Review of Environmental Factors

Avon Reservoirs Reline and Roof Repair
(April, 2025)

Sydney WATER

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Determination

This Review of Environmental Factors (REF) assesses potential environmental impacts of Avon Reservoirs Reline and Roof Repair. The REF was prepared under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Sydney Water both the proponent and determining authority.

The Sydney Water Project Manager is accountable for ensuring the proposal is carried out as described in this REF. Additional environmental impact assessment may be required if the scope of work or work methods described in this REF change significantly following determination.

Decision Statement

The main potential construction environmental impacts of the proposal include impacts such as vegetation clearing and soil erosion. During operation, it is unlikely that any adverse impacts will be experienced. The proposal will not be carried out in a declared area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities, or their habitats. Therefore, a Species Impact Statement (SIS) and/or Biodiversity Development Assessment Report (BDAR) is not required.

Given the nature, scale and extent of impacts and implementation of the mitigation measures outlined in this REF, the proposal is unlikely to have a significant impact on the environment. Therefore, we do not require an Environmental Impact Statement (EIS) and the proposal may proceed.

Certification

I certify that I have reviewed and endorsed this REF and, to the best of my knowledge, it is in accordance with the EP&A Act and the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation). The proposal has been considered against matters listed in section 171 (Appendix A) and the guidelines approved under section 170 of the EP&A Regulation. The information it contains is neither false nor misleading.

Prepared by:	Reviewed by:	Endorsed by:	Approved by:
[redacted] Andrea Glass Environmental Scientist Sydney Water Date: 16/04/2025	[redacted] John Eames Snr Environmental Scientist Sydney Water Date: 16/04/2025	[redacted] Andrew Owen Acting Project Manager Sydney Water Date: 16/04/2025	[redacted] Murray Johnson Senior Manager Environment & Heritage Sydney Water Date: 28/04/2025

1 Introduction

1.1 Context

Sydney Water provides water, wastewater, recycled water and some stormwater services to over five million people. We operate under the *Sydney Water Act 1994* and have three equal objectives to protect public health, protect the environment and be a successful business.

We are a statutory State-owned corporation and are classified as a public authority, and a determining authority for the proposal under Division 5.1 of the EP&A Act. This REF assesses the potential environmental impacts associated with Avon Reservoirs Reline and Roof Repair and identifies mitigation measures that avoid or minimise potential impacts.

1.2 Proposal background

In 2016, Sydney Water identified the areas behind the two Avon Reservoirs (WS0219 and WS0234) require rock wall stabilisation and tree removal to ensure the long-term protection of the reservoirs. A 6 m wide vehicle access track was proposed at the time to facilitate vegetation clearing and maintenance work. The work was not carried out at the time due to internal project priorities.

A condition assessment of the Avon Reservoirs was undertaken in 2019 and confirmed that the lining of the reservoirs are in poor condition, that there was evidence of rock falls on the cliff face behind the reservoirs and some large trees around the reservoir were identified as having the potential to fall onto the reservoirs.

In 2022, Sydney Water identified the need to repair and reline the two reservoirs as part of the Water Reservoir Renewal Programs. The Geotechnical Assessment Memorandum (WSP, 2022) identified there are rock fall and ongoing tree fall hazards on the cliff behind the reservoirs. Consultation with an arborist (October, 2022) indicated that all trees with the potential to strike the reservoirs due to partial failure (branch failure) or failure at ground level (whole tree failure) should be removed. This includes removing trees up to 60 m behind the reservoirs. The methodology proposed in 2016 will therefore not be sufficient to address the above risks at the current site.

Sydney Water proposes to repair and reline the 2 reservoir roofs in order to improve the long-term reliability and resilience of the Avon Reservoirs. The proposal involves clearing of vegetation behind the reservoirs and installing drape mesh and rock anchors to prevent damage to the reservoirs from vegetation and to stabilise the slope.

A summary of the proposal need, objectives and consideration of alternatives are provided in Table 1-1 below.

Table 1-1 Proposal need, objectives and consideration of alternatives

Aspect	Relevance to proposal
Proposal need	The Avon Reservoirs require relining and roof renewal as the lining of the reservoirs have deteriorated, are in poor condition and the roofs have been damaged from fallen trees and not deemed safe for access. The relining and roof renewal would occur as part of the Water Reservoir Renewal Program. This program is required to satisfy Sydney Water's strategy of replacing the bitumen linings with epoxy coatings. The replacement with epoxy coating allows easier maintenance and repair work than bitumen lining in the future. Due to the damage from fallen trees and evidence of rock falls in behind the reservoirs, the proposal would remove vegetation that is likely to damage the reservoirs and install a drape mesh to prevent further rock fall events. The proposal will allow for long term protection of the reservoirs from the unstable cliff and falling trees. The proposal will also help reduce bushfire risk to the reservoirs by maintaining an Asset Protection Zone (APZ).
Proposal objectives	The proposal objectives are to: • avoid safety risk associated with reservoir roof access • avoid breaching the water quality performance standards in the operating licence • adopt Sydney Water compliant lining, by removing bitumen lining and replacing with epoxy protective coating system • extend design life of reservoirs • protect public health and the environment.
Consideration of alternatives/options	**Roof repair and relining** The Option Assessment Report (SASTTI Joint Venture, 2022) has considered the following alternatives and options for the roof repair and relining: • Option 1 is a "Do Nothing" option. This involves maintaining current operation and replacing the roof following failure. • Option 2 involves repairing the roof and relining the reservoirs. This involves relining the reservoir and undertaking repairs to make the roof operationally serviceable with the intention of replacing the complete roof in about 30 years' time. • Option 3 involves a full roof replacement with relining. This involves completely removing and replacing the existing roof and relining the reservoirs. • Option 4 is to construct a new reservoir. This involves constructing a new reservoir in a new location that is not subject to ongoing maintenance associated with falling trees or slope instability.

Aspect	Relevance to proposal
	Option 1 is not viable as the reservoir roof structure has already failed and there is an unacceptable risk of further damage to the structure due to unstable cliff which has resulted in rock fall and fallen trees. Option 4 is not viable as there is no suitable open location for construction of new reservoirs. Major earthworks and vegetation removal would be required to either excavate a level footprint into the hill or backfill part of the slope towards the dam. Option 2 was the preferred option in the option assessment study as the financial evaluation suggested that this option is more economical than Option 3. Geotechnical and arborist advice was sought to inform the decision of the preferred option. The proposed vegetation removal required for the proposal would fulfil the minimum standard to maintain the reservoirs. To reduce the amount of vegetation to be cleared where not required, the workers will utilise existing access tracks behind the reservoirs. However, it is noted that the access tracks behind the reservoirs are likely to have overgrown since the 2016 geotechnical study was undertaken. **Cliff stabilisation and vegetation removal** Vegetation removal has been proposed to reduce the risk of trees being able to fall on to the reservoirs and to allow for cliff stabilisation works to be undertaken. The Geotechnical Assessment Memorandum (WSP, 2022) considered the following options for cliff stabilisation: • Scaling (systematic removal of small volumes of loose soil and rocks) and only removal of unstable vegetation • Drape mesh system (wire mesh suspended by anchors and hung over cliff face) • Pinned mesh system (uniformly pinned along the entire cliff face) • Rock bolts (threaded steel bars drilled into the cliff face). Scaling and selective vegetation removal and the rock bolts were not considered viable options. These options are considered to only be short term solutions and are constrained due to limited space behind the reservoirs. The assessment suggested that the cliff stabilisation works should use a combination of the drape and pinned mesh systems. The mesh would be installed by pins at the top of the cliff and would hang for the rest of the cliff. To allow for the installation of the mesh, vegetation must be removed for 10 metres on the cliff/slope behind the reservoirs.

1.3 Consideration of Ecologically Sustainable Development

Table 1-2 considers how the proposal aligns with the principles of ecologically sustainable development (ESD).

Table 1-2 Consideration of principles of ecologically sustainable development (ESD)

Principle	Proposal alignment
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.*	The proposal will not result in serious or irreversible environmental damage and there is no scientific uncertainty relating to the proposal.
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 proposal will help meet the needs of future generations by providing a reliable water service.
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 proposal will not significantly impact on biological diversity or impact ecological integrity. No significant impacts to ecological communities will occur. Vegetation removal will be conducted in a way that minimises disturbance to surrounding native vegetation and fauna habitat. Vegetation removed will be offset according to Sydney Water's Biodiversity Offset Guide.
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 proposal will provide cost efficient use of resources and provide optimum outcomes for the community and environment.

2 Proposal description

2.1 Proposal details

Table 2-1 describes the proposal. Figure 2-1 and Figure 2-2 show the location and key environmental constraints. Figure 2-3 shows the location of the reservoir and the cliff.

Table 2-1 Description of proposal

Aspect	Detailed description
Proposal description	The key features of the proposal include: • repairing and relining roof at Avon Reservoirs (WS0219 and WS0234) • stabilising cliff including vegetation clearing behind the reservoirs and installation of mesh.
Location and land ownership	The proposal is in the suburb of Avon in the City of Wollongong Local Government Area (LGA). The proposal is within the Upper Nepean Catchment, the Sydney Drinking Water Catchment. The two reservoirs are on Sydney Water owned land and its surrounding lands are Water NSW land.
Site establishment and access tracks	Vehicle access to the reservoirs is only available via Fire Road No.15 (access road) on the northeast side, where the access road passes by the reservoirs. No public access is allowed on Fire Road No.15. Access tracks will be required for areas behind the reservoir to carry out vegetation clearing. Site establishment and enabling work will include: • establishing environmental controls (e.g. erosion and sediment controls, fences) and designated areas for stockpiling equipment and materials • establishing site compounds and access arrangements • installing construction signs along the access road.
Construction compound	A construction compound would be required to house site sheds, construction amenities, vehicle parking and materials laydown. An indicative location for the construction compound is shown in Figure 2-1. No excavations are required for the construction compound area. To establish the compound the slashing of grass, weeds and shrubs would occur, then the laying of geofabric and crushed rock (DGB2).
Methodology	**Site investigation** Site investigations will include geotechnical investigation.

Security Hut

A security hut would be temporarily established at the Mount Kembla lookout to manage access for the proposal's construction vehicles. The installation of the security hut includes installing a security shed, a portaloo, a security camera hire unit and a generator. The establishment of the security hut would not require excavations or vegetation removal.

Bridge stabilisation works

To ensure safe passage of vehicles, works would occur on the existing bridge, located between Gate 4 and the reservoirs, to increase the load limit of the bridge. Work would include the installation of beams and road plates to span the bridge structure to allow for the transfer of loads. After the completion of the proposal, the bridge would be reinstated to its original condition.

Vegetation removal

The following vegetation removal within the study area would include:

- grass, weed and shrub slashing at the construction compound
- selective removal of vegetation to the south of the reservoirs
- removal of selective larger trees behind the reservoirs with a crane
- removal of the remaining selective trees via a helicopter that cannot be reached by the crane if required.

Further details of the vegetation removal are in Section 5.2.3, Appendix D Flora and Fauna Assessment and Appendix E Arboriculture Assessment.

Ground and rock stabilisation

The stabilisation work will include:

- creating a 5 m wide vehicular access track
- removing loose soil and rocks from slopes
- establishment of a diversion berm for flow diversion to manage any surface runoff
- drilling rock anchors and installing mesh including clearing vegetation within the mesh zone.

Water discharge

During the reservoirs work period and prior to commissioning, the reservoirs will be cleaned and flushed. Any wastewater will be disposed off-site.

Reservoir repair, reline and associated work

The reservoir repair and associated work will involve:

- relining the reservoir
- replacing ridge ventilators

Aspect	Detailed description
	• installing new ladders and removing non-compliant ladders • replacing sections of roof including structural elements • removing steel walkway • installing aluminium platform. **Stair tower and bridge** A new stair tower will be installed in close proximity to WS0234. The dimension of the stair tower is about 2.5 m width x 5 m length. This stair tower will be connected via a new bridge to WS0234. Excavation will be required on the existing concrete slab to create a concrete foundation for the stair. **Demobilisation** The demobilisation will include: • removing environmental, safety and traffic controls • removing temporary fencing • clearing and rehabilitating the site • restoring site and laydown area surface.
Commissioning	Commissioning involves testing and running the new equipment to ensure it works correctly and is integrated with existing plant operations. The exact commissioning steps depend on the type of the equipment, but typically include turning on the valves to allow water to flow into the reservoirs. The reservoirs will be flushed and cleaned prior to commissioning, wastewater will be disposed of off-site.
Restoration	The study area will be restored following construction, in consultation with Water NSW. Site restoration activities will include: • dismantling laydown, removal and disposal of waste material and removing construction signage • restoration of road surfaces (in line with the dilapidation assessment) • removing erosion and sedimentation controls, fencing and traffic management measures. Native vegetation will be replaced in consultation with Water NSW and offset in accordance with the Sydney Water Biodiversity Offset Guideline (2024). Refer to Section 5 for further details on native vegetation clearing and offsets.
Materials/ equipment	An indicative equipment list for the proposal is as below: • chainsaws

Aspect	Detailed description
	• concrete truck • crane • excavator (8 tonne) with hammer • franna cranes • generator (diesel) • hand tools (electric) • helicopter (if required) • light vehicle • mulcher • scaffolding and mobile working platform • site sheds and toilets • skid steer loader • skip bins • smooth drum roller (12 tonne) • tipper truck (12 tonne) • utility vehicle • wagon drill.
Work hours	Work and deliveries will be scheduled to occur during the following hours: • 6 am to 6 pm, Monday to Friday • 6 am to 6 pm, Saturday. Weekday and Saturday work hours are longer than standard construction hours to allow sufficient hours for work to be carried out due to the proposal remoteness. This would help reduce number of overall shifts required and travel emissions resulting from the proposal. The proposal is not expected to require work outside the above hours. However, Sydney Water's Project Manager can approve additional work outside of standard daytime hours in consultation with Water NSW. The approval process is described in the mitigation measures in Section 5.
Proposal timing	Construction is expected to start early 2025 and take up to 30 months.
Operational requirements	Periodic maintenance will be required for remaining trees on the cliff and clearing any fallen branches.

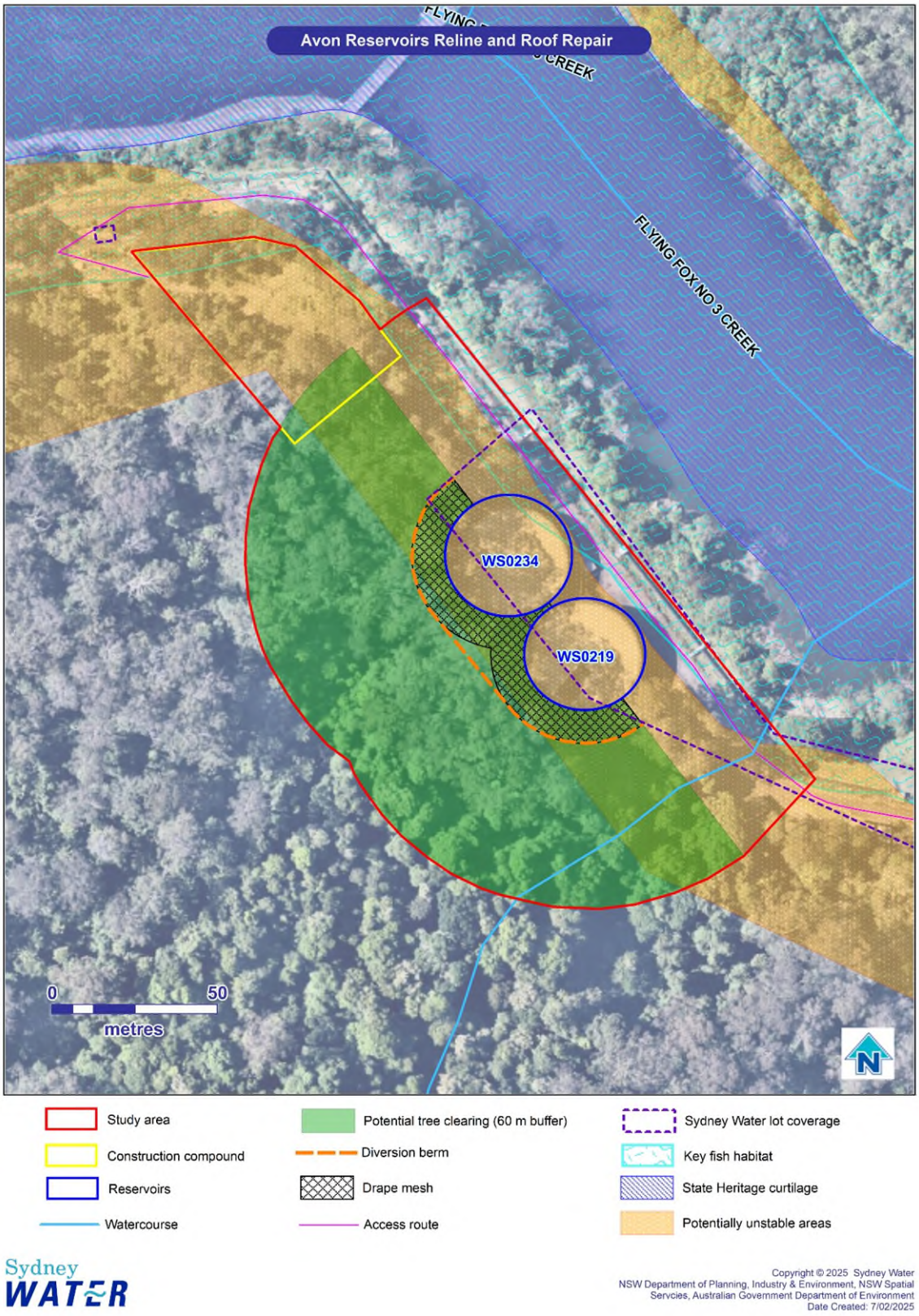

Figure 2-1 Location of proposal and key environmental constraints

Figure 2-2 Ecological constraints (Appendix D Flora and Fauna Assessment) (Note the stair tower in the figure is indicative)

Figure 2-3 Reservoirs and cliff

2.2 Field assessment area and changes to the scope of work

The proposal shown in this REF is indicative and based on the latest concept design at the time of REF preparation. The final proposal may change based on detailed design and/ or construction planning. The general mitigation measures outline when changes to the proposal trigger supplementary environmental impact assessment. If required, further assessment must be prepared in accordance with SWEMS0019.

3 Consultation

3.1 Community and stakeholder consultation

Our approach to community and stakeholder consultation is guided by Sydney Water's community and stakeholder engagement guidelines.

Stakeholder and community engagement is a planned process of initiating and maintaining relationships with external parties who have an interest in our activities. Community and stakeholder engagement:

- enables us to explain strategy, policy, proposals, proposal or programs
- gives the community and stakeholders the opportunity to share their knowledge, issues and concerns
- enables us to understand community and stakeholder views in our decision-making processes alongside safety, environment, economic, technical and operational factors.

The nature, scale and extent of the proposal's potential impact has been evaluated in this REF. If our work impacts the community in some way, we will consult with affected groups throughout the proposal. This includes engaging the broader community and stakeholders during plan or strategy development or before making key decisions.

Stakeholders who may be impacted by the proposal include Endeavour Energy, TransGrid, Australian Rail Track Corporation (ARTC) and GM3 (formerly South32). The stakeholders have been consulted with in regard to other projects that are proposed to be undertaken by Sydney Water in a similar timeframe and area (refer to Section 5.2.11 for details on the other Sydney Water projects). The stakeholders have been supportive of the works and request to be notified when construction begins.

Sydney Water and/or the construction contractor will consult with the stakeholders about this proposal when construction is anticipated to commence.

Consultation has been undertaken with Wollongong City Council regarding the security hut as it is located on land owned by Wollongong City Council. It has been mutually agreed that the adoption of a security hut at the main gate to the catchment would effectively reduce the impact on the existing roads and mitigate the risk of potential incidents arising from multiple stakeholders utilising the roads within the catchment. Wollongong City Council has no objections to the proposed location or the ongoing monitoring of the area.

We will also provide local council with reasonable notice when we would like to commence works. Wollongong City Council will be consulted about matters identified in environmental planning instruments (refer Section 4.1 below). This includes public safety issues, temporary works on council land, and full or partial road closures of council managed roads.

3.2 Consultation required under State Environmental Planning Policies and other legislation

Sydney Water must consult with councils and other authorities for work in sensitive locations or where the work may impact other agencies' infrastructure or land. This is specified in the State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP).

No formal consultation with council was required under the TISEPP. Further detail is provided in Appendix B.

Water NSW

Part of the proposal is in Water NSW owned land. This includes removing selected vegetation behind the two reservoirs on Water NSW land. Early consultation has been carried out with Water NSW and will continue throughout the project. The draft REF was provided to Water NSW for review. Comments were received and have been incorporated. Water NSW endorsement of the updated REF was received11 April 2025 with WaterNSW site specific requirements, attached in Appendix G.

During construction, consultation will continue via monthly meetings with the WaterNSW Operations Team, the purpose of consultation is to ensure proposed construction activities do not impede on operational activities undertaken by WaterNSW in the Catchment such as deer trapping.

Access for works required within Water NSW land will be conducted in accordance with the Sydney Water and Water NSW Access Protocol. The proposal is located within the Metropolitan Special Area (Schedule 1 land). Activities within Schedule 1 or 2 (Special and Controlled Areas), as set out in the Water NSW Regulation 2020, require consultation with Water NSW at least 28 days prior to the commencement of works.

4 Legislative requirements

4.1 Environmental legislation

Sydney Water is the proponent and determining authority under the EP&A Act. The proposal does not require development consent and is not classified as State significant infrastructure. We have assessed this proposal 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.

The following environmental planning instruments (Table 4-1) and legislation (Table 4-2) are relevant to the proposal. Table 4-2 also documents any licences and permits required, and timing and responsibility for obtaining them.

Table 4-1 Environmental planning instruments relevant to the proposal

Environmental Planning Instrument	Relevance to proposal
Wollongong Local Environmental Plan 2009	The proposal is located on land zoned as: • C2: Environmental Conservation • SP2: Infrastructure.
State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP)	Section 2.159 (1) of the TISEPP permits development for the purpose of water reticulation systems by or on behalf of a public authority on any land. The proposal involves development for the purpose of water supply reservoirs. Water supply reservoirs are included as water reticulation systems under section 2.158. As Sydney Water is a public authority, the proposal is permissible without consent.
State Environmental Planning Policy (Biodiversity and Conservation) 2021 (BCSEPP)	**Vegetation in non-rural areas (Chapter 2)** The proposal is in an area or zone listed in subsection 2.3(1). However, subsection 2.4(1) states: 'This Policy does not affect the provisions of any other SEPP….', and as the works are permissible under the TISEPP, a council permit to clear vegetation under this SEPP is not required. **Koala habitat protection (2020 and 2021) (Chapters 3 and 4)** The proposal is on land zoned Koala Habitat Protection, under section 4.4 of the BCSEPP. The BCSEPP outlines that development consent cannot be granted unless there is a plan of management prepared for the relevant local government area. Sydney Water is the determining authority and does

Environmental Planning Instrument	Relevance to proposal
	not require development consent for vegetation removal in koala habitat. Nonetheless, as outlined in Section 5 of the REF, the proposal is not anticipated to significantly impact koalas. **Water catchments (Chapter 6)** Chapter 6 of this SEPP applies as the proposal is within the Sydney Drinking Water Catchment, a regulated catchment area. A neutral or beneficial effect on water quality (NorBE assessment) (Appendix B) was therefore completed as specified by Section 171A of Environmental Planning and Assessment Regulation 2021. The assessment confirmed that potential impacts are neutral. Section 5 of this REF assessed potential environmental impacts on water quality and quantity, aquatic ecology, flooding, access, cultural heritage, flora and fauna, and scenic quality. The NorBE assessment also confirmed that potential impacts are neutral and meet the requirements of part 6.2 of the BCSEPP.

Table 4-2 Consideration of key environmental legislation

Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
Protection of the Environment Operations Act 1997 (POEO Act)	The POEO Act is the main NSW legislation covering pollution and waste management. Construction and operation of the proposal is not a scheduled activity. An EPL is not required. There is a requirement under Part 5.7 of the POEO Act to immediately report any pollution incidents to the relevant authority where material harm to the environment is caused or threatened. The definition of material harm and the relevant authorities are identified in Part 5.7 of the POEO Act. The contractor is responsible for immediately reporting such incidents in accordance with SWEMS0009.	N/A	During construction, contractor
Biodiversity Conservation Act 2016 (BC Act)	The BC Act lists threatened species, populations, and ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats. If any of these could be	ToS	Pre-construction, Sydney Water

Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
	impacted by the proposal, an assessment of significance 'Test of Significance' (ToS) must be completed to determine the significance of the impact. The ToS addresses the requirements of section 7.3 of the BC Act. While the proposal would require the removal of native vegetation, the implementation of the mitigation measures provided in Section 5.2.3 of the REF would minimise the potential for impacts on threatened species, populations or ecological communities listed under the BC Act. The ToS concluded the proposal is not likely to result in a significant impact upon any threatened species or populations and their habitats listed under the BC Act. Further information is provided in Appendix D.		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act provides the framework for Commonwealth environmental approvals. A Significant Impact Criteria (SIC) assessment concluded that significant impacts to an EPBC Act listed entity are unlikely (Appendix D).	SIC	Pre-construction, Sydney Water
National Parks and Wildlife Act 1974	This Act provides for the establishment, preservation, and management of areas such as national parks, state conservation areas, nature reserves, and Aboriginal areas. This Act also provides for the protection of Aboriginal heritage, including Aboriginal objects and places. An Aboriginal Archaeological Due Diligence Assessment has been undertaken for the proposal and determined that it is unlikely to impact on Aboriginal heritage items or sites (Appendix F).	N/A	N/A
Heritage Act 1977	This Act provides for the conservation of environmental heritage in NSW. The proposal is located 25 m to the south of Avon Dam, a listed heritage item on the State Heritage Register (SHR). The proposal is not	N/A	N/A

Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
	expected to have any direct or indirect impact on this listed heritage item.		
Fisheries Management Act 1994 (FM Act)	The FM Act protects threatened species, populations and communities of fish and marine vegetation, as well as commercial and recreational fishing areas, in NSW waters. A permit and/or notification is required under Part 7 of the FM Act for activities that involve dredging and reclamation work, temporarily or permanently obstructing fish passages and or harming marine vegetation. Part of the proposal is within a mapped key fish habitat. As the proposal is located above the top of the bank and not anticipated to impact the key fish habitat, no notification to Department of Primary Industries (DPI – Fisheries) is required.	N/A	N/A
Water Act 1912/ Water Management Act 2000 (WM Act)	Under section 91B of the WM Act, Sydney Water is required to obtain a Water Supply Work Approval (WSWA) for the temporary dewatering of groundwater and a Water Access Licence (WAL) if more than 3 ML of groundwater is extracted. During construction, there is the potential to intercept groundwater for the proposed excavation work for the stair tower. The groundwater volume will be confirmed during detailed design. A WSWA is required if groundwater dewatering is required.	WSWA	Pre-construction, contractor
Water NSW Act 2014	For work in Water NSW lands, the work will be carried out in accordance with the Sydney Water and Water NSW Access Protocol (D0000755). Consultation has commenced with Water NSW and will be ongoing throughout the proposal. A summary of the consultation done to date is provided in Section 3.	Landowner consent	During REF, Sydney Water

5 Environmental assessment

This section of the REF describes the existing environment and assesses direct and indirect impacts of construction and operation of the proposal. It also identifies mitigation measures to minimise impacts. These will be incorporated into contract documents and a Construction Environmental Management Plan (or similar) prior to starting work.

5.1 Existing environment

The proposal is located on Sydney Water owned land and Water NSW land in Avon. The study area is only accessible via Fire Road No.15, which is accessed via Cordeaux Road. The proposal is located to the south of Flying Fox No.3 Creek. The cliff behind the reservoirs is an disturbed vegetated area. The closest residential receiver is located about 2 km to the south-east of the proposal. An ephemeral stream is located on the south-eastern side of the proposal.

5.2 Environmental aspects, impacts and mitigation measures

5.2.1 Topography, geology and soils

Existing environment

Geology and soil

An eSPADE search on soil landscapes was conducted in January 2025. The geology of the study area is predominantly fine-grained lithic sandstone occasionally interbedded with thin shale lenses. The dominant soil materials are dark brown loamy sand, very dark reddish brown clayey sand and pedal clay (eSPADE, 2023). Most of the proposal is on land subject to varying levels of past disturbances from erosion and reservoir development (Appendix F).

The Geotechnical Assessment Memorandum (WSP, 2022) identified that the rock cut behind the reservoirs is sub vertical and typically comprises moderately to slightly weathered sandstone. The report indicates that the trees located on the vertical cut surface contribute or have the potential to contribute to rock falls from root jacking. The main geotechnical hazard identified is rock falls across the vertical cut face. The report also noted that there are existing rock falls from the vertical cut surface behind the reservoirs.

Topography

The topography is dominated by moderate to very steep slopes. The proposal is on mapped potentially unstable areas, particularly the cliff face behind the two reservoirs. The proposal is located on Woronora Plateau, a deeply dissected sandstone plateau. The elevation ranges between 500 and 70 m Australian Height Datum (AHD) across the study area (Appendix F).

Contamination

There are no notified contaminated sites managed by the EPA within the study area (EPA, 2025).

Potential impacts

Construction phase

Ground disturbance activities such as vegetation removal, excavation and stockpiling of soil, if not adequately managed, could result in:

- loss of soil from erosion of exposed soil and stockpiled materials
- dust generation from excavation and vehicle movements over exposed soil
- increase in sediment loads entering the stormwater system and downstream waterways.

Any excavated materials from the stair tower and bridge will be stockpiled as far as practicable from Flying Fox No.3 Creek. The potential impacts of erosion and sedimentation are expected to be readily managed with implementation of the mitigation measures below.

Temporary access track may be required behind the reservoir to facilitate work personnel and vehicle access for vegetation removal. Once vegetation is removed, only minor scaling work to remove loose soil and rocks will be required behind the reservoirs. The contractor will retain vegetation to maintain groundcover and prevent erosion as far as practicable.

A mesh would be installed to maintain soil integrity, reduce the likelihood of surface erosion (i.e. rock falls or shifting soils), and ensure the long-term stability and safety of the area above the reservoirs during construction and operation.

The implementation of the mitigation measures below would minimise the risk and potential impacts on offsite erosion and sedimentation of surrounding land and waterways. Any residual impacts such as exposed soil are likely to be minor, temporary and short-term.

Operation phase

The proposal is expected to create a narrow diversion berm on the edge of the slope. The diversion berm is expected to have only a negligible impact on the overall surface topography due to its minor nature. The proposed ground and rock stabilisation work would minimise potential erosion and destabilisation impacts on the slope. A maintenance plan will also be developed for the cleared area behind the reservoirs to manage any potential erosion risk.

Mitigation measures

With the implementation of the mitigation measures below, impacts to topography and soil can be adequately managed, and residual impacts are expected to be low.

Table 5-1 Environmental mitigation measures — topography, geology and soils

Mitigation measures
Prevent sediment moving offsite in accordance with Managing Urban Stormwater, Soils and Construction, Volume 1 and 2A (Landcom 2004 and DECC 2008), including, but not limited to: • develop a Soil and Water Management Plan (SWMP)/ Erosion and Sedimentation Control Plan (ESCP) as part of the CEMP in consultation with Water NSW.

Mitigation measures
• divert surface runoff away from disturbed soil and stockpiles • install sediment and erosion controls before construction starts • reuse topsoil where possible and stockpile separately • inspect controls at least weekly and immediately after rainfall • rectify damaged controls immediately • remove controls once surfaces have been stabilised, including removing trapped sediment in drainage lines.
Minimise ground disturbance and stabilise disturbed areas progressively.
Contractor to ensure imported material is Virgin Excavated Natural Materials (VENM) or meets a relevant NSW EPA Resource Recovery Order and Resource Recovery Exemption, or is a commercially supplied material that is not waste. If using materials that are subject to an NSW EPA Resource Recovery Order/Exemption the contractor must ensure the conditions in that Order/Exemption are strictly adhered to.
Stop work in the immediate vicinity of suspected contamination. Indicators of contamination include discoloured soil, anthropogenic material within fill, asbestos, chemical or petrol odours and leachate. Contain disturbed material on an impermeable surface and cordon areas off. Notify the Sydney Water Project Manager, Water NSW and the Environmental Representative (who will contact Contamination and Hazardous Materials team) to agree on proposed management approach.
Stop work during heavy rainfall or in waterlogged conditions when there is a risk of sediment loss off site.
Sweep up any sediment/soil transferred off site at least daily, or before rainfall.
Eliminate ponding and erosion by restoring landforms as close to pre-work conditions without impacting slope stability.
Backfill excavations as soon as practicable.
Develop a maintenance plan for the cleared area behind the reservoirs including the diversion berm in consultation with Water NSW.
If any contamination or hazardous materials are encountered, works must stop immediately until a qualified environmental specialist has been contacted and conducted a thorough assessment. If contamination is identified as a result of this assessment, and if remediation is required, all works must cease in the vicinity of the contamination and Water NSW notified immediately. Where remediation work is required, the written approval of Water NSW is required prior to implementation. A clearance certificate must be provided to Water NSW prior to works recommencing.

5.2.2 Water and drainage

Existing environment

Surface water

An unnamed ephemeral stream is located on the south eastern side of the study area. The proposed works are located to 25 m to the south of Flying Fox No.3 Creek. The proposal is located within the Sydney Drinking Water Catchment and in the Metropolitan Special Area (Schedule 1 land) on Water NSW land.

Groundwater

The groundwater level is unknown. A search of MinView in January 2025 indicates there is no registered groundwater boreholes within 200 m of the proposal (GNSW, 2025).

Flooding

The proposal is not on any land mapped as subjected to flood risk (Wollongong City Council, 2023).

Potential impacts

Construction phase

Surface water

The proposed vegetation clearing work may interrupt or alter overland flow paths as clearing progresses. This may cause minor impacts to site drainage patterns resulting in additional surface runoff. A diversion berm will be implemented on the cliff to divert flow and dissipate energy. Any surface runoff from the diversion berm will be diverted around the mesh to the side of the cliff. The runoff will follow existing drainage patterns down the cliff and dissipate further onto the ground.

The proposed excavation and tree clearing activities have the potential to impact on water quality of the ephemeral stream and Flying Fox No.3 Creek. Sediments in runoff could increase turbidity and result in a decline in water quality. Additionally, fuels, chemicals or wastewater from accidental spills during construction could potentially enter stormwater flows to the above waterway. Poor site management may lead to potential sedimentation impacts on the local waterway system. The potential impacts of erosion and sedimentation are expected to be readily managed with implementation of the mitigation measures below.

The proposal is in an area administered by Water NSW and a NorBE assessment has been performed (Appendix C). The proposal would have a neutral effect on water quality with the implementation of mitigation measures in this REF.

Groundwater

There is the potential to intercept groundwater during construction. Geotechnical investigations are to be performed prior to construction and will identify whether groundwater is present. A Water Supply Work Approval (WSWA) is required for any groundwater dewatering. During detailed design, the contractor would confirm the estimate to support the WSWA application, and if it is

likely that more than 3 ML of groundwater would be extracted, a Water Access Licence would also be sought prior to dewatering.

Operation phase

During operation, the diversion berm will continue to divert any overland flow around the mesh to minimise potential runoff. The runoff will follow existing drainage pattern down the cliff and dissipate further onto the ground. To ensure appropriate dissipation of water flow from the diversion berm, scour protection methods would be considered, this would be detailed in the maintenance plan. In the long term, the proposal would have a beneficial impact on drinking water quality by restoring service of the reservoirs.

Mitigation measures

With the implementation of the mitigation measures below, impacts to water and drainage can be adequately managed, and residual impacts are expected to be minor.

Table 5-2 Environmental mitigation measures — water and drainage

Mitigation measures
Use appropriate controls to avoid potential sedimentation to waterbodies.
Bund potential contaminants and store on robust waterproof membrane, away from drainage lines.
Keep functioning spill kit on site for clean-up of accidental chemical/fuel spills. Keep the spill kits stocked and located for easy access.
Locate portable site amenities, chemical storage and stockpiles of erodible materials away from watercourses, drainage lines and flood prone areas.
If the potential for intercepting groundwater is identified after the REF is determined, Sydney Water will obtain a groundwater Water Supply Works Approval. Where dewatering is >3 ML per water year (from 1 July), Sydney Water will also obtain a Water Access Licence from the Department of Planning and Environment – Water. The contractor is responsible for: • providing expert hydrogeological technical information to obtain the approvals • preparing a Dewatering Management Plan • complying with the conditions of the approvals (such as protecting water quality; minimising aquifer extraction volumes, monitoring extraction with flow meters and recording volumes).
Store all chemicals and fuels in accordance with relevant Australian Standards and Safety Data Sheets. Record stored chemicals on site register. Ensure bunded areas have 110% capacity of the largest chemical container, or an additional 25% capacity of the total volume stored within (whichever is greater). Tightly secure chemicals and fuels in vehicles. Clearly label all chemicals.
Conduct refuelling, fuel decanting and vehicle maintenance in compounds where possible. If field refuelling is necessary, designate an area away from waterways and drainage lines with functioning spill kits close by.

Mitigation measures
No wash down of equipment permitted onsite.
Ensure equipment is leak free. Repair oil/fuel leaks immediately or remove from site and replace with a leak-free item.
Once the need of discharging water is identified, the contractors must: • prepare a Discharge Assessment • conduct water quality testing • conduct an Aquatic Ecology Due Diligence check • liaise with Sydney Water Environmental Representative on consultation with DPI Fisheries (if required) • obtain Water NSW approval.
Prior to water discharge, the contractors will: • remove any existing debris along the scour flow path • improve the existing slit fencing (if required) • place sandbags around outlet to dissipate energy.
During water discharge, the contractors will: • closely monitor water release and control water release rate • initially open the scour valves by a half turn and monitor for signs of erosion at the outlet and suspended sediments (turbid waters) in the discharge for 5 minutes. After the initial 5 minutes, open the scour valves by another half turn and monitor for signs of erosion and suspended sediments for 5 minutes • take photographic record of surrounding environment every 5 minutes until valves are open in final position • repeat the above process until erosion starts to occur, immediately turn the scour valve back by a half turn to reduce the flow rate and stop the erosion • determine and record flow rate to inform future water discharge • monitor the site periodically and during heavy rainfall event for the duration of the work.
Discharge all water in accordance with Sydney Water's Water Quality Management During Operational Activities Policy (D0001667) including erosion controls, discharge rate, monitoring. Specifically, Appendix 3 of the Policy requires landowner approval (Water NSW) for discharging water to their land. Water NSW approval is given through the Water NSW review and acceptance of the Discharge Assessment in accordance with the Sydney Water and Water NSW Access Protocol.

5.2.3 Flora and fauna

This section provides a summary of the Flora and Fauna Assessment prepared by Eco Logical (Appendix D) and the Arboricultural Assessment from Canopy Consulting (Appendix E).

Existing environment

Vegetation types

Two Plant Community Types (PCTs) were identified within the study area: PCT 3213 Illawarra Southern Escarpment Wet Forest and PCT 3028 Illawarra Escarpment Warm Temperate Rainforest. In addition, there is also a small strip of 14 planted *Acacia binervata* recorded between the roadway and access ramp to the north of the reservoirs.

There are no threatened ecological communities (TECs) within the study area.

Groundwater Dependent Ecosystems

No Groundwater Dependent Ecosystem (GDE) were identified within the study area. The probability for a GDE being present on site is very low. There is medium to high probability of a GDE located within 100 m of the study area.

Key fish habitat

The Flying Fox No.3 Creek is mapped as key fish habitat (KFH). Although the proposal is located within KFH, the proposal is located about 25 m from the top of the bank (Figure 2-1).

Flora and fauna habitat features

There is one hollow bearing tree within the study area. Surface rock, boulders and cobbles are present on the steep slopes. These rocky areas contain suitable habitat for ground dwelling fauna as there is potential for fauna to inhabit crevices between rocks and burrows between rock and soil substrate. The soil consists of a sandy loam texture, suitable for digging fauna such as *Potorous tridactylus* (Long-nosed Potoroo). An unnamed ephemeral stream is located on the south-eastern side of the reservoirs. This unnamed ephemeral stream contains small pools of water with vegetated banks which may provide habitat for frogs. The small strip of planted *Acacia* is in poor condition with some dying trees. These planted trees are not considered to provide habitat to flora or fauna.

Other habitat features include:

- logs and debris
- leaf litter and groundcover
- culverts, caves, cliffs, abandoned structures
- nectar sources (shrub canopy)
- sap and gum sources
- fruiting species such as fruiting trees and vines
- abundant and diverse prey resources.

Threatened fauna and flora

The desktop searches identified 103 threatened fauna species (including migratory species) and 33 threatened flora species as occurring, or having the potential to occur, within a 5 km radius of the study area.

No threatened flora or fauna was identified or recorded in the field survey.

An assessment of likelihood of occurrence was conducted for threatened species, populations, ecological communities and migratory species identified from the database searches. This assessment of likelihood of occurrence is conducted based on database or other records, presence or absence of suitable habitat, features of the study area, results of the site inspection and professional judgement.

A test of significance (ToS) was conducted for threatened species that were recorded or had a higher likelihood of occurring within the study area and were not recorded during the site visit. Tests of Significance (ToS) were completed for 4 flora and 23 fauna species listed under the BC Act.

A Significant Impact Criteria (SIC) assessments was conducted for EPBC Act listed threatened species that are considered likely or have the potential to occur within the study area. These listed threatened species represent Matters of National Environmental Significance (MNES). The SIC assessments were completed for 3 flora and 9 fauna species listed under the EPBC Act.

Weeds

No high threat or priority weeds were present within the study area.

Bushfire prone land

The proposal is within mapped Category 1 bushfire prone land.

Potential impacts

Construction phase

Vegetation

The proposal involves only removal of non-threatened native vegetation. This involves mainly the removal and trimming of canopy trees and shrubs. The works would only remove trees if they have potential to damage Sydney Water assets or cause safety concerns for staff. Trees that do not pose a risk of ongoing asset damage or staff safety will remain intact.

The Flora and Fauna Assessment (Appendix D) assessed the impact of the proposal on vegetation as an assumed worst-case scenario and outlines the possible maximum potential extent of vegetation removal. However, not all vegetation within this study area would be removed. The Arboricultural Assessment (Appendix E) confirmed which trees would need to be removed to allow for construction works and safety reasons, refer to Figure 5-1.

The area within a 10 m radius of the reservoir tanks will require removal of all trees, shrubs and groundcover to allow for mesh installation and heavy machinery use. Selective tree clearing will occur between 10 m and 60 m behind the reservoir tanks. The selective tree clearing would cut the

trunks at a safe height and leave the stumps intact. No vegetation removal would occur within 5 m of the watercourse. Only grass slashing will occur within the construction compound. The security hut would not require the removal of vegetation.

The Arboricultural Assessment (Appendix E) recommended the removal of a total of 216 trees, as shown on Figure 5-1. 139 trees would be removed for the bank stabilisation works (where the mesh will go), 56 trees would be removed to allow for construction activities and 12 trees would be removed for safety reasons.

In a worst-case scenario, as described in the Flora and Fauna Assessment (Appendix D), the proposal would require the removal of up to 1.49 hectares (ha) of vegetation:

- 0.86 ha of Illawarra Southern Escarpment Wet Forest (PCT 3213)
- 0.61 ha of Illawarra Escarpment Warm Temperate Rainforest (PCT 3028)
- 0.02 ha of planted native trees
- One hollow-bearing tree.

Trees that do not pose a risk of ongoing asset damage or staff safety will remain intact. Stumps will be left on the ground unless it is deemed as safety or access risk to site personnel and assets. The contractors will use less vegetated areas for access to mitigate and minimise impacts to native vegetation. Mitigation measures below will be implemented to minimise biodiversity impacts.

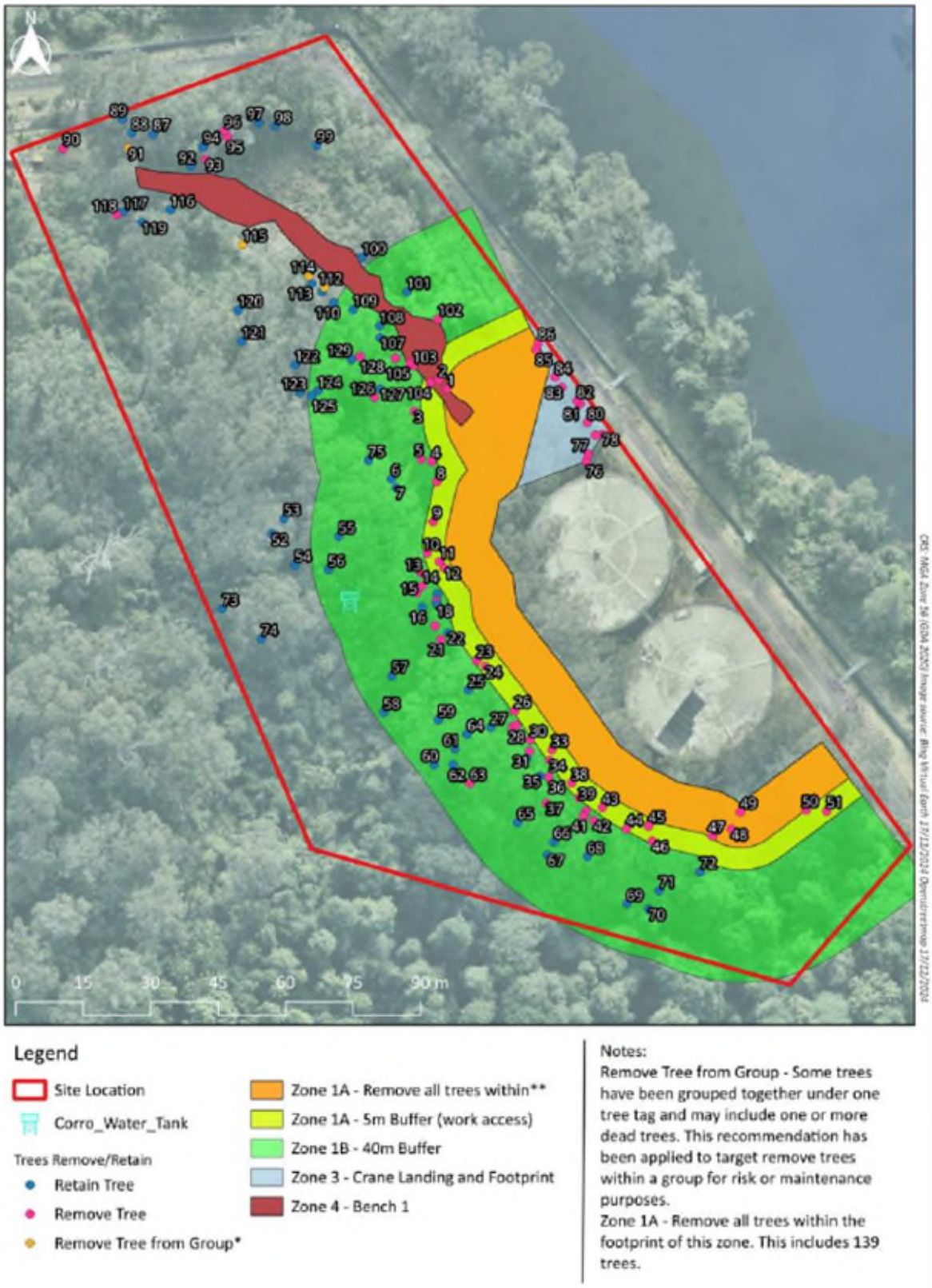

Figure 5-1 Tree retention and removal map

The removal of vegetation is considered as “Moderate Impact” under Sydney Water’s Biodiversity Offset Guideline. The vegetation impacts will be offset in accordance with the guideline as per Table 5-3 which has assessed the worst-case scenario. Note; not all vegetation within this study area would be removed, therefore the actual offsetting number will be lower, this will be documented in the CEMP.

Table 5-3 Vegetation offsetting (worst-case scenario)

Vegetation type	Maximum areas to be removed (ha)	Sydney Water Biodiversity Offset Guideline ratio	Maximum areas to be restored (ha)
PCT 3213	0.86	1:2	1.72
PCT 3028	0.61	1:2	1.22
Planted native trees	0.02	1:2	0.04
Total	**1.49**		**2.98**

Threatened flora/ fauna and habitat features

The ToS and SIC assessment concluded that the proposal is not likely to have a significant impact upon any of these threatened species for the following reasons:

- Up to 1.49 ha vegetation of potential habitat for all threatened flora species would be modified. The potential impacts include tree removal, shrub removal and groundcover disturbance. Such impact is considered as marginal as the area of habitat proposed to be modified represents a small area of potential habitat. There are larger areas of similar or higher quality retained in the study area. Any local population present would likely occupy additional adjoining or nearby habitat.
- Up to 1.49 ha of potential foraging, nesting and residential habitat for threatened fauna species would be modified. These habitats include hollowing bear trees, nectar-bearing trees, leaf litter, understorey vegetation. The habitat to be affected represents a small area of potential habitat which is surrounded by much larger areas of similar and / or higher quality habitat that would be retained. The surrounding habitat is either in a conservation reserve or is maintained for water management. The proposal would not diminish the importance of the surrounding habitats.
- The proposal is expected to disturb the existing fallen logs and timber. However, the logs will remain following completion of work.
- No habitat is expected to be isolated or fragmented for threatened fauna species. Small gaps would develop due to tree removal, however, this area is relatively small and would not pose a barrier to the species.

Key fish habitat

The northern side of the proposal is within a mapped KFH. As the proposal is located above the top of the bank, no notification to Department of Primary Industries (DPI – Fisheries) is required. The proposal is not expected to impact KFH as the proposal is outside the top of the bank. Any indirect impact resulting from surface runoff will be managed with the implementation of the above erosion and sedimentation mitigation measures.

Groundwater dependent ecosystems

Due to the absence of mapped GDE within the study area and the low likelihood of GDE presence in the surrounding area, the proposal has a low likelihood of impacting the surrounding potential GDE.

Bushfire prone land

The use of heavy machinery has the potential to increase bushfire risk. Any potential bushfire risk will be managed with the implementation of mitigation measures below.

Indirect impacts

The proposal has the potential to indirectly impact flora and fauna via noise, weed introduction and spread, sedimentation and dust resulting in soil or water pollution. The overall impacts are likely to be minor with the implementation of the mitigation measures below.

Operation phase

During operation, maintenance works could potentially introduce weeds and plant pathogens to the study area.

Mitigation measures

With the implementation of the mitigation measures below, impacts to biodiversity can be adequately managed, and residual impacts are expected to be minor.

Table 5-4 Environmental mitigation measures — flora and fauna

Mitigation measures
Provided it is essential for delivering the project, Sydney Water's Project Manager can approve the following vegetation removal and tree trimming, without additional environmental assessment (but only after consultation with the Environmental and Community Representatives and affected landowners). Sydney Water considers vegetation removal in these circumstances has minimal environmental impact. • Any minor: - vegetation trimming or - removal of exotic vegetation or - removal of planted native vegetation where the vegetation is not a threatened species (including a characteristic species of a threatened community or population), heritage listed, in declared critical habitat or in a declared area of outstanding biodiversity value.

Mitigation measures
• Any removal of remnant vegetation where there is no net change to environmental impact (e.g. a different area of vegetation is removed but the total area is the same or less than assessed in the EIA). Written explanation of the application of this clause (including justification of the need for trimming or removal and any proposed revegetation) should be provided when seeking Project Manager approval. Any impacts to native vegetation and trees must be offset in accordance with the Biodiversity Offset Guideline (SWEMS0019.13).

Offset residual impacts to native vegetation and trees in accordance with the Biodiversity Offset Guideline (SWEMS0019.13). The removal of vegetation will be offset under a 1:2 ratio.

Planting of vegetation offset would follow the hierarchy below. Vegetation will be planted:

- on-site in areas deemed safe for Sydney Water assets in consultation with Water NSW
- at alternate locations in consultation with Water NSW
- at Sydney Water properties.

The location of the offsetting to be undertaken for the proposal would be documented in the CEMP.

Map and report native vegetation clearing greater than 0.01 ha in extent (and any associated rehabilitation) to the Sydney Water Environmental Representative. Track vegetation clearing as per SWEMS0015.26 Contractor Native Vegetation Clearing and Rehabilitation template.

The above record will also be submitted to Water NSW.

Minimise vegetation clearance and disturbance, including impacts to standing dead trees and riparian zones. Where vegetation is restricting work, apply the following hierarchy for tree/vegetation impacts:

- tying back of branches
- trimming
- remove trees and vegetation only where the above two options are not practical.

Physically delineate vegetation to be cleared and/or protected on site and install appropriate signage prior to works commencing.

Adjust methodology (e.g. avoid area, hand excavate, implement exclusion fencing) to protect sensitive areas where possible (such as mature trees, known threatened species, populations or ecological communities).

Protect trees in accordance with the requirements of Australian Standard 4970-2009 for the Protection of Trees on Development Sites. Do not damage tree roots unless absolutely necessary, and engage a qualified arborist where roots >50 mm are impacted within the Tree Protection Zone.

Retain dead tree wastes, bush rock or logs in-situ unless they are in the impact area and moving is unavoidable. Reposition material elsewhere on the site or approved adjacent sites.

Mitigation measures
Inspect vegetation for potential fauna prior to clearing or trimming. If native fauna is likely to be present, a licenced ecologist should conduct a pre-clearance inspection and undertake fauna relocation.
If native fauna is encountered on site, stop work and allow the fauna to move away unharassed. Engage WIRES or a licenced ecologist if assistance is required to move fauna.
If any threatened species (flora or fauna) is discovered during the works, stop work immediately and notify the Sydney Water Project Manager. Work will only recommence once the impact on the species has been assessed and appropriate control measures implemented.
If any damage occurs to vegetation outside of the study area (as shown in the CEMP), notify the Sydney Water Project Manager and Environmental Representative so that appropriate remediation strategies can be developed. Water NSW is to be notified immediately via Water NSW Incident Number 1800 065 069.
Manage biosecurity in accordance with: • *Biosecurity Act 2015* (see NSW Weedwise), including reporting new weed infestations or invasive pests • contemporary bush regeneration practices, including disposal of sealed bagged weeds to a licenced waste disposal facility. Record Pesticides and Herbicides use in accordance with SWEMS0017.
To prevent spread of weeds: • clean all equipment including PPE prior to entering or leaving the work sites • wrap straw bales in geofabric to prevent seed spread.
Bag all plant parts and excavated topsoil that may be infested with weed propagules and dispose at a licensed waste disposal facility.
In a TOBAN, activities involving general purpose hot works (that are not essential/emergency works) require an exemption. Exemption requests are to be submitted to CDResilienceProgram@sydneywater.com.au or CustomerHub.DutyManager@sydneywater.com.au. Note: In TOBAN, entry to the catchment is not permitted. All hot work process needs to meet or exceed Water NSW procedure and mitigation measures are to be updated as fire danger ratings increase.
The site-specific CEMP must include instructions for dealing with orphaned or injured native animals and include the contact details for the NSW Wildlife Information, Rescue and Education Service Inc. (WIRES).
Prepare a Biosecurity Plan and implement prior to works. This plan should aim to prevent the spread of priority weeds and introduction of pathogens (e.g. *Phytophthora cinnamomi*) around the impact area.
Use less vegetated areas for access.

Mitigation measures
Retain stump to prevent erosion unless stump is deemed as safety or access risk to site personnel and asset.
Retain vegetation to prevent erosion unless vegetation is deemed a safety or access risk to site personnel and asset.
No wash down of equipment permitted on site. The cleaning protocol must be in accordance with the Department of Planning, Industry and Environment 2020 Document Hygiene guidelines for wildlife - Protocols to protect priority biodiversity areas in NSW from Phytophthora cinnamomi, myrtle rust, amphibian chytrid fungus and invasive plants.
Vegetation removal would be undertaken with the presence of an ecologist. The ecologist is to consider minimising the amount of vegetation to be removed where possible while still ensuring the objectives of the proposal and safety.

5.2.4 Aboriginal heritage

This section provides a summary of the Aboriginal Archaeological Due Diligence Assessment prepared by AECOM (Appendix F). The assessment identified if Aboriginal objects were likely to be in the study area and if so, whether the proposal was likely to harm those objects.

Existing environment

The proposal is located within a high risk landscape for Aboriginal heritage (< 200 m from waters).

A search of the AHIMS database undertaken on 28 November 2024 indicates that there is no registered Aboriginal site within or immediately adjacent to the study area. The nearest site [redacted] located 2.03 km to the north-east of the study area. All other registered Aboriginal sites are over 2.08 km from the study area.

Key findings of the assessment are summarised below:

- There are no registered Aboriginal sites within the study area.
- No Aboriginal objects were identified during the visual inspection.
- Multiple trees were identified to have scarring, but were all of natural origin (Figure 5-2). This was evident in branch tears, with fallen branches on the ground beneath the scars, scars caused by falling trees gouging neighbouring trees. There are also trauma scars from past bushfires. None of the extant trees shows any signs of cultural modification.
- Majority of the land within the study area has been subject to varying levels of past disturbance as a result of erosion and existing reservoir development.
- The topography of the study area is very steeply inclined and unlikely to have been used in past habitation activities or to have retained sites, if any were once present.

- Searches of the National Native Title Register, Register of Native Title Claims and Register of Indigenous Land Use Agreements identified one relevant registered Native Title claim for the proposal comprising the “South Coast People”. As there is no risk of impacting the Aboriginal heritage, the relevant contact entity does not need to be contacted.

Given the above factors, the Aboriginal archaeology sensitivity of the land within the study area is considered to be low. Aboriginal objects are unlikely to be present.

Figure 5-2 Example of natural scar on tree

Potential impacts

Given the low Aboriginal archaeology sensitivity of the study area, there is a low potential for the proposal to impact any surface or subsurface Aboriginal objects or other site types.

The proposal is unlikely to have any operational impacts to Aboriginal heritage.

Mitigation measures— Aboriginal heritage

With the implementation of the mitigation measures below, impacts to Aboriginal heritage can be adequately managed, and residual impacts are expected to be low.

Table 5-5 Environmental mitigation measures — Aboriginal heritage

Mitigation measures
Do not make publicly available or publish, in any form, Aboriginal heritage information on sites / potential archaeological deposits, particularly regarding location.
Repeat the basic AHIMS search if it is older than 12 months. Conduct additional assessment if new sites are registered and could be impacted by the works.
If any Aboriginal object is found, cease all excavation or disturbance in the area and notify Sydney Water Project Manager in accordance with SWEMS0009.
If any cultural heritage site or artefact (as defined by the *National Parks and Wildlife Act 1974* or *Heritage Act 1977*) is identified during the Permitted Activity, the Consent Holder's employees, contractors and/or subcontractors must Stop Work immediately at the location and ensure no further harm to the object. The Consent Holder must immediately report the find to Water NSW and the regulator in accordance with legislation. Works are not permitted to recommence in the vicinity of the find until any required approvals have been granted by the regulator. In the event that skeletal remains are encountered, the area must be secured to prevent unauthorised access and the Consent Holder must immediately contact NSW Police and Water NSW.

5.2.5 Non-Aboriginal heritage

Existing environment

The proposal is located 25 m to the south of Avon Dam, a listed heritage item on the State Heritage Register (SHR) (Figure 2-1). There are no other listed heritage items sites listed on the National Heritage, s170 heritage register or SHR located within the study area.

Potential impacts

Construction phase

During construction, the proposal is not expected to have any impact on the SHR listed Avon Dam due to the distance to the work. All vehicle access would be via Fire Road No.15 and no waterway access is required from Avon Dam. No indirect impact is expected.

Operation phase

It is unlikely that the proposal would result in any operational non-Aboriginal heritage impacts.

Mitigation measures

With the implementation of the mitigation measures below, potential impacts to heritage can be adequately managed.

Table 5-6 Environmental mitigation measures — non-Aboriginal heritage

Mitigation measures
If any non-Aboriginal relic is found, cease all excavation or disturbance in the area and notify Sydney Water Project Manager in accordance with SWEMS0009.

5.2.6 Noise and vibration

The likelihood of noise impact from the proposal was reviewed against risk factors (following Table 2 of the EPA's 2020 Draft Construction Noise Guideline). The review indicated that the likelihood of noise impact will be low and therefore a qualitative noise impact assessment was undertaken.

Existing environment

The proposal is in a rural area surrounded by dense vegetation. The closest residential receiver is located about 2 km to the south east of the proposal. The study area is not publicly accessible.

Potential impacts

Construction phase

During construction, the proposal is scheduled to be outside standard daytime hours on weekdays and Saturdays. No work is expected on Sunday. The excavator with hammer is a vibratory equipment and will be the noisiest plant. The excavator with hammer will be used for creating the concrete foundation for the stair tower. As the excavator will be used intermittently, vibration impact to the reservoirs are unlikely and can be managed with the mitigation measures below.

No noise impacts are expected due to the distance from sensitive receivers.

Operation phase

During operation, there will be no permanent changes to background noise. Noise generated during operation will not exceed the noise criteria in the Noise Policy for Industry (EPA 2017).

Mitigation measures

With the implementation of the mitigation measures below, potential noise and vibration impacts can be adequately managed and residual impacts are expected to be low.

Table 5-7 Environmental mitigation measures — noise and vibration

Mitigation measures
Works must comply with the Draft Construction Noise Guideline (EPA, 2020). No work to be scheduled on Sunday nights or public holidays. Any proposed work outside of these hours must be justified. The proposal will also be carried out in accordance with Sydney Water's Noise Management Procedure SWEMS0056.

Mitigation measures
All reasonable and feasible noise mitigation measures should be justified, documented and implemented on-site to mitigate noise impacts.

Incorporate standard daytime hours noise management safeguards into the CEMP, including but not limited to:

- Identify and consult with the potentially affected residents prior to commencement of works. This should:
- describe the nature of works, the expected noise impacts, approved hours of work, duration, complaints handling and contact details
- determine need for, and appropriate timing of respite periods (e.g. times identified by the community that are less sensitive to noise such as mid-morning or mid-afternoon for works near residences).
- Implement a noise complaints handling procedure.
- Do not warm-up plant or machinery near residential dwellings before the nominated working hours.
- Select appropriate plant for each task, to minimise the noise impact (e.g. all stationary and mobile plant will be fitted with residential type silencers).
- Regularly inspect and maintain equipment in good working order.

As works beyond standard daytime hours are needed, the contractor would:

- consider potential noise impacts and: implement the relevant standard daytime hours safeguards; Sydney Water's Noise Management Code of Behaviour (SWEMS0056.01) and document all reasonable and feasible management measures to be implemented
- identify additional community notification requirements and outcomes of targeted community consultation
- seek approval from the Sydney Water Project Manager in consultation with Water NSW, the environment and the communications representatives.

Consider less vibration intensive methodologies where practicable and use only the necessary sized and powered equipment.

Notify Water NSW on any work outside the specified working hours in the REF.

5.2.7 Air and energy

Existing environment

The proposal is in a rural vegetated area. The main source of pollutants within the study area are emissions from maintenance vehicles for the reservoirs. There are no sensitive receivers within 2 km of the study area.

Potential impacts

Construction phase

During construction, the following activities have potential to impact air quality of the environment:

- dust generated during excavation, stockpiling and exposed soils
- dust generated by construction vehicles travelling on disturbed access routes
- emissions from machinery, equipment and vehicles used during construction.

There would be additional energy use through fuel used in vehicles and plant. The additional energy use is expected to have only a minimal impact due to the limited extent of the proposal.

No odour impacts are expected.

Operation phase

Overall impacts to air quality and energy during operation of the proposal are considered minimal as the proposal would not result in a significant change in land use.

Mitigation measures

With the implementation of the mitigation measures below, air quality and energy impacts can be adequately managed and residual impacts are expected to be low.

Table 5-8 Environmental mitigation measures — air and energy

Mitigation measures
Track energy use as per SWEMS0015.28 Contractor NGER template.
Maintain equipment in good working order, comply with the clean air regulations of the *Protection of the Environment Operations Act 1997*, have appropriate exhaust pollution controls, and meet Australian Standards for exhaust emissions.
Switch off vehicles/machinery when not in use.
Implement measures to prevent offsite dust impacts, for example: • cover exposed areas with tarpaulins or geotextile fabric • modify or cease work in windy conditions.
Cover all transported waste.

5.2.8 Waste and hazardous materials

Existing environment

A search on Sydney Water HazCentral register in January 2025 indicates there are Asbestos Containing Material (ACM) (moderate risk) and lead paint (low and medium risk) present in both

WS0234 and WS0219. Additionally, Polychlorinated Biphenyls (moderate risk) and Lead Contaminated Dust (low risk) are present within WS0219.

Potential environmental impacts

Construction phase

Our corporate objectives include to be a resource recovery business with an increasing portfolio of circular economy products and services. This includes reducing waste through recycling and re-use, and encouraging our suppliers to minimise waste. The proposal has the potential to generate up to 1,000 tonnes of waste from the following waste streams:

- green waste from tree clearing and noxious weeds
- excavated waste material
- general construction waste such as excess concrete and metal
- domestic waste including food scraps, plastic and paper containers generated by site construction personnel
- excavated soil
- hazardous waste (if encountered)
- contaminated material (if encountered).

At this stage, the amount of green waste to be created from the proposal is unable to be quantified. However, we anticipate that the majority of vegetation impacted would be mulched and reused on site where possible for sedimentation controls and for site restoration. Excess vegetation that cannot be reused on site would either be provided to interested parties that would use the mulch or sent to an appropriate waste facility. The re-use of vegetation during construction would be undertaken in consultation with WNSW. This will be documented in the CEMP.

Any identified hazardous materials as outlined above along with any other potential contamination identified on site would be effectively managed in accordance with the Asbestos Removal Control Plan (ARCP) and SafeWork NSW requirements and other mitigation measures below.

Mitigation measures

With the implementation of the mitigation measures below, waste and hazardous impacts can be adequately managed, and residual impacts are expected to be minor.

Table 5-9 Environmental mitigation measures — waste and hazardous materials

Mitigation measures
Manage waste in accordance with relevant legislation and maintain records to show compliance (e.g. waste register, transport and disposal records). Record and submit SWEMS0015.27 Contractor Waste Report.
Provide adequate bins for general waste, hazardous waste and recyclable materials.

Mitigation measures
Minimise stockpile size and ensure delineation between different stockpiled materials.
Minimise the generation of waste and sort waste streams to maximise reuse/recycling in accordance with the legislative requirements.
Manage waste and excess spoil in accordance with the NSW EPA Resource Recovery Orders and Exemptions (if applicable) and / or Waste Classification Guidelines. Where materials are not suitable or cannot be reused onsite or offsite, recycle where appropriate. Recycle soils at a licensed soil recycling facility or dispose at an appropriately licenced landfill facility.
Prevent pollutants from escaping including by covering skip bins.
Reuse vegetation (non weed) for erosion and sedimentation controls, site stabilisation and site rehabilitation where appropriate. Dispose excess vegetation (non-weed) that cannot be reused at an appropriate green waste disposal facility.
A targeted destructive Hazardous Building Materials (HBM) assessment, tailored to the scope of proposed works, needs to be undertaken prior to commencement of the refurbishment works. Should HBM be present and potentially impacted by the works, it should be safely removed. All HBM removal must be conducted in accordance with the NSW WHS Regulation, 2017. Where asbestos is required to be removed, an Asbestos Removal Control Plan (ARCP) must be prepared. Prior to commencing relining and repair work, clearance certificates must be obtained and reviewed.
Manage lead paint in accordance with the WHS Regulation (2017) Part 7.2 and the Australian Standard AS4361.1.2017. Consult with Contamination and Hazardous Materials team where works involve removal of lead-based paint. Develop a Lead Removal Control Plan (LRCP) if required.
Supporting documentation: Targeted destructive HBM assessments, SafeWork Method Statements (SWMS), ARCPs, LRCPs and similar need to be forwarded to the Contamination and Hazardous Materials team for review ahead of the HBM removal works.
Upon completion of HBM removal works, clearance certificates and close out documentation should also be forwarded to the Contamination and Hazardous Materials team to enable updating of records.

5.2.9 Traffic and access

Existing environment

The reservoirs are only accessible from Fire Road No.15. Vehicle movements on this road are limited as there is no public access. However relevant stakeholders such as Endeavour Energy, TransGrid, Australian Rail Track Corporation (ARTC) and GM3 (formerly South32) would infrequently utilise the fire road. Informal parking of vehicles is available on hardstand area of Fire Road No.15.

Potential impacts

Construction phase

The proposal would require partial road closure of sections of Fire Road No.15 around the reservoirs to facilitate operation of heavy vehicles throughout the construction period. Temporary road closure along Fire Road No. 15 will be required for the bridge stabilisation works. The bridge works would approximately last for a week and the road closures would last for a couple days at a time. The contractor will consult with Water NSW to manage impacts to vehicle movement along Fire Road No.15.

The proposal is expected to generate about 5 light vehicle and 8 heavy vehicle movements per day. Light vehicle movements will generally peak for a one-hour period at the start and end of each shift, when workers arrive and depart from the site each day. Heavy vehicle journeys would occur periodically throughout the day.

To minimise traffic impacts along the fire road and due to the limited available paring within the proposal area, workers may consider accessing the site via a shuttle bus or car pooling. Workers would park their vehicles at a designated parking area (yet to be determined), which would not significantly disrupt parking availability within the community.

Access to the back of the reservoirs would be via less vegetation area on the eastern side of the reservoirs. Franna cranes would be used to allow access to steeper sections of the cliff directly behind the reservoirs. The vehicle access to the study area would be via Fire Road No.15. Access to Fire Road No.15 for other vehicles would be maintained at all times.

Construction vehicles would use the hardstand area adjacent to the reservoirs for parking.

Operation phase

During operation, maintenance activities are not expected to result in additional traffic impacts to the surrounding road network, access and parking.

Mitigation measures

With the implementation of the mitigation measures below, traffic and access impacts can be adequately managed, and residual impacts are expected to be low.

Table 5-10 Environmental mitigation measures — traffic and access

Mitigation measures
Manage sites to allow people to move safely past the works, including alternative pedestrian access.
Consult with Water NSW about managing impacts to pedestrian traffic, signposting, meters, parking, line-marking or if traffic control or pavement restoration is required.
Erect signs to inform road users of the proposal and any temporary road closures.

Mitigation measures
Ensure work vehicles do not obstruct other maintenance vehicular access unless necessary and only if appropriate notification has been provided to Water NSW as per the Sydney Water and Water NSW Access Protocol.
Maintain continuous access for Water NSW, Sydney Water and respective contractors to and beyond the work area.
Regularly check Water NSW channels on any potential road closure from wet weather, fire danger or other unexpected events. Update work schedule and notify Water NSW if additional days for access are required.
Conduct a dilapidation/ condition assessment on all access routes used for the proposal to ensure tracks are suitable to carry the higher load vehicles.
Where parking within the construction compound would be exceeded, additional measures to reduce parking demand (e.g. shuttle buses or car pooling) would be implemented. Overflow parking for workers would be provided at a location that would seek to minimise local parking impacts to the community.
All vehicles to access the catchment must be 4WD.

5.2.10 Social and visual

Existing environment.

The proposal is located on Sydney Water owned land and Water NSW land in Avon. The study area is only accessible via Fire Road No.15. The land behind the reservoirs is an undisturbed vegetated area. No public access is allowed and there are no sensitive receivers within 2 km of the proposal.

Potential impacts

Construction

During construction, the existing visual amenity of the area would be disrupted by presence of heavy machinery, stockpiling of excavated material, excavations, storage of equipment and site sheds. Although only vegetation deemed as a safety or access risk to assets will be removed, there is still potential to disrupt the existing visual amenity of the area. Any access restrictions during construction would be temporary and would be re-instated after construction.

As there are no sensitive receivers within 2 km of the proposal, the proposal is expected to have only a minor social and visual impact to road users.

Operation

The removal of vegetation behind the reservoirs would have a visual impact to the road users of Fire Road No.15. Given the road is not publicly accessible, the proposal is expected to have only a negligible visual impact to road users. Most of these road users would be asset maintenance

contractors and owners. Reservoirs are expected to have a similar external appearance upon completion of work. No ongoing visual impact is expected.

The proposal will have a positive social impact by providing a reliable drinking water service for the community.

Mitigation measures

With the implementation of the mitigation measures below, social and visual impacts can be adequately managed, and residual impacts are expected to be low.

Table 5-11 Environmental mitigation measures — social and visual

Mitigation measures
Undertake works in accordance with Sydney Water Communications policies and requirements including: • Notify impacted residents. • Treat community enquiries appropriately.
Restore work sites as close to pre-existing condition or better
Minimise visual impacts (e.g. retain existing vegetation where possible).
Maintain work areas in a clean and tidy condition.
No smoking within National Parks or Special Areas.

5.2.11 Cumulative and future trends

Potential environmental impacts

Sydney Water is currently proposing to undertake works at the same time near to the proposal in the suburb of Avon. The project includes the maintenance and / or replacement of 36 power poles and their related infrastructure as required along the Avon High Voltage Overhead Line. Due to the minor impacts anticipated from the proposal, cumulative impacts are considered to be minimal.

A search on the Wollongong City Council Development Applications (DA) and the Department of Planning and Environment Major Projects website was conducted in January 2025. The search indicates there is no significant development within Avon.

The main potential cumulative impacts of the proposal are likely to come from the simultaneous use of the Fire Road No.15 with other projects. There would be potential for additional traffic and access impacts. Therefore, consultation with Water NSW and relevant stakeholders would be undertaken to minimise the potential for interaction as far as practicable through construction planning.

Future trends

The proposal has considered future trends such as bushfire and extreme heat and is unlikely to further exacerbate them. The proposed vegetation clearing would help reduce bushfire risk to the

reservoirs by maintaining an Asset Protection Zone (APZ). The proposal would also improve long-term reliability and resilience of the reservoirs particularly during drought season.

Mitigation measures

With the implementation of the mitigation measures below, potential cumulative impacts can be adequately managed, and residual impacts are expected to be low.

Table 5-12 Environmental mitigation measures — cumulative and future trends

Mitigation measures
Consult with Water NSW and Sydney Water project teams to minimise potential interaction during construction as far as practicable.

5.2.12 General environmental management

Table 5-13 Environmental mitigation measures — general environmental management

Mitigation measures
Sydney Water's Project Manager (after consultation with the environmental and community representatives and affected landowners) can approve temporary ancillary construction facilities (such as compounds and access tracks), without additional environmental assessment or approval if the facilities: • limit proximity to sensitive receivers • do not disrupt property access • have no impact to known items of non-Aboriginal and Aboriginal heritage • are outside high risk areas for Aboriginal heritage • use existing cleared areas and existing access tracks • have no impacts to remnant native vegetation or key habitat features • have no disturbance to waterways • do not require additional safeguards beyond those included in the EIA • do not disturb contaminated land or acid sulfate soils • will be rehabilitated at the end of construction. The contractor must demonstrate in writing how the proposed ancillary facilities meet these principles. Any facilities that do not meet these principles will require additional environmental impact assessment. The agreed location of these facilities must be shown on the CEMP site plan and appropriate environmental controls installed.
Should the proposal change from the Environmental Impact Assessment (EIA), no further environmental assessment is required provided the change: • remains within the study area for the EIA and has no net additional environmental impact or • is outside the study area for the EIA but:

Mitigation measures

- reduces impacts to biodiversity, heritage or human amenity or
- avoids engineering (for example, geological, topographical) constraints and
- after consultation with any potentially affected landowners and relevant agencies such as Water NSW.

The contractor must demonstrate in writing how the changes meet these requirements, for approval by Sydney Water's Project Manager in consultation with the environmental and community representatives.

Prepare a Construction Environmental Management Plan (CEMP) addressing the requirements of this environmental assessment and how the identified mitigation measures will be implemented. The CEMP should specify licence, approval and notification requirements. Prior to the start of work, all project staff and contractors will be inducted in the CEMP.

The CEMP must be readily available on site and include a site plan which shows:

- go/no go areas (e.g. heritage/AHIP zones professionally surveyed. Mark the boundary with highly visible non-ground-disturbing and 'environmental protection zone' signs) and boundaries of the study area including locations of laydown and storage areas for materials and equipment
- location of environmental controls such as erosion and sediment controls, fences or other measures to protect vegetation or fauna, spill kits
- location and full extent of any vegetation disturbance
- stockpile locations
- traffic control and access arrangements
- access and works identification arrangements at/ around the proposal area where it occurs on WaterNSW land
- adequate measures to suppress any dust raised during the works
- catchment incident response plans including Water NSW Incident Notification number (1800 061 069)
- requirements to regularly check Water NSW website (link) for catchment closure.

The CEMP will identify appropriate delineation with (e.g. metal fencing for AHIMS, white flagging for construction corridor, red flagging for no go zones). Delineate approved study area before construction.

The CEMP would be provided to Water NSW for review.

Comply with the Sydney Water and Water NSW Access Protocol. The contractors will need to adhere to the conditions outlined in the 'Conditions of Access into Special and Controlled Areas' contained in clause 11 of the 'Sydney Water and Water NSW Access Protocol, Version 1' and any other conditions outlined in correspondence from Water NSW including notification and catchment induction requirements. This includes any additional conditions from ongoing consultation with Water NSW.

CEMP, Erosion and Sedimentation Control Plan and maintenance plan for the cleared area will need to be reviewed by Water NSW.

Mitigation measures
The contractors will send through the access notification to Water NSW at least 28 days prior to commencement of work upon finalising construction methodology. Note that this proposal requires a full consent with possession of the land.
Prepare an Incident Management Plan (IMP) outlining actions and responsibilities for: • predicted/onset of heavy rain during works • spills • unexpected finds (e.g. heritage and contamination) • other potential incidents relevant to the scope of works. All site personnel must be inducted into the IMP.
To ensure compliance with legislative requirements for incident management (e.g. *Protection of the Environment Operations Act 1997*), Follow SWEMS0009 and attach SWEMS0009 to the CEMP.
Complaints to be managed in accordance with Sydney Water's Complaints Procedure and relevant Community Engagement Plan.
Assign single person with accountability for coordinating communication and information flow across contractors and consultants and provide the contact details of this person in the CEMP.
Contact Water NSW Catchment Duty Officer for out of ordinary situations (e.g. reporting an incident to Water NSW, negotiating activity outside of approved activity). The current officer contact is Glen Capararo (0429 326 797, glen.capararo@waternsw.com.au). Alternatively, please call 9685 4340 with any enquiries or notifications.
Consult with WaterNSW to schedule works in consideration of WaterNSW's deer management program.
Gates to the Special Area must be locked at all times and not left open during construction works.
All Hot Work (work that involves high temperatures or ignition sources that pose a fire or explosion risk) and work using machinery in bush and grass land environments must have adequate controls in place to prevent a fire from starting or spreading.

6 Conclusion

Sydney Water has prepared this REF to assess the potential environmental impacts of Avon Reservoirs Reline and Roof Repair. The proposal is required to improve the long-term reliability and resilience of the Avon Reservoirs.

The main potential construction environmental impacts of the proposal include impacts such as vegetation clearing and soil erosion. During operation, it is unlikely that any adverse impacts will be experienced. Given the nature, scale and extent of impacts and implementation of the mitigation measures outlined in this REF, the proposal is unlikely to have a significant impact on the environment. Therefore, an environmental impact statement is not required under Division 5.1 of the EP&A Act.

The REF considers how the proposal aligns with the principles of ESD. The proposal will result in positive long-term environmental improvements. The proposal will not result in the degradation of the quality of the environment and will not pose a risk to the safety of the environment.

7 References

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NSW Environment Protection Authority (EPA), 2025, *List of notified sites*, Available at: https://www.epa.nsw.gov.au/your-environment/contaminated-land/notified-and-regulated-contaminated-land/list-of-notified-sites

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Water NSW 2022, *Neutral or Beneficial Effect on Water Quality Assessment Guideline*, Water NSW, NSW

Wollongong City Council, 2025, *Planning and Environment Map*, Available at: https://wollongong.nsw.gov.au/development/development-policies-guidelines/flooding-stormwater-and-development/flooding-accordions/online-maps

Appendices

Appendix A – Section 171 checklist

Section 171 checklist	REF finding
Any environmental impact on a community	There may be short-term impacts on the community from traffic, vegetation clearing and soil erosion. There will be environmental improvements by providing a reliable water service to the local community.
Any transformation of a locality	The proposal will not result in the transformation of a locality.
Any environmental impact on the ecosystems of the locality	The proposal has been designed to minimise biodiversity impact as much as possible, however, clearing of native vegetation is required. Appropriate vegetation offsets will mitigate this impact.
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality	The proposal will not reduce the aesthetic, recreational, scientific or other environmental quality or value of the locality.
Any effect upon a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or any other special value for present or future generations	The proposal will not have any effect upon a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or any other special value for present or future generations. The Aboriginal Archaeological Due Diligence Assessment did not identify any Aboriginal objects during the visual inspection.
Any impact on the habitat of any protected animals (within the meaning of the *Biodiversity Conservation Act 2016*)	The proposal will result in the removal of some habitat of protected animals, however it will not result in a significant impact to any of the species within the study area. Mitigation measures, including biodiversity offsets have been identified to avoid or minimise impacts on habitat areas.
Any endangering of any species of animal or plant or other form of life, whether living on land, in water or in the air	The proposal will not be endangering any species of animal, plant or other form of life, whether living on land, in water or in the air.
Any long-term effects on the environment	The proposal will not have any long-term impacts on the environment but will have a long-term benefit by providing a reliable and modern water service for the area.
Any degradation of the quality of the environment	The proposal will not cause the degradation of the quality of the environment.
Any risk to the safety of the environment	The proposal will not increase risk to the safety of the environment. The proposed stair tower will increase improve safety when accessing the reservoirs.

Section 171 checklist	REF finding
Any reduction in the range of beneficial uses of the environment	The proposal will not reduce the range of beneficial uses of the environment.
Any pollution of the environment	Environmental mitigation measures will mitigate the potential for the proposal to pollute the environment. No pollution of the environment is expected.
Any environmental problems associated with the disposal of waste	Waste disposal will be in accordance with the environmental mitigation measures, and no environmental problems associated with the disposal of waste are expected.
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply	The proposal will not increase demand on resources, that are, or are likely to become, in short supply.
Any cumulative environmental effect with other existing or likely future activities	The proposal will have cumulative environmental effects with other activities, although the impacts are expected to be low.
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	The proposal will not have any impact on coastal processes or hazards, and coastal processes and coastal hazards will not have any impact on the proposal.
Any applicable local strategic planning statements, regional strategic plans or district strategic plans made under the EP&A Act, Division 3.1	There are no applicable strategic planning statements or plans, as the proposal forms part of a Water Reservoir Renewal Program.
Any other relevant environmental factors.	The proposal has been assessed against the factors listed above, and there are no other relevant environmental factors to consider.

Appendix B – Consideration of TISEPP consultation

TISEPP section	Yes	No
Section 2.10, council related infrastructure or services – consultation with council		
Will the work:		
Potentially have a substantial impact on stormwater management services provided by council?		✓
Be likely to generate traffic that will strain the capacity of the road system in the LGA?		✓
Connect to, and have a substantial impact on, the capacity of a council owned sewerage system?		✓
Connect to, and use a substantial volume of water from a council owned water supply system?		✓
Require temporary structures on, or enclose, a public space under council's control that will disrupt pedestrian or vehicular traffic that is not minor or inconsequential?		✓
Excavate a road, or a footpath adjacent to a road, for which the council is the roads authority, that is not minor or inconsequential?		✓
Section 2.11, local heritage – consultation with council		
Is the work likely to affect the heritage significance of a local heritage item, or of a heritage conservation area (not also a State heritage item) more than a minor or inconsequential amount?		✓
Section 2.12, flood liable land – consultation with council		
Will the work be on flood liable land (land that is susceptible to flooding by the probable maximum flood event) and will works alter flood patterns other than to a minor extent?		✓
Section 2.13, flood liable land – consultation with State Emergency Services		
Will the work be on flood liable land (land that is susceptible to flooding by the probable maximum flood event) and undertaken under a relevant provision*, but not the carrying out of minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance? * (e) Div.14 (Public admin buildings), (g) Div.16 (Research/ monitoring stations), (i) Div.20 (Stormwater systems)?		✓
Section 2.14, development with impacts on certain land within the coastal zone– council consultation		
Is the work on land mapped as coastal vulnerability area and inconsistent with a certified coastal management program?		✓
Section 2.15, consultation with public authorities other than councils		
Will the proposal be on land adjacent to land reserved under the *National Parks and Wildlife Act 1974* or land acquired under Part 11 of that Act*? If so, consult with DPE (NPWS).*		✓
Will the proposal be on land in Zone C1 National Parks and Nature Reserves or on a land use zone that is equivalent to that zone? *If so, consult with DPE (NPWS).*		✓
Will the proposal include a fixed or floating structure in or over navigable waters? *If so, consult TfNSW.*		✓
Will the proposal be on land in a mine subsidence district within the meaning of the *Coal Mine Subsidence Compensation Act 2017*? *If so, consult with Subsidence Advisory NSW.*		✓
Will the proposal be on land in a Western City operational area specified in *the Western Parkland City Authority Act 2018,* Schedule 2 and have a capital investment value of $30 million or more? *If so, consult the Western Parkland City Authority*.		✓
Will the proposal clear native vegetation on land that is not subject land (i.e. non-certified land)? *If so, notify DPE at least 21 days prior to work commencing. (Requirement under s3.24 Chapter 3 Sydney Region Growth Centres - of the SEPP (Precincts – Central River City) 2021).*		✓

Appendix C – Neutral or beneficial effect on water quality (NorBE Assessment)

NorBE assessment – is there likely to be a neutral or beneficial effect on water quality? (assessment must consider surface and ground waters, and construction and operational stages)	
Are there any identifiable potential impacts on water quality? What pollutants are likely? *Major potential pollutants are sediments (fine & coarse), nitrogen, phosphorus, pathogens and hazardous chemicals and contaminants such as oil/fuel.* At what stage do the impacts occur? *ie during construction and/or post construction?*	The potential pollutants generated by the proposal during construction are sediments, dust, and contaminants such as oil/fuel. These pollutants have the potential to impact water quality of Flying Fox No.3 Creek through runoff and storage of fuels and chemicals on site. Mitigation measures such as the implementation of an erosion and sediment control plan and bunding before construction starts would manage potential impacts. Refer to Section 5 for all mitigation measures.
For each pollutant list the safeguards needed to prevent or mitigate potential impacts on water quality? *These may be Water NSW endorsed current recommended practices (CRPs) and/or equally effective other practices*	The mitigation measures used to manage sedimentation and fuel spills into nearby waterway would include, but not limited to, the installation of sediment traps and frequent checks of the erosion and sediment controls. Refer to Section 5 for all mitigation measures.
Will the safeguards be adequate for the time required? How will they need to be maintained?	Yes, the mitigation measures would be managed for the duration of the project by the contractor through the implementation of the mitigation measures in Section 5 and the CEMP.
Will all impacts on water quality be effectively contained on the site by the identified safeguards (above) and not reach any watercourse, waterbody or drainage depression? Or will impacts on water quality be transferred outside the site for treatment? How? Why?	Sediment – will be effectively contained on the site provided the required erosion and sediment controls are properly installed and maintained. Dust – offsite dust impacts would be managed though the watering and/or covering of exposed areas and conducting work in appropriate weather conditions (i.e. works would cease in windy conditions). Contaminants – would be managed through appropriate storage of contaminants, location of refuelling areas away from waterways/drainage lines and functional and easily accessible spill kits. The mitigation measures outlined in this REF (Section 5) are considered effective to contain any potential impacts to water quality on site.

NorBE assessment – is there likely to be a neutral or beneficial effect on water quality? (assessment must consider surface and ground waters, and construction and operational stages)	
	Transfer of wastewater is required for offsite treatment. Wastewater would be trucked off site and treated at an appropriate facility.
Is it likely that a neutral or beneficial effect on water quality will occur? Justify	The proposal is likely to have a neutral effect on water quality. Mitigation measures, outlined in Section 5, would be implemented to minimise any potential impacts. When the proposal is operational, the proposal would have the same level of impact on water quality as before the proposal commenced (i.e. neutral effect).

Appendix D – Flora and Fauna Assessment

Appendix E – Arboricultural Assessment

Appendix F – Aboriginal Archaeological Due Diligence Assessment

Appendix G – Water NSW endorsement and site specific requirements