Church Point Wharf Feasibility Study

Planning and Environmental Constraints Report

Northern Beaches Council

14 February 2022

311010-00457

Advisian
Worley Group

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PROJECT 311010-00457: Church Point Wharf Feasibility Study - Planning and Environmental Constraints Report

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Executive summary

Scotland Island is located on the Northern Beaches of Sydney in the Northern Beaches Council (NBC) Local Government Area (LGA). The island has 359 private dwellings and a permanent population of 579. The Island can be accessed by the Church Point Ferry and private vessels.

Residents with private vessels may use the Church Point Commuter Wharf to access the mainland. At present, the commuter wharf has 111 boat bays. With 300 permits and 21 residents on the waiting list for permits the existing mooring facility needs to be upgraded to minimise overcrowding.

NBC has engaged Advisian to undertake a feasibility assessment of future wharf upgrade options in order to address boat mooring demand. Selection of the most feasible option will be based on stakeholder engagement, strategic analysis of the issues and constraints, benefits and costs and pros/cons of each. This report provides an overview of the planning and environmental constraints for each of the potential wharf options. A desktop review of the following items was undertaken and constraints for the various options identified and summarised:

- Planning and approvals
- Land use and property
- Cultural heritage
- Aquatic and terrestrial biodiversity
- Hydrology, water quality and groundwater
- Geology, sediments and soils
- Socio-economic
- Landscape character and visual amenity
- Traffic, transport and access
- Noise and vibration
- Air quality

Based on a review of all matters above, along with the proximity of Scotland Island to the proposed wharf locations, the options with the least environmental constraints are identified as:

- Option 1a and 1b - extension to the existing Church Point Commuter Wharf; or
- Option 2a - Rostrevor Reserve.

This information should be considered along with the results of stakeholder engagement, strategic analysis of the issues and constraints and benefits and costs and pros/cons of each being investigated alongside this planning and environmental constraints analysis. Full environmental assessment in the form of a Review of Environmental Factors (REF) will be required for the selected option.

Acronyms and abbreviations

Acronym/abbreviation	Definition
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AOBV	Areas of Outstanding Biodiversity Value
ASS	Acid sulphate soils
BC Act	*Biodiversity Conservation Act 2016*
BOS	Biodiversity Offsets Scheme
CLM Act	*Crown Land Management Act 2016*
CM SEPP	State Environmental Planning Policy (Coastal Management) 2018
DA	Development Application
DAWE	Department of Agriculture, Water and Environment
DDA	*Disability Discrimination Act 1992*
DPI	NSW Department of Primary Industries
DPIE	NSW Department of Planning, Industry and Environment
ECD SEPP	State Environmental Planning Policy (Exempt and Complying Development Codes) 2008
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	Environmental Protection Licence
FM Act	*Fisheries Management Act 1994*
GDEs	Groundwater Dependent Ecosystems
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
KFH	Key Fish Habitat
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LG Act	*Local Government Act 1993*
LGA	Local Government Area

MNES	Matters of National Environmental Significance
MPAs	Marine Protected Areas
NBC	Northern Beaches Council
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	NSW National Parks and Wildlife Service
NSW	New South Wales
NT Act	*Native Title Act 1993*
NTS Corp	Native Title Services Corp Ltd
PASS	Potential Acid Sulphate Soils
Pittwater LEP	*Pittwater Local Environmental Plan 2014*
POEO Act	*Protection of the Environment Operations Act 1997*
REF	Review of Environmental Factors
SEPP Coastal Protection	State Environmental Planning Policy 71
SEPP Coastal Wetlands	State Environmental Planning Policy 14
SEPP Littoral Rainforests	State Environmental Planning Policy 26
SEPPs	State Environmental Planning Policies
SIS	Species Impact Statement
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
SSI	State Significant Infrastructure
TfNSW	Transport for New South Wales
WM Act	*Water Management Act 2000*

1 Introduction and Options

1.1 Introduction

Scotland Island is located on the Northern Beaches of Sydney in the Northern Beaches Council (NBC) Local Government Area (LGA). The island has 359 private dwellings and a permanent population of 579 (ABS Census, 2016). The Island can be accessed by the Church Point Ferry and private vessels.

Residents with private vessels may use the Church Point Commuter Wharf to access the mainland (Figure 1-1). At present, the commuter wharf has 111 boat bays. With 300 permits and 21 residents on the waiting list for permits the existing mooring facility needs to be upgraded to minimise overcrowding.

NBC has engaged Advisian to undertake a feasibility assessment of future wharf upgrade options in order to address boat mooring demand. Selection of the most feasible option will be based on stakeholder engagement, strategic analysis of the issues and constraints, benefits and costs and pros/cons of each. This report provides an overview of the planning and environmental constraints for each of the potential options.

Figure 1-1 Existing commuter wharf and vessels at Church Point.

1.2 Options

As part of this study four options aimed at alleviating overcrowding at the existing facility are being assessed. These options and their locations are shown in Figure 1-2. These options comprise an extension to the existing facility as well as alternative structures/boat bays at various location within the local area, as detailed below.

Figure 1-2 Location of options to be assessed.

1.2.1 Option 1a and 1b

Option 1a and 1b involve an extension to the existing Church Point Commuter Wharf as depicted in Figure 1-3. Option 1a includes the addition of six fingers perpendicular to the current wharf and Option 1b includes an additional structure running parallel with the existing facility. Option 1b would provide an additional 119 boat berths and a total of 230 when combined with existing.

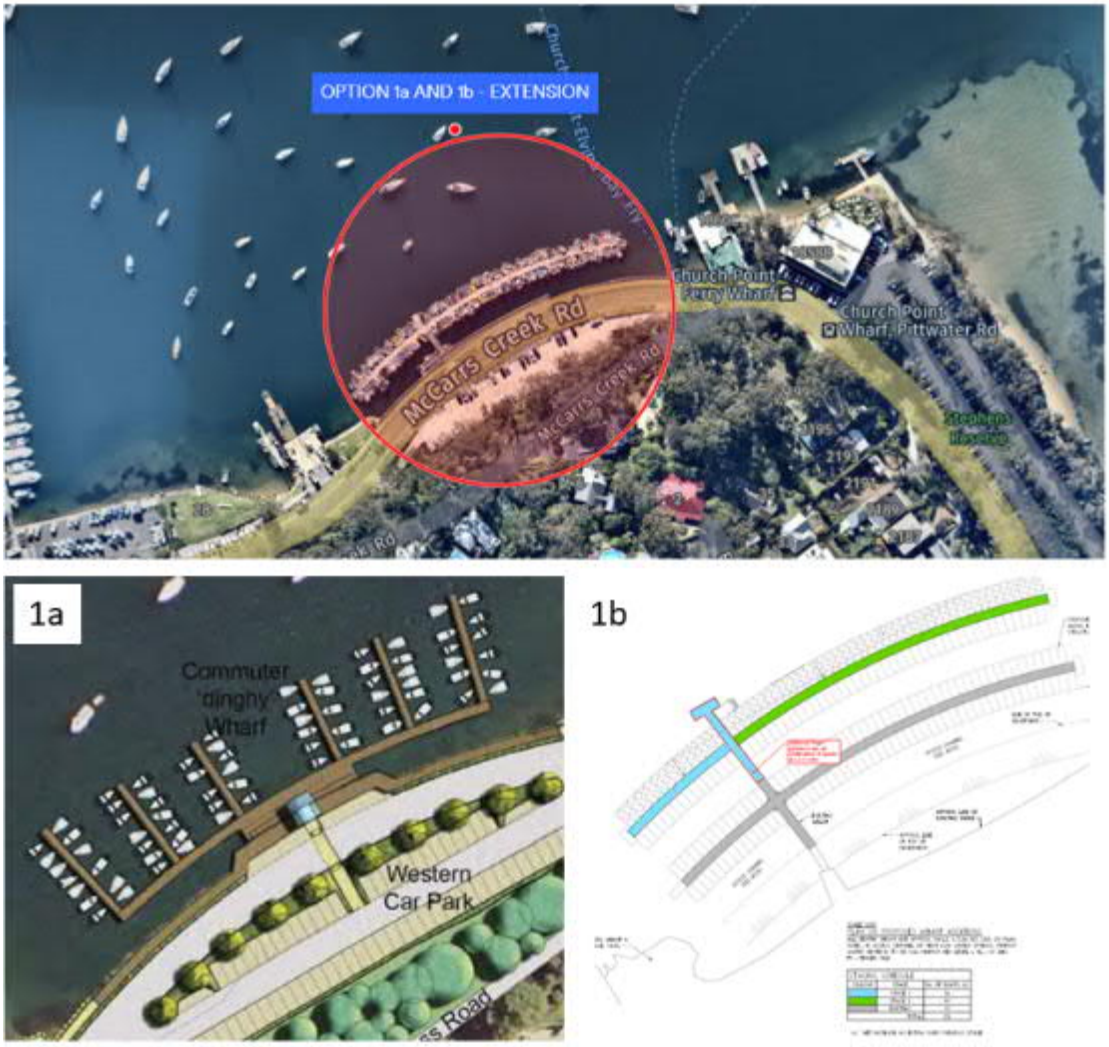

Figure 1-3 Option 1a and 1b - Extension to the Existing Church Point Commuter Wharf.

1.2.2 Option 2a and 2b

Option 2 includes an additional commuter wharf at either Rostrevor Reserve (2a) or Church Point Reserve (2b) (Figure 1-4). During construction of the new seawall adjacent to the commuter wharf in 2016 an additional pontoon was installed at Rostrevor Reserve. It was later removed once construction works were complete. The community survey results indicate that many residents support the installation of a structure at Rostrevor Reserve to provide additional tie-up spaces. Church Point Reserve is currently used in an ad-hoc manner for offshore residents with many parking their boats on the beach due to limited spots at the Commuter Wharf.

Figure 1-4 Option 2a and 2b - Additional structures at either Rostrevor Reserve (2a) or Church Point Reserve (2b).

1.2.3 Option 3a, 3b and 3c

Option 3 covers provision of boat bays at other locations in Pittwater including Rowland Reserve, McCarrs Creek Reserve and Bayview Baths (Figure 1-5). Rowland Reserve is located approximately 3 km from the Scotland Island Ferry Wharf, travelling by water, and McCarrs Creek and Bayview Baths are approximately 2.3 km away.

Figure 1-5 Option 3a, 3b and 3c - Additional Boat Bays at either Rowland Reserve (3a), McCarrs Creek Reserve (3b) and Bayview Baths (3c).

1.2.4 Option 4

Option 4 would consider either a 'do nothing' approach or assessment on the feasibility of a possible combination of the above-mentioned options. If a combination of options was considered it is envisaged indicative costs would be a largely weighted deciding factor.

2 Planning and Approvals

As part of preliminary options analysis, a review of relevant legislative, regulatory, Commonwealth, State and Local statutory planning instruments has been undertaken to identify any planning issues and to advise on the expected planning approvals that would be required to construct and operate each option based on their respective location and environmental setting, scope of construction works and future use(s). Site-specific information relevant to individual options is included within this section.

2.1 Federal Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as Matters of National Environmental Significance (MNES). The EPBC Act requires assessment of whether proposed actions are likely to significantly impact on MNES or Commonwealth land. MNES are identified in an EPBC Act Protected Matters Search undertaken for the study area (see Appendix A).

A preliminary assessment of the potential impact of the options on MNES and Commonwealth land in Table 2-1 found that there is unlikely to be a significant impact on relevant MNES or on Commonwealth land. Accordingly, it is expected that none of the options would require a referral to the Australian Government Department of Agriculture, Water and Environment (DAWE) under the EPBC Act.

Table 2-1 Assessment of impacts to MNES.

MNES and Commonwealth Land	Potential Impacts
Any impact on a World Heritage property? There are no World Heritage properties within 1 km of the option locations.	Nil
Any impact on a National Heritage place? There are no National Heritage places within option locations. Option 3b is located in the vicinity of the National Heritage place "Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves".	Nil
Any impact on a wetland of international importance? There are no wetlands of international importance within 1 km of the option locations.	Nil
Any impact on a listed threatened species or communities? There are a number of listed threatened species and ecological communities under the EPBC Act which have the potential to occur within the general study area (refer to Sections 3.3.1 and 3.3.10). Further site investigations would be required to confirm the presence/absence of species and listed ecological communities (e.g. Posidonia seagrass meadows, saltmarsh, swamp oak forest). However, with appropriate design and adoption of mitigation measures during	Potential

construction, it is unlikely that the development of the options would significantly affect any listed threatened species or communities.	
Any impacts on listed migratory species? There are a number of listed migratory species under the EPBC Act which have the potential to occur within the general study area (refer to Section 3.3.10). Further site investigations would be required to confirm the presence/absence of species. However, with appropriate design and adoption of mitigation measures during construction, it is unlikely that the development of the options would significantly affect listed migratory species.	Potential
Does the proposal involve a nuclear action (including uranium mining)? The options do not involve a nuclear action.	Nil
Any impact on a Commonwealth marine area? There are no Commonwealth marine areas in the vicinity of the options.	Nil
Does the proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources? The options do not involve development of coal seam gas or a large coal mine.	Nil
Additionally, any impact (direct or indirect) on Commonwealth land? The options would not be undertaken on or near any Commonwealth land.	Nil

2.1.2 Native Title Act 1993 (NT Act)

The NT Act recognises the traditional rights and interests to land and waters of Aboriginal and Torres Strait Islander people. Under the NT Act, native title claimants can make an application to the Federal Court to have their native title recognised by Australian law. A search of the National Native Title Register indicates there are no native claims registered with respect to the option locations.

The NT Act presumes that Native Title exists on all land within the country (including Crown land) unless there has been an extinguishing event. The development of the options would be considered a Future Act as defined in the NT Act as a facility for services to the public under Subdivision K of Division 3 of Part 2 of the NT Act. The Future Act would not extinguish native title interests in the land and waters affected as the non-extinguishment principle will apply. For any works to commence, consultation under 24KA to Native Title Services Corp Ltd (NTS Co Corp) would be required.

2.1.3 Disability Discrimination Act 1992 (DDA)

The DDA aims to eliminate as far as possible, discrimination against persons on the ground of disability in areas including access to premises and the provision of facilities, services and land. The design of the options would be required to have regard to the requirements of the DDA, where facilities are to be used by the public.

2.2 NSW Legislation

2.2.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

The EP&A Act is the principal planning and development legislation in NSW. The EP&A Act establishes planning approval pathways and environmental planning instruments which include State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs).

Part 4 Developments

Division 4.3 of the EP&A Act sets out the provisions for development that needs consent. Section 4.15 of the EP&A Act details the matters requiring consideration by the consent authority in determining a development application (DA).

Under Section 4.10 of the EP&A Act, certain DAs may be declared to be designated development by an EPI or the regulations which are high-impact developments. A designated development can also be integrated development, when under Section 4.46 of the EP&A Act, certain DAs may require the approval (such as a permit or license) from an NSW Government agency (approval body) before determination can be made by the consent authority.

Development of the options does not require consent.

Part 5 Activities

Section 5.5 of the EP&A Act requires determining authorities, when assessing an 'activity' under Part 5, to "*examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity*". A Review of Environmental Factors (REF) is prepared and determined in accordance with these provisions.

As per Section 4.1 of the EP&A Act, if an environmental planning instrument provides that development may be carried out without the need for development consent, a person may carry out the development, in accordance with the environmental planning instrument, on land to which the provision applies.

2.2.2 Environmental Planning and Assessment Regulation 2000 (EP&A Regulation)

Designated Development

Clause 4 of the EP&A Regulation provides definition of designated development as development described in Part 1 of Schedule 3 of the EP&A Regulation unless declared not to be designated development by Part 2 or 3 of that Schedule. The relevant designated development criteria is included in Part 1, Clause 23 of Schedule 3 of the EP&A Regulation as follows:

> *23 Marinas or other related land and water shoreline facilities*
>
> *(1) Marinas or other related land or water shoreline facilities that moor, park or store vessels (excluding rowing boats, dinghies or other small craft) at fixed or floating berths, at freestanding moorings, alongside jetties or pontoons, within dry storage stacks or on cradles on hardstand areas—*

(a) that have an intended capacity of 15 or more vessels having a length of 20 metres or more, or

(b) that have an intended capacity of 30 or more vessels of any length and—

(i) are located in non-tidal waters, or within 100 metres of a wetland or aquatic reserve, or

(ii) require the construction of a groyne or annual maintenance dredging, or

(iii) the ratio of car park spaces to vessels is less than 0.5:1, or

(c) that have an intended capacity of 80 or more vessels of any size.

(2) Facilities that repair or maintain vessels out of the water (including slipways, hoists or other facilities) that have an intended capacity of—

(a) one or more vessels having a length of 25 metres or more, or

(b) 5 or more vessels of any length at any one time.

It is considered that the boat bays would not meet the above definition for designated development as the primary purpose is to moor, park or store rowing boats, dinghies or other small craft.

Clause 228

Clause 228 of the EP&A Regulation defines the factors which must be considered when determining if an activity assessed under Division 5.1 of the EP&A Act has or is likely to have a significant impact on the environment.

2.2.3 Biodiversity Conservation Act 2016 (BC Act)

The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future consistent with the principles of ecologically sustainable development.

The BC Act outlines the protection of threatened species, communities and critical habitats in NSW. In the aquatic environment seabirds, waders, aquatic reptiles, aquatic mammals and insects, endangered aquatic ecological communities and key threatening processes are addressed under the BC Act. A number of threatened species listed under the BC Act 2016 have the potential to occur within the study area (refer to Section 3.3.10.1 and Appendix B). No Areas of Outstanding Biodiversity Value (AOBV) declared under the BC Act occur within the study area (refer to Section3.3.9.2).

Part 7 of the BC Act contains the biodiversity assessment and approvals provisions for which developments or activities are to be assessed. There are not expected to be any significant impacts on any threatened species or on any endangered ecological community (EEC) listed under the BC Act as a result of the options. Therefore, preparation of a Species Impact Statement (SIS) would not be expected to be necessary and entry into the Biodiversity Offsets Scheme (BOS) under the BC Act would not be required.

2.2.4 Fisheries Management Act 1994 (FM Act)

The FM Act aims to conserve threatened species, populations and ecological communities of fish and key fish habitats. Part 7 of the FM Act relates to the protection of aquatic habitats including providing

management of dredging and reclamation work within permanently or intermittently flowing watercourses as well as for the management of marine vegetation. The FM Act is administered by NSW Department of Primary Industries (DPI).

NSW DPI administers legislation, which protects marine vegetation (mangroves, seagrasses and seaweeds) on public water land and foreshores. Harming or removal of marine vegetation is generally only permissible by permit.

NSW DPI applies the following policies in relation to harm to marine vegetation:

- Under most circumstances damage to live seagrass is only permitted for replanting and scientific research purposes.
- Strapweed (*Posidonia australis*) seagrass must not be directly or indirectly impacted by any activity or development.
- The collection of living macroalgae, with the exception of green 'bait weed' (Enteromorpha and Ulva spp.), requires a permit from NSW DPI.
- Removal of marine vegetation, such as mangroves, requires a permit. No removal of marine vegetation will generally be permitted in certain areas, such as SEPP14 wetlands (Coastal Wetlands).

There are a number of threatened fish species listed under the FM Act with the potential to occur in the study area, which have been identified and discussed in Section 3.3.10.2 (also see Appendix C). No significant impacts on these species are expected to occur.

Marine vegetation, including the endangered *Posidonia australis* seagrass population of Pittwater, is mapped by NSW DPI at many of the option sites. It is also expected to occur at sites where current mapping does not indicate its presence (also note that macroalgae is not included within the DPI mapping and a review of aerial imagery suggests that aquatic vegetation does occur at many sites where not mapped). This is discussed in Section 3.3.2.

No areas of declared Critical Habitat under the FM Act occur within the study area and would not be impacted by any of the proposed options (refer to Section 3.3.9.1).

Permits or notification to DPI that would likely be required (for any option) under the following sections of the FM Act are as follows:

- Section 199: Notification for carrying out of dredging and reclamation works (note that piling is regarded as reclamation).
- Section 205: Permit for works that harm marine vegetation (i.e. mangroves, saltmarsh, seagrass or macroalgae).

2.2.5 Water Management Act 2000 (WM Act)

Under Section 91 of the WM Act, an approval is required for a "*controlled activity that is undertaken on waterfront land*". Waterfront land includes beds of any river, lake and estuary. Development of any of the options would be exempt from the requirement to obtain a 'controlled activity' approval under Clause 41 of the Water Management (General) Regulation 2018 for work on waterfront land as it would be conducted by a public authority.

2.2.6 National Parks and Wildlife Act 1974 (NPW Act)

The NPW Act provides controls in relation to the protection of land reserved under the NPW Act as well as controls in relation to the protection of items of cultural heritage. It is an offence under the NPW Act to 'harm' Aboriginal objects or sites of Aboriginal significance without an Aboriginal Heritage Impact Permit (AHIP). Refer to Section 3.2 for further discussion on potential impacts to any Aboriginal places and sites. Refer to Section 3.3.7 for a description of the location of National Parks and Nature Reserves under the NPW Act.

2.2.7 Heritage Act 1977

The *Heritage Act 1977* contains provisions for listing sites or places on the State Heritage Register (SHR), establishment of State Government Agencies Heritage and Conservation Registers and the protection of relics. None of the option locations are listed on the SHR or any Agency's Heritage and Conservation Register.

The Heritage Act 1977 defines a "relic" as follows:

> "*relic means any deposit, artefact, object or material evidence that:*
>
> *(a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and*
>
> *(b) is of State or local heritage significance.*"

There are no known relics at the option locations or any known maritime heritage (such as shipwrecks) that would be directly impacted. Refer to Section 3.2 for further discussion.

2.2.8 Crown Land Management Act 2016 (CLM Act)

The CLM Act includes provision for the ownership, use and management of the State's Crown land. Crown land is administered by the Department of Planning, Industry and Environment (DPIE). The majority of the bed of Pittwater and McCarrs Creek is mapped as Crown land, with the exception of Rowland Reserve and parts of the adjoining bed of Winnererremy Bay (Figure 2-1).

Crown reserves are identified in Figure 2-2 to Figure 2-4. Most of the reserve trusts are managed by Council, except for the Pittwater Regional Crown Reserve.

Under Division 3.4 of the CLM Act, if a Council is a manager of a reserve trust and the reserve is a public reserve, the trust has all the functions of a Council under the *Local Government Act 1993* (LG Act). However, the trust has no authority to classify a public reserve or any part of it as operational land under the LG Act.

Figure 2-1 Crown land mapped around Rowland Reserve – Option 3a (Source: NSW Planning Portal).

Figure 2-2 Crown reserves at Options 1a, 1b, 2a and 2b (Source: NSW Planning Portal).

Figure 2-3 Crown reserves at Option 3b (Source: NSW Planning Portal).

Figure 2-4 Crown reserves at Option 3c (Source: NSW Planning Portal).

2.2.9 Local Government Act 1993 (LG Act)

The LG Act requires that all councils classify public land as “operational” or “community” and that plans of management be prepared for community land, except land to which the CLM Act applies. The Council maintains a Land Register under Section 53 of the LG Act.

Land at Options 1a, 1b, 2a, 2b, 3b and 3c does not directly include community land vested in Council and is therefore not subject to the provisions of the LG Act. However, there is a Church Point Plan of Management, dated November 2009 that currently exists. Land at Option 3a at Rowland Reserve is classified as community land (Figure 2-5) and the Winnererremy Bay Plan of Management, dated May 2003 applies to this land.

Figure 2-5 Council owned/managed land (NBC Land Register 2021).

2.2.10 Protection of the Environment Operations Act 1997 (POEO Act)

The POEO Act regulates activities which may result in pollution impacts (for example land, air, water and noise pollution). Part 3.2 of the POEO Act requires an environmental protection licence (EPL) for scheduled development work and to carry out scheduled activities as identified in Schedule 1 of the POEO Act. Examples of schedules activities including extractive activities (dredging) where more than 30,000 tonnes per year and marinas including boat moorings and storage capacity to handle more than 80 vessels (excluding rowing boats, dinghies and other small craft) at any time. None of the options would require an EPL.

2.3 Environmental Planning Instruments

2.3.1 State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP)

The CM SEPP aims to update and consolidate into one integrated policy, a series of previous SEPPs including State Environmental Planning Policy 14 (Coastal Wetlands), State Environmental Planning Policy 26 (Littoral Rainforests) and State Environmental Planning Policy 71 (Coastal Protection). The CM SEPP gives effect to the objectives of the *Coastal Management Act 2016* from a land use planning perspective, specifying how developments are to be assessed if they fall within the coastal zone.

All option sites falls within the Coastal Environment Area and Coastal Use Area zones identified in the CM SEPP. The option locations do not fall within any mapped Coastal Wetlands or Littoral Rainforests. Options 3a and 3b are located within land mapped Proximity Areas for Coastal Wetlands (Figure 2-6). Section 3.3.4 and 3.3.5 provide further detail on the location of Coastal Wetlands and Littoral Rainforests in relation to each of the options.

Figure 2-6 Land mapped as CM SEPP Coastal Wetlands and Proximity Areas for Coastal Wetlands (Source: NSW Planning Portal).

Under the CM SEPP, development consent for land in proximity to Coastal Wetlands must not be granted if a development will have a significant impact under Clause 11. For development on land within the Coastal Environment Area and Coastal Use Area, consent must not be granted if a development is likely to cause an adverse impact to these areas with respect to matters outlined in Clauses 13 and 14.

As any development would be assessed and determined under Division 5.1 of the EP&A Act, the consideration of these development controls is not a statutory requirement.

2.3.2 State Environmental Planning Policy (Infrastructure) 2007 (ISEPP)

The ISEPP aims to facilitate the effective delivery of various infrastructure types across NSW including provisions for exempt and complying development, development without consent and development permitted with consent.

Clause 68(4) of the Infrastructure SEPP permits the development of 'wharf or boating facilities' on any land by or on behalf of a public authority without consent. The definition of 'wharf or boating facilities' under the Standard Instrument is:

> *"a wharf or any of the following facilities associated with a wharf or boating that are not port facilities—*
>
> *(a) facilities for the embarkation or disembarkation of passengers onto or from any vessels, including public ferry wharves,*
>
> *(b) facilities for the loading or unloading of freight onto or from vessels and associated receival, land transport and storage facilities,*
>
> *(c) wharves for commercial fishing operations,*
>
> *(d) refuelling, launching, berthing, mooring, storage or maintenance facilities for any vessel,*
>
> *(e) sea walls or training walls,*
>
> *(f) administration buildings, communication, security and power supply facilities, roads, rail lines, pipelines, fencing, lighting or car parks.*"

Clause 68(5) allows the following to be undertaken when in connection with development for the purpose of wharf or boating facilities:

> *"(a) construction works (including dredging or land reclamation, if the dredging or land reclamation is required for the construction of those facilities),*
>
> *(b) routine maintenance works,*
>
> *(c) environmental management works,*
>
> *(d) alteration, demolition or relocation of a local heritage item,*
>
> *(e) alteration or relocation of a State heritage item."*

In addition, Clause 68(7) allows dredging, or bed profile levelling, of existing navigation channels, if that dredging or levelling is:

> *"(a) carried out for safety reasons, or*
>
> *(b) carried out in connection with any such facilities that, at the time of the dredging or levelling, exist."*

As the proposed activity is for the purpose of 'wharf or boating facilities' and would be carried out by Council, it can be assessed and determined by Council under Division 5.1 of the EP&A Act. A REF would be prepared to describe the proposed activity, its potential environmental impacts, and safeguards and management measures to be implemented. In doing so, the REF helps to fulfil the requirements of Section 5.5 of the EP&A Act, including that Council examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

Clause 16 contains provisions for consultation with public authorities other than councils for certain types of development including Clause 16(2)(e) for "*development comprising a fixed or floating structure in or over navigable waters—Transport for NSW*".

2.3.3 State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP)

The SRD SEPP identifies development that is State significant infrastructure and critical State significant infrastructure.

Clause 14(1) of the SRD SEPP declares development to be State significant infrastructure if the development is, by the operation of a State environmental planning policy, permissible without development consent and the development is specified in Schedule 3 of the SRD SEPP.

Schedule 3 specifies that development for the purpose of port and wharf facilities or boating facilities (not including marinas) by or on behalf of a public authority that has a capital investment value of more than $30 million is State significant infrastructure.

The proposed development has a capital investment value of less than $30 million. Therefore, it is not State significant infrastructure as declared by the SRD SEPP.

2.3.4 State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 (ECD SEPP)

The ECD SEPP contains provisions for:

- Exempt development in Part 1, Subdivision 40A Waterways structures—minor alterations to existing lawful boat sheds, jetties, marinas, pontoons, water recreation structures and wharf or boating facilities.
- Complying development in Part 4A, Subdivision 6 Waterways structures for structural repairs to, the replacement of, or the carrying out of maintenance works in relation to, existing lawful boat sheds, cranes, davits, jetties, marinas, pontoons, slipway rails, winches, water recreation structures and wharf or boating facilities.

2.3.5 Pittwater Local Environmental Plan 2014 (LEP)

The LEP governs local development controls and land use zonings. The zoning for each option is shown in Figure 2-7 and Table 2-2.

As stated previously, Clause 68(4) permits development for the purpose of wharf or boating facilities to be carried out by or on behalf of a public authority without consent on any land. As development

without consent, the options would not be subject to the provisions of the LEP. However, the LEP is useful in identifying the objectives of the land use zonings and range of permitted land uses (Table 2-3).

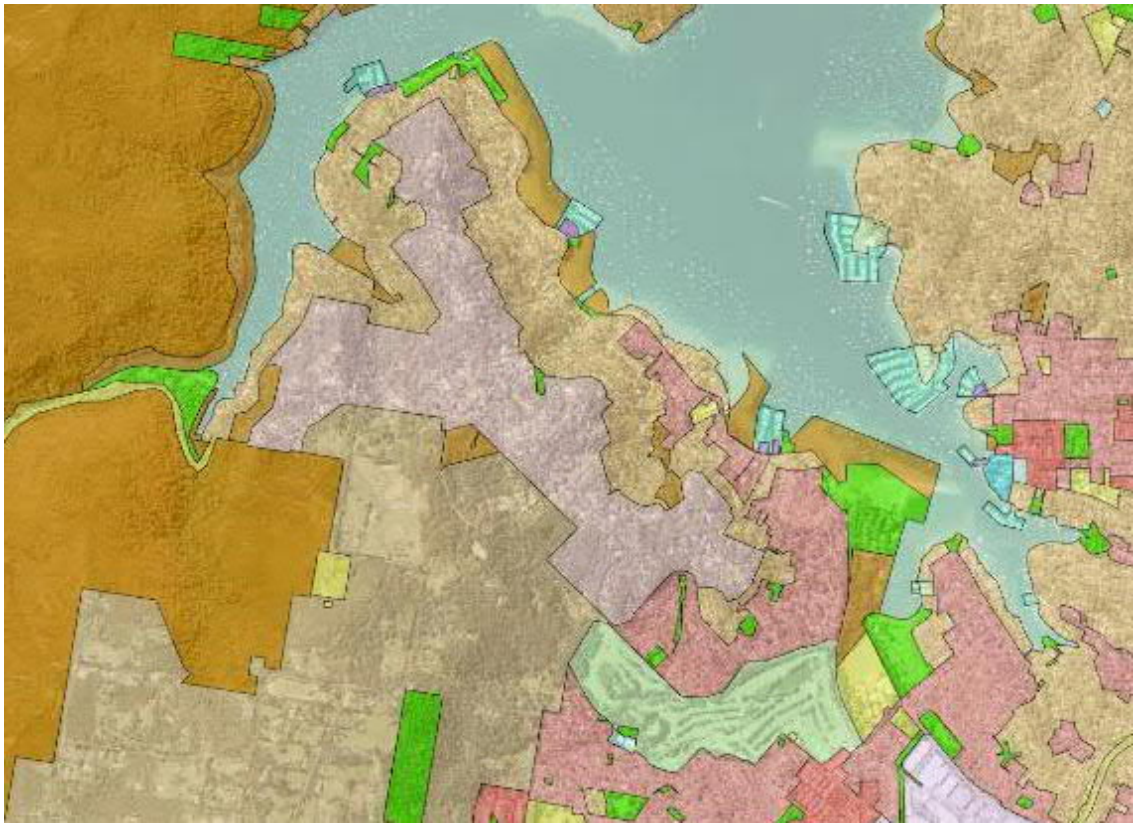

Figure 2-7 LEP Land Zoning (Source: NSW Planning Portal).

Table 2-2 Zoning for the options.

Option	Zoning
Option 1a and 1b	W1 Natural Waterways
Option 2a	W1 Natural Waterways, RE1 Public Recreation
Option 2b	E2 Environmental Conservation, RE1 Public Recreation
Option 3a	W1 Natural Waterways, E2 Environmental Conservation, RE1 Public Recreation
Option 3b	W1 Natural Waterways, E2 Environmental Conservation, RE1 Public Recreation
Option 3c	W1 Natural Waterways, W2 Recreational Waterways, RE1 Public Recreation

Table 2-3 Zone objectives and land uses.

Zone	Zone objectives	Permitted without consent	Permitted with consent	Prohibited
W1 Natural Waterways	• To protect the ecological and scenic values of natural waterways. • To prevent development that would have an adverse effect on the natural values of waterways in this zone. • To provide for sustainable fishing industries and recreational fishing. • To ensure development does not adversely impact on the natural environment or obstruct the navigation of the waterway. • To provide opportunities for private access to the waterway where these do not cause unnecessary impact on public access to the foreshore.	Environmental protection works	Aquaculture; Environmental facilities; Mooring pens	Business premises; Hotel or motel accommodation; Industries; Multi dwelling housing; Recreation facilities (major); Residential flat buildings; Restricted premises; Retail premises; Seniors housing; Service stations; Warehouse or distribution centres; Any other development not specified in item 2 or 3
RE1 Public Recreation	• To enable land to be used for public open space or recreational purposes. • To provide a range of recreational settings and activities and compatible land uses. • To protect and enhance the natural environment for recreational purposes. • To allow development that does not substantially diminish public use of, or access to, public open space resources. • To provide passive and active public open space resources, and ancillary development, to meet the needs of the community.	Building identification signs; Environmental protection works; Horticulture; Markets; Roads	Aquaculture; Centre-based child care facilities; Community facilities; Environmental facilities; Information and education facilities; Kiosks; Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Respite day care centres; Restaurants or cafes; Signage; Take away food and drink premises; Water recreation structures	Any development not specified in item 2 or 3
E2 Environmental Conservation	• 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.	Environmental protection works	Environmental facilities; Oyster aquaculture Recreation areas; Roads	Business premises; Hotel or motel accommodation; Industries; Multi dwelling housing; Pond-based aquaculture; Recreation facilities (major); Residential flat buildings; Restricted premises; Retail premises; Seniors housing; Service stations; Tank-based

	• 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.			aquaculture; Warehouse or distribution centres; Any other development not specified in item 2 or 3
W2 Recreational Waterways	• To protect the ecological, scenic and recreation values of recreational waterways. • To allow for water-based recreation and related uses. • To provide for sustainable fishing industries and recreational fishing. • To provide for amateur and professional recreational yachting or boating clubs and the like that serve Pittwater and the wider region. • To ensure development does not adversely impact on the enjoyment and use of the waterway or adjoining land. • To provide for a variety of passive and active recreational pursuits and water-based transport while preserving the environmental setting of the waterway. • To ensure that public access to the waterway and foreshore areas suitable for public recreational and transport purposes is maintained.	Environmental protection works	Aquaculture; Boat building and repair facilities; Boat launching ramps; Boat sheds; Charter and tourism boating facilities; Emergency services facilities; Environmental facilities; Jetties; Kiosks; Marinas; Mooring pens; Signage; Water recreation structures	Industries; Multi dwelling housing; Residential flat buildings; Seniors housing; Warehouse or distribution centres; Any other development not specified in item 2 or 3

2.4 Planning Approvals Pathway

It is expected that the construction of the new boating facilities can be carried out under the provisions of ISEPP at any of the option locations. The planning approval pathway is development for the purpose of 'wharf or boating facilities' under Clause 68(4) when undertaken by or on behalf of a public authority this may be carried out without development consent subject to the preparation and determination of a REF under Part 5 of the EP&A Act.

Statutory consultation would be required with Transport for New South Wales (TfNSW) and NTS Corp (Native Title Service Provider for Aboriginal Traditional Owners in New South Wales and the Australian Capital Territory).

Other notification and permits that are likely to be required for the proposal under the FM Act include:

- Section 199: Notification for carrying out of dredging and reclamation works.
- Section 205: Permit for works that harm marine vegetation.

3 Environmental Constraints

Environmental constraints associated with each of the six locations identified by NBC are outlined in the following Sections. This identification of constraints is based on a desktop review of existing data as well as a general site inspection undertaken on 16th August 2021. No specialist surveys of flora (aquatic or terrestrial) or fauna were undertaken as part of the general site inspection but should be included for the following stage of approvals (i.e. preparation of an REF).

3.1 Land Use and Property

Land use and property constrains for all six options are identified in the following Sections as well as other areas of this report as follows.

Land use zoning is discussed previously in Section 2.3.5. The NBC LEP governs local development controls and land use zonings. The land use zoning for each option is shown previously in Figure 2-7 and Table 2-2. Clause 68(4) permits development for the purpose of wharf or boating facilities to be carried out by or on behalf of a public authority without consent on any land. As development without consent, the options would not be subject to the provisions of the LEP. However, the LEP is useful in identifying the objectives of the land use zonings and range of permitted land uses (Table 2-3).

Crown land is discussed previously in Section 2.2.8. The majority of the bed of Pittwater and McCarrs Creek is mapped as Crown land, with the exception of Rowland Reserve and parts of the adjoining bed of Winnererremy Bay (Figure 2-1). Crown reserves in the vicinity of the options are identified in Figure 2-2 to Figure 2-4. Most of the reserve trusts are managed by Council, except for the Pittwater Regional Crown Reserve.

Native title is discussed previously in Section 2.1.2. A search of the National Native Title Register indicates there are no native claims registered with respect to any of the option locations.

National parks and nature reserves are discussed in Section 3.3.7. No National Parks or Nature Reserves occur on land identified for any of the options.

Socio-economic factors are discussed in Section 3.6 and traffic, transport and access constraints in Section 3.8.

3.1.1 Option 1a and 1b – Extension

A summary of land use and property matters for Option 1a and 1b is provided below.

- Land Zoning – W1 Natural Waterways
- Crown Land – Yes
- Native Title – No native claims registered
- National Parks and Nature Reserves – No
- Residential (in vicinity) – Yes
- Open space and recreation – Yes

- Commercial areas - Yes

3.1.2 Option 2a – Additional Structure Rostrevor Reserve

A summary of land use and property matters for Option 2a is provided below.

- Land Zoning – W1 Natural Waterways, RE1 Public Recreation
- Crown Land – Yes
- Native Title – No native claims registered
- National Parks and Nature Reserves – No
- Residential (in vicinity) – Yes
- Open space and recreation – Yes
- Commercial areas - Yes

3.1.3 Option 2b – Additional Structure Church Point Reserve

A summary of land use and property matters for Option 2b is provided below.

- Land Zoning – E2 Environmental Conservation, RE1 Public Recreation
- Crown Land – Yes
- Native Title – No native claims registered
- National Parks and Nature Reserves – No
- Residential (in vicinity) – Yes
- Open space and recreation – Yes
- Commercial areas - Yes

3.1.4 Option 3a – Boat Bays Rowland Reserve

A summary of land use and property matters for Option 3a is provided below.

- Land Zoning – W1 Natural Waterways, E2 Environmental Conservation, RE1 Public Recreation
- Crown Land – No
- Native Title – No native claims registered
- National Parks and Nature Reserves – No
- Residential (in vicinity) – Yes
- Open space and recreation – Yes
- Commercial areas - No

3.1.5 Option 3b – Boat Bays McCarrs Creek Reserve

A summary of land use and property matters for Option 3b is provided below.

- Land Zoning – W1 Natural Waterways, E2 Environmental Conservation, RE1 Public Recreation
- Crown Land – Yes
- Native Title – No native claims registered
- National Parks and Nature Reserves – In close vicinity of "Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves". The option would have no have direct physical impacts on this item, but the REF would be required to assess any potential visual impacts to this item.
- Residential (in vicinity) – Yes
- Open space and recreation – Yes
- Commercial areas - No

3.1.6 Option 3c – Boat Bays Bayview Baths

A summary of land use and property matters for Option 3c is provided below.

- Land Zoning – W1 Natural Waterways, W2 Recreational Waterways, RE1 Public Recreation
- Crown Land – Yes
- Native Title – No native claims registered
- National Parks and Nature Reserves - No
- Residential (in vicinity) – Yes
- Open space and recreation – Yes
- Commercial areas - No

3.1.7 Summary of Land Use and Property Constraints

A summary of key land use and property constraints for each option is provided in Table 3-1.

Table 3-1 Summary of land use and property constraints for each option.

Option	Residential Areas	Open Space / Recreation Areas	Commercial Areas	Native Title Claims	Crown Land *	National Parks	Nature Reserves
1a and 1b – Extension at Church Point							
2a – Additional Structure Rostrevor Reserve							
2b – Additional Structure Church Point Reserve							
3a – Boat Bays Rowland Reserve							
3b – Boat Bays McCarrs Creek Reserve							
3c – Boat Bays Bayview Baths							

Green = not a constraint (based on review of existing mapping/data). Yellow = potential constraint. * Identifies that the site is on Crown Land (not particularly a constraint).

3.2 Cultural Heritage

Aboriginal cultural heritage

A desktop Aboriginal Heritage Due Diligence Assessment in accordance with the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW, 2010) was undertaken for each site. The assessment included Aboriginal Heritage Information Management System (AHIMS) database searches, review of landscape context and review of any previous investigations. It is suggested that consultation with the relevant Local Aboriginal Land Councils (LALCs) is undertaken at a later phase (i.e. REF stage). The Due Diligence Assessment has determined whether an Aboriginal Heritage Impact Permit (AHIP) is likely to be required for each site.

A copy of the AHIMS database search is provided in Appendix D.

Non-Aboriginal heritage

Non-Aboriginal heritage (including historic research of the study area and identification of built, archaeological and landscape items with their statutory status) was considered for each site by reference to statutory and non-statutory heritage lists/registers as well as previous studies, where available. A preliminary assessment of the potential impact(s), if any, on any conservation values that may constitute the heritage significance of the site and its elements, as well as impact(s), if any, on heritage items that may be located in vicinity of the site has been included.

3.2.1 Option 1a and 1b – Extension

No Aboriginal places have been recorded in AHIMS.

Two Aboriginal sites have been recorded in AHIMS in or near the locations at Church Point based on a map search. Section 2.1.1 of the Church Point Plan of Management (Pittwater Council and Land and Property Management Authority, 2009) states that "*Several Aboriginal Middens have been identified within or near the Church Point study area. Prior to detailed documentation the exact locations and extent of Middens on site will be investigated and liaison with the Aboriginal Land Council undertaken to ensure the long term protection of viable sites*".

An extensive AHIMS search would be required to be undertaken to confirm the location of the two Aboriginal sites recorded in or near the locations. If any Aboriginal sites are determined to be located within the options footprint, the design is to seek to avoid harm to these sites. If harm is unavoidable, detailed investigation and impact assessment of potential Aboriginal archaeology would be required to inform the submission of an AHIP.

No heritage items, archaeological sites or heritage conservation areas listed under the LEP are located on the location. The following items listed under Schedule 5 of the LEP are located in the vicinity of the option locations (Figure 3-1):

- "Memorial Obelisk" (Item No. 2270007).
- "Church Point Post Office and store" (Item No. 2270010).
- ""Rostrevor" (House)" (Item No. 2270005).
- "Homesdale" (house)" (Item No. 2270070).

- “Graveyard and site of former Methodist Church“ (Item No. A2270125).
- “Church Point Wharf“ (Item No. A2270336).

The options would have no have direct physical impacts to the heritage items and archaeological sites located in the vicinity. The REF would be required to assess any potential visual impacts to these items.

Figure 3-1 Location of heritage items and archaeological sites (Source: Northern Beaches Council 2021).

3.2.2 Option 2a – Additional Structure Rostrevor Reserve

No Aboriginal places have been recorded in AHIMS. See above discussion in Section 3.2.1 regarding Aboriginal sites at Church Point.

The heritage item “Memorial Obelisk“ (Item No. 2270007)” is located within Rostrevor Reserve. The option design would be required to avoid direct physical impact to this item. The REF would be required to assess any potential indirect heritage and visual impacts to this item.

The heritage items ““Rostrevor” (House)“ (Item No. 2270005) and “Homesdale” (house)“ (Item No. 2270070) are located in the vicinity. The option would have no have direct physical impacts to the heritage items located in the vicinity. The REF would be required to assess any potential visual impacts to these items.

3.2.3 Option 2b – Additional Structure Church Point Reserve

No Aboriginal places have been recorded in AHIMS. See above discussion in Section 3.2.1 regarding Aboriginal sites at Church Point.

No heritage items, archaeological sites or heritage conservation areas listed under the LEP are located on the location. The following items are located in the vicinity of the option locations (Figure 3-1):

- "Church Point Post Office and store" (Item No. 2270010).
- "Graveyard and site of former Methodist Church" (Item No. A2270125).
- "Church Point Wharf" (Item No. A2270336).

The option would have no have direct physical impacts to the heritage item and archaeological sites located in the vicinity. The REF would be required to assess any potential visual impacts to these items.

3.2.4 Option 3a – Boat Bays Rowland Reserve

No Aboriginal places have been recorded in AHIMS.

Four Aboriginal sites have been recorded in AHIMS in or near the location at Rowland Reserve for Lot 8 DP578688 with a 200 m buffer. It is noted that Section 2.1.3 of the Winnererremy Bay Plan of Management (Pittwater Council, 2003) states that "*No archaeological survey has been conducted in the study area, however, due to past dredging and reclamation works over an extended period of time, it is most unlikely that any physical evidence of Aboriginal culture still exists*".

An extensive AHIMS search would be required to be undertaken to confirm the location of the four Aboriginal sites recorded in or near the location. If any Aboriginal sites are determined to be located within the options footprint, the design is to seek to avoid harm to these sites. If harm is unavoidable, detailed investigation and impact assessment of potential Aboriginal archaeology would be required to inform the submission of an AHIP.

No heritage items, archaeological sites or heritage conservation areas listed under the LEP are located on the location or in the vicinity.

3.2.5 Option 3b – Boat Bays McCarrs Creek Reserve

No Aboriginal places or sites have been recorded in AHIMS.

The location is in the vicinity of the heritage item "Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves" listed on the National Heritage List (Figure 3-2) and protected under the EPBC Act. The option would have no have direct physical impacts to the heritage item located in the vicinity. The REF would be required to assess any potential visual impacts to this item.

No heritage items, archaeological sites or heritage conservation areas listed under the LEP are located on the location or in the vicinity.

Figure 3-2 Curtilage for the "Ku-ring-gai Chase National Park, Lion, Long and Spectacle Island Nature Reserves" (Source: Department of Agriculture, Water and Environment 2021).

3.2.6 Option 3c – Boat Bays Bayview Baths

No Aboriginal places have been recorded in AHIMS.

Four Aboriginal sites have been recorded in AHIMS in or near the location based on a map search. An extensive AHIMS search would be required to be undertaken to confirm the location of the four Aboriginal sites recorded in or near the location. If any Aboriginal sites are determined to be located within the options footprint, the design is to seek to avoid harm to these sites. If harm is unavoidable, detailed investigation and impact assessment of potential Aboriginal archaeology would be required to inform the submission of an AHIP.

No heritage items, archaeological sites or heritage conservation areas listed under the LEP are located on the location. The following items listed under Schedule 5 of the LEP are located in the vicinity of the option location (Figure 3-3):

- "Sea scout hall" (Item No. 2270406).
- "Street trees—1 Bunya Pine (*Araucaria bidwillii*) and 2 Norfolk Island Pines (*Araucaria heterophylla*)" (Item No. 2270046).
- "Sandstone retaining wall" (Item No. A2270057).

The option would have no have direct physical impacts to the heritage items and archaeological sites located in the vicinity. The REF would be required to assess any potential visual impacts to these items.

Figure 3-3 Location of heritage items and archaeological sites (Source: Northern Beaches Council 2021).

3.2.7 Summary of Heritage Constraints

A summary of heritage constraints for each option is provided in Table 3-2.

Table 3-2 Summary of heritage constraints for each option.

Option	Aboriginal Places	Aboriginal Sites	Native Title Claims	European Heritage Items	European Archaeological Sites	European Landscape Items	Heritage Conservation Areas
1a and 1b – Extension at Church Point							
2a – Additional Structure Rostrevor Reserve							
2b – Additional Structure Church Point Reserve							
3a – Boat Bays Rowland Reserve							
3b – Boat Bays McCarrs Creek Reserve							
3c – Boat Bays Bayview Baths							

Green = not a constraint (based on review of existing mapping/data). Yellow = potential constraint.

3.3 Aquatic and Terrestrial Biodiversity

Aquatic and terrestrial biodiversity constraints in the study area were identified through a review of existing data (e.g. online databases and mapping). The review of existing data included a preliminary identification of terrestrial and aquatic habitats, protected vegetation communities and threatened and/or protected fauna listed under State and Federal legislation.

Identification of important conservation tenures (e.g. NPWS reserves, areas of critical habitat (as identified under the FM Act and EPBC Act) and Areas of Outstanding Biodiversity Value (AOBVs) (as identified under the BC Act), NSW DPI mapped marine vegetation (i.e. mangroves, saltmarsh and seagrass), SEPP Coastal Wetlands or Littoral Rainforest as identified under the CM SEPP and identification of waterways and Key Fish Habitat was made. Recent Nearmap aerial imagery was reviewed for each site in order to assist with the identification of any areas of aquatic vegetation which may not be mapped under existing NSW DPI mapping.

3.3.1 Matters of National Environmental Significance

Matters of National Environment Significance (MNES) relating to biodiversity, as listed under the EPBC Act, were identified via an EPBC Act Protected Matters Search for the study area (http://www.environment.gov.au/epbc/protected-matters-search-tool). A point was selected in the approximate middle of all proposed sites with a 5 km radius search area adopted to cover the entire area of interest (Figure 3-4). The Protected Matters Search Report is provided in Appendix A.

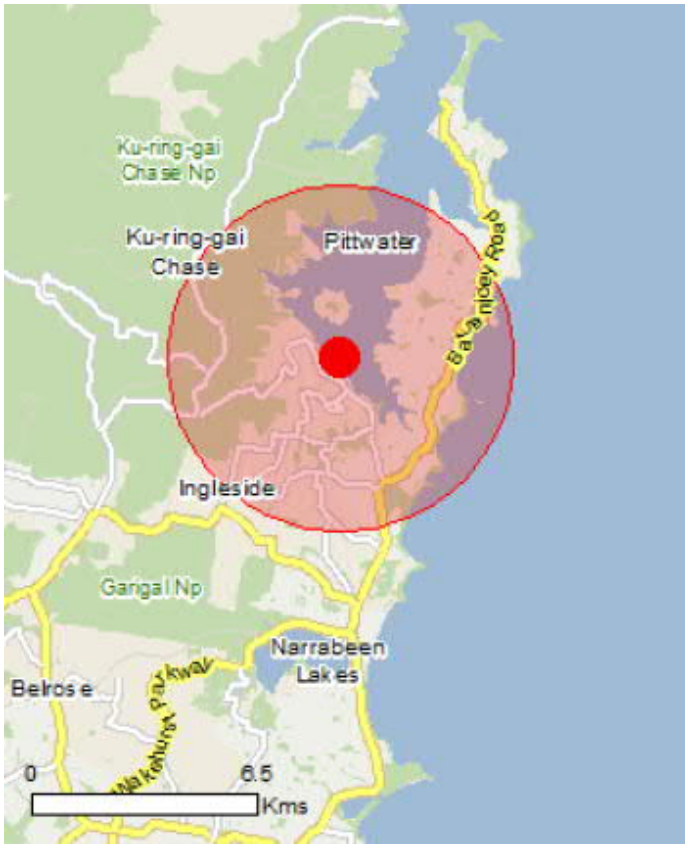

Figure 3-4 Protected Matters Search area (Protected Matters Search Tool 2021).

Matters of National Environmental Significance (MNES) relating to aquatic and terrestrial biodiversity in the study area are relevant for all options and are listed below:

- Wetlands of International Importance - None
- Great Barrier Reef Marine Park – None
- Commonwealth Marine Area – None
- Listed Threatened Species – 90 (refer to Section 3.3.10)
- Listed Threatened Ecological Communities – 6 (see following).
- Listed Migratory Species – 59 (refer to Section 3.3.10)

Other Matters Protected by the EPBC Act in the study area are listed below:

- Listed Marine Species – 77 (refer to Section 3.3.10)
- Whales and Other Cetaceans – 14 (refer to Section 3.3.10)
- Critical Habitats - None
- Australian Marine Parks – None
- Nationally Important Wetlands - None
- Key Ecological Features (Marine) – None

Listed Threatened Ecological Communities in the study area are listed below:

1. Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological Community - Endangered Community likely to occur within area.
2. Coastal Upland Swamps in the Sydney Basin Bioregion - Endangered Community likely to occur within area.
3. Littoral Rainforest and Coastal Vine Thickets of Eastern Australia - Critically Endangered Community likely to occur within area.
4. *Posidonia australis* seagrass meadows of the Manning-Hawkesbury ecoregion - Endangered Community likely to occur within area.
5. River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria - Critically Endangered Community likely to occur within area.
6. Subtropical and Temperate Coastal Saltmarsh - Vulnerable Community likely to occur within area.

Site investigations will be required to determine and/or confirm whether any of these listed communities occur within the waterway or on the foreshore at the individual option sites.

Areas of saltmarsh and Posidonia seagrass, as previously mapped by NSW DPI in the study area, are described further in Section 3.3.2. Areas of mapped saltmarsh occur in the vicinity of Option 3a. Areas of Posidonia seagrass are mapped in the vicinity of Option 2a and Option 3c. Inspection of aerial

imagery for the sites suggests, and past experience has shown, that areas of aquatic vegetation are often more expansive or differ from the DPI mapping so this must be confirmed with specific site inspections.

3.3.2 Mapped Aquatic Vegetation

All aquatic vegetation (i.e. mangroves, saltmarsh, seagrass and macroalgae) is protected under the FM Act. Under the FM Act it is an offence to remove or harm (either directly or indirectly) aquatic vegetation without a permit. Six locations within NSW (Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie) have suffered significant population declines of the seagrass *P. australis* and these have been listed as endangered populations. In addition, *P. australis* Seagrass Meadows of the Manning Hawkesbury Ecoregion are a Nationally Significant Ecological Community listed under the EPBC Act.

NSW DPI has mapped estuarine vegetation in all estuaries of NSW, with mapping available on the NSW DPI Fisheries Spatial Data Portal (https://www.dpi.nsw.gov.au/about-us/research-development/spatial-data-portal). Figure 3-5 provides an overview of all mapped aquatic vegetation within the local waterway. Site specific maps for each option are included in the following sections with further descriptions of mapped aquatic vegetation occurrence. Note that the NSW DPI mapping does not include areas of macroalgae (which is common around intertidal rocky shores, subtidal rocky reefs and also on artificial structures).

A NSW DPI Part 7 s205 Permit to Harm Marine Vegetation is likely to be required for any of the options being considered based on the known occurrence of aquatic vegetation (seagrass, mangroves or saltmarsh) at, or in the vicinity, of the proposed options, and the likelihood that marine macroalgae will also occur. However, the need for such permits will need to be confirmed once site specific investigations are undertaken for selected option at the REF stage.

Figure 3-5 Aquatic vegetation distribution around Church Point and surrounding areas (NSW DPI 2021).

3.3.2.1 *Option 1a and 1b – Extension*

No aquatic vegetation has been mapped in the immediate vicinity of the existing commuter wharf or Option 1a or 1b (Figure 3-6). If an extension of the current commuter wharf is decided upon this would likely be into deeper waters which are less likely to contain aquatic vegetation (although this is still possible, depending on typical water clarity and has been seen in Pittwater). Based on this mapping, any additional construction in this area may impact indirectly on aquatic vegetation (and potentially directly). Site specific investigations should be undertaken to better inform an REF for the proposal.

Figure 3-6 Aquatic vegetation mapped in the vicinity of Option 1a and 1b (NSW DPI 2021).

3.3.2.2 *Option 2a – Additional Structure Rostrevor Reserve*

No aquatic vegetation is mapped in the vicinity of Option 2a (Figure 3-7). However, aerial imagery and a general site inspection undertaken in August 2021 suggests that it likely occurs inshore in this area. Some images taken from the shore are provided in Figure 3-8. Construction in this area may impact directly or indirectly on aquatic vegetation. Site specific investigations should be undertaken to better inform an REF for the proposal.

Figure 3-7 Aquatic vegetation mapped in the vicinity of Option 2a (NSW DPI 2021).

Figure 3-8 Inshore aquatic vegetation in the vicinity of Option 2b.

3.3.2.3 Option 2b – Additional Structure Church Point Reserve

Quite expansive beds of Posidonia and smaller areas of Zostera seagrass have been mapped in the vicinity of Option 2b (Figure 3-9). Images of nearshore seagrass and macroalgae, taken from the shore during a general site inspection in August 2021, are shown in Figure 3-10. Based on the aerial imagery it is likely that the extent of seagrass in this area is more widespread than current NSW DPI mapping suggests. In addition, additional species may be present. Construction in this area will most likely impact directly on aquatic vegetation. Site specific investigations should be undertaken to inform an REF for the proposal. In addition, this option has been identified by NSW DPI Fisheries as one which is not preferred due to the mapped Posidonia.

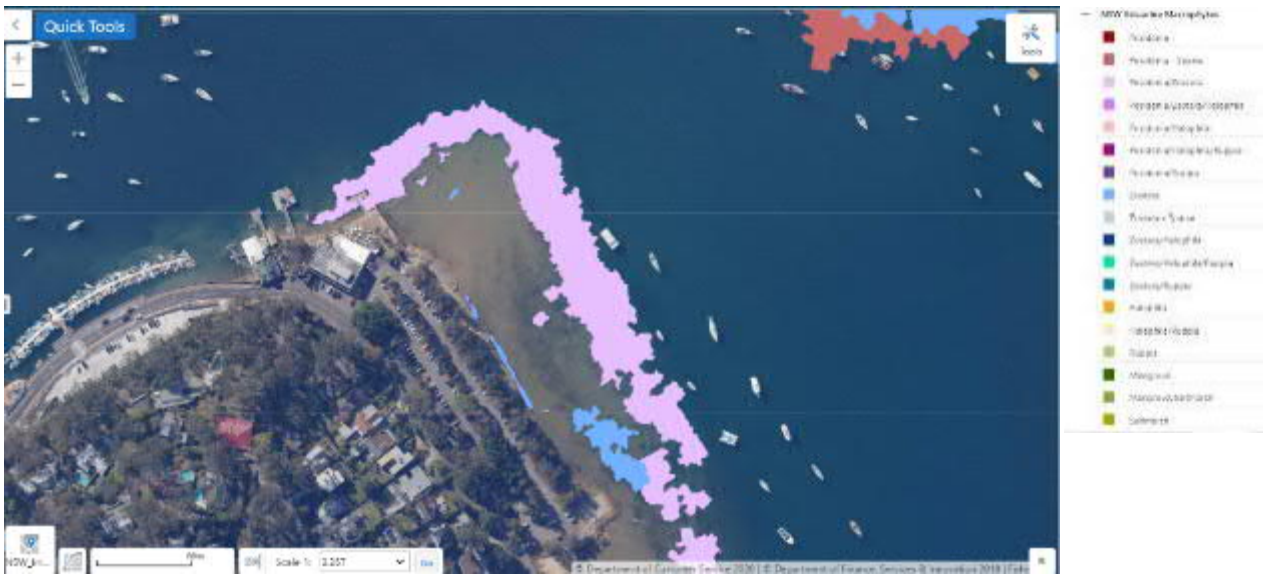

Figure 3-9 Aquatic vegetation mapped in the vicinity of Option 2b (NSW DPI 2021)

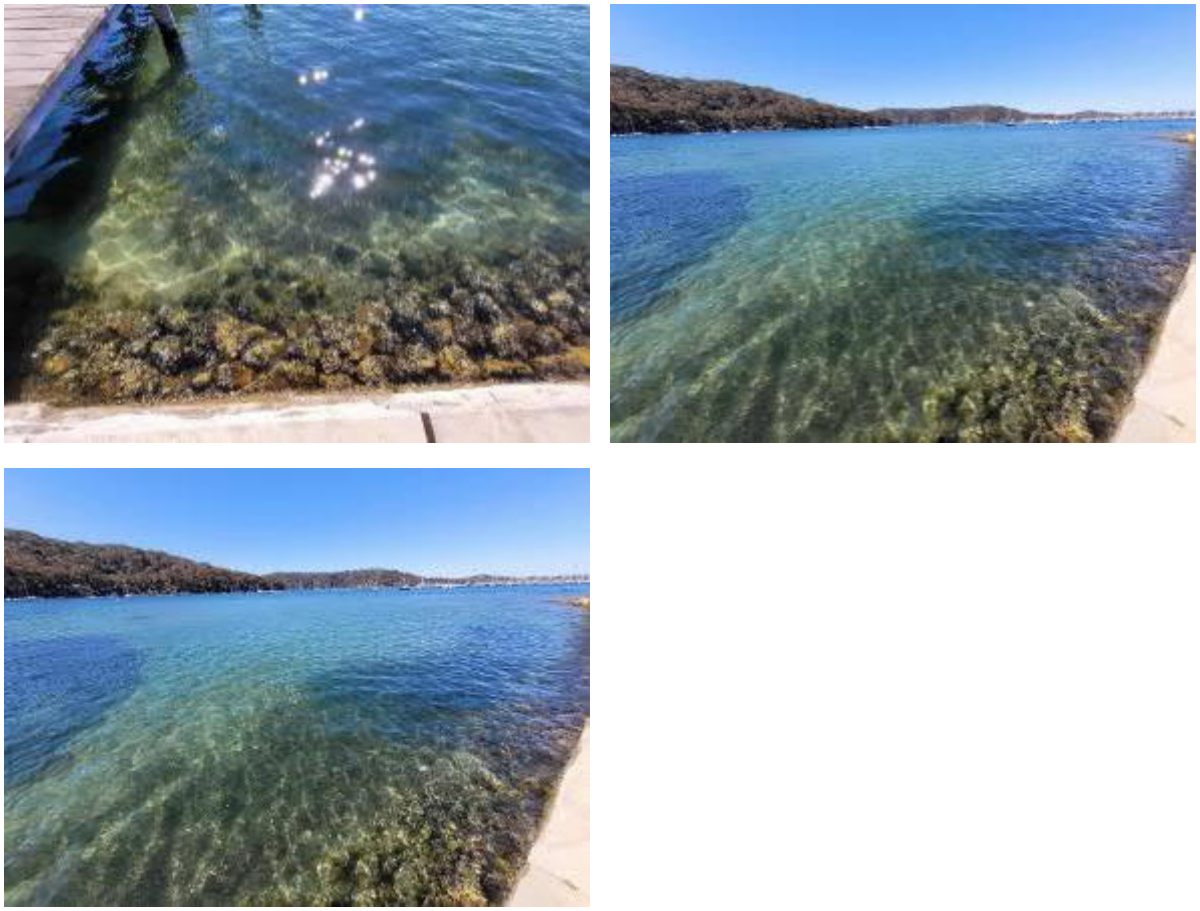

Figure 3-10 Inshore aquatic vegetation in the vicinity of Option 2b.

3.3.2.4 *Option 3a – Boat Bays Rowland Reserve*

Areas of Zostera seagrass, mangroves and saltmarsh are mapped in the vicinity of Option 3a (Figure 3-11). Images of nearshore seagrass and mangroves, taken from the shore during a general site inspection in August 2021, are shown in Figure 3-12. The extent of this aquatic vegetation may differ slightly than is mapped and the species of seagrass present may be more diverse. Construction in this area may impact directly and/or indirectly on aquatic vegetation. Site specific investigations should be undertaken to better inform an REF for the proposal.

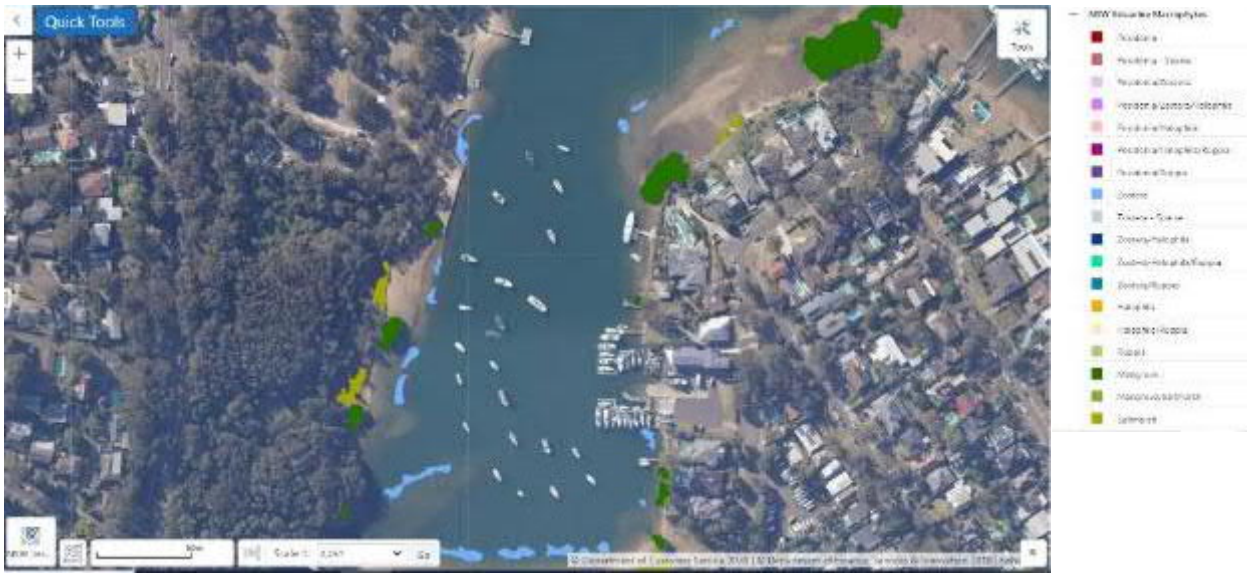

Figure 3-11 Aquatic vegetation mapped in the vicinity of Option 3a (NSW DPI 2021).

Figure 3-12 Inshore aquatic vegetation in the vicinity of Option 3a.

3.3.2.5 *Option 3b – Boat Bays McCarrs Creek Reserve*

Expansive areas of Zostera seagrass and mangroves are mapped within the vicinity of Option 3b (Figure 3-13). Seagrass occurs in the inshore location of the proposed option, across the river and upstream, while mangroves occur across the river and upstream. These seagrass beds may be more expansive than mapped. Some images of aquatic vegetation taken from the shore during a general

site visit in August 2021 are shown in Figure 3-14. Construction here may impact directly and/or indirectly on aquatic vegetation. Site specific investigations should be undertaken to inform an REF.

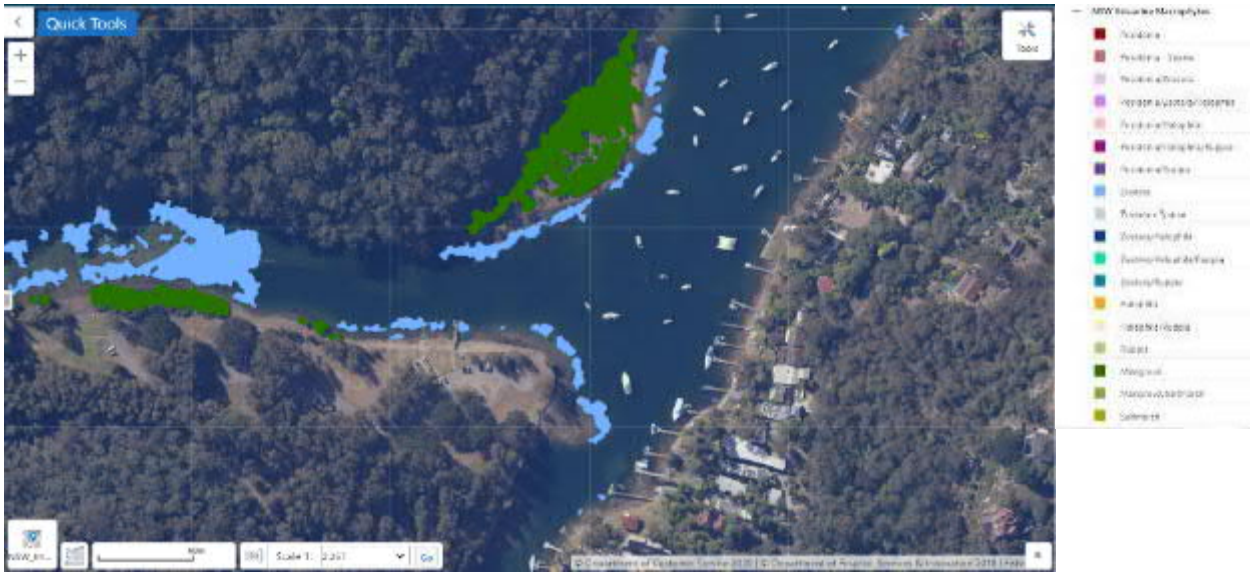

Figure 3-13 Aquatic vegetation mapped in the vicinity of Option 3b (NSW DPI 2021).

Figure 3-14 Aquatic vegetation in the vicinity of Option 3b.

3.3.2.6 *Option 3c – Boat Bays Bayview Baths*

Mangroves, Posidonia and Zostera seagrass are all mapped in the vicinity of Option 3c (Figure 3-15). Mangroves are quite extensive around the areas of shoreline which are currently undeveloped. Smaller patches of seagrass are mapped further offshore but aerial imagery suggests that they may be more expansive inshore also. Images taken during a general site inspection are shown in Figure 3-16 showing mangroves and macroalgae occur in the study area. Construction in this area may impact directly and/or indirectly on aquatic vegetation. Site specific investigations should be undertaken to better inform an REF for the proposal.

Figure 3-15 Aquatic vegetation mapped in the vicinity of Option 3c (NSW DPI 2021).

Figure 3-16 Aquatic vegetation in the vicinity of Option 3c.

3.3.3 Key Fish Habitat, Waterway and Fish Habitat Classification

Key Fish Habitat

Key Fish Habitat (KFH) is defined as “aquatic habitats that are important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish populations, and the survival and recovery of threatened aquatic species” (NSW DPI 2021). KFH includes all marine and estuarine habitats up to highest astronomical tide level (that reached by 'king' tides) and most permanent and semipermanent freshwater habitats including rivers, creeks, lakes, lagoons, billabongs, weir pools and impoundments up to the top of the bank (NSW DPI 2021).

KFH in the study area is shown in Figure 3-17. All of the proposed wharf option sites are located within mapped KFH which will need to be considered in the preparation of an REF for the selected option.

Figure 3-17 Mapped Key Fish Habitat in the study area (NSW DPI 2021).

Waterway and Fish Habitat Classification

Waterway and Fish Habitat Classification for each of the option areas under the NSW DPI Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (NSW DPI 2013) was determined using available data from the desktop review.

All sites would be classed as Class 1 Waterway – Major Key Fish Habitat under "Table 2 – Classification of waterway class" (see Figure 3-18), with Pittwater being a marine or estuarine waterway and also a habitat of a threatened or protected fish species.

Under "Table 1 - Key fish habitat and associated sensitivity classification scheme" (see Figure 3-19) the Type of KFH for the various options differ as identified for each option following.

Table 2 - Classification of waterways for fish passage

Classification	Characteristics of waterway class
CLASS 1 Major key fish habitat	Marine or estuarine waterway or permanently flowing or flooded freshwater waterway (e.g. river or major creek), habitat of a threatened or protected fish species or 'critical habitat'.
CLASS 2 Moderate key fish habitat	Non-permanently flowing (intermittent) stream, creek or waterway (generally named) with clearly defined bed and banks with semi-permanent to permanent waters in pools or in connected wetland areas. Freshwater aquatic vegetation is present. TYPE 1 and 2 habitats present.
CLASS 3 Minimal key fish habitat	Named or unnamed waterway with intermittent flow and sporadic refuge, breeding or feeding areas for aquatic fauna (e.g. fish, yabbies). Semi-permanent pools form within the waterway or adjacent wetlands after a rain event. Otherwise, any minor waterway that interconnects with wetlands or other CLASS 1-3 fish habitats.
CLASS 4 Unlikely key fish habitat	Waterway (generally unnamed) with intermittent flow following rain events only, little or no defined drainage channel, little or no flow or free standing water or pools post rain events (e.g. dry gullies or shallow floodplain depressions with no aquatic flora present).

Figure 3-18 Table 2 - Classification of waterways for fish passage (NSW DPI 2013).

Table 1 – Key fish habitat and associated sensitivity classification scheme
(for assessing potential impacts of certain activities and developments on key fish habitat types)

TYPE 1 - Highly sensitive key fish habitat:

- *Posidonia australis* (strapweed)
- *Zostera*, *Heterozostera*, *Halophila and Ruppia* species of seagrass beds >5m^2 in area
- Coastal saltmarsh >5m^2 in area
- Coral communities
- Coastal lakes and lagoons that have a natural opening and closing regime (i.e. are not permanently open or artificially opened or are subject to one off unauthorised openings)
- Marine park, an aquatic reserve or intertidal protected area
- SEPP 14 coastal wetlands, wetlands recognised under international agreements (e.g. Ramsar, JAMBA, CAMBA, ROKAMBA wetlands), wetlands listed in the Directory of Important Wetlands of Australia[2]
- Freshwater habitats that contain in-stream gravel beds, rocks greater than 500 mm in two dimensions, snags greater than 300 mm in diameter or 3 metres in length, or native aquatic plants
- Any known or expected protected or threatened species habitat or area of declared 'critical habitat' under the FM Act
- Mound springs

TYPE 2 – Moderately sensitive key fish habitat:

- *Zostera*, *Heterozostera*, *Halophila* and *Ruppia* species of seagrass beds <5m^2 in area
- Mangroves
- Coastal saltmarsh <5m^2 in area
- Marine macroalgae such as *Ecklonia* and *Sargassum* species
- Estuarine and marine rocky reefs
- Coastal lakes and lagoons that are permanently open or subject to artificial opening via agreed management arrangements (e.g. managed in line with an entrance management plan)
- Aquatic habitat within 100 m of a marine park, an aquatic reserve or intertidal protected area
- Stable intertidal sand/mud flats, coastal and estuarine sandy beaches with large populations of in-fauna
- Freshwater habitats and brackish wetlands, lakes and lagoons other than those defined in TYPE 1
- Weir pools and dams up to full supply level where the weir or dam is across a natural waterway

TYPE 3 – Minimally sensitive key fish habitat may include:

- Unstable or unvegetated sand or mud substrate, coastal and estuarine sandy beaches with minimal or no in-fauna
- Coastal and freshwater habitats not included in TYPES 1 or 2
- Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation

Notes: For the purposes of these policy and guidelines the following are **not considered key fish habitat**[5]:

- First and second order streams on gaining streams (based on the Strahler method of stream ordering)
- Farm dams on first and second order streams or unmapped gullies
- Agricultural and urban drains
- Urban or other artificial ponds (e.g. evaporation basins, aquaculture ponds)
- Sections of stream that have been concrete-lined or piped (not including a waterway crossing)
- Canal estates

Figure 3-19 Table 1 - Key fish habitat and associated sensitivity classification scheme (NSW DPI 2013).

3.3.3.1 *Option 1a and 1b – Extension*

Class 1 Waterway – Major Key Fish Habitat.

Key Fish Habitat = Type 2 – Moderately Sensitive Key Fish Habitat (area is permanently open, intertidal and subtidal mudflats/sandflats, macroalgae).

3.3.3.2 *Option 2a – Additional Structure Rostrevor Reserve*

Class 1 Waterway – Major Key Fish Habitat.

Key Fish Habitat = Type 2 – Moderately Sensitive Key Fish Habitat (area is permanently open, intertidal and subtidal mudflats/sandflats, macroalgae).

3.3.3.3 *Option 2b – Additional Structure Church Point Reserve*

Class 1 Waterway – Major Key Fish Habitat.

Key Fish Habitat = Type 1 – Highly Sensitive Key Fish Habitat (*P. australis* is present, *Zostera* seagrass beds are >5 m^2 in area).

3.3.3.4 *Option 3a – Boat Bays Rowland Reserve*

Class 1 Waterway – Major Key Fish Habitat.

Key Fish Habitat = Type 1 – Highly Sensitive Key Fish Habitat (*Zostera* seagrass beds are >5 m^2 in area, coastal saltmarsh is >5 m^2 in area, mangroves present).

3.3.3.5 *Option 3b – Boat Bays McCarrs Creek Reserve*

Class 1 Waterway – Major Key Fish Habitat

Key Fish Habitat = Type 1 – Highly Sensitive Key Fish Habitat (*Zostera* seagrass beds are >5 m^2 in area, mangroves present).

3.3.3.6 *Option 3c – Boat Bays Bayview Baths*

Class 1 Waterway – Major Key Fish Habitat.

Key Fish Habitat = Type 1 – Highly Sensitive Key Fish Habitat (*Zostera* seagrass beds are >5m^2 in area, mangroves present).

3.3.4 Coastal Wetlands

Coastal Wetlands are wetlands which are situated along a coastline. These include including estuarine lakes and lagoons, mangrove and saltmarsh swamps, dune swamps and lagoons, upland lakes and lagoons, upland swamp, coastal floodplain forests, and coastal floodplain swamps and lagoons (NSW DPI n.d.). An overview of the location of Coastal Wetlands and Proximity Areas for Coastal Wetlands, which were mapped using the NSW DPI Spatial Data Portal in the general study area, are shown in Figure 3-20. The occurrence of Coastal Wetlands at each of the option sites is discussed following.

Figure 3-20 Coastal Wetlands and Proximity Areas for Coastal Wetlands (NSW DPI 2021).

3.3.4.1 *Option 1a and 1b – Extension*

There are no Coastal Wetlands or Proximity Areas for Coastal Wetlands located in the vicinity of Option 1a or Option 1b.

3.3.4.2 *Option 2a – Additional Structure Rostrevor Reserve*

There are no Coastal Wetlands or Proximity Areas for Coastal Wetlands located in the vicinity of Option 2a.

3.3.4.3 *Option 2b – Additional Structure Church Point Reserve*

There are no Coastal Wetlands or Proximity Areas for Coastal Wetlands located in the vicinity of Option 2b.

3.3.4.4 *Option 3a – Boat Bays Rowland Reserve*

Coastal Wetlands and Proximity Areas for Coastal Wetlands are located within the area identified for Option 3a, as shown in Figure 3-21.

Figure 3-21 Coastal Wetlands and Proximity Areas for Coastal Wetlands in the vicinity of Option 3a (NSW DPI 2021).

3.3.4.5 *Option 3b – Boat Bays McCarrs Creek Reserve*

Option 3b is located within a Proximity Area for Coastal Wetlands and in the vicinity of mapped Coastal Wetlands, as shown in Figure 3-22.

Figure 3-22 Coastal Wetlands and Proximity Areas for Coastal Wetlands in the vicinity of Option 3b (NSW DPI 2021).

3.3.4.6 *Option 3c – Boat Bays Bayview Baths*

The site for Option 3c is located in close proximity to a mapped Coastal Wetland and a Proximity Area for Coastal Wetland as shown in Figure 3-23.

Figure 3-23 Coastal Wetlands and Proximity Areas for Coastal Wetlands in the vicinity of Option 3c (NSW DPI 2021).

3.3.5 Littoral Rainforest

Littoral Rainforests are closed forests for which their structure and composition are heavily influenced by their proximity to the ocean. The majority of Littoral Rainforests are found within 2 km of the ocean

and are made up of predominantly rainforest species (Office of Environment & Heritage 2020). Littoral rainforests mapped in the study area are shown in Figure 3-24. There are no Littoral Rainforests or Proximity Areas for Littoral Rainforest within the vicinity of any of the options identified.

Figure 3-24 Littoral Rainforests and Proximity Areas for Littoral Rainforests (NSW DPI 2021).

3.3.6 Marine Protected Areas

Marine Protected Areas (MPAs) are areas protected under the *Marine Estate Management Act 2014* in order to conserve marine biodiversity and support marine science, recreation and education (NSW DPI 2021). NSW DPI undertakes the day to day management of marine parks and aquatic reserves.

The NSW system of marine protected areas includes:

- Marine parks – six multiple use marine parks cover around one third (approximately 345,000 hectares) of the NSW marine estate.
- Aquatic reserves – 12 aquatic reserves cover around 2,000 hectares of the NSW marine estate.
- National parks and nature reserves – include around 20,000 hectares of estuarine and oceanic habitats.

A map of MPAs in NSW is provided in Appendix E. MPAs in the vicinity of the proposed options are shown in Figure 3-25. There are no MPAs in the vicinity of any option sites. Barrenjoey Head, located approximately 6 km north of Church Point, is the closest MPA to the site. The reserve covers 30 hectares, extends 100 m offshore, and features a range of habitats and organisms including rocky shores, seagrass beds, reef systems, long spined sea urchins and finfish. This MPA will not be impacted by the proposed works.

Figure 3-25 Marine Protected Areas identified in the study area (NSW DPI 2021).

3.3.7 Terrestrial Protected Areas

Protected areas are set aside for conservation and managed by the NSW National Parks and Wildlife Service (NPWS), part of the Department of Planning, Industry and Environment. NPWS also jointly manages over 30 reserves in partnership with Aboriginal people. The protected area network in New South Wales includes a range of habitats and ecosystems, a diversity of plant and animal species, significant geological features and landforms, as well as Aboriginal cultural heritage sites, heritage buildings and historic sites (DPIE 2021).

Ku-ring-gai Chase National Park is the closest National Park to the Church Point site (Figure 3-26). The National Park is home to a variety of flora and fauna species including the long-nosed bandicoot, White-bellied sea eagle, old man banksia, grass tree, scribbly gum, and grey mangroves.

None of the option sites are located within the National Park. The proximity of each site the National Park is provided in the ensuing Sections.

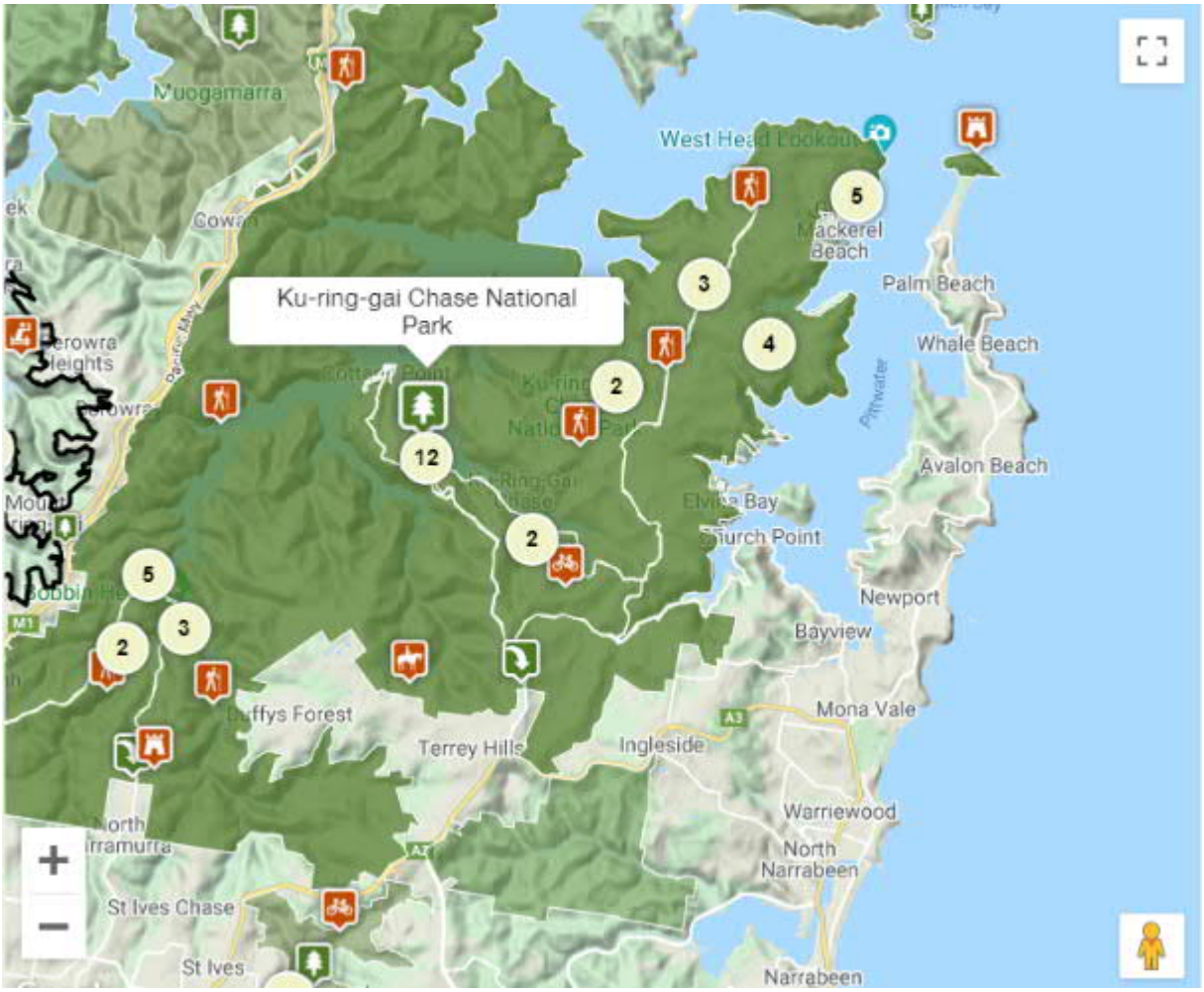

Figure 3-26 Ku-ring-gai Chase National Park in relation to Church Point.

3.3.7.1 *Option 1a and 1b – Extension*

Ku-ring-gai Chase National Park is located approximately 600 m west of Option 1a and 1b. Construction at this site will not directly impact the National Park and is very unlikely to indirectly impact the National Park.

3.3.7.2 *Option 2a – Additional Structure Rostrevor Reserve*

Ku-ring-gai Chase National Park is location approximately 475 m west of Option 2a. Construction at this site will not directly impact the National Park and is very unlikely to indirectly impact the National Park.

3.3.7.3 *Option 2b – Additional Structure Church Point Reserve*

Ku-ring-gai Chase National Park is location approximately 1 km west of Option 2b. Construction at this site will not directly impact the National Park and is very unlikely to indirectly impact the National Park.

3.3.7.4 *Option 3a – Boat Bays Rowland Reserve*

Ku-ring-gai Chase National Park is located approximately 3 km north-west of Option 3a, the furthest site from the National Park. Construction here will not directly or indirectly impact the National Park.

3.3.7.5 *Option 3b – Boat Bays McCarrs Creek Reserve*

Ku-ring-gai Chase National Park is located approximately 70 m north of Option 3b, on the northern side of McCarrs Creek. The close proximity of the National Park to the site provides complete visibility of the park, including the protected Grey Mangrove species along its waters edge. Construction in this area may indirectly impact on the National Park but direct impacts are not likely.

3.3.7.6 *Option 3c – Boat Bays Bayview Baths*

Ku-ring-gai Chase National Park is located approximately 1.5 km north-west of Option 3c. Construction at Option 3c is very unlikely to impact the National Park either directly or indirectly.

3.3.8 Biodiversity Values Mapping

The Biodiversity Values (BV) Map identifies land with high biodiversity value that is particularly sensitive to impacts from development and clearing. The map forms part of the Biodiversity Offsets Scheme (BOS) threshold, which is one of the triggers for determining whether the BOS applies to a clearing or development proposal. The map is prepared by the Department of Planning, Industry and Environment (DPIE) under Part 7 of the BC Act.

A review of the BV Map for the study area was undertaken using the Biodiversity Values Map and Threshold Tool (https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap). An overview of the general study area is shown in Figure 3-27. Specific data for each option is provided following. No permits to clear native terrestrial vegetation are expected to be required for any option, however, this will need to be confirmed once the final design and construction requirements are determined.

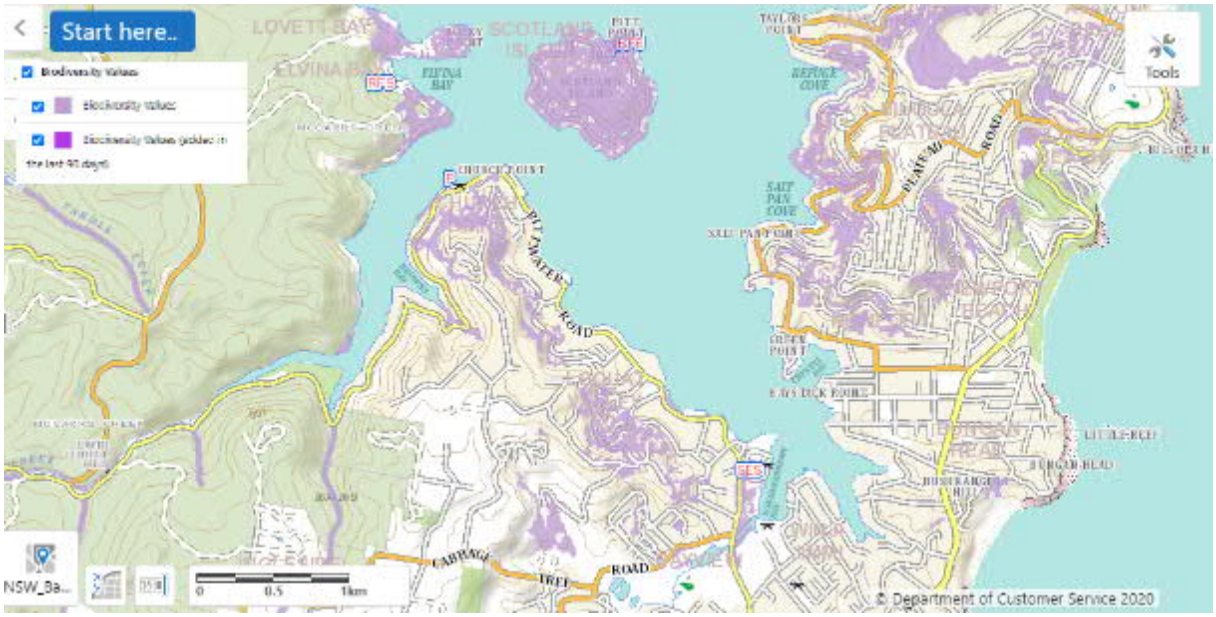

Figure 3-27 Biodiversity Values Map for the general study area (NSW Government 2021).

3.3.8.1 *Option 1a and 1b – Extension*

No BV areas lie within the proposed works area for Option 1a or 1b (Figure 3-28). Suitable land and water access is available to the site, meaning that the need for any land clearing is unlikely. The in-water construction required for Option 1a or 1b will not impact the terrestrial BV areas mapped nearby.

Figure 3-28 Biodiversity Values Map for the Church Point area (NSW Government 2021).

3.3.8.2 *Option 2a – Additional Structure Rostrevor Reserve*

No BV areas lie within the proposed works area for Option 2a (Figure 3-28). Suitable land and water access is available to the site, meaning that the need for any land clearing is unlikely. The in-water construction required for this option will not impact the terrestrial BV areas mapped nearby.

3.3.8.3 *Option 2b – Additional Structure Church Point Reserve*

No BV areas lie within the proposed works area for Option 2b (Figure 3-28). Suitable land and water access is available to the site, meaning that the need for any land clearing is unlikely. The in-water construction for this option will not impact the terrestrial BV areas mapped nearby.

3.3.8.4 *Option 3a – Boat Bays Rowland Reserve and Option 3c – Boat Bays Bayview Baths*

No BV areas lie within the proposed works areas for Option 3a or 3c (Figure 3-29). Suitable land and water access is available to the site, meaning that the need for any land clearing is unlikely. The in-water construction for this option will not impact the terrestrial BV areas mapped nearby.

Figure 3-29 Biodiversity Values Map for the Rowland Reserve and Bayview Baths areas (NSW Government 2021).

3.3.8.5 Option 3b – Boat Bays McCarrs Creek Reserve

No BV areas lie within the proposed works area for Option 3b (Figure 3-30). Suitable land and water access is available to the site, and in-water construction for this option will not impact the terrestrial BV areas mapped nearby across the waterway.

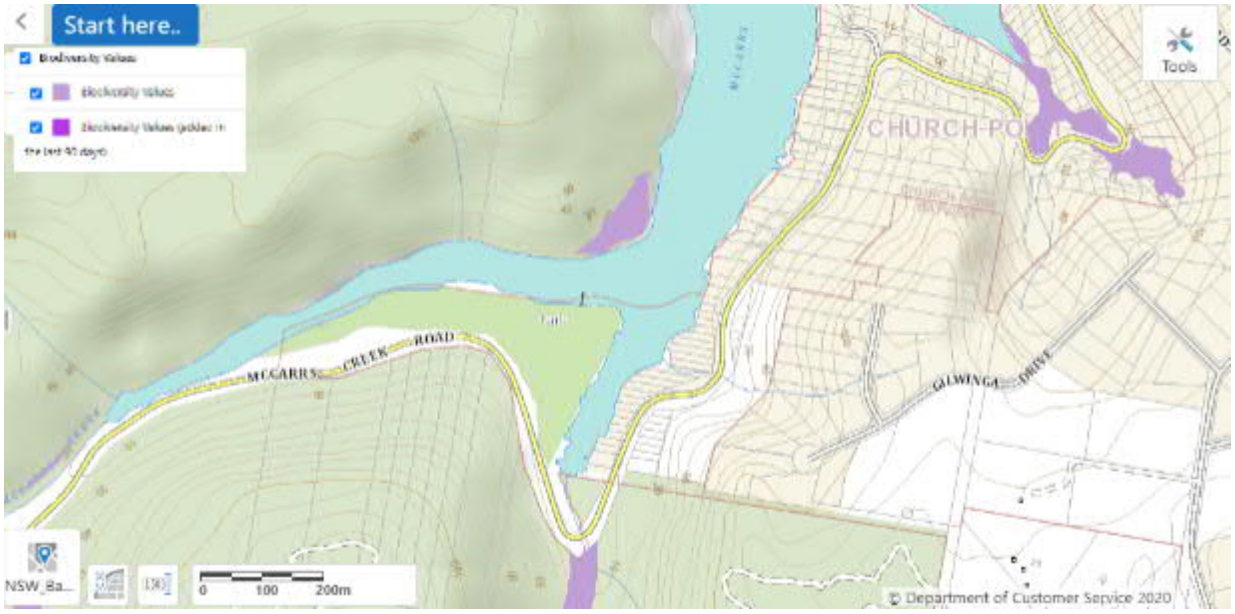

Figure 3-30 Biodiversity Values Map for McCarrs Creek Reserve (NSW Government 2021).

3.3.9 Critical Habitat / Areas of Outstanding Biodiversity Value

3.3.9.1 Land Identified as Critical Habitat

This section identifies any land declared as Critical Habitat located within the study area as listed under the EPBC Act 1999 and FM Act 1994.

EPBC Act 1999

The Register of Critical Habitat for species listed under the EPBC Act 1999 indicates that no areas of listed Critical Habitat under this Act occur within the study area (Commonwealth of Australia 2021) (http://www.environment.gov.au/cgi-bin/sprat/public/publicregisterofcriticalhabitat.pl).

The only areas of Critical Habitat for species identified under the EPBC Act 1999 are:

- *Diomedea exulans* (Wandering Albatross) - Macquarie Island.
- *Lepidium ginninderrense* (Ginninderra Peppercress) - Northwest corner Belconnen Naval Transmission Station, ACT.
- *Manorina melanotis* (Black-eared Miner) - Gluepot Reserve, Taylorville Station and Calperum Station, excluding the area of Calperum Station south and east of Main Wentworth Road.
- *Thalassarche cauta* (Shy Albatross) - Albatross Island, The Mewstone, Pedra Branca.
- *Thalassarche chrysostoma* (Grey-headed Albatross) - Macquarie Island.

None of these sites are located near to any of the proposed option sites and will not be impacted by the Proposal.

FM Act 1994

The FM Act 1994 makes provision for the declaration of Critical Habitat by the Minister for Primary Industries. Critical Habitat is defined under the FM Act 1994 as '*the whole or any part of the habitat of an endangered species, population or ecological community that is critical to the survival of the species, population or ecological community*'. Regulations can be developed to control specific activities in critical habitat areas. The Register of Critical Habitat under the FM Act (NSW DPI 2021) (http://www.dpi.nsw.gov.au/fishing/species-protection/conservation/what/register) includes:

- Grey Nurse Shark Critical Habitat – Various locations in NSW are listed (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/636330/Grey-nurse-shark-critical-habitat.pdf)

None of these identified sites are located near to any of the proposed option locations and will not be impacted by the Proposal.

3.3.9.2 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 (DPIE 2021). The Biodiversity Conservation Regulation 2017 establishes the criteria for declaring AOBVs. The criteria have been designed to identify the most valuable sites for biodiversity conservation in NSW.

AOBV declarations in NSW include:

- Gould's Petrel (*Pterodroma leucoptera leucoptera*) – Cabbage Tree Island, and to a lesser extent, Boondelbah Island, off the coast of Port Stephens, NSW, are the only breeding sites in the world of Australia's rarest seabird, the Gould's Petrel.
- Little penguin (*Eudyptula minor*) population in Sydney's North Harbour, NSW.
- Mitchell's Rainforest Snail (*Thersites mitchellae*) in Stotts Island Nature Reserve, NSW.
- Wollemi Pine (*Wollemia nobilis*) – a single population in the Wollemi National Park on the Central Tablelands of NSW.

(https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/areas-of-outstanding-biodiversity-value/area-of-outstanding-biodiversity-value-register).

None of these sites are located near to any of the proposed options and will not be impacted by the Proposal.

3.3.10 Threatened and Protected Fauna

Identification of the potential for threatened and protected fauna listed under the BC Act, FM Act and EPBC Act to occur in the study area was made using the following online databases.

- BioNet Atlas of NSW Wildlife - http://www.bionet.nsw.gov.au/ (refer to Appendix B for listing of species)
- Schedules 4 to 5 of the FM Act 1994 - http://classic.austlii.edu.au/au/legis/nsw/consol_act/fma1994193/ (refer to Appendix C for listing of species)
- EPBC Act Protected Matters Search Tool - http://www.environment.gov.au/epbc/protected-matters-search-tool (refer to Appendix A for listing of species).

Threatened and/or protected aquatic fauna have the potential to utilise aquatic habitats in the vicinity of all wharf options. Threatened and/or protected terrestrial fauna may utilise nearby terrestrial habitats but are unlikely to be impacted by the proposal which is expected to involve predominately in-water works and is unlikely to directly impact on any native terrestrial habitat. However, site specific investigations should be undertaken at the REF stage once design and construction details are developed to further assess the potential for specific threatened and protected fauna to occur at the selected site and be impacted by the proposed works.

3.3.10.1 Biodiversity Conservation Act 2016

An online database search for threatened and protected species listed under the NSW BC Act 2016 recorded within a 10 km radium of the study site (using the BioNet Atlas of NSW Wildlife) was undertaken on 9th August 2021. The full Atlas of NSW Wildlife search results (including aquatic and terrestrial species) are provided in Appendix B. Purely aquatic species which are more likely to be impacted by the proposed works are listed below.

- Little Penguin (*Eudyptula minor*) – protected
- Dugong (*Dugong dugon*) – endangered, protected

- Australian Fur-seal (*Arctocephalus pusillus doriferus*) – vulnerable, protected
- Unidentified Fur-seal (Arctocephalus sp.) - protected
- Unidentified Seal (Seal sp.) - protected
- Southern Right Whale (*Eubalaena australis*) – endangered, protected
- Humpback Whale (*Megaptera novaeangliae*) – vulnerable, protected
- Sperm Whale (*Physeter macrocephalus*) – vulnerable, protected
- Common Dolphin (*Delphinus delphis*) - protected
- Unidentified Dolphin (Dolphin sp.) - protected
- Long-finned Pilot Whale (*Globicephala melas*) - protected
- Dusky Dolphin (*Lagenorhynchus obscurus*) - protected
- Spotted Dolphin (*Stenella attenuate*) - protected
- Long-beaked Bottle-nosed Dolphin (*Tursiops aduncus*) – protected
- Bottlenose Dolphin (*Tursiops truncates*) - protected

3.3.10.2 Fisheries Management Act 1994

Threatened and protected marine species listed under the FM Act (see Appendix C) were reviewed in order to satisfy requirements of the Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (NSW DPI 2013). Marine species, populations and ecological communities currently listed as endangered, critically endangered and/or vulnerable under Schedule 4, 4A and 5 of the FM Act with the potential to occur in the study area are listed below.

Schedule 4: Endangered Species, Populations and Ecological Communities

- White's Seahorse (*Hippocampus whitei*) – endangered species
- Scalloped hammerhead shark (*Sphyrna lewini*) - endangered species
- Southern bluefin tuna (*Thunnus maccoyii*) - endangered species
- Marine worm (*Hadrachaeta aspeta*) - species presumed extinct
- Green sawfish (*Pristis zijsron*) - species presumed extinct
- Bennetts seaweed (*Vanvoorstia bennettiana*) - species presumed extinct

Schedule 4A: Critically Endangered Species and Ecological Communities

- Grey nurse shark (*Carcharius taurus*) - critically endangered species
- Marine slug (*Smeagol hilaris*) - critically endangered species
- Marine brown algae (*Nereia lophocladia*) - critically endangered species

Schedule 5: Vulnerable Species and Ecological Communities

- Great white shark (*Carcharodon carcharias*) - vulnerable species
- Black cod (*Epinephelus daemelii*) - vulnerable species
- Great hammerhead shark (*Sphyrna mokarran*) - vulnerable species

Protected Species

- All species of the families 'Syngnathidae', 'Solenostomidae' and 'Pegasidae' (i.e. seahorses, sea dragons, pipefishes, pipehorses).
- Ballina angelfish (*Chaetodontoplus ballinae*)
- Bluefish (*Girella cyanea*)
- Eastern blue devil fish (*Paraplesiops bleekeri*)
- Elegant wrasse (*Anampses elegans*)
- Estuary cod (*Epinephelus coioides*)
- Herbsts nurse shark (*Odontaspis ferox*)

3.3.10.3 Environment Protection and Biodiversity Conservation Act 1999

An online database search for species listed under the EPBC Act 1999 with the potential to occur in the study area (within a 5 km radius of the site) was made on 10th August 2021 using the EPBC Act Protected Matters Search Tool. Full search results are provided in Appendix A.

The search returned the following in regard to threatened and protected fauna:

- 90 listed threatened species
- 59 listed migratory specie
- 77 listed marine species
- 14 Whales and Other Cetaceans

Marine species which have the potential to occur in the study area and be impacted by the proposal are listed below:

- Cauliflower Soft Coral (*Dendronephthya australis*) - Endangered
- Black Rockcod (*Epinephelus daemelii*) - Vulnerable
- White's Seahorse (*Hippocampus whitei*) – Endangered
- Blue Whale (*Balaenoptera musculus*) – Endangered, Migratory, Whales and Other Cetaceans
- Southern Right Whale (*Eubalaena australis*) – Endangered, Migratory, Whales and Other Cetaceans
- Pygmy Right Whale (*Caperea marginata*) – Migratory, Whales and Other Cetaceans

- Humpback Whale (*Megaptera novaeangliae*) – Vulnerable, Migratory, Whales and Other Cetaceans
- Bryde's Whale (*Balaenoptera edeni*) – Migratory, Whales and Other Cetaceans
- Killer Whale (*Orcinus orca*) – Migratory, Whales and Other Cetaceans
- Minke Whale (*Balaenoptera acutorostrata*) – Whales and Other Cetaceans
- Loggerhead Turtle (*Caretta caretta*) – Endangered, Migratory, Listed
- Green Turtle (*Chelonia mydas*) – Vulnerable, Migratory, Listed
- Leatherback Turtle (*Dermochelys coriacea*) – Endangered, Migratory, Listed
- Hawksbill Turtle (*Eretmochelys imbricata*) – Vulnerable, Migratory, Listed
- Flatback Turtle (*Natator depressus*) – Vulnerable, Migratory, Listed
- Yellow-bellied Seasnake (*Pelamis platurus*) - Listed
- Grey Nurse Shark (east coast population) (*Carcharias taurus*) - Critically Endangered
- White Shark (*Carcharodon carcharias*) – Vulnerable, Migratory
- Whale Shark (*Rhincodon typus*) – Vulnerable, Migratory
- Oceanic Whitetip Shark (*Carcharhinus longimanus*) – Migratory
- Porbeagle (*Lamna nasus*) – Migratory
- Dugong (*Dugong dugon*) – Migratory, Listed
- Dusky Dolphin (*Lagenorhynchus obscurus*) – Migratory, Whales and Other Cetaceans
- Indo-Pacific Humpback Dolphin (*Sousa chinensis*) – Migratory, Whales and Other Cetaceans
- Common Dolphin (*Delphinus delphis*) - Whales and Other Cetaceans
- Indian Ocean Bottlenose Dolphin (*Tursiops aduncus*) - Whales and Other Cetaceans
- Bottlenose Dolphin (Tursiops truncatus s. str.) - Whales and Other Cetaceans
- Risso's Dolphin (*Grampus griseus*) - Whales and Other Cetaceans
- Spotted Dolphin (*Stenella attenuata*) - Whales and Other Cetaceans
- Reef Manta Ray (*Manta alfredi*) – Migratory
- Giant Manta Ray (*Manta birostris*) – Migratory
- New Zealand Fur Seal (*Arctocephalus forsteri*) – Listed
- Australian Fur Seal (*Arctocephalus pusillus*) - Listed
- 21 Syngnathids – Listed (including White's Seahorse (*H. whitei*) – Endangered

3.3.11 Summary of Biodiversity Constraints

A summary of key biodiversity constraints for each option is provided in Table 3-3. Based on the desktop review, the three options with the least potential biodiversity constraints are expected to be Option 1a and 1b, Option 2a or Option 2b.

Table 3-3 Summary of biodiversity constraints for each option.

Option	Aquatic Vegetation *	Key Fish Habitat	Coastal Wetlands	Littoral Rainforests	Marine Protected Areas	National Parks / Nature Reserves	Critical Habitat / AOBVs	Threatened Species **
1a and 1b – Extension at Church Point								
2a – Additional Structure Rostrevor Reserve								
2b – Additional Structure Church Point Reserve								
3a – Boat Bays Rowland Reserve								
3b – Boat Bays McCarrs Creek Reserve								
3c – Boat Bays Bayview Baths								

* Note that this constraints analysis is based on the NSW DPI mapped estuarine vegetation. There is the potential that additional areas or types of aquatic vegetation may occur at any of the sites proposed (this is probable) and final options should be subject to site investigations. NSW DPI has advised Option 2b in unsuitable due to Posidonia. ** There is the potential for threatened species to utilise habitats near to all proposed sites - threatened species assessments should be the subject of site specific investigations at the REF stage. Green = not a constraint (based on review of existing mapping/data). Yellow = potential constraint.

3.4 Hydrology, Water Quality and Groundwater

3.4.1 Hydrology

The study area for all potential options is located within the Pittwater subcatchment of the Hawkesbury-Nepean River Catchment and is characterised by tidal influences and estuarine waters (Figure 3-31). The whole western side of the subcatchment is Ku-ring-gai Chase National Park which is reserved bushland interspersed with pockets of urban development.

Pittwater drains a catchment area of approximately 51 km^2 with an average depth of 9.9 m and maximum of 22 m (TfNSW 2014). On the Eastern side, drainage into Pittwater is via McCarrs Creek and Cicada Glen Creek. On the Western side, drainage is divided by a ridge which extends along the peninsula with drainage to the west into Pittwater and to the east into northern ocean beaches including Avalon, Whale and Palm Beach.

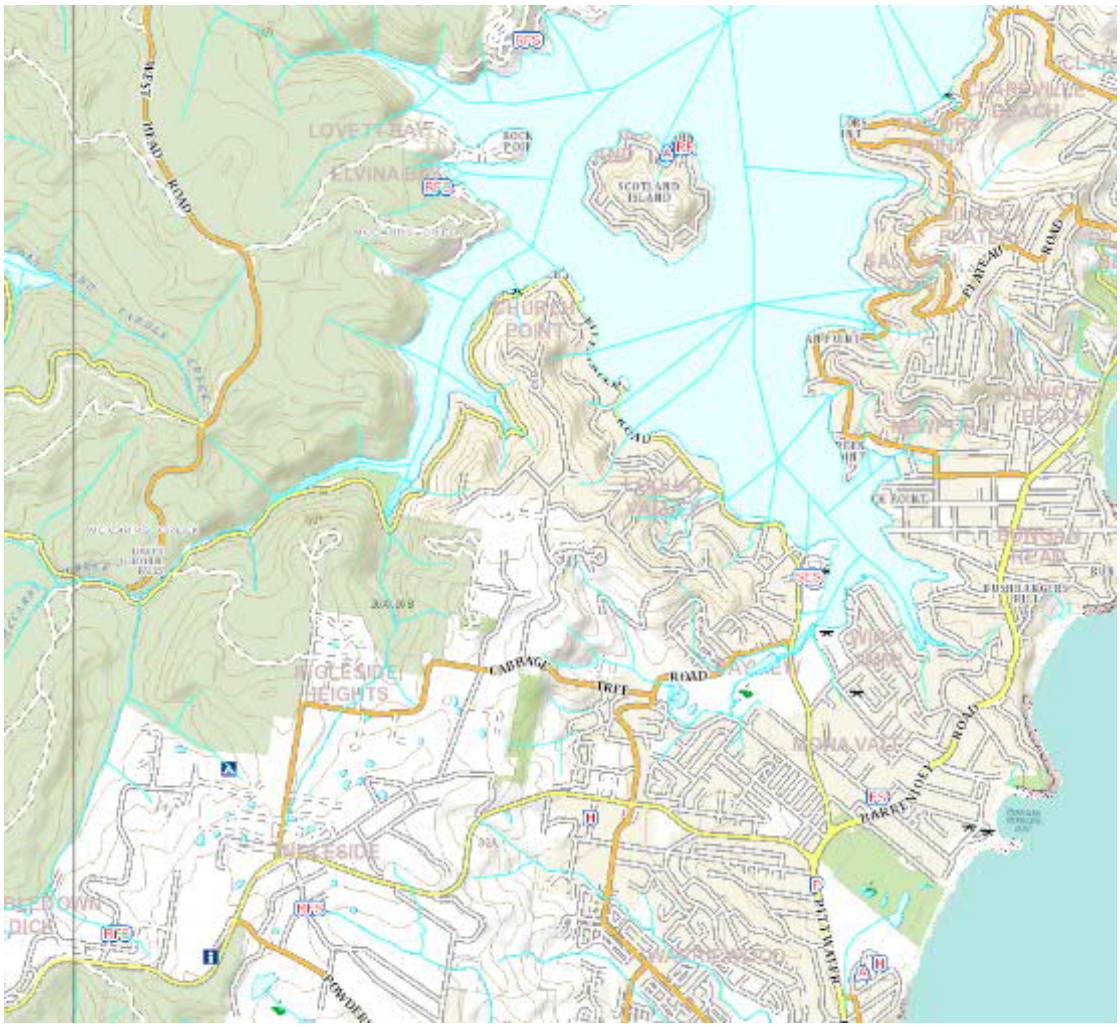

Figure 3-31 Pittwater sub catchment showing waterways that drain into Pittwater (NSW Spatial Map Viewer).

In 2002, Local Land Services (LLS) identified a number of risks to hydrology within the Pittwater subcatchment which included:

- Extensive number of modified or engineered channel structures including seawalls and foreshore structures.
- Flow regulation.
- Urban land use.
- Boat use – Pittwater is the most heavily moored waterway within NSW.

Cardno undertook an overland flow mapping and flood study on behalf of Council in 2013 and this modelling did not identify the study site as subject to minor or major flood events (Cardno 2013).

3.4.2 Groundwater Dependent Ecosystems

The location of aquatic, terrestrial and subterranean groundwater dependent ecosystems (GDEs) in relation to the study area was mapped using the Groundwater Dependent Ecosystems Atlas (http://www.bom.gov.au/water/groundwater/gde/map.shtml) (BoM 2021). No aquatic GDEs occur in the study area and will not be impacted by any of the proposed options (Figure 3-32). Terrestrial GDEs occur in the general study area as shown in Figure 3-33, with a terrestrial GDE located a few hundred meters to the north west of Option 3c (Boat Bays Bayview Baths)(Figure 3-34). However, this terrestrial GDE is not within the proposed option site and is highly unlikely to be impacted by any proposed works in this location. Subterranean GDEs occur over the entire study area (Figure 3-35), however, the construction and operational activities required for the proposed works are very unlikely to have any impact on subterranean GDEs.

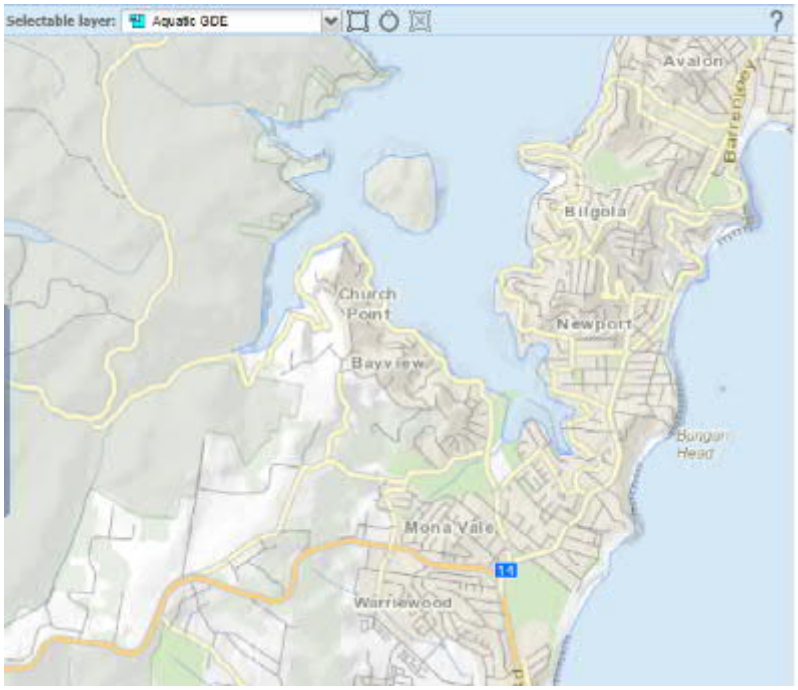

Figure 3-32 Aquatic groundwater dependent ecosystems in the study area (BoM 2021).

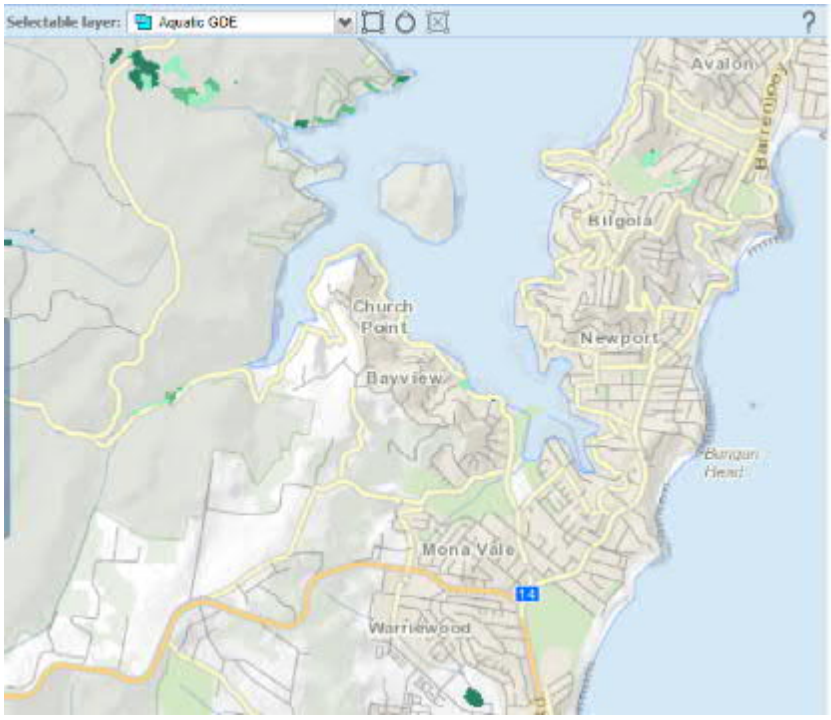

Figure 3-33 Terrestrial groundwater dependent ecosystems in the study area (BoM 2021).

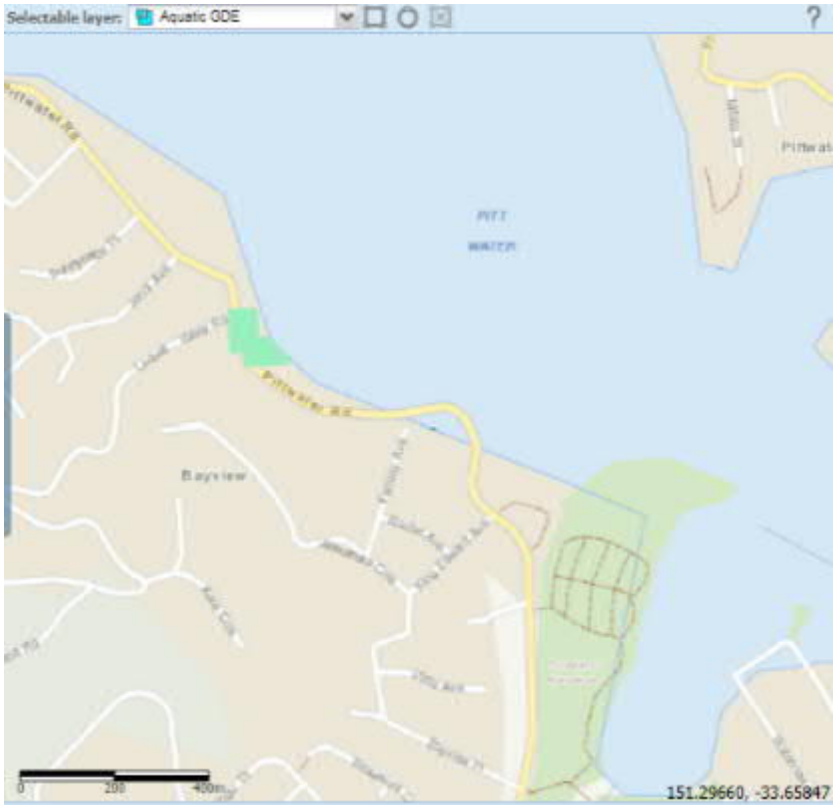

Figure 3-34 Terrestrial groundwater dependent ecosystems near Option 3c (Bayview Baths) (BoM 2021).

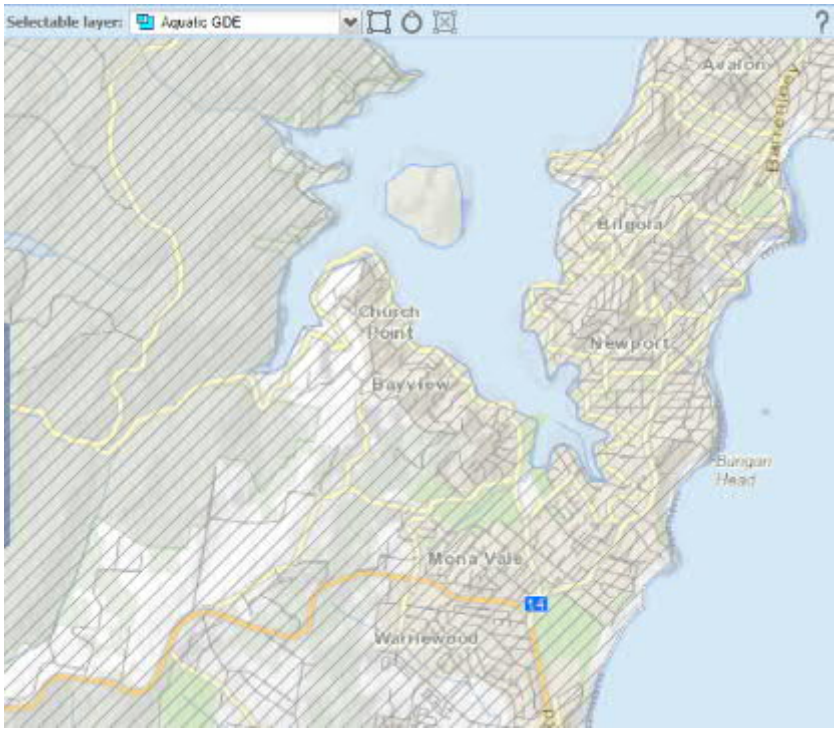

Figure 3-35 Subterranean groundwater dependent ecosystems in the study area (BoM 2021).

3.4.3 Local Water Quality

No local water quality testing was undertaken as part of the initial constraints identification. A summary of existing data is provided below.

3.4.3.1 General

As Pittwater is close in proximity to the ocean and subject to tidal influence, water quality is typically quite good. However, this waterway also has quite significant waterway traffic and is used extensively for recreational activities including swimming, sailing, fishing, sailboarding, water-skiing, sailing and fishing (TfNSW 2012). There are also regular ferries that commute between Scotland Island and the western foreshore to the mainland.

Major tributaries that drain into the Pittwater catchment on the western side are McCarrs Creek and Cicada Glen Creek that run through Ku-ring-gai National Park. McCarrs Creek has been used as a reference site as part of the Ku-ring-gai Council stream health monitoring program since 1998 and results from this area are shown in Table 3-4 (Ku-ring-gai Council 2020).

Local water quality has the potential to be impacted by construction activities at all sites identified and this must be adequately managed. There is also the potential for less flushing and higher levels of impacts at locations located further upstream (e.g. at Option 3a, 3b and 3c) than those located in more open waters (e.g. Option 1b, 1b, 2a and 2b).

Table 3-4 Ku-ring-gai Stream Monitoring Program, McCarrs Creek (from Ku-ring-gai Council 2020).

Reference Monitoring Site C - McCarrs Creek										
Sampling Season/ Date	EC	Turbidity	DO	pH	Ammonium Nitrogen	Oxidised Nitrogen	Total Nitrogen	Total Phosphorous	Faecal Coliforms	SIGNAL 2
Units	µs/cm	NTU	%		mg/L	mg/L	mg/L	mg/L	CFU /100mL	
Autumn 1998 (11/5/98)	166	2.39	84.43	6.7						5.57
Spring 1998 (27/10/98)	180	3.50	76.16	6.4						6.01
Autumn 1999 (25/3/99)	195	2.50	94.41							5.75
Spring 1999 (28/10/99)	147	1.48	89.22	5.7						6.18
Autumn 2000 (25/3/00)	144	2.16	90.20	5.7						5.88
Summer 2006-2007 (7/1/07)										4.73
Summer 2006-2007 (8/1/07)										3.91
Summer 2006-2007 (9/1/07)										4.90
Summer 2006-2007 (10/1/07)	193	9.50	72.85	5.5						
Summer 2006-2007 (12/1/07)	192	9.60	81.84	5.7						
Summer 2006-2007 (15/1/07)	199	12.55	74.33	5.6						
Spring 2007 (15/10/07)				6.7			0.30	0.11		
Spring 2007 (22/10/07)				5.7			0.10	0.06		
Spring 2007 (29/10/07)				6.3			0.40	0.07		
Spring 2007 (5/11/07)							0.20	0.05		
Spring 2010 (21/12/10)	193	1.00	84.40	5.6	0.01	0.11	0.10	0.03	16	4.79
Autumn 2011 (11/5/11)	209	0.60	80.60	8.0	0.02	0.04	0.20	0.06	4	5.71
Spring 2018 (6/11/2018)	232			6.51	0.02	0.03	0.05	0.01	53	4.88
Autumn 2019 (23/04/19)	121	1.2	94.4	6.61	0.03	0.005	0.1	0.01	18	5.25
Spring 2020 (17/11/2020)	154	0.1	66.1	7.01	0.005	0.005	0.2	0.005	34	4.6

3.4.3.2 *Recreational Water Quality*

The water quality of NSW beaches and other swimming locations, including popular swimming harbour locations near Church Point (Elvina Bay, South Scotland Island and North Scotland Island) are routinely monitored under the NSW Government's Beachwatch Program (NSW DPIE 2021). Elvina Bay is located on the south-west foreshore of Pittwater. North Scotland Island is a netted swimming enclosure on the north side of Scotland Island. South Scotland Island is an un-netted swimming site at Carols Wharf on the southern side of Scotland Island and is the closest location, approximately 15 0m northeast, to the study site.

Microbial assessment (of enterococci) measures the impact of pollution sources, enables the effectiveness of stormwater and wastewater management practices to be assessed and highlights areas where further work is needed. Swimming sites are graded as Very Good, Good, Fair, Poor or Very Poor in accordance with the National Health and Medical Research Council (NHMRC) 2008 Guidelines for Managing Risks in Recreational Waters. Grades are determined from the most recent 100 water quality results (two to four years' worth of data) and a risk assessment of potential pollution sources. There are four Microbial Assessment Categories (A to D) and these are determined from the 95th percentile of an enterococci dataset of at least 100 data points. Each category is associated with a risk

of illness determined from epidemiological studies (refer to Figure 3-36). The risks of illness are not associated with a single data point but are the overall risk of illness associated with the 95th percentile of the enterococci dataset.

Category[a]	95th percentile value for intestinal enterococci/ 100 mL (rounded values)	Basis of derivation	Estimation of probability
A	≤40	This value is below the NOAEL in most epidemiological studies.	GI illness risk: < 1% AFRI risk: < 0.3% The upper 95th percentile value of 40/100 mL relates to an average probability of less than one case of gastroenteritis in every 100 exposures. The AFRI burden would be negligible.
B	41–200	The 200/100 mL value is above the threshold of illness transmission reported in most epidemiological studies that have attempted to define a NOAEL or LOAEL for GI illness and AFRI.	GI illness risk: 1–5% AFRI risk: 0.3–1.9% The upper 95th percentile value of 200/100 mL relates to an average probability of one case of gastroenteritis in 20 exposures. The AFRI illness rate would be 19 per 1000 exposures or approximately 1 in 50 exposures.
C	201–500	This represents a substantial elevation in the probability of all adverse health outcomes for which dose–response data are available.	GI illness risk: 5–10% AFRI risk: 1.9–3.9% This range of 95th percentile values represents a probability of 1 in 20 to 1 in 10 risk of gastroenteritis for a single exposure. Exposures in this category also suggest a risk of AFRI in the range of 19–39 per 1000 exposures or a range of approximately 1 in 50 to 1 in 25 exposures.
D	> 501	Above this level there may be a significant risk of high levels of illness transmission.	GI illness risk: > 10% AFRI risk: > 3.9% There is a greater than 10% chance of illness per single exposure. The AFRI illness rate at the guideline value of 500 enterococci per 100 mL would be 39 per 1000 exposures or approximately 1 in 25 exposures.

Figure 3-36 Microbial assessment categories and risk of illness (NHMRC, 2008).

The NSW State of the Beaches 2019-2020 report for the Sydney region showed that Elvina Beach was rated as "Very Good for most of the time with microbial water quality considered suitable for swimming almost all of the time, with few potential sources of faecal contamination. The South Scotland and North Scotland beaches were both rated as "Good" indicating that they are suitable for swimming most of the time but are susceptible to pollution following rain and there are several potential sources of faecal contamination nearby. Data is provided in Figure 3-37.

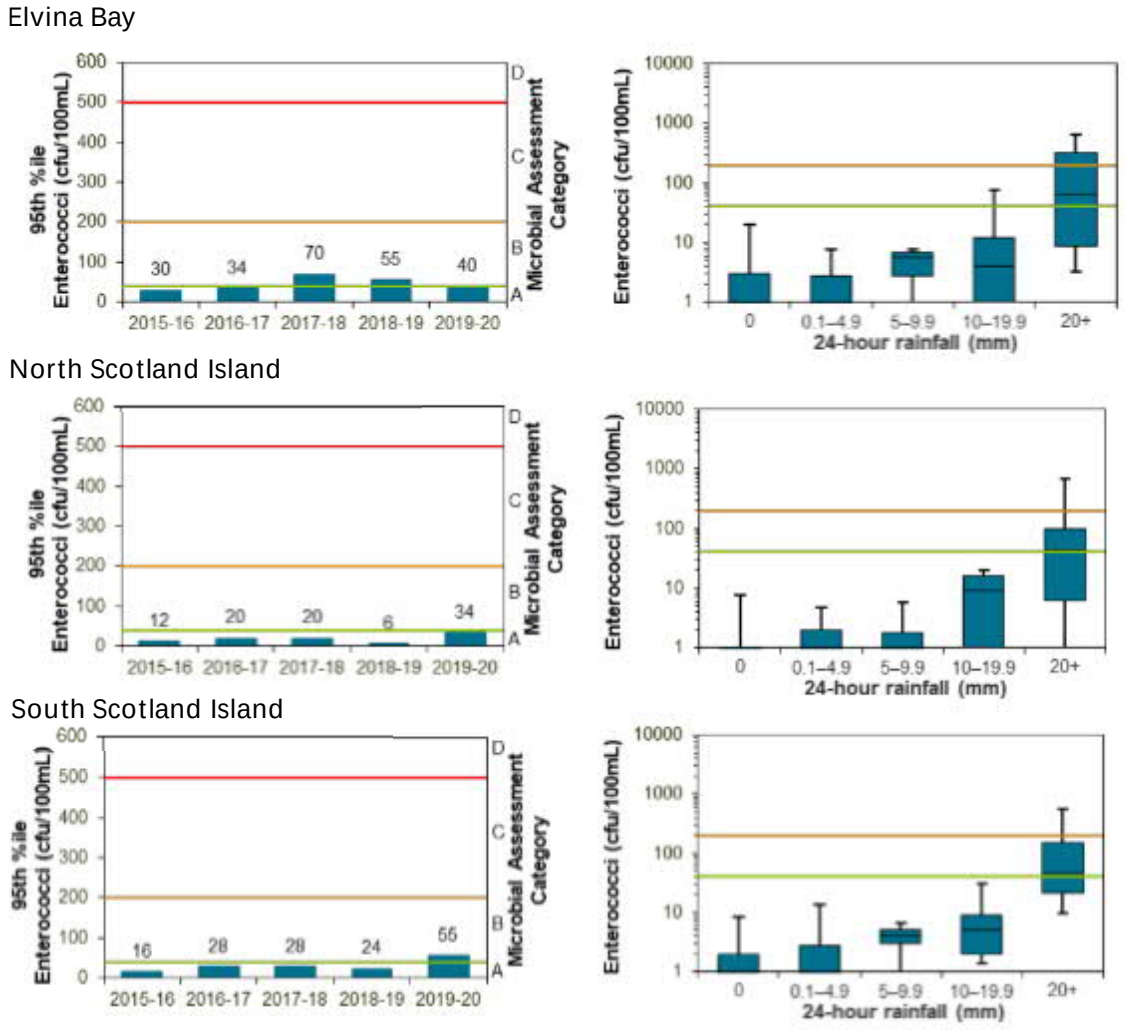

Figure 3-37 Beachwatch recreational water quality at swimming locations close to Church Point.

3.4.3.3 Water Quality Guidelines

The ANZG (2018) Water Quality Guidelines provide high-level guidance on the management context, ecological descriptions, biological indicator selection and other advice for five of Australia's six marine planning regions as well as for the Great Barrier Reef Marine Park (which represents the inshore portion of the Coral Sea Marine Region) (Figure 3-38). Physical and chemical stressor default guideline values (DGVs) for marine waters have also been derived on a finer scale, using the Integrated Marine and Coastal Regionalisation of Australia (IMCRA 4.0) mesoscale bioregions.

The ANZG (2018) Water Quality Guidelines for physical and chemical stressors for the IMCRA mesoscale bioregion: Hawkesbury Shelf, in which the option sites are located, are listed in Table 3-5. For those physical and chemical stressors not listed specifically for the Hawkesbury Shelf Marine Region, the DGVs for Australian ecoregions for slightly disturbed marine ecosystems (in this case for the south-east marine region) are adopted (Table 3-6).

The following guidelines are applicable to the site and for any future water quality assessments:

- NSW Department of Environment and Conservation – Marine Water Quality Objectives for NSW Ocean Waters (2005).
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) – Toxicant Default Guideline Values for 95% species protection. http://www.waterquality.gov.au/anz-guidelines.
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) – IMCRA mesoscale bioregions Default Guideline Values for Physical and Chemical Stressors, Hawkesbury. http://www.waterquality.gov.au/anz-guidelines.
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) – Default Guideline Values for Physical and Chemical Stressors, East Coast Australia.
- National Health and Medical Council Water Quality Guidelines for Recreational Users (NHMRC 2005).

The relevant water quality default guidelines for stressors within the Hawkesbury Shelf mesoscale region are shown in Table 3-5. Other relevant water quality guidelines that apply to the project in terms of the protection of aquatic ecosystems and primary contact recreation are shown in Table 3-6. These guidelines should be adopted for any monitoring required during the construction phase.

Table 3-5 ANZG (2018) Hawkesbury Shelf IMCRA mesoscale bioregional default guideline values for physical and chemical stressors.

Parameter	Guideline Value – 80th%iles for surface waters (top 20 m)[1]			
	Summer	Autumn	Winter	Spring
Salinity	35.557PSU	35.594PSU	35.591PSU	35.589PSU
Temperature	23.6°C	23.3°C	19.8°C	20.3°C
Turbidity	0.067 1/m	0.073 1/m	0.082 1/m	0.091 1/m
Dissolved oxygen	5.128 mL/L	5.042 mL/L	5.403 mL/L	5.428 mL/L
Nitrate	0.636 µmol/L	0.681 µmol/L	1.307 µmol/L	0.664 µmol/L
Phosphate	0.216 µmol/L	0.18 µmol/L	0.267 µmol/L	0.266 µmol/L
Chlorophyll-a	0.433 µg/L	0.517 µg/L	0.653 µg/L	0.778 µg/L
Silicate	1.101 µmol/L	1.154 µmol/L	1.416 µmol/L	1.099 µmol/L

[1] The 80th%ile is calculated for that season and then compared to the guideline.

Table 3-6 Other Water Quality Guidelines applicable to the project.

Water Quality Guideline	Parameter	Guideline Value	NSW Water Quality Objective
Protection of Aquatic Ecosystems – default stressor Ecosystem default stressor guidelines- East Coast (ANZECC, 2000)	Frequency of algal blooms	--	No change from natural conditions
	pH	8.0-8.4	--
	Turbidity	0.5-10 NTU	0.5-10 NTU
	Total nitrogen	120 µg/L	<120 µg/L
	Total phosphorus	25 µg/L	<25 µg/L
Protection of Aquatic Ecosystems – 95% protection level for toxicants (ANZG, 2018)	Cadmium (Cd)	5.5 µg/L	--
	Chromium (Cr)	4.4 µg/L	--
	Copper (Cu)	1.3 µg/L	<1.3 µg/L
	Nickel (Ni)	70 µg/L	--
	Lead (Pb)	4.4 µg/L	<4.4 µg/L
	Zinc (Zn)	15 µg/L	<15 µg/L
	Mercury (Hg)	0.4 µg/L	--
	Tributyltin (TBT)	0.006 µg/L	--
Primary Contact Recreational – biological (NHMRC, 2008)	Faecal coliforms	Median over bathing season of less than 150 faecal coliforms/100 mL	Median over bathing season of less than 150 faecal coliforms/100 mL with 4 out of 5 samples
	enterococci	Median over bathing season of less than 35 enterococci/100 mL	Median over bathing season of less than 35 enterococci/100 mL (maximum number in any one sample = 100 organisms/100 mL)
Primary Contact Recreational – physiochemical (NHMRC, 2008)	Visual clarity	Natural visual clarity should not be reduced by more than 20%. Horizontal sighting of a 200 mm black disc should exceed 1.6 m	A 200 mm diameter black disc should be able to be sighted horizontally from a distance of more than 1.6 m
	pH	pH of the water should be within the range of 5.0-9.0 assuming that the buffering capacity of the water is low near the extremes of the pH limits	--
	Temperature	15-35˚C (for prolonged exposure)	--
	Salinity (TDS)	<1,000,000 µg/L	--

Water Quality Guideline	Parameter	Guideline Value	NSW Water Quality Objective
	Surface films	Oil and petrochemicals should not be noticeable as a visible film on the water nor should they be detectable by odour	--
Primary Contact Recreational – toxicants (NHMRC, 2008)	Arsenic (As)	50 µg/L	--
	Cadmium (Cd)	5 µg/L	--
	Chromium (Cr)	50 µg/L	--
	Copper (Cu)	1000 µg/L	--
	Nickel (Ni)	100 µg/L	--
	Lead (Pb)	5 µg/L	--
	Zinc (Zn)	5000 µg/L	--
	Mercury (Hg)	1 µg/L	--

- not listed.

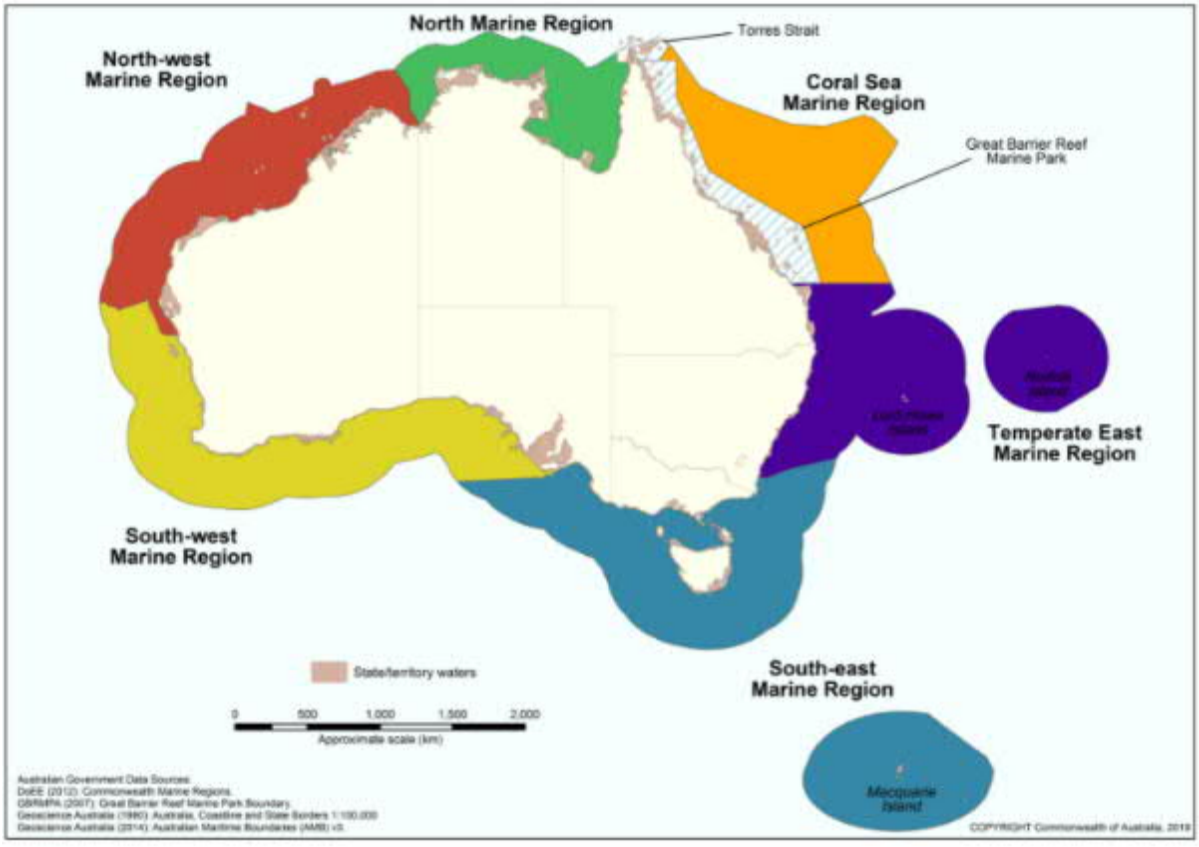

Figure 3-38 Australia's six marine planning regions (Commonwealth of Australia 2019).

3.4.4 Summary of Hydrology, Water Quality and Groundwater Constraints

A summary of key hydrology, water quality and groundwater constraints for each option is provided in Table 3-7. All sites have the potential to be impacted by water quality issues associated with construction and this may be more pronounced at locations further upstream, however, this can be managed/mitigated with typical controls. It is highly unlikely that subterranean GDEs will be impacted by the proposed works although they are mapped in the study area and applicable to all locations. A terrestrial GDE occurs in close proximity to Option 3c so appropriate mitigations must be adopted to prevent any impacts on this GDE if Option 3c is selected.

Table 3-7 Summary of hydrology, water quality and groundwater constraints for each option.

Option	Hydrology	Flooding Risk*	Local Water Quality	Aquatic GDEs	Terrestrial GDEs	Subterranean GDEs
1a and 1b – Extension at Church Point						
2a – Additional Structure Rostrevor Reserve						
2b – Additional Structure Church Point Reserve						
3a – Boat Bays Rowland Reserve						
3b – Boat Bays McCarrs Creek Reserve						
3c – Boat Bays Bayview Baths						

* based on overland flow mapping and flood study which did not identify the study site as subject to minor or major flood events (Cardno 2013).

3.5 Geology, Sediments and Soils

3.5.1 Geology

The geology of Pittwater is described in the Pittwater Natural Areas Plan of Management 2010 (Pittwater Council 2010). The geology of the area underlain by a near-horizontally bedded sequence of sedimentary rocks of the Triassic Age. Erosion of the rocks has produced a surface profile with a flat crest above steep slopes with relatively narrow terraces, often underlain by sandstone. The flat-capped ridges are formed by Hawkesbury Sandstone while the slopes surrounding the plateaus are underlain by an interbedded sequence of laminate, siltstone, shale and quarts sandstone of the Narrabeen Formation. On the slopes these rocks are overlain by talus that has fallen from the sandstone uphill and by clayey colluvium derived by weathering of the siltstone and shale. On the lower slopes rock is overlain by Quaternary Age alluvial and marine sands (Mac Gregor et. al. 2007). A map of local geology is provided in Figure 3-39.

Once the selected option is identified the geology of underlying substrates will likely need to be considered for the construction stage.

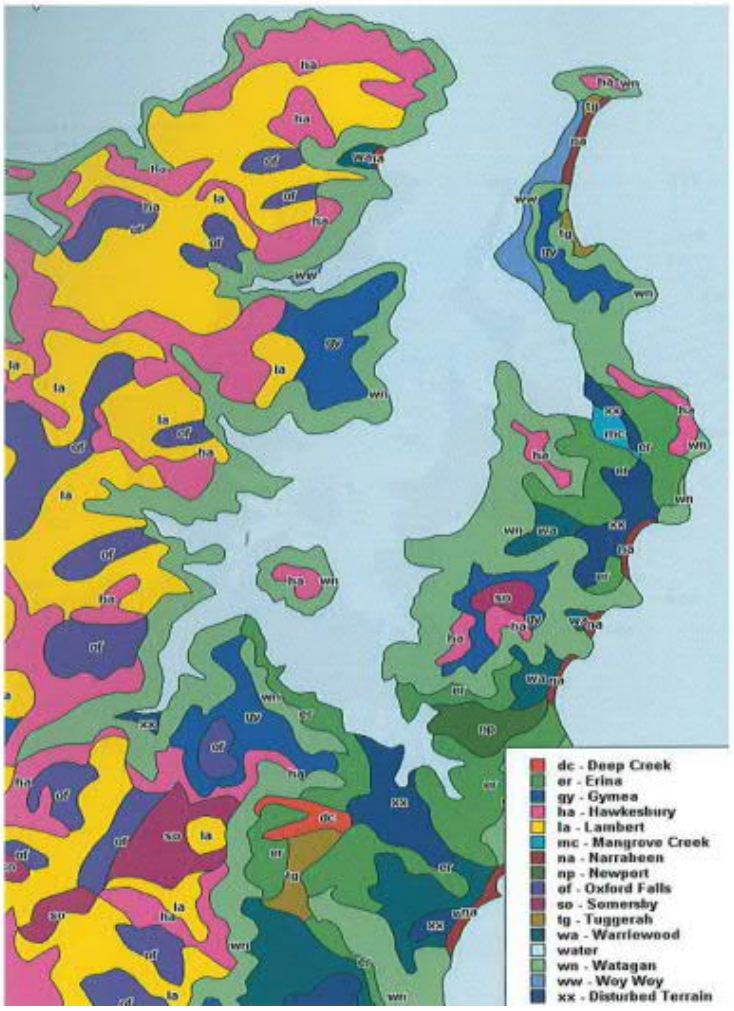

Figure 3-39 Local geology (Pittwater Council 2010).

3.5.2 Acid Sulphate Soils

All options being considered are located in areas which have been mapped as containing Class 1 and Class 2 potential for acid sulfate soils (Figure 3-40), which are designated as below:

- Class 1: Acid sulfate soils in a class 1 area are likely to be found on and below the natural ground surface.
- Class 2 : Acid sulfate soils in a class 2 area are likely to be found below the natural ground surface.

Site specific testing of soils/sediments in accordance with the NSW Acid Sulphate Assessment Guidelines (Ahern et al. 1998) should be undertaken for the selected option if any excavation or dredging is proposed as part of the proposed construction works. This is required in order to confirm the occurrence of potential or actual acid sulfate soils at the site and the potential for construction related impacts. If potential or acid sulphate soils are confirmed to occur then specific management/treatment will be required during construction.

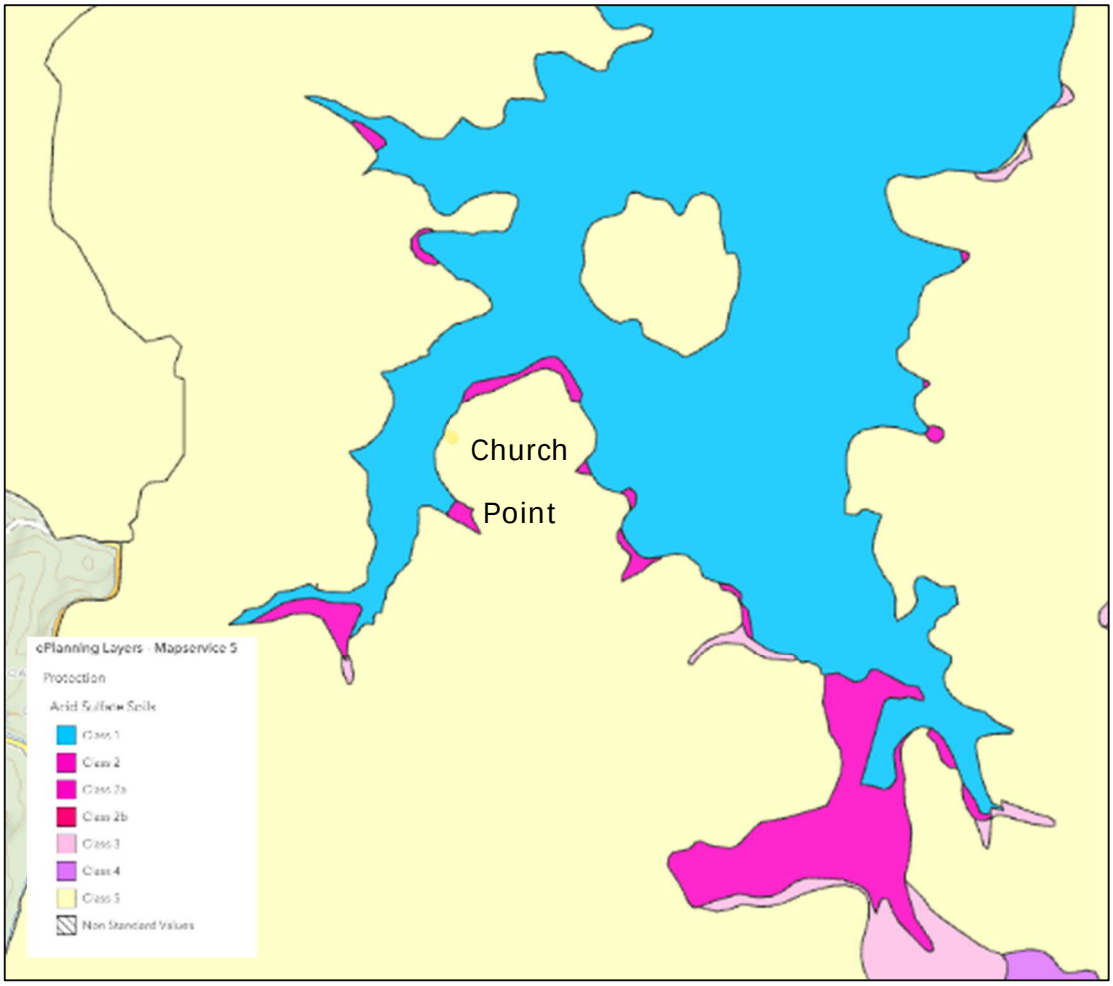

Figure 3-40 Acid sulfate soil risk mapping for Church Point (ePlanning Portal, Pittwater LEP 2014).

3.5.3 Sediment Quality

No sediment quality assessment was undertaken as part of the preliminary assessment; however, a suitable assessment should be undertaken once the preferred option and construction methodology/requirements are identified in order to identify potential risks of construction and disturbance of marine sediments in the selected location.

3.5.4 Summary of Geology, Sediments and Soils Constraints

A summary of geology, sediments and soils constraints for each option is provided in Table 3-8. For the identified option, appropriate geological and soil/sediment quality investigations must be undertaken to inform both the constructability and potential impacts relating to disturbance of soils/sediments during construction. Appropriate mitigation/management measures must be applied.

Table 3-8 Summary of geology, sediments and soils constraints for each option.

Option	Geology	Acid Sulphate Soils	Sediment Quality
1a and 1b – Extension at Church Point			
2a – Additional Structure Rostrevor Reserve			
2b – Additional Structure Church Point Reserve			
3a – Boat Bays Rowland Reserve			
3b – Boat Bays McCarrs Creek Reserve			
3c – Boat Bays Bayview Baths			

3.6 Socio-Economic

A high level overview of socio-economic matters which may be impacted by the proposal at each option site was assessed by reviewing aerial photographs, identifying local businesses, recreational facilities, residential property, access, amenities etc.

3.6.1 Option 1a and 1b – Extension

Local businesses within the vicinity of Option 1a and 1b include cafés, restaurants, and a post office. A boardwalk provides easy access to these businesses. A number of residential properties are located directly behind the existing two storey car park. Access to the site is primarily via a foreshore

boardwalk. Public toilets, whilst not within the direct vicinity, are located within 200 m of the site. Images are provided in Figure 3-41.

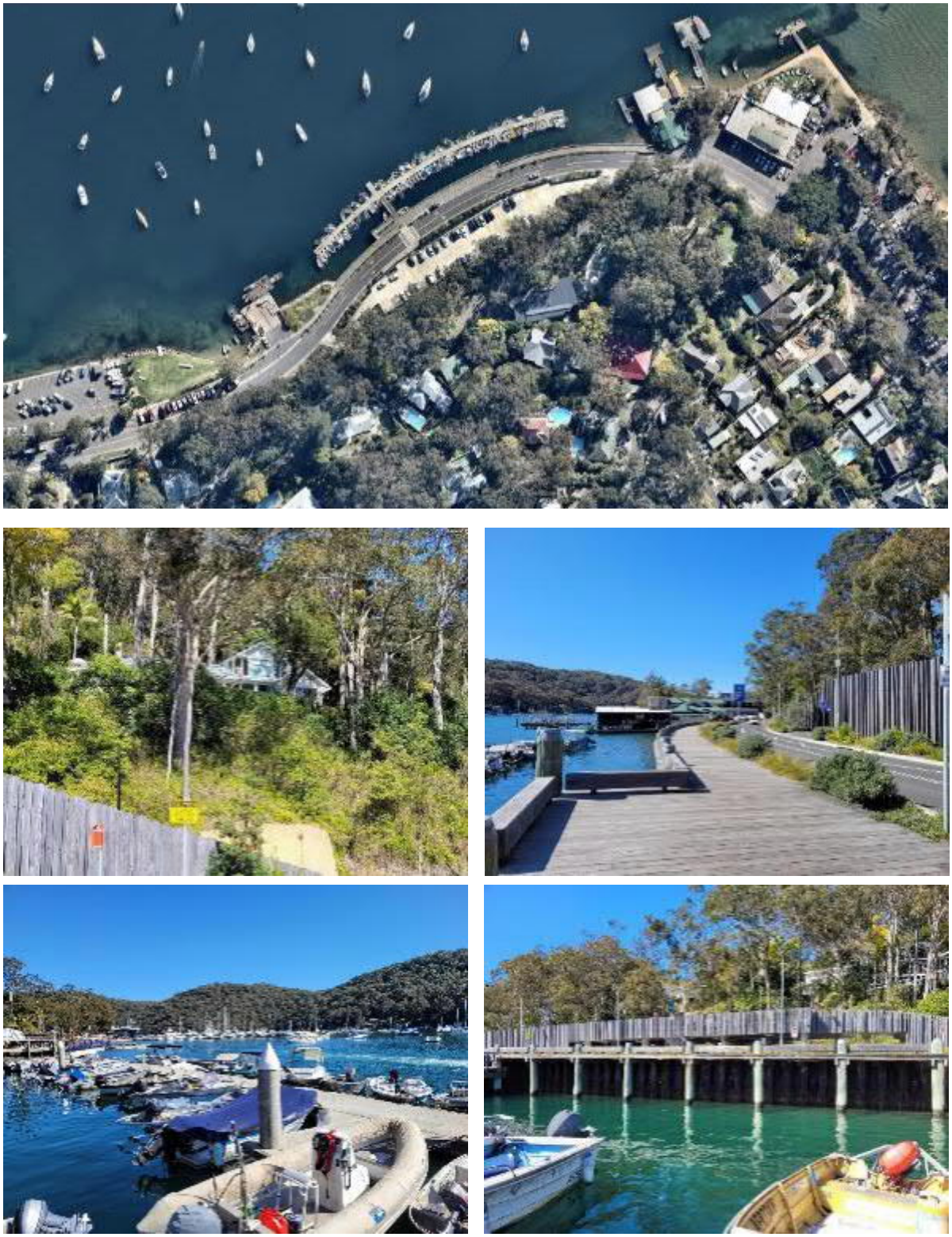

Figure 3-41 Local businesses and residential properties in the vicinity of Option 1a and 1b.

3.6.2 Option 2a – Additional Structure Rostrevor Reserve

Option 2a is located directly adjacent to Rostrevor Reserve. The reserve contains public seating facilities and open space for recreation. There is a cargo wharf, marina, boat dealer and boat repair business within the vicinity of the site. Residential properties are located across the road from the site. Access to the site is primarily via the reserve. Access to public toilets requires an approximate 350 m walk. Images are shown in Figure 3-42.

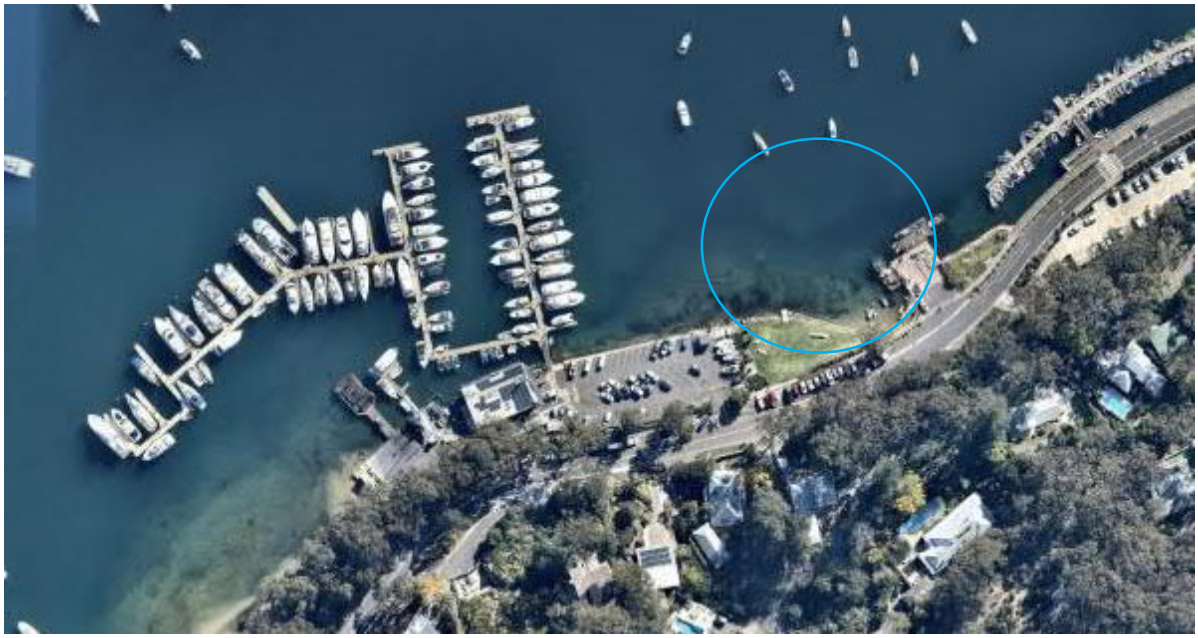

Figure 3-42 Local businesses and residential properties in the vicinity of Option 2a.

3.6.3 Option 2b – Additional Structure Church Point Reserve

Option 2b is located within the direct vicinity of Church Point Reserve and beach. The reserve contains seating facilities for the public, open space for recreation and storage for unpowered recreational vessels (e.g. kayaks). The northern end of the reserve contains a public toilet fitted with wheelchair access, as well as a number of local businesses including a post office, bottle shop, real estate agent, cafe, hotel and restaurant and wharf. Residential properties are located opposite the reserve. Images are provided in Figure 3-43.






PASADENA


Figure 3-43 Local businesses and recreational activities in the vicinity of Option 2b.

3.6.4 Option 3a – Boat Bays Rowland Reserve

Option 3a, located at Rowland Reserve, is the furthest site from Scotland Island by boat. This area contains public seating and picnic facilities and open space and small beaches for recreation. A number of small wharfs/pontoons and boat ramps line the water's edge for small vessel access and other recreational activities. The Rowland Reserve Dog Park is located at the northern end of the reserve, which is also home to the Bei Loon Dragon Boat Club. Public toilets are located at the rear of the Rowland Reserve carpark. The Marine Rescue Broken Bay unit is based at the southern end of the carpark. Residential properties and a marina are located on the opposite side of the river. Images are provided in Figure 3-44.

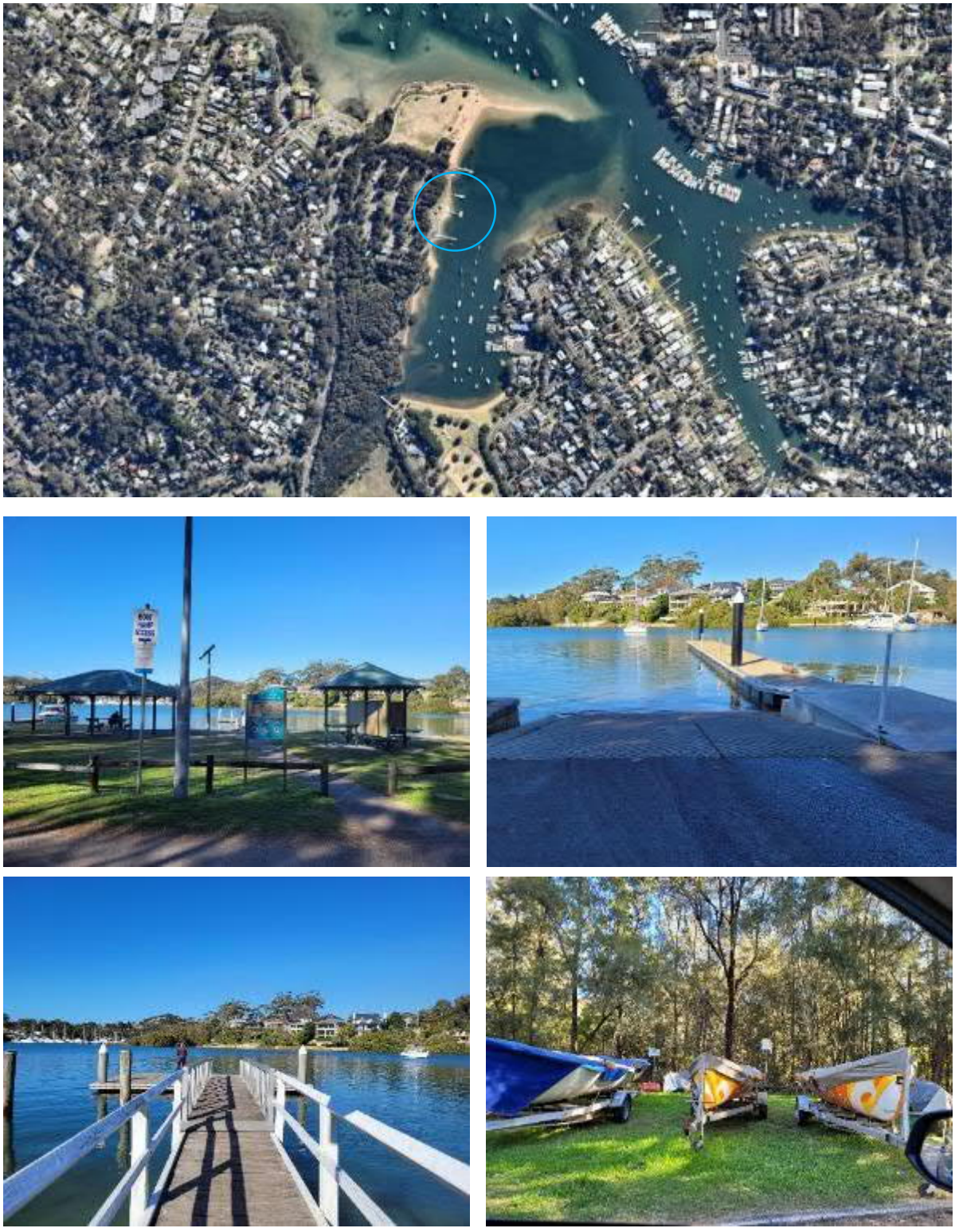

Figure 3-44 Wharf, boat ramp, residential housing, and seating in the vicinity of Option 3a.

3.6.5 Option 3b – Boat Bays McCarrs Creek Reserve

Option 3b, located at McCarrs Creek Reserve, is the least developed of all sites and one of the furthest sites from Scotland Island by boat. This area includes considerable open space for recreation and contains public seating, BBQ, and picnic facilities. The reserve currently contains dinghy storage, a small wharf and boat ramp extending into the creek. There are no commercial businesses at this site. Residential properties are located within the vicinity of the site (across the waterway). Dogs are allowed off the leash in designated areas. Public toilets are available in the direct vicinity of the site. Access is strictly via McCarrs Creek Road and there is an existing carpark. Kuring-Gai Chase National Park lies on the opposite bank. Images are provided in Figure 3-49.

Figure 3-45 Dinghy storage, boat ramp, and residential housing in the vicinity of Option 3b.

3.6.6 Option 3c – Boat Bays Bayview Baths

Option 3c is located directly adjacent to Gibson Marina Bayview, and the many local businesses alongside it (e.g. cafés, boat dealers, canoe and kayak rental services). An existing carpark leads to a small reserve which offers public seating and access to the Historic Bayview Baths and wharf. Residential properties are situated opposite the carpark. Images are shown in Figure 3-46.

Figure 3-46 Gibson Marina Bayview, seating, and the carpark in the vicinity of Option 3c.

3.6.7 Summary of Socio-economic Constraints

A summary of key socio-economic constraints for each option is provided in Table 3-9 on the following page. In regard to residential, commercial and open space constraints these relate to the potential for impacts (e.g. noise, access, visual) during construction (with these socio-economic factors existing at or near the site). While carparking has been identified at all sites this constraints analysis does not represent a specialist parking study and has not considered specifics like number of car park spots to number of proposed berths etc.

Table 3-9 Summary of socio-economic constraints for each option.

Option	Residential Areas	Commercial / Business	Open Space / Reserves	Nearby Amenities (e.g. toilet blocks)	Public Transport Routes	Carparking
1a and 1b – Extension at Church Point						
2a – Additional Structure Rostrevor Reserve						
2b – Additional Structure Church Point Reserve						
3a – Boat Bays Rowland Reserve						
3b – Boat Bays McCarrs Creek Reserve						
3c – Boat Bays Bayview Baths						

3.7 Landscape Character and Visual Amenity

It is not considered that the proposed wharf upgrades are considerably out of keeping with the existing landscape character of any of the option sites and/or waterway use. All sites are already subject to a high level of recreational vessel use and include various and multiple boating facilities including swing moorings, boat ramps, small pontoons/jetties and some with larger commercial or commuter wharves. The visual amenity of the majority of the sites would not be considerably changed by the proposed works during operation but there would be some unavoidable short term visual impacts to local receivers during construction (refer to Section 3.6 for details of these receivers).

However, it is also noted that some sites are more similar in terms of their existing landscape character and uses to the proposed works than others. The option sites which are most similar include Option 1a and 1b (Extension), Option 2a (Rostrevor Reserve) and Option 3c (Bayview Baths). Option 2c (Church Point Reserve) is considered to be next most similar but currently has more open space and a lower level of development. The two sites which are currently the least developed in terms of boating facilities and currently have the most natural outlook and surroundings include Option 3a (Rowland Reserve) and 3b (McCarrs Creek Reserve). These sites are also the most distant from Scotland Island for vessel travel.

3.7.1 Option 1a and 1b – Extension

Option 1a and 1b are not expected to present any significant change to these sites landscape character or visual amenity during operation. Some short term construction impacts on visual amenity are to be expected.

3.7.2 Option 2a – Additional Structure Rostrevor Reserve

Option 2a is not expected to present any significant change to the landscape character or visual amenity during operation. Some short term construction impacts on visual amenity are to be expected.

3.7.3 Option 2b – Additional Structure Church Point Reserve

Option 2b will present a slight change to the local landscape character and visual amenity during operation. Some short term construction impacts on visual amenity are to be expected.

3.7.4 Option 3a – Boat Bays Rowland Reserve

Option 3a presents a minor change to the existing landscape character and visual amenity during operation. Some short term construction impacts on visual amenity are to be expected.

3.7.5 Option 3b – Boat Bays McCarrs Creek Reserve

Option 3b will result in some changes to landscape character and visual amenity during operation. This site is considered the most sensitive location for landscape character and visual amenity impacts due to the higher extent of undeveloped land / foreshore reserve and the proximity to the National Park. Some short term construction impacts on visual amenity are to be expected.

3.7.6 Option 3c – Boat Bays Bayview Baths

Option 3c is not expected to present any significant change to landscape character or visual amenity during operation. Some short term construction impacts on visual amenity are to be expected.

3.7.7 Summary of Landscape Character and Visual Amenity Constraints

A summary of the general landscape character and visual amenity constraints for each option is provided in Table 3-10. This high level assessment takes into account the existing landuse and landscape character of each site and impacts of the proposed new facilities on the local landscape character and visual amenity during construction and operation. While some sites are identified as being constrained more than others, it is not expected that for any option these impacts would be significant.

Table 3-10 Summary of landscape character and visual amenity constraints for each option.

Option	Landscape Character	Visual Amenity (Operation)	Visual Amenity (Construction)
1a and 1b – Extension at Church Point			
2a – Additional Structure Rostrevor Reserve			
2b – Additional Structure Church Point Reserve			
3a – Boat Bays Rowland Reserve			
3b – Boat Bays McCarrs Creek Reserve			
3c – Boat Bays Bayview Baths			

3.8 Traffic, Transport and Access

A high level overview of traffic, transport and access constraints (on water and land) was undertaken for each site considering their distance from Scotland Island, local land uses, local roads, available public transport facilities and available parking areas.

The NSW Roads and Maritime boating map for Pittwater (https://roads-waterways.transport.nsw.gov.au/documents/maritime/usingwaterways/maps/boating-maps/9a-pittwater.pdf) is included in Appendix F for reference.

3.8.1 Option 1a and 1b – Extension

Option 1a and 1b are located ~500 m from Scotland Island by water (noting that vessel proximity is dependent on the island location being departed from) and are one of the most proximate locations for commuters of all the options being considered. The main road leading to Option 1a and 1b (McCarrs Creek Road), is a single carriageway with two lanes, primarily utilised by cars, buses and bicycles. There is a public bus stop approximately to the 150 m west and 200 m to the east of Option 1a and 1b, and a double story carpark is located directly opposite the site. Disabled parking, motorcycle and bicycle parking is also available in the carpark. Water access is available via ferries and water taxis at the Church Point Wharf as well as small private vessel access via the existing Church Point Commuter Wharf. Images are provided in Figure 3-47.

Figure 3-47 McCarrs Creek Road and the carpark in the vicinity of Option 1a and 1b.

3.8.2 Option 2a – Additional Structure Rostrevor Reserve

Option 2a is located ~650 m from Scotland Island by water (noting vessel proximity is dependent on the island location being departed from) and also is one of the most proximate locations for commuters of all options being considered. Option 2a is located off McCarrs Creek Road, following the same structure of Option 1a and 1b. There are bus stops located directly adjacent to Option 2a travelling in both directions, with on-street parking lining the northern side of McCarrs Creed Road for approximately 100 m. Water access is available via ferries and water taxis at the Church Point Wharf and small vessel access via the existing Church Point Commuter Wharf. Images are provided in Figure 3-52.


Figure 3-48 McCarrs Creek Road and on-street parking options in the vicinity of Option 2a.

3.8.3 Option 2b – Additional Structure Church Point Reserve

Option 2b is located ~350 m from Scotland Island by water (noting vessel proximity is dependent on the island location being departed from) and is the most proximate location for commuters of all options being considered. Option 2b is located at the northern end of Pittwater Road, which follows the same structure of McCarrs Creek Road. The Church Point Parking Area, a large, open-air, ticketed car park covering 600 m, is located directly adjacent to the site. Bus stops can be found at either end of the carpark, travelling in both directions. Disabled parking, motorcycle and bicycle parking is available in the carpark. Water access is available via ferries and water taxis at the Church Point Wharf. Images are provided in Figure 3-49.



Figure 3-49 McCarrs Creek Road, bus stop, carparking and Church Point Wharf in the vicinity of Option 2b.

3.8.4 Option 3a – Boat Bays Rowland Reserve

Option 3a is located ~ 2.5 km from Scotland Island by water (noting vessel proximity is dependent on the island location being departed from) and is one of the furthest locations for commuters of all options being considered. Option 3a is located off Pittwater Road, through an open-air, ticketed car park, where disabled parking and boat trailer parking is available. Bus stops are located south of the carpark travelling in both directions, as well as on-street parking, with access to the site via foot through Rowland Reserve. Water access is available via water taxis at the small wharf. Images are provided in Figure 3-50.



Figure 3-50 Pittwater Road, bus stop, carpark and wharf in the vicinity of Option 3a.

3.8.5 Option 3b – Boat Bays McCarrs Creek Reserve

Option 3b is located ~2 km from Scotland Island by water (noting vessel proximity is dependent on the island location being departed from) and is one of the furthest locations for commuters of all the options being considered. There are a large number of swing moorings which occur along the McCarrs Creek waterway on the way to this site. Land access to Option 3b is via a car park and Reserve off McCarrs Creek Road. The closest bus stop is approximately 400 m from the car park entrance travelling northbound, with no footpaths leading to the site. While there is a small wharf for access by water taxis, no public ferries visit this location. Images are provided in Figure 3-51.


Figure 3-51 McCarrs Creek Road, wharf and the carpark in the vicinity of Option 3b.

3.8.6 Option 3c – Boat Bays Bayview Baths

Option 3c is located ~1.8 km from Scotland Island by water (noting vessel proximity is dependent on the island location being departed from) and is also one of the most distant locations for commuters of all options being considered. Option 3c is located off Pittwater Road, with an open-air car park adjacent to the site, with disabled and boat trailer parking also available. There are bus stops located approximately 100 m north of the site, travelling north and southbound. Water access is limited to water taxis from the existing wharf. Images are provided in Figure 3-52.

Figure 3-52 Pittwater Road, and the carpark in the vicinity of Option 3c.

3.8.7 Summary of Traffic, Transport and Access Constraints

A summary of key traffic, transport and access constraints for each option is provided in Table 3-11. All options have some form of carparking available as well as decent access roads and most have bus stops in their near vicinity. However, Options 3a, 3b and 3c are all considered to be constrained by their distance via water from Scotland Island, potentially making travel to and from these sites at night and in poor weather conditions unsuitable for small vessels.

Table 3-11 Summary of traffic, transport and access constraints for each option.

Option	Distance from Scotland Island	Carparking Available	Access Roads	Land Based Public Transport (nearby)	Water Based Public Transport
1a and 1b – Extension at Church Point					
2a – Additional Structure Rostrevor Reserve					
2b – Additional Structure Church Point Reserve					
3a – Boat Bays Rowland Reserve					
3b – Boat Bays McCarrs Creek Reserve					
3c – Boat Bays Bayview Baths					

3.9 Noise and Vibration

Noise and vibration resulting from the proposed construction works will have short term impacts on local residents, businesses and commercial activities. These receivers have been identified in Section 3.6. There is also the potential for noise impacts on aquatic and terrestrial fauna. Depending on the option selected, the required construction activities and noise impacts will differ slightly.

Once the selected option and construction methodology is decided on then noise and vibration impacts should be considered further in an REF with regard to the local socio-economic factors and ecological factors in that location.

All noise impact assessment and construction works should be undertaken within standard construction hours and in accordance with the following. It is not expected that noise impacts from the small scale works would be significant as long as these guidelines and policies are adhered to.

- Interim Construction Noise Guideline (DECC, 2009).
- NSW Noise Policy for Industry (EPA, 2017).
- Vibration is to be assessed in accordance with Assessing Vibration: A Technical Guideline (DECC, 2006).

3.9.1 Summary of Noise and Vibration Constraints

A summary of key noise and vibration constraints for each option is provided in Table 3-12. There are the potential for construction associated noise impacts of some kind at all locations. Operational noise impacts are considered to be insignificant given the current high recreational use of all waterways.

Table 3-12 Summary of noise and vibration constraints for each option.

Option	Residential	Commercial / Local Businesses	Ecological (Aquatic or Terrestrial Fauna)
1a and 1b – Extension at Church Point			
2a – Additional Structure Rostrevor Reserve			
2b – Additional Structure Church Point Reserve			
3a – Boat Bays Rowland Reserve			
3b – Boat Bays McCarrs Creek Reserve			
3c – Boat Bays Bayview Baths			

3.10 Air Quality

General construction vessel and vehicle exhaust emissions are expected to occur from the proposed works. Impacts to air quality would primarily occur from exhaust emissions from the use of diesel powered construction vessels and fugitive refuelling emissions. Fugitive refuelling emissions are predicted to be minor as a result of the proposed works. It is not expected that any stockpiling of sediments or soils would be required that have the potential to generate dust, however, this would need to be confirmed and addressed once the selected option and required construction methods are identified. No other significant air quality emissions form part of the proposal.

3.10.1 Summary of Air Quality Constraints

A summary of key air quality constraints, based on the proximity of sensitive receivers for each option, is provided in Table 3-13. However, it must be noted that for many of those areas which are identified as constrained, activities with similar air quality impacts already exist (i.e. local main roads with private vehicles and buses, marina facilities, public ferries and recreational vessel emissions).

Table 3-13 Summary of air quality constraints for each option.

Option	Residential	Commercial / Local Businesses
1a and 1b – Extension at Church Point		
2a – Additional Structure Rostrevor Reserve		
2b – Additional Structure Church Point Reserve		
3a – Boat Bays Rowland Reserve		
3b – Boat Bays McCarrs Creek Reserve		
3c – Boat Bays Bayview Baths		

4 Summary of Constraints

Table 4-1 below provides a very high level overview of environmental constraints identified for each of the options which have been drawn from the multiple impacts within each of these topics identified in the previous Sections. Specifics relating to the constraints identified in Table 4-1 are provided in Table 3-1 to Table 3-13.

Based on the identified environmental constraints, Options 1a and 1b (Extension at Church Point), Option 2a (Additional Structure Rostrevor Reserve) or Option 2b (Additional Structure Church Point) are considered to be most preferable.

Table 4-1 High level summary of environmental constraints identified for each option.

Option	Planning and Permissibility	Land Use and Property	Aboriginal Heritage	European Heritage	Aquatic Biodiversity	Terrestrial Biodiversity	Hydrology, Water Quality, Groundwater	Geology, Sediments and Soils	Socio-Economic	Landscape Character and Visual Amenity	Traffic Transport and Access	Noise and Vibration	Air Quality
1a and 1b – Extension at Church Point													
2a – Additional Structure Rostrevor Reserve													
2b – Additional Structure Church Point Reserve													
3a – Boat Bays Rowland Reserve													
3b – Boat Bays McCarrs Creek Reserve													
3c – Boat Bays Bayview Baths													

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Appendix A
EPBC Act Protected Matters Search

Appendix B BioNet Atlas of NSW Wildlife Search

Appendix C FM Act Schedules

Appendix D AHIMS Database Search

Appendix E NSW Marine Protected Areas

Appendix F Boating Map for Pittwater