctica and winter breeding grounds around the coasts of southern Australia, New Zealand, South Africa and South America. They feed in the open ocean in summer. They move inshore in winter for calving and mating.	Low-no habitat	Low
Megaptera novaeangliae	Humpback Whale	V	V	The population of Australia's east coast migrates from summer cold-water feeding grounds in subantarctic waters to warm-water winter breeding grounds in the central Great Barrier Reef.	Low-no habitat	Low
Physeter macrocephalus	Sperm Whale	V	-	Wide, but patchy distribution from the tropics to the edge of the polar pack-ice in both hemispheres. Concentrations of Sperm Whales tend to occur where the seabed rises steeply from a greater depth, beyond the continental shelf.	Low-no habitat	Low
Reptiles						
Caretta caretta	Loggerhead Turtle	E	-	Loggerhead turtles have a worldwide tropical and subtropical distribution. In Australia, they occur in coral reefs, bays and estuaries in tropical and warm temperate waters off the coast of Queensland, Northern Territory, Western Australia and New South Wales.	Low-no habitat	Low
Chelonia mydas	Green Turtle	V	V	Green Turtles occur in seaweed-rich coral reefs and inshore seagrass pastures in tropical and subtropical areas of the Indo-Pacific region.	Low-no habitat	Low
Dermochelys coriacea	Leathery Turtle	V	E	Occurs in inshore and offshore marine waters. Rarely breeds in Australia, with the nearest regular nesting sites being the Solomon	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
				Islands and Malayan Archipelago. Occasional breeding records from NSW coast, including between Ballina and Lennox Head in northern NSW.		
Eretmochelys imbricata	Hawksbill Turtle	-	V, M, MA	Hawksbill Turtles spend their first five to ten years drifting on ocean currents. Hawksbill Turtles have been seen in temperate regions as far south as northern NSW.	Low-no habitat	Low
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Occurs almost exclusively in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they spend most of the year sheltering in and under rock crevices and exfoliating rock. However, some individuals will migrate to tree hollows to find shelter during hotter parts of summer.	Low-no habitat	Low
Natator depressus	Flatback Turtle	-	V, M, MA	Post-hatchling and juvenile Flatback Turtles do not have the wide dispersal phase in the oceanic environment like other sea turtles. Adults inhabit soft bottom habitat over the continental shelf of northern Australia.	Low-no habitat	Low
Varanus rosenbergi	Rosenberg's Goanna	V	-	Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. Found in heath, open forest and woodland, associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat and feeds on carrion, birds, eggs, reptiles and small mammals. They shelter in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	Low-no habitat	Low
Plants						
Asterolasia elegans		E	E	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Also likely to occur in the western part of Gosford local government area. Known from only seven populations, only one of which is wholly within a conservation	Low-not detected during field surveys	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
				reserve. Occurs on Hawkesbury sandstone in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest.		
Astrotricha crassifolia	Thick-leaf Star-hair	V	V	Occurs near Patonga (Gosford LGA), and in Royal NP and on the Woronora Plateau (Sutherland and Campbelltown LGAs). There is also a record from near Glen Davis (Lithgow LGA). Also in Victoria. Occurs in dry sclerophyll woodland on sandstone.	Low-no habitat	Low
Boronia umbellata	Orara Boronia	V	V	Grows as an understorey shrub in and around gullies in wet open forest.	Low-no habitat	Low
Caladenia tessellata	Thick-lip Spider Orchid	E	V	The Tessellated Spider Orchid is found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. Known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct.	Low-no habitat	Low
Callistemon linearifolius	Netted Bottle Brush	V	-	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. Grows in dry sclerophyll forest on the coast and adjacent ranges.	Low-not detected during field surveys	Low
Chamaesyce psammogeton	Sand Spurge	E	-	Found sparsely along the coast from south of Jervis Bay (at Currarong, Culburra and Seven Mile Beach National Park) to Queensland (and Lord Howe Island). Populations have been recorded in Wamberal Lagoon Nature Reserve, Myall Lakes National Park and Bundjalung National Park. Grows on fore-dunes and exposed headlands, often with Spinifex sericeus.	Low-not detected during field surveys	Low
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum, Silvertop Ash, Red Bloodwood and Black She-oak and appears to prefer open areas in the understorey of this community.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Cynanchum elegans	White-flowered Wax Plant	E	E	Recorded from rainforest gullies scrub and scree slopes from the Gloucester district to the Wollongong area and inland to Mt Dangar.	Low-no habitat	Low
Eucalyptus camfieldii	Heart-leaved Stringybark	V	V	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace Area south to Waterfall. Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas.	Low-no habitat	Low
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. Seedling recruitment is common, even in disturbed soils, if protected from grazing and fire.	Low-not detected during field surveys	Low
Genoplesium baueri	Bauer's Midge Orchid	E	E	Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March. Has been recorded between Ulladulla and Port Stephens. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded in Berowra Valley Regional Park, Royal National Park and Lane Cove National Park and may also occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments.	Low-no habitat	Low
Grevillea caleyi	Caley's Grevillea	CE	CE	Restricted to an 8 km square area around Terrey Hills, approximately 20 km north of Sydney. Occurs in three major areas of suitable habitat, namely Belrose, Ingleside and Terrey Hills-Duffys forest within the Ku-ring-gai, Pittwater and Warringah Local Government Areas. All sites occur on the ridgetop between elevations of 170 to 240 m, in association with laterite soils and a vegetation community of open forest, generally dominated by Silvertop Ash and Red Bloodwood. Commonly found in the endangered Duffys forest ecological community.	Low-no habitat	Low
Grevillea shiressii	Grevillea shiressii	V	V	Grows along creek banks in wet sclerophyll forest with a moist understorey in alluvial sandy or loamy soils.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Haloragodendron lucasii		E	E	Occurs on Hawkesbury Sandstone in moist sandy loam soil. The species prefers sheltered aspects and inhabits gentle slopes below cliff lines near creeks in low open woodland or open forest. Its distribution is correlated with high soil moisture and phosphorus levels.	Low-no habitat	Low
Kunzea rupestris	Kunzea rupestris	V	V	Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland.	Low-no habitat	Low
Lasiopetalum joyceae		V	V	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest. Seventeen of these are reserved. Grows in heath on sandstone.	Low-no habitat	Low
Leptospermum deanei	Deane's Tea-tree	V	V	Woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone. Occurs in riparian scrub, woodland and open forest.	Low-no habitat	Low
Melaleuca biconvexa	Biconvex Paperbark	V	V	Grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north.	Low-no habitat	Low
Melaleuca deanei	Deane's Melaleuca	V	V	Grows in wet heath on sandstone in coastal districts from Berowra to Nowra.	Low-no habitat	Low
Microtis angusii	Angus's Onion Orchid	E	E	It is not easy to define the preferred natural habitat of this orchid as the Ingleside location is highly disturbed. The dominant species occurring on the site are introduced weeds Coolatai grass and Acacia saligna. The Ingleside population occurs on soils that have been modified but were originally those of the restricted ridgetop lateritic soils in the Duffys forest - Terrey Hills - Ingleside and Belrose areas. These soils support a specific and distinct vegetation type, the Duffys forest Vegetation Community which is listed as an EEC under the TSC Act and ranges from open forest to low open forest and rarely woodland.	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
Persoonia hirsuta	Hairy Geebung	E	E	Distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. A large area of occurrence, but occurs in small populations, increasing the species' fragmentation in the landscape. Found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. Usually present as isolated individuals or very small populations. Probably killed by fire (as other Persoonia spp. are) but will regenerate from seed.	Low-no habitat	Low
Pimelea curviflora var. curviflora		V	V	Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Former range extended south to the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly. Occurs on shale-lateritic soils over sandstone and shale-sandstone transition soils on ridgetops and upper slopes amongst woodlands.	Low-no habitat	Low
Prostanthera askania	Tranquility Mintbush	E	E	Occurs adjacent to drainage lines on flat to moderately steep slopes formed on Narrabeen sandstone, and in moist sclerophyll forest and warm temperate rainforest communities. These communities are generally tall forests with a mesic understorey. Appears in some locations to propagate vegetatively by stem-layering where prostrate branches take root where they remain in contact with the soil.	Low-no habitat	Low
Prostanthera junonis	Somersby Mintbush	E	E	The species is restricted to the Somersby Plateau. It occurs on both the Somersby and Sydney Town soil landscapes on gently undulating country over weathered Hawkesbury sandstone within open forest-low woodland-open scrub. It occurs in both disturbed and undisturbed sites.	Low-no habitat	Low
Prostanthera marifolia	Seaforth Mintbush	CE	CE	Occurs in localised patches in or in close proximity to the endangered Duffys forest ecological community. Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has been extensively urbanised.	Low-no habitat	Low
Syzygium paniculatum	Magenta Lilly Pilly	E	V	Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State forest. On the south coast the species occurs on grey	Low-no habitat	Low

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat	Likelihood of occurance	Likelihood of impacts from project
				soils over sandstone, restricted mainly to remnant stands of littoral rainforest. On the central coast it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.		
Tetratheca glandulosa	Tetratheca glandulosa	V	-	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey-sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops. Vegetation structure varies from heaths and scrub to woodlands-open woodlands, and open forest.	Low-no habitat	Low
Thesium australe	Austral Toadflax	V	V	Grows in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland. Grows on Kangaroo Grass tussocks but has also been recorded within the exotic Coolatai Grass.	Low-no habitat	Low

Key: CE = Critically Endangered; E, E1 = Endangered; EP = Endangered Population; V = Vulnerable; M = Migratory.

Note: Fauna that are exclusively dependant on marine environments, including near shore environments, were not included in the assessment due to lack of suitable habitat.

Habitat descriptions taken from the relevant profiles on the OEH Threatened Species website unless otherwise stated.

Appendix 2. Photos of the study area

Plate 1: Starting point of shared pathway project at Newport beach (existing dirt walking trail)

Plate 2: Starting point of shared pathway project at Newport beach (existing dirt walking trail) with Newport beach in view

Plate 3: Existing stairs running up through Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817) vegetation community

Plate 4: Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817) vegetation community

Plate 5: Existing walking trail through Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817)

Plate 6: 1817: Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817) which will be impacted by a shared path (on-ground).

Plate 7: Existing borderwalk running through Lilly Pilly - Cabbage Tree Palm littoral rainforest on escarpment slopes and gullies of the Sydney basin (PCT 1833)

Plate 8: Manecured garden area where shared path (omn-ground) will run through (impact).

Plate 9: Occasional weeds found along existing trails and road side (asparagous fern)

Plate 10: On-road section of the project along the Serpentine Rd with road side exotic plantings, running through a residential area.

Plate 11: On-road section of the project along the Serpentine Rd with road side native plantings, running through a residential area.

Plate 12: On-road section of the project along the Serpentine Rd, running through a residential area next to drive ways/ lawn.

Plate 13: Serpentine Rd running past Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney (PCT 1778)

Plate 14: Serpentine Road where a footpath (on-ground) is to be constructed impacting the local Banksia - Tea-tree - She-oak / Spiny-headed Mat-rush - Kangaroo Grass heath on clay soils on headlands around Sydney and the Central Coast (PCT 1817) vegetation community

Plate 15: Steep hill along the Serpentine Rd with dirve ways on the road verge.

Plate 16: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (TEC).

Plate 17: On road section of the project running past the Coast Banksia - Coast Wattle dune scrub of the Sydney Basin Bioregion and South East Corner Bioregion (PCT 772) vegetation community.

Plate 18: On road section of the project running past residential area along Barrenjoey Rd where a shared path (on-ground) is to be constructed.

Plate 19: Corner of The Serpentine Rd and Barrenjoey rd.

Plate 20: Project ending point at Avaon Beach

Appendix 3 – Assessments of Significance (Five Part Test) BC Act

The following threatened biodiversity listed on the BC Act are known to occur or considered likely to occur in the study area:

- PCT 898: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (KGSTG)

The potential impact of the proposal this threatened ecological community have been assessed via the application of the Five Part Test under the BC Act.

PCT 898: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (KGSTG)	
a) In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction	n/a
b) In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed: i. Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or ii. Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction	The action proposed will not have an adverse effect on either the extent or composition of (KGSTG) such that its local occurrence is placed at risk of extinction as: • No patches of KGSTG will be cleared completely, or even significantly of vegetation. • Only a maximum of 0.1 ha of KGSTG will be cleared with temporary trampling impacts to another 0.2 ha that the community will likely recover from • There is approximately 5 ha of KGSTG within the vicinity of the Study Area which, therefore the impact area of the project represents less than 1% of the local occurrence this community.
c) In relation to the habitat of a threatened species, population or ecological community: i. The extent to which habitat is likely to be removed or modified as a result of the action proposed, and ii. Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and iii. The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.	**Extent of impact on habitat** Only 0.1 ha of KGSTG would be removed by the proposal, with a maximum of another 0.2 ha temporarily impacted through trampling during construction. This represents less than 1% percent of the local occurrence of KGSTG this proposal will impact. **Habitat fragmentation** No further habitat fragmentation would occur as the patch of KGSTG to be impacted is already isolated from other patches along the coast. **Importance of habitat to be impacted** The area of KGSTG represents a small patch of this community and is typical of the patches that exist along the coast. Given this is only a small to typically sized representative patch of this community, the minor impact to it is **unlikely to have long-term negative consequences for the local occurrence of KGSTG**.

PCT 898: Kangaroo Grass sod tussock grassland of coastal areas of the Sydney Basin Bioregion and South East Corner Bioregion (KGSTG)	
d) Whether the action proposed is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly)	No areas of outstanding biodiversity value would be affected by the proposed works either directly or indirectly. No areas identified as priority conservation lands were identified within the footprint of the project or near surrounds. Priority conservation lands are identified as the lands that can contribute most to the long-term recovery and maintenance of threatened biodiversity (DECCW 2010).
e) Whether the action proposed constitutes or is part of a Key Threatening Process (KTP) or is likely to result in the operation of, or increase the impact of, a KTP	The proposal has the potential to increase the impact of the following KTPs listed in NSW: • Clearing of native vegetation'. A total of 0.1 ha of KGSTG will be removed by the proposal. This is only a very small fraction of the total area of this community within the vicinity of the project (<1 %). • Invasion of native plant communities by exotic weeds (e.g, perennial grasses) – there is a risk that weeds may be introduced into the community during the removal / pruning of trees by workers. The proposal is not likely to exacerbate the occurrence of exotic weeds, provided weed management is undertaken during clearing to minimise introduction and spread of weed species, in accordance with Guide 6 of the Roads and Maritime Biodiversity Guidelines (RTA 2011).
Conclusion	The local occurrence of KGSTG is unlikely to be significantly affected by the proposed works.

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Appendix E

Database Search Results

EPBC Act Protected Matters Report

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

Report created: 23-Nov-2023

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	8
Listed Threatened Species:	109
Listed Migratory Species:	63

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 https://www.dcceew.gov.au/parks-heritage/heritage

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

Commonwealth Lands:	14
Commonwealth Heritage Places:	None
Listed Marine Species:	83
Whales and Other Cetaceans:	15
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	2
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	13
Key Ecological Features (Marine):	None
Biologically Important Areas:	8
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [Resource Information]

Name	State	Legal Status	Buffer Status
Natural			
Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves	NSW	Listed place	In buffer area only

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 a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name	Buffer Status
Commonwealth Marine Areas (EPBC Act)	In buffer area only

Listed Threatened Ecological Communities [Resource Information]

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

Community Name	Threatened Category	Presence Text	Buffer Status
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community likely to occur within area	In feature area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community likely to occur within area	In feature area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community likely to occur within area	In feature area
Eastern Suburbs Banksia Scrub of the Sydney Region	Critically Endangered	Community may occur within area	In feature area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area	In buffer area only
Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion	Endangered	Community likely to occur within area	In buffer area only
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area	In feature area

Community Name	Threatened Category	Presence Text	Buffer Status
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area	In buffer area only

Listed Threatened Species [Resource Information]

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat may occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In feature area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pycnoptilus floccosus Pilotbird [525]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thalassarche salvini](#) Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
FISH			
[Epinephelus daemelii](#) Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Hippocampus whitei](#) White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat known to occur within area	In feature area
[Macquaria australasica](#) Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In feature area
[Prototroctes maraena](#) Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Seriolella brama](#) Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In feature area
[Thunnus maccoyii](#) Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
FROG			
[Heleioporus australiacus](#) Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Litoria aurea](#) Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Mixophyes balbus](#) Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area	In feature area
MAMMAL			
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
[Chalinolobus dwyeri](#) Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known to occur within area	In feature 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	In feature area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area
[Isoodon obesulus obesulus](#) Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area	In feature area
[Notamacropus parma](#) Parma Wallaby [89289]	Vulnerable	Species or species habitat may occur within area	In feature area
[Petauroides volans](#) Greater Glider (southern and central) [254]	Endangered	Species or species habitat likely to occur within area	In feature area
[Petaurus australis australis](#) Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Petrogale penicillata			
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Potorous tridactylus tridactylus			
Long-nosed Potoroo (northern) [66645]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pseudomys novaehollandiae			
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area	In feature area
OTHER			
Dendronephthya australis			
Cauliflower Soft Coral [90325]	Endangered	Species or species habitat may occur within area	In buffer area only
PLANT			
Acacia bynoeana			
Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area	In feature area
Acacia terminalis subsp. Eastern Sydney (G.P.Phillips 126) listed as Acacia terminalis subsp. terminalis MS			
Sunshine Wattle (Sydney region) [91564]	Endangered	Species or species habitat likely to occur within area	In feature area
Asterolasia elegans			
[56780]	Endangered	Species or species habitat known to occur within area	In feature area
Astrotricha crassifolia			
Thick-leaf Star-hair [10352]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Caladenia tessellata			
Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Darwinia biflora [14619]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Eucalyptus camfieldii Camfield's Stringybark [15460]	Vulnerable	Species or species habitat known to occur within area	In feature area
Genoplesium baueri Yellow Gnat-orchid, Bauer's Midge Orchid, Brittle Midge Orchid [7528]	Endangered	Species or species habitat likely to occur within area	In feature area
Grevillea caleyi Caley's Grevillea [9683]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
Grevillea shiressii [19186]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Haloragodendron lucasii Hal [6480]	Endangered	Species or species habitat may occur within area	In buffer area only
Kunzea rupestris [8798]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Lasiopetalum joyceae [20311]	Vulnerable	Species or species habitat known to occur within area	In feature area
Leucopogon exolasius Woronora Beard-heath [14251]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Melaleuca biconvexa Biconvex Paperbark [5583]	Vulnerable	Species or species habitat may occur within area	In feature area
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Micromyrtus blakelyi [6870]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Persoonia hirsuta Hairy Geebung, Hairy Persoonia [19006]	Endangered	Species or species habitat known to occur within area	In feature area
Pimelea curviflora var. curviflora [4182]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Prostanthera densa Villous Mintbush [12233]	Vulnerable	Species or species habitat may occur within area	In feature area
Prostanthera junonis Somersby Mintbush [64960]	Endangered	Species or species habitat may occur within area	In buffer area only
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area	In feature area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Rhodomyrtus psidioides Native Guava [19162]	Critically Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Syzygium paniculatum](#) Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Thesium australe](#) Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
REPTILE			
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In feature area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Hoplocephalus bungaroides](#) Broad-headed Snake [1182]	Endangered	Species or species habitat may occur within area	In feature area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
SHARK			
[Carcharias taurus (east coast population)](#) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat known to occur within area	In feature area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Galeorhinus galeus School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In feature area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
SNAIL			
Meridolum maryae Maroubra Woodland Snail, Maroubra Land Snail [89884]	Endangered	Species or species habitat known to occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Ardenna grisea Sooty Shearwater [82651]		Species or species habitat likely to occur within area	In feature area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area	In feature area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche eremita			
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini			
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Migratory Marine Species			
Balaenoptera borealis			
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera edeni			
Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Dugong dugon Dugong [28]		Species or species habitat may occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Lagenorhynchus obscurus](#) Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
[Lamna nasus](#) Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In feature area
[Megaptera novaeangliae](#) Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
[Mobula alfredi as Manta alfredi](#) Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat may occur within area	In feature area
[Mobula birostris as Manta birostris](#) Giant Manta Ray [90034]		Species or species habitat may occur within area	In feature area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
[Rhincodon typus](#) Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
[Cuculus optatus](#) Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat likely to occur within area	In feature area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
[Rhipidura rufifrons](#) Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
[Symposiachrus trivirgatus as Monarcha trivirgatus](#) Spectacled Monarch [83946]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area	In feature area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Limosa lapponica			
Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pandion haliaetus			
Osprey [952]		Species or species habitat known to occur within area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

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

Commonwealth Land Name	State	Buffer Status
Communications, Information Technology and the Arts - Australian Postal Corporation		
Commonwealth Land - Australian Postal Commission [13224]	NSW	In buffer area only
Commonwealth Land - Australian Postal Commission [13239]	NSW	In buffer area only
Commonwealth Land - Australian Postal Corporation [16525]	NSW	In buffer area only
Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian Telecommunications Commission [11831]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [13241]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [13240]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [13221]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [13222]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [13223]	NSW	In buffer area only
Defence		

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - Defence Service Homes Corporation [13220]	NSW	In buffer area only
Defence - PITTWATER DIVING ANNEX (forms part of "RAN Torpedo Range") [10028]	NSW	In buffer area only
Defence - PITTWATER DIVING ANNEX (forms part of "RAN Torpedo Range") [10027]	NSW	In buffer area only
Defence - PITTWATER DIVING ANNEX (forms part of "RAN Torpedo Range") [10026]	NSW	In buffer area only
Defence - Defence Housing Authority		
Commonwealth Land - Defence Housing Authority [13238]	NSW	In buffer area only

Listed Marine Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]		Species or species habitat likely to occur within area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat known to occur within area	In feature area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Diomedea antipodensis](#) Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
[Diomedea antipodensis gibsoni as Diomedea gibsoni](#) Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
[Diomedea epomophora](#) Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
[Diomedea exulans](#) Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
[Diomedea sanfordi](#) Northern Royal Albatross [64456]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area	In buffer area only
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area	In feature area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area	In feature area
Pterodroma cervicalis White-necked Petrel [59642]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Stercorarius antarcticus as Catharacta skua Brown Skua [85039]		Species or species habitat may occur within area	In buffer area only
Sterna striata White-fronted Tern [799]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons as Sterna albifrons Little Tern [82849]		Species or species habitat may occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat may occur within area overfly marine area	In feature area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri platei as Thalassarche sp. nov. Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Thalassarche eremita](#) Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
[Thalassarche impavida](#) Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area	In feature area
[Thalassarche melanophris](#) Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
[Thalassarche salvini](#) Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area overfly marine area	In feature area
Fish			
[Acentronura tentaculata](#) Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area	In feature area
[Festucalex cinctus](#) Girdled Pipefish [66214]		Species or species habitat may occur within area	In feature area
[Filicampus tigris](#) Tiger Pipefish [66217]		Species or species habitat may occur within area	In feature area
[Heraldia nocturna](#) Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area	In feature area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In feature area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]	Endangered	Species or species habitat known to occur within area	In feature area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area	In feature area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area	In feature area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In feature area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area	In feature area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In feature area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In feature area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In feature area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In feature area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In feature area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In feature area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area	In feature area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area	In feature area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In feature area
Mammal			
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In feature area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In feature area
Dugong dugon Dugong [28]		Species or species habitat may occur within area	In feature area
Reptile			
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area	In feature area
Hydrophis platurus as Pelamis platurus Yellow-bellied Sea Snake [93517]		Species or species habitat may occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

Whales and Other Cetaceans			[Resource Information]
Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In feature area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area	In feature area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In buffer area only

Current Scientific Name	Status	Type of Presence	Buffer Status
[Caperea marginata](#) Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
[Delphinus delphis](#) Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area
[Grampus griseus](#) Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
[Lagenorhynchus obscurus](#) Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
[Megaptera novaeangliae](#) Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
[Stenella attenuata](#) Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In feature area
[Tursiops aduncus](#) Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area	In feature area
[Tursiops truncatus s. str.](#) Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Ku-ring-gai Chase	National Park	NSW	In buffer area only
Narrabeen	Aquatic Reserve	NSW	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Construction of a high-capacity fibre optic submarine cable	2006/2914	Not Controlled Action	Completed	In feature area
Currawong Beach residential development adjoining Ku-ring-gai Chase National Par	2008/3988	Not Controlled Action	Completed	In buffer area only
Demolition of Ablutions Block, Snapper Island, NSW	2018/8303	Not Controlled Action	Completed	In feature area
Dog swimming area	2002/870	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Installation of Sydney-Guam Submarine Cable	2007/3848	Not Controlled Action	Completed	In buffer area only
Japan-Guam-Australia Sunshine Coast Branch Marine Cable Route Survey (JGA) QLD	2018/8373	Not Controlled Action	Completed	In buffer area only
Residential subdivision of 62 Hillside Road, Newport, NSW	2017/8044	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
2D marine seismic survey in PEP-11 permit area, NSW	2002/879	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Construction and operation of a subsea telecommunications cable, between Sydney and New Zealand	2015/7480	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Japan-Guam-Australia (JGA) Fibre Optic Cable project	2016/7795	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
Tasman Global Access submarine cable marine route survey, Narrabeen, NSW	2015/7442	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Referral decision				
Breeding program for Grey Nurse Sharks	2007/3245	Referral Decision	Completed	In feature area

Biologically Important Areas

Scientific Name	Behaviour	Presence	Buffer Status
Dolphins			
Tursiops aduncus Indo-Pacific/Spotted Bottlenose Dolphin [68418]	Breeding	Likely to occur	In feature area
Seabirds			
Ardenna carneipes Flesh-footed Shearwater [82404]	Foraging	Known to occur	In buffer area only
Ardenna pacifica Wedge-tailed Shearwater [84292]	Foraging	Likely to occur	In feature area
Diomedea exulans antipodensis Antipodean Albatross [82269]	Foraging	Known to occur	In buffer area only
Procellaria parkinsoni Black Petrel [1048]	Foraging	Likely to occur	In buffer area only
Sharks			
Carcharias taurus Grey Nurse Shark [64469]	Foraging	Known to occur	In feature area
Carcharodon carcharias White Shark [64470]	Distribution	Known to occur	In buffer area only
Whales			
Megaptera novaeangliae Humpback Whale [38]	Foraging	Known to occur	In feature area

Bioregional Assessments

SubRegion	BioRegion	Website	Buffer Status
Sydney	Sydney Basin	BA website	In feature area

Caveat

1 PURPOSE

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

The report contains the mapped locations of:

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

2 DISCLAIMER

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

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

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

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

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

4 LIMITATIONS

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

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

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

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

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

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

Acknowledgements

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

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

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

Please feel free to provide feedback via the Contact us page.

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Data from the 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°C; ^^ rounded to 0.01°C. Copyright the State of NSW through the Department of Planning, Industry and Environment. Search criteria : Public Report of all Valid Records of Entities in selected area [North: -33.60 West: 151.27 East: 151.37 South: -33.70] returned a total of 49,940 records of 2,094 species.

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Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records
Animalia	Amphibia	Myobatrachidae	3116	*Pseudophryne australis*		Red-crowned Toadlet	V,P		40
Animalia	Amphibia	Limnodynastidae	3042	*Heleioporus australiacus*		Giant Burrowing Frog	V,P	V	12
Animalia	Amphibia	Hylidae	3166	*Litoria aurea*		Green and Golden Bell Frog	E1,P	V	2
Animalia	Reptilia	Cheloniidae	2004	*Caretta caretta*		Loggerhead Turtle	E1,P	E	6
Animalia	Reptilia	Cheloniidae	2007	*Chelonia mydas*		Green Turtle	V,P	V	12
Animalia	Reptilia	Dermochelyidae	2013	*Dermochelys coriacea*		Leatherback Turtle	E1,P	E	2
Animalia	Reptilia	Varanidae	2287	*Varanus rosenbergi*		Rosenberg's Goanna	V,P		20
Animalia	Aves	Anatidae	0214	*Stictonetta naevosa*		Freckled Duck	V,P		1
Animalia	Aves	Columbidae	0021	*Ptilinopus regina*		Rose-crowned Fruit-Dove	V,P		4
Animalia	Aves	Columbidae	0023	*Ptilinopus superbus*		Superb Fruit-Dove	V,P		6
Animalia	Aves	Diomedeidae	0086	*Diomedea exulans*		Wandering Albatross	E1,P	E	2
Animalia	Aves	Diomedeidae	0091	*Thalassarche cauta*		Shy Albatross	E1,P	E	3
Animalia	Aves	Diomedeidae	0088	*Thalassarche melanophris*		Black-browed Albatross	V,P	V	1
Animalia	Aves	Procellariidae	0072	*Ardenna carneipes*		Flesh-footed Shearwater	V,P	J,K	1
Animalia	Aves	Procellariidae	0937	*Macronectes halli*		Northern Giant-Petrel	V,P	V	1
Animalia	Aves	Ardeidae	0196	*Ixobrychus flavicollis*		Black Bittern	V,P		7
Animalia	Aves	Accipitridae	0226	*Haliaeetus leucogaster*		White-bellied Sea-Eagle	V,P		47
Animalia	Aves	Accipitridae	0225	*Hieraaetus morphnoides*		Little Eagle	V,P		4
Animalia	Aves	Accipitridae	0230	^^*Lophoictinia isura*		Square-tailed Kite	V,P,3		4
Animalia	Aves	Accipitridae	8739	^^*Pandion cristatus*		Eastern Osprey	V,P,3		30
Animalia	Aves	Burhinidae	0174	*Burhinus grallarius*		Bush Stone-curlew	E1,P		53
Animalia	Aves	Burhinidae	0175	*Esacus magnirostris*		Beach Stone-curlew	E4A,P		1
Animalia	Aves	Haematopodidae	0131	*Haematopus fuliginosus*		Sooty Oystercatcher	V,P		7
Animalia	Aves	Rostratulidae	0170	*Rostratula australis*		Australian Painted Snipe	E1,P	E	3
Animalia	Aves	Cacatuidae	0268	^^*Callocephalon fimbriatum*		Gang-gang Cockatoo	V,P,3	E	2
Animalia	Aves	Cacatuidae	8862	^*Calyptorhynchus lathami lathami*		South-eastern Glossy Black-Cockatoo	V,P,2	V	62
Animalia	Aves	Psittacidae	0260	*Glossopsitta pusilla*		Little Lorikeet	V,P		6
Animalia	Aves	Psittacidae	0309	*Lathamus discolor*		Swift Parrot	E1,P	CE	15
Animalia	Aves	Psittacidae	0302	^^*Neophema pulchella*		Turquoise Parrot	V,P,3		1
Animalia	Aves	Strigidae	0246	^^*Ninox connivens*		Barking Owl	V,P,3		28
Animalia	Aves	Strigidae	0248	^^*Ninox strenua*		Powerful Owl	V,P,3		548
Animalia	Aves	Tytonidae	0250	^^*Tyto novaehollandiae*		Masked Owl	V,P,3		4
Animalia	Aves	Tytonidae	9924	^^*Tyto tenebricosa*		Sooty Owl	V,P,3		2
Animalia	Aves	Meliphagidae	0603	^*Anthochaera phrygia*		Regent Honeyeater	E4A,P,2	CE	7
Animalia	Aves	Neosittidae	0549	*Daphoenositta chrysoptera*		Varied Sittella	V,P		3
Animalia	Aves	Artamidae	8519	*Artamus cyanopterus cyanopterus*		Dusky Woodswallow	V,P		2
Animalia	Aves	Petroicidae	0380	*Petroica boodang*		Scarlet Robin	V,P		2
Animalia	Mammalia	Dasyuridae	1008	*Dasyurus maculatus*		Spotted-tailed Quoll	V,P	E	9
Animalia	Mammalia	Peramelidae	1710	*Isoodon obesulus obesulus*		Southern Brown Bandicoot (eastern)	E1,P	E	8
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*		Koala	E1,P	E	74
Animalia	Mammalia	Burramyidae	1150	*Cercartetus nanus*		Eastern Pygmy-possum	V,P		381
Animalia	Mammalia	Petauridae	1137	*Petaurus norfolcensis*		Squirrel Glider	V,P		7
Animalia	Mammalia	Petauridae	1137	*Petaurus norfolcensis*		Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	E2,V,P		1
Animalia	Mammalia	Pteropodidae	1280	*Pteropus poliocephalus*		Grey-headed Flying-fox	V,P	V	181
Animalia	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*		Yellow-bellied Sheathtail-bat	V,P		2
Animalia	Mammalia	Molossidae	1329	*Micronomus norfolkensis*		Eastern Coastal Free-tailed Bat	V,P		17
Animalia	Mammalia	Vespertilionidae	1353	*Chalinolobus dwyeri*		Large-eared Pied Bat	V,P	V	14
Animalia	Mammalia	Vespertilionidae	1372	*Falsistrellus tasmaniensis*		Eastern False Pipistrelle	V,P		2
Animalia	Mammalia	Vespertilionidae	1357	*Myotis macropus*		Southern Myotis	V,P		29
Animalia	Mammalia	Vespertilionidae	1361	*Scoteanax rueppellii*		Greater Broad-nosed Bat	V,P		7
Animalia	Mammalia	Vespertilionidae	1025	*Vespadelus troughtoni*		Eastern Cave Bat	V,P		3
Animalia	Mammalia	Miniopteridae	1346	*Miniopterus australis*		Little Bent-winged Bat	V,P		56
Animalia	Mammalia	Miniopteridae	3330	*Miniopterus orianae oceanensis*		Large Bent-winged Bat	V,P		83
Animalia	Mammalia	Dugongidae	1558	*Dugong dugon*		Dugong	E1,P		2
Animalia	Mammalia	Otariidae	1543	*Arctocephalus forsteri*		New Zealand Fur-seal	V,P		7
Animalia	Mammalia	Otariidae	1882	*Arctocephalus pusillus doriferus*		Australian Fur-seal	V,P		1

Animalia	Mammalia	Balaenidae	1561	*Eubalaena australis*	Southern Right Whale	E1,P	E	4
Animalia	Mammalia	Physeteridae	1578	*Physeter macrocephalus*	Sperm Whale	V,P		3
Plantae	Flora	Elaeocarpaceae	6205	*Tetratheca glandulosa*		V		14
Plantae	Flora	Ericaceae	7752	*Epacris purpurascens var. purpurascens*		V		1
Plantae	Flora	Euphorbiaceae	9851	*Chamaesyce psammogeton*	Sand Spurge	E1		6
Plantae	Flora	Malvaceae	6140	*Lasiopetalum joyceae*		V	V	1
Plantae	Flora	Myrtaceae	4007	^^*Callistemon linearifolius*	Netted Bottle Brush	V,3		3
Plantae	Flora	Myrtaceae	4134	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	4
Plantae	Flora	Myrtaceae	4212	*Kunzea rupestris*		V	V	1
Plantae	Flora	Myrtaceae	4248	*Melaleuca deanei*	Deane's Paperbark	V	V	1
Plantae	Flora	Myrtaceae	4283	*Rhodamnia rubescens*	Scrub Turpentine	E4A	CE	32
Plantae	Flora	Myrtaceae	4293	*Syzygium paniculatum*	Magenta Lilly Pilly	E1	V	19
Plantae	Flora	Orchidaceae	4415	^*Cryptostylis hunteriana*	Leafless Tongue Orchid	V,P,2	V	1
Plantae	Flora	Orchidaceae	4464	^*Genoplesium baueri*	Bauer's Midge Orchid	E1,P,2	E	1
Plantae	Flora	Orchidaceae	9616	^*Microtis angusii*	Angus's Onion Orchid	E1,P,2	E	23
Plantae	Flora	Proteaceae	5365	^^*Grevillea caleyi*	Caley's Grevillea	E4A,3	CE	1
Plantae	Flora	Proteaceae	5458	^^*Persoonia hirsuta*	Hairy Geebung	E1,P,3	E	5
Plantae	Flora	Rutaceae	9099	*Boronia umbellata*	Orara Boronia	V,P	V	1
Plantae	Flora	Thymelaeaceae	6965	*Pimelea curviflora var. curviflora*		V	V	1

Appendix F

Threatened biodiversity likelihood of occurrence table (additional species)

Table F1: Threatened biodiversity likelihood of occurrence table for species not listed in the PEA

Common Name	Species Name	Statutory Listing*		No. of BioNet Records	Habitat (https://threatenedspecies.bionet.nsw.gov.au/)	Likelihood of occurrence	Likelihood of impacts from proposal
		BC Act	EPBC Act				
Freckled Duck	*Stictonetta naevosa*	V	-	1	Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour.	Low-no habitat	Low
Rose-crowned Fruit-Dove	*Ptilinopus regina*	V	-	4	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia.	Low	Low
Flesh-footed Shearwater	*Ardenna carneipes*	V	M	1	Marine Nest on Lord Howe Island in forests on sandy soils from Ned's Beach to Clear Place, with smaller colonies below Transit Hill and at Old Settlement Beach. Eggs are laid at the end of a burrow 1 - 2 metres in length.	Low-no habitat	Low
Black Bittern	*Ixobrychus flavicollis*	V	-	7	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in	Low-no habitat	Low

Common Name	Species Name	Statutory Listing* BC Act	Statutory Listing* EPBC Act	No. of BioNet Records	Habitat (https://threatenedspecies.bionet.nsw.gov.au/)	Likelihood of occurrence	Likelihood of impacts from proposal
					flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds. When disturbed, freezes in a characteristic bittern posture (stretched tall, bill pointing up, so that shape and streaked pattern blend with upright stems of reeds), or will fly up to a branch or flush for cover where it will freeze again. Generally solitary, but occurs in pairs during the breeding season, from December to March. Like other bitterns, but unlike most herons, nesting is solitary. Nests, built in spring are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks. Between three and five eggs are laid and both parents incubate and rear the young.		
Beach Stone-curlew	*Esacus magnirostris*	E4A	-	1	Beach Stone-curlews are found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. Beach Stone-curlews breed above the littoral zone, at the backs of beaches, or on sandbanks and islands, among low vegetation of grass, scattered shrubs or low trees; also among open mangroves.	Low-no habitat	Low
Turquoise Parrot	*Neophema pulchella*	V	-	1	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Usually seen in pairs or small, possibly family, groups and have also been reported in flocks of up to thirty individuals.	Low-no habitat	Low

Common Name	Species Name	Statutory Listing* BC Act	Statutory Listing* EPBC Act	No. of BioNet Records	Habitat (https://threatenedspecies.bionet.nsw.gov.au/)	Likelihood of occurrence	Likelihood of impacts from proposal
					Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants or browsing on vegetable matter.		
Sooty Owl	*Tyto tenebricosa*	V	-	2	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum (Pseudocheirus peregrinus) or Sugar Glider (Petaurus breviceps). Nests in very large tree-hollows.	Medium	Low
Varied Sittella	*Daphoenositta chrysoptera*	V	-	3	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.	Low	Low
Scarlet Robin	*Petroica boodang*	V	-	2	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal	Low	Low

Common Name	Species Name	Statutory Listing* BC Act	Statutory Listing* EPBC Act	No. of BioNet Records	Habitat (https://threatenedspecies.bionet.nsw.gov.au/)	Likelihood of occurrence	Likelihood of impacts from proposal
					regions; this species is occasionally found up to 1000 metres in altitude. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees.		
Eastern Cave Bat	*Vespadelus troughtoni*	V	-	3	Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Little is understood of its feeding or breeding requirements or behaviour.	Medium	Low
Large Bent-winged Bat	*Miniopterus orianae oceanensis*	V	-	83	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. • Cold caves are used for hibernation in southern Australia.	High	Low

Common Name	Species Name	Statutory Listing*		No. of BioNet Records	Habitat (https://threatenedspecies.bionet.nsw.gov.au/)	Likelihood of occurrence	Likelihood of impacts from proposal
		BC Act	EPBC Act				
	Epacris purpurascens var. purpurascens	V	-	1	The vegetation formations and classes associated with the species are different to the native vegetation occurring in the subject site.	Low-no habitat	Low
Scrub Turpentine	*Rhodamnia rubescens*	E4A	CE	32	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts. The vegetation formations and classes associated with the species are different to the native vegetation occurring in the subject site.	Low	Low

CE = Critically Endangered, E = Endangered, V = Vulnerable, E4A = Eligible to be listed as Critically Endangered

Appendix G

Aboriginal Objects Due Diligence Assessment Report

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Excellence in your environment

Ecology and biodiversity
Heritage management
Environmental management and approvals
Environmental offsetting

Aboriginal Objects Due Diligence Assessment
Newport to Avalon Shared Pathway
Avalon, NSW

Pittwater Government Area

Prepared for Tract Consultants on behalf of Northern Beaches Council

Prepared by Niche Environment and Heritage | 29 November 2018

A leading independent specialist environmental and heritage consultancy

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Excellence in your environment

29 November 2018

Ms Kate Gong
Landscape Architect
Tract Consultants Pty Ltd
Level 8, 80 Mount Street
North Sydney NSW 2060

Dear Ms Gong,

Re: Newport to Avalon Beach shared pathways – Aboriginal Objects Due Diligence Assessment

On the basis of this assessment, it is unlikely that Aboriginal objects have survived within the Subject Area due to the high level of disturbance and modification to the ground surface. The proposed pathway within the Eric Green Reserve, has a low potential of in situ deposits. AHIMS ID #45-6-0855 (Bilgola Beach) is a shell midden located less than 100 meters from the proposed works. The land modification practices associated with the construction of roads (Barrenjoey Road and The Serpentine) and residential development surrounding the Subject Area has disrupted the ground surface to such an extent that the possibility of in situ deposits is unlikely.

No Aboriginal heritage constraints were identified for the proposed activity and no further investigation or impact assessment is required.

The Due Diligence Code states that where a desktop and visual inspection has occurred and concluded that Aboriginal objects are unlikely to occur and an Aboriginal Heritage Impact Permit (AHIP) application will not be necessary. The proposed activity may therefore proceed with caution without a further Aboriginal Cultural Heritage Assessment (ACHA) or AHIP. It is recommended that:

- In the unlikely event that any Aboriginal objects are found, all activities must stop and an appropriately qualified archaeologist engaged to assess the findings, and notification is provided to the Office of Environment and Heritage.
- In the unlikely event that human remains are found, stop work, secure the site and notify the NSW Police and the Office of Environment and Heritage.

Please do not hesitate to contact me should you have any questions, or would like to clarify details of this assessment.

Yours sincerely,

Jessica Cuskelly
Heritage Consultant
Niche Environment and Heritage

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1. Introduction

1.1 The proponent

Niche Environment and Heritage Pty Ltd (Niche) was commissioned by Tract Consultants on behalf of Northern Beaches Council to undertake an Aboriginal Objects Due Diligence Assessment to assess the proposed pedestrian and bikeway between Newport and Avalon Beach (hereafter referred to as the 'Subject Area').

1.2 The Subject Area

1.2.1 Location

The Subject Area is located between Newport and Avalon Beach, NSW within the Pittwater Local Government Area and the boundaries of the Metropolitan Local Aboriginal Land Council (Figure 1, Figure 2). The Subject Area includes an existing footpath between Newport and Bilgola Beach along the South Bilgola Headland and Eric Green Reserve. The Subject Area is also located on The Serpentine and Barrenjoey Road in Avalon.

1.3 The proposed activity

The proposed development will involve the construction of shared pathways and pedestrian pathways between Newport and Avalon Beaches:

- Shared path (suspended) – 3m wide plus at least 2m either side for construction impacts
- Shared path (on-ground) – 3m wide plus at least 2m either side for construction impacts
- Footpath (suspended) – 1.5m wide plus at least 2m either side for construction impacts
- Footpath (on-ground) – 1.5m wide plus at least 2m either side

See Figure 3 for more detail.

1.4 Statutory controls

The *National Parks and Wildlife Act 1974* (NPW Act), administered by the Office of Environment and Heritage (OEH), is the primary legislation for the protection of some aspects of Aboriginal cultural heritage in New South Wales[1]. Part 6 of the NPW Act provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm.

The *National Parks and Wildlife Act 1974* (NPW Act) provides that a person who exercises due diligence in determining that their actions will not harm Aboriginal objects has a defence against prosecution if they later unknowingly harm an object without an Aboriginal Heritage Impact Permit (AHIP).

The *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* sets out a process for individuals and organisations to follow to determine whether an Aboriginal object will be harmed by an activity, whether further investigation is needed, and whether that harm requires an AHIP (Figure 4).

1.5 Objectives and assessment methodology

The aim of the assessment was to assess whether Aboriginal Objects and/or Places are present or are likely to occur within or in close proximity to the Subject Area and/or places are and if those Aboriginal Objects and/or places may be harmed by the proposed works and if further investigation is required. This

[1] For further information visit: https://www.environment.nsw.gov.au/licences/achregulation.htm

assessment follows the process outlined in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (Figure 4).

Location map

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 1

Study Area

Newport to Avalon Shared pathway - Ecological Assessment

FIGURE 3

Imagery: (c) NearMap 2018-01-20

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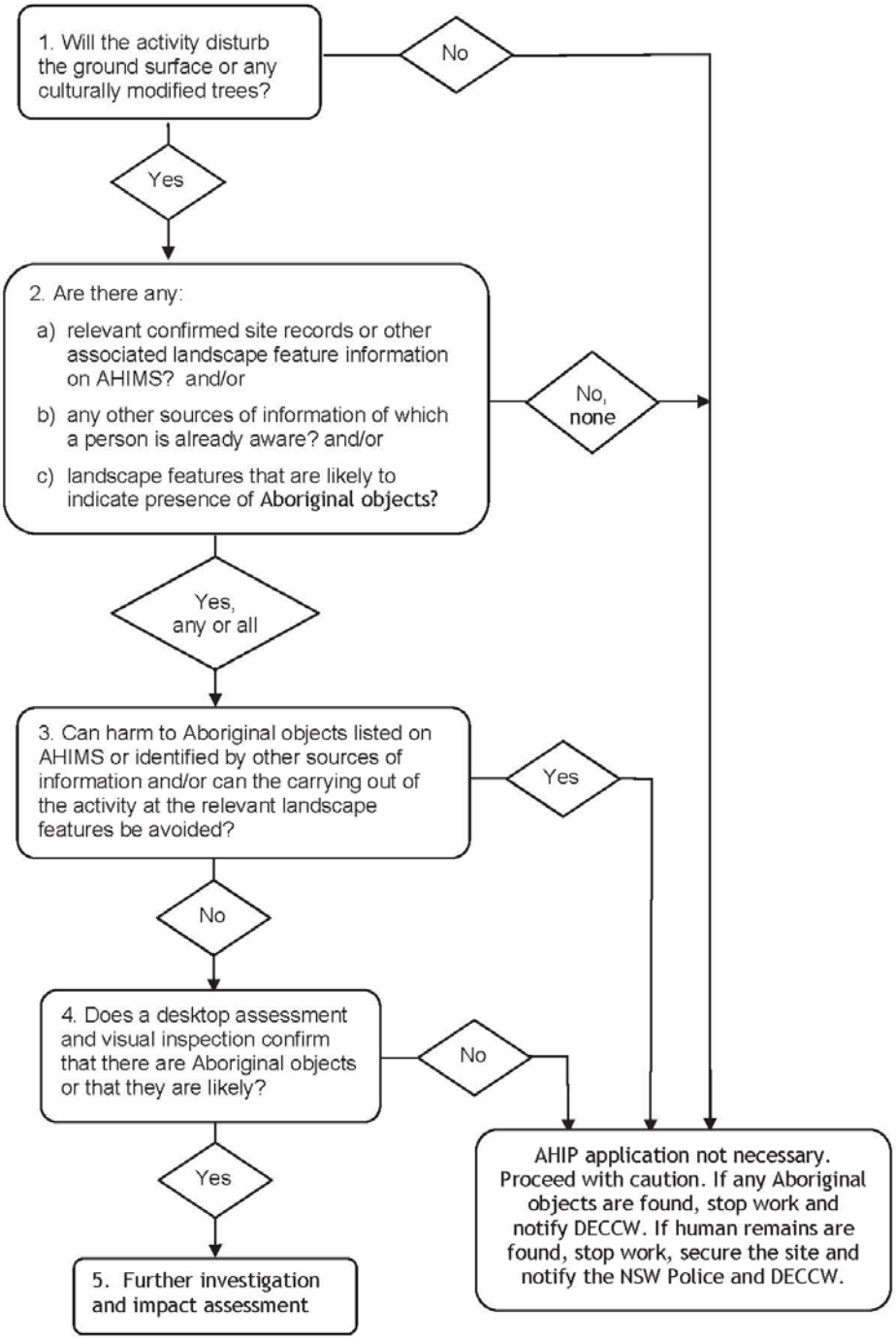

Figure 3: The generic due diligence assessment process

2. Environmental Context

2.1 Topography, Landforms and Hydrology

The Subject Area is located within the Pittwater sub bioregion of the Sydney Basin. The Landscape is characterised by Hawkesbury sandstone plateaus with steep coastal cliffs (including Bilgola Heads) and rock platforms with small beach and costal lagoon systems. The Subject Area, has an existing footpath through Eric Green Reserve. The proposed works run along Barrenjoey Road and The Serpentine, an area already disturbed by modern development and residential development. The proposed works is located between Newport Beach and Avalon Beach within the Northern Beaches City Council. Bilgola Creek runs through the Subject Area to Bilgola Beach (Pittwater Council).

The eastern shores of the Pittwater Estuary rise to form Barrenjoey Peninsula. The peninsula's narrow ridge contains five flat-topped plateaus at Newport, Bilgola, Avalon, Whale Beach and Palm Beach reaching elevations of 100 meters (Pittwater Council).

2.2 Geology and soils

The soil landscape of the Subject Area is characterised by loose loamy sand that is highly disturbed. The surrounding Subject Area has been cleared for residential development and infrastructure.

2.3 Vegetation

Part of the Subject Area is situated within the Eric Green Reserve. The vegetation within the Reserve consists of Coastal Headland Clay Heath and some intrusive (non-native) plants. Further north along The Serpentine and Barrenjoey Road the area has been cleared due to residential development.

2.4 Past land use and disturbance

The land has been significantly modified since European occupation in 1788, when a small party discovered the southern arm of Broken Bay. By the 1800s, the Pittwater area contained a number of satellite farming communities that supplied produce and raw materials to the settlement at Sydney Cove. Timber was harvested from the steep slopes and fish were taken from the estuary while wheat, oats, potatoes, fruit and vegetables were grown.

Between 1840 and 1870, cargoes of shells were transported from Pittwater to Millers Point to produce lime for the building industry.

The land surrounding the Subject Area in 1951 shows low urban development of the area. The footpaths can be seen quite prevalent in the aerials and were established by 1951. The pathways have been used continuously since. By 1971 residential development of the area further increased, however the footpaths remained largely unchanged.

Geomorphology and hydrology in the local area

Newport to Avalon Shared pathway - Aboriginal Objects Due Diligence

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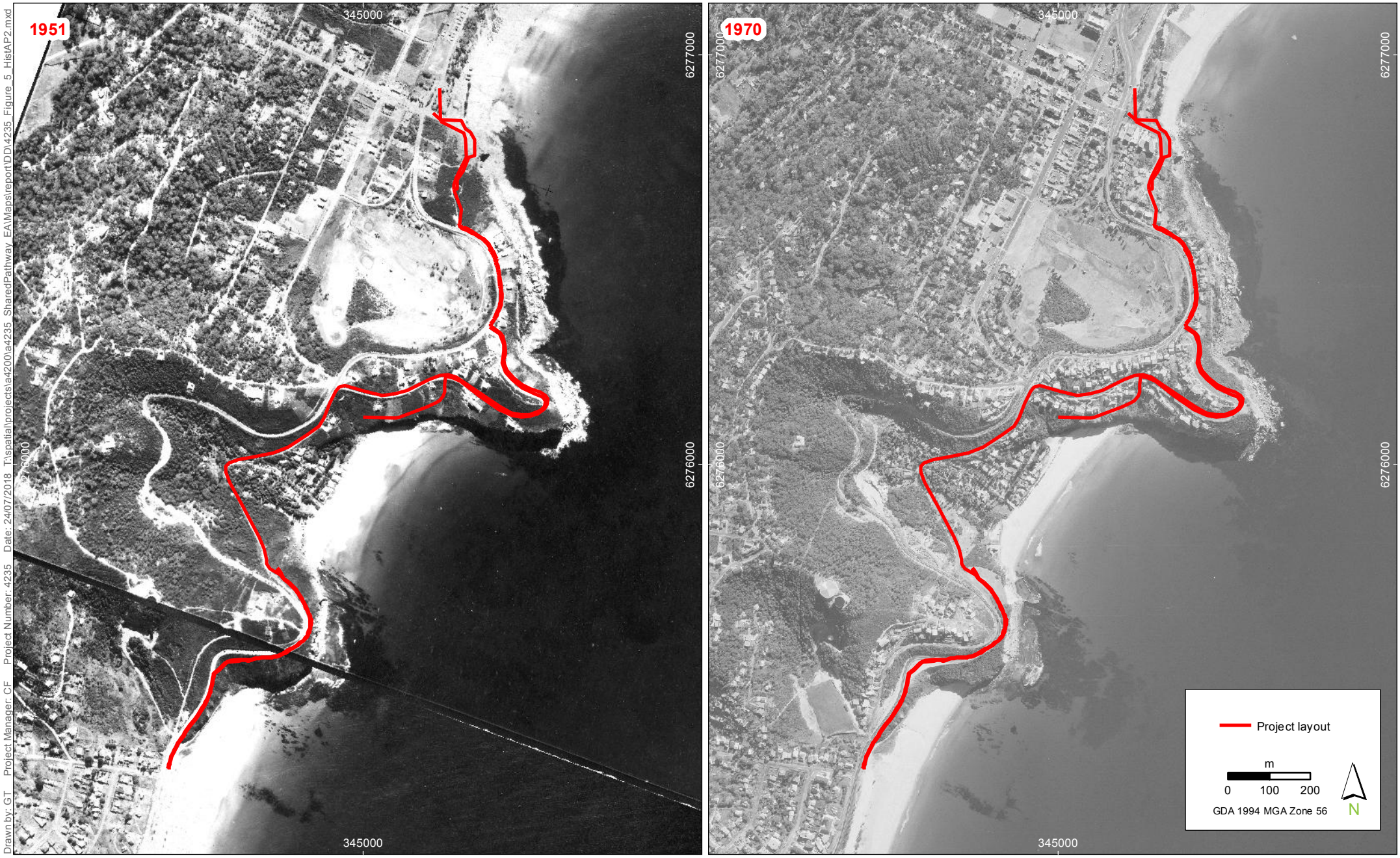
FIGURE 4

Imagery: (c) NearMap 2018-01-20



Drawn by: GT Project Manager: CF Project Number: 4235 Date: 24/07/2018 T:\spatialprojects\a4200\a4235_SharedPathway_EAMaps\report\DD\4235_Figure_5_HistAP2.mxd

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Historical aerial photographs

Newport to Avalon Shared pathway - Aboriginal Objects Due Diligence

FIGURE 5

3. Generic Aboriginal objects due diligence assessment

Is the proposed activity a low impact activity as defined by the Regulation?

Yes

The activity is a low impact activity as defined under section 80B of the National Parks and Wildlife Regulation 2009 ('the Regulation') as it would be:

- (a) maintenance work of the following kind on land that has been disturbed:
  - (i) maintenance of existing roads, fire and other trails and tracks,
  - (ii) maintenance of existing utilities and other similar services (such as above or below ground electrical infrastructure, water or sewerage pipelines), or
- (e) was an activity on land that has been disturbed that comprises exempt development or was the subject of a complying development certificate issued under the Environmental Planning and Assessment Act 1979, or
- (h) was the removal of isolated, dead or dying vegetation, but only if there is minimal disturbance to the surrounding ground surface

Step 1 - Will the activity disturb the ground surface or any culturally modified trees?

Yes.

The proposed activity involves earthworks and vegetation clearance and therefore has the potential to disturb Aboriginal objects.

Step 2a - Are there any relevant confirmed site records or other associated landscape feature information on AHIMS (or other heritage registers)?

Yes.

Heritage Registers

AHIMS

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) was conducted on the 25 June 2018 (AHIMS Client Service ID #353165) over a 5 km^2 area centred on the Subject Area. Table 2 outline AHIMS sites that are within 200 m of the Subject Area.

There are no recorded sites located within the Subject Area (Figure 5). Two (2) isolated sites are within 200 meters of the Subject Area (AHIMS #45-6-0855 and #45-6-2279). Both sites comprise of shell middens with associated artefacts as outlined in Table 1.

Table 1: AHIMS sites within 200 m of the Subject Area

AHIMS ID	Site Name	Site Features
45-6-0855	Bilgola Beach	Shell, Artefacts(s)
45-6-2279	Jilliby	Shell, Artefact(s)

Within the wider local area, as outlined in Table 2 Midden and Artefacts (n=16), Midden (n=3), Midden (n=4) and Midden, Artefacts with Art (Pigment or Engraved) (n=3) were the most common Aboriginal site features within the AHIMS register. The closest sites were predominantly located approximately 200-500 meters from the coast line. It must be noted that care should be taken when using the AHIMS database to reach conclusions about site prevalence or distribution. The distribution of registered sites does not reflect patterns of occupation, but rather is often indicative of survey coverage and conditions.

Table 2: Summary of AHIMS site features within 5 km^2 of the Subject Area

Site features	Total
Art (Pigment or Engraved)	1 (2 not Aboriginal site)
Art (Pigment or Engraved); Artefact (s)	2
Art (Pigment or Engraved); Shell and Potential Archaeological Deposit (PAD)	2
Artefact(s)	1
Artefact(s); Shell	17
Shell	4
Burial	1
Grinding Grove	1
Modified Tree (Carved or Scarred)	1
Art (Pigment or Engraved); Shell and Art (Pigment or Engraved)	3
Shell; Artefact(s) and Grinding Groove	2
Total	**35**

Other heritage registers

Searches of the Australian World Heritage Database, the Commonwealth Heritage List, National Heritage List, State Heritage Register, State Heritage Inventory, the Liverpool Local Environmental Plan (LEP) (2008) and the Liverpool Development Control Plan (DCP) were conducted on the 26 November 2018.

The searches concluded that there are no recorded historic or Aboriginal heritage items within the Subject Area and it is unlikely that the Subject Area falls within the visual catchment of any nearby heritage items. The closest LEP heritage items are largely 100 m away or less from the Subject Area (Table 3).

Table 3: Listed heritage items in proximity to the Subject Area

Heritage Register	Items in the Subject Area	Items nearby to the Subject Area
Schedule 5 of the LEP		Avalon Golf Club – Club House (ID 2270055)
		Avalon Golf Club – Former Kiosk (ID 2270012)
		Avalon Golf Club – Green Keeper's House (ID 2270013)
		Grove of cabbage Tree Palms (Livistona Australis) (ID 2270031)
		House- "The Palms" (ID 2270016)
		Newport Surf Life Saving Club (ID 2270445)
		Ocean Rock Pool – Avalon Beach (ID 22701118)
		Ocean Rock Pool – Bilgola Beach (2270120)
		Sandstone retaining wall (ID 2270032)

Previous heritage assessments within or relevant to the Subject Area

The following heritage assessments or Aboriginal Heritage Impact Permits have occurred or have included the Subject Area:

Table 4: Previous heritage assessments within the Subject Area

Author	Title	Relevance to Subject Area
GML Heritage	Ingleside Precinct – Heritage Interpretation Strategy	Relevance to development of Pittwater

GML Heritage (2016) conducted a Heritage Interpretation Strategy for the Ingleside Precinct.

Step 2b - Are there any other sources of information of which a person is already aware?

No.

Step 2c - Are there landscape features that are likely to indicate the presence of Aboriginal Objects?

No

Based on the desktop assessment above (Section 2, Steps 2a and 2b), while there are landscape features within the Subject Area, either identified by the desktop assessment or by the Due Diligence Code of

Practice, that are likely to indicate the presence of Aboriginal objects, the degree of disturbance from road construction and existing pathways within the Subject Area is likely to have removed that potential. There is a low potential of Aboriginal objects being located within the Eric Green Reserve adjacent to the pre-existing pathways.

Location of AHIMS Sites and Heritage Items

Newport to Avalon Shared pathway - Aboriginal Objects Due Diligence

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FIGURE 3

Imagery: (c) NearMap 2018-01-20

Step 3 - Can the harm or the activity be avoided?

Not applicable

The desktop and visual inspection indicates that Aboriginal Objects are unlikely to occur within the Subject Area and/or appropriate control measures, there is no compelling reason to move or avoid the activity.

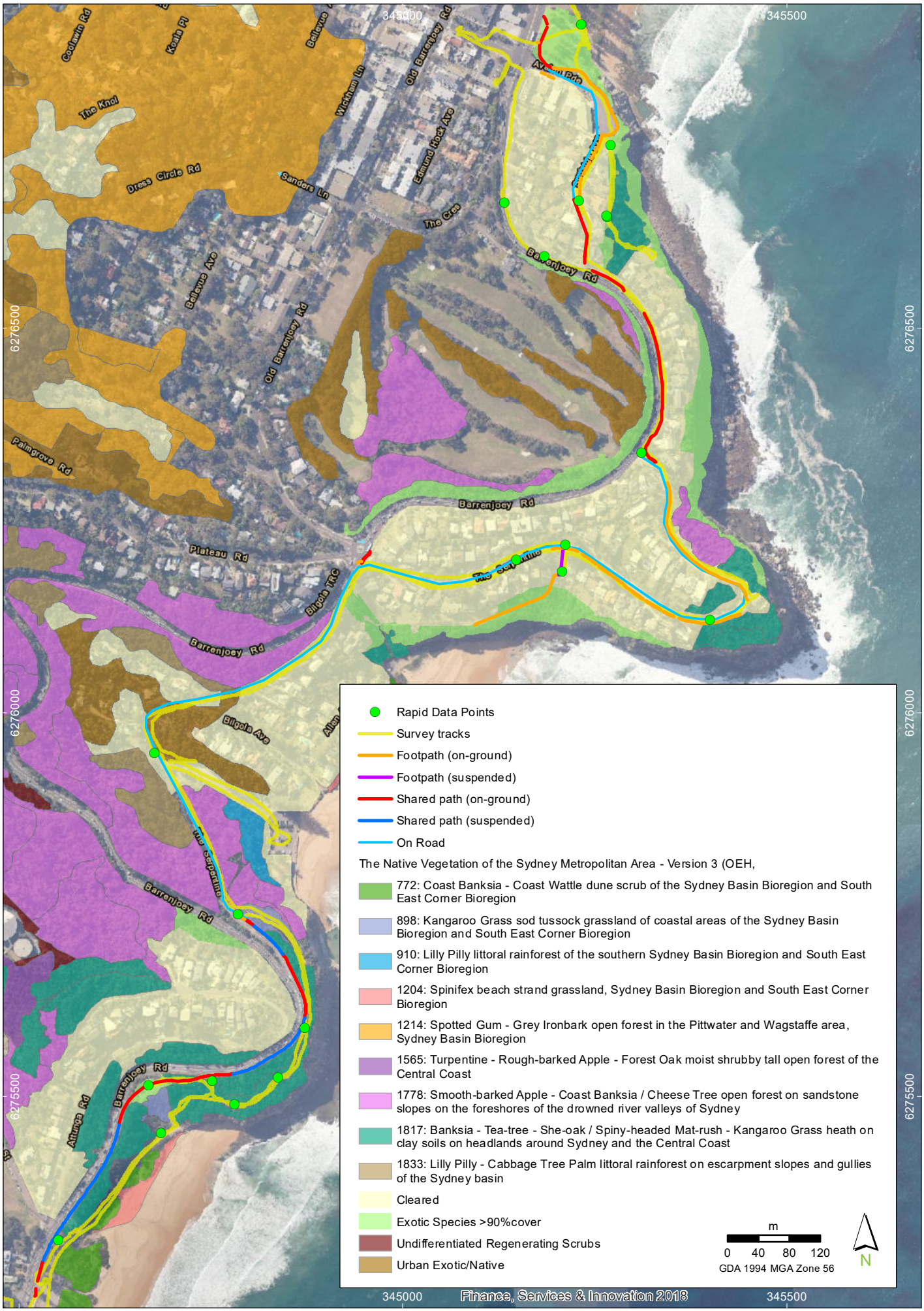
Step 4 - Does a desktop assessment and visual inspection confirm that there are Aboriginal Objects or that they are likely?

No

The desktop and visual inspection confirmed that Aboriginal objects are unlikely due to the high degree of past land use and disturbance

Site inspection details

The site inspection was conducted by Jessica Cuskelly (Heritage Consultant) and Cairo Forrest (Ecologist). The proposed footpaths and shared pathways have been designed on pre-existing walkways, disturbed areas from pedestrian movement and along road reserves of Barrenjoey Road and The Serpentine.



Vegetation Mapping and survey effort

Newport to Avalon Shared pathway - Ecological Assessment

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FIGURE 4

Imagery: (c) LPI 2018-08-30

Plate 1: Beginning of proposed footpath (Newport Beach)

Plate 2: Facing towards Bilgola Head

Plate 3: Drainage construction

Plate 4: Drainage construction facing Bilgola Beach (Bilgola Creek)

Plate 5: Bilgola Beach

Plate 6: Existing footpath

Plate 7: Car tracks leading to Eric Reserve lookout

Plate 8: Eric Reserve lookout

Plate 9: Suspended walkway

Plate 10: The Serpentine road reserve for proposed pathway

Plate 11: Upgrade to footpath

Plate 12: Proposed pathway on already disturbed surface

Plate 13: Existing walkway through residential area

Plate 14: Proposed pathway

Step 5 - Further investigations and impact assessment

No

The desktop and visual inspection confirmed that Aboriginal objects are unlikely due to the high degree of past land use and disturbance

No further investigation or impact assessment is required.

4. Conclusions and Recommendations

On the basis of this assessment, there is a low potential that Aboriginal objects have survived within the Subject Area due to the high level of disturbance and modification to the ground surface. The land modification practices associated with the existence of roads and pathways within the Subject Area has disrupted the ground surface to such an extent that the possibility of in situ deposits is low.

No Aboriginal heritage constraints were identified for the proposed activity and no further investigation or impact assessment is required.

The Due Diligence Code states that where a desktop and visual inspection has occurred and concluded that Aboriginal objects are unlikely to occur and an Aboriginal Heritage Impact Permit (AHIP) application will not be necessary. The proposed activity may therefore proceed with caution without a further Aboriginal Cultural Heritage Assessment (ACHA) or AHIP. It is recommended that:

- In the unlikely event that any Aboriginal objects are found, all activities must stop and an appropriately qualified archaeologist engaged to assess the findings, and notification is provided to the Office of Environment and Heritage.
- In the unlikely event that human remains are found, stop work, secure the site and notify the NSW Police and the Office of Environment and Heritage.

On the basis of this assessment, Aboriginal objects are known and/or likely to occur within the Subject Area. The Due Diligence Code states that where a desktop and/or visual inspection has occurred and concluded that Aboriginal objects are likely to occur or identifies that additional investigation is necessary, further investigation of impact assessment is required by the *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*.

The following recommendations are made:

Table 5: Recommendations

Recommendations	
	General
1.	In the unlikely event that suspected human remains are encountered during construction, all work in the area that may cause further impact, must cease immediately and: • The location, including a 20 m curtilage, should be secured using barrier fencing to avoid further harm. • The NSW Police must be contacted immediately. • No further action is to be undertaken until the NSW Police provide written notification to the Department of Justice. • If the skeletal remains are identified as Aboriginal, The Department of Justice or their agent must contact: • the OEH's Enviroline on 131 555; and • representatives of the RAPs. • No works are to continue until the OEH provides written notification to the proponent or their Agent.

5. References

Department of Environment, Climate Change and Water (2010), *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales,* produced for the Department of Environment, Climate Change and Water, NSW

Department of Environment, Climate Change and Water NSW [DECCW] . (2010b). *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales.* Department of Environment, Climate Change and Water NSW.

GML Heritage (2006), *Ingleside Precinct Heritage Interpretation Strategy*. Report prepared for NSW Department of Planning and Environment.

Pittwater Council (2009), *Pittwater Natural Areas Plan of Management – Part 1 of 2 – Generic Management Issues*. [Online] https://files.northernbeaches.nsw.gov.au/sites/default/files/Pittwater_Natural_Areas_POM_-_ADOPTED_AND_WEBSITE_COPY.pdf

Office of Environment and Heritage (2010) Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW

Attachment 1 – AHIMS Extensive Search

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 4235_02

Client Service ID : 353165

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-6-2603	WE-S-1	AGD	56	342780	6275920	Closed site	Valid	Artefact : -	Shelter with Deposit	
	Contact	**Recorders**	Unknown Author					**Permits**		
45-6-2279	Jilliby;	AGD	56	344690	6276420	Open site	Valid	Shell : -, Artefact : -	Midden	1333
	Contact	**Recorders**	Warren Bluff					**Permits**		
45-6-1890	Taylors Beach.;	AGD	56	342760	6276500	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Margrit Koettig					**Permits**		
45-6-1892	Careel Bay;	AGD	56	344710	6278280	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Margrit Koettig					**Permits**		
45-6-1456	Salt Pan Cove;	AGD	56	343036	6276442	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1457	Salt Pan Cove;	AGD	56	343240	6275348	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1372	St Michaels Cave	AGD	56	345895	6277323	Closed site	Not a Site	Art (Pigment or Engraved) : -	Not an Aboriginal Site	
	Contact	**Recorders**	M Young					**Permits**		
45-6-1374	Salt Pan Cove;McMahons Creek;	AGD	56	344061	6275455	Open site	Valid	Grinding Groove : -	Axe Grinding Groove	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1225	Refuge Cove;Scotland Island;	AGD	56	343224	6276171	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1404	Angophora Reserve;Hudson Park;	AGD	56	343600	6276300	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1826,1932
	Contact	**Recorders**	John Edgar,Ms.Tessa Corkill					**Permits**		
45-6-1408	Irrubel Road;Newport;	AGD	56	343796	6274993	Closed site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Rock Engraving,Shelter with Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1338	Scotland Island;South Beach;Salt Pan Cove;	AGD	56	342859	6276164	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1340	Scotland Island;Refuge Cove;	AGD	56	343405	6276266	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1359	Wandarra;East Pitt Water;Refuge Cove;	AGD	56	343034	6276533	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		

Report generated by AHIMS Web Service on 25/06/2018 for Jess Cuskelly for the following area at Lat, Long From : -33.6451, 151.3142 - Lat, Long To : -33.6271, 151.3428 with a Buffer of 1000 meters. Additional Info : Due Diligence report. Number of Aboriginal sites and Aboriginal objects found is 37

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-6-1365	Newport;Irrubel Road;	AGD	56	343344	6274710	Closed site	Valid	Artefact : -, Art (Pigment or Engraved) : -	Rock Engraving,Shelter with Deposit	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1254	Newport	AGD	56	343180	6276040	Open site	Not a Site	Art (Pigment or Engraved) : -	Not an Aboriginal Site	
	Contact	**Recorders**	M Young					**Permits**		
45-6-0055	Careel Bay;Avalon;	AGD	56	343920	6278013	Closed site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Shelter with Art,Shelter with Midden	
	Contact	**Recorders**	R Clegg					**Permits**		
45-6-0852	Salt Pan Cove - PITT 030	GDA	56	343054	6276160	Closed site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Rock Engraving,Shelter with Midden	
	Contact	**Recorders**	Aboriginal Heritage Office					**Permits**		
45-6-0853	Scotland Island;Salt Pan Cove;	AGD	56	343326	6275624	Closed site	Valid	Shell : -, Artefact : -, Grinding Groove : -	Axe Grinding Groove,Shelter with Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-0854	Long Beach; Midden	AGD	56	343981	6278061	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Alan Heath					**Permits**		
45-6-0855	Bilgola Beach;	AGD	56	344775	6275548	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Alan Heath					**Permits**		
45-6-0856	Scotland Island;Refuge Bay;	AGD	56	343325	6275716	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-0857	Scotland Island;Refuge Cove;	AGD	56	343586	6276361	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-0859	Scotland Island;Salt Pan Cove;	AGD	56	343332	6275350	Closed site	Valid	Shell : -, Artefact : -, Grinding Groove : -	Axe Grinding Groove,Shelter with Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-0867	Scotland Island;Refuge Cove;Hudson Park;	AGD	56	343778	6275907	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-0070	Refuge Cove Scotland Island Angophora_Reserve	AGD	56	343499	6276176	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	1026,1826,1932
	Contact	**Recorders**	Alexandra Kelly					**Permits**		

Report generated by AHIMS Web Service on 25/06/2018 for Jess Cuskelly for the following area at Lat, Long From : -33.6451, 151.3142 - Lat, Long To : -33.6271, 151.3428 with a Buffer of 1000 meters. Additional Info : Due Diligence report. Number of Aboriginal sites and Aboriginal objects found is 37

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : 4235_02

Client Service ID : 353165

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
45-6-0091	Scotland Island;Hanson's Wharf;	AGD	56	342952	6276074	Closed site	Valid	Art (Pigment or Engraved) : -, Artefact : -	Shelter with Art,Shelter with Deposit	
	Contact	**Recorders**	Australian Museum					**Permits**		
45-6-2645	Newport Burial	AGD	56	344310	6274559	Open site	Valid	Burial : -		
	Contact	**Recorders**	Mr.Phil Hunt					**Permits**		
45-6-2766	34 CA 1	AGD	56	343820	6277100	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact T Russell	**Recorders**	Mary Dallas Consulting Archaeologists					**Permits**		
45-6-1458	Salt Pan Cave;	AGD	56	343050	6275710	Open site	Valid	Artefact : -, Shell : -	Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-1339	Scotland Island;Refugee Cove;	AGD	56	343497	6276268	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-2996	Hanson's Wharf 2 - PITT 024	GDA	56	342854	6276090	Closed site	Valid	Art (Pigment or Engraved) : -, Shell : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Aboriginal Heritage Office					**Permits**		
45-6-2997	Hanson's Wharf 3 - PITT 036	GDA	56	343004	6276040	Closed site	Valid	Art (Pigment or Engraved) : -, Shell : -, Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Aboriginal Heritage Office					**Permits**		
45-6-3027	Yarrabee Shelter 2 - PITT 32	GDA	56	343274	6276420	Closed site	Valid	Shell : -		
	Contact	**Recorders**	Aboriginal Heritage Office					**Permits**		
45-6-3028	Hansford Shelter 2 PITT 034	GDA	56	343114	6276330	Closed site	Valid	Shell : -		
	Contact	**Recorders**	Aboriginal Heritage Office					**Permits**		
45-6-3061	Salt Pan Cove #2	GDA	56	343054	6276160	Closed site	Valid	Shell : 10		
	Contact	**Recorders**	Mr.Phil Hunt					**Permits**		
45-6-3219	Stapleton Shelter 01 PITT231	GDA	56	344630	6277760	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Mr.Phil Hunt,Aboriginal Heritage Office					**Permits**		

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