



**NGH**



# Review of Environmental Factors

## Retford Dam

September 2022

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# 1. Introduction

Wingecarribee Shire Council (the Council) proposes to construct a detention basin and earth embankment along Mittagong Creek within Lot 501 DP1271673, Bowral (the proposal) (referred to as 'Retford Dam'). The purpose of the proposal is to manage stormwater levels as flood events traverse Mittagong Creek westerly to the township of Bowral. Refer to Figure 1-1 for the proposal site context within the Wingecarribee Local Government Area (LGA).

The proposal would involve diverting Mittagong Creek, associated clearing, cut and fill for basin and embankment construction with a dedicated access road from Old South Road. Refer to Chapter 3 of the REF for a detailed proposal description.

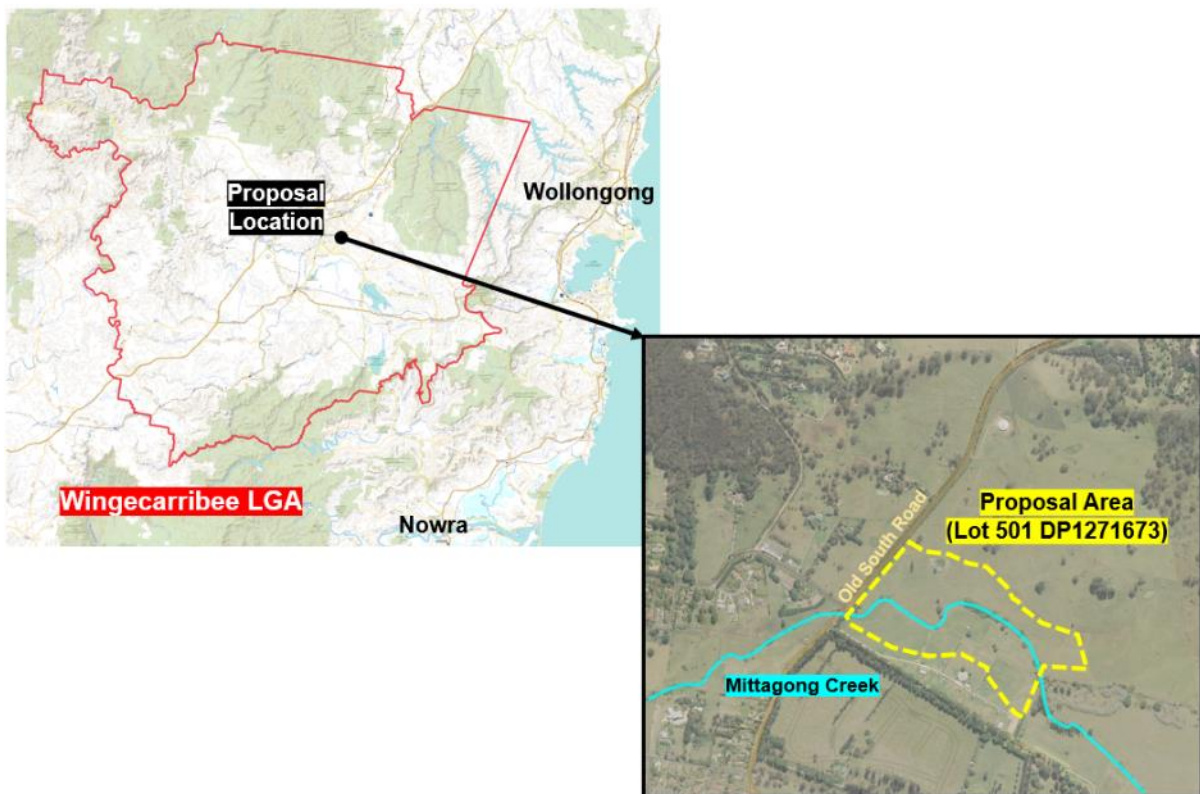


Figure 1-1 Location context of proposal area

## 1.1. Purpose of the REF

This Review of Environmental Factors (REF) has been prepared by NGH Pty Ltd (NGH) on behalf of J Wyndham Prince (JWP), on behalf of Wingecarribee Shire Council. For the purpose of these works, Council is the proponent and the determining authority under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the REF is to review the potential environmental impacts based on the current detailed design developed by JWP (Appendix A - July 2022). The REF documents the likely impact of the proposal on the environment and details the mitigation and management measures that are to be implemented. Refer to Appendix A for the current designs.

## 1.2. Location of the activity

The study area in which the proposal is located was traditionally inhabited by the Tharawal people and is under custodianship of the Illawarra Local Aboriginal Land Council (LALC).

During post-colonial expansion, the proposal site was referred to as “Bloomfield” and has historically remained a rural setting; currently used for horse agistment and grazing as freehold land.

The proposal is directly east of the corner of Old South Road and Merrigang Street, Bowral, and is surrounded by the following features:

- Low-density residential properties directly south
- Retford Park National Trust heritage area directly south
- Large lot residential properties directly west
- Rural lands directly north and east.

Under the Wingecarribee Local Environmental Plan 2010 (Wingecarribee LEP), the proposal is on land zoned E3 Environmental Management. Refer to Figure 1-2 for the land zoning surrounding the proposal.

## 1.3. Definitions of the proposal

The following definitions apply to this assessment:

**Proposal site** – the footprint of the proposed work including the extent of construction works and ancillary facilities.

**Proposal area** – land within Lot 501 DP1271673 which contains the proposal site.

**Study area** – land within 10km of the proposal site.

Appendices and references in this REF are listed below and referred to throughout this document:

Appendix A – Proposal design

Appendix B – Database searches

Appendix C – Construction Noise Estimator Tool Outputs

Appendix D – Aboriginal Due Diligence Assessment

Appendix E – Test Excavation Report and Memo

Appendix F – Biodiversity Assessment

Appendix G – Landscape Plan

Appendix H – Site Photographs

Appendix I – Consultation.



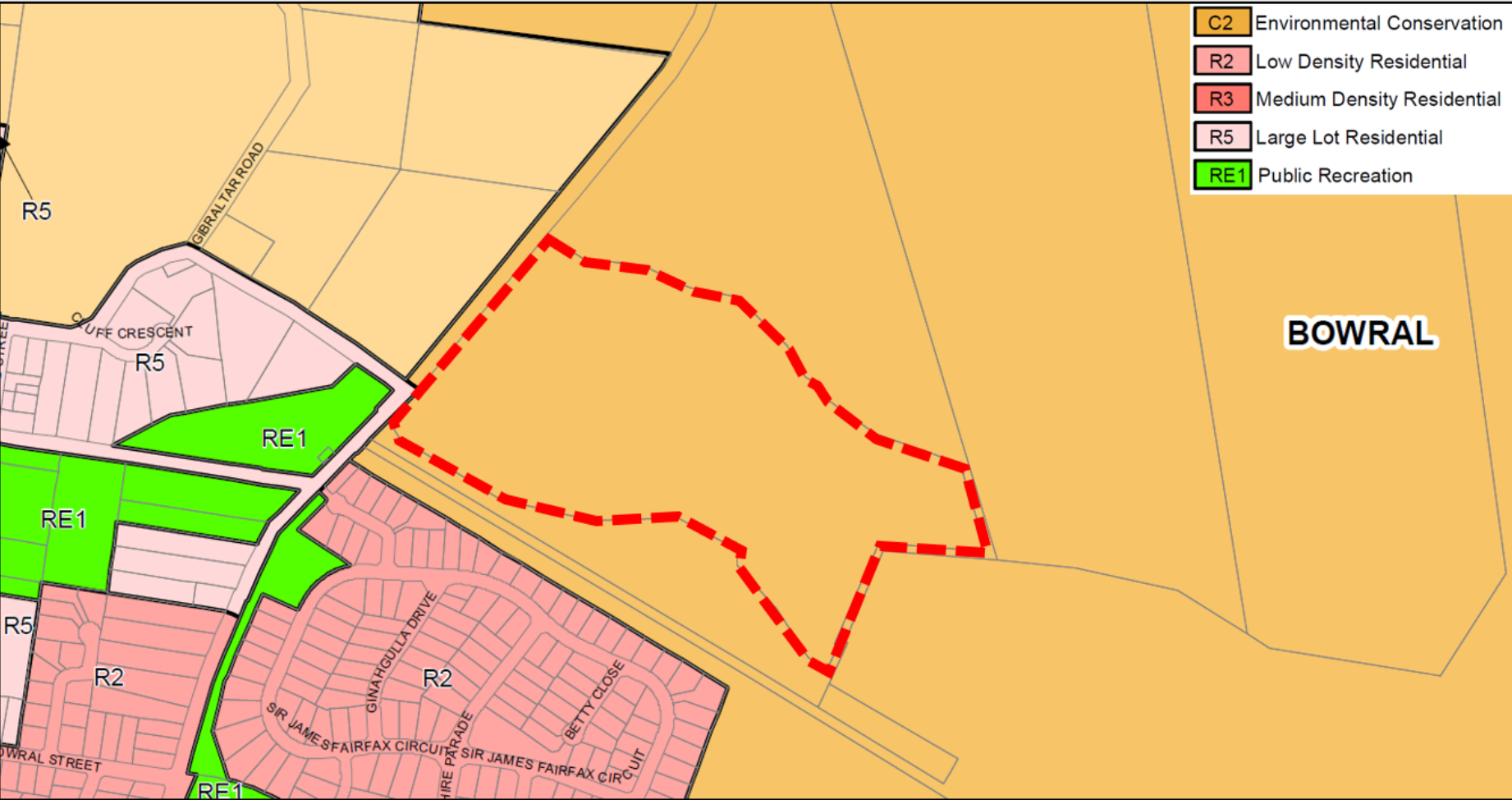


Figure 1-2 Land zoning surrounding the proposal (red) (Source: Wingecarribee LEP)

## 2. Need and options considered

### 2.1. Background

During flood events, stormwater levels traverse Mittagong Creek westerly to the township of Bowral, resulting in flooding causing property damage and ongoing maintenance costs for infrastructure such as roads.

Flood mitigation requirements were identified in the Bowral Floodplain Risk Management Study and Plan by Bewsher Consulting (2005) and was adopted by Council in 2009 as the *Bowral Floodplain Risk Management Strategy*. Subsequently, the *Retford Farm Detention Basin Scoping Study* (the Scoping Study; Bewsher Consulting, 2010) produced three (3) concept designs for the proposal and recommended “Concept 3”.

JWP was engaged by Council in 2020 to prepare the detailed design for construction. The detailed design has since been updated to include a dedicated access road from Old South Road (JWP, July 2022).

### 2.2. Strategic need for the proposal

The proposed detention basin for the proposal area was identified in the *Bowral Floodplain Risk Management Strategy* (2009) as providing more effect than any other single (feasible) measure in mitigating the impacts of flooding resulting from a 1 in 100 year flood event.

The primary need for the proposal is to manage stormwater levels during flood events in Mittagong Creek as it flows west to minimise flood risk to the Bowral township. The current design is a direct interpretation of the Scoping Study and seeks to implement its recommendations to address the strategic need for the proposal.

#### 2.2.1. Objectives

The objectives of the proposal are to:

- Manage stormwater levels during flood events in Mittagong Creek
- Minimise flood risk to the Bowral township
- Alleviate property damage and ongoing maintenance costs due to flooding.

#### 2.2.2. Consideration of alternatives

##### Option 1 Do nothing

Option 1 would prevent potential impacts to the environment including to soil and water quality as a result of the construction works. However, this option would not meet the Council's objective to alleviate property damage due to floods whereby costs associated with reactive repairs are predicted to be higher than that of preventative mitigation such as this proposal.

##### Consideration of the concept designs

The Scoping Study produced three (3) concept designs for the proposal; all of which encompass the following:

- Generally achieve the storage volume recommended in the Management Study provided the spillway level is up at RL691.5; having considerable impact on the storage volume available
- Require outlet control structures and overflow control spillways with visual erosion control measures

- Create visual impacts from Old South Road. This may be softened with the inclusion of landscaping works
- Propose an embankment alignment and water storage volumes.

For all three (3) options, future negotiations between Council and the landowner would be required to achieve any approvals for one or a combination of the concepts.

### **Concept 1**

Concept 1 impacts the existing creek alignment greater than Concept 3. The spillway level and crest level of RL691.5 and RL692.5 respectively are some 6.5 metres and 7.5 metres above the creek invert opposite the existing culverts under Old South Road. This is also the case for Concept 3.

This Concept also includes possible filling to increase the area of flood-free land for possible future rezoning and development.

### **Concept 2**

Similar to Concept 1, Concept 2 also impacts the existing creek alignment greater than Concept 3. The spillway level and crest level of RL691.5 and RL692.5 respectively are some 6.5 metres and 7.5 metres above the creek invert opposite the existing culverts under Old South Road. This is also the case for Concept 3.

### **Concept 3**

Similar to the other concepts, the spillway level and crest level of RL691.5 and RL692.5 respectively are some 6.5 metres and 7.5 metres above the creek invert opposite the existing culverts under Old South Road.

In comparison to Concepts 1 and 2, impacts on the existing creek alignment are lesser in Concept 3. This option proposes an embankment alignment further to the east than in the other options which would provide for a lesser visual impact; and the storage volume is slightly reduced.

## **Conclusions of the options investigation**

Concept 3 was considered to best meet Council's objectives and is therefore the preferred option. The current design of the proposal is a direct interpretation of this concept.

While there are potential environmental impacts associated with Concept 3, including vegetation removal and disturbance of Mittagong Creek in addition to temporary construction impacts such as potential erosion and sedimentation, construction noise etc., all impacts would be mitigated through design and environmental controls.

Upon completion, the proposal is expected to alleviate flood risks by reducing peak flows and flood levels to and minimise future maintenance costs associated with infrastructure repairs within the Bowral township downstream of the proposal.

## **Design refinements**

The current detailed design is an iteration of the JWP (2020) design in which the key refinement is the relocation of the maintenance access road from the southern side of the embankment to the northern side.

The access road was previously designed to share the entry/exit point with the existing driveway access to "Two Mile Lodge" (1251 Old South Road, Bowral; refer to Figure 2-1). The updated design (Figure 2-2) removes this road and proposes dedicated access from Old South Road to the embankment's northern side (refer to Figure 2-3).

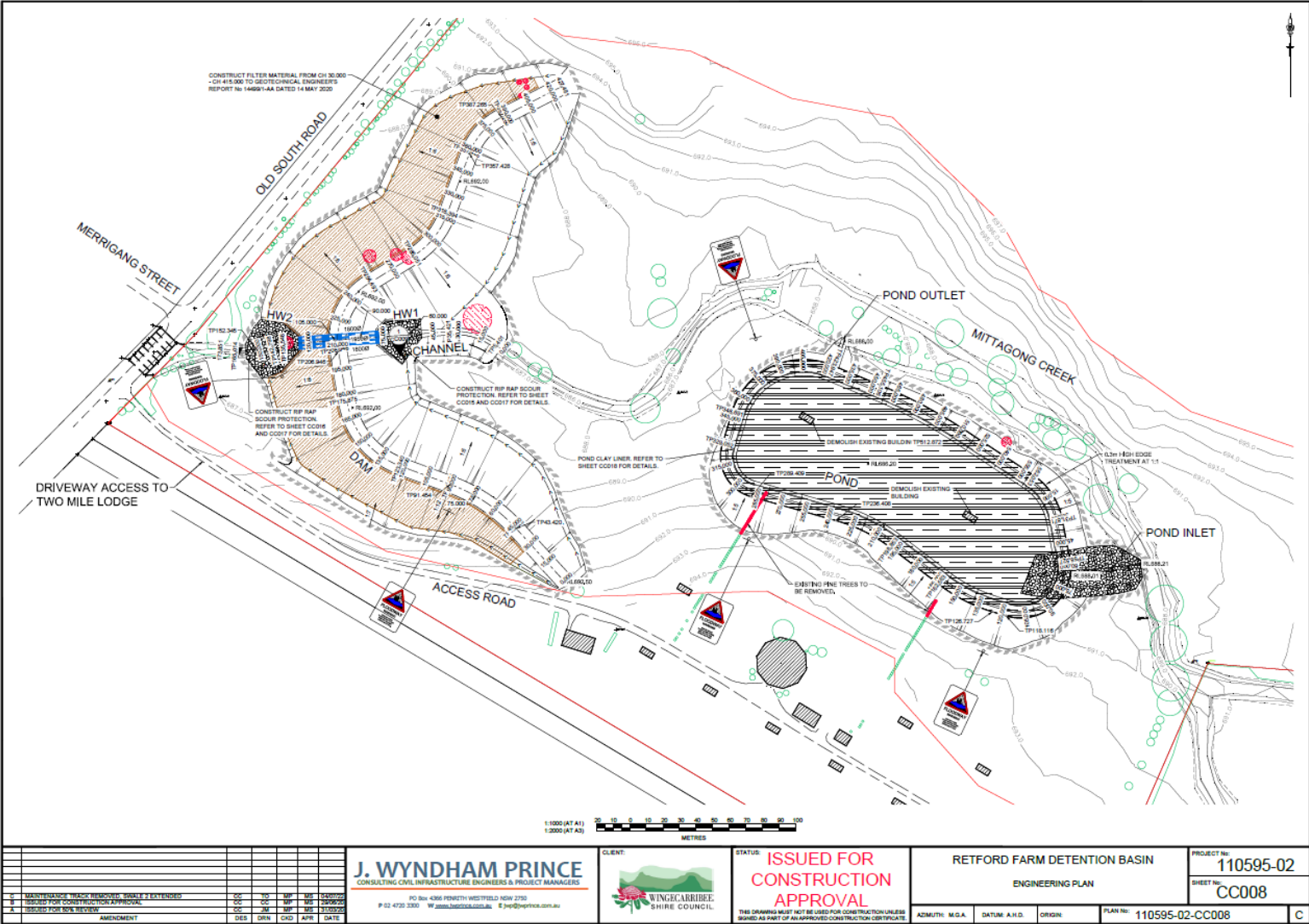


Figure 2-1 Detailed design for construction (JWP, 2022)

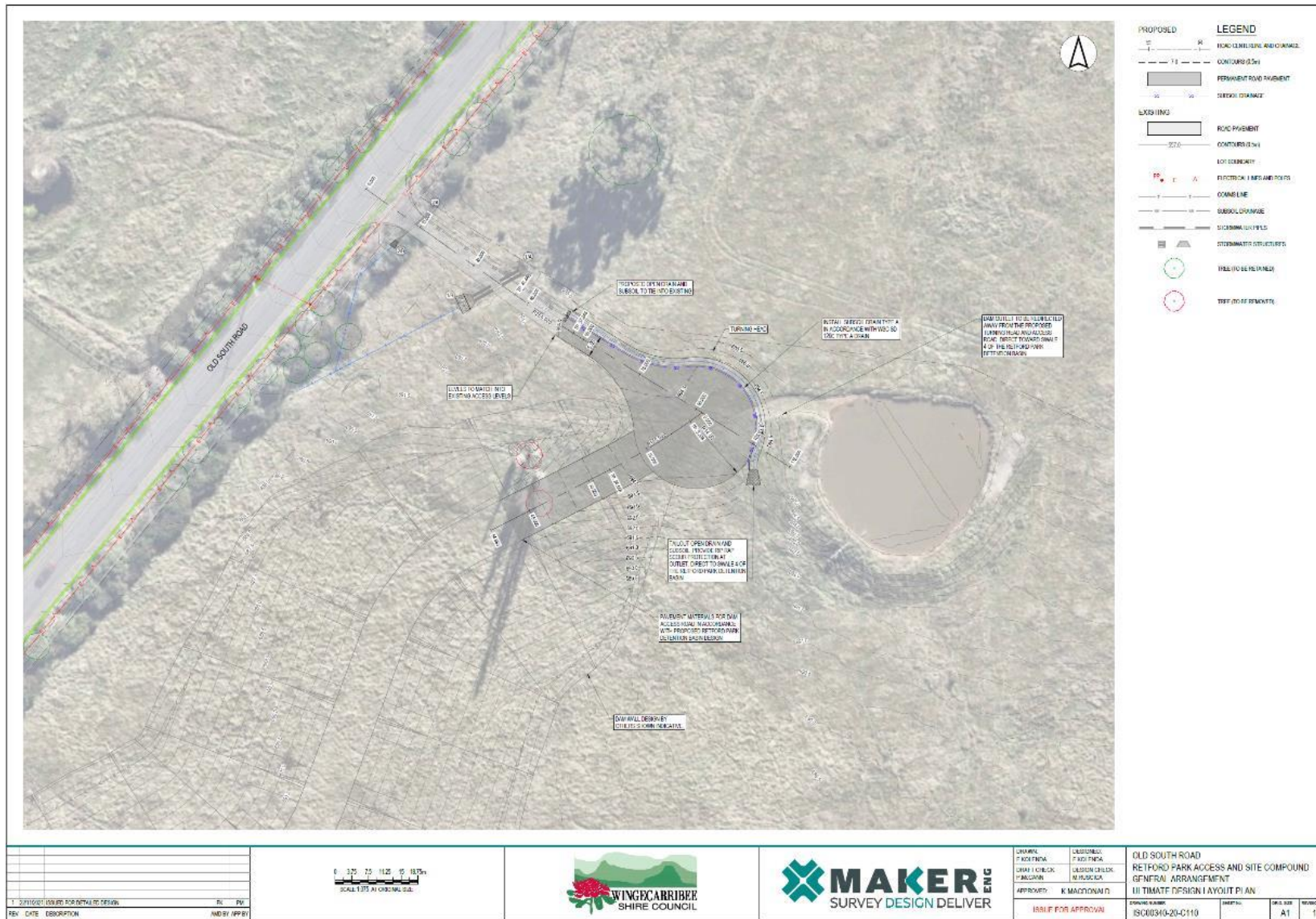
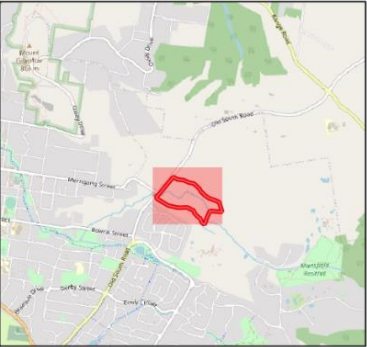


Figure 2-2 Proposed maintenance access road along embankment's northern side (Maker ENG, 2021)

Retford Dam Access road design

- Legend
- Proposal area
  - Northern Access Road
  - Strahler Streams
  - 1
  - 3



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Author: Bishal G  
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Datum: GDA94 / MGA zone 56



Figure 2-3: Proposed dedicated access from Old South Road to the embankment's northern side.

### 3. Description of the proposal

#### 3.1. The proposal

The proposal includes the construction of a detention basin and earth embankment along Mittagong Creek as well as diverting Mittagong Creek and associated clearing, and a dedicated permanent access road from Old South Road. The purpose of the proposal is to manage stormwater levels as flood events traverse Mittagong Creek westerly to the township of Bowral.

Key features of the proposal would include the following elements:

- Detention basin approximately 3.0ha in area
- Earth embankment approximately 3.4ha in area and up to approximately 5m tall with 1:6 grade batter on both slopes
- Culvert inlet and outlet of the Mittagong Creek diversion under the embankment
  - Maintain Mittagong Creek waterflow via three (3) reinforced concrete pipes (RCPs)
  - Stacked rock headwalls and rip rap scour protection at each culvert
- Four (4) swales along embankment edges to direct overland flows into the embankment inlet and outlet
- Basin inlet and outlet with three (3) stormwater pipes per connection with Mittagong Creek
- Dedicated maintenance access route via Old South Road traversing the embankment’s ridgeline from its northern side.

Refer to Figure 2-2 for the current design layout, as well as Appendix A for all other drawings.

#### 3.2. Construction activities

##### 3.2.1. Works methodology

Activity	Associated work
<b>Pre-construction</b>	<ul style="list-style-type: none"> <li>• Notify the public, businesses and other stakeholders before work commences</li> <li>• Carry out geotechnical investigations and other investigation work including utilities (e.g. Dial Before You Dig)</li> <li>• Install safety barriers and environmental controls (e.g. erosion and sedimentation controls, temporary drainage controls)</li> <li>• Set out, demarcate and fence the site to establish routes, accesses, and no-go zones including tree protection zones</li> <li>• Establish site compound.</li> </ul>
<b>Construction</b>	<ul style="list-style-type: none"> <li>• Remove the existing vegetation within the construction footprint</li> <li>• Demolish two (2) small buildings (sheet metal farm sheds)</li> <li>• Bulk earthworks to cut and fill for basin and embankment formation                             <ul style="list-style-type: none"> <li>○ Maintain Mittagong Creek waterflow via pipes during earthworks</li> </ul> </li> <li>• Construct inlets and outlets for the basin and embankments with scour protection</li> <li>• Lay down dedicated RCPs and pipes to direct inflow and outflow of rerouted Mittagong Creek</li> <li>• Construct swales and safety barrier fences along embankment edges</li> <li>• Construct paved access route from Old South Road to traverse the embankment’s ridgeline for dedicated maintenance access</li> </ul>

Activity	Associated work
	<ul style="list-style-type: none"> <li>○ Site compound to operate until paved access is completed</li> <li>○ Install subsoil drain along northern edge of the constructed pavement to direct flow to Swale 4 of the embankment <ul style="list-style-type: none"> <li>▪ Redirect existing farm dam outlet to drain into this subsoil drain</li> </ul> </li> <li>• Revegetate basin edges and embankment as per the landscaping plan <ul style="list-style-type: none"> <li>○ Dense planting along basin edges to inhibit casual entry</li> </ul> </li> <li>• Allow passive fill of constructed basin by natural stormwater inflow.</li> </ul>
<b>Post-construction</b>	<ul style="list-style-type: none"> <li>• Rehabilitate surfaces and other areas affected by construction works</li> <li>• Demobilise site by removing environmental and safety controls.</li> </ul>

### 3.2.2. Construction plant and equipment

Plant and equipment to be utilised during construction would include:

- Tracked excavator
- Backhoe
- Generator
- Vibratory roller
- Concrete trucks
- Tip trucks
- Delivery trucks
- Light vehicles
- Hand tools
- Chainsaws
- Scrapers
- Woodchipper
- Mulcher.

### 3.2.3. Source and quantity of materials

The proposal would predominantly involve excavation and embanking in conjunction to construct the basin and embankment respectively. As such, excavated soils for the basin formation would be used to construct the embankment to minimise importation of fill. Any such soil import would be minimal.

Other materials would include geotextile fabric and clay for water permeability, rocks for scour protection and headwalls, concrete for pipes and pavement, and safety fences. These materials are expected to be locally sourced.

### 3.2.4. Earthworks

The proposal would involve bulk earthworks to facilitate the basin and embankment construction via excavation from a borrow pit. Due to the predominantly flat topography and the minimal net soil movement upon cut and fill, the proposal is not anticipated to require an Environmental Protection Licence (EPL) for this activity.

Should the excavated material be classified as a controlled or restricted waste or found to contain weed seed stock or contaminants of concern at elevated concentrations, it would not classify for exemption and reuse. These would therefore need to be stored in a contained separate location onsite before being transported offsite to a licenced facility. This is further discussed in Chapter 6.10.

Waste would be generated by the proposal; this is further explained in Chapter 6.10, and would likely include: green waste (trees, roots other vegetation), concrete and building materials, and landscape waste.

### 3.2.5. Traffic management and access

Access to the proposal would be established from Old South Road at the proposed northwest region of the proposal area (refer to Figure 2-3). It is expected that construction staff vehicles as well as plant and



equipment would park within the proposal area. A detailed Traffic Management Plan (TMP) would be prepared to ensure impacts to vehicle flow at the proposal location are minimised during construction.

Upon completion, the access route would be sealed to facilitate dedicated maintenance access during operation of the proposal. Refer to Chapter 6.11 for details.

### **3.2.6. Site personnel**

Site personnel required for the proposal would be determined by the successful contractor upon award pre-construction. The works are expected to be staged and hence would not require all personnel on site at all times.

### **3.2.7. Ancillary facilities**

The location and dimensions of the site compound would be determined by the successful contractor. The site compound and other ancillary facilities would be located within the proposal area.

### **3.2.8. Construction timing**

The proposal is expected to require a construction duration of up to nine months. The timing of the works would be confirmed upon Contractor award.

Construction activities would be undertaken during standard working hours as per the Council's *Common Noise Sources Factsheet* (Wingecarribee Shire, 2018):

- Monday to Friday: 7am – 6pm
- Saturday 8am – 1pm
- No work on Sundays nor public holidays.

Work outside these hours is not recommended in order to comply with Council policy and to minimise noise impacts.

## 4. Legal and policy requirements

### 4.1. Planning approval process

The description of the proposal and assessment of associated environmental impact has been undertaken in the context of Section 171 of the Environmental Planning and Assessment Regulation 2021 (NSW), the factors in *Is an EIS Required? Best Practice Guidelines for Part 5 of the Environmental Planning and Assessment Act 1979* (DUAP, 1995/1996), the *Biodiversity Conservation Act 2016* (NSW) (BC Act), *Heritage Act 1977* (NSW) and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

### 4.2. Legal permissibility

The Council is the determining authority for the proposal. This REF fulfils the Council's obligation under Section 5.5 of the EP&A Act including to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

The proposal is not State Significant Infrastructure (SSI) nor State Significant Development (SSD). As the proposal does not require development consent and would be carried out by the Council, it would be assessed under Division 5.1 of the EP&A Act and therefore, development consent is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* (NSW) and does not require development consent nor approval under the State Environmental Planning Policy (Biodiversity and Conservation) 2021, nor the State Environmental Planning Policy (Planning Systems) 2021.

### Environmental Planning and Assessment Act 1979

The EP&A Act provides for a co-ordinated development approach ensuring the proper management, development and conservation of natural and cultural resources and promoting social and economic welfare and a better environment.

Proposals which do not require development consent under a planning instrument may be approved by relevant government agencies under Division 5.1 of the Act.

Subsection 5.7 of the EP&A Act requires an Environmental Impact Statement (EIS) to be prepared (instead of or in addition to a REF) if an activity is likely to significantly affect the environment. However, Subsection 5.7 also provides that if the activity is only likely to significantly affect the environment in respect of (1) land that is, or is part of, critical habitat OR (2) threatened species, populations or ecological communities, or their habitats; then an EIS is not required, provided a Species Impact Statement (SIS) has been furnished.

Subsection 5.7 also requires the concurrence of the Director-General of OEHS if there is likely to be significant impact to the above listed entities.

This REF has been completed under Division 5.1 of the EP&A Act and aims to address the Council's duty in respect to considering the environmental impact of the proposed activities under Section 5.5 of the EP&A Act. The proposal is not likely to significantly affect the environment, and no EIS is required.

### State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP)

TISEPP aims to facilitate the effective delivery of infrastructure across the state, including for stormwater management systems. Section 2.137 of the TISEPP permits development on any land for this purpose to be carried out by or on behalf of a public authority without consent.

The proposal involves the construction of a detention basin and embankment along Mittagong Creek and is characterised as development for a stormwater management system. Therefore, it can be assessed under Division 5.1 of the EP&A Act on behalf of the Council.

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

This SEPP consolidated those previously tailored to conservation of natural landscapes, biodiversity values and riparian resources, including the SEPP (Sydney Drinking Water Catchment) 2011. This SEPP aims to ensure water quality objectives to provide for healthy water catchments that will deliver high quality water while permitting development that is compatible with that goal.

The proposal is located within land classified as Sydney Drinking Water Catchment (refer to Appendix B) where developments within this land requires an assessment to identify Neutral or Beneficial Effect (NorBE) on water quality as a result of the proposed works. JWP has undertaken a stormwater quality assessment as part of the 100% Design Report (JWP, 2020) which resulted in NorBE compliance with the SEPP requirements. Refer to Chapter 6.3 of the REF and Appendix A for details.

### **Wingecarribee Local Environmental Plan 2010**

The proposal is located within the Wingecarribee LGA in an area covered by the Wingecarribee LEP, where the proposed work would take place within land zoned C3 Environmental Management (refer to Figure 1-2).

The provisions of TISEPP override development consent requirements of this LEP and development consent from Council would not be required.

## **4.3. Other Relevant NSW Legislation**

### **Biodiversity Conservation Act 2016**

The BC Act aims to conserve and protect certain classes of threatened, endangered and vulnerable species, populations, and ecological communities. Section 1.7 of the EP&A Act requires consideration of the significance of impact on threatened species, defined by section 7.3 of the BC Act, which lists a number of factors to be considered when deciding if there is the likelihood of a significant impact on threatened species, populations and their habitat or on ecological communities. If there is potential for impact, a Test of Significance (ToS) would be required to determine the significance of the impact. If there is likelihood for a significant impact on threatened species, populations and their habitat or on ecological communities then a Species Impact Assessment is required.

Potential impacts on biodiversity have been assessed in Chapter 6.5 of the REF and the accompanying Biodiversity Assessment (BA) (refer to Appendix F). It is recognised that riparian area of Mittagong Creek has potential microbat and woodland bird habitat. However, due to the low probability of occupancy described within the ToS (refer to Appendix C of the BA), there is unlikely to be any significant impacts on threatened species as a result of the proposed work.

### **Fisheries Management Act 1994**

The objects of the *Fisheries Management Act 1994* (FM Act) are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. An assessment of the potential impacts of the proposal on threatened species, populations, ecological communities and critical habitat listed on the FM Act must be undertaken in accordance with Section 1.7 of the EP&A Act, defined by section 220ZZ of the FM Act, in order to determine the requirement for a Species Impact Statement or a Biodiversity Development Assessment Report.

If the following activities form part of a proposal, a permit from the Department of Primary Industries (DPI) under the FM Act is required:

- Aquaculture
- Harm marine vegetation such as mangrove, seagrass or seaweed
- Dredging or reclamation of waterways, including removal of snags or aquatic vegetation
- Temporary or permanent blockage of fish passage.

The proposal would include excavating water land and moving and moving materials on and off water land which are considered dredging activities (Section 198A). Council is therefore required to obtain a permit issued by the Minister under Section 200(1): *A local government authority must not carry out dredging work or reclamation work except under the authority of a permit issued by the Minister.*

The proposed work may temporarily block fish passage with Mittagong Creek during construction of the new channel footing as Mittagong Creek is proposed to be diverted through the channel via RCPs. Upon completion, the proposal would not block fish passage. A permit to temporarily block fish passage may be required under Section 220 of the Act upon final construction design.

Impacts to biodiversity are assessed in Chapter 6.5 of the REF and the accompanying BA (refer to Appendix F). There is unlikely to be any significant impact on threatened species.

## **Heritage Act 1977**

The *Heritage Act 1977* (Heritage Act) provides protection for items of 'environmental heritage' in NSW. 'Environmental heritage' includes places, buildings, works, relics, movable objects or precincts considered significant based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values. Under the Heritage Act, a person must not disturb or excavate land if they know or have reasonable cause to suspect that they might discover, expose, move or damage a relic unless they have an excavation permit.

Items considered to be significant to the State can be listed on the State Heritage Register (SHR) and cannot be demolished, altered, moved or damaged, or their significance altered, without approval from the Heritage Council of NSW. Other items may be listed on the National and Commonwealth Heritage Lists, State Heritage Inventory (SHI) or by local Councils in LEPs. Additionally, under Section 170 of the Heritage Act, all government agencies are required to identify, conserve and manage heritage items in their ownership or control. Items are typically listed in a Heritage and Conservation Register and may also be included on the SHI.

A search of all relevant heritage databases was undertaken for the proposal area. Two (2) items of local heritage significance (Wingecarribee LEP) are adjacent to the proposal site:

- *Old South Road* (item no. I102) directly west
- *"Retford Park" house, grounds and outbuildings* (item nos. I496, I495, I152) directly south.

The proposal would not impact these items and is discussed in Chapter 6.7 of this REF.

## **National Parks and Wildlife Act 1974**

The *National Parks and Wildlife Act 1974* (NPW Act) promotes and regulates the management of national parks and historic sites or places of cultural value within the landscape and the conservation of certain fauna, native plants and Aboriginal objects and places.

The NPW Act provides for a register of sites of archaeological and Aboriginal cultural significance (Schedule 14). A Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW 2010) has been released to facilitate the protection of Aboriginal heritage under the Act. An Aboriginal Heritage Impact Permit from OEH is required for works impacting on an Aboriginal object or place.

Assessment of potential impacts to Aboriginal cultural heritage has been undertaken in Chapter 6.6 of this REF as an Aboriginal Due Diligence Assessment (refer to A.6).

Under the NPW Act, all native fauna is protected, threatened or otherwise. Schedule 13 of the NPW Act lists protected plants which shall not be harmed or picked on any land either on or off National Park estate. Impacts to biodiversity are discussed in Chapter 6.5 of this REF and as a BA (refer to Appendix F).

### **Biosecurity Act 2015**

The *Biosecurity Act 2015* (NSW) repealed the *Noxious Weeds Act 1993* and provides a framework for the prevention, elimination and minimisation of biosecurity risks. The *Biosecurity Act 2015* (NSW) and supporting Biosecurity Regulation 2017 (NSW) provide for the establishment and functions of Local Control Authorities for weeds (LGA or County Councils) and weed control obligations on public and private land.

Measures have been included within the Chapter 6.5 of the REF and the accompanying BA (refer to Appendix F) to ensure adequate weed hygiene during the proposed work.

### **Water Management Act 2000 / Water Management Regulation 2018**

The aim of the *Water Management Act 2000* (NSW) (WM Act) is to ensure that water resources are conserved and properly managed for sustainable use benefiting both present and future generations. It is also intended to provide formal means for the protection and enhancement of the environmental qualities of waterways and in-stream uses, as well as to provide for the protection of catchments.

Controlled activities are certain types of activities which are carried out on waterfront land and defined as a controlled activity in the WM Act.

'Waterfront land' means the bed of any river, lake or estuary, and the land within 40 metres of the riverbanks, lake shore or estuary mean high water mark.

Controlled activities include modifications to a watercourse, such as erosion control works and channel realignment, construction of bed control structures, construction of watercourse crossings such as bridges, causeways and bed level crossings, and ancillary works such as roads construction of stormwater outlets and spillways.

Regulating controlled activities protects waterfront land and its important natural functions whilst supporting appropriate development.

In accordance with Clause 41 of the Water Management Regulation 2018, a public authority is exempt from section 91E (1) of the WM Act in relation to all controlled activities that it carries out in, on or under waterfront land.

### **Protection of the Environment Operations Act 1997**

Under the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act), should an activity have the potential to pollute waters as any chemical, biological, physical change to existing water quality (i.e. turbidity, release of untreated wastewater) an Environment Protection Licence (EPL) may be required from the NSW Office of Environment and Heritage. As the proposal is for the purpose of a stormwater management system, it does not require an EPL.

In addition, the POEO Act relates to any pollution of the environment through noise, air and waste.

The POEO Act also obliges the Contractor to notify the NSW Environment Protection Authority (EPA) when a "pollution incident" occurs that causes or threatens "material harm" to the environment.

## **Waste Avoidance and Resource Recovery Act 2001**

The *Waste Avoidance and Resource Recovery Act 2001* (NSW) includes resource management hierarchy principles to encourage the most efficient use of resources and to reduce environmental harm. The proposal's resource management options would be considered against a hierarchy of the following order:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal.

Adopting the above principles would encourage the most efficient use of resources and reduce costs and environmental harm in accordance with the principles of ecologically sustainable development (Chapter 6.12).

## **Environmental Planning and Assessment Regulation 2021 (EP&A Regulation)**

The Environmental Planning and Assessment Regulation 2021 (NSW) (EP&A Regulation) sets out the requirements and form for an REF and the consideration of matters to be addressed.

Section 170 refers to the REF Guidelines to be followed.

Section 171(2) refers to the environmental factors to be taken into account in the REF.

Section 171(4) requires publication of an REF for any activity with:

- A capital investment value of more than \$5 million
- An approval or permit for activity that requires approval under:
  - *Fisheries Management Act 1994* (NSW) sections 144, 201, 205 or 219
  - *Heritage Act 1977* (NSW) section 57
  - *National Parks and Wildlife Act 1974* (NSW) section 90
  - *Protection of the Environment Operations Act 1997* (NSW) sections 47-49 or 122
- If the determining authority considers it to be in the public interest.

This applies to the proposal unless, as noted under section 171(6), it:

- a) Belongs to a class specified by the Planning Secretary in a notice published on the Department's website for the purposes of this section, or
- b) An approved code under Division 6 applies.

Publishing of the REF must be undertaken on Council's website either:

- a) Before the activity commences, or
- b) If not practical, no later than one month after the activity commences.

As the REF requires a Fisheries permit, the REF would be required to be published.

In preparing this REF, the REF Guidelines have been followed and all Section 171(2) factors have been taken into consideration (refer section 7.1).

## **4.4. Commonwealth legislation**

### **Environment Protection and Biodiversity Conservation Act 1999**

Under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed actions that have the potential to

significantly impact on Matters of National Environmental Significance (MNES) or the environment of Commonwealth land. These are considered in Chapter 7.2 of the REF.

A referral is not required for proposed stormwater management systems that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015.

Potential impacts to these biodiversity matters are also considered as part of Chapter 6.5 of the REF and accompanying BA (refer to Appendix F).

**Findings – Matters of National Environmental Significance (other than biodiversity matters)**

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

**Findings – nationally listed biodiversity matters**

The assessment of the proposal's impact on nationally listed threatened species, populations, endangered ecological communities and migratory species found that there is unlikely to be a significant impact on relevant MNES.

## 5. Consultation

### 5.1. TISEPP consultation

Part 2.2 Division 1 of the TISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. This assessment is provided in Table 5-1 below.

Table 5-1 Assessment of items of TISEPP Part 2.2 Division 1

TISEPP section 2.10 – 2.14 and 2.110	Is consultation with Council required?	
<p><b>2.10 (1)(a)</b> Are the works likely to have a substantial impact on the stormwater management services which are provided by council?</p> <p>The purpose of the proposal is to enhance the stormwater management capacity of Mittagong Creek to alleviate flood risk to the Bowral township. As Council is the proponent of the proposal, internal consultation would be undertaken.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<p><b>2.10 (1)(b)</b> Are the works likely to generate traffic to an extent that will strain the capacity of the existing road system in a local government area?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p><b>2.10 (1)(c)</b> Will the works involve connection to a council owned sewerage system? If so, will this connection have a substantial impact on the capacity of the system?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p><b>2.10 (1)(d)</b> Will the works involve connection to a council owned water supply system? If so, will this require the use of a substantial volume of water?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p><b>2.10 (1)(e)</b> Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a minor or inconsequential disruption to pedestrian or vehicular flow?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p><b>2.10 (1)(f)</b> Will the works involve more than a minor or inconsequential excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p><b>2.11</b> Is there a local heritage item (that is not also a state heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the heritage significance of the item/area are more than minor or inconsequential?</p>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<p><b>2.12</b> Are the works located on flood liable land? If so, will the works change flooding patterns to more than a minor extent?</p> <p>The proposal is on flood liable land. The purpose of the</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No



TISEPP section 2.10 – 2.14 and 2.110	Is consultation with Council required?	
proposal is to alleviate flood risk to the Bowral township via Mittagong Creek. As Council is the proponent of the proposal, internal consultation would be undertaken.		
<b>2.14</b> Is the proposal within the coastal vulnerability area and is inconsistent with a certified coastal management program applying to that land?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No/NA
<b>2.110</b> Does the proposal include a car park intended for the use by commuters using regular bus services?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<b>2.110</b> Does the project propose a bus depot?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<b>2.110</b> Does the project propose a permanent road maintenance depot or associated infrastructure, such as garages, sheds, tool houses, storage yards, training facilities and workers amenities?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

TISEPP section 2-13 – 2.16	Is consultation with a public authority (other than Council) required?	
<p><b>2.13</b> Are the works located on flood liable land? If so, do the works comprise more than minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance?</p> <p>Notification to NSW State Emergency Service regarding development along Mittagong Creek was provided on 14 April 2020. Refer to Appendix I for evidence of this notification.</p>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
<b>2.15 (2)(a)</b> Are the works adjacent to a national park, nature reserve or other area reserved under the National Parks and Wildlife Act 1974, or on land acquired under that Act?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<b>2.15 (2)(b)</b> Are the works on land in Zone E1 National Parks and Nature Reserves or in a land use zone equivalent to that zone?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<b>2.15 (2)(c)</b> Are the works comprising a fixed or floating structure in or over navigable waters?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<b>2.15 (2)(d)</b> Would the works increase the amount of artificial light in the night sky and that is on land within the dark sky region as identified on the dark sky region map? (Note: the dark sky region is within 200 kilometres of the Siding Spring Observatory)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<b>2.15 (2)(e)</b> Are the works on buffer land around the defence communications facility near Morundah? (Note: refer to	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

TISEPP section 2-13 – 2.16	Is consultation with a public authority (other than Council) required?	
<i>Defence Communications Facility Buffer Map referred to in clause 5.15 of Lockhardt LEP 2012, Narrandera LEP 2013 and Urana LEP 2011).</i>		
<b>2.15 (2)(f)</b> Are the works on land in a mine subsidence district within the meaning of the Coal Mine Subsidence Compensation Act 2017?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
<b>2.16 (1)</b> Are the works for the purpose of residential development, a health services facility, a correctional facility or group home in bush fire prone land?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

## 5.2. Agency Consultation

Notification to NSW State Emergency Service regarding development along Mittagong Creek was provided on 14 April 2020. Refer to Appendix I for evidence of this notification.

## 5.3. Community consultation

Community consultation was undertaken during initial concept design development between the involved landowner, Council and Bewsher Consulting representatives in early 2009. This resulted in the preferred option designed by Bewsher as “Concept 3”. JWP has since undertaken detailed development of this design in consultation with Council.

Community consultation regarding the proposal’s current design would be undertaken by Council closer to the planned date of construction and as required during the construction phase. Upon final design, a Public Communication Plan would be prepared with internal stakeholders and Council’s communication team.

## 6. Environmental assessment and mitigation measures

### 6.1. Air quality and climate

#### 6.1.1. Existing environment

##### Air Quality

The proposal site is within a peri-urban region of Wingecarribee LGA within the township of Bowral. A search of the NSW EPA air quality monitoring station database on 4 August 2022 identified the closest station was the Bargo station, approximately 22.9 km north of the proposal site. A summary of the previous 24-hour period of monitoring is summarised in Table 6-1.

Table 6-1 Bargo ambient air quality monitoring results

Pollutants	O3	<u>Ozone</u> O3	<u>Nitrogen dioxide</u> NO2	<u>Visibility</u> NEPH	<u>Carbon monoxide</u> CO	<u>Sulfur dioxide</u> SO2	<u>Particles</u> PM10	<u>Particles</u> PM2.5
Averaging periods	max 1-hour average	max rolling 4-hour average	max 1-hour average	max 1-hour average	max rolling 8-hour average	max 1-hour average	24-hour average	24-hour average
<b>Bargo monitoring station</b>	0.3	0.6	1.5	0.31	0.1	11.3	10.9	

GOOD	FAIR	POOR	VERY POOR	EXTREMELY POOR
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The results show that the air quality is generally “good”.

##### Climate

The proposal is located within the Sydney Basin Bioregion. The Sydney Basin is dominated by a temperate climate characterised by warm summers with no dry season (NSW Environment, Energy and Science, 2018).

The nearest Bureau of Meteorology (BOM) Automatic Weather Station (AWS) to the proposal is Mittagong (Alfred Street), approximately 3.7 km north of the proposal site. The mean annual minimum temperature is 7.4°C and the maximum annual mean temperature is 18.8°C. The mean annual rainfall is 904.1 mm, with the highest rainfall during February and June and the least falling during April, May and July (refer to Figure 6-1).

Location: 068044 MITTAGONG (ALFRED STREET)

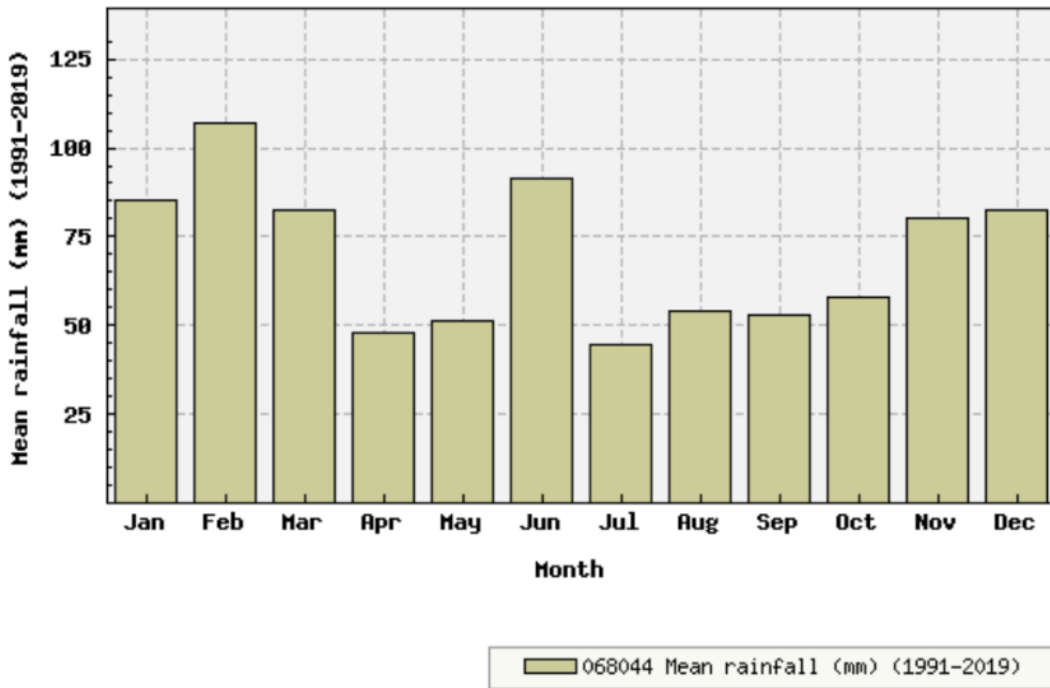


Figure 6-1 Mean monthly rainfall at the Mittagong (Alfred Street) AWS covering 1991-2019 (BOM, 2019)

### 6.1.2. Potential impacts

#### Construction

High rainfall has the potential to impact the proposal site from stormwater inundation due to the existing drainage lines alongside Mittagong Creek during the main construction activities. Climate characteristics for the proposal area indicate that rainfall would be most prevalent during late summer and least prevalent during winter excluding the month of June. Therefore, it is recommended that the stormwater diversion be undertaken during late winter to minimise inundation to Mittagong Creek. Refer to Chapter 6.3 of the REF for details.

Adverse impacts to air quality during construction of the proposal may result from the following:

- Dust generation from exposed areas of soil as a result of excavation and stockpiling
- Exhaust emissions from construction vehicles, plant and equipment.

The nearest sensitive receivers include residences along the surrounding streets. The impact to these receivers is considered temporary and moderate given the contained scale of the works within the proposal area and would only be during construction.

All other air quality impacts would be manageable and mitigated by the implementation of the recommend safeguards.

#### Construction

No air quality impacts are expected to be generated during the operation phase as a result of the proposal.

### 6.1.3. Safeguards and mitigation measures

Impact	Environmental safeguards	Responsibility	Timing
Air quality	<ul style="list-style-type: none"> <li>All loads will be covered during transport</li> <li>Limit exposed surfaces areas to the minimum area required</li> <li>Maintain plant to manufacturers standards</li> <li>Machinery will not be left running when idle</li> <li>Water carts are to be used on stockpile sites or access roads to reduce dust</li> <li>Ensure that all plant and equipment comply with Part 4 of the Protection of the Environment Operations (Clean Air) Regulation 2002</li> <li>Where levels of dust become unacceptable, appropriate action must be taken. This may include suspending works during periods of high wind</li> <li>Smokey emissions from construction plant and vehicles will be maintained to Australian Standards. The <i>Protection of the Environment Operations Act 1997</i> (POEO Act) requires that no vehicle shall have continuous smoky emissions for more than 10 seconds</li> <li>Vegetation or other materials will not be burnt on site.</li> </ul>	Contractor	Construction

## 6.2. Geology, soils and contamination

### 6.2.1. Approach

Soil profiles and associated mapping were accessed from eSPADE v2.2 on 4 August 2022 to identify the existing soil environment in the vicinity of the proposal area.

Records of contaminated land in the vicinity of the proposal area were accessed on 4 August 2022 from the following databases:

- NSW EPA Contaminated Land: Record of Notices
- List of NSW contaminated sites notified to EPA.

Refer to Appendix B for database search results.

### 6.2.2. Existing environment

#### Geology and soils

The proposal area is within a peri-urban landscape as a result of Bowral's establishment and development within the Southern Highlands region of NSW. The local topography of the proposal area is generally flat at its location along Mittagong Creek with an approximate elevation of 690 metres Australian Height Datum (AHD) where it comprises the lowlands south of Mount Gibraltar and adjacent ranges with elevations approximately between 750-850 metres AHD.

Existing ASS maps showed no mapped probability at the proposal site. The nearest mapped region with probable ASS presence is located in Albion Park approximately 30 km east.

A Soil Profile Report of '150m south Old South Rd. – Merrigang St.' (OEH, 2001), approximately 150 metres southwest of the proposal site location along Old South Road, characterised the local geological landscape as "hillcrest under unknown on shale, sandstone-quartz lithology". Surface condition was "hard set, profile is well drained, erosion hazard is moderate" where the soil profile was noted as "moderately permeable" which is indicative of the proposal area's history as an elevated floodplain (refer to Appendix B).

## **Contamination**

The nearest recorded site of contaminated land 'Former Gasworks' is approximately 1.7 km west of the proposal site adjacent to 88 Merrigang Street, Bowral. No records of contaminated land are within the vicinity of the proposal.

### **6.2.3. Potential impacts**

#### **Construction**

Construction would result in surface and soil disturbance via excavation activities within and along Mittagong Creek. Potential impacts to soil and water during construction of the proposal would include the following:

- Erosion as a result of surface disturbance
- Damage to soil structure due to machinery/vehicular movements
- Accidental spills of chemicals such as fuels, oils and lubricants
- Leaching of construction materials such as concrete and sealant.

Potential downstream impacts to Mittagong Creek would primarily occur during construction of the embankment and channel. This would be staged by first constructing the channel footings, headwalls and scour protection along the proposed diversion. Reinforced Concrete Pipes (RCP) would be laid down to facilitate the waterway's existing flow to be diverted along the constructed channel. This would also be staged to control flow velocities to minimise downstream inundation.

Other general contamination risks are associated with the handling and processing of products where liquid waste and hazardous material can escape into the soil. These are associated with the transport, handling and storage of such materials if not properly undertaken, that would result in the potential threat of releases and spills onto the ground.

Vegetation clearing and the excavation of tree roots would expose soils and increase the risk of erosion at the site. Risks to soils are influenced by landscape position, slope, soil type, hydrogeology and land use.

The following works pose a risk of impacts to water quality in the proposal area:

- Soil disturbance during earthworks on Mittagong Creek bank and areas for the detention basin causing sediment to potentially transported downstream
- Chemical spills from construction work or refuelling activities and plant failure.
- Run-off from stockpile and compound sites.

Mitigation measures to the impacts below are provided in Chapter 6.2.4.

#### **Soil erosion and water pollution**

The risk of soil erosion from ground disturbance is present. Run off into waterways following a storm event could lead to water pollution in downstream environments. These impacts occur when the site has inadequate or unmaintained erosion and sediment controls. Construction activities disturb surface soils and generate excess material that has the potential to enter the stormwater system and impact water quality.

A stormwater quality assessment determined that the proposal's impact on water quality would comply with NorBE assessment standards as per the Sydney Drinking Water Catchment SEPP, now SEPP (Biodiversity and Conservation) 2021.

Potential downstream impacts to Mittagong Creek and Wingecarribee River would largely be limited to the construction phase. Safeguards would remain in place to prevent soil and pollution from entering Mittagong Creek until after the site is stabilised.

### **Spills and Leaks**

There is a potential risk for accidental spills and leaks of hazardous products such as oils, fuels, lubricants and sanitary wastewater during construction. The consequences are greater when the risks are near/within Mittagong Creek. Chemical and fuel spills have the potential to cause serious harm to the ecology of a river system, including fish kills, harm to other fauna, and damage to vegetation. Spills may also occur at the construction site's storage areas or during transportation of hazardous products on and off the site.

Inadequate procedures for storing, transferring, and handling may also result in spills to the ground and lead to soil contamination. Safeguards would be in place to minimise the impact of any accidental spill or leak that may enter the soil or Mittagong Creek during construction.

### **Inadequate Waste Management**

Construction activities typically generate solid and hazardous waste, as well as hazardous liquid wastes. Although these types of wastes (used oil, machinery lubricants and sludge) represent a small proportion of the total amount of construction waste, if inadequate handling, storage and disposal of these wastes occur, the risk of soil contamination at the proposal site may increase.

Waste management risks from any existing sources during construction would be managed using best practice waste management and response procedures.

### **Cross Contamination of Soil**

Use and storage of fuels and other chemicals pose a potential risk for spills during construction. This risk is considered low with the implementation of the mitigation measures and using best practice storage, use and spill response procedures.

Soil contamination risks from any existing sources and the use and storage of fuels and other chemicals during construction would be managed using best practice storage, use and spill response procedures.

### **Overall risks**

Overall, the works would be short-term and any risks to soils, erosion and water would be localised and adequately addressed by the recommended mitigation strategies outlined below. Stabilisation and revegetation would act to resist soil erosion and sedimentation to the same extent that existing vegetation now functions.

Areas disturbed by vegetation clearing and excavations have potential to continue to be susceptible to erosion until groundcover is restored. These impacts are expected to be minimal, subject to the implementation of appropriate restoration measures, outlined below.

## **Operation**

Upon completion, areas disturbed by vegetation clearing have potential to continue to be susceptible to erosion until groundcover is restored. These impacts are expected to be minimal, subject to the implementation of recommended safeguards and mitigation measures.

#### 6.2.4. Safeguards and mitigation measures

Impact	Safeguards and mitigation measures	Responsibility	Timing
<b>General</b>	A Construction Management Plan (CEMP) or equivalent will be prepared by a suitably qualified person.	Contractor	Pre-construction
<b>Erosion and sedimentation</b>	<p>The CEMP will include the measures below, in accordance with the requirements of Landcom’s “Managing Urban Stormwater: Soils and Construction, 2004” (the Blue Book):</p> <ul style="list-style-type: none"> <li>• Install and maintain erosion and sediment controls on a regular basis during construction to prevent sediment moving offsite and sediment laden water entering drainage lines</li> <li>• Stabilised access is to be established to prevent mud tracking prior to exiting onto public roads</li> <li>• Stabilise disturbed areas progressively</li> <li>• Minimise soil disturbance from vehicle use onsite</li> <li>• Inspect and maintain sediment and erosion controls until the site has been stabilised post construction.</li> </ul>	Contractor	Pre-construction Construction
<b>Soil</b>	Stockpiles will be appropriately controlled by sediment fencing or other materials identified in the Blue Book to ensure sediments do not enter a waterway.	Contractor	Construction
<b>Hazardous chemical spills</b>	Spill kits will be available onsite, and all staff will be aware of their location and trained in their use.	Contractor	Construction
<b>Storage management</b>	<ul style="list-style-type: none"> <li>• Wherever possible, do not store chemicals and fuel within the within 30m of the waterway</li> <li>• All servicing, refuelling, stockpiles, waste disposal and storage areas will be located as far as possible from stormwater drains to reduce potential of pollution via spillage and or inundation during storm events</li> <li>• Clean excavated materials will be kept in the stockpile for as short a time as possible</li> <li>• No hazardous material including potential ASS will be stockpiled</li> <li>• Induction training shall be undertaken for employees to increase their awareness of chemical management protocols including proper handling and storage of chemicals, and emergency response and contingency plans.</li> </ul>	Contractor	Construction
<b>Soil</b>	Following the construction phase, the site will be cleaned up including remediating soils if required, removing rubbish, restoring profiles and decompacting soils in the construction areas.	Contractor	Post construction



## 6.3. Hydrology and flooding

### 6.3.1. Existing environment

#### Hydrology

Mittagong Creek is a Strahler third-order stream that rises in East Bowral approximately 2.9 km east of the proposal site and flows west until its confluence with Wingecarribee River approximately 5.8 km west. Mittagong Creek courses through the Bowral township where several minor tributaries drain into the waterway from various surrounding hillcrests, namely Mount Gibraltar and Oxley Hill. At the proposal location, Mittagong Creek flows west through the proposal area and traverses Old South Road. Several first-order streams drain into Mittagong Creek due to its surrounding topography. Mittagong Creek is also within land mapped as Sydney Drinking Water Catchment as per the *SEPP (Biodiversity and Conservation) 2021* (refer to Chapter 4.2).

Water quality of Mittagong Creek was observed to have high turbidity during the site visit, although no samples were collected to confirm particulate components. This was undertaken upstream of an existing concrete weir controls the overflow of Mittagong Creek's waterfront land (refer to Figure 6-2) where Mittagong Creek was dry downstream of the weir, likely due to prolonged drought conditions at the time of the site visit.



Figure 6-2 Existing weir along Mittagong Creek

The proposal would retain this weir as an existing control. Refer to Figure 6-3 for the location of the weir.

#### Flooding

Mittagong Creek's flood risk is directly related to its proposed function as a detention basin as it is already a catchment area for its surrounds. Flood risk mapping for the region shows that areas surrounding Mittagong Creek, downstream of the proposal and within the Bowral township, would be prone to inundation at the 1% annual exceedance probability (AEP) (refer to Figure 6-4).

The Bowral FRMSP (Bewsher, 2005) indicated that a number of dwellings would flood during a 1% AEP occurrence, and consequently recommended for the construction of a 6m-high earth embankment. The

embankment would minimise the number of dwellings being flooded by providing storage of approximately 355,000 m<sup>3</sup> of water within the proposal area upstream of the Old South Road. Subsequently, a Flood Study Addendum was undertaken (Bewsher, 2009) to detail flood characteristics of the proposal area (refer to Figure 6-4).

JWP has since updated the 2009 flood modelling for the proposal area using 2018 XP-RAFTS and TUFLOW modelling software for the revised hydrological parameters. No statistically significant differences were observed in the 2018 XP-RAFTS flow rates, compared to the 2009 model. The 2018 TUFLOW model showed some reduced flood-risk areas downstream of the proposal area compared to the 2009 model. Thus, the recommendation from the Bowral FRMSP would still be applicable to minimise flooding downstream of the proposal site via its proposed stormwater retention.

Refer to the 100% Design Report for the proposal in Appendix A for details.

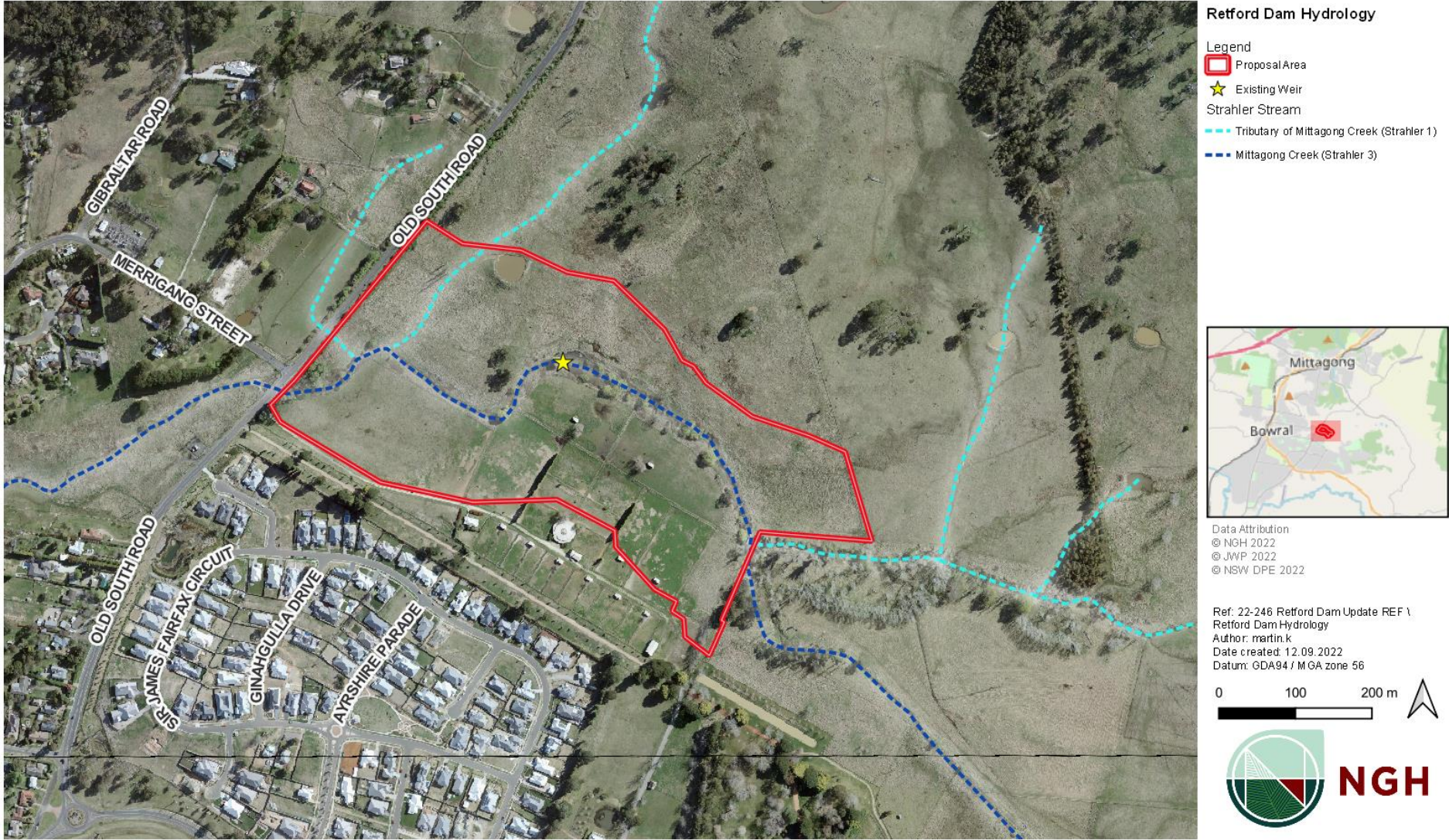


Figure 6-3 Hydrological elements traversing the proposal area

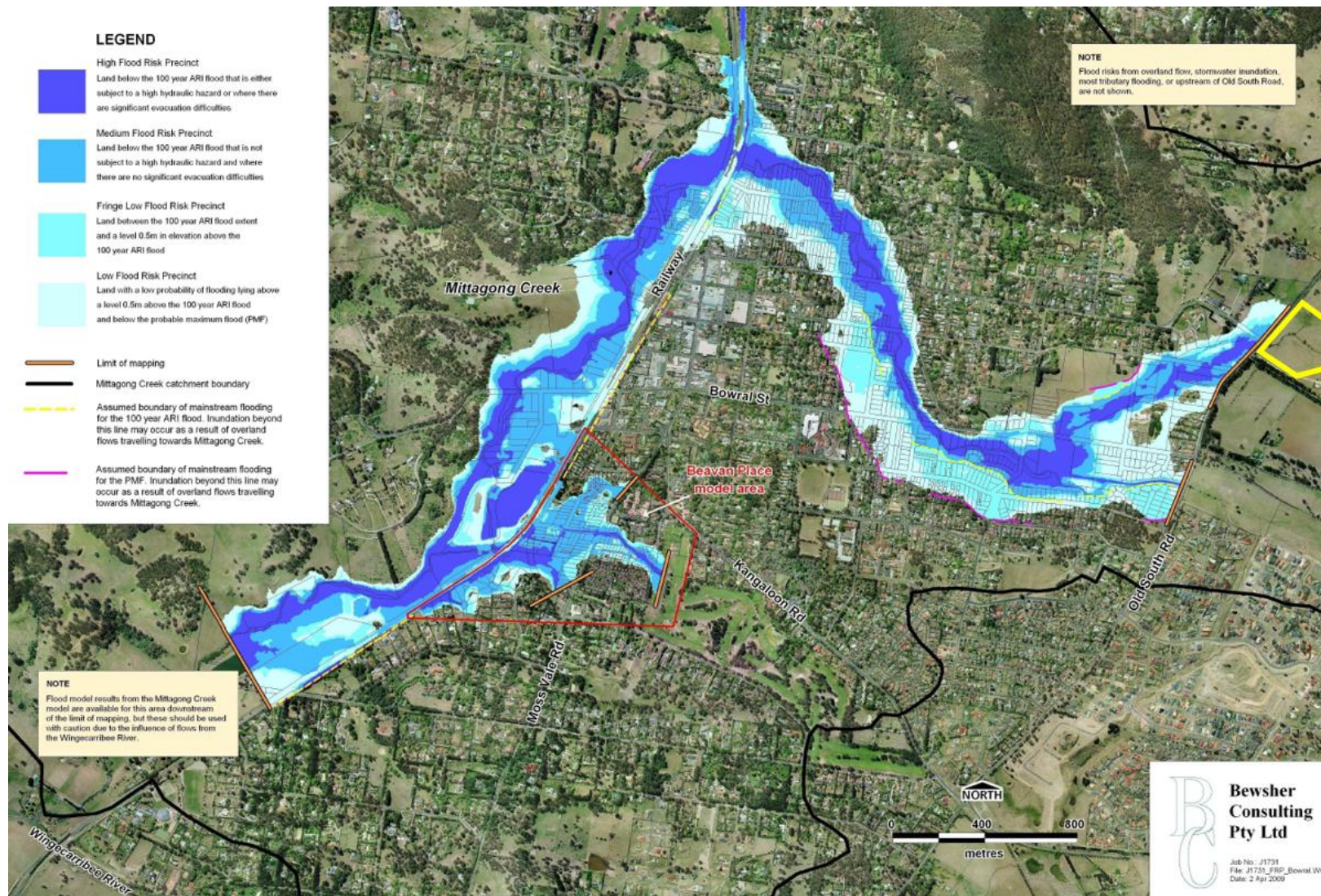


Figure 6-4 Existing flood risk mapping of Mittagong Creek downstream of the proposal (yellow) (Bewsher, 2009)

### 6.3.2. Potential impacts

#### Flooding

In the event of a high rainfall occurrence, Mittagong Creek could potentially inundate from stormwater flow. Flooding would impact on any infrastructure and properties located within the flood zone. Although storm events would be temporary and short term, flood waters would recede at a slower rate and would depend on the capacity of downstream stormwater systems.

The proposed works are to construct a stormwater management system in the form of a detention basin and embankment to alleviate potential 1% AEP inundation surrounding Mittagong Creek as it traverses the Bowral township downstream. Refer to Appendix A for details.

During construction of the proposal, preparation for potential flood events would be implemented to minimise impacts to the work site. The impact would be moderate to major if appropriate measures are not considered in the final design and pre-construction stage.

### 6.3.3. Safeguards and mitigation measures

Water quality safeguards and mitigation measures are addressed in Chapter 6.2.4.

Impact	Safeguards and mitigation measures	Responsibility	Timing
Flooding	<ul style="list-style-type: none"> <li>Climate characteristics for the locality indicate that rainfall would be most prevalent during late summer and least prevalent during late winter. It is therefore recommended that the proposed work be undertaken during late winter to minimise potential inundation of the work site</li> <li>The CEMP would include a plan or procedure to evacuate equipment and manage the site in the event of a flood.</li> </ul>	Contractor	Pre-construction

## 6.4. Noise and vibration

### 6.4.1. Approach

The proposal has the potential to affect the community due to noise and vibration during construction. The Transport for NSW Construction Noise Estimator Tool (CNET) was used to assess the worst-case noise impact scenario during construction and the following key factors were identified during assessment:

- Appropriate background noise levels
- Noise management levels (NMLs)
- Noise catchment areas (NCAs)
- Potential noise and vibration impacts
- Reasonable safeguards and mitigation measures.

The CNET was used to identify these factors for each time period of the proposal's construction. Noise area category "R2" was chosen as the representative noise area for the proposal due to the following factors to determine background noise levels:

- Existing background noise from peri-urban processes of Bowral
- Vehicle movements along the adjacent Old South Road carriageway with a posted speed limit of 70 km/hr
- Direct line of sight to the proposal site from sensitive receivers.

As per the Roads and Maritime Construction Noise and Vibration Guideline (CNVG; (RMS, 2016)), NMLs are set to be 10 dB(A) above the background noise level during standard hours and 5 dB(A) above outside standard hours. Construction activities would be undertaken during standard working hours as per the Council's *Common Noise Sources Factsheet* (Council, 2018):

- Monday to Friday: 7am – 6pm
- Saturday: 8am – 1pm
- Sunday, Public Holidays: No work

Based on the variables above, the following conditions would apply to the proposal:

- Background noise level (Rating Background Level (RBL)) = 45 dB(A)
- Noise Management Level (NML) = 55 dB(A)
- Noise environment = Propagation across a valley / over water
- Noisiest scenario = Bulk earthworks.

Refer to Appendix C for the CNET outputs.

Sensitive receivers were grouped into NCAs to assist with assessment based on their distance range and line of sight from the proposal area during the worst-case noise impact scenario. The noisiest scenario "bulk earthworks" was selected to produce the NMLs for each NCA due to the most relevant construction activities. This was also applied to assess the estimated sound pressure level (SPL) for noise levels emitted during the same scenario.

Refer to Figure 6-5 for a map of NCAs relative to the proposal during standard hours.



Figure 6-5 NCAs during standard hours

Minimum working distances from sensitive receivers for typical items of vibration-intensive plant are listed in Table 6-2 below. The minimum distances are quoted for both “cosmetic” damage (refer BS 7385) where vibratory plant ratings are given in kilonewtons (kN) under typical geotechnical conditions. The minimum working distances for cosmetic damage must be complied with at all times.

Table 6-2 Minimum working distances regarding vibratory plant

Plant item	Rating / Description	Minimum working distance (metres)
		Cosmetic damage (BS 7385)
Vibratory Roller	< 50 kN (Typically 1-2 tonnes)	5
	< 100 kN (Typically 2-4 tonnes)	6
	< 200 kN (Typically 4-6 tonnes)	12
	< 300 kN (Typically 7-13 tonnes)	15
	> 300 kN (Typically 13-18 tonnes)	20
	> 300 kN (> 18 tonnes)	25
Small Hydraulic Hammer	(300 kg - 5 to 12t excavator)	2
Medium Hydraulic Hammer	(900 kg – 12 to 18t excavator)	7
Large Hydraulic Hammer	(1600 kg – 18 to 34t excavator)	22
Vibratory Pile Driver	Sheet piles	2 to 20
Pile Boring	≤ 800 mm	2 (nominal)
Jackhammer	Hand held	1 (nominal)
Profiler	Wirtgen W210	4
Asphalt Paver	Vogele Super 1800-3	1
Steel Drum Roller	Hamm HD70 (Oscillating Mode)	2
Steel Drum Roller	Hamm HD70 (Static Mode)	1

### 6.4.2. Existing environment

The proposal is located in a peri-urban area of Bowral within the Wingecarribee LGA. The surrounding land use is largely rural and residential where construction activities would traverse land zoned E3 Environmental Management (Wingecarribee LEP 2010).

The nearest residential receivers are directly south of the proposal within the former Retford Park Estate that has since been subdivided, and along Old South Road and Merrigang Street across the western boundary of the proposal.



Other sensitive receivers in relation to the proposal include:

- Recreational areas:
  - Retford Park National Trust heritage area approximately 250 metres south
  - David Wood Playing Fields approximately 740 metres south
- Places of worship:
  - Bowral Seventh-day Adventist Church approximately 600 metres southwest
- Early education centres:
  - Bowral Street Childcare approximately 650 metres southwest
  - Bambino’s Kindergarten approximately 700 metres southwest.

### 6.4.3. Potential impacts

#### Construction

The nearest noise-affected sensitive receivers during standard hours were found to be the following:

- Residents within the subdivided Retford Park Estate
- Residents along Old South Road and Merrigang Street.

Noise would be generated by construction vehicles bringing materials to site and the operation of plant and machinery. Table 6-3 summarises the CNET results during standard hours.

Table 6-3 Summary of NCAs surrounding the proposal during standard hours

Catchment distances	Receivers affected	NML, dB(A)	Mitigation level, dB(A)	SPL, dB(A)	Recommended additional mitigation measures
<b>NCA1 (70m) in line of sight</b>	<ul style="list-style-type: none"> <li>• Residents directly south of the proposal area (Old South Road)</li> <li>• Residents within Retford Park Estate:                             <ul style="list-style-type: none"> <li>○ Sir James Fairfax Circuit</li> <li>○ Warwick Close</li> </ul> </li> </ul>	55	75	76	<b>N, PC, RO</b> for receivers affected by ‘highly intrusive’ noise
<b>NCA2 (230m) in line of sight</b>	<ul style="list-style-type: none"> <li>• Residents within Retford Park Estate:                             <ul style="list-style-type: none"> <li>○ Sir James Fairfax Circuit</li> </ul> </li> <li>• Residents at Old South Road, Merrigang Street, Gibraltar Road, Cluff Crescent</li> </ul>	55	65	65	<b>N</b> for receivers affected by ‘moderately intrusive’ noise

\* N=notification; PC=phone call; RO=respite offer

Sensitive receivers not within the line of sight were found to be outside the potential NCA, thus NCAs only applied to those within the line of sight. The Retford Park National Trust heritage area as a ‘passive recreation’ receiver is not within the noise-affected distance of 115 metres (refer to Appendix C).

During standard hours, the CNET indicated a SPL of 76 dB(A) within NCA1. This SPL is marginally above the mitigation level of 75 dB(A). Within NCA2, the SPL is on par with the mitigation level of 65 dB(A). While the SPL within NCA2 does not exceed its mitigation level, the SPL within NCA1 would require additional mitigation measures for the receivers along Sir James Fairfax Circuit and Warwick Close, Bowral in the form

of N, PC and RO as per Table 6-3. RO is recommended should complaints be received, where this may be offered as a one-hour respite period between three-hour work shifts as recommended by the CVNG (RMS, 2016).

The nearest structure to the proposal that may be potentially impacted by vibration is the existing homestead within the proposal area approximately 30 metres south of the proposed work. This distance exceeds the minimum working distances of vibratory plant as per Table 6-2. No vibration impacts are expected to occur as a result of the proposal.

To maintain ongoing noise mitigation measures during construction, noise would be managed through implementation of a Noise Management Plan (NMP) as part of the CEMP.

## Operation

The proposal is not expected to generate any additional noise during operation.

### 6.4.4. Safeguards and mitigation measures

Impact	Safeguard and mitigation measures	Responsibility	Timing
<b>Construction noise</b>	The NMP will include the following safeguards for noise and: <ul style="list-style-type: none"> <li>• A process for documenting and resolving issues and complaints.</li> <li>• A process for updating the plan when activities affecting construction noise and vibration change or if additional measures need to be incorporated to resolve complaints or exceedances of the relevant guidelines.</li> <li>• Identify in toolbox talks where noise and vibration management is required.</li> <li>• A map indicating the locations of sensitive receivers including residential properties.</li> </ul>	Contractor	Pre-Construction
	<ul style="list-style-type: none"> <li>• Use less noisy plant and equipment, where feasible and reasonable.</li> <li>• Plant and equipment will be properly maintained.</li> <li>• Provide special attention to the use and maintenance of 'noise control' or 'silencing' kits fitted to machines to ensure they perform as intended.</li> <li>• Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel.</li> <li>• Avoid any unnecessary noise when carrying out manual operations and when operating plant.</li> <li>• Any equipment not in use for extended periods during construction work will be switched off.</li> <li>• Affected neighbours to the construction works shall be advised in advance of the proposed construction period at least 7 days prior to the commencement of works</li> </ul>	Contractor	Construction
<b>Construction Noise – receivers</b>	Mitigation measures for 'moderately intrusive' catchment areas (within 230m): <ul style="list-style-type: none"> <li>• Notification (letterbox drop or equivalent) a minimum of 7 days prior to the commencement of works.</li> </ul>	Contractor	Construction

Impact	Safeguard and mitigation measures	Responsibility	Timing
	Mitigation measures for 'highly intrusive' catchment areas (within 70m): <ul style="list-style-type: none"> <li>• Notification (letterbox drop or equivalent) a minimum of 7 days prior to the commencement of works.</li> <li>• Phone calls detailing relevant information made to identified/affected stakeholders within 7 days of proposed work.</li> <li>• Respite offer to these residents would be provided should there be any noise complaints received.</li> </ul>	Contractor	Construction

## 6.5. Flora and fauna

### 6.5.1. Approach

Government databases were reviewed to identify potential threatened species, populations and threatened ecological communities (TECs) of the study area. Refer to Table 6-4 for a summary of biodiversity database searches were carried out on 9 July 2019 with updated searches on 4 August 2022.

Table 6-4 Summary of database search methods

Resource	Target	Search date	Search area
<b>OEH BioNet Atlas</b>	Threatened flora and fauna species, populations and ecological communities listed under the BC Act	4/8/2022	10 km radius of the study area
<b>EPBC Act Protected Matters Search</b>	Threatened flora and fauna, endangered populations and ecological communities and migratory species	4/8/2022	10 km radius of the study area
<b>DPI Weed Wise</b>	Priority weeds declared in the South East Region which encompasses Wingecarribee LGA.	4/8/2022	Wingecarribee Shire LGA
<b>Bureau of Meteorology National Atlas of Groundwater Dependant Ecosystems</b>	Vegetation communities that are likely to rely on groundwater.	4/8/2022	Locality
<b>OEH vegetation information system (VIS) database and Vegetation Types Database</b>	Plant Community Type (PCT) identification.	4/8/2022	Study area

Resource	Target	Search date	Search area
DPI Fisheries NSW Spatial Data Portal	Threatened fish and freshwater fish community status.	4/8/2022	Locality

A site visit on 15 January 2020 was undertaken to investigate the presence of any threatened species.

A Biodiversity Assessment (BA) was prepared for the proposal to investigate potential impacts to biodiversity. Refer to Appendix F for the BA methodology and detailed results.

## 6.5.2. Existing environment

Database search results are summarised in Table 6-5 below.

Table 6-5 Summary of threatened entities that may or are likely to occur within 10km of the proposal site

Statutory body	TECs	Flora	Fauna	Migratory
BC Act	56	65	74	N/A
EPBC Act	8	38	31	15

The study area is located within the Sydney Basin IBRA bioregion, the Moss Vale IBRA subregion, and the Moss Vale Highlands/Robertson Basalts Mitchell Landscapes.

The study area occurs within a highly modified rural agricultural landscape and contains paddocks and working horse stables. Native vegetation has been almost entirely cleared and replaced by exotic pastures or ornamental species such as pines, poplars, birches, oaks, etc. including along Old South Road. Infestations of blackberry and willow species occur along Mittagong Creek which runs through the study area. Native vegetation within the study area occurs only as isolated paddock trees or individual trees along Mittagong Creek.

### Flora and plant community types

A total of 60 flora species were recorded within the study area at the time of survey, including 36 exotic species (60%). No threatened flora species were identified. All species recorded are included in Appendix B of the BA.

A review of existing vegetation mapping (DECCW, 2010) was ground-truthed using quantitative floristic data gathered within the study area. A random meander search (Cropper, 1993) was also undertaken throughout the study area. One (1) Plant Community Type (PCT) is considered to potentially occur:

- PCT 1107: River Peppermint - Narrow-leaved Peppermint open forest on sheltered escarpment slopes, Sydney Basin Bioregion and South East Corner Bioregion.

PCT 1107 is considered to be present wherever native canopy species are present. This PCT occurs as several small patches including two paddock trees in the centre of the study area, a single tree along Mittagong Creek, and a small patch in the south-east corner of the study area. It should be noted that this native vegetation does not readily fit any existing PCT due to the high degree of fragmentation and modification present. Native canopy species within study area include Ribbon Gum *Eucalyptus viminalis* and Candlebark *E. rubida* with an occasional subcanopy of Blackwood *Acacia melanoxylon*. Forest Red Gum *E.*

*tereticornis* and Swamp Gum *E. ovata* occur adjacent to the study area. PCT 1107 is considered the best fit in this case.

All other areas where vegetation consists of exotic or non-indigenous native species have been identified as exotic vegetation. Vegetation types mapped relevant to the proposal are shown in Figure 6-6 and are described in Table 6-6 below.

Table 6-6 PCTs within the proposal

<b>Plant Community Type (PCT)</b>	<b>Condition class</b>	<b>Threatened ecological community?</b>	<b>Within the proposal area?</b>
PCT 1107: River Peppermint - Narrow-leaved Peppermint open forest on sheltered escarpment slopes, Sydney Basin Bioregion and South East Corner Bioregion	Poor	Yes – Southern Highlands shale woodlands in the Sydney Basin Bioregion EEC (BC Act NSW)	No
Exotic vegetation	-	No	Yes



Figure 6-6 Ground-truthed vegetation

**Threatened ecological communities**

PCT 1107 within the study area conforms to the BC Act listed Southern Highlands Shale Woodlands in the Sydney Basin Bioregion Endangered Ecological Community (EEC) however would not be impacted by the proposal.

The Southern Highlands Shale Woodlands within the study area occurs in this fragmented and degraded state with only 5-10% native species cover across the site. PCT 1107 within the study area does not correspond to the EPBC Act form of Southern Highlands Shale Forest and Woodland Critically Endangered Ecological Community (CEEC). All patches of PCT 1107 within the study area are less than 0.5 ha and consist of less than 30% native perennial understorey species.

**Priority weeds**

Three (3) priority weeds listed under the South East Regional Strategic Weed Management Plan were recorded within the study area and are listed in Table 6-7 below.

Under the *Biosecurity Act 2015* (NSW), all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any land managers or authorities who deal with any plant have a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Table 6-7 Priority weeds recorded within the study area

Common Name	Scientific Name	Duty
Grey Sallow	<i>Salix cinerea</i>	<b>Prohibition on dealings</b> <i>Must not be imported into the State or sold</i>
Willows	<i>Salix</i> species	<b>Prohibition on dealings</b> <i>Must not be imported into the State or sold</i> All species in the <i>Salix</i> genus have this requirement, except <i>Salix babylonica</i> (weeping willows), <i>Salix x calodendron</i> (pussy willow) and <i>Salix x reichardtii</i> (sterile pussy willow)
Blackberry	<i>Rubus fruticosus</i> species aggregate	<b>Prohibition on dealings</b> <i>Must not be imported into the State or sold</i> All species in the <i>Rubus fruticosus</i> species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree

**Threatened fauna**

30 fauna species were recorded within the study area including two (2) threatened species: Dusky Woodswallow *Artamus cyanopterus* (BC Act – Vulnerable) and Eastern False Pipistrelle *Falsistrellus tasmaniensis* / Greater Broad-nosed Bat *Scoteanax rueppellii* (BC Act – Vulnerable).

The study area generally lacks specific habitat features such as key foraging resources, fallen logs and woody debris that may draw more commonly recorded threatened species to it. Mobile species may visit the study area to investigate potential foraging and roosting opportunities. A stand of mature Pine trees along the eastern edge of the study area may provide foraging habitat for Glossy Black-cockatoos on occasion. See Appendix D of the BA for threatened species evaluations.

**Terrestrial fauna habitat**

Fauna habitat within the study area is generally of poor quality due to historical clearing and lack of native vegetation cover. Five (5) hollow bearing trees were identified including paddock trees and willows along Mittagong Creek. In particular, two (2) large Candlebarks may provide roosting habitat for hollow dependant birds and mammals including microbats. A dilapidated wooden bridge over Mittagong Creek may provide roosting habitat for microbat species. Refer to Figure 6-6 for the location of all habitat features.

The study area is approximately 500 metres from the nearest patch of remnant native vegetation and is separated by paddocks to the north and east, residential properties to the south, and a road to the west. Mittagong Creek may act as a minor habitat corridor for mobile species and provides east-west access through the study area. As there is low connectivity to other patches of native vegetation in the locality, the study area is not considered to form part of an important wildlife corridor.

**Microchiropteran bats**

Three (3) species of microbat were recorded during the Anabat survey, one of which may be listed as Vulnerable under the BC Act. As per Table 6-8, “possible” calls include short call sequences or calls that are low quality but fall within the call shape or characteristic frequency ranges of particular species. “Probable” calls are of a higher quality but may overlap in frequency or call shape with other species in the locality. “Definite” calls include clear call sequences containing definite diagnostic features for one species or group, e.g. shape, characteristic frequency, direction of tail, etc.

One call recorded was not able to be identified to species level as Eastern False Pipistrelle *Falsistrellus tasmaniensis*, Greater Broad-nosed Bat *Scoteanax rueppellii* and Eastern Broad-Nosed Bat *Scotorepens orion* overlap in call shape, frequency and in distribution. As two (2) of these species are listed as Vulnerable under the BC Act, a precautionary approach has been taken, and the species are assumed present. No cave or structure dependent bats were detected during the survey.

Table 6-8 Summary of Anabat results

Species	4/03/2020			5/03/2020		
	Possible	Probable	Definite	Possible	Probable	Definite
Gould's Wattled bat <i>Chalinolobus gouldii</i>	1	2				
Eastern Free-tailed Bat <i>Mormopterus ridei</i>				5		
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i> (BC Act – Vulnerable) /						
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i> (BC Act – Vulnerable) /					1	
Eastern Broad-Nosed Bat <i>Scotorepens orion</i>						
Noise			2491			1120



### 6.5.3. Potential impacts

#### Construction

##### Loss of vegetation

The proposal would require the removal of a maximum of approximately 6.1 ha of exotic vegetation. No native vegetation would be removed as part of the proposal. Existing rows of planted exotic trees within the proposal site footprint would be removed.

The estimates of area above are based on a worst-case scenario, that all vegetation within the proposal site would require removal. Given the plant and machinery are required for the proposal, there is also likely to be minor disturbance to vegetation adjacent to the proposal site where construction access would be required.

Up to five street trees along Old South Road would be removed for the proposed access road including groundcover. These trees are planted exotic species of Elms (*Ulmus spp.*) and Poplars (*Populus spp.*) with groundcover including non-native Coolatai Grass (*Hyparrhenia hirta*). The impact of this vegetation removal would be negligible.

Overall, the amount of vegetation to be cleared within the proposal site is not considered significant given that it is not native vegetation and will not impact the broader landscape. The proposal would not exacerbate Key Threatened Processes.

##### Spread of weeds and soil pathogens

During the removal of vegetation required for the proposed works, the spread of weeds and soil pathogens may be facilitated by construction activities including stockpiling and vehicle movements.

Priority weeds identified in Table 6-7 have the potential to spread from the work site to other localities if not properly managed. A Weed Management Plan is recommended to be prepared to minimise this spread.

Soil pathogens including *Phytophthora cinnamomic* commonly known to cause root-rot and dieback in native plants have the potential to spread via soil excavation activities including bulk earthworks and stockpiling. Erosion and sedimentation controls to contain all soils within the site, as well as a site-specific Soil Pathogen Management Plan are recommended to be implemented to contain the spread of such pathogens.

##### Threatened flora and ecological communities

The proposal would not directly impact or remove any vegetation from a TEC. Given this, no Tests or Assessments of Significance under the BC Act and/or EPBC Act have been prepared. The proposal is considered unlikely to reduce the long-term viability of any TEC or place it at risk of extinction.

No threatened flora species were detected during the site survey, and none are considered likely to occur or be impacted. Given this, no Tests or Assessments of Significance under the BC Act and/or EPBC Act have been prepared for threatened flora species.

##### Loss of fauna habitat

The proposed works would result in the loss of up to 6.1 ha of exotic vegetation. Vegetation loss would result in a very small reduction in low quality foraging habitat for commonly occurring woodland birds, reptiles and mammals. These impacts are considered minor given the relatively small amount of vegetation removal required, extent of exotic plant presence, historic regular site disturbance, and location adjacent to existing road infrastructure.

A small amount of aquatic habitat for commonly occurring amphibians would be impacted, though this would likely return upon the cessation of works.

None of the five (5) habitat trees identified within the study area will be removed by the proposed works. No logs or coarse woody debris were identified within the study area.

Ground disturbance activities have the potential to impact native fauna habitat such as burrows for the Common Wombat (*Vombatus ursinus*). While no evidence of burrows were identified during the site survey, unexpected findings of such habitat would be managed in accordance with the Council's biodiversity strategy (Wingecarribee Shire, June 2003).

**Threatened fauna**

Several Dusky Woodswallows *Artamus cyanopterus* were observed foraging in the far eastern portion of the study area near exotic tree plantings along Mittagong Creek, outside of the development footprint. Hollow-dependent microchiropteran bats (microbats) are also considered likely to occur within the study area due to the presence of hollow bearing trees and the dilapidated bridge which may provide roosting habitat.

Tests of Significance for Dusky Woodswallow and hollow-dependant microbats have been undertaken (Refer to Appendix C of the BA). The proposal is considered unlikely to result in a significant impact to any of these species. The fauna habitats to be affected by the proposal generally comprise common and widespread foraging and sheltering resources, occur widely within the surrounding landscape, and are not unique to the study area.

It is noted that observations of Latham's Snipe (*Gallinago hardwickii*) have been identified within citizen-input databases like Birddata ([birddata.birdlife.org.au](http://birddata.birdlife.org.au)) within the locality. These databases are not considered as BC Act- and EPBC Act-relevant databases for state and federally listed threatened species. Database searches undertaken on 4 August 2022 indicated 14 records of Latham's Snipe, with the nearest being approximately 850 metres southwest of the proposal. Considering this distance from the proposal site and the nature of impacts to potential habitat for the species within the site, the proposal would not affect the species.

**Operation**

The loss of non-native vegetation would be restored by planting groundcover such as turf and regionally native grasses to reinforce the basin and embankment soil stability. Refer to Chapter 6.8.3 and Appendix G for the proposed landscape plan.

During a major flood event, operation of the proposal may temporarily inundate existing riparian vegetation along Mittagong Creek. However, this impact is predicted to be temporary and minor as the purpose of the proposal is to channel and drain potential flood events at the proposal location. Should the proposal not be constructed, inundation of existing riparian vegetation has the potential to be more than minor.

No adverse impacts to flora and fauna are expected upon operation.

**6.5.4. Safeguards and mitigation measures**

Impact	Environmental safeguards	Responsibility	Timing
Clearing and prevention of over-clearing	<ul style="list-style-type: none"> <li>Prior to the commencement of any works, a physical clearing boundary is to be clearly marked and maintained.</li> <li>Utilise areas already impacted by previous clearing or disturbance for access purposes, stockpiles or the establishment of compound sites.</li> <li>If clearing of vegetation is required outside the subject site these areas will need to be assessed by an ecologist for potential impacts to TECs, threatened species and their habitats.</li> </ul>	Contractor	Project start up and ongoing

Impact	Environmental safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> <li>Trees to be retained, including trees adjacent but outside of the subject site, require an adequate tree protection zone (TPZ) for the duration of works. Details for calculating TPZs are provided within <i>Australian Standard 4970-2009 – Protection of trees on development sites</i>.</li> <li>If the TPZ cannot be avoided during works, the Structural Root Zones (SRZ) of trees will be retained. Details for calculating the SRZs are provided within <i>Australian Standard 4970-2009 – Protection of trees on development sites</i>.</li> </ul>		
Direct impact to threatened fauna	<ul style="list-style-type: none"> <li>Information on the threatened species within the locality are to be included in the induction process for applicable personnel.</li> <li>If unexpected threatened fauna species are discovered, works will stop immediately, and the environment manager notified. An ecologist would then be engaged to determine management actions to avoid or mitigate any potential impact.</li> </ul>	Contractor	Project start up and ongoing
Direct impact to TEC and to threatened flora	<ul style="list-style-type: none"> <li>Vegetation removal will be restricted to the minimum extent necessary.</li> <li>Through the course of the project, if it is revealed that clearing of vegetation is required outside the subject site, said areas will need to be assessed by an ecologist for potential impacts to TECs, threatened flora and their habitats.</li> <li>Where unexpected threatened flora species are found within the worksite the following actions would take place: <ul style="list-style-type: none"> <li>All work within the vicinity would stop and the Wingecarribee Council Environmental Officer contacted.</li> <li>The area containing the threatened species would be surveyed by an ecologist who would determine appropriate actions to protect any individuals if required (e.g. translocation).</li> </ul> </li> </ul>	Contractor	Project start up and ongoing

Impact	Environmental safeguards	Responsibility	Timing
Replacement of native vegetation	<ul style="list-style-type: none"> <li>• Treatment comprising the installation of erosion control blankets and hydro-mulching shall be applied to re-establish vegetation growth in resulting areas of bare earth or disturbance.</li> <li>• Hydro-mulch should include locally-occurring native flora species typical of the original habitat.</li> </ul>	Contractor	Post construction
Introduction and spread of noxious weeds and pathogens	<ul style="list-style-type: none"> <li>• A Weed Management Plan will be developed for the site to minimise risk of spread of weeds into and between sites.</li> <li>• Declared priority weeds (e.g. Willows, Blackberry, etc.) will be managed according to the requirements stipulated by the <i>Biosecurity Act 2015</i> (NSW). To fulfil this requirement all priority weed requiring removal will need to be disposed of at a registered waste management facility.</li> <li>• All machinery (e.g. bulldozers, excavators, trucks, loaders etc.) will be cleaned using a high-pressure washer (or other suitable device) prior to entering and exiting work sites. All plant material containing seed heads, weeds that have allelopathic properties, and weeds that are able to reproduce vegetatively, including topsoil containing weed propagules, will be disposed of at an appropriate waste management facility or otherwise properly treated to prevent weed growth.</li> <li>• Herbicides will be used in accordance with the requirements on the label. Any person undertaking herbicide application will be trained to do so and have the proper certificate of completion/competency or statement of attainment issued by a registered training organisation.</li> </ul>	Contractor	Project start up and ongoing
Disturbance to woody debris and litter and bush rock	<ul style="list-style-type: none"> <li>• Any fallen timber and dead wood encountered on site will be left in situ wherever possible or relocated to a suitable place nearby. Rock will be removed with suitable machinery so as</li> </ul>	Contractor	Project start up and ongoing

Impact	Environmental safeguards	Responsibility	Timing
	not to damage the underlying rock or result in excessive soil disturbance.		
Infection of native plants by <i>Phytophthora cinnamomi</i>	<ul style="list-style-type: none"> <li>Preparation of a Soil Pathogen Management Plan as part of the CEMP to manage soil-borne pathogens. This plan will be implemented during works within the study area.</li> </ul>	Contractor	Project start up and ongoing

## 6.6. Aboriginal Heritage

### 6.6.1. Approach

An Aboriginal Heritage Due Diligence Assessment was completed by NGH (NGH, 2020) for the proposed works at that time. The Due Diligence Assessment concluded that the proposed works were likely to impact upon Aboriginal objects, and as such required the area to be subject to further investigation and assessment. Refer to Appendix D for details.

Kelleher Nightingale Consulting Pty Ltd (KNC) was subsequently engaged by Council to undertake archaeological test excavations for the proposal in the form of a Test Excavation Report (KNC, 2021) The Test Excavation Report was completed in accordance with the Heritage NSW 2010 *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. Aboriginal community consultation was completed in accordance with Heritage NSW 2010 *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010*. Refer to Appendix E for the full report.

In response to the proposal's 2022 design refinement, KNC provided an email memo to Council (August 2022) regarding the additional area at the proposed access location. Refer to Appendix E for the memo.

### 6.6.2. Existing environment

The project area lies within the Sydney Basin bioregion, Moss Vale subregion, in accordance with the IBRA Bioregions of NSW (NSW NPWS, 2003). The landscape is described by Mitchell (Mitchell, 2002) as the Moss Vale Highlands, in the SB Moss Vale. The entirety of the proposed works is within 200m of water (Mittagong Creek). This close proximity suggests the sensitivity of the landscape across the project area. Based on the recorded AHIMS sites in the surrounding region, the most likely type of sites to be found will be artefacts and open camp sites. Culturally modified trees will only be present in areas where suitable mature growth vegetation remains.

The Due Diligence Assessment (Appendix D) identified two areas of Potential Archaeological Deposit (PAD), based on landform analysis, archaeological modelling of the region and the results of archaeological excavations within 5km of the study area.

KNC investigated both PADs with test excavation squares were within PAD 1 and PAD 2 (as identified by NGH (2020)) where TS1-5 were in PAD 1 and TS6-12 were within PAD 2 (refer to Figure 6-7).

Results revealed moderate to relatively deep highly mixed soil deposits. These have resulted both from repeated flooding/waterlogging, transferral formation processes and landuse practices. Truncated soil profiles were also encountered in areas further away from the creekline, within the fenced areas; these soils have been subject to erosion/deflation and removal due to past land use practices. PAD 2 contained patches of truncated, partially disturbed soils that contained some natural mixed clay loams however this appeared to

be redeposited natural material. The majority of the PAD 2 area revealed the presence of redeposited and imported fill material to basal clay layers. This is likely a consequence of attempts to improve drainage and artificially raise the landform above the lower-lying swampy area.

Both these natural and anthropogenic processes would have caused any possible cultural material to be removed/displaced. The landforms within the study area are generally not conducive to sustained human occupation due to swampy, waterlogged conditions. The area was more likely utilised as a passing corridor between resource areas, and some sporadic lost or discarded cultural material may have once been present. However, due to flooding effects, previous extensive land clearing, grazing and other farming activities, as well as removal/redeposition of soils and landform modification, any possible subsurface archaeological material, would have been removed and/or displaced.

No Aboriginal cultural material was recovered during the program of test excavations.

Refer to Appendix E for the complete methodology and results.



Figure 6-7 Test excavation squares within the proposal area (KNC, 2021)

### 6.6.3. Potential impacts

KNC (2021) concluded that there is considered to be no further archaeological potential for any Aboriginal cultural material to be present within the study area.

In response to the proposal's 2022 design refinement, KNC determined that the additional area proposed for the access road is consistent with the findings of their previous report (KNC, 2021) and that this additional area is not archaeologically sensitive. Refer to Appendix D for the memo (KNC, 2022).

Therefore, the potential for impact on Aboriginal cultural heritage within the proposal area would be low. No further assessment is required.

Safeguards for any unexpected finds would be in place during construction.

### 6.6.4. Safeguards and mitigation measures

Impact	Environmental safeguard	Responsibility	Timing
Unexpected finds	<p>In the event that any unexpected Aboriginal heritage places or objects are unexpectedly discovered during the proposal, the following management protocols will be implemented:</p> <ol style="list-style-type: none"> <li>1. Works at that identified heritage location will cease with an appropriate buffer zone of at least 20 metres to allow for the assessment and management of the find. All site personal will be informed about the buffer zone with no further works to occur within the buffer zone.</li> <li>2. A heritage specialist will be engaged to assess the Aboriginal place or object encountered, Representatives from the Illawarra Local Aboriginal Land Council may also be engaged to assess the cultural significance of the place or object.</li> <li>3. The discovery of an Aboriginal place or object will be reported to the local office of the Environment and Heritage Group, NSW Department of Planning and Environment (DoPE), and Enviroline on 131 555.</li> <li>4. If the heritage place or object can be managed <i>in situ</i>, works at the heritage location will not recommence until appropriate heritage management controls have been implemented, such as protective fencing, and until advice has been received from the Environment and Heritage Group (DoPE).</li> <li>5. If the project cannot avoid impacting upon the object, further assessment of the object will be required in the form of an Aboriginal Cultural Heritage Assessment (ACHA), which would include consultation with the Aboriginal community. An ACHA is a requirement for an Aboriginal Heritage Impact Permit application.</li> </ol>	Contractor	Construction
	<p>Where human skeletal remains are unexpectedly found during works for the Project the following protocol would be adopted:</p>	Contractor	Construction



Impact	Environmental safeguard	Responsibility	Timing
	<ul style="list-style-type: none"> <li>• Works at that location will cease, and an appropriate buffer zone of at least 50 metres will be established;</li> <li>• The human remains will not be moved;</li> <li>• The NSW police will be notified, and if the human remains are deemed a crime scene, the place will be managed by the police;</li> <li>• Should the human remains be deemed Aboriginal or historical by the police, the Environment and Heritage Group must be notified immediately to assess the remains; and</li> <li>• Should the human remains be deemed Aboriginal in origin all relevant Aboriginal stakeholders are to be notified in writing.</li> </ul>		

## 6.7. Non-Aboriginal Heritage

### 6.7.1. Approach

The following database searches were completed on 4 August 2022:

- National Heritage List
- Commonwealth Heritage List
- State Heritage Register
- State Heritage Inventory
- Wingecarribee LEP 2010.

Refer to Appendix B for heritage search results.

### 6.7.2. Existing environment

The proposal is not within any items of Commonwealth-, National- nor State-significant heritage. Two (2) items of local heritage significance (Wingecarribee LEP 2010) are adjacent to the proposal site:

- *Old South Road* (item no. I102) directly west
- *“Retford Park” house, grounds and outbuildings* (item nos. I496, I495, I152) directly south.

Refer to Figure 6-8 below.

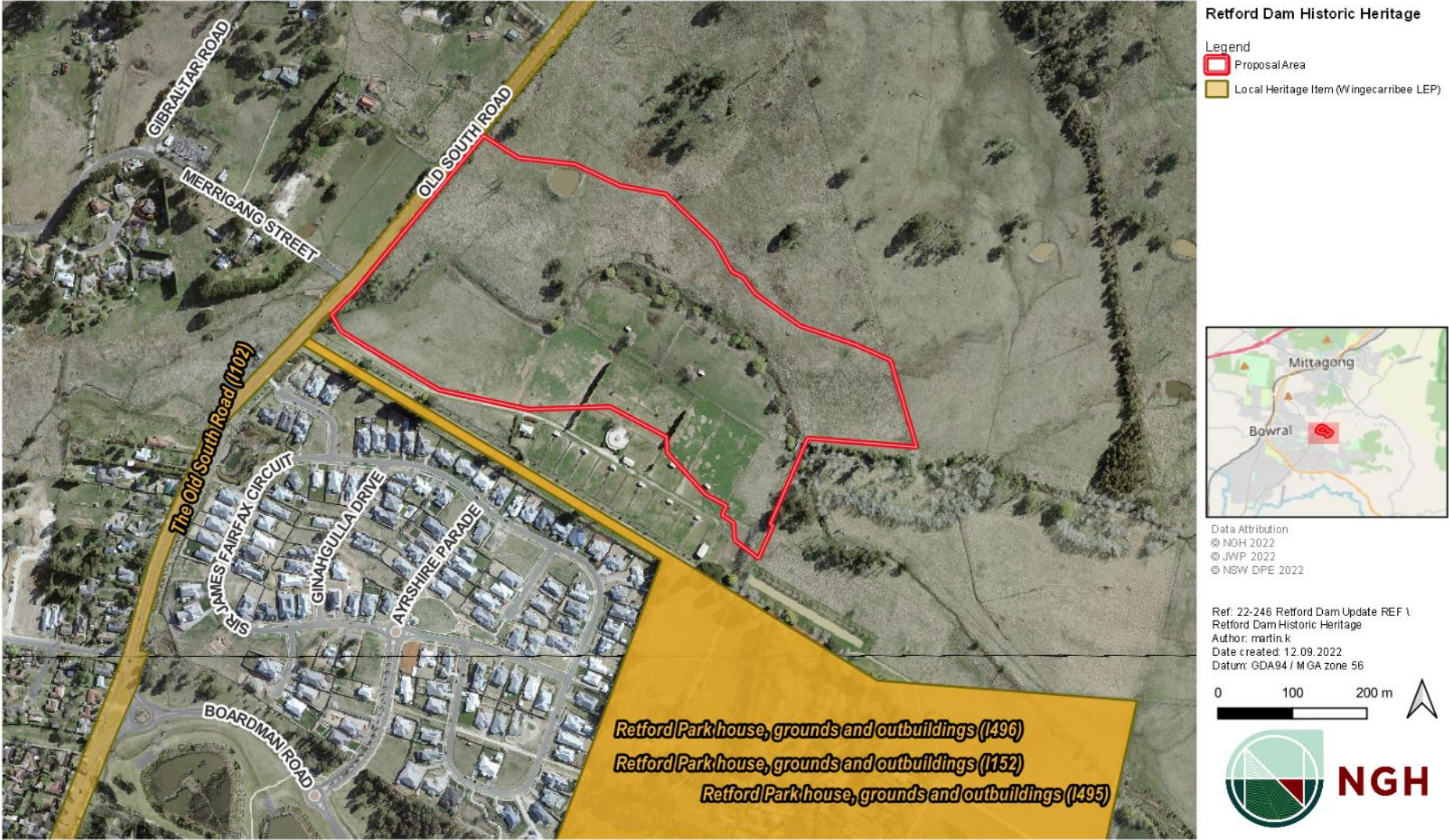


Figure 6-8 Non-Indigenous heritage entities surrounding the proposal

### 6.7.3. Potential impacts

The proposal would not impact on any items of Commonwealth, State nor local heritage. No Statement of Heritage Impact (SOHI) is required.

Safeguards would be in place to stop works if any unexpected items are uncovered during construction.

### 6.7.4. Safeguards and mitigation measures

Impact	Safeguard and mitigation measures	Responsibility	Timing
	All works within the vicinity of heritage items must be completed with a 10m buffer in place to protect the heritage item.	Contractor	Construction
Unexpected Heritage (historic) Finds	<ul style="list-style-type: none"> <li>Contractor will notify Council before commencing any work</li> <li>Staff working at the site during construction will be instructed to stop work immediately on identification of any suspected heritage artefact</li> <li>If any unexpected archaeological remains are discovered during construction, work will stop immediately in the vicinity of the material/find and specialist advice from a suitably qualified heritage consultant will be sought.</li> </ul>	Contractor	Construction

## 6.8. Visual impacts

### 6.8.1. Approach

A visual impact assessment of the proposal on sensitive receivers has been undertaken with reference to the Transport for NSW *Guideline for Landscape Character and Visual Impact Assessment: Environmental Impact Assessment Practice Note EIA-N04* (TfNSW, 2020).

The potential landscape character and visual impact of the proposal has been assessed in relation to the key viewpoints. The assessment considered the magnitude of visual change and the distance from the viewer, as well as the sensitivity. The sensitivity refers to the quality of the view and how sensitive it is to the proposed change. The categories of magnitude and sensitivity of visibility are defined in Table 6-9.

The combination of sensitivity and magnitude then provides an overall landscape character and visual impact rating based on the grading matrix shown in the table below.

Table 6-9 Magnitude and sensitivity of visibility (TfNSW, 2020)

Rank	Description
Negligible	Very minor loss or alteration to one or more key elements/features/characteristics of the baseline visual character and/or introduction of elements that are consistent with the existing visual character.
Low	Minor loss of or alteration to one or more key elements/feature/characteristics of the baseline visual character and/or introduction of elements that are consistent with the existing visual character.
Moderate	Partial loss of or alteration to one or more key elements/features/characteristics of the baseline visual character and/or introduction of elements that may be prominent but not considered to be substantially uncharacteristic.
High	Substantial to total loss of key elements/features/characteristics of the baseline visual character and/or introduction of elements considered to be totally uncharacteristic.

Table 6-10 Landscape character and visual impact grading matrix (TfNSW, 2020)

		Magnitude			
		High	Moderate	Low	Negligible
Sensitivity	High	High Impact	High-Moderate Impact	Moderate Impact	Negligible Impact
	Moderate	High-Moderate Impact	Moderate Impact	Moderate-Low Impact	Negligible Impact
	Low	Moderate Impact	Moderate-Low Impact	Low Impact	Negligible Impact
	Negligible	Negligible Impact	Negligible Impact	Negligible Impact	Negligible Impact

### 6.8.2. Existing environment

The visual environment in the vicinity of the proposal can be summarised as follows:

- Located within a peri-urban landscape
- Surrounded by rural residential land consisting of small and large lots
- Adjacent to local heritage items “Retford Park” house, grounds and outbuildings’ and ‘Old South Road’
- Along Old South Road which has a posted speed limit of 70 km/h.

Photographs of the site, taken during the site visit are provided in Appendix H.

### 6.8.3. Potential impacts

The assessment of impact is based on the identification of key viewpoint sensitive receivers, which were determined from site investigations, and are listed below:

- The nearest residential receivers within Retford Park Estate
- Visitors to Retford Park heritage site
- Road users.

Refer to Table 6-11 for a summary of visual impacts from the nearest sensitive receivers.

Table 6-11 Landscape character and visual impact of the proposal

Viewpoint	Visual sensitivity	Magnitude	Overall impact	Comments
View from nearest residential receivers	Moderate	Moderate	<b>Moderate Impact</b>	Viewpoints from the nearest residential receivers would be moderately affected as the proposal would involve bulk earthworks and associated works during construction. Boundary fencing, exclusion tape and other construction site-related features would have negative visual impacts to nearby residents. Moderate visual impacts would be temporary during construction but would substantially decrease upon completion and revegetation of the site.
View from visitors to Retford Park	Moderate	Moderate	<b>Moderate Impact</b>	The Retford Park heritage site only operates on the first weekend of each month 10am – 4pm. Other than maintenance access along its perimeter, the majority of Retford Park is within landscaped vegetation that efficiently screens surrounding viewpoints. Due to the localised activities and opening hours, visual impacts from this viewpoint is considered to be moderate. Visual impacts would be temporary during construction but would be substantially decrease upon completion of the proposal.
View from road users on surrounding streets	Low	Moderate	<b>Moderate-Low Impact</b>	The majority of road user viewpoints would be from Old South Road. Views of the proposal are largely screened by existing treescapes along the road. Site access establishment along Old South Road would involve short term and minor construction to facilitate material delivery and staff vehicle thoroughfare for the duration of the overall proposal construction. Upon completion, this access would appear typical of rural accessways to Old South Road. Road users along Merrigang Street would only have short duration views of the proposal as they drive past the site. Visual impacts would be low during construction and operation of the proposal.

Visual impacts would largely be localised within the immediate environment of the proposal. Construction magnitude impact is deemed to be moderate within this area as the proposal is within the vicinity of

residential receivers and local heritage items. However, lines of sight are generally constrained due to existing vegetation screening that partially shield this area from view.

Upon completion of the proposal, areas disturbed by construction would be rehabilitated and revegetated as per the Basin Landscape Plan (Sturt Noble, 2020). The access road is not proposed to include landscaping works other than the safeguards recommended for soil stabilisation in Chapter 6.2.4.

Refer to Figure 6-9 below and Appendix G.

#### 6.8.4. Safeguards and mitigation measures

Impact	Environmental safeguards	Responsibility	Timing
Minimise visual and landscape impact during construction	Project work sites, including construction areas will be managed to minimise visual impact. A site arrangement plan showing at minimum the following: <ul style="list-style-type: none"> <li>• Storage areas for equipment and materials</li> <li>• Sufficient parking areas are available at the work sites</li> <li>• Waste storage areas, and ensure waste is sorted and recycled.</li> </ul>	Contractor	Pre-Construction
	Notices and letters shall be provided to nearby residents and Retford Park, informing them of working hours and any activities with four weeks' notice of the proposed works.	Council	Pre-Construction



**LEGEND**

- EXTENT OF WORKS
- PROPERTY BOUNDARY
- ... BASIN EXTENT
- EXISTING TREES TO BE RETAINED. REFER TO SPEC. ALIERS REPORT CORRELATE TO ALIERS REPORT
- ⊙ EXISTING TREES TO BE REMOVED. ALIERS CORRELATE TO ALIERS REPORT
- ▭ REINFORCED GRASS EMBANKMENT
- ▨ REINFORCED GRASS EMBANKMENT

**PRELIMINARY**

DATE FOR COORDINATION: 14/01/20  
SCALE: 1:1000

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landscape architecture  
environmental & urban design

PROJECT: RETFORD DETENTION BASIN  
USER: J. WYNDHAM PRINCE  
TITLE: Basin Landscape Plan  
DRAWN BY: CD-1626-001  
SCALE: 1:1000 @ A1, 1:2000 @ A3  
CHECKED BY: J, TP, GS

Figure 6-9 Proposed landscape plan (Sturt Noble, 2020)

## **6.9. Socio-Economic impact**

### **6.9.1. Existing environment**

The area surrounding the proposal site comprises of largely rural and residential land within the suburb of Bowral, Wingecarribee Shire LGA. The proposal is adjacent to the Retford Park local heritage site, low-density residential lots within Retford Park Estate, and large residential lots along Old South Road and Merrigang Street.

The main stakeholders in the vicinity of the proposal site include the following:

- Surrounding residents
- Visitors to Retford Park
- Road users along Old South Road and Merrigang Street.

#### **Population of Bowral**

Census data from the Australian Bureau of Statistics (ABS), collected in 2021, reveals that the township of Bowral has a population of 13,626 with males to females split respectively at 46.5% and 53.5%. The Aboriginal and/or Torres Strait Islander population is 1.0% of the LGA population.

#### **Socio-economic Profile**

The composition of the population helps provide information about the area's communities and values. It also assists in profiling how adaptable the community is likely to be to change. The study area's demography in 2021 had a median age of 56. Children aged 0 -14 years made up 14.2% of the population and people aged 65 years and over made up 38.8% of the population. Table 6-12 below summarises the suburbs social and economic characteristics as of 2021.



Table 6-12 Bowral socio-economic profile (ABS, 2021)

Category	Sub-category	Characteristics
<b>Social characteristics</b>		
<b>Population and demography</b>	Population	<ul style="list-style-type: none"> <li>13,626 people lived in the township</li> <li>There were 7% more females than males</li> <li>56.2% of the adult population was registered as married, while 21.6% had never married and the remainder were either divorced, separated, widowed or de-facto.</li> </ul>
	Age	<ul style="list-style-type: none"> <li>With a median age of 56, this was 17 years older than the NSW average at the time</li> <li>The resident percentage of children (under 15) was 14.2%, and the resident percentage of old people (over 65) was 38.8%.</li> </ul>
	Cultural Diversity	<ul style="list-style-type: none"> <li>73.5% of the resident population were born in Australia, followed by England (7.1%) and New Zealand (1.8%)</li> <li>88% of the population spoke English only at home, followed by Nepali (0.8%), Italian (0.6%) and German (0.4%)</li> <li>Christianity was the largest broad religious group reported overall (60.6%) while 33% of the population claimed no religion.</li> </ul>
	Education	<ul style="list-style-type: none"> <li>77.4% of the population were attending an educational institution between preschool and higher education.</li> </ul>
	Australian Defence Force service	<ul style="list-style-type: none"> <li>0.2% of the population aged 15 and over were serving at the time compared to NSW' 0.4%</li> <li>4.3% had previously served and 90.2% had never served.</li> </ul>
<b>Families and housing</b>	Families	<ul style="list-style-type: none"> <li>Couple families without children accounted for 55.5% while 32.5% were couple families with children</li> <li>One-parent families accounted for 11.4% compared to the NSW average of 15.8%.</li> </ul>
	Housing costs and tenure	<ul style="list-style-type: none"> <li>The median weekly rent was \$500 compared to the NSW median of \$420</li> <li>The median monthly mortgage repayment was about \$2,300 compared to the NSW median of \$2,167.</li> </ul>
<b>Economic Characteristics</b>		
<b>Income</b>	Income	<ul style="list-style-type: none"> <li>The median weekly income for individuals aged 15 years and over was \$827 with the NSW median being \$813</li> <li>The household income per week was \$1,650 with the NSW median being \$1,829</li> <li>17.1% of households had a total weekly income less than \$650 while 26.5% had more than \$3,000.</li> </ul>
	Unpaid work	<ul style="list-style-type: none"> <li>During the week before the census night, 75.2% of the population had done unpaid domestic work, including 20.2% which was voluntary work through an organisation. 18% of people had worked less than 5 hours while 11.4% did 30 hours or more for that week.</li> </ul>

## 6.9.2. Potential impacts

### Construction

The following socio-economic impact have been assessed in previous Chapters:

- Noise and vibration (Chapter 0)
- Transport and access (Chapter 6.11)
- Visual impact (Chapter 6.8).

The works would involve bulk earthworks for stormwater management and associated drainage infrastructure. All construction activities would occur within the proposal area, where access to the site would be via the existing entrance along Old South Road.

Works would occur in stages, with intervals of reduced vehicle and worker activity. Delayed accessibility may impact productivity and working schedules. However, these impacts are temporary and short term and of minor significance. Construction materials are expected to be locally sourced to simplify delivery schedules and traffic management.

Vehicle movements to the proposal site such as for material deliveries may cause minor traffic volume increase on Old South Road and Merrigang Street. The impact is assessed to be short-term and moderate in the absence of mitigation measures. In order to minimise the impact, the measures identified in the Chapter 6.6 are recommended to be implemented.

### Operation

The objective of the proposal is to improve the stormwater retention capabilities of Mittagong Creek to minimise inundation events downstream within the Bowral township. As the proposal is within private rural lands, its construction would have minimal socio-economic impact other than minor, temporary traffic disruptions. Upon completion, the proposal is expected to have positive impacts to the local community by decreasing inundation risk of existing flood-risk areas within the Bowral township.

## 6.9.3. Safeguards and mitigation measures

Impact	Environmental safeguards	Responsibility	Timing
<b>Socio-economic</b>	A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community during construction. The CP will include (as a minimum): <ul style="list-style-type: none"> <li>• Mechanisms to provide details and timing of proposed activities to affected businesses and residents, including scope of the works, changed traffic and access conditions</li> <li>• Contact name and number for complaints</li> </ul>	Contractor	Construction
<b>Complaints</b>	A project information board will be displayed at the proposal area. A contact phone number for complaints and enquiries would be on display.	Contractor	Construction
	A complaint handling procedure and register will be included in the CEMP.	Contractor	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	The complaints register will be maintained throughout construction.		and construction
<b>Communication</b>	Start of Work letters would be distributed one week before commencement of works	Contactors	Detailed design / pre-construction
	<p>The following will be undertaken to manage complaints from the community and stakeholders:</p> <ul style="list-style-type: none"> <li>• Regular review of complaints and enquiries received to identify emerging trends and unresolved issues.</li> <li>• Review of initial response time to complaints and timing of response letter/email/phone call/visit to assess compliance</li> <li>• Regular review of all communication materials</li> <li>• A weekly “look ahead” of activities along the project timeline to be shared with the construction manager to plan engagement activities</li> <li>• Complaints with resolution to be reported by Contractor at monthly contractor meetings with Council</li> <li>• Escalated complaints will be reported to Council no more than one week if outstanding</li> <li>• Records/logs of complaints and resolution will be made available for review by Council at any time</li> <li>• Reviewing timing of notifications</li> <li>• Monitoring of the media (traditional and social).</li> </ul>	Contractor Council	Construction

## 6.10. Waste management

### 6.10.1. Waste management principles

The Council is committed to the responsible management of unavoidable waste and promotes the reuse of such waste in accordance with the resource management hierarchy principles outlined in the *Waste Avoidance and Resource Recovery Act 2001* (NSW). These resource management hierarchy principles, in order of priority are:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal.

By adopting the above principles, Council aims to efficiently reduce resource use, reduce costs, and reduce environmental harm in accordance with the principles of Ecologically Sustainable Development (ESD).

### 6.10.2. Potential impacts

#### Construction

Waste material generated as a result of the proposal would include:

- General solid waste (non-putrescible), including steel, aluminium and concrete
- Excess material from bulk earthworks

- General waste (putrescible), including paper waste, food waste and general rubbish generated by the construction workforce
- Liquid waste including small volumes of oils, paints, lubricants and other chemicals used in the installation of stormwater infrastructure within and along Mittagong Creek.

The estimated waste streams for the proposal are described in Chapter 3.2.4.

Any excess soil as a result of embankment formation would be transported offsite to an appropriate licenced facility.

For other waste streams such as excess concrete, reuse of waste would be implemented in accordance with the resource management hierarchy principles outlined in the *Waste Avoidance and Resource Recovery Act 2001* (NSW).

Vegetation waste would be generated by the removal of trees and shrubs.

Construction of the proposal would involve activities that generate solid and hazardous waste, as well as liquid wastes. Waste generated during these activities poses a threat to soils on site and downstream waterways. Measures would be in place to minimise the impact of accidental spills, and stockpiling standards to prevent any seepage.

## Operation

The proposal would not produce any waste upon operation.

### 6.10.3. Safeguards and mitigation measures

Impact	Environmental safeguard	Responsibility	Timing
<b>Waste Management</b>	All wastes would be managed in accordance with the <i>Protection of the Environment Operations Act 1997</i> (NSW).	Contractor	Construction
<b>Generation of waste</b>	The CEMP will include the following measures to handle waste but not be limited to: <ul style="list-style-type: none"> <li>• Measures to avoid and minimise waste associated with the project</li> <li>• Classification of wastes and management options (re-use, recycle, stockpile, disposal)</li> <li>• Statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions</li> <li>• Procedures for storage, transport and disposal</li> <li>• Monitoring, record keeping and reporting.</li> </ul>	Contractor	Construction
<b>Disposal of waste</b>	<ul style="list-style-type: none"> <li>• All waste generated by the proposal will be classified in accordance with the <i>NSW Waste Classification Guidelines Part 1: Classifying Wastes</i> (DECCW 2008).</li> <li>• All waste generated on site is to be transported off site and disposed of at landfill site approved to accept General Solid Waste (non-putrescible).</li> <li>• Waste is not to be burned or buried on-site and is not to be disposed of on other land unless a Section 143 notice under the POEO Act is completed.</li> <li>• Site amenities will discharge all sewage to holding tanks which will be regularly removed by a licensed liquid waste contractor</li> </ul>	Contractor	Construction

Impact	Environmental safeguard	Responsibility	Timing
	<ul style="list-style-type: none"> <li>Waste material is not to be left on site once the works have been completed.</li> <li>Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day</li> <li>Material and waste for disposal (including recyclable waste, general waste and oil contaminated waste) must be classified and transported by appropriately licensed contractors to approved facilities.</li> </ul>		
<b>Storage of waste</b>	<ul style="list-style-type: none"> <li>Waste shall be stored in an appropriate location. For example, spoil is to be stored in a stockpile with adequate erosion and sedimentation control measures. General litter to be stored in bins.</li> <li>Waste receptacles shall be available to facilitate on-site source separation of waste.</li> </ul>	Contractor	Construction

## 6.11. Transport and access

### 6.11.1. Existing environment

The proposal is located within Lot 501 DP1271673 which is along Old South Road in the township of Bowral. Merrigang Road is perpendicular to the proposal until its junction with Old South Road as shown in Figure 2-1

There is currently no vehicular access to the proposal area.

No pedestrian access is available along Old South Road, where road users are primarily vehicular.

### 6.11.2. Potential impacts

#### Construction

Access to the site would be established prior to construction of the proposal. Following site access establishment, construction vehicles would enter and exit the proposal area via Old South Road.

Plant and equipment required for construction activities may temporarily disrupt traffic flow as vehicle movements enter/exit the proposal area along Old South Road. All construction activities would be undertaken within the proposal area which is not accessible to the public. It is expected that construction vehicles would park within the proposal area.

A Traffic Management Plan (TMP) would be developed to detail vehicular movements entering/exiting the proposal area during construction.

#### Operation

Upon completion of the proposal, the access site would be used sporadically by Council/contractor vehicles for ongoing maintenance of the basin. These activities would have negligible impacts on surrounding traffic.

### 6.11.3. Safeguards and mitigation measures

Impact	Environmental safeguard	Responsibility	Timing
<b>Traffic and access</b>	<p>A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will include:</p> <ul style="list-style-type: none"> <li>• Confirmation of haulage routes</li> <li>• Site specific traffic control measures (including signage) to manage and regulate traffic movement</li> <li>• Measures to maintain landowner access</li> <li>• Requirements and methods to consult and inform the local community of potential traffic impacts</li> <li>• Entry and exit locations and measures to prevent construction vehicles queuing on public roads.</li> <li>• A response plan for any construction traffic incident</li> <li>• Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic.</li> </ul>	Contractor	Pre-Construction Construction
<b>Traffic and access</b>	<p>Consultation will be undertaken with Council seeking approval regarding the proposed traffic arrangements and establishment of the compound site.</p>	Contractor	Pre-Construction

## 6.12. Ecologically sustainable development and sustainability

### 6.12.1. The precautionary principle

Namely that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

This REF has been prepared utilising the precautionary principle. That is, if threats are perceived as possibly leading to serious or irreversible environmental damage, then either the proposal would not go-ahead, or the development would be modified to ensure that such threats do not exist. The potential risks associated with the proposed works assessed in this REF are considered to be adequately manageable.

### 6.12.2. Inter-generational equity

Intergenerational and intra-generational equity requires that the present generation would ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of present and future generations.

There would be some environmental impacts associated with the proposal, although these would be short term during construction and would be managed through implementation of mitigation measures during construction.

The proposed work would not impact on natural or cultural features to a level that would compromise the health, diversity or productivity of the environment to a level that would impact on future generations.

The proposal would benefit future generations by providing a safer and manageable stormwater retention system to alleviate flood risk to the Bowral township.

### 6.12.3. Conservation of biological diversity and ecological integrity

The proposed scope of work is minor and would not impact on biological diversity or ecological integrity.

#### **6.12.4. Improved valuation of environmental factors**

This principle requires that costs to the environment are incorporated or internalised in terms of the overall project costs.

The proposal has been designed with the objective of avoiding or minimising potential impacts on the surrounding environment, thereby minimising costs to the environment. Environmental factors have been incorporated into the landscaping design, and selection of construction materials.

The environmental consequences of the proposal have been assessed in this REF and mitigation measures identified for factors with potential for adverse impact. Implementing the mitigation measures would impose an economic cost on Council, increasing both the capital and operating costs of the proposal. Council has sought to justify the proposal's economic and environmental costs to alleviate potential damage from stormwater inundation, increase the overall safety of the Bowral township, and improving the value of the environment.

### **6.13. Cumulative environmental impacts**

#### **6.13.1. Existing environment**

In the Bowral township between July and August 2022, there were 15 active development applications (DA's) regarding construction and alterations of private dwellings, and commercial developments. The nearest DA is approximately 2 km south of the proposal.

On the NSW Planning Portal, 52 State Significant Development Applications (SSDA's) within Wingecarribee LGA are in the 'Determination' phase. The nearest of these projects (Bowral & District Hospital Redevelopment) is approximately 1.2 km southwest of the proposal.

#### **6.13.2. Potential impacts**

Construction and operation impacts of these DA's and SSDA would have negligible impacts on this proposal due to their localised nature and sufficient distance from the project respectively. These projects are unlikely to have overlapping impacts with the proposal and are unlikely to result in negative cumulative impacts.

## 7. Environmental factors considered

### 7.1. Section 171 checklist

Section 171 of the Environmental Planning and Assessment Regulation 2021 (NSW) details those factors to be taken into account when assessing the likely effect of an activity on the environment. If after considering the section 171 factors, it is still unclear as to whether an EIS is required, the Department of Planning publication 'Is an EIS Required', can be utilised.

Consideration of each of the section 171 factors is included in the table below.

Section 171 factors	Impact			
	N/A	Negative	Nil	Positive
<p><b>Any environmental impact on a community?</b></p> <p>The local communities may experience some minor impact from air quality, noise, and traffic during construction. No negative impacts during operation are anticipated.</p> <p>Socio-economic impacts may be minor positive as a result of increased sales and demand for local products, during construction. Operational impacts will be moderate positive as the proposal would improve the safety of the Bowral township by alleviating potential flood risk.</p>		Short-term minor		Long-term positive
<p><b>Any transformation of a locality?</b></p> <p>The proposal would negatively transform the locality in the short-term due to construction works and the presence of construction materials, machinery and signage.</p> <p>Once operational the proposal is expected to provide long-term stormwater retention capability.</p>		Short-term minor		Long-term positive
<p><b>Any environmental impact on the ecosystems of the locality?</b></p> <p>The proposed scope of work would remove non-native trees and approximately 6.1 ha of non-native groundcover during construction. All removed groundcover would be reinstated upon completion.</p>			Nil	
<p><b>Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</b></p> <p>There would be no substantive impacts to the recreational, scientific or other environmental quality or value as a result of the proposal, and once vegetation is able to re-establish, there would be minimal impact on aesthetic or environmental quality of the area.</p>			Nil	
<p><b>Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?</b></p> <p>The proposal's potential impact on Aboriginal cultural and archaeological was found to be low. Safeguards would be in place should any unexpected finds be discovered.</p>			Nil	
<p><b>Any impact on the habitat of protected fauna (within the meaning of the <a href="#">National Parks and Wildlife Act 1974</a>)?</b></p>			Nil	



Section 171 factors	Impact			
	N/A	Negative	Nil	Positive
No identified trees with potential fauna habitation would be removed during construction of the proposal. All removed groundcover vegetation would be reinstated upon completion.				
<p><b>Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</b></p> <p>The proposal would involve minor diversion of Mittagong Creek to construct the channel footing and embankment. While the Freshwater Fish Community Status of Mittagong is rated as 'Poor', measures would be in place to minimise potential harm to fish at this location.</p> <p>Upon completion, fish passage would be maintained along Mittagong Creek.</p>			Nil	
<p><b>Any long-term effects on the environment?</b></p> <p>The proposal would have no adverse long-term effect on the environment.</p>			Nil	
<p><b>Any degradation of the quality of the environment?</b></p> <p>The proposal would remove non-native trees approximately 6.1 ha of non-native groundcover. However, the proposal would include new landscape planting to reinstate groundcover vegetation.</p> <p>Once established, the landscaping would improve the quality of the environment.</p>		Short-term minor		
<p><b>Any risk to the safety of the environment?</b></p> <p>The proposal would pose a minimal risk to the safety of the environment; however, the potential impacts would be minimised with the implementation of the safeguards of this REF.</p>		Short-term minor		
<p><b>Any reduction in the range of beneficial uses of the environment?</b></p> <p>The proposal would operate as a stormwater management system and would be beneficial to the Bowral township.</p>				Long-term positive
<p><b>Any pollution of the environment?</b></p> <p>The proposal could generate pollution risks for soils and air quality during construction works. These risks would be confined to the construction phase and are manageable with implementation of the safeguards outlined in Chapter 6.</p>		Short-term minor		
<p><b>Any environmental problems associated with the disposal of waste?</b></p> <p>There are no expected problems associated with the disposal of waste. Mitigation measures have been provided to manage waste disposal.</p>			Nil	
<p><b>Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?</b></p> <p>Resources required are readily available, and are unlikely to become in short supply.</p>			Nil	

Section 171 factors	Impact			
	N/A	Negative	Nil	Positive
<p><b>Any cumulative environmental effect with other existing or likely future activities?</b></p> <p>The proposal would not have any cumulative impact on the environment in conjunction with other activities.</p>			Nil	
<p><b>Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?</b></p> <p>The proposal is not located in a coastal area, therefore would not impact on coastal processes and coastal hazards, including those under projected climate change conditions.</p>	N/A			
<p><b>Any impacts applicable to strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1?</b></p> <p>The Proposal is being undertaken within land zoning that permits development for outdoor recreational areas and facilities with consent and meets the objectives of land zone C3 Environmental Management. The works align with the Wingecarribee 2040 Local Strategic Planning Statement planning priority 1.2ii – ‘Continue to manage the impacts of climate change (such as heat, floods, storms and drought) on Council assets and services’.</p>	Nil			Moderate long-term positive
<p><b>Any impact to relevant other environmental factors?</b></p> <p>All environmental impacts have been assessed in Chapter 6 of this REF.</p>	Nil		Nil	

## 7.2. Consideration of national environmental significance

Under the environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth), the following MNES and impacts on Commonwealth land are required to be considered to assist in determining whether the Proposal should be referred to the Australian Government Department of Climate Change, Energy, the Environment and Water (DECCW).

Factor	Impact
<p><b>a. Any impact on a World Heritage property?</b></p> <p>There are no world heritage listed items located near the proposal area that would be affected as part of the Proposal.</p>	Nil
<p><b>b. Any impact on a National Heritage place?</b></p> <p>There are no national heritage listed places located near the proposal area that would be affected as part of the Proposal.</p>	Nil
<p><b>c. Any impact on a wetland of international importance?</b></p> <p>There are no wetlands of international importance within 5km of the proposed works.</p>	Nil
<p><b>d. Any impact on a listed threatened species or communities?</b></p> <p>Although a number of listed threatened species and communities have been recorded within a 10km radius of the Proposal area, the works would not affect any of these species.</p>	Nil

Factor	Impact
<p><b>e. Any impacts on listed migratory species?</b> Although a number of migratory species have been recorded within a 10km radius of the proposal area, the works would not affect any of these species.</p>	Nil
<p><b>f. Any impact on a Commonwealth marine area?</b> There are no Commonwealth marine areas located near the proposal.</p>	Nil
<p><b>g. Any impact on the Great Barrier Marine Park?</b> The proposal would not impact on the Great Barrier Marine Park.</p>	Nil
<p><b>h. Does the Proposal involve a nuclear action?</b> The proposal does not involve a nuclear action.</p>	Nil
<p><b>i. Does the Proposal impact on any Commonwealth land?</b> The proposal does not impact on any Commonwealth Land.</p>	Nil

## 8. Summary of mitigation measures

Impact	Environmental safeguards	Responsibility	Timing
<b>AIR QUALITY AND CLIMATE</b>			
<b>Air quality</b>	<ul style="list-style-type: none"> <li>All loads will be covered during transport</li> <li>Limit exposed surfaces areas to the minimum area required.</li> <li>Maintain plant to manufacturers standards.</li> <li>Machinery will not be left running when idle.</li> <li>Water carts are to be used on stockpile sites or access roads to reduce dust.</li> <li>Ensure that all plant and equipment comply with Part 4 of the Protection of the Environment Operations (Clean Air) Regulation 2002.</li> <li>Where levels of dust become unacceptable, appropriate action must be taken. This may include suspending works during periods of high wind.</li> <li>Smokey emissions from construction plant and vehicles will be maintained to Australian Standards. The <i>Protection of the Environment Operations Act 1997</i> (POEO Act) requires that no vehicle shall have continuous smoky emissions for more than 10 seconds.</li> <li>Vegetation or other materials will not be burnt on site.</li> </ul>	Contractor	Construction
<b>GEOLOGY, SOILS AND CONTAMINATION</b>			
<b>General</b>	A Construction Management Plan (CEMP) or equivalent will be prepared by a suitably qualified person.	Contractor	Preconstruction
<b>Erosion and sedimentation</b>	<p>The CEMP will include the measures below, in accordance with the requirements of Landcom's "Managing Urban Stormwater: Soils and Construction, 2004" (the Blue Book):</p> <ul style="list-style-type: none"> <li>Install and maintain erosion and sediment controls on a regular basis during construction to prevent sediment moving offsite and sediment laden water entering drainage lines.</li> <li>Stabilised access is to be established to prevent mud tracking prior to exiting onto public roads.</li> <li>Stabilise disturbed areas progressively.</li> <li>Minimise soil disturbance from vehicle use onsite.</li> <li>Inspect and maintain sediment and erosion controls until the site has been stabilised post construction</li> </ul>	Contractor	Preconstruction Construction
<b>Soil</b>	Stockpiles will be appropriately controlled by sediment fencing or other materials identified in the	Contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	Blue Book to ensure sediments do not enter a waterway.		
<b>Hazardous chemical spills</b>	Spill kits will be available onsite, and all staff will be aware of their location and trained in their use.	Contractor	Construction
<b>Storage management</b>	<ul style="list-style-type: none"> <li>• Wherever possible, do not store chemicals and fuel within the within 30m of the waterway.</li> <li>• All servicing, refuelling, stockpiles, waste disposal and storage areas will be located as far as possible from stormwater drains to reduce potential of pollution via spillage and or inundation during storm events.</li> <li>• Clean excavated materials will be kept in the stockpile for as short a time as possible.</li> <li>• No hazardous material including potential ASS will be stockpiled.</li> <li>• Induction training shall be undertaken for employees to increase their awareness of chemical management protocols including proper handling and storage of chemicals, and emergency response and contingency plans.</li> </ul>	Contractor	Construction
<b>Soil</b>	Following the construction phase, the site will be cleaned up including remediating soils if required, removing rubbish, restoring profiles and decompacting soils in the construction areas.	Contractor	Post construction

#### HYROLOGY AND FLOODING

<b>Flooding</b>	<ul style="list-style-type: none"> <li>• Climate characteristics for the locality indicate that rainfall would be most prevalent during late summer and least prevalent during late winter. Therefore, it is recommended that the proposed work be undertaken during late winter to minimise potential inundation of the work site.</li> <li>• The CEMP would include a plan or procedure to evacuate equipment and manage the site in the event of a flood.</li> </ul>	Contractor	Pre-construction
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#### NOISE AND VIBRATION

<b>Construction noise</b>	<p>The NMP will include the following safeguards for noise and:</p> <ul style="list-style-type: none"> <li>• A process for documenting and resolving issues and complaints.</li> <li>• A process for updating the plan when activities affecting construction noise and vibration change or if additional measures need to be incorporated to resolve complaints or exceedances of the relevant guidelines.</li> </ul>	Contractor	Pre-Construction
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Impact	Environmental safeguards	Responsibility	Timing
<b>Construction Noise –receivers</b>	<ul style="list-style-type: none"> <li>Identify in toolbox talks where noise and vibration management is required</li> <li>A map indicating the locations of sensitive receivers including residential properties.</li> </ul>		
	<ul style="list-style-type: none"> <li>Use less noisy plant and equipment, where feasible and reasonable.</li> <li>Plant and equipment will be properly maintained.</li> <li>Provide special attention to the use and maintenance of ‘noise control’ or ‘silencing’ kits fitted to machines to ensure they perform as intended.</li> <li>Strategically position plant on site to reduce the emission of noise to the surrounding neighbourhood and to site personnel.</li> <li>Avoid any unnecessary noise when carrying out manual operations and when operating plant.</li> <li>Any equipment not in use for extended periods during construction work will be switched off.</li> <li>Affected neighbours to the construction works shall be advised in advance of the proposed construction period at least 7 days prior to the commencement of works</li> </ul>	Contractor	Construction
	<p>Mitigation measures for ‘moderately intrusive’ catchment areas:</p> <ul style="list-style-type: none"> <li>Notification (letterbox drop or equivalent) a minimum of 7 days prior to the commencement of works.</li> </ul>	Contractor	Construction
	<p>Mitigation measures for ‘highly intrusive’ catchment areas:</p> <ul style="list-style-type: none"> <li>Notification (letterbox drop or equivalent) a minimum of 7 days prior to the commencement of works.</li> <li>Phone calls detailing relevant information made to identified/affected stakeholders within 7 days of proposed work. <ul style="list-style-type: none"> <li>Respite offer to these residents would be provided should there be any noise complaints received.</li> </ul> </li> </ul>	Contractor	Construction
<b>FLORA AND FAUNA</b>			
<b>Clearing and prevention of over-clearing</b>	<ul style="list-style-type: none"> <li>Prior to the commencement of any works, a physical clearing boundary is to be clearly marked and maintained.</li> <li>Utilise areas already impacted by previous clearing or disturbance for access purposes, stockpiles or the establishment of compound sites.</li> </ul>	Construction contractor	Project start up and ongoing

Impact	Environmental safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> <li>If clearing of vegetation is required outside the subject site these areas will need to be assessed by an ecologist for potential impacts to TECs, threatened species and their habitats.</li> <li>Trees to be retained, including trees adjacent but outside of the subject site, require an adequate tree protection zone (TPZ) for the duration of works. Details for calculating TPZs are provided within <i>Australian Standard 4970-2009 – Protection of trees on development sites</i>.</li> <li>If the TPZ cannot be avoided during works, the Structural Root Zones (SRZ) of trees will be retained. Details for calculating the SRZs are provided within <i>Australian Standard 4970-2009 – Protection of trees on development sites</i>.</li> </ul>		
<p><b>Direct impact to threatened fauna</b></p>	<ul style="list-style-type: none"> <li>Information on the threatened species within the locality are to be included in the induction process for applicable personnel.</li> <li>If unexpected threatened fauna species are discovered, works will stop immediately, and the environment manager notified. An ecologist would then be engaged to determine management actions to avoid or mitigate any potential impact.</li> </ul>	<p>Construction contractor</p>	<p>Project start up and ongoing</p>
<p><b>Direct impact to TEC and to threatened flora</b></p>	<ul style="list-style-type: none"> <li>Vegetation removal will be restricted to the minimum extent necessary.</li> <li>Through the course of the project, if it is revealed that clearing of vegetation is required outside the subject site, said areas will need to be assessed by an ecologist for potential impacts to TECs, threatened flora and their habitats.</li> <li>Where unexpected threatened flora species are found within the worksite the following actions would take place: <ul style="list-style-type: none"> <li>All work within the vicinity would stop and the Wingecarribee Council Environmental Officer contacted.</li> <li>The area containing the threatened species would be surveyed by an ecologist who would determine</li> </ul> </li> </ul>	<p>Construction contractor</p>	<p>Project start up and ongoing</p>

Impact	Environmental safeguards	Responsibility	Timing
	appropriate actions to protect any individuals if required (e.g. translocation).		
<b>Replacement of native vegetation</b>	<ul style="list-style-type: none"> <li>Treatment comprising the installation of erosion control blankets and hydro-mulching shall be applied to re-establish vegetation growth in resulting areas of bare earth or disturbance.</li> <li>Hydro-mulch should include locally-occurring native flora species typical of the original habitat.</li> </ul>	Construction contractor	Post construction
<b>Introduction and spread of noxious weeds and pathogens</b>	<ul style="list-style-type: none"> <li>A Weed Management Plan will be developed for the site to minimise risk of spread of weeds into and between sites.</li> <li>Declared priority weeds (e.g. Willows, Blackberry, etc.) will be managed according to the requirements stipulated by the <i>Biosecurity Act 2015</i>. To fulfil this requirement all priority weed requiring removal will need to be disposed of at a registered waste management facility.</li> <li>All machinery (e.g. bulldozers, excavators, trucks, loaders etc.) will be cleaned using a high-pressure washer (or other suitable device) prior to entering and exiting work sites. All plant material containing seed heads, weeds that have allelopathic properties, and weeds that are able to reproduce vegetatively, including topsoil containing weed propagules, will be disposed of at an appropriate waste management facility or otherwise properly treated to prevent weed growth.</li> <li>Herbicides will be used in accordance with the requirements on the label. Any person undertaking herbicide application will be trained to do so and have the proper certificate of completion/competency or statement of attainment issued by a registered training organisation.</li> </ul>	Construction contractor	Project start up and ongoing
<b>Disturbance to woody debris and litter and bush rock</b>	Any fallen timber and dead wood encountered on site will be left in situ wherever possible or relocated to a suitable place nearby. Rock will be removed with suitable machinery so as not to damage the underlying rock or result in excessive soil disturbance.	Construction contractor	Project start up and ongoing



Impact	Environmental safeguards	Responsibility	Timing
<p><b>Infection of native plants by <i>Phytophthora cinnamomi</i></b></p>	<ul style="list-style-type: none"> <li>Preparation of Soil Pathogen Management Plan as part of the CEMP to manage soil-borne pathogens. This plan will be implemented during works within the study area.</li> </ul>	<p>Construction contractor</p>	<p>Project start up and ongoing</p>
<p><b>ABORIGINAL HERITAGE</b></p>			
<p><b>Unexpected finds</b></p>	<p>In the event that any unexpected Aboriginal heritage places or objects are unexpectedly discovered during the proposal, the following management protocols will be implemented:</p> <ol style="list-style-type: none"> <li>Works at that identified heritage location will cease with an appropriate buffer zone of at least 20 metres to allow for the assessment and management of the find. All site personal will be informed about the buffer zone with no further works to occur within the buffer zone.</li> <li>A heritage specialist will be engaged to assess the Aboriginal place or object encountered, Representatives from the Illawarra Local Aboriginal Land Council may also be engaged to assess the cultural significance of the place or object;</li> <li>The discovery of an Aboriginal place or object will be reported to the local office of the Biodiversity and Conservation Division (BCD) and Enviroline on 131 555.</li> <li>If the heritage place or object can be managed <i>in situ</i>, works at the heritage location will not recommence until appropriate heritage management controls have been implemented, such as protective fencing, and until advice has been received from the BCD</li> </ol> <p>If the project cannot avoid impacting upon the object, further assessment of the object will be required in the form of an Aboriginal Cultural Heritage Assessment (ACHA), which would include consultation with the Aboriginal community. An ACHA is a requirement for an Aboriginal Heritage Impact Permit application.</p>	<p>Contractor</p>	<p>Construction</p>
	<p>Where human skeletal remains are unexpectedly found during works for the Project the following protocol would be adopted:</p> <ul style="list-style-type: none"> <li>Works at that location will cease, and an appropriate buffer zone of at least 50 metres will be established;</li> <li>The human remains will not be moved;</li> </ul>	<p>Contractor</p>	<p>Construction</p>

Impact	Environmental safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> <li>The NSW police will be notified, and if the human remains are deemed a crime scene, the place will be managed by the police;</li> <li>Should the human remains be deemed Aboriginal or historical by the police, BCD must be notified immediately to assess the remains; and</li> <li>Should the human remains be deemed Aboriginal in origin all relevant Aboriginal stakeholders are to be notified in writing.</li> </ul>		

#### NON-INDIGENOUS HERITAGE

	<ul style="list-style-type: none"> <li>All works within the vicinity of heritage items must be completed with a 10m buffer in place to protect the heritage item.</li> </ul>	Contractor	Construction
<b>Unexpected Heritage (historic) Finds</b>	<ul style="list-style-type: none"> <li>Contractor will notify Council before commencing any work.</li> <li>Staff working at the site during construction will be instructed to stop work immediately on identification of any suspected heritage artefact.</li> <li>If any unexpected archaeological remains are discovered during construction, work will stop immediately in the vicinity of the material/find and specialist advice from a suitably qualified heritage consultant will be sought.</li> </ul>	Contractor	Construction

#### VISUAL

<b>Minimise visual and landscape impact during construction</b>	<p>Project work sites, including construction areas will be managed to minimise visual impact. A site arrangement plan showing at minimum the following:</p> <ul style="list-style-type: none"> <li>Storage areas for equipment and materials</li> <li>Sufficient parking areas are available at the work sites</li> <li>Waste storage areas, and ensure waste is sorted and recycled</li> </ul>	Contractor	Pre-Construction
	<p>Notices and letters shall be provided to residents, informing them of working hours and any activities with four weeks' notice of the proposed works.</p>	Council	Pre-Construction

#### SOCIO-ECONOMIC

<b>Socio-economic</b>	<p>A Communication Plan (CP) will be prepared and implemented as part of the CEMP to help provide timely and accurate information to the community</p>	Contractor	Construction
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Impact	Environmental safeguards	Responsibility	Timing
	<p>during construction. The CP will include (as a minimum):</p> <ul style="list-style-type: none"> <li>• Mechanisms to provide details and timing of proposed activities to affected businesses and residents, including scope of the works, changed traffic and access conditions</li> <li>• Contact name and number for complaints</li> </ul>		
<b>Complaints</b>	A project information board will be displayed at the proposal area. A contact phone number for complaints and enquiries would be on display.	Contractor	Construction
	<p>A complaint handling procedure and register will be included in the CEMP.</p> <p>The complaints register will be maintained throughout construction.</p>	Contractor	Pre-construction and construction
<b>Communication</b>	Start of Work letters would be distributed one week before commencement of works	Contacto	Detailed design / pre-construction
	<p>The following will be undertaken to manage complaints from the community and stakeholders:</p> <ul style="list-style-type: none"> <li>• Regular review of complaints and enquiries received to identify emerging trends and unresolved issues.</li> <li>• Review of initial response time to complaints and timing of response letter/email/phone call/visit to assess compliance</li> <li>• Regular review of all communication materials</li> <li>• A weekly “look ahead” of activities along the project timeline to be shared with the construction manager to plan engagement activities</li> <li>• Complaints with resolution to be reported by Contractor at monthly contractor meetings with Council</li> <li>• Escalated complaints will be reported to Council no more than one week if outstanding</li> <li>• Records/logs of complaints and resolution will be made available for review by Council at any time</li> <li>• Reviewing timing of notifications</li> <li>• Monitoring of the media (traditional and social)</li> </ul>	Contractor Council	Construction

**WASTE**

<b>Waste Management</b>	All wastes would be managed in accordance with the <i>Protection of the Environment Operations Act 1997</i> .	Contractor	Construction
<b>Generation of waste</b>	The CEMP will include the following measures to handle waste but not be limited to:	Contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> <li>Measures to avoid and minimise waste associated with the project</li> <li>Classification of wastes and management options (re-use, recycle, stockpile, disposal)</li> <li>Statutory approvals required for managing both on and off-site waste, or application of any relevant resource recovery exemptions</li> <li>Procedures for storage, transport and disposal</li> </ul> <p>Monitoring, record keeping and reporting.</p>		
<b>Disposal of waste</b>	<ul style="list-style-type: none"> <li>All waste generated by the proposal will be classified in accordance with the <i>NSW Waste Classification Guidelines Part 1: Classifying Wastes</i> (DECCW 2008).</li> <li>All waste generated on site is to be transported off site and disposed of at landfill site approved to accept General Solid Waste (non-putrescible).</li> <li>Waste is not to be burned or buried on-site and is not to be disposed of on other land unless a Section 143 notice under the POEO Act is completed.</li> <li>Site amenities will discharge all sewage to holding tanks which will be regularly removed by a licensed liquid waste contractor</li> <li>Waste material is not to be left on site once the works have been completed.</li> <li>Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day</li> </ul> <p>Material and waste for disposal (including recyclable waste, general waste and oil contaminated waste) must be classified and transported by appropriately licensed contractors to approved facilities.</p>	Contractor	Construction
<b>Storage of waste</b>	<ul style="list-style-type: none"> <li>Waste shall be stored in an appropriate location. For example, spoil is to be stored in a stockpile with adequate erosion and sedimentation control measures. General litter to be stored in bins.</li> </ul> <p>Waste receptacles shall be available to facilitate on-site source separation of waste.</p>	Contractor	Construction
<b>TRAFFIC AND ACCESS</b>			
<b>Traffic and access</b>	<p>A Traffic Management Plan (TMP) will be prepared and implemented as part of the CEMP. The TMP will include:</p> <ul style="list-style-type: none"> <li>Confirmation of haulage routes</li> <li>Site specific traffic control measures (including signage) to manage and regulate traffic movement</li> <li>Measures to maintain landowner access</li> </ul>	Contractor	Pre-Construction Construction

Impact	Environmental safeguards	Responsibility	Timing
	<ul style="list-style-type: none"> <li>• Requirements and methods to consult and inform the local community of potential traffic impacts</li> <li>• Entry and exit locations and measures to prevent construction vehicles queuing on public roads.</li> <li>• A response plan for any construction traffic incident</li> <li>• Consideration of other developments that may be under construction to minimise traffic conflict and congestion that may occur due to the cumulative increase in construction vehicle traffic.</li> </ul>		
<b>Traffic and access</b>	Consultation will be undertaken with Council seeking approval regarding the proposed traffic arrangements and establishment of the compound site.	Contractor	Pre-Construction

### 8.1. Permits and Licences

As the proposal would involve construction activities defined as dredging, a permit issued by the Minister is required under Section 200(1) of the FM Act.

A permit to temporarily block fish passage may be required under Section 220 of the FM Act depending on the final construction method of diverting Mittagong Creek.

As the REF requires a Fisheries permit, the REF would be required to be published on Council's website prior to commencement of construction or (if not practical) no later than one month after the activity commences.

## 9. Conclusion

The proposal is subject to assessment under Part 5.1 of the EP&A Act and has been prepared with due consideration of the Environmental Planning and Assessment Regulation 2021 (NSW). A section 171 checklist has been completed and is provided in Chapter 7.1.

This REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

As part of the design development and options assessed some potential environmental impacts were avoided or reduced. Where potential environmental impacts have been identified, safeguards and mitigation measures have been proposed to ameliorate or minimise the expected impacts.

The proposal would not result in any significant impacts to threatened species, populations or ecological communities listed on the *Biodiversity Conservation Act 2016* (NSW), *Fisheries Management Act 1994* (NSW), or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The proposal would achieve the identified objectives and, with the implementation of the mitigation measures identified in this REF, it is unlikely that these proposed works would result in a significant impact to the environment.

An environmental impact statement is not required to be prepared. A Biodiversity Development Assessment Report or Species Impact Statement is not required.

Prepared by:

Martin Kim

Senior Environmental Consultant



25/09/2022

Determining officer (print name) Ned Tripkovic

Position Manager Project Delivery

Signature 

Date 10/10/2022

## 10. References

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## **Appendix A Proposal design**



## **Appendix B Database Searches**

## **Appendix C Construction Noise Estimator Tool Outputs**

# **Appendix D Aboriginal Due Diligence Assessment**

## **Appendix E Test Excavation Report and Memo**

# **Appendix F Biodiversity Assessment**

# Appendix G Landscape Plan

## **Appendix H Site Photographs**

# Appendix I Consultation