

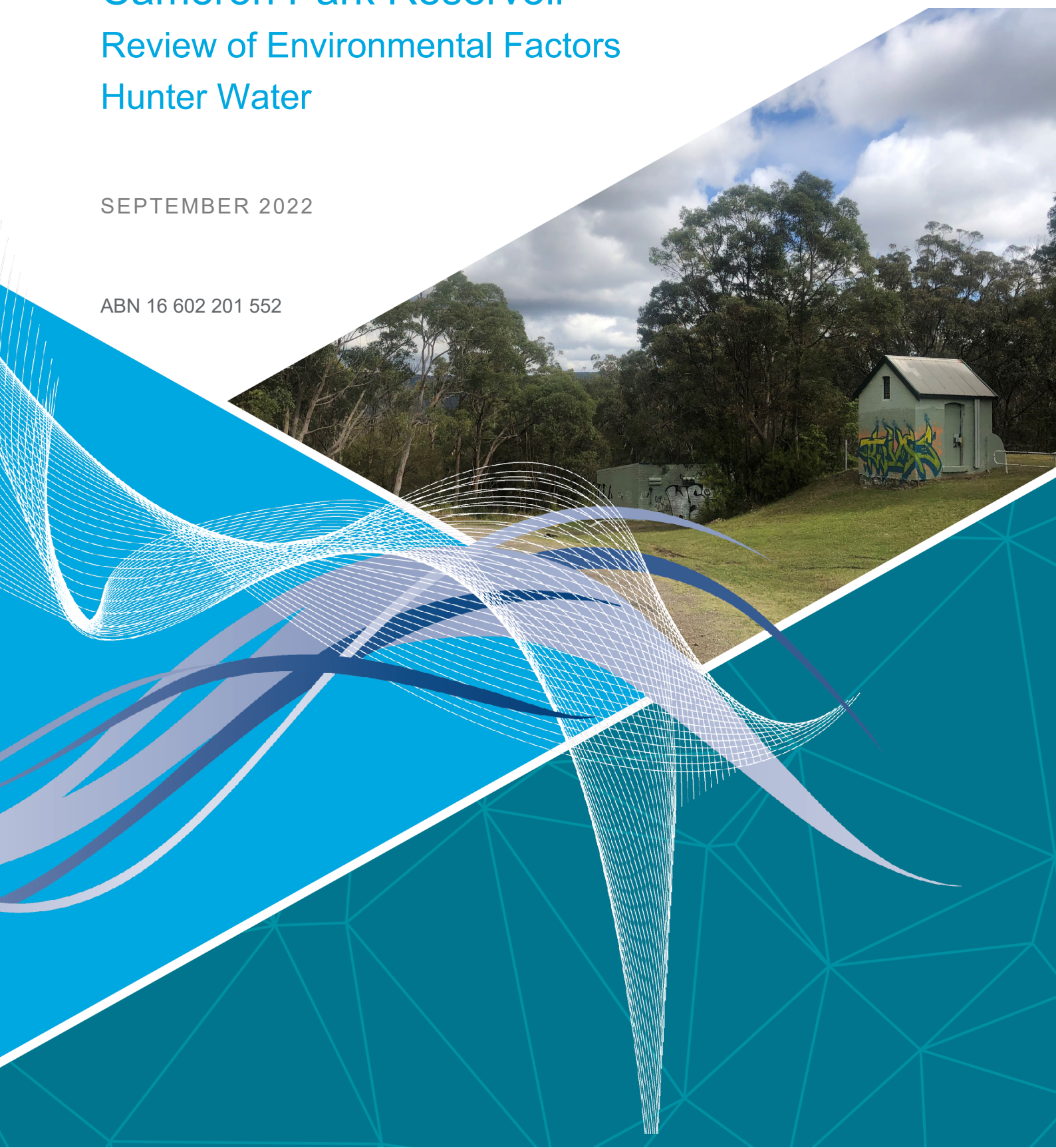
# hunterh<sub>2</sub>O



## Cameron Park Reservoir Review of Environmental Factors Hunter Water

SEPTEMBER 2022

ABN 16 602 201 552



## Report Details

<b>Report Title</b>	Cameron Park Reservoir: Review of Environmental Factors
<b>Project No.</b>	SR156
<b>Status</b>	Final
<b>File Location</b>	P:\HWC\10000 HWC Partnership\10156 Cameron Park Reservoir\3. Outputs\12. 20220901 REF Draft 5
<b>Enquiries</b>	Proponent Project Manager Hunter Water Gregory Moore Ph: (02) 4979 9732 E: <a href="mailto:greg.moore@hunterwater.com.au">greg.moore@hunterwater.com.au</a>  Consultant Project Manager Josh Plummer P: (02) 4941 4968 E: <a href="mailto:josh.plummer@hunterh2o.com.au">josh.plummer@hunterh2o.com.au</a>

## Document History and Status

Revision	Report Status	Prepared by	Reviewed by	Approved by	Issue Date
1	Draft	James McMahon	Marnie Coates		22 March 2022
2	Draft	James McMahon	Josh Plummer		26 May 2022
3	Draft	James McMahon	Josh Plummer		29 June 2022
4	Draft	James McMahon	Josh Plummer		5 August 2022
5	Final	James McMahon	Steve Farrar Josh Plummer		1 Sept 2022

### Copyright © Hunter H2O Holdings Pty Limited 2022

The concepts and information contained in this document are the property of Hunter H2O Holdings Pty Limited for the sole use of the nominated client. Use or copying of this document without the written permission of Hunter H2O constitutes an infringement of copyright.

# Executive Summary

## Proposal background and identification

The West Wallsend/Edgeworth/Minmi area is part of the West Lake Macquarie Water System. It is Lake Macquarie's main area of residential development in the short to medium term. Approximately 5,300 new residential properties are expected to be developed from two major developments: Northlakes and Minmi.

With the impending growth of residential development within the West Wallsend/Edgeworth area, Hunter Water Corporation (HWC) prepared a regional servicing strategy in 2018. This strategy identified network augmentation required for increased capacity to service the planned growth.

## Summary of assessed options

Hunter Water's strategic planning identified the construction of a reservoir as a superior option to boosted pressure zones. A site was selected that had sufficient elevation to hydraulically function.

Alternative routes for pipelines to supply the reservoir were considered and selected based on constructability and minimising environmental impacts. These are summarised in section 2.

## Summary of the proposed infrastructure

The proposal comprises of:

- the construction of two reservoirs ('Cameron Park 1' and 'Cameron Park 2') each with a capacity of 3.25ML.
- new trunk mains (water mains) that will link water reticulation areas in Cameron Park and West Wallsend areas via a new pressure reducing valve (PRV). The water mains are proposed to be constructed using both open trenching and horizontal directional drill technology.

The key features of the proposal are shown in Drawing Number 16258 of the Cameron Park Reservoirs Concept Design Contract Drawings in Appendix A.

The new system will be able to service West Wallsend including the elevated areas fed by gravity from the new Cameron Park Reservoirs. The reservoir will be filled from a Water Pump Station (WPS) in Cameron Park ("Cameron Park 2 Water Pump Station").

The reservoirs will be constructed in a staged approach. The first reservoir, Cameron Park 1 Reservoir, will service growth to 2030. The second reservoir, Cameron Park 2 Reservoir, will service growth beyond 2030.

## Summary of assessed environmental impacts and mitigations

The proposal will impact 1.32ha of PCT 1589 - Spotted Gum - Broad-leaved Mahogany - Grey Gum grass - shrub open forest on Coastal Lowlands of the Central Coast and 0.93ha of PCT 1619 - Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands. Of this, 0.96ha of PCT 1589 will be removed permanently while 0.36ha will be rehabilitated and the total 0.93ha of PCT 1619 will be rehabilitated. Sixteen (16) Hollow Bearing trees were identified during field surveys nine of these will be removed while seven will be retained.

The proposal may result in the removal of the 14 Black-eyed Susan clumps that are located on the proposal site. The Black-eyed Susan is included in the Matters of National Environmental Significance. Additional survey for Black-eyed Susan will be undertaken during the flowering period to determine the extents of the local population. Following this survey EPBC referral for the impact may be recommended.

The proposal will result in disturbance of AHIMS site 38-4-0989, which lies within the footprint of the Reservoir.

Mitigation measures for the identified impacts have been identified and will be implemented to minimise impacts during construction and operation. These are identified in Section 7.

## Contents

1	Introduction .....	1
1.1	Proposal Identification .....	1
1.2	Purpose of the report.....	1
2	Proposal need and justification.....	2
2.1	Objectives of proposal .....	2
2.2	Existing water supply infrastructure.....	2
2.3	Options considered.....	2
2.3.1	Do nothing.....	2
2.3.2	Reservoir vs boosted pressure zones as technical solution.....	2
2.3.3	Reservoir site .....	2
2.3.4	Water main alignments – connection from West Wallsend reticulation.....	3
2.3.5	Water main alignments – connection from reticulation at Floresta Crescent. ....	4
3	Description of the proposal.....	5
3.1	Scope of works .....	5
3.2	Construction phases activities .....	5
3.2.1	Preconstruction .....	5
3.2.2	Reservoir site construction activities.....	6
3.2.3	West Wallsend WPS to Reservoir Pipe Alignment construction activities .....	6
3.2.4	Reservoir to Floresta Crescent and Reservoir to Cameron Park Drive Pipe Alignments construction activities.....	6
3.3	Operational requirements .....	6
3.4	Timing and staging .....	6
3.4.1	Construction timing .....	6
3.4.2	Operation .....	7
3.5	Ancillary facilities .....	7
4	Statutory framework .....	8
4.1	Environmental Planning Instruments.....	8
4.1.1	State Environmental Planning Policy (Transport and Infrastructure) 2021 .....	8
4.1.2	Lake Macquarie Local Environmental Plan 2014 .....	8
4.1.3	State Environmental Planning Policy (Resilience and Hazards) 2021 .....	8
4.1.4	Biodiversity and Conservation SEPP.....	8
4.2	Commonwealth and NSW legislation .....	9
4.2.1	Hunter Water Act .....	9
4.2.2	Environmental Planning and Assessment Act 1979.....	9
4.2.3	2021 Environmental Planning & Assessment Regulation .....	9
4.2.4	Biodiversity and Conservation Act 2016.....	9
4.2.5	Heritage Act .....	10
4.2.6	Environment Protection and Biodiversity Conservation Act 1999 (Cth) .....	10
4.2.7	National Parks and Wildlife Act 1974.....	11

4.2.8	Roads Act 1993 .....	11
4.2.9	Protection of the Environment Operations Act 1997 .....	11
5	Stakeholder and community consultation.....	12
5.1	Government agency and other stakeholder consultation.....	12
5.2	Community consultation .....	13
5.2.1	Consultation with registered Aboriginal parties .....	13
5.2.2	Consultation with nearby residents.....	13
6	Environmental assessment .....	14
6.1	Introduction .....	14
6.2	Assessment Methodology .....	14
6.3	Ecology .....	14
6.3.1	Existing Environment .....	14
6.3.2	Impact Assessment.....	14
6.3.3	Impact Assessment.....	15
6.3.4	Mitigation Measures.....	18
6.4	Aboriginal cultural heritage .....	18
6.4.1	Existing Environment .....	18
6.4.2	Impact Assessment.....	19
6.4.3	Mitigation Measures.....	19
6.5	Non-aboriginal cultural heritage.....	19
6.5.1	Existing Environment .....	19
6.5.2	Impact Assessment.....	20
6.5.3	Mitigation Measures.....	21
6.6	Noise and Vibration .....	21
6.6.1	Existing Environment .....	21
6.6.2	Impact Assessment.....	21
6.6.3	Mitigation Measures.....	22
6.7	Soils and geology .....	23
6.7.1	Existing Environment .....	23
6.7.2	Impact Assessment.....	23
6.7.3	Mitigation Measures.....	23
6.8	Water Quality and Hydrology.....	23
6.8.1	Existing Environment .....	23
6.8.2	Impact Assessment.....	24
6.8.3	Mitigation Measures.....	24
6.9	Air Quality and Energy.....	24
6.9.1	Existing Environment .....	24
6.9.2	Impact Assessment.....	24
6.9.3	Mitigation Measures.....	25
6.10	Contamination.....	26
6.10.1	Existing Environment .....	26

6.10.2	Mitigation Measures	27
6.11	Waste Management	27
6.11.1	Existing Environment	27
6.11.2	Impact Assessment	27
6.11.3	Mitigation Measures	27
6.12	Bushfire	28
6.12.1	Existing Environment	28
6.12.2	Impact Assessment	28
6.12.3	Mitigation Measures	28
6.13	Cumulative Impacts	29
7	Mitigation Measures Summary	30
8	Conclusion	36
9	Declaration	37

## Tables

Table 1: SEPP (Transport and Infrastructure) 2021 Consultation with Councils Other Agencies Requirements	12
--	----

## Appendices

Appendix A	Pipe Alignment Options Assessments
Appendix B	Reservoir Site Plan
Appendix C	Aboriginal Cultural Heritage Assessment Report
Appendix D	Ecological Assessment Report
Appendix E	Noise and Vibration Assessment
Appendix F	Non-Aboriginal Heritage Assessment



# 1 Introduction

## 1.1 Proposal Identification

The West Wallsend/Edgeworth/Minmi area is part of the West Lake Macquarie Water System. It is Lake Macquarie's main area of residential development in the short to medium term. Approximately 5,300 new residential properties are expected to be developed from two major developments in Northlakes and Minmi.

With the impending growth of residential development within the West Wallsend/Edgeworth area, Hunter Water Corporation (HWC) prepared a regional servicing strategy in 2018. This strategy identified network augmentation required for increased capacity to service the planned growth. The proposal comprises of:

- a new 6.5ML reservoir storage site with:
  - one reservoir of 3.25ML (hereafter called 'Cameron Park 1') to service growth to 2030.
  - a second reservoir of 3.25ML (hereafter called 'Cameron Park 2') to service growth beyond 2030.
  - pumping facilities
  - telemetry and monitoring facilities
- new trunk mains (water mains) that will supply the reservoir from reticulation:
  - from a rising main in Wallsend (West Wallsend RM) and
  - at Floresta Crescent, Cameron Park the Cameron Park 2 Zone and the West Wallsend area via a new pressure reducing valve (PRV).
- Various valving and pressure control devices

The key features of the proposal are shown Appendix A.

The new system will be able to service West Wallsend including the elevated areas fed by gravity from the new Cameron Park Reservoirs. The Cameron Park 2 Water Pump Station (WPS) will feed the new reservoirs.

The reservoir site will be constructed in a staged approach. The first reservoir, Cameron Park 1 Reservoir, of 3.25ML will service growth to 2030. The second reservoir, Cameron Park 2 Reservoir, of 3.25ML will service growth beyond 2030.

## 1.2 Purpose of the report

This REF was prepared by James McMahon, Director/Principal, JME Environments on behalf of HWC, the proponent.

The potential environmental impacts of the proposal have been assessed in accordance with the environmental impact assessment requirements of the Environmental Planning and Assessment Act 1979 (EP&A Act). HWC is the determining authority of the proposal in accordance with Division 5.1 of the EP&A Act.

The purpose of this REF is to describe the proposed works and assess the potential construction and operation environmental impacts with consideration of the factors listed in clause 171 of the Environmental Planning and Assessment Regulation 2021. The REF identifies safeguards to mitigate identified impacts.

## 2 Proposal need and justification

### 2.1 Objectives of proposal

Cameron Park is currently the main residential growth area in Lake Macquarie. Approximately 2,050 new residential properties have been constructed in Cameron Park over the past 15 years. Approximately 2,700 residential properties are expected to be developed by 2027-28 and a further 2,600 properties beyond 2027-28.

Hunter Water's strategy has identified the following objectives for this proposal:

- Ensure that water supply is maintained to existing customers in West Wallsend in high demand periods as further growth occurs
- Service elevated development areas at Cameron Park and Minmi (approximately up to 3,000 properties)
- Contribute as part of a broader strategy to comply with Operating Licence requirements on pressure and discontinuity.

### 2.2 Existing water supply infrastructure

Most development in Cameron Park is supplied under gravity from the Elernmore Vale reservoirs. But there are elevated areas (approximately 850 properties) that currently require water to be boosted by two pumping stations (Cameron Park 1 and 2). Future development in elevated areas at nearby Minmi would result in at least two more pumping stations being built by developers to boost pressure.

The existing water supply comprises of West Wallsend 1 Hydro tank and West Wallsend Water Pump Station (West Wallsend WPS), West Wallsend 3 WPS and West Wallsend 1 Reservoir (WWR). These are located on Lot 6 DP 923587.

The existing infrastructure cannot meet the anticipated water supply demand generated by the predicted residential development within the West Wallsend/Edgeworth area. Due to the existing water supply infrastructures age, it is not practical to upgrade these assets and as such they will be decommissioned.

### 2.3 Options considered

#### 2.3.1 Do nothing

A do-nothing approach was considered as not appropriate because the current supply of potable water is not expected to meet the demand in the future.

#### 2.3.2 Reservoir vs boosted pressure zones as technical solution

Boosted pressure zones are one acceptable way of servicing elevated areas but power outages or pipe breaks can impact supply to customers in the boosted zone if contingency measures (e.g. backup generator) are not effective. Compared to gravity supply from reservoirs they present a higher risk of customers being affected by low pressure or complete supply interruption during a power outage or pipe break depending on the demand conditions. Therefore Hunter Water have selected a reservoir as a sustainable and robust option for achieving the project objectives.

#### 2.3.3 Reservoir site

Hunter Water have undertaken hydraulic modelling and have identified a site that would be able to be supplied from existing reticulation in two locations. Approximately ten years ago, Hunter Water purchased land in an elevated area close to these reticulation points which would enable supply to be maintained to existing customers in West Wallsend and also be able to supply elevated development at Cameron Park and Minmi. It was identified that the construction of a reservoir at this location would enable a separate reservoir (West Wallsend reservoir) and existing small boosted pressure zones at West Wallsend to be

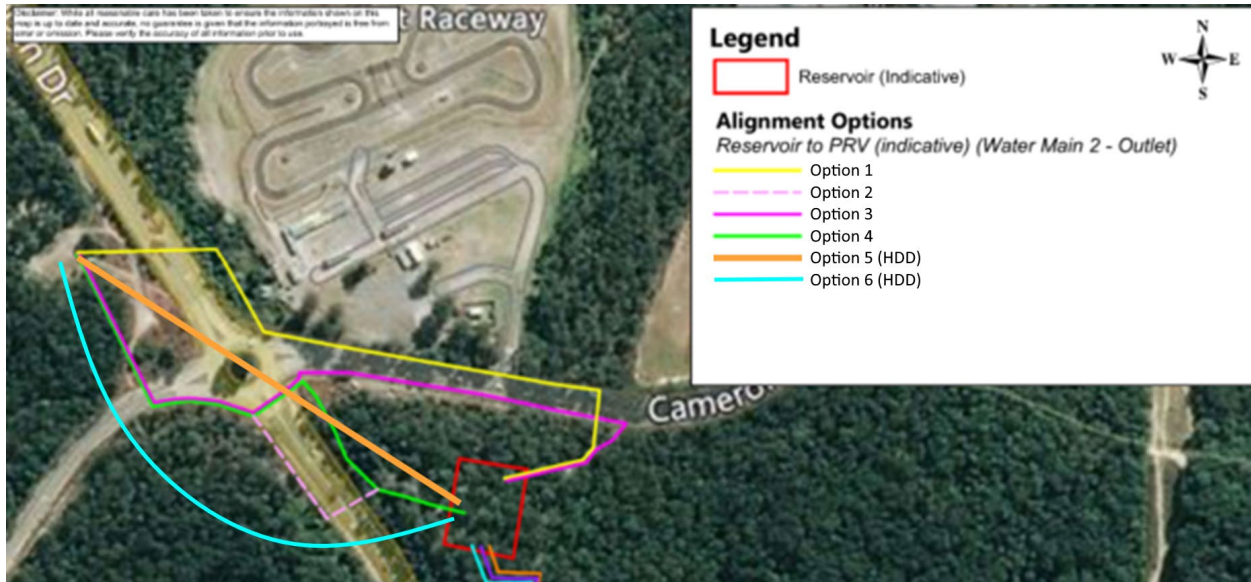


decommissioned. From a technical (hydraulic) and sustainability perspective, this site was selected as preferred.

### 2.3.4 Water main alignments – connection from West Wallsend reticulation

The proposal will require watermain to connect from existing reticulation in West Wallsend to the reservoir site. An Options Assessment Workshop (Author: Marnie Coates 09/09/2021) considered options for the water main alignments.

Six alignment options were considered for the Reservoir to existing West Wallsend WPS pipeline which are illustrated in Figure 1.



**Figure 1:** Reservoir to West Wallsend WPS Pipeline Alignment Options

Options to connect from West Wallsend WPS to Cameron Park Reservoir site:

- Option 1: Trenching east from West Wallsend WPS to George Booth Drive, Horizontal Directional Drilling (HDD) under George Booth west of the Cameron Park Drive roundabout, trenching along George Booth Drive and Cameron Park Drive, HDD under Cameron Park Drive and trenching along a 'paper road' to the Reservoir.
- Option 2: Trenching south southeast from West Wallsend WPS to Cameron Park Drive, HDD under Cameron Park Drive west of the George Booth Drive roundabout, trenching around the outside of the roundabout and south along George Booth Drive, HDD under George Booth Drive and trenching through the bush to the Reservoir.
- Option 3: Trenching south southeast from West Wallsend WPS to Cameron Park Drive, HDD under Cameron Park Drive west of the George Booth Drive roundabout, trenching around the outside of the roundabout, HDD under George Booth Drive and trenching through the bush to the Reservoir.
- Option 4: Trenching south southeast from West Wallsend WPS to Cameron Park Drive, HDD under Cameron Park Drive west of the George Booth Drive roundabout, trenching around the outside of the roundabout, HDD under George Booth Drive and trenching along Cameron Park Drive trenching along a 'paper road' to the Reservoir.
- Option 5 and Option 6: HDD from direct West Wallsend WPS to the Reservoir.

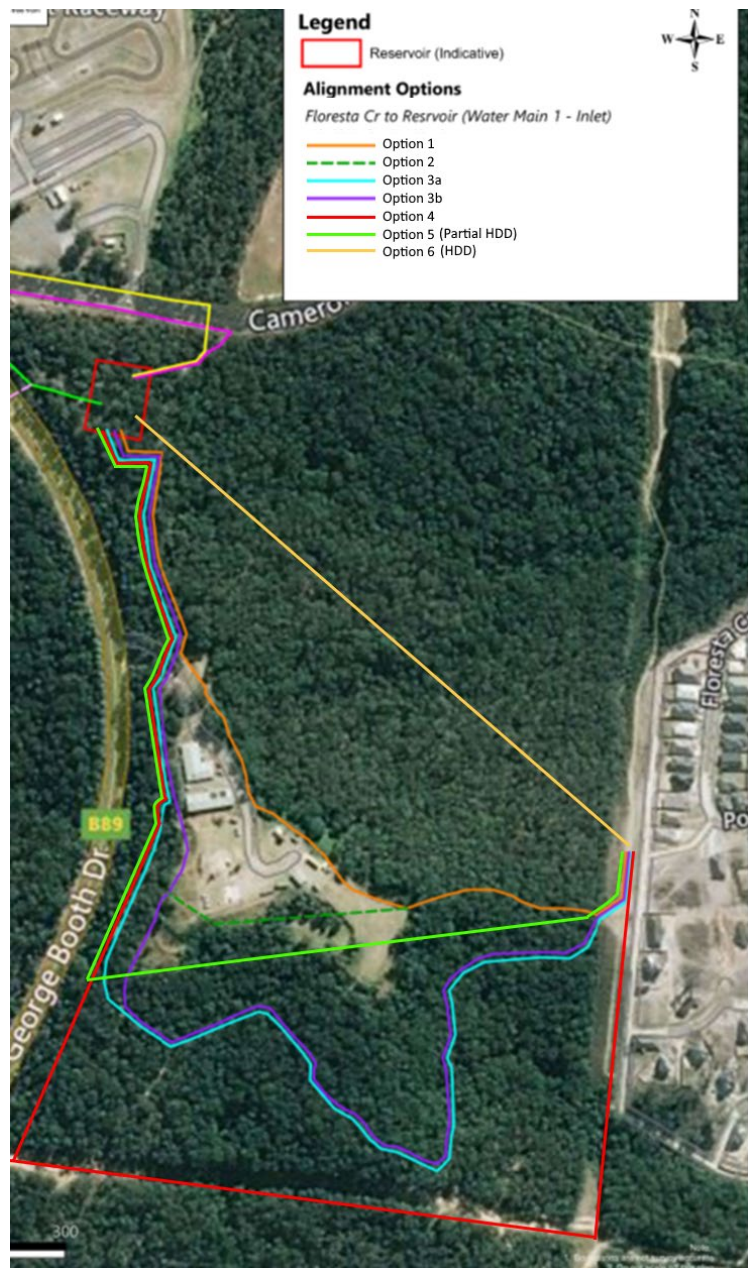
The HDD entire alignment from West Wallsend WPS (Option 5) to the reservoir provided a cost-effective methodology that removed the health and safety risk of trenching works along major road and intersections and delivers the lowest environmental impact. This the preferred option.

### 2.3.5 Water main alignments – connection from reticulation at Floresta Crescent.

Six alignment options were considered for the Reservoir to Floresta Crescent. as illustrated in Figure 2.

Reservoir to Floresta Crescent options include trenching along a 'paper road' south to the driveway of the NSW Rural Fire Service (RFS) Depot and training ground.

- Option 1: Trenching along the eastern boundary of the RFS and east along an existing trail.
- Option 2: Trenching along the western boundary and east along the same existing trail as above.
- Option 3a and Option 3b are similar and involve trenching along exiting trails to the west, south and east of the RFS.
- Option 4: Trenching utilising existing overhead power line corridors.
- Option 5: Partial HDD from George Booth Drive to Floresta Crescent.
- Option 6: HDD from Reservoir to Floresta Crescent.



**Figure 2:** Reservoir to Floresta Crescent Pipeline

Option 3a (the alignment between the Reservoir and Floresta Crescent) was assessed to be more constructible, was an area that could be more easily accessed for, future maintenance and had manageable environmental impacts, particularly as its alignment coincided with an established fire trail. This the preferred option.

## 3 Description of the proposal

### 3.1 Scope of works

Stage 1 scope of works broadly entail:

- Construction of access and driveway off George Booth Drive from the Rural Fire Service driveway access to the reservoir site;
- Construction of a 3.25 ML Water Reservoir (the Reservoir) on Lot 1 DP 115617 including:
  - Reservoir footings, walls and roofing with a wall height of 7.8m and internal radius of 25.25m.
  - Pipework to receive and release potable water;
  - A chlorination dosing facility;
  - A pumping station;
  - A reservoir mixing pump set;
  - Access road from George Booth Drive to the Reservoir;
  - Dedicated power supply;
  - Stormwater and reservoir overflow management system; and
  - Security fencing.
- Connection of Reservoir to various existing water mains at:
  - West Wallsend Rising Main and
  - Floresta Crescent; and
- Decommissioning of existing Reservoir and West Wallsend 2 WPS on Lot 1 DP 923587.

The key features of the proposal are shown Appendix A.

Stage 2 scope of works entail the construction of a 2<sup>nd</sup> 3.25 ML Water Reservoir.

This REF is concerned with Stage 1 only. Stage 2 would be the subject of a further assessment.

### 3.2 Construction phases activities

The key construction activities are listed below:

#### 3.2.1 Preconstruction

The reservoir and main construction compound would be located within Lot 1 DP 1156170 as shown in Appendix B. Lot 1 DP1156170 will also be used for ancillary activities including site offices, ablution blocks and receipt of construction materials. Preconstruction activities would include:

- Preparation of management plans and risk assessments.
- Installation of erosion and sedimentation and other controls (as listed in Section 7)
- Installation of temporary site facilities
- Construction of access road from George Booth Drive along a “paper road” lot.
- Clearing & grubbing all of Lot 1 DP 1156170 to situate infrastructure, approximately 3,600m<sup>2</sup>.
- Establish a secure compound to take delivery of materials.

### 3.2.2 Reservoir site construction activities

Construction activities in this area will include:

- Excavation cut / fill to site levels (bulk earthworks and detailed footing excavation)
- Steel and concrete construction (formwork, reinforcement, pouring, curing)
- Construction of footings, slabs and supports for ancillary structures
- Trenching, installation and connection of site pipework
- Mechanical and electrical installation
- Commissioning
- Site restoration and demobilisation

### 3.2.3 West Wallsend WPS to Reservoir Pipe Alignment construction activities

The heritage listed West Wallsend Valve House and Underground Reservoir will be isolated from construction activities using temporary fencing and “no go zone” signage. The non-heritage listed assets, a 1980s pump house and modern pump set located to the southwest of the West Wallsend Valve House and Underground Reservoir (refer to Section 6.9) will be demolished and removed from site.

If the heritage listed water pipe, 1903/04 pipe line from Minmi, is required to be removed or be drilled through, then an intact section must be stored within the heritage protection fencing for future display.

A horizontal directional drilling (HDD) compound will be established in an area disturbed by non-heritage item demolition. The compound will be securely fenced and will be used to store drill rig(s), drill rods, other drilling equipment and consumables.

HDD drilling involves the use of drilling fluids and will generate drill spoil in the form of a slurry with a drill fluid:soil ratio of 2.5:1. HDD will be undertaken from the West Wallsend WPS to the proposed reservoir site. HDD hole will start at the surface and is expected to reach a maximum depth of 10.502m below ground surface at a distance of 72.922m from the entry hole. The HDD hole is designed to be approximately 397m long.

Launch and receival pits will be constructed at either end of the pipeline indicated in drawing 16258 011.

The mains pipeline (approximately 450m) will be installed between the Reservoir and the West Wallsend WPS.

### 3.2.4 Reservoir to Floresta Crescent and Reservoir to Cameron Park Drive Pipe Alignments construction activities

The Reservoir to Floresta Crescent and Reservoir to Cameron Park Drive Pipe Alignments are proposed to be installed by trenching existing access tracks.

The pipeline alignment was designed for two parallel pipelines with one pipeline planned to be installed at this stage. The pipeline alignment is 8m wide. The pipeline trench will be excavated, and the spoil will be stored alongside the trench excavation for use as backfill.

## 3.3 Operational requirements

Once commissioned, the Reservoir will operate to store and gravity feed potable water via the HWC network.

Power will be supplied via connection to the established electricity supply grid.

## 3.4 Timing and staging

### 3.4.1 Construction timing

Construction is expected to commence from January 2023 and continue to January 2025.

Hours of work would be from 7am-6pm, Monday to Friday and 8am-1pm Saturdays. No construction activities will be undertaken on Sundays or Public Holidays.

### 3.4.2 Operation

The Reservoir will operate continuously for 24hrs per day.

## 3.5 Ancillary facilities

The exact location of the compounds has not been set. Site compounds will be located within the Reservoir site on Lot 1 DP 11561170 and HDD borehole entry location on Lot 1 DP923587 in areas that do not require additional clearing, ground disturbance or demolition of existing structures that are not planned to be demolished.



## 4 Statutory framework

This REF considers the requirements of Section 171 of the Environmental Planning and Assessment Regulation, 2021 and Sections 5A and 111 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

### 4.1 Environmental Planning Instruments

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

*State Environmental Planning Policy (Transport and Infrastructure) 2021* Clause 2.157 states that water reticulation system has the same meaning as in the Standard Instrument but also includes water supply reservoirs. Clause 2.158 (1) permits the development for the purpose of water reticulation systems may be carried out by or on behalf of a public authority without consent on any land.

HWC is a public authority therefore the proposal can be carried out without consent.

#### 4.1.2 Lake Macquarie Local Environmental Plan 2014

The proposal lies within the Lake Macquarie Local Government Area and is situated on or under land zoned

- C2 Environmental Conservation;
- RE1 Public Recreation;
- R2 Low Density Residential; and
- SP2 Infrastructure.

#### 4.1.3 State Environmental Planning Policy (Resilience and Hazards) 2021

This SEPP provides a consistent State-wide planning approach to the remediation of contaminated land. As discussed in section 6.10, the proposal will not be situated on land that is known to be contaminated and the proposed proposal is a less sensitive land use.

#### 4.1.4 Biodiversity and Conservation SEPP

Chapter 2 of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 contains planning rules and controls for the clearing of native vegetation in NSW on land zoned for urban and environmental purposes that is not linked to a development application. Part 2.2-Clearing vegetation in non-rural areas list the following for clearing that requires permit or approval:

(1) A person must not clear vegetation in a non-rural area of the State to which Part 3 applies without the authority conferred by a permit granted by the council under that Part. Part 3 applies to Lake Macquarie City Council in areas zoned RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry. The proposal site does not contain these zonings.

(2) A person must not clear native vegetation in a non-rural area of the State that exceeds the biodiversity offsets scheme threshold without the authority conferred by an approval granted by the Native Vegetation Panel under Part 2.4. The Native vegetation Panel is unable to grant authority to Activities under Part 5 Environmental Planning and Assessment Act 1979.

(3) Subsection (2) does not apply to clearing on biodiversity certified land under the Biodiversity Conservation Act 2016, Part 8.

(4) Clearing of vegetation is not authorised under this section unless the conditions to which the authorisation is subject are complied with.

(5) Subsection (4) extends to a condition that imposes an obligation on the person who clears the vegetation that must be complied with before or after the clearing is carried out.

(6) For the purposes of the Act, section 4.3, clearing vegetation that requires a permit or approval under this Chapter is prohibited if the clearing is not carried out in accordance with the permit or approval.



The Subject Site contains several koala feed trees. Habitat assessment, general searches for koala presence and vegetation mapping were undertaken in October 2021. No scats, scratch marks or other signs of Koalas were found within the Subject Site. Given the small size of the site, it is considered unlikely that current Koala population within the site would go undetected. Furthermore, given the small area of moderate quality habitat to be removed and considering the availability of suitable foraging and breeding habitat in the broader locality it is not anticipated that the removal of a small number of native vegetation will significantly impact this species. Therefore, the proposal site is not considered core koala habitat.

## 4.2 Commonwealth and NSW legislation

### 4.2.1 Hunter Water Act

The Hunter Water Act establishes the legal framework for the operation of the Hunter Water Corporation and the requirement for licences for Hunter Water operations.

All Hunter Water operations are undertaken in accordance with Hunter Water Corporation Operating Licence 2022 – 2027 (the Licence). The Licence conditions includes requirements for the management of Hunter Water assets and for maintaining service levels with minimal disruption. The proposal has a role in providing drinking water to Hunter Water customers and is therefore integral to meeting its licence requirements. The proposal is therefore consistent with the requirements of the HW Act.

### 4.2.2 Environmental Planning and Assessment Act 1979

HWC is the proponent and determining authority under this Act. The proposal does not require development consent and is not classified as State Significant Infrastructure. The proposal has been assessed under Division 5.1 of the EP&A Act. This REF has concluded that the proposal is unlikely to have a significant impact on the environment.

### 4.2.3 2021 Environmental Planning & Assessment Regulation

Clause 171 (4) of the 2021 EP&A Reg requires certain reports that determine whether an activity is likely to have a significant environmental impact (i.e. REFs) to be published on the determining authority's website or the NSW Planning Portal before the activity commences. This requirement only applies where:

- the activity has a capital investment value greater than \$5,000,000; or
- the activity requires another approval under:
  - the Fisheries Management Act 1994, sections 144, 201, 205 or 219,
  - the Heritage Act 1977, section 57,
  - the National Parks and Wildlife Act 1974, section 90,
  - the Protection of the Environment Operations Act 1997, sections 47–49 or 122
- the determining authority considers that it is in the public interest to publish the report

The 2021 EPA&A Reg also:

- allows the Secretary to prescribe guidelines for the format of a REF and the factors to be taken into account when considering the likely impact of an activity.
- clarifies that only relevant factors need to be considered, including factors that are deemed relevant but are not specifically listed.

This REF is required to be displayed with respect to the capital investment value exceeding \$5,000,000 and to the National Parks and Wildlife Act due to the proposal requiring an approval under Section 90 for the Reservoir site.

### 4.2.4 Biodiversity and Conservation Act 2016

The Biodiversity Conservation Act 2016 (NSW) (the BC Act) sets out protections for native plants and animals, the process for listing threatened species (including the lists themselves), contains criminal

offences, allows for licensing of certain activities and provides for the Biodiversity Offsets Scheme to apply to certain developments.

Investigations were carried out at the site and via literature / database searches to gather information required to adequately address the requirements of the Section 7.3 of the BC Act (known as the “5-part test”).

#### 4.2.5 Heritage Act

Non-Indigenous heritage in NSW is protected under the Heritage Act 1977 (the Heritage Act) and the Environmental Planning & Assessment Act 1979 (the EP&A Act). The State Heritage Register is maintained under Part 3A of the Heritage Act and comprises a list of places and objects of state significance to the people of NSW.

Section 57 and Section 60 of the Heritage Act state that exemptions or permits may be required when undertaking works or excavating within the curtilage of a State Heritage Register item and applies to places, buildings, works, relics, moveable objects, precincts, or land within the Proposal. Where works are minor in nature and will have minimal impact on the heritage significance of a place, a Section 57 exemption may be granted (exemptions were recently updated in December 2020).

If works are not exempt under Section 57, a permit under Section 60 would be required to carry out activities to an item listed on the State Heritage Register. This includes built and ground disturbance in areas that are likely to contain archaeological material.

There were no items of State Significance identified within the SoHI Study Area. All built heritage items are listed as being of local significance.

#### 4.2.6 Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is the Australian Government’s environmental legislation. It covers environmental assessment and approvals, protects significant biodiversity and integrates the management of important natural and cultural places.

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of national environmental significance require approval from the Commonwealth Environment Minister. An ‘action’ is generally defined as a project, development, undertaking, activity or a series of activities, or an alteration of any of these. A ‘significant impact’ is one that is ‘important, notable or of consequence having regard to its context or intensity’.

The matters of national environmental significance (or ‘triggers’) are set out in Part 3 of the EPBC Act as follows:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (such as uranium mines, although nuclear power plants are prohibited) and
- a water resource, in relation to coal seam gas development and large coal mining development (known as the ‘water trigger’).

This was examined by Andersons Environment and Planning Pty Ltd (AEP) who has determined that the works for the proposal will not significantly impact species or ecological communities listed under the EPBC Act.

Additional surveys for Black-eyed Susan will be undertaken during the flowering period to determine the extents of the local population. Following this survey the supporting Ecology assessment report will be revised to include this additional information and reassess the significance of the impacts associated with the proposal.

#### 4.2.7 National Parks and Wildlife Act 1974

Under Section 86 of this Act, it is an offence to harm or desecrate an Aboriginal place or object unless authorised by an Aboriginal heritage impact permit (AHIP), or where it is reasonably determined that no Aboriginal object will be harmed. The proposal will impact Aboriginal sites and an AHIP under Section 90 of the Act will be sought.

#### 4.2.8 Roads Act 1993

Section 138 of the Roads Act 1993 states a person must not carry out work in, on or over a public road without consultation and consent of the appropriate road's authority. The proposal will not involve work in, on or over a public road as road crossing of pipeline will be achieved by HDD under roads.

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

Under Section 48 of the Protection of the Environment Operations Act 1997 ('POEO Act'), an Environment Protection Licence (EPL) is required if the activity undertaken is listed in Schedule 1. Water storage is not a listed activity and as such an EPL is not required for the proposal.

Chapter 5 of the POEO Act define Environment protection offences and the penalties associated with the offences. The offences include

- Pollution of waters including sedimentation.
- Air pollution caused by:
  - the operation of any plant in such a manner as to cause air pollution;
  - maintenance work on any plant in such a manner as to cause air pollution that is caused by the occupier's failure to carry out that work in a proper and efficient manner.

## 5 Stakeholder and community consultation

### 5.1 Government agency and other stakeholder consultation

Division 1 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 provides for consultation with other agencies as outlined in Table 1.

*Table 1: SEPP (Transport and Infrastructure) 2021 Consultation with Councils Other Agencies Requirements*

Clause	Public authority	Requirement for notification
2.10	Council	Not required – The proposal does not/will not <ul style="list-style-type: none"> <li>a) impact on stormwater management services provided by council,</li> <li>b) generate traffic to an extent that will strain the capacity of the road system in a local government area</li> <li>c) involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council, or</li> <li>d) involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council, or</li> <li>e) involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential, or</li> <li>f) involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the Roads Act 1993.</li> </ul>
2.11	Council	Required – The proposal includes the decommissioning of infrastructure that are local heritage items that are not State heritage items. See 6.5.
2.12	Council	Not required – The proposal is not on flood liable land.
2.13	State Emergency Service	Not required – The proposal is not on flood liable land.
2.14	Council	Not required – The proposal is not with the coastal zone
2.15a and b	Office of Environment and Heritage	Not required – The proposal land is not <ul style="list-style-type: none"> <li>• adjacent to land reserved under the National Parks and wildlife Act 1974.</li> <li>• in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone, other than land reserved under the National Parks and Wildlife Act 1974</li> </ul>
2.15c	Transport for NSW (TfNSW)	Not required - the development does not comprise a fixed or floating structure in or over navigable waters.
2.15d	Director of the Observatory	Not Required – The proposal does not 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,
2.15e	Secretary of the Commonwealth Department of Defence	Not Required – The proposal is not a defence communications facility buffer land.

Clause	Public authority	Requirement for notification
2.15f	Subsidence Advisory	Required – The proposal is in a mine subsidence district within the meaning of the Mine Subsidence Compensation Act 1961. See below

Hunter Water has consulted with Lake Macquarie City Council (Council) and Subsidence Advisory NSW (SA NSW) as shown in Table 1. Letters were sent to Council and SA NSW during August 2022 that provided information on the proposal and invited responses with any issues or concerns.

### **Council**

Council in their response raised the following issues: Roads are to be under bored, where this is not possible, restoration to Councils standards EGSD 703 and EGSD 704; and Contractor to complete “Minor public works” application available on Council’s website prior to starting work on any Council controlled land. All road crossings are to be under-bored. These issues have since been included in the design specification by Hunter Water.

Other consultation has occurred with Council regarding the Proposal in general. Council did not raise heritage issues in the correspondence between Hunter Water and Council reviewed by JME. JME contacted the Council Heritage Office by telephone. A Council Heritage Officer indicated that a Statement of Heritage Impact (SoHI) would be required to assess if a heritage exemption applies provided there was no significant loss to the fabric of the heritage item(s).

### **Subsidence Advisory NSW**

Subsidence Advisory (SA) advised on 26 August that the land is located within a declared mine subsidence district and recommended that a mine subsidence desktop study be undertaken in accordance with their merit assessment policy. This would be undertaken during the detailed design phase of the proposal.

Copies of the consultation emails are in Appendix C.

## **5.2 Community consultation**

### **5.2.1 Consultation with registered Aboriginal parties**

HWC has conducted consultation with the Awabakal Local Aboriginal Land Council and various other local aboriginal corporations, community groups and individuals. A list summarising the consultations can be found in Appendix 1 of Heritage Now Aboriginal Cultural Heritage Assessment Report Cameron Park Reservoir And Water Supply Upgrade (ACHAR), in Appendix D of this REF. The Awabakal Local Aboriginal Land Council communicated that there are many significant ceremonial sites in the area, as well as travelling routes. The location of these routes and places is sensitive information, but Awabakal Local Aboriginal Land Council was able to confirm that the proposed works would not impact the values of these travelling routes and sites.

### **5.2.2 Consultation with nearby residents**

HWC will provide letters to landowners within 200m of construction areas to inform of construction impacts.

# 6 Environmental assessment

## 6.1 Introduction

This section describes the potential construction and operational impacts of the proposal and provides mitigation measures to manage identified impacts.

## 6.2 Assessment Methodology

For each environmental aspect the following is described:

- Existing environment: describe the nature of the aspect at the time of REF preparation. Where appropriate details from specialist reports describing the nature of the environment should be included (e.g. vegetation types and condition).
- Impact assessment: assess the environmental impacts of the proposed works during construction and operation phases.
- Mitigation measures: specify controls to be implemented during the construction and operation of the proposal. Controls should be relevant to the impacts identified. If an impact is not identified, control measures will not be included.

## 6.3 Ecology

### 6.3.1 Existing Environment

An Ecological assessment has been completed for the proposal and is summarised in this section and presented in full in Appendix E.

The proposal site contains vegetation that is commensurate with:

- PCT 1589 - Spotted Gum - Broad-leaved Mahogany - Grey Gum grass - shrub open forest on Coastal Lowlands of the Central Coast; and
- PCT 1619 - Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands.

Neither PCT is associated with an Endangered Ecological Community under the BC Act or EPBC Act.

A threatened flora species, *Tetratheca juncea* (Black-eyed Susan) was found to occur within the proposal site. A total of 29 clumps were found, 14 occurring with the Subject Site while 15 were located outside the Subject Site. Black-eyed Susan is listed as a threatened species under the BC Act and EPBC Act.

The location of PCT 1589, PCT 1619 and the identified clumps of Black-eyed Susan are shown on Figure 3.

The current vegetation on site has good connectivity to the surrounding landscape in all directions although roads acting as potential barriers for less mobile species exist to the north, and east.

No threatened fauna species were recorded within the proposal site.

Parts of the proposal site (Lot 2 DP 1156170 and Lot 2999 DP 1260247), See Figure 4, are within lands that have been established as an offset site for unrelated development. The offset land is proposed to be dedicated to Council by Hammersmith Management Pty Ltd following the 10-year maintenance period in accordance with a Voluntary Planning Agreement (VPA).

### 6.3.2 Impact Assessment

#### 6.3.2.1 Construction Impacts

The proposal will impact 1.32ha of PCT 1589 - Spotted Gum - Broad-leaved Mahogany - Grey Gum grass - shrub open forest on Coastal Lowlands of the Central Coast and 0.93ha of PCT 1619 - Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands. Of this, 0.96ha of PCT 1589 will be removed permanently while 0.36ha will be rehabilitated and the total



0.93ha of PCT 1619 will be rehabilitated. Sixteen (16) Hollow Bearing trees were identified during field surveys nine of these will be removed while seven will be retained.

The EPBC Act listed *Tetratheca juncea* (black-eyed Susan) was identified during targeted surveys conducted within the peak flowering period. The quantitative survey identified twenty-nine (29) clumps in total, fourteen (14) within the Subject Site and fifteen (15) outside the site boundary. A clump is defined as a group of plants not separated by more than 30cm. The proposal will result in the removal of the 14 Black-eyed Susan clumps that are located on the proposal site. The Black-eyed Susan is included in the Matters of National Environmental Significance and as such an EPBC referral for the impact is recommended.

The 5-part test assessed the ecological impact of the proposal could be insignificant or minimal subject to the implementation of mitigation measures.

The proposal will directly impact Lot 2 DP 1156170 and Lot 2999 DP 1260247 of the offset lands as follows:

- 0.33ha of PCT 1589 which exists in a moderate condition will be permanently cleared;
- 0.05ha of PCT 1589 which exists in a moderate condition will be cleared and then rehabilitated; and
- 0.33ha of PCT 1619 which exists in a high-quality state will be cleared and then rehabilitated.

Along with the direct impacts from the proposal indirect impacts must be taken into consideration and will likely include:

- Edge effects which will be managed through a site rehabilitation plan.
- Erosion and impacts of sediment yield which will be managed through an erosion and sediment control plan.

#### 6.3.2.2 Operational Impacts

The proposal would not have operational flora and fauna impacts.

#### 6.3.3 Impact Assessment

Additional surveys for Black-eyed Susan will be undertaken during the flowering period to determine the extents of the local population. Following this survey the supporting Ecology assessment report will be revised to include this additional information and reassess the significance of the impacts associated with the proposal.

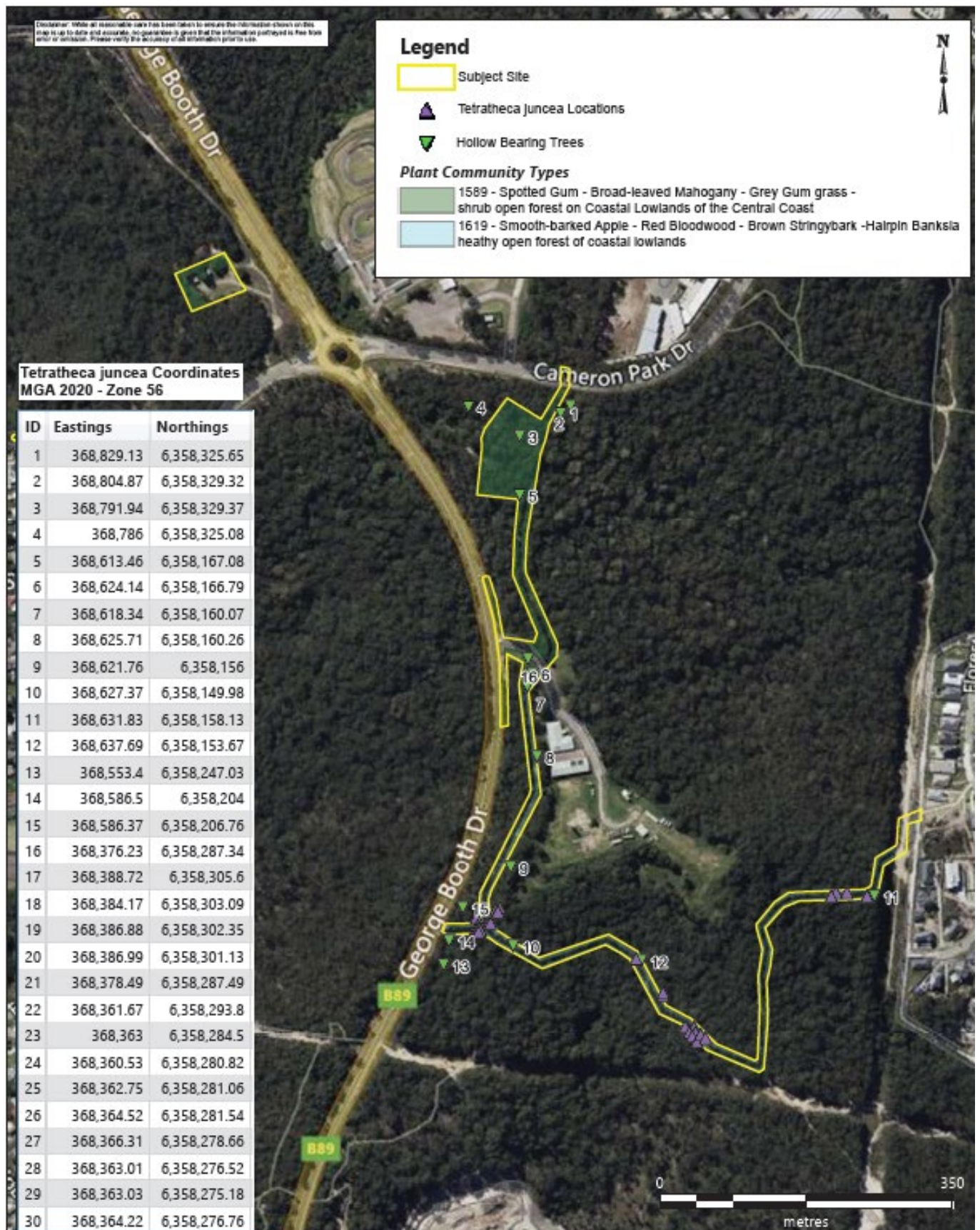
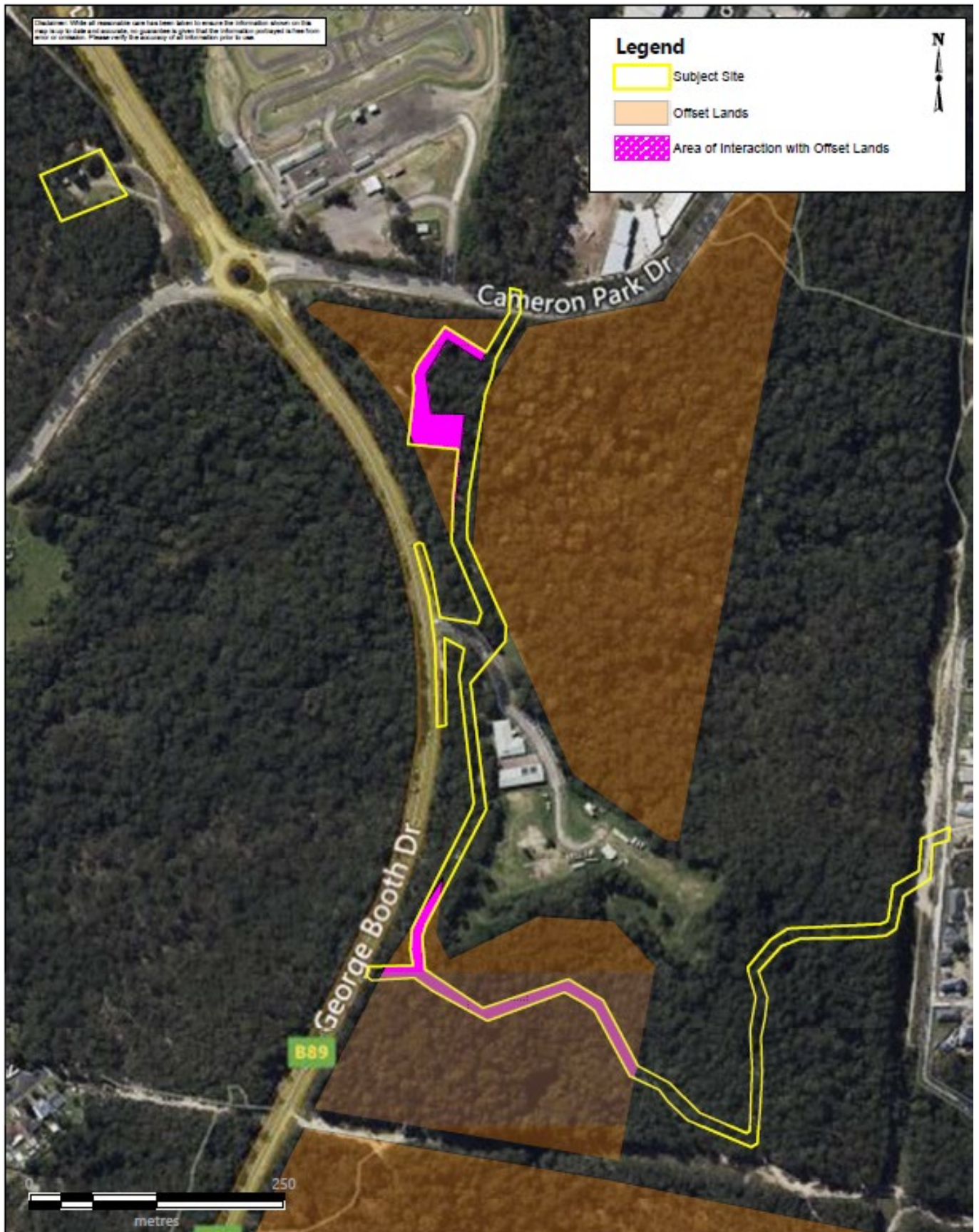


Figure 3: Ecological Impact Plan





**Figure 4: Hammersmith Offset Impact Plan**

### 6.3.4 Mitigation Measures

General recommendations are made for consideration to mitigate potential impacts on local biodiversity as a result of the activity of the site:

- The disturbance footprint for the proposed watermain alignment will be kept to a minimum by limiting access and works to the existing trail as far as practicable. Where possible, equipment and vehicles will remain on existing tracks. The pipeline pathway has been designed to minimise impacts on threatened species, and methods such as hand excavation around trees to be retained should adopted to maximise hollow-bearing tree retention. If any significant trees (habitat and mature trees) are to be removed or their root zones likely to be impacted, an arborist will be present to supervise and advise on construction work near those trees.
- A flora and fauna management plan will be prepared as part of the CEMP.
- Given the cryptic nature of *Tetratheca juncea* outside of the flowering period, plant clumps in close proximity to the disturbance area will be identified with flagging tape by the supervising ecologist prior to works to clearly delineate retained plant clumps. Clumps will then be fenced as 'no go' areas to prevent construction encroachment.
- Any vegetation to be retained will be protected with flagging and a sign installed to protect the vegetation;
- Required clearing of any vegetation on site should be undertaken in the presence of a suitably experienced ecologist to ensure any displaced native fauna can be taken into care and dealt with appropriately.
- Pre-clearance surveys should be undertaken to identify and clearly mark all habitat features including hollow-bearing trees, and observe any occupied hollows prior to felling. Appropriate measures should be devised prior to vegetation removal works to minimise impacts on resident fauna during the felling process;
- Felled trees should remain in situ a minimum of 48 hours to allow any fauna to disperse to retained vegetation to the north and south;
- To mitigate the potential loss of any hollow bearing trees nest boxes are to be installed in retained and adjacent vegetation. Hollows are to be remedied with a 1:1 ratio of replacement. Where possible removed hollows will be salvaged and utilised as nest boxes;
- Impacts of Chytrid and Phytophthora will be managed through the adoption of site hygiene protocols;
- Workers, equipment and vehicles are to remain within the construction zone as far as practicable and avoid entering surrounding vegetated areas. Site induction procedures will include explanation of Phytophthora and its impacts. Further, fauna handling, is to be undertaken only by a qualified ecologist or wildlife carer;
- Rehabilitation should focus on stable landform shaping to facilitate regeneration of native species occurring on site where natural areas are disturbed. No exotic species are to be introduced to site with the exception of sterile cover crops (if appropriate);
- A biodiversity offset package will be developed for the proposal by Hunter Water in consultation with LMCC and the owner of the adjacent offset lands.

## 6.4 Aboriginal cultural heritage

### 6.4.1 Existing Environment

The Aboriginal Cultural Heritage Assessment Report undertaken by Heritage Now Pty Ltd (Appendix D of this REF) noted that the proposal area contains one Aboriginal Heritage Information Management System (AHIMS) registered site that has cultural and archaeological values: AHIMS site 38-4-0989. The AHIMS site card describes this site as an artefact scatter comprising two loci of evidence in the gentle ridge crest south of Cameron Park Drive and east of George Booth Drive. Locus A comprises four artefacts (all red silcrete including flakes, flake portions and a nondescript core) and is in a 40 x 12 m. The artefacts were located on substantial gravel exposures associated with a vehicle track. Locus B comprises three artefacts (including a pink silcrete flake, a brown tuff medial flake portion and brown rhyolite nondescript

core fragment) and is in a 10 x 2 m area. The artefacts were located on an existing vehicle track running south from Cameron Park Drive.

The location of AHIMS Site 38-4-0989 was validated onsite, but none of the seven associated artefacts were identified during survey. It is representative of Aboriginal sites on a local level; however, the site is not rare and is of low research and educational potential. Overall, the site has low significance on a local and regional scale.

## 6.4.2 Impact Assessment

### 6.4.2.1 Construction Impacts

AHIMS site 38-4-0989 lies within the footprint of the Reservoir and the area in which it lays will be completely disturbed. The consequence of this harm will be partial loss of value, as the artefacts will be removed to a safe location in consultation with the Registered Aboriginal Parties (RAPs).

### 6.4.2.2 Operational Impacts

Operational aboriginal cultural heritage impacts are not expected.

## 6.4.3 Mitigation Measures

AHIMS site 38-4-0989 location is protected under the National Parks and Wildlife Act 1974 and thus an Aboriginal Heritage Impact Permit (AHIP) is required to disturb this location. The AHIP must be approved and required heritage works undertaken before the commencement of ground disturbing works on the site. The ongoing AHIP conditions are to also to be abided by for the duration of the proposal.

Before works commence, a heritage induction will be delivered to the siter workers by a heritage consultant before or on the first day of works. A copy of the heritage induction will be provided to the works foreman to deliver to subsequent workers.

If additional, Aboriginal archaeological material is uncovered during the development, then works in that area are to stop and the area is to be cordoned off. The proposal manager is to contact the heritage consultant to make an assessment as to whether the material is classed as Aboriginal object/s under the National Parks and Wildlife Act 1974 and advise on the required management and mitigation measures and if they are covered by the approved AHIP. Works are not to recommence in the cordoned off area until heritage clearance has been given and/or the required management and mitigation measures have been implemented.

In the unlikely event that human remains, or suspected human remains, are uncovered during the development, works in that area are to stop and the area is to be cordoned off. The proposal manager is to contact the NSW Police to establish whether the area is a crime scene. If it is not a crime scene, Heritage NSW is to be notified via the Environment Line on 131 555 and management measures are to be devised in consultation with the local Aboriginal community. Works are not to recommence in the area until the management measures have been implemented.

## 6.5 Non-aboriginal cultural heritage

### 6.5.1 Existing Environment

The Statement of Heritage Impact – West Wallsend Reservoir Report undertaken by Heritage Now Pty Ltd (the SOHI, Appendix F) reported that the WWPS contains the West Wallsend Valve House and Underground Reservoir which are listed in the s170 register and the Lake Macquarie LEP 2014 as high regional, local and group significance. The State Heritage Inventory reports that *“The Valve House and Underground Reservoir represent the provision of safe reticulated municipal water supply to this out-lying district at an unusually early date and demonstrate the enlightened concern of the Government & municipal authorities, for the public’s health. The Valve House is of good quality, evocative of its period & function & highly visible”*.

Table 2: Registered Heritage Items

Item	Listing Type	Listed Name	ID	Significance	Item Type
Reservoir and Valve House	Lake Macquarie LEP	West Wallsend Valve House & Underground Reservoir	207	Local	Built



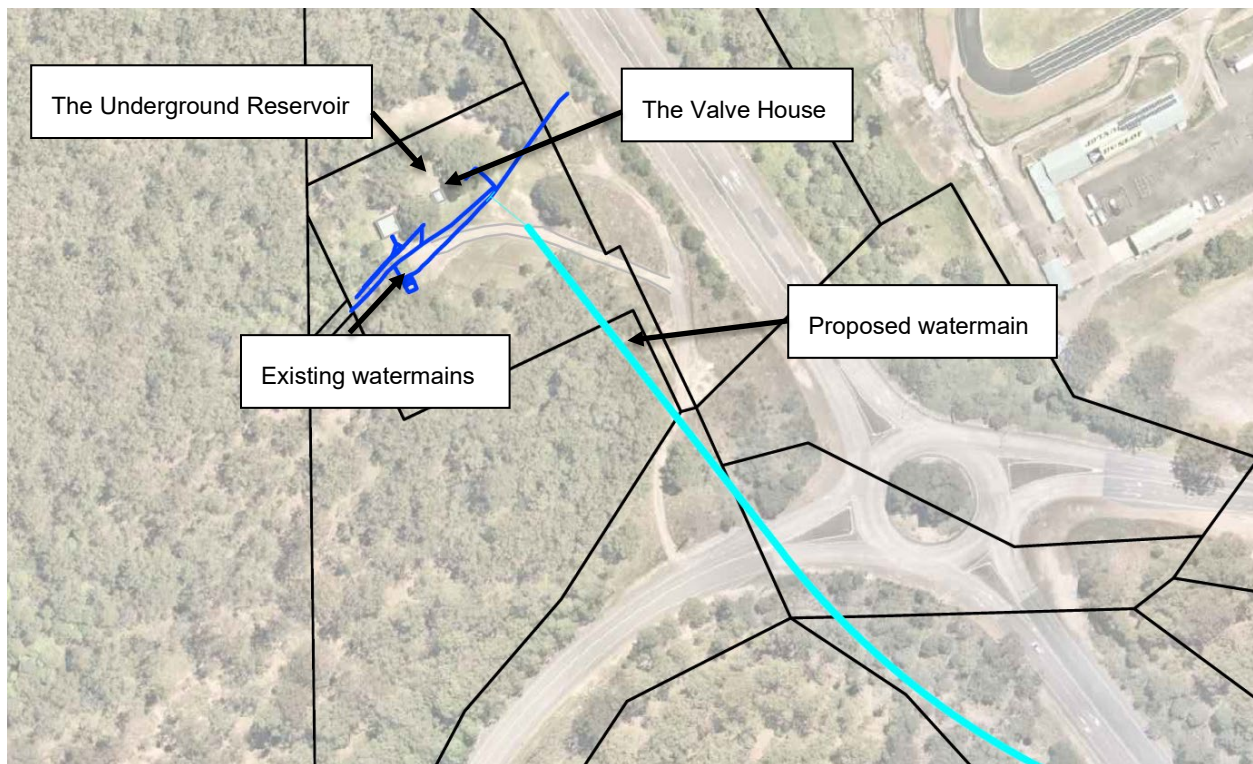
	s170 register	<i>West Wallsend Reservoir and Valve House</i>	-		
West Wallsend Colliery	Lake Macquarie LEP	<i>West Wallsend (No 1) Colliery</i>	220	Local	Archaeological-Terrestrial
	s170 register	<i>Former West Wallsend (No.1) Colliery</i>	-		

The West Wallsend WPS is underlain by the West Wallsend (No 1) Colliery which is listed in the s170 register and the Lake Macquarie LEP 2014. The surficial items in the listings are not located in the vicinity of the West Wallsend WPS. The NSW Subsidence Advisory (NSW SA) advised that the workings are a mixture of bord and pillar first workings and pillar extraction workings. NSW SA records indicate the reservoir site is undermined by pillar extraction workings at depths from approximately 195 to 205m.

## 6.5.2 Impact Assessment

### 6.5.2.1 Construction Impacts

The proposal includes the establishment of new watermains. It also means decommissioning some of the current water infrastructure. The valve house and reservoir are planned to be retained.



**Figure 5:** Local Heritage Plan

The SOHI assessed that the West Wallsend WPS upgrade complies with the Lake Macquarie Development Control Plan 2014. The proposal enhances the Heritage significance of the item by upgrading the water infrastructure to ensure the original purpose of the heritage item continues in new upgraded forms. The proposal will not include the removal or original fabric of the Heritage listed valve house and reservoir. Instead, will restore the historical known setting and its condition.

Filling the reservoir with sand is not a detrimental impact, as sand can easily and safely be removed, and will ensure that the reservoir does not become a safety risk to the general public.

HWC aim to remove some of the watermains that join into the reservoir and valve house. There is one known water pipe which contains heritage significance, 1903/04 pipe line from Minmi. This has heritage significance as being evidence of the Walka pumping scheme being introduced to the area.



### 6.5.2.2 Operational Impacts

Operational heritage impacts are not expected. However, ongoing maintenance of the Valve House will be required.

### 6.5.3 Mitigation Measures

During the construction phase the West Wallsend Reservoir and Valve House will be isolated from the proposal site with temporary fencing and 'no go zone' signage.

Archival recording of the infrastructure and building to be removed should be undertaken. The archival recording should be undertaken in accordance with Photographic Recording of Heritage Items Using Film or Digital Capture (Heritage Office 1994). The archival recording report will be submitted to the local council library for public access, to the local council, and to Hunter Water.

If the 1903/04 pipeline from Minmi is required to be removed by Hunter Water in order to complete the proposal, some intact lengths should be retained next to the valve house, and interpretation signage installed.

A heritage induction is to be provided to all on-site personnel undertaking construction works so that they understand their obligations for protecting heritage under the Heritage Act 1977, which includes the reporting of archaeological or suspected archaeological material.

In the unlikely event archaeological, or suspected archaeological, material is uncovered during works, then works in that area are to cease and the area cordoned off. The material is to be inspected by a heritage consultant and works in that area are only to recommence once heritage clearance has been gained and/or mitigation and management measures implemented.

## 6.6 Noise and Vibration

### 6.6.1 Existing Environment

The closest noise sensitive receivers to the works areas are workers at the Rural Fire Service facility, approximately 25m away, and residences in Floresta Crescent who are approximately 50m away. These receptors will be subject to minor construction activity such as trenching and pipe laying. The closest noise sensitive receivers that may be affected by decommissioning and demolition of the existing West Wallsend water storage are 300 metres to the west of the site and facility are not expected to receive noise from construction activities above 50 dB(A).

Background noise monitoring was undertaken on 24 April 2022 for the following noise catchment areas:

- Floresta Crescent Residents – background sound level 35dB(A)
- The RFS Headquarters – background sound level 55dB(A) and
- West Wallsend Residents – background sound level 45dB(A).

### 6.6.2 Impact Assessment

#### 6.6.2.1 Construction Impacts

A construction noise assessment has been conducted (refer to Appendix G) as a qualitative assessment in accordance with the NSW Interim Construction Noise Guideline (ICNG) and by examining the significant plant items and activities that have the potential to cause a noise impact on nearby neighbours. The evaluation of construction noise impacts shows that there will be times during the project when residents in Floresta Crescent may be noise affected but not highly noise affected (ie sound levels above 75 dB(A)).

In general construction noise levels within adjacent dwellings when windows and doors are closed will be below 45 dB(A) which is consistent with the recommended internal sound levels for those dwellings most affected by construction activities.

None of the proposed work areas that may generate construction vibration are close enough to buildings that there is a risk of adverse impacts arising from vibration caused by construction activities.

### 6.6.2.2 Operational Impacts

Whilst the detailed design of the infrastructure has not been completed, it is foreseeable that noise or vibration could be generated from:

- Delivery trucks;
- Maintenance activities;
- Reservoir pumps; and
- PRV.

However, given the distance from the infrastructure to the nearest residence and the background noise levels (particularly the busy roads adjacent to the site), it is not expected that that this would have a significant impact.

### 6.6.3 Mitigation Measures

The acoustic assessment recommended that a construction noise and vibration management plan should be put in place as outlined in Appendix A of the acoustic assessment. The construction noise strategy includes:

- Provide at least seven (7) days' notice to affected receivers prior to starting work unless it is emergency works or it is discussed with the affected receivers face-to-face. Include the following information in notification letters:
  - a description of the works and why they are being undertaken
  - details of the works that will be noisy
  - work hours and expected duration
  - what is being done to minimise the impacts (e.g. respite periods)
  - 24 hour contact number.
- Works will be carried out during standard work hours (i.e. 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday). For any work that is performed outside normal work hours or on Sunday or public holidays, the contractor must complete the Hunter Water OOHW Approval Form and adhere to the OOHW Construction Noise Guideline.
- All vehicles and plant will be turned off when not in use.
- All stationary and mobile equipment will be fitted with mufflers and in serviceable condition. Generators, if used are to have soundproof enclosures.
- Personnel will be inducted and trained in noise control measures to reduce impacts on receivers during inductions and toolbox talks.
- A complaint management procedure will be developed. Community complaints will be allocated to a responsible contractor representative immediately to facilitate investigation, respond to the complainant, review noise mitigation measures and to implement any corrective actions. The details of the complaint will also be circulated to the applicable construction personnel for action, where required.
- Construction vehicles including trucks will not be allowed to queue on local roads or if it is required for safety reasons, engines will be switched off.
- Where possible, all plant are to utilise a broad band reverse alarm and the need for reversing manoeuvres will be minimised.
- Deliveries will be scheduled during standard work hours only.
- Should persistent complaints arise, then an appropriately qualified Acoustic Consultant should be engaged to assess the sound or vibration levels in accordance with the NSW Interim Construction Noise Guide and to recommend remedial action as required.

## 6.7 Soils and geology

### 6.7.1 Existing Environment

The landform is comprised of undulating to rolling hills and low hills on the Newcastle Coal Measures of the Awaba Hills region. Elevation 50–160 m, local relief 30–100 m, slopes are 3–20%. The proposal is located in a mine subsidence district. The soils qualities and limitations are high water erosion hazard, foundation hazard (localised), shallow soils (localised), seasonal waterlogging (localised), sodic/dispersible soils of low wet strength. The site is situated in an area not mapped for the probability of the occurrence of acid sulfate soils.

### 6.7.2 Impact Assessment

#### 6.7.2.1 Construction impacts

The proposed works will involve ground disturbance including excavation of rock and soil for the reservoir construction and trenching of soils of the pipeline alignments. This has a risk of sediment being mobilised and washed away in stormwater that may leave the site. This may be enhanced with the removal of trees and their roots that provide additional soil stability. There are potential risks of soil erosion and sedimentation impacts. As such measures have been proposed in Section 6.7.3 to minimize these potential impacts.

#### 6.7.2.2 Operational Impacts

There are no ongoing impacts on the site soil from the operation of the Reservoir.

### 6.7.3 Mitigation Measures

An Erosion and Sedimentation Control Plan will be prepared and implemented as necessary and would incorporate appropriate erosion and sediment control measures in accordance with Landcom's Managing Urban Stormwater, Soils & Construction Guidelines (The Blue Book). Where over 2,500m<sup>2</sup> of soil is being disturbed as a result of the works, a Soil and Water Management Plan would be implemented.

Erosion and sedimentation control measures will be maintained regularly and after rainfall events in accordance with the Blue Book.

Erosion and sedimentation control measures will not be removed until disturbed areas have stabilised.

Disturbed areas will be stabilised during construction works where necessary and revegetation of previously vegetated areas will be undertaken after works are complete, in line with the Blue Book.

Any excess spoil following construction will be seeded to minimise the likelihood of it being transported offsite through wind or water action. Alternatively, it will be removed off site for disposal in accordance with the EPA Waste Classification Guidelines or a Site Specific Resource Recovery Order and Exemption.

## 6.8 Water Quality and Hydrology

### 6.8.1 Existing Environment

Cocked Hat Creek headwaters are approximately 190m downslope of the Reservoir site. Cocked Hat Creek flows through the suburbs of Cameron Park and Edgeworth and serves as the primary receptor of urban stormwater runoff for these suburbs. Cocked Hat Creek discharges into Brush Creek near the confluence of Cockle Creek. Groundwater beneath the proposal site is assumed to be in banded coal seams between 15 and 20 metres below the surface. A Geotechnical assessment undertaken by Aurecon did not intercept groundwater in shallow excavations up to 6.7m below ground surface.

A search of the Water NSW real-time data shows the nearest groundwater bore is approximately 1.7km from the Proposal in the suburb of Holmesville. The bore is 5.25m deep and drilled into sandstone from approximately 0.7m. The bore is drilled within the low-lying areas of Holmesville approximately 90m below the height of the elevation of the proposed reservoir.

## 6.8.2 Impact Assessment

### 6.8.2.1 Construction Impacts

The main potential impact during construction is sediments being washed into Cocked Hat Creek during rainfall events. The proposed works are unlikely to impact the local groundwater.

The proposal:

- will not involve a creek crossing;
- is not located on a floodplain;
- does not involve the diversion of a creek;
- is not expected to intercept groundwater; and
- will not require a licence under the Water Act 1912 or the Water Management Act 2000, A Controlled Activity Approval is not required.

### 6.8.2.2 Operational Impacts

The ongoing operation of the Reservoir is unlikely to impact on Cocked Hat Creek and the local groundwater.

Although not anticipated, should groundwater extraction be required during construction, a Water Supply Works approval will be sought from NRAR. Any dewatering of groundwater should be undertaken in accordance with an approved Dewatering Management Plan (DMP).

## 6.8.3 Mitigation Measures

Sediment mitigation measures are included in Section 6.6.3.

Although not anticipated, should groundwater extraction be required during construction, a Water Supply Works approval will be sought from NRAR. Any dewatering of groundwater should be undertaken in accordance with an approved Dewatering Management Plan (DMP).

## 6.9 Air Quality and Energy

### 6.9.1 Existing Environment

The subject land is located in the lower Hunter Valley. Coal mining and coal-fired power generation are major economic activities that have potential to impact the air quality on a regional basis. The nearest operating coal mine is approximately 5km south of the site. The nearest operating coal fired power station is approximately 19km south of the site. The subject is adjacent to two main roads, George Booth Drive and Cameron Park Drive.

The nearest NSW EPA air quality monitoring station is located off Frances Street, Wallsend, approximately 7 km east of the reservoir site. A review of the previous year's air quality data published on the <https://www.dpie.nsw.gov.au/air-quality/air-quality-data-services/data-download-facility> website indicates that the Air Quality Category at Wallsend is 'Good'.

### 6.9.2 Impact Assessment

#### 6.9.2.1 Construction Impacts

Construction traffic and activities may intermittently affect local air quality but is unlikely to contribute to permanent reductions in air quality. Airborne dust is also likely to be generated by excavation works and vehicle movements, although these are considered to be minor and unlikely to exceed regional ambient air quality threshold levels for particulate matter less than 10 micrometres in diameter (PM<sub>10</sub>), particulate matter less than 2.5 micrometres in diameter (PM<sub>2.5</sub>) and deposited dust. The threshold level for PM<sub>10</sub> and PM<sub>2.5</sub> are summarised in Table 3.

Table 3: Air Quality Threshold Levels

Air Quality Parameter	Averaging Period	Threshold value
PM <sub>10</sub>	1 day	50 µg/m <sup>3</sup>
	1 year	25 µg/m <sup>3</sup>

PM <sub>2.5</sub>	1 day	50 µg/m <sup>3</sup>
	1 year	25 µg/m <sup>3</sup>
Deposited Dust	1 month	4 g/m <sup>2</sup> /month <sup>a</sup>
	1 month	2 g/m <sup>2</sup> /month <sup>b</sup>

<sup>a</sup> Total impact (i.e. incremental increase in concentrations due to the project plus background concentrations due to all other sources);

<sup>b</sup> Incremental impact (i.e. incremental increase in concentrations due to the project on its own);

Greenhouse gases (GHGs) are gases found in the atmosphere that absorb heat that is reflected from the earth's surface. The primary GHG is carbon dioxide (CO<sub>2</sub>).

The National Greenhouse Accounts Factors provide three types of assessment categories:

- Scope 1, which covers direct emissions from sources within the boundary of an organisation, such as fuel combustion and manufacturing processes
- Scope 2, which covers indirect emissions from the consumption of purchased electricity, steam or heat produced by another organisation
- Scope 3, which includes all other indirect emissions that are a consequence of an organisation's activities but are not from sources owned or controlled by the organisation.

The construction activities likely to generate GHGs are:

- Vehicles, plant and equipment used during construction (Scope 1 emissions)
- Emissions from off-site facilities which produce the materials used for construction of the upgrades (Scope 3 emissions).

While the proposal includes the construction of new infrastructure, this would be balanced by the decommissioning of redundant infrastructure. The change in GHG emissions generated at the site is therefore expected to be negligible.

Construction odour emissions are expected to be negligible.

#### 6.9.2.2 Operational Impacts

The ongoing operation of the Reservoir will generate indirect emissions from the consumption of electricity during operation of the site (Scope 2 emissions) Operational dust air quality impacts and odour impacts are not expected.

#### 6.9.3 Mitigation Measures

During construction, the following measures will be considered and implemented where possible:

- Plant and equipment will be switched off when not in use
- Vehicles, plant and construction equipment will be appropriately sized for the task and properly maintained so as to achieve optimum fuel efficiency
- Materials will be delivered with full loads and will come from local suppliers, where possible
- Energy efficiency and related carbon emissions will be considered when selecting vehicles and equipment
- Apply watering to exposed areas, haulage routes and stockpiled materials as identified to be required, and in preparation for windy conditions
- Cover stockpiled materials if not to be used for extended periods
- Regularly review local meteorological conditions and scale back or suspend activities as necessary during inclement (i.e., dry, windy) conditions
- Remove debris from plant and vehicles prior to entering the existing road network, and apply street sweeping as necessary to remove any tracked materials from the site
- Potentially dust generating work will not be carried out during strong winds. The Bureau of Meteorology considers winds to be strong when:
  - the wind speed is between 22-27 knots; and/or



- large tree branches are in motion; and/or
- whistling can be heard in telephone wires; and/or
- Umbrellas are used with difficulties.

## 6.10 Contamination

### 6.10.1 Existing Environment

A formal contamination assessment was not deemed necessary by HWC. During an initial site walkover a JME environmental scientist noted some bonded asbestos in the form of corrugated fibre sheeting was located outside the eastern boundary of the Reservoir site, See Photograph 1. Some black plastic wrapped parcels presumed to contain asbestos were located near the northern boundary of the Reservoir site, see Photographs 2 and 3.

A review of the NSW EPA's public register of contaminated sites under Section 58 of the Contaminated Land Management Act 1997 (the CLM Act) on 24 June 2022 revealed no properties with records in either Cameron Park or West Wallsend.

#### 6.10.1.1 Construction Impacts

The asbestos containing materials cause a risk of asbestos fibre inhalation to construction workers. During construction, there may be some storage and use of fuel and chemicals at the site which are used in construction and other site operations. These are generally in small volumes and do not create significant risk to the surrounding area.

#### 6.10.1.2 Operational Impacts

Operational contamination impacts are not expected.



**Photograph 1:** Corrugated asbestos containing fibre cement sheeting





**Photograph 2:** Presumed asbestos bundle



**Photograph 3:** Presumed Asbestos Bundles

### 6.10.2 Mitigation Measures

Prior to construction mobilisation, the asbestos containing materials must be removed from the proposal site by Class A or Class B licenced asbestos removalist. Following the removal a clearance inspection must be undertaken by a licenced asbestos assessor or a person who is competent in the identification of asbestos containing products.

The Construction Environmental Management Plan will include procedures for the handling and storage of fuels and chemicals to ensure that risks to the surrounding area are minimised. If any contaminated material (e.g. asbestos) is encountered during excavation for the footings or trenches, work shall cease, the site secured, and a safe work method statement(s) and appropriate documented practices will be implemented.

## 6.11 Waste Management

### 6.11.1 Existing Environment

The subject land and surrounding land are predominantly vacant. There was some anthropogenic waste, including household garbage, asbestos, and burnt-out cars, dumped at various locations in the proposal area.

### 6.11.2 Impact Assessment

#### 6.11.2.1 Construction Impacts

It is likely that some excess building materials would be produced due to the construction work, such as miscellaneous waste associated with packaging and transport of materials and equipment and various other manufactured items forming part of the works. Excavation required for construction may result in excess spoil.

#### 6.11.2.2 Operational Impacts

Operational waste impacts are not expected.

### 6.11.3 Mitigation Measures

Resource management hierarchy principles are to be followed (in accordance with the Waste Avoidance & Resource Recovery Act 2001) and detailed in the Contractors CEMP:

- avoid unnecessary resource consumption as a priority
- avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery)
- disposal is undertaken as a last resort.

All waste generated during the course of the works will be reused or removed from the work areas as soon as practicable and disposed of in accordance with waste regulations. Excess spoil that is generated at the site that cannot be reused must be disposed of in accordance with the NSW EPA Waste Classification Guidelines.

Evidence of the lawful disposal or reuse of waste will be retained and provided to the HWC Project Manager on request.

The work site(s) will be left clean and free of weeds, debris, and other rubbish at the end of works.

Handling and disposal of excess soils is discussed in Section 6.3.

## 6.12 Bushfire

### 6.12.1 Existing Environment

The subject land was identified as bushfire prone land. The proposal land was identified as containing primarily Category 1 vegetation with some Category 2 vegetation.

### 6.12.2 Impact Assessment

#### 6.12.2.1 Construction Impacts

Construction works within bushfire prone areas raise two (2) primary issues in relation to bushfire hazards:

- Potential for works to start a fire through the generation of ignition sources from work areas.
- Possible danger to workers in bushfire prone areas.

#### 6.12.2.2 Operational Impacts

When the reservoir is erected, it is unlikely that it will present any additional impact to bushfire hazard. The reservoir will not be permanently staffed during operation.

### 6.12.3 Mitigation Measures

To reduce the potential for ignition sources during construction, care needs to be undertaken with any activities which may generate sparks or flame into adjoining bushland. Rather than try to limit or control such activities, it is suggested that work areas be provided with a firefighting water supply (backpack spray) and a fire extinguisher which can be used to extinguish small fires before they develop into larger fires.

The danger to workers is not considered to be a significant issue, given that they will be alert and aware of their surrounding environment. The site has alternate evacuation routes and the RFS is stationed adjacent to the proposal site. It is recommended that evacuation procedures be incorporated into a Construction Management Plan and as part of WHS induction to the site.

AS 3959-2009 provides construction requirements for building in bushfire prone areas. While these controls are usually applied to residential buildings, they can also be used for other forms of construction. AS 3959 examines the proximity of buildings to unmanaged vegetation and provides construction requirements to address likely bushfire attack from radiant heat, embers, or flame attack.

Buildings should be designed with reference to AS 3959-2009. The access to and within the site is suitable and will be consistent with the NSW Rural Fire Service Guidelines. Water supply and provision of hydrants on-site will provide access for firefighting supply.

The detail design contractor should:

- i) assess Asset Protection Zone and bushfire protection requirements without clearing beyond HW property or road easement
- ii) address bushfire controls with measures such as: monitoring weather forecasts, hot work permits, restricting works on total fire ban days.
- iii) Refer to AS3959-2009 during the detailed design process.

## 6.13 Cumulative Impacts

The proposal will impact on established Biodiversity Offset area for an adjacent project. This will result in a loss 0.33ha of PCT 1589 which exists in a moderate condition which will be permanently cleared.

## 7 Mitigation Measures Summary

The mitigation measures required to manage the environmental impacts are summarised in Table 3. These

Table 3: Mitigation Measures Summary

Aspect	Mitigation measure	Timing	Responsibility
Ecology	The disturbance footprint for the proposed watermain alignment will be kept to a minimum by limiting access and works to the existing trail as far as practicable. Where possible, equipment and vehicles will remain on existing tracks. The pipeline pathway has been designed to minimise impacts on threatened species, and methods such as hand excavation around trees to be retained should adopted to maximise hollow-bearing tree retention. If any significant trees (habitat and mature trees) are to be removed or their root zones likely to be impacted, an arborist will be present to supervise and advise on construction work near those trees.	Site preparation and construction	Contractor
	A biodiversity offset package will be developed for the proposal by Hunter Water in consultation with LMCC and the owner of the adjacent offset lands	Pre-construction	Hunter Water
	A flora and fauna management plan will be prepared as part of the CEMP.	Pre- construction	Contractor/Ecologist
	Tetratheca juncea clumps, in close proximity to the disturbance area, will be identified with flagging tape by the supervising ecologist prior to works to clearly delineate retained plant clumps. Clumps will then be fenced as 'no go' areas to prevent construction encroachment.	Pre- construction	Contractor/Ecologist
	Any vegetation to be retained will be protected with flagging and a sign installed to protect the vegetation	Pre- construction	Contractor
	Pre-clearance surveys should be undertaken to identify and clearly mark all habitat features including hollow-bearing trees and observe any occupied hollows prior to felling. Appropriate measures should be devised prior to vegetation removal works to minimise impacts on resident fauna during the felling process	Pre- construction	Contractor
	Felled trees should remain in situ a minimum of 48 hours to allow any fauna to disperse to retained vegetation to the north and south	Pre- construction	Contractor
	To mitigate the potential loss of any hollow bearing trees nest boxes are to be installed in retained and adjacent vegetation. Hollows are to be remedied with a 1:1 ratio of replacement. Where possible removed will be salvaged and utilised as nest boxes	Pre- construction	Contractor
	Impacts of Chytrid and Phytophthora will be managed through the adoption of site hygiene protocols	Site preparation and construction	Contractor
	Ecology	Workers, equipment and vehicles are to remain within the construction zone as far as practicable and avoid entering surrounding vegetated areas.	Site preparation and construction



<b>Aspect</b>	<b>Mitigation measure</b>	<b>Timing</b>	<b>Responsibility</b>
	Site induction procedures will include explanation of Phytophthora and its impacts.		
	Fauna handling, is to be undertaken only by a qualified ecologist or wildlife carer	Site preparation and construction	Contractor
	Rehabilitation should focus on stable landform shaping to facilitate regeneration of native species occurring on site where natural areas are disturbed. No exotic species are to be introduced to site with the exception of sterile cover crops (if appropriate).	Post-construction	Contractor
Aboriginal Cultural Heritage	AHIMS site 38-4-0989 location is protected under the National Parks and Wildlife Act 1974 and thus an Aboriginal Heritage Impact Permit (AHIP) is required to disturb this location. The AHIP must be approved and required heritage works undertaken before the commencement of ground disturbing works on the site. The ongoing AHIP conditions are to also to be abided by for the duration of the proposal.	Pre- construction	Heritage Consultant/Contractor
	If additional, Aboriginal archaeological material is uncovered during the development, then works in that area are to stop and the area is to be cordoned off. The proposal manager is to contact the heritage consultant to make an assessment as to whether the material is classed as Aboriginal object/s under the National Parks and Wildlife Act 1974 and advise on the required management and mitigation measures and if they are covered by the approved AHIP. Works are not to recommence in the cordoned off area until heritage clearance has been given and/or the required management and mitigation measures have been implemented.	Site preparation and construction	Contractor
	In the unlikely event that human remains, or suspected human remains, are uncovered during the development, works in that area are to stop and the area is to be cordoned off. The proposal manager is to contact the NSW Police to establish whether the area is a crime scene. If it is not a crime scene, Heritage NSW is to be notified via the Environment Line on 131 555 and management measures are to be devised in consultation with the local Aboriginal community. Works are not to recommence in the area until the management measures have been implemented.	Site preparation and construction	Contractor
Non-Aboriginal Cultural Heritage	West Wallsend Reservoir and Valve House will be isolated from the proposal site with temporary fencing and 'no go zone' signage.	Site preparation	Contractor
	Archival recording of the infrastructure and building to be removed should be undertaken. The archival recording should be undertaken in accordance with Photographic Recording of Heritage Items Using Film or Digital Capture (Heritage Office 1994). The archival recording report will be submitted to the local council library for public access, to the local council, and to Hunter Water.	Site preparation	Heritage Consultant/Contractor

<b>Aspect</b>	<b>Mitigation measure</b>	<b>Timing</b>	<b>Responsibility</b>
	If the 1903/04 pipeline from Minmi is required to be removed by Hunter Water in order to complete the proposal, some intact lengths should be retained next to the valve house, and interpretation signage installed.	Site preparation and construction	Contractor
	A heritage induction is to be provided to all on-site personnel undertaking construction works so that they understand their obligations for protecting heritage under the Heritage Act 1977, which includes the reporting of archaeological or suspected archaeological material. In the unlikely event archaeological, or suspected archaeological, material is uncovered during works, then works in that area are to cease and the area cordoned off. The material is to be inspected by a heritage consultant and works in that area are only to recommence once heritage clearance has been gained and/or mitigation and management measures implemented.	Site preparation and construction	Heritage Consultant/Contractor
	In the unlikely event archaeological, or suspected archaeological, material is uncovered during works, then works in that area are to cease and the area cordoned off. The material is to be inspected by a heritage consultant and works in that area are only to recommence once heritage clearance has been gained and/or mitigation and management measures implemented.	Site preparation and construction	Contractor
Noise and Vibration	Provide at least seven (7) days' notice to affected receivers prior to starting work unless it is emergency works or it is discussed with the affected receivers face-to-face. Include the following information in notification letters: <ul style="list-style-type: none"> <li>• a description of the works and why they are being undertaken</li> <li>• details of the works that will be noisy</li> <li>• work hours and expected duration</li> <li>• what is being done to minimise the impacts (e.g. respite periods)</li> <li>• 24 hour contact number.</li> </ul>	Site preparation and construction	Contractor
	Works will be carried out during standard work hours (i.e. 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday). For any work that is performed outside normal work hours or on Sunday or public holidays, the contractor must complete the Hunter Water OOHW Approval Form and adhere to the OOHW Construction Noise Guideline.	Site preparation and construction	Contractor
	All vehicles and plant will be turned off when not in use.	Site preparation and construction	Contractor
	All stationary and mobile equipment will be fitted mufflers and in serviceable condition. Generators, if used are to have soundproof enclosures.	Site preparation and construction	Contractor
	A complaint management procedure will be developed. Community complaints will be allocated to a responsible contractor representative immediately to facilitate investigation, respond to the complainant,	Site preparation and construction	Contractor

Aspect	Mitigation measure	Timing	Responsibility
	review noise mitigation measures and to implement any corrective actions. The details of the complaint will also be circulated to the applicable construction personnel for action, where required.		
	Construction vehicles including trucks will not be allowed to queue on local roads or if it is required for safety reasons, engines will be switched off.	Site preparation and construction	Contractor
	Where possible, all plant are to utilise a broad band reverse alarm and the need for reversing manoeuvres will be minimised.	Site preparation and construction	Contractor
	Deliveries will be scheduled during standard work hours only	Site preparation and construction	Contractor
	Should persistent complaint arise, then an appropriately qualified Acoustic Consultant should be engaged to assess the sound or vibration levels in accordance with the NSW Interim Construction Noise Guide and to recommend remedial action as required	Site preparation and construction	Contractor
Soils and Geology	An Erosion and Sedimentation Control Plan will be prepared and implemented as necessary and would incorporate appropriate erosion and sediment control measures in accordance with Landcom's Managing Urban Stormwater, Soils & Construction Guidelines (The Blue Book). Where over 2,500m <sup>2</sup> of soil is being disturbed as a result of the works, a Soil and Water Management Plan would be implemented.	Pre- construction	Contractor
	Erosion and sedimentation control measures will be maintained regularly and after rainfall events in accordance with the Blue Book.	Site preparation and construction	Contractor
	Erosion and sedimentation control measures will not be removed until disturbed areas have stabilised.	Site preparation and construction	Contractor
	Disturbed areas will be stabilised during construction works where necessary and revegetation of previously vegetated areas will be undertaken after works are complete, in line with the Blue Book.	Site preparation and construction	Contractor
	Any excess spoil following construction will be seeded to minimise the likelihood of it being transported offsite through wind or water action. Alternatively, it will be removed off site for disposal in accordance with the EPA Waste Classification Guidelines or a Site Specific Resource Recovery Order and Exemption.	Site preparation and construction	Contractor
Water Quality and Hydrology	Although not anticipated, should groundwater extraction be required during construction, a Water Supply Works approval will be sought from NRAR. Any dewatering of groundwater should be undertaken in accordance with an approved Dewatering Management Plan (DMP)	Site preparation and construction	Contractor
Air Quality	Plant and equipment will be switched off when not in use	Site preparation and construction	Contractor
	Vehicles, plant and construction equipment will be appropriately sized for the task and properly	Site preparation and construction	Contractor

Aspect	Mitigation measure	Timing	Responsibility
	maintained so as to achieve optimum fuel efficiency		
	Materials will be delivered with full loads and will come from local suppliers, where possible	Site preparation and construction	Contractor
	Energy efficiency and related carbon emissions will be considered when selecting vehicles and equipment	Site preparation and construction	Contractor
	Apply watering to exposed areas, haulage routes and stockpiled materials as identified to be required, and in preparation for windy conditions	Site preparation and construction	Contractor
	Cover stockpiled materials if not to be used for extended periods	Site preparation and construction	Contractor
	Regularly review local meteorological conditions and scale back or suspend activities as necessary during inclement (i.e., dry, windy) conditions	Site preparation and construction	Contractor
	Remove debris from plant and vehicles prior to entering the existing road network, and apply street sweeping as necessary to remove any tracked materials from the site	Site preparation and construction	Contractor
	Potentially dust generating work will not be carried out during strong winds.	Site preparation and construction	Contractor
Contamination	Prior to construction mobilisation, the asbestos containing materials must be removed from the proposal site by Class A or Class B licenced asbestos removalist. Following the removal a clearance inspection must be undertaken by a licenced asbestos assessor or a person who is competent in the identification of asbestos containing products.	Site preparation	Contractor
	The Construction Environmental Management Plan will include procedures for the handling and storage of fuels and chemicals to ensure that risks to the surrounding area are minimised. If any contaminated material (i.e. asbestos) is encountered during excavation for the footings or trenches, work shall cease, the site secured and a safe work method statement(s) and appropriate documented practices will be implemented.	Pre- construction	Contractor
Waste Management	Resource management hierarchy principles are to be followed (in accordance with the Waste Avoidance & Resource Recovery Act 2001) and detailed in the Contractors CEMP: <ul style="list-style-type: none"> <li>• avoid unnecessary resource consumption as a priority</li> <li>• avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery)</li> <li>• disposal is undertaken as a last resort.</li> </ul>	Site preparation and construction	Contractor
	All waste generated during the course of the works will be reused or removed from the work areas as soon as practicable and disposed of in accordance with waste regulations. Excess spoil that is generated at the site that cannot be	Site preparation and construction	Contractor



<b>Aspect</b>	<b>Mitigation measure</b>	<b>Timing</b>	<b>Responsibility</b>
	reused must be disposed of in accordance with the NSW EPA Waste Classification Guidelines.		
	Evidence of the lawful disposal or reuse of waste will be retained and provided to the HWC Project Manager on request.	Site preparation and construction	Contractor
	The work site(s) will be left clean and free of weeds, debris and other rubbish at the end of works.	Site preparation and construction	Contractor
	Handling and disposal of excess soils is discussed in Section 6.3.	Site preparation and construction	Contractor
Bushfire	To reduce the potential for ignition sources during construction, care needs to be undertaken with any activities which may generate sparks or flame into adjoining bushland. Rather than try to limit or control such activities, it is suggested that work areas be provided with a firefighting water supply (backpack spray) and a fire extinguisher which can be used to extinguish small fires before they develop into larger fires.	Site preparation and construction	Contractor
	The danger to workers is not considered to be a significant issue, given that they will be alert and aware of their surrounding environment. The site has alternate evacuation routes and the RFS is stationed adjacent to the proposal site. It is recommended that evacuation procedures be incorporated into a Construction Management Plan and as part of WHS induction to the site.	Site preparation and construction	Contractor
	AS 3959-2009 provides construction requirements for building in bushfire prone areas. While these controls are usually applied to residential buildings, they can also be used for other forms of construction. AS 3959 examines the proximity of buildings to unmanaged vegetation and provides construction requirements to address likely bushfire attack from radiant heat, embers, or flame attack.	Detailed Design Phase	Design Engineer
	Buildings should be designed with reference to AS 3959-2009. The access to and within the site is suitable and will be consistent with the NSW Rural Fire Service Guidelines. Water supply and provision of hydrants on-site will provide access for firefighting supply.	Detailed Design Phase	Design Engineer

## 8 Conclusion

This REF was prepared to assess the potential environmental impacts of the construction and operation of the Cameron Park Reservoir Proposal. During construction, the main potential environmental impacts of the project are vegetation clearing and disturbance of aboriginal artefacts.

There are no expected impacts from the operation of the Cameron Park Reservoir.

The proposal is required to cater for the predicted growth in demand for water servicing in the West Wallsend/Edgeworth/Minmi area.

The proposal has been considered against the principles of ecologically sustainable development (ESD) in Table 4.

Table 4: Consideration of principles of ecologically sustainable development (ESD)

Principle	Consideration in the proposal
Precautionary principle - if there are threats of serious or irreversible environmental damage, lack of scientific uncertainty should not be a reason for postponing measures to prevent environmental degradation. Public and private decisions should be guided by careful evaluation to avoid serious or irreversible damage to the environment where practicable, and an assessment of the risk-weighted consequences of various options.	<p>The project will not result in serious or irreversible environmental damage and there is no scientific uncertainty relating to the proposal.</p> <p>The proposal is designed to locate pipes in disturbed road corridors and access tracks where possible to minimise environmental impact.</p> <p>Vegetation impacts in offsets areas can be rehabilitated at the completion of the proposal</p>
Inter-generational equity - the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	The project will help to meet the needs of future generations by providing water servicing and improving system resilience.
Conservation of biological diversity and ecological integrity - conservation of the biological diversity and ecological integrity should be a fundamental consideration in environmental planning and decision-making processes.	The project will not have a significant impact on biological diversity or ecological integrity. The proposal will require clearing of native vegetation. However, the proposal was designed to minimise clearing by constructing pipelines along road corridors and access tracks.
Improved valuation, pricing, and incentive mechanisms - environmental factors should be included in the valuation of assets and services, such as 'polluter pays', the users of goods and services should pay prices based on the full life cycle costs (including use of natural resources and ultimate disposal of waste) and environmental goals.	The project will provide cost efficient use of resources and provide optimum outcomes for the community, environment and with respect to financial cost.

It is considered that, given the nature, scale and extent of impacts and implementation of the mitigations outlined in this REF, the proposed work is unlikely to have a significant impact on the environment and an environmental impact statement is not required under Division 5.1 of the EP&A Act.

## 9 Declaration

This Review of Environmental Factors provides a true and fair review of the activity in relation to its likely impact on the environment. It addresses to the fullest extent possible, all the factors listed in Section 171 of the Environmental Planning and Assessment Regulation 2021 and the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999.

.....

Signed

Position:

# Appendix A      Ref Impact Area Drawing



# Appendix B      Reservoir Site Plan

# Appendix C      Consultation

Appendix D  
Report

Aboriginal Cultural Heritage Assessment

# Appendix E      Ecological Assessment Report



# Appendix F      Non-Aboriginal Heritage Assessment

# Appendix G      Noise and Vibration Assessment