



Review of Environmental Factors

Calderwood Package 3A1 Mount Terry Lead-in
Mains (October, 2022)

Sydney
WATER

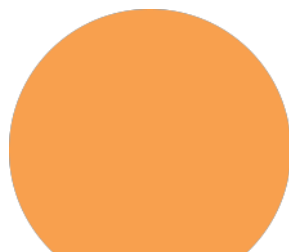


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Determination

This Review of Environmental Factors (REF) assesses potential environmental impacts of the Calderwood Package 3A1 Mount Terry Lead-in Mains proposal and 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 to ensure the proposal is carried out as described in this REF. If the scope of work or work methods described in this REF change significantly following determination, additional environmental impact assessment may be required.


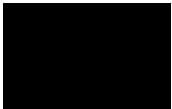
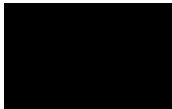
Decision Statement

During construction, the main potential environmental impacts of the proposal are typical construction impacts such as impacts to ecology, Aboriginal heritage, and noise. 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. Accordingly, a Species Impact Statement (SIS) and Biodiversity Development Assessment Report (BDAR) is not required.

It is considered that, given the nature, scale and extent of impacts and implementation of the safeguards outlined in this REF, the proposed work is unlikely to have a significant impact on the environment. Accordingly, we do not require an Environmental Impact Statement (EIS) and the proposal may proceed.

Certification

I certify that I have reviewed and endorsed the contents of this REF document and, to the best of my knowledge, it is in accordance with the EP&A Act and the Environmental Planning and Assessment Regulations (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 and the information it contains is neither false nor misleading.

Prepared by:	Reviewed by:	Endorsed by:	Approved by:
 Francisco Medina REF author Environment and Heritage, Sydney Water Date: 12/10/2022	 Sarah Mitchell A/ Senior Environment Scientist Environment and Heritage, Sydney Water Date: 14/10/2022	 Sam Ali Project Manager Program delivery, Sydney Water Date: 14/10/2022	 Jude Gregory A/ Manager Environment and Heritage Asset Lifecycle, Sydney Water Date: 14/10/2022

1 Executive summary

Sydney Water is working towards expanding its network of drinking water infrastructure to ensure there is sufficient capacity to service the Government's planned development of the West Dapto Urban Release Area (WDURA) up to 2048. Calderwood is one of the adjacent development areas to the broader WDURA.

Sydney Water is responsible for providing drinking water services to the Illawarra Region and there is insufficient capacity to meet the demands of projected population growth.

The proposal would provide water infrastructure to the Calderwood precinct by constructing and operating drinking water pipelines. The key drinking water requirements in the near term include:

- 3.8 km of DN300 Mt Terry lead-in main, crossing the Macquarie Rivulet at the north section
- 0.2 km of DN250 along Road 10
- 0.4 km x DN250 along Berrima Street and Wongawilli Street
- 0.3 km of DN150 Ravenswood (existing DN450 to be disused and exhumed)
- two pressure reducing valves (PRVs)
- compound and underbore staging areas.

The scope of works for this project is detailed Section 3 and **Appendix C**.



The lead Developer for this proposal is Dahua. The Mt Terry alignment has been positioned according to Dahua's planned road alignments and lot layout.

Construction is expected to start early 2023 and will be completed by 2025.

Sydney Water consulted with key stakeholders including relevant local Councils, landowners and residents of adjacent properties.

During construction, the main potential environmental impacts of the proposal are typical construction impacts such as impacts to ecology, Aboriginal heritage, and noise. Up to 3.23 ha of native vegetation and seven hollow-bearing trees will be cleared and offset as part of the proposal. The Biodiversity Assessment undertaken shows that if the safeguards identified in this document are implemented, the proposal will not have a significant environmental impact.

The proposal overlaps areas that have been previously assessed for Aboriginal cultural heritage values and are covered under existing Aboriginal Heritage Impact Permits (AHIPs). These AHIPs allow impacts to Aboriginal objects within their respective AHIP areas, provided that works are undertaken in accordance with AHIP conditions. If impacts to Aboriginal archaeological features (outside of existing AHIP area) cannot be avoided, further detailed Aboriginal heritage assessment would be required. In addition, an AHIP would be required prior to impacting any Aboriginal archaeological sites not covered by existing AHIPs.



Given the nature, scale and extent of impacts and implementation of the safeguards outlined in this document, it is considered that the proposed work is unlikely to have a significant impact on the environment.

The proposal has been considered in accordance with the principles of ESD. The proposal will ensure a reliable drinking water supply to service the projected growth. It will result in positive long-term environmental improvements as it will allow Sydney Water to ensure the stability and safe operation of these assets. 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.

2 Introduction

2.1 Context

We provide water, wastewater, recycled water and some stormwater services to almost 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 proposed work under Division 5.1 of the EP& A Act. This REF assesses the potential environmental impacts associated with Calderwood Package 3A1 Mount Terry Lead-in Mains proposal and identifies safeguards that avoid or minimise potential impacts.

2.2 Proposal background and need

Calderwood is one of the adjacent development areas to the broader West Dapto Urban Release Area (WDURA), with Calderwood planning included in the WDURA servicing strategy development. The Calderwood development precinct covers approximately 1,845 ha, located in the Illawarra region, with the potential to develop 7,700 new residential dwellings.

A portion of the Calderwood development precinct (approximately 723 ha) was released and rezoned for development in December 2010. This is anticipated to yield 4,800 dwellings and 50 hectares of commercial land, including villages/town centres and a business park. The precinct is being developed in stages, and Dahua is the developer for the proposal area that is the subject of this REF. This proposal involves the construction of about 5km water main and associated infrastructure, known as the 'Mt Terry' alignment. The Mt Terry alignment has been positioned according to Dahua's planned road alignments and lot layout. The proposed alignment is shown in **Figure 3-1** and **Figure 3-2**. Additional environmental impact assessment will be undertaken for the other sections of water pipeline as the precinct develops.

A summary of the proposal need, objectives and consideration of alternatives are provided in **Table 2-1**.

Table 2-1 Proposal need, objectives and consideration of alternatives

Aspect	Relevance to proposal
Proposal need	The key driver for the project is to expand Sydney Waters network of drinking water infrastructure to ensure there is sufficient capacity to service the Government's planned development of the WDURA up to 2048. Sydney Water is responsible for providing drinking water services to the Illawarra Region and there is insufficient capacity to meet the demands of projected population growth.



The proposal would provide water infrastructure to the Calderwood precinct by constructing and operating drinking water pipelines to connect to Albion Park and Mt Terry.

Proposal objectives

The proposal objectives are to:

- ensure secure water supply
- protect public health
- protect catchment and river health
- provide affordable and efficient water services
- provide resource and energy efficient water services
- support the orderly rollout of land release and infrastructure
- meet Sydney Water's statutory and regulatory obligations.

Consideration of alternatives/options

Alternatives to the current proposed alignment were considered in the *Calderwood Package 3 - Mount Terry Lead-In Water Main Concept Design Report (August 2020)*. The current alignment, as described in this REF, was selected due to Aboriginal heritage, ecology and construction constraints within the precinct area.



2.3 Consideration of Ecologically Sustainable Development

The proposal has been considered against the principles of ecologically sustainable development (ESD) (refer to **Table 2-2** below).

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

Principle	Consideration in proposal
<p>Precautionary principle - <i>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.</i></p>	<p>The proposal will not result in serious or irreversible environmental damage and mitigation measures have been designed to reduce scientific uncertainty relating to the proposal.</p>
<p>Inter-generational equity - <i>the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.</i></p>	<p>The program of works will contribute to better public health and environmental outcomes by providing a reliable water service that meets the demand of the future population.</p>
<p>Conservation of biological diversity and ecological integrity - <i>conservation of the biological diversity and ecological integrity should be a fundamental consideration in environmental planning and decision-making processes.</i></p>	<p>The proposal will not significantly impact on the conservation of biological diversity, or impact ecological integrity.</p> <p>The project will involve the removal of native vegetation and hollow bearing trees as described in Section 6.2.3. Exact impact areas will be determined following finalisation of detailed design. However, a significant portion of the vegetation will be underbored to avoid impacts.</p> <p>In addition, vegetation and tree removal will be offset in accordance with Sydney Water’s non-statutory offset guide.</p>

Principle	Consideration in proposal
<p>Improved valuation, pricing and incentive mechanisms - <i>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.</i></p>	<p>The proposal will provide cost efficient use of resources and provide optimum outcomes for the community and environment.</p> <p>The program of works will recommend cost-efficient use of resources. Construction methodologies have been chosen that minimise environmental impacts, such as underboring. The proposal includes a commitment to voluntary biodiversity offsets. The proposal would provide long-term sustainable water infrastructure to the Calderwood precinct to meet future population demands and provide optimum outcomes for the community and environment.</p>

3 Proposal description

3.1 Proposal details

Table 3-1 describes the proposal scope and Figure 3-1 and Figure 3-2 show the location.

Table 3-1 Description of proposal

Scope of work	Detailed description of work/ activity
Proposal description	<p>The proposal would provide water infrastructure to the Calderwood precinct by constructing and operating drinking water pipelines. As shown in the design drawings (Appendix C), the key drinking water requirements in the near term include:</p> <ul style="list-style-type: none">• 3.8 km of DN300 Mt Terry lead-in main, crossing the Macquarie Rivulet at the north section• 0.2 km of DN250 along Road 10• 0.4 km x DN250 along Berrima Street and Wongawilli Street• 0.3 km of DN150 Ravenswood (existing DN450 to be disused and exhumed)• two pressure reducing valves (PRVs)• two laydown areas. <p>Laydown areas are proposed adjacent to Tongarra Road on Lot 2/-/DP1250747 and adjacent to Yellow Rock Road on 49/-/DP1173685, as shown in Figure 3-1 and Figure 3-2.</p> <p>The southern end of the alignment is within private properties and follows the property boundaries and Endeavour Energy High Voltage (HV) powerline easement. The northern end of the pipeline is in existing roads.</p>
Location and land ownership	<p>The proposed alignment is within the Shellharbour Local Government Area. The alignment will cross the Illawarra Highway, which is a 'Classified Road.' The alignment to the north of the Illawarra Highway is in land identified under the State Environmental Planning Policy (Precincts – Regional) 2021.</p> <p>The surrounding land use is a mix of low and medium density residential development to the north, with semi-rural land to the south and west of the alignment. The central section of the proposal area has been cleared for urban development, whilst the southern section of the proposal area currently retains its rural land use.</p> <p>Dahua Group are the developers of the land through which most of the pipeline is located. The proposed alignment has been positioned according to Dahua's road alignment and lot layout.</p>

Scope of work	Detailed description of work/ activity
	In addition to developer owned land, the proposal area includes private properties and an Endeavour Energy easement.
Site establishment and access tracks	During construction heavy vehicles would access the precinct via the Illawarra Highway, and then either Escarpment Drive (north), or Yellow Rock Road (south). Once within the precinct, vehicles would use the existing sealed and unsealed access tracks established for the precinct development.
Ancillary facilities (compounds)	Construction compounds will be required to house site sheds, construction amenities and laydown areas. Indicative locations for the compounds are shown in Figure 3-1 and Figure 3-2 .
Scope of work	<p>The total length of the proposed alignment is about 5 km.</p> <p>The pipeline will be installed through conventional open trenching or trenchless methodology including horizontal directional drilling (HDD) and pipe jacking as shown in Figure 3-1 and Figure 3-2.</p> <p>Most creeks will be underbored however one will be open trenched due to geotechnical constraints. Following a review of technical, social, environmental and financial considerations the alignment will include about:</p> <ul style="list-style-type: none"> • 3.95 km of open cut trenching • 1 km of HDD • 0.07 of pipe jacking. <p>The width and depth of the trenches would be determined based on several factors including topography, ground conditions, or the need for utility service, road or creek crossings. It is anticipated that the trenches for the water mains would typically be about 0.7 m wide and 2 m deep, with entry and exit pits about 9 m by 4 m wide.</p> <p>Groundwater is likely to be encountered due to excavation during construction. The volume of water to be extracted is estimated to be 12.66 megalitres (ML). Therefore, a Water Supply Works Approval (WSWA) and a Water Access Licence (WAL) will be required as the estimated dewatering is above the 3ML/year threshold. A WSWA was submitted with the Department of Planning and Environment – Water (DPE Water) on 11 August 2022.</p> <p>A review of the design calculations indicated that the Macquarie Rivulet cannot be underbored as the pipes would be unable to withstand the water pressure due to the depth the bore would be drilled. Therefore, Macquarie Rivulet will need to be open cut trenched.</p> <p>It is anticipated that all other creek crossings, including Hazelton Creek, and areas of Aboriginal heritage and some ecologically sensitive areas would be underbored.</p>

Scope of work	Detailed description of work/ activity
	<p>Traffic control or partial road closures may be required during construction. Consultation with TFNSW and a Road Occupancy Licence may also be required for works.</p>
Commissioning	<p>Commissioning involves testing and running the new equipment to ensure the equipment is working correctly and integrated with existing plant operations. Commissioning will be carried out according to Sydney Water’s procedures.</p>
Restoration	<p>The work site will be restored to the pre-existing condition following construction in consultation with landowners. Any native vegetation removed during construction would be restored according to Sydney Water <i>SWEMS0025.11 Guideline for native revegetation following construction</i>.</p>
Materials/ equipment	<p>Materials/ equipment may include the following:</p> <ul style="list-style-type: none"> • backhoe/excavators • bitumen and road base • cranes and lift truck • erosion and sediment control devices • imported clean fill • jackhammers • road saw/ concrete saw • concrete for restoration purposes • light vehicles • semi-trailer/utes • compactor • delivery and waste removal dump trucks • horizontal directional drill • concrete and dewatering pumps • vacuum trucks • heavy vehicles. <p>Wherever possible machinery and equipment would be removed from the site each day or stored at the construction compounds.</p>
Work hours	<p>Work and deliveries will be scheduled to occur during standard daytime hours:</p> <ul style="list-style-type: none"> • 7am to 6pm, Monday to Friday • 8am to 1pm, Saturdays. <p>Some work may be necessary outside of these hours (eg. for work in roads or delivery of oversize equipment). Sydney Water’s Project Manager can approve work outside of standard daytime hours, following the approval process described in the safeguards in Section 6.</p>
Proposal timing	<p>Construction is expected to start early 2023 and will be completed by 2025.</p>
Operational requirements	<p>The program of works would be operated according to procedures and policies that Sydney Water applies to the remainder of its water systems. This includes routine inspections, and cleaning and repair, as necessary.</p>



Figure 3-1 Location of proposal and key environmental constraints – Part 1 of 2

[This figure has been redacted due to sensitive Aboriginal heritage information]



Figure 3-2 Location of proposal and key environmental constraints – Part 2 of 2

[This figure has been redacted due to sensitive Aboriginal heritage information]

3.2 Field assessment area and changes to the scope of work

The width of proposal area considered in the assessments included a 30 m wide construction corridor. The proposed alignment shown in this REF is indicative and based on the latest concept design at the time of REF preparation. The final alignment may change based on detailed design and/ or construction planning. If the design/scope of work, construction methods or construction timing described in this document change significantly, supplementary environmental impact assessment must be prepared for the amended components in accordance with SWEMS0019. An addendum is not required provided the change:

- remains within the impact area of the REF and has no net additional environmental impact; or
- is outside the impact area of the REF but reduces the overall environmental impact of the proposal (subsection 5.4(a) of the Act).

Changes to the proposal outside the impact area can only occur:

- to reduce impacts to biodiversity, heritage or human amenity; or
- to avoid engineering (for example, geological, topographical) constraints; and
- after consultation with any potentially affected landowners and relevant agencies.

The Contractor will 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.

4 Consultation

4.1 Community and stakeholder consultation

Our approach to community and stakeholder consultation is guided by the Guidelines for Community and Stakeholder Engagement (Sydney Water, 2021).

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, projects 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 will impact the community in some way, we will consult with affected groups through a variety of ways and through different stages of a project. This includes engaging the broader community and stakeholders during plan or strategy development or before making key decisions.

We will also provide local councils with reasonable notice when we would like to commence works, regardless of the need for development consent. Local council will be consulted about matters identified in environmental planning instruments (refer Section 4.2 below), including public safety issues, the placement of any temporary site sheds or laydown areas on council land, or full or partial road closures of council managed roadways.

Sydney Water met with Shellharbour Council on 16 October and 3 November 2020 to discuss the concept design and proposed alignment. In addition, representatives of Shellharbour Council attended the Design Review Workshop on 1 May 2022 and provided their comments in relation to concept design. There was also a joint site visit on 9 May 2022 for the proposed locations for the pressure reduction valves along the water main.

Sydney Water also maintains regular communication with the lead developer in the precinct, Dahua, and Endeavour Energy to ensure the proposed alignment is complimentary to the existing infrastructure in the precinct. In addition, extensive consultation was undertaken between December 2021 and March 2022 to establish a preconstruction agreement that enables Sydney Water to undertake works within Dahua's existing AHIP areas. Consultation with both Dahua and Endeavour Energy will continue throughout the detailed design and construction stages.

4.2 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 (specified in Part 2.2 Division 1 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP)).

The alignment will cross the Illawarra Highway, which is a classified road. Traffic control or partial closures may be required during construction. The RDC is required to consult with TfNSW to obtain a Road Occupancy License (ROL) for the works.

The section of the alignment, north of the Illawarra Highway will cross the Macquarie Rivulet, while the southern section of the proposal, will cross Hazelton Creek. Both the Macquarie Rivulet and Hazelton Creek are mapped 'Key Fish Habitat'. Consultation with the Department of Primary Industries - Fisheries (DPI Fisheries) was undertaken on 8 August 2022 as required under s 199 of the *Fisheries Management Act 1994*, as the proposal involves crossing and dredging waterways classified as 'Key Fish Habitat' as noted above. DPI Fisheries had no objections to the proposed works if they occur as described in this REF (see **Appendix E**). In addition, DPI Fisheries provided specific safeguards to be implemented during construction as outlined in Section 6. of this REF.

Consultation with Shellharbour City Council is required under Section 2.10 of the TISEPP as the proposal involves work affecting council-related infrastructure or services, including work on roads for which Council is the roads authority under the *Roads Act 1993*. As noted in Section 4.1, consultation with Shellharbour City Council regarding potential impacts to their land and assets has been undertaken. As such, formal consultation under the TISEPP for the partial closure of these roads would not be required. Access for traffic in both directions would be maintained with traffic controls during construction. A traffic management plan would be prepared in consultation with Shellharbour City Council prior to works being undertaken.

Further consideration of TISEPP consultation is summarised in **Appendix B**.

5 Legislative requirements

5.1 Strategic context

Sydney Water considered the following Shellharbour City Council planning strategy in development the proposal.

Shellharbour City Local Strategic Planning Statement (LSPS)

The Shellharbour City LSPS guides the future of land use planning in the City. The LSPS creates a vision on which Council can base planning decisions and assist with managing the future growth of the City based on economic, social and environmental needs over the next 20 years. It demonstrates an understanding of the changes that will shape Shellharbour City's future, so that Council, Councillors and community can create a future that is desirable to the community and visitors.

Planning Priority P11 (P11) relates to the efficient management of water, energy and waste to ensure a sustainable environment. The proposal aligns with P11 as it would provide long-term sustainable water infrastructure to the Calderwood precinct to meet future population demands and provide optimum outcomes for the community and environment.

5.2 Environmental Planning and Assessment Act

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 5-1**) and legislation (**Table 5-2**) are relevant to the proposal. **Table 5-2** also documents any licences and permits, timing and responsibility for obtaining them.

Table 5-1 Consideration of environmental planning instruments relevant to the proposal

Environmental Planning Instrument	Relevance to proposal
Shellharbour Local Environmental Plan 2013	The proposal involves development of a water reticulation systems and is in land zoned: <ul style="list-style-type: none">• C2 – Environmental conservation; the Macquarie Rivulet• C3 – Environmental Management; the Macquarie Rivulet• R2 – Low Density Residential

Environmental Planning Instrument	Relevance to proposal
	<ul style="list-style-type: none"> SP2 – Infrastructure; the Illawarra Highway is a ‘Classified road’ DM – Deferred Matter. <p>Deferred matter land is land that has not yet been zoned according to the LEP.</p>
State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP)	<p>Section 2.159(1) of the TISEPP permits development by or on behalf of a public authority for water reticulation systems without consent on any land.</p> <p>As Sydney Water is a public authority, the proposal is permissible without consent.</p>
State Environmental Planning Policy (Precincts – Regional) 2021	<p>The northern section of the proposal area is within the Calderwood Site which is regulated under SEPP (Precincts – Regional) 2021.</p> <p>The project is consistent with the land use objectives for the Calderwood precinct land use zones (C2, C3 and B4) as described in Appendix 5 in the SEPP (Precincts – Regional) 2021 and is designated as development without consent. As such, the project will be assessed under Part 5 of the EP&A Act via this REF.</p>
SEPP (Biodiversity and Conservation) 2021	<p>Vegetation in non-rural areas (Chapter 2)</p> <p>Chapter 2 of this SEPP applies as it is in an area or zone listed in subsection 2.3(1). However, subsection 2.4(1) states: ‘<i>This Policy does not affect the provisions of any other SEPP....</i>’, and as the works are permissible under the TISEPP a Council permit to clear vegetation under this SEPP is not required.</p>

Table 5-2 Consideration of key environmental legislation

Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
<i>Protection of the Environment Operations (POEO) Act 1997</i>	<p>The proposal is not considered to be a scheduled activity under Schedule 1 of the POEO Act and therefore an environment protection licence (EPL) is not required.</p> <p>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</p>	N/A	N/A

material harm and the relevant authorities are defined in Part 5.7 of the PoEO Act. The contractor is responsible for immediately reporting such incidents in accordance with *SWEMS0009 Responding to incidents with an environmental impact*.

Biodiversity Conservation (BC) Act 2016

The BC Act lists species and ecological communities which are protected in NSW. The impact of the proposal on threatened species, communities and their habitats has been assessed in Section 6.2.3.

REF

Pre-construction, Sydney Water

Two threatened ecological communities (TECs) and 12 threatened species listed under the BC Act have either been identified within or have a medium or greater likelihood of occurring within the proposal corridor. Tests of Significance have been prepared for threatened biota that are deemed likely to be subject to adverse impacts and are provided in the Biodiversity Assessment (**Appendix D**).

The Tests of Significance indicate that a significant effect is not likely to result from the proposal. Therefore, application of the Biodiversity Offset Scheme (BOS) or preparation of a Species Impact Statement (SIS) is not required.

National Parks and Wildlife (NPW) Act 1974

The proposal does not fall within land owned by National Parks and Wildlife

Dahua's existing AHIPs and preconstruction agreement conditions.

REF assessment (Sydney Water), construction AHIP compliance (Contractor)

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

An Aboriginal Heritage Due Diligence Assessment has been undertaken as part of this REF. Sections of the proposal would be carried out within the bounds of two existing AHIPs, granted to the developer, Dahua. Provided the conditions of the existing developers AHIP and mitigation measures in Section 6.2.4 are implemented, no additional

impacts to known or unknown heritage items are anticipated.

Detail design will confirm the impact footprint stays within these AHIP areas. If not, further detailed Aboriginal heritage assessment would be required. The remainder of the proposal is on land with low Aboriginal archaeological potential.

Heritage Act 1977

The *Heritage Act 1977* aims to protect and preserve items of State and local heritage significance and outlines processes for approval of development that may impact items of environmental heritage owned by Sydney Water.

REF

Pre-construction,
Sydney Water

Any work sites where there is the potential to impact items of environmental heritage have been assessed in Section 6.2.4.

Fisheries Management (FM) Act 1994

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.

Notification and consultation under section 199 of the FM Act

Pre-construction,
Sydney Water

If the proposal involves dredging work (excavation in water land) or obstructs fish passage in Key Fish Habitat, and/or harms marine vegetation then a permit from NSW DPI Fisheries may be needed. Section 6 of this REF provide details on any sites impacting Key Fish Habitat.

Water Act 1912/ Water Management Act 2000

It is likely that dewatering of excavations, such as trenches, will be required for the project. In accordance with Schedule 4 of Water Management (General) Regulation 2018, a Water Supply Work Approval (WSWA) is required for all activities that involve dewatering (pumping) of groundwater. This Project has the potential to dewater more than 3 ML of groundwater and will require a Water Access Licence (60A). Section 6.2.2 of this REF provides details on dewatering requirements and safeguards.

Water Access Licence, Water Supply Works Approval

Pre-construction,
Sydney Water

Roads Act 1993

This Act regulates works in, on or over a public road. Approval under Section 138(1) of this Act is required for carrying out works in, digging up, or disturbing a classified road.

Road
Occupancy
Licence

Pre-
construction,
Contractor

The alignment will cross the Illawarra Highway, which is a classified road. Traffic control or partial closures may be required during construction. Consultation with RMS and a Road Occupancy Licence may be required for works.

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

Actions that are likely to have a significant impact on matters of national environmental significance (MNES), Commonwealth lands or actions carried out by the Commonwealth are subject to assessment and approval. Under the EPBC Act, a person must not take an action that has, will have or is likely to have a significant impact on any of the matters of environmental significance without approval from the Australian Government Minister for the Sustainability, Environment, Water, Population and Communities. The EPBC Act outlines the environmental assessment and approval process.

N/A

Pre-
construction,
Sydney Water

A Significant Impact Criteria (SIC) Assessment for species listed under the EPBC Act was prepared for two TECs, three threatened flora species and two threatened fauna species (**Appendix D**). The assessment concluded it was considered unlikely that a significant impact on MNES would result from the proposal. Although communities listed under the EPBC Act would be impacted, these impacts have been sited on the edges of communities and within previously disturbed corridors such that the impacts are unlikely to place the communities at risk of extinction or significant decline.

6 Environmental assessment

The potential environmental aspects and direct and indirect impacts associated with construction and operation of the proposal are identified in **Section 6.2** as well as safeguards to minimise these. These safeguards will be incorporated into contract documents and a Construction Environmental Management Plan (or similar) to be developed by the Contractor prior to commencement of work.

6.1 Existing environment

The proposal is in the suburbs of Calderwood, Tullimbar, Albion Park and Yellow Rock within the Shellharbour Local Government Area. The surrounding land use is a mix of low and medium density residential development to the north, with semi-rural land to the south and west of the alignment. The central section of the proposal area has been cleared for urban development, whilst the southern section of the proposal area currently retains its rural land use.

6.2 Environmental aspects, impacts and safeguards

6.2.1 Topography, geology and soils

Existing environmental and potential impacts

The regional soil landscape mapping of the Kiama 1:100,000 sheet (Hazleton 1992) indicates that the proposal area occurs on the following soil landscapes:

- Fairy Meadow (SWfa) – is a swamp landscape overlying Quaternary sediments and is characterised by alluvial plains, floodplains, valley flats and terraces.
- Albion Park (ERap) - is an erosional landscape overlying the Berry Formation and is defined by short steep upper slopes and long gentle footslopes.
- Bombo (ERbo) - is an erosional landscape overlying Bombo Latite characterised by rolling low hills and benched slopes and sea cliffs with extensive rock platforms.
- Cambewarra soil formation - an erosional landscape overlying Cambewarra Latite and Illawarra Coal.

Construction involves excavating and stockpiling soil to install underground pipelines. The pipelines would be installed using a combination of open trenching and trenchless techniques, such as HDD and pipe jacking. These activities have the potential to cause erosion and sedimentation.

The potential for land subsidence and instability can restrict pipeline construction methods and the choice of construction materials. There is potential slope instability at the southern end of the site where Bombo Latite is expected to be encountered, based on site observations made during the geotechnical investigations for the nearby Tullimbar Village development.

A geotechnical desktop study for the proposal was completed as part of the concept design. The proposal area includes generally favourable trenching conditions, as stiff to very stiff clay and little to no groundwater were encountered. However, locally higher groundwater tables are possible at some locations, where intermittent spring activities have been observed. The study identified that soft to firm alluvial soils, and high groundwater table, may be encountered at the northern end of the alignment, which crosses Macquarie Rivulet. As a result, shallow trenching may experience stability issues. Additionally, gravels and cobbles may be present, and this would need to be taken into consideration when assessing the most suitable depths for trenchless installation.

Rock excavation may also be required at some locations. For example, between Araluen Terrace and Burrier Street, where low to medium strength rock was encountered at depths of less than 2 m and rock outcrops were observed. Also, at the southern end of the site where Bumbo Latite is expected to be encountered. Uncontrolled filling associated with previous construction works may also be present adjacent to recent residential developments.

Potential acid sulphate soils and treatment of excavated soils may be required near Yellow Rock Creek and Macquarie Rivulet. If not adequately managed, construction activities could potentially result in exposure of acid sulphate soils, resulting in the formulation of sulphuric acid. This could have detrimental impacts on water quality and lead to adverse environmental impacts.

The works are not proposing to permanently change the surface topography and drainage patterns of the area. The area will be returned to its original topography and drainage pattern following construction.

Potential impacts to topography, geology and soils are assessed as low, and can be adequately managed by the safeguards below.

Safeguards

Prevent sediment moving offsite in accordance with *Managing Urban Stormwater, Soils and Construction, Volume 1 and 2A* (Landcom 2004 and DECC 2008), including:

- develop a Soil and Water Management Plan (SWMP) as part of the CEMP
- 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 a 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 and the Environmental Representative (who will contact Property Environmental Services) 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 natural landforms to the pre-works condition.

Manage acid sulfate soils in accordance with the *Acid Sulfate Soils Management Advisory Committee: Acid Sulfate Soils Assessment Guidelines* (ASSMAC, 1998). Prepare an Acid Sulfate Soils Management Plan (ASSMP) (if required).

6.2.2 Water and drainage

Existing environment and potential impacts

Within the study area 13 waterways were identified including the Macquarie Rivulet, Hazelton Creek, and an additional 11 tributaries of Hazelton Creek which includes one unnamed second order ephemeral waterway and ten unnamed third order ephemeral waterways (see **Figure 3-1** and **Figure 3-2**). In addition, one man-made dam was identified on site and is associated with Hazelton Creek. The Macquarie Rivulet is identified as 'Environmentally Sensitive Land' in the Shellharbour LEP 2013. Both the Macquarie Rivulet and Hazelton Creek are mapped Key Fish Habitat (KFH).

Hazelton Creek will be underbored and KFH is not expected to be impacted. However, trenchless techniques have a potential risk of drilling fluid escaping the bore and entering the environment from a spill or frac-out (drilling intercepting faults and fractures in the rock).

Macquarie Rivulet cannot be underbored as the pipes cannot withstand the water pressure due to the depth the bore would be drilled. Therefore, Macquarie Rivulet will need to be open trenched. If not adequately managed, open trenching waterways has the potential to cause sedimentation and impact water quality and aquatic fauna. Under Section 199 of the FM Act, notification and consultation with DPI Fisheries was undertaken as the proposal involves crossing and dredging KFH waterways (see **Appendix G**). DPI Fisheries provided recommendations which have been included with the safeguards below.

Construction activities will involve excavation and temporary stockpiling, with the potential to cause sedimentation to waterways if not adequately managed. The excavations will be progressively backfilled and restored to a condition similar to that prior to the disturbance.

The proposal may require storing fuels and chemicals on site, which will be managed in accordance with the safeguards below to avoid any pollution of nearby waterways.

Groundwater inflows are expected when the excavation extends near or below the groundwater table. The use of steel shoring boxes would result in a reduction of inflows into the open pits, however it is anticipated that groundwater dewatering will still be required. Based on known inflows, groundwater level, construction method and schedule, it was determined that the volume of groundwater extracted for the duration of the proposal would be approximately 12.66 ML.

Therefore, a Water Supply Works Approval (WSWA) and a Water Access Licence (WAL) will be required as the estimated dewatering is above the 3ML/year threshold. A WSWA was submitted with the DPE Water on 11 August 2022.

Most of the proposal is in a flood prone area. The Macquarie Rivulet Flood Study (February 2017) indicates that the proposal is in a 1:100 flood zone. Flooding and wet weather events have the potential to impact construction and increase the movement of soil offsite.

Construction may result in minor impacts to flood behaviour because excavations may cause minor alterations to flow paths and drainage patterns. These impacts are unlikely to be significant due to the temporary and localised nature of construction activities.

The proposal would be underground with limited surface infrastructure. We do not anticipate any long-term impacts on surface water, drainage including storm water management, flooding or groundwater.

The proposal will require discharge of drinking water during commissioning. The water discharge will be undertaken outside sensitive environments and the [Sydney Water Discharge Protocol](#) will be applied, including flow control and dichlorination.

The pipeline will connect to the existing water network and will be managed under existing licences and operating procedures ensuring no impacts to groundwater or surface water quality during operation.

Any potential impacts in relation to water, drainage and groundwater will be managed in accordance with the safeguards listed above in Section 6.2.1, and below.

Safeguards

Use appropriate controls to avoid potential sedimentation to waterbodies (eg floatation boom).

Consider the DPI Water [Guidelines for watercourse crossings](#) during the design and construction of works within 40m of Macquarie Rivulet to protect waterfront land.

Works within Macquarie Rivulet should be timed for low flow conditions in the waterway.

Works across Macquarie Rivulet will be carefully managed so that the time fish passage is blocked for is minimised as far as possible, taking no longer than 1 or 2 weeks. If the trenching works will take longer than that, DPI Fisheries will be informed prior to construction.

A habitat survey of the bed of the waterway at the crossing site in Macquarie Rivulet will be conducted before the works. On filling in the trench post works, the bed of the waterway should be returned to the pre-trenching condition.

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 and/or aquatic spill kit on site for clean-up of accidental chemical/fuel spills in mapped key fish habitat. 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.

Machinery is not to enter or work from the waterway unless in accordance with the proposed works.

Sydney Water will obtain a groundwater Water Supply Works Approval and where dewatering is >3ML per water year (from 1 July) a Water Access Licence from NRAR will also be obtained. The Delivery Contractor is responsible for complying with the approval conditions (such as protecting water quality; minimising aquifer extraction volumes, monitoring extraction with flow meters and recording volumes).

Discharge all water in accordance with Sydney Water's Water Quality Management During Operational Activities Policy (D0001667) including erosion controls, discharge rate, dechlorination, monitoring. Re-use potable / groundwater water where possible.

Dewater excavations in accordance with the Delivery Management Guidance Standard 9.1 Excavation Dewatering (ENV-GS-001).

Dewater excavations in waterways as follows:

- Pumps used in waterways are to be screened with mesh of no greater than 6mm in diameter,
- Daily checks of the sediment levels in the dewatering sediment dams are to be conducted to ensure adequate storage capacity,
- Dewatering operations must ensure retention of spoil for a long enough period to allow mobilised sediments to settle out
- A visual inspection of the waterway is to be conducted at all times during dewatering operations to ensure that no visible plumes are generated within the waterway from dewatering operations.

If discharge to the environment is not possible, seek approval and discharge criteria from the relevant Sydney Water Network Area Manager prior to discharge to the wastewater system. Otherwise tanker by a licensed waste contractor and dispose off-site to an appropriately licensed facility.

Store all chemicals and fuels in accordance with relevant Australian Standards and Safety Data Sheets. Record stored chemicals on site register. Bunded areas to have 110% capacity of stored liquid volume and to be stored away from drainage lines. Chemicals and fuels in vehicles must be tightly secured. All chemicals to be clearly labelled.

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.

Conduct any equipment wash down within a designated washout area.

Ensure equipment is leak free. Repair oil/fuel leaks immediately or remove from site and replace with a leak-free item.

Prior to use at the site and/or entry into the waterway, machinery is to be appropriately cleaned degreased and serviced. Spill kits are to be available on site at all times during the works.

Prepare Drilling Fluid Management plan to avoid impacts, including:

- contain and monitor drilling fluids at entry/exit points
- identify and manage frac-outs
- re-use and/or disposal of drilling fluids (checking waste classification).

Silt curtains or a coffer dam should be deployed around instream work sites and stormwater outlet headwall construction zones where required. In addition to standard erosion and sediment control measures, to protect against any impacts to water quality.

Coffer dams are to be removed following pipe laying activities within Macquarie Rivulet. Cofferdams must not be constructed from material sources from the waterway.

The stockpiling of sediment should be located as far away from the waterway as possible and managed so that it is secure against flooding, to at least the 1 in 10 year flood interval.

Instream works should be limited to calm weather conditions.

Instream works should be undertaken during low flow periods wherever possible.

Where natural banks exist (e.g. not constructed from gabions or lined with concrete), these banks should be reformed or remediated to resemble the pre-works condition and form to the fullest extent practicable.

Any plant or equipment used in-stream should be washed down and cleaned prior to and following use to reduce the translocation risk of aquatic weed species.

To the fullest extent practicable, minimise disturbance to any native vegetation, including aquatic vegetation within the study area. This may include the demarcation of areas of native vegetation to be retained during works.

DPI Fisheries (1800 043 536) and the Environment Protection Authority (131 555) is to be notified immediately if any fish kills occur in the vicinity of the works. In such cases, all works other than emergency response procedures are to cease until the issue is rectified and approval is given by DPI Fisheries and/or the Environment Protection authority for the works to proceed.

The horizontal directional drilling process would include monitoring of the pressure of the drilling fluid to determine if there is a sudden decrease in pressure which indicates that a frac-out has occurred. A CEMP would be prepared and include contingency measures to be implemented to respond to a frac-out.

Any material removed from the waterway that is to be temporarily deposited or stockpiled on land is to be located well away from the waterway and to be contained by appropriate erosion and sediment control devices.

6.2.3 Flora and fauna

A Biodiversity Assessment was completed by Biosis in October 2022 (see **Appendix D**). The study area encompasses a 20-metre buffer area along the alignment and a 50-metre buffer around the launching pits and laydown areas. The impact area includes a 15-metre buffer either side of the alignment and a 30-metre buffer around the entry and exit pits.

Existing environment and potential impacts

Vegetation within the study area has been highly fragmented by previous clearing and the construction of hard barriers, such as residential development and infrastructure. However, remnant vegetation within the southern portion of the study area provides a moderate level of connectivity with bushland across the local area. These areas may facilitate the movement of fauna across agricultural land and south towards larger areas of bushland.

Vegetation communities

Four plant community types (PCT) were determined in the impact area:

- PCT 838: Forest Red Gum – *Thin leaved Stringybark grassy woodland on coastal lowlands, southern Sydney Basin Bioregion* which forms a component of the Threatened Ecological Community, *Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion* (Critically Endangered Ecological Community (CEEC), EPBC Act and Endangered Ecological Community (EEC), BC Act). (Illawarra Lowlands Grassy Woodland)
- PCT 1300: *Whalebone Tree - Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin Bioregion*, which forms the TEC, *Illawarra Subtropical Rainforest in the Sydney Basin Bioregion* (CEEC, EPBC Act and EEC, BC Act). (Illawarra Subtropical Rainforest)

- PCT 1105: *River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion* - not listed.
- Urban native / exotic vegetation – not listed.

The impact of the proposal on the above vegetation communities has been detailed in **Table 6-1**.

Aquatic habitats

During the field assessment, Macquarie Rivulet was observed to contain moderately deep (up to 0.3 m), rapidly moving clear water over a bed comprising algae covered cobbles (up to 20 cm in width), fine silt. The banks are well formed and natural and covered with dense terrestrial and semi aquatic vegetation, primarily juvenile River Oak, patches of Narrow-leaved Cumbungi *Typha domingensis*, Common Rush *Juncus usitatus*, Slender Knotweed *Persicaria decipiens*, Stinging Nettle *Urtica incisa* and exotics Broadleaf Dock *Rumex obtusifolius* and Turkey Rhubarb *Acetosa sagittata*. Patches of macrophytic vegetation lined the bed of the waterway, specifically Water Ribbons *Cycnogeton procerum*. No aquatic fauna was detected within this section of Macquarie Rivulet during the field investigation.

No aquatic fauna was detected within Hazelton Creek or the adjoining first and second order ephemeral waterways. All creeks other than Macquarie Rivulet will be underbored, including their associated riparian corridors. Therefore, no impacts are expected.

Macquarie Rivulet and Hazelton Creek are mapped as KFH under the FM Act. Hazelton Creek is being under bored and is not expected to be impacted. Macquarie Rivulet will be open trenched which is expected to divert water flow by pump and pipe to the adjacent side and block fish passage for up to two weeks. If not managed accordingly, works in Macquarie Rivulet have the potential to cause sedimentation and impact water quality and aquatic fauna.

Weeds

Seven priority weeds for the South Coast Local Land Services region, which includes the Shellharbour LGA, have been recorded in the study area. They include:

- *Anredera cordifolia* (Madeira Vine)
- *Asparagus aethiopicus* (Ground Asparagus)
- *Asparagus asparagoides* (Bridal Creeper)
- *Asparagus plumosus* (Climbing asparagus fern)
- *Eragrostis curvula* (African Lovegrass)
- *Lantana camara* (Lantana)
- *Senecio madagascariensis* (Fireweed).

The proposal is in the 'core infestation area' of Lantana and 'exclusion zone' of Fireweed. Therefore, in accordance with the Regional Recommended Measures outlined in **Appendix D**, land managers are required to reduce impacts from the Lantana on priority assets and eradicate Fireweed from the land.

Bushfire prone land

Most of the study area is in medium to high risk bushfire prone land. The safeguards outlined below will be implemented during construction to mitigate any impacts. No bushfire impacts are expected during operation of the proposal.

Flora and Fauna

The Biodiversity Assessment (**Appendix D**) identified the potential for 25 threatened flora species and 50 threatened fauna species, recorded or predicted to occur, within 5 kilometres of the study area. Of these, seven threatened flora species and eight threatened fauna species were identified with a medium or greater likelihood of occurrence within the study area. As detailed in Appendix 3 and Appendix 4 of **Appendix D**, the assessment determined that the following species required a Test of Significance (ToS) under the BC Act, and/or Significant Impact Criteria (SIC) Assessment under the EPBC Act:

- Ecological communities
 - Illawarra Lowlands Grassy Woodland (CEEC, EPBC Act and EEC, BC Act)
 - Illawarra Subtropical Rainforest (CEEC, EPBC Act and EEC, BC Act)
- Flora
 - White-flowered Wax Plant *Cynanchum Elegans* (Endangered, EPBC Act and BC Act)
 - Illawarra Irene *Irenepharsus trypherus* (Endangered, EPBC Act and BC Act)
 - *Solanum celatum* (Endangered, BC Act)
 - Illawarra Zieria *Zieria granulata* (Endangered, BC Act and EPBC Act).
- Fauna
 - Grey-headed Flying-fox *Pteropus poliocephalus* (Vulnerable, EPBC Act and BC Act)
 - Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act)
 - Large Bent-winged Bat *Miniopterus schreibersii oceanensis* (Vulnerable, BC Act)
 - Large-eared Pied Bat *Chalinolobus dwyeri* (Vulnerable, EPBC Act and BC Act)
 - Little Bent-winged Bat *Miniopterus australis* (Vulnerable, BC Act)
 - Southern Myotis *Myotis macropus* (Vulnerable, BC Act)
 - Yellow-bellied Sheath-tail-bat *Saccolaimus flaviventris* (Vulnerable, BC Act).

The ecological features of the study area are shown in **Figure 6-1** to **Figure 6-7** below.



Figure 6-1 Ecological features of the study area – Part 1/7

[This figure has been redacted due to sensitive ecological information]



Figure 6-2 Ecological features of the study area – Part 2/7

[This figure has been redacted due to sensitive ecological information]



Figure 6-3 Ecological features of the study area – Part 3/7

[This figure has been redacted due to sensitive ecological information]



Figure 6-4 Ecological features of the study area – Part 4/7

[This figure has been redacted due to sensitive ecological information]



Figure 6-5 Ecological features of the study area – Part 5/7

[This figure has been redacted due to sensitive ecological information]



Figure 6-6 Ecological features of the study area – Part 6/7

[This figure has been redacted due to sensitive ecological information]



Figure 6-7 Ecological features of the study area – Part 7/7

[This figure has been redacted due to sensitive ecological information]

Table 6-1 details the potential ecological impacts of the proposal. Up to 3.23 hectares of native vegetation is proposed to be cleared or modified.

The biodiversity impact assessment is a conservative impact assessment as:

- it assumes any impacted vegetation will be cleared, however some may be trimmed
- is assumed every area of urban native/urban exotic within the 30m wide impact corridor would be impacted, including residential road verges, vegetation on private properties and cleared farmland
- the underbored sections were not known at the time of the assessment, so it does not account for avoided impacts from underbored areas, which is approximately 1 km of the 5km pipeline length
- does not account for avoided biodiversity impacts during detailed design stage.

Table 6-1 Ecological values and potential impacts

Ecological Value	Potential impact
Threatened ecological communities	Removal of 2.93 ha of native vegetation consisting of two TECs listed under the EPBC Act and BC Act: <ul style="list-style-type: none"> • 0.86 ha Illawarra Lowlands Grassy Woodland (PCT 838) of which: <ul style="list-style-type: none"> - 0.37 ha satisfies the EPBC Act listing (moderate condition) - 0.21 ha is riparian vegetation. • 2.07 ha Illawarra Subtropical Rainforest (PCT 1300) of which: <ul style="list-style-type: none"> - 1.78 ha satisfies the EPBC Act listing (moderate condition) - 1.4 ha is riparian vegetation.
Non-threatened native vegetation	Removal of 0.30 ha of native vegetation, consisting of one non-threatened native vegetation community: <ul style="list-style-type: none"> • 0.30 ha PCT 1105 of which 0.1 ha is riparian vegetation
Threatened flora/fauna habitat	<ul style="list-style-type: none"> • Impact to threatened flora/fauna habitat, consisting of: <ul style="list-style-type: none"> - 2.93 ha listed as TECs (as above) - 0.30 ha listed as non-threatened native vegetation (as above) - Seven hollow-bearing trees - 2.93 ha of known Illawarra Zieria habitat.



Number of locally indigenous native trees and tree hollows to be removed that are not part of a vegetation community

- Thirteen locally indigenous trees, not part of a vegetation community.

Number of non-locally indigenous native or exotic trees and vegetation

- 108 non-locally indigenous native/exotic trees
- 10.97 ha of Urban Native / Exotic vegetation
 - of which 0.26 ha of is a revegetated riparian vegetation that closely resembles PCT 1105.

A SIC was prepared for two TECs, three threatened flora species and two threatened fauna species. On the basis of criteria outlined in (Commonwealth of Australia 2013) it is considered unlikely that a significant impact on a Matters of National Environmental Significance (NES) would result from the project. Although communities listed under the EPBC Act will be impacted by greater than 1 ha in vegetation, these impacts have been sited on the edges of communities and within previously disturbed corridors such that the impacts are unlikely to place the communities at risk of extinction or significant decline.

A ToS was prepared for two TECs, four threatened flora species and eight threatened fauna species. It was concluded that the project will not have a significant effect on the ecological communities or threatened species, as impacts are on the edge of communities and in already modified areas. Impacts will not increase fragmentation or put the local populations/habitats at risk of extinction. Therefore a Biodiversity Development Assessment Report (BDAR) or Species Impact Statement (SIS) was not required.

One EPBC Act and BC Act listed threatened flora species, Illawarra Zieria, was recorded within the study area during initial field surveys, and may be indirectly impacted by the project. A 2-metre buffer, including 'No Go Zones' and fencing, will be established around any Illawarra Zieria individuals within the impact area to avoid any impacts.

Sydney Water biodiversity offset requirements

Although formal offsets are not required under the BC Act, Sydney Water has an internal position to maintain or enhance biodiversity outcome if projects have residual biodiversity impacts. Vegetation removed will be offset in accordance with Sydney Water's non-statutory offset guide as outlined in the safeguards below.

Indicative maximum offset numbers in accordance with the guide are summarised in **Table 6-2** and would be confirmed once native vegetation clearance is verified during construction. The Biodiversity Assessment has not taken into consideration the sections of the alignment that are to be underbored or avoided during detailed design. In addition, we have used the multiplier for moderate condition clearing in areas where vegetation is a combination of low and moderate condition PCTs. As a result, the offsets detailed below are the worst-case scenario and the final offset figures are expected to be substantially lower. The Contractor will consult with the relevant homeowners and local councils for areas where offset plantings may be conducted. Areas mapped as urban native/exotic will be restored to the pre-existing condition following construction in

consultation with landowners. All trees removed within areas mapped as urban native/exotic will be recorded and offset in accordance with Sydney Water’s offset guide.

Table 6-2 Statutory biodiversity offset requirements

Vegetation Community / Trees	Impact Area (Ha) / Number of Trees	Offset Multiplier	Maximum Offset Requirement
Illawarra Lowlands Grassy Woodland (PCT 838) – Low to Moderate condition	0.86 ha	3 (Moderate)	3.21 ha
Illawarra Subtropical Rainforest (PCT 1300) – Low to Moderate condition	2.07 ha	3 (Moderate)	6.21 ha
River Oak open forest of major streams (PCT 1105) – Low to Moderate condition	0.30 ha	3 (Moderate)	0.9 ha
Hollow-bearing trees	7 trees	2 nest boxes or salvaged hollows (for each removed)	14 nest boxes or 7 salvaged hollows.
Locally indigenous native trees	13 trees	3	39 trees

The impact of the work to flora and fauna would be mitigated through the implementation of safeguards described below.

Safeguards

Impacts to hollow-bearing trees should be avoided where possible. Should hollow-bearing trees need to be removed, it should occur in a two-stage process:

- Stage 1: All surrounding vegetation to be cleared and grubbed
- Stage 2: 24 to 48 hours later, the hollow-bearing trees to be inspected by an ecologist. If resident fauna is observed, the hollow section is to be lowered to the ground and the animal allowed to move on of its own volition. If injured, the fauna to be taken to a WIRES carer or appropriate veterinarian for care.

Stag watches should be undertaken no more than one week prior to the removal of hollow-bearing trees, to determine if hollow dependent microbats are residing in any hollows recorded within the study area.

Appropriate ‘No Go Zone’ fencing should be installed around areas of high ecological value and around populations of Illawarra Zieria or other threatened flora species if they become known.

Underbore vegetation where possible, to reduce impacts.

Avoid land containing moderate condition *Illawarra Lowlands Grassy Woodland* (PCT 838) and *Illawarra Subtropical Rainforest EEC vegetation* (PCT 1300) meeting EPBC Act and BC Act listing criteria and forming threatened fauna breeding and foraging habitat.

Minimise vegetation clearance on land containing:

- low condition *Illawarra Lowlands Grassy Woodland* (PCT 838), *Illawarra Subtropical Rainforest EEC vegetation* (PCT 1300) and *Coastal freshwater lagoons of the Sydney Basin Bioregion*
- *River Oak open forest of major streams, Sydney Basin Bioregion and South East Corner Bioregion* (PCT 1105).

Ensure appropriate vegetated riparian zones from the 'top of bank' are maintained for all waterways in the impact area, in accordance with the *NSW Natural Resource Regulator* (NRAR).

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 Sydney Water's 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.

- Any removal of remnant vegetation where there is no net change to environmental impact (eg 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](#)).

Residual impacts to native vegetation and trees will be offset in accordance with the Biodiversity Offset Guideline ([SWEMS0019.13](#)).

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](#).

Minimise vegetation clearance and disturbance, including impacts to standing dead trees and riparian zones. Where possible, limit clearing to trimming rather than the removal of whole plants.

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

Adjust methodology (eg 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 >50mm are impacted within the Tree Protection Zone.

Potentially affected residents will be notified of any tree removal.

Retain dead tree trunks, bush rock or logs in-situ unless they are in the disturbance corridor and moving is unavoidable. Reposition material elsewhere on the site or approved adjacent sites. If native fauna is likely to be present, a licenced ecologist should inspect the removal and undertake fauna relocation.

Inspect vegetation for potential fauna prior to clearing or trimming. If fauna is present, or ecological assessment has determined high likelihood of native fauna presence, including removal of hollow bearing trees, engage WIRES or a licenced ecologist to inspect and relocate fauna before works.

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.

Where possible, avoid impeding/blocking fish passage. Retain snags and natural obstructions in waterways where possible.

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 provided.

If any damage occurs to vegetation outside of the disturbance corridor (as shown in the CEMP), notify the Sydney Water Project Manager and Environmental Representative so that appropriate remediation strategies can be developed.

On completion of the works all disturbed soil is to be levelled, smoothed and sown with a mixture of sterile/native grass seeds to encourage rapid revegetation and planted out with native endemic riparian vegetation.

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 the 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 TOBAN period:

1. Check specific TOBAN notice to confirm whether the work can be carried out under standard exemptions (Govt Gazette No18 Feb 2018).
2. If not, apply to RFS for specific exemption.


6.2.4 Heritage

Existing environment and potential impacts

Aboriginal heritage

Kelleher Nightingale Consulting Pty Ltd (KNC) was engaged to complete an Aboriginal Heritage Due Diligence Assessment (AHDD) in July 2022 (see **Appendix E**). This assessment has been conducted in accordance with the *Heritage NSW Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH 2010a). The AHDD included a desktop assessment of online data bases, landscape features and previous archaeological investigations as well as a visual inspection undertaken on the 8 May 2020 and follow up inspection 12 April 2021.

The assessment found that generally, archaeological sites have mostly been identified on elevated landforms in proximity to major creeks such as Macquarie Rivulet, Hazelton Creek and their tributaries. Archaeological evidence suggests that whilst Aboriginal objects are known to occur in and near the study area, the likelihood of intact subsurface deposit will vary significantly based on



the level of environmental and anthropomorphic disturbance. The current study area has been subject to natural fluvial processes and land use disturbance, leading to a low likelihood of any intact archaeological deposit remaining within the majority of the study area.

A search of Aboriginal Heritage Information Management System (AHIMS), conducted on 8 March 2022, identify 37 Aboriginal sites (27 artefacts, six potential archaeological deposits (PADs) and four artefacts/PADs) close to the proposal. Of these previously registered Aboriginal sites, several have been destroyed or partially destroyed by residential development and associated works. One artefact reburial has also been recorded.

A review of the database searches and associated background information identified two extant Aboriginal archaeological sites [REDACTED] within the study area. One previously recorded (not registered) PAD area [REDACTED] was also identified within the study area.

The proposal overlaps areas that have been previously assessed for Aboriginal cultural heritage values and are covered under existing AHIPs [REDACTED].

The visual inspection confirmed the location of previously registered Aboriginal archaeological sites [REDACTED] were confirmed [REDACTED] within the southern portion of the study area (**Figure 3-1** and **Figure 3-2**).

The alignment north of the Illawarra Highway had been disturbed by bulk earthworks associated with residential development and flooding from the Macquarie Rivulet. The area has been assessed as having low archaeological potential. The proposed site compounds were inspected and no archaeological potential was identified within this area. No Aboriginal archaeological sites or areas of potential archaeological deposit were identified during the visual inspection outside of the registered items previously identified. The site visit confirmed that all other sections of the study area outside of the areas with existing AHIPS were found to display low archaeological potential due to combinations of archaeologically unfavourable topography, erosion, flooding or disturbance from land use practices (including residential subdivision and road related infrastructure).

The impact area overlaps areas that are covered under existing [REDACTED] (**Figure 3-1** and **Figure 3-2**). These AHIPs allow impacts to Aboriginal objects within their respective AHIP areas. Any works undertaken within existing the AHIP areas must be undertaken in accordance with AHIP conditions and the preconstruction agreement between Dahua and Sydney Water (**Appendix F**).

The portion of [REDACTED] within the study area is wholly covered by [REDACTED]. Sydney Water has an agreement with Dahua to conduct works under the existing AHIP.

The portion of [REDACTED] within the study area is partially covered by [REDACTED]. Sydney Water has an agreement with Dahua to conduct works under the existing AHIP. Small sections of the alignment are currently shown outside the existing AHIP boundaries. Once the AHIP boundary is verified, the impact area will be refined during detailed design to be within the AHIP boundary.

If impacts to Aboriginal archaeological features cannot be avoided further detailed Aboriginal heritage assessment would be required.

Non-Aboriginal heritage

The proposal is approximately 100 m from two non-Aboriginal heritage items, listed on the *Shellharbour LEP*:

- Riversford (I291), located 100 m west from the alignment adjacent to Escarpment Drive
- Yellow Rock Farm Group, trees and setting (I275), located approximately 100 m west of the alignment, separated by Cooby Road.

There are no other non-Aboriginal heritage items located in the direct vicinity of the proposal.

The proposal would not result in any direct impacts on Riversford, or the Yellow Rock Farm Group, heritage items. However, there is potential for indirect impacts to both items due to construction vehicle movements. Safeguards will be implemented to reduce the potential for impacts to Riversford and Yellow Rock Farm Group, and the proposal is unlikely to have significant impacts.

Safeguards

Working within the curtilage of Dahua's AHIP must be undertaken in accordance with the conditions of the AHIP and the Pre-construction Agreement between Sydney Water and Dahua.

All site personnel must be inducted to work on Dahua property. The Dahua induction includes information about the AHIP to ensure all on-site personnel are aware of the consent conditions.

If Dahua conclude works at the AHIP site during construction, the Contactor will appoint a project manager and notify DPE must be notified of their contact details within 14 days of this appointment.

Detail design will ensure the footprint of the proposal is not located within the mapped Aboriginal archaeological site and PADs.

The boundary of the AHIPs will be surveyed and protective hard barriers (ie. ATF fencing, concrete barriers or water-filled barriers) and signage installed around the AHIP boundaries before construction, to protect them from damage.

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.

Harm to any Aboriginal objects and declared Aboriginal places is only permitted once an Aboriginal Heritage Impact Permit (AHIP) has been granted. Include Aboriginal Heritage Management Plan (AHMP) in CEMP to address AHIP conditions.

If any Aboriginal object or non-Aboriginal relic is found, cease all excavation or disturbance in the area and notify SW Project Manager in accordance with [SWEMS0009](#).

All site personnel must be inducted by a heritage specialist before starting work on site. The induction should include clear explanation of heritage constraints, go and no-go areas, processes and measures to avoid impacts, stop work procedures, and contact details to obtain further heritage guidance if needed.

6.2.5 Noise and vibration

Existing environment and potential impacts

The northern and southern sections of the proposal are near residential receivers. In the southern section, construction would be undertaken prior to any residents being present in the development area. Residential receivers will be present in the northern section, and the proposal will be within new road reserves adjacent to private properties.

Nearby receivers may be temporarily affected by construction noise impacts associated with the following activities:

- vehicle and staff movements, including heavy vehicle movements
- excavation, trenching and backfilling
- generator and compressor operation
- cleaning equipment
- the delivery and removal of materials
- noise from machinery, such as vehicle reversing alarms.

Additionally, both compound sites are adjacent to residential receivers along Wongawilli Street and Illawarra Highway. During establishment (delivery of site sheds and other equipment) it is anticipated there will be a minor increase in noise and vibration. As these works will be scheduled during standard daytime work hours the impact is expected to be minor.

Operation of the compound sites would occur during standard daytime hours and result in a minor increase in noise from deliveries, and construction traffic.

The likelihood of noise impact from the proposal was reviewed in **Table 6-3** 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/medium risk and a qualitative noise impact assessment was undertaken. A quantitative noise assessment was not required as construction will be during standard construction hours, and of short duration impacting a small number of receivers as the work moves along the alignment.

Table 6-3 Noise risk profile for the project

Work attributes	Description	Likelihood of Noise Impact
Time of construction	All of the works will occur during the recommended standard construction hours.	Low
Duration of works	Up to 24 months. However, the proposal is linear in nature and works will only occur at each location for short periods of time as the works will progressively move along the alignment.	Low

Operation of the compound sites during this period will be limited to fluctuating truck movements throughout the day and not result in significant increase in noise for extended periods of time.

Noise-making equipment and process	Use of medium-sized equipment as outlined in Section 3.1. Light and medium-sized vehicles would be required on the worksite, with occasional deliveries and removals by large vehicles. Heavy vehicles, excavators and HDD machines will also be required during construction.	Medium
Proximity to sensitive receivers	Most of the proposed works will occur within relatively empty land, some of which are adjacent to sensitive receivers, including nearby residents.	Medium
Containment of noise	The proposal involves works mostly contained within the project's alignment. The proposal will result in some temporary and localised construction noise as described above.	Low
Number of people affected and community views	The proposal has the potential to impact on a moderate number of sensitive receivers located along the northern and south-western sections of the proposal. Relevant stakeholders, residents and landowners will be notified and consulted in relation to the proposed works as mentioned in Section 4.1 of this REF.	Medium

The proposal area is not adjacent to any structures which could be impacted by vibration associated with construction works.

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).

Safeguards

Works must comply with the *Construction Noise Guideline* (Draft, 2021), including schedule work and deliveries during standard daytime working hours of 7am to 6pm Monday to Friday and 8am to 1pm Saturday. No work to be scheduled on Sundays or public holidays.

The Proposal will also be carried out in accordance with *Sydney Water's Noise Management Procedure SWEMS0056*. 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:

- identify and consult with the potentially affected residents prior to the commencement:
 - 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 (eg times identified by the community that are less sensitive to noise such as mid-morning or mid-afternoon for works near residences)
- implement a complaints handling procedure for dealing with noise complaints
- plant or machinery will not be permitted to warm-up near residential dwellings before the nominated working hours.
- appropriate plant will be selected for each task, to minimise the noise impact (eg all stationary and mobile plant will be fitted with residential type silencers)
- engine brakes will not be used when entering or leaving the work site(s) or within work areas.
- regularly inspect and maintain equipment in good working order
- arrange work sites where possible to minimise noise (eg generators away from sensitive receivers, minimise use of vehicle reversing alarms).
- schedule noisy activities around times of surrounding high background noise (local road traffic or when other noise sources are active).

If works **beyond standard daytime hours are needed**, the Contractor would:

- justify the need for out of hours work (OOHW) and why it is not possible to carry out the works during standard daytime hours
- consider potential noise impacts and implement the relevant standard daytime hours safeguards; Sydney Water's Noise Management Code of Behaviour (SWEMS0056.01) and other reasonable and feasible management measures
- identify community notification requirements
- seek approval from the Sydney Water Project Manager in consultation with Sydney Water's Environment and communications representatives.

If **night works are needed**, the Contractor would:

- justify the need for night works
- consider potential noise impacts and implement the relevant standard daytime and out of hours safeguards and document consideration of all reasonable and feasible management measures
- identify community notification requirements (ie for scheduled night work (not emergency works)),
- notify all potentially impacted residents and sensitive noise receivers not less than one week prior to commencing night work.
- seek approval from the Sydney Water Project Manager in consultation with the environment and communications representatives.

If works on **Sundays or public holidays are required**, the Contractor would:

- justify why all other times are not feasible
- consider potential noise impacts and, implement relevant standard daytime, out of hours and night-time safeguards and other reasonable and feasible management measures
- identify community notification requirements
- seek approval from the Sydney Water Project Manager in consultation with the environment and communications representatives.

Conduct a dilapidation survey / asset condition assessment prior to works which have potential to damage existing structures.

6.2.6 Air and energy

Existing environment and potential impacts

The proposal involves ground disturbance and excavation which has the potential to generate dust. There is potential for dust from construction vehicles travelling on disturbed/ unsealed access routes, and emissions from machinery, equipment and vehicles used during construction. If inadequately controlled, this could result in air quality impacts at nearby sensitive receivers.

There is also the potential for earthworks associated with construction to encounter acid sulphate soils which if oxidised can generate odour associated with hydrogen sulphide (rotten egg gas) release.

Potential impacts on air quality could be readily managed by implementing standard mitigation measures.

Operation of the water pipeline is unlikely to impact air quality.

Safeguards

Use alternatives to fossil fuels where practical and cost-effective.

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:

- water exposed areas (using non-potable water source where possible such as water from excavation pits)
- cover exposed areas with tarpaulins or geotextile fabric
- modify or cease work in windy conditions
- modify site layout (place stockpiles away from sensitive receivers)
- vegetate exposed areas using appropriate seeding.

Cover all transported waste.

6.2.7 Waste and hazardous materials

Existing environment and potential environmental impacts

Project construction activities will generate the following waste streams:

- general construction and demolition waste including excavated road material and exhumed disused watermain
- excess spoil from excavation of pits and earthworks
- groundwater
- green waste

- general domestic waste from the construction workforce such as food scraps, aluminium cans, glass bottles, plastic and paper containers, and putrescible waste generated by site construction personnel
- sewage waste and grey water from temporary amenities.

The largest volume of waste generated by construction would be excess spoil from the pipeline excavations. Wherever possible, suitable excavated spoil would be re-used on site for backfilling, landscaping and other uses. Should any material be found to be unsuitable, it would be disposed of as detailed in the safeguards below. If spoil is unable to be re-used on-site, opportunities for off-site re-use would be investigated.

If re-use opportunities are unable to be identified, or the spoil is unsuitable for re-use due to its geotechnical or contamination characteristics (including asbestos), spoil would be tested and classified according to the Waste Classification Guidelines (NSW EPA, 2014) and disposed of at an appropriately licenced facility.

Small volumes of liquid wastes, including oils or fuels are unlikely to be generated during construction. Construction by trenchless methods will involve the use of drilling fluids. The drilling fluids that will be used will be an environmentally benign substance such as bentonite. The drilling fluids will be circulated through the trenchless section and then screened to remove drill cuttings. Any waste drill cuttings and drilling fluid will be tested, classified, treated and disposed of appropriately.

General workforce waste including food packaging will be generated in minor quantities and will be classified as putrescible or non-putrescible general solid waste.

No hazardous wastes are expected to be generated. It is not expected that the proposed works will involve managing waste or hazardous waste or hazardous building materials. Should the works uncover asbestos or any other such material be encountered, it will be managed through an unexpected finds procedure.

Opportunities to reduce, recycle and reuse on this project would be sought with the Delivery Contractor and documented in the CEMP.

Safeguards

Manage waste in accordance with relevant legislation and maintain records to show compliance eg 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.

Minimise stockpile size and ensure delineation between different stockpiled materials.

Minimise the generation of waste, sort waste streams to maximise reuse/recycling in accordance with the *Waste Avoidance and Resource Recovery Act 2001*.

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 soils at a licensed soil recycling facility or dispose at an appropriately licenced landfill facility.

Prevent pollutants from escaping, including covering skip bins.

Dispose excess vegetation (non-weed) that cannot be used for site stabilisation at an appropriate green waste disposal facility.

Stop works and notify the Sydney Water Project Manager if any contamination (eg asbestos, discoloured soil, chemical or petrol odours, refuse or leachate) is discovered.

If fibro or other asbestos containing material is identified, restrict access and follow Sydney Water's Asbestos Management – Minor Works procedure, Document Number 746607. Contact Sydney Water Project Manager (who will consult with Property Environmental Services (propertyenvironmental@sydneywater.com.au)).

6.2.8 Traffic and access

Existing environment and potential impacts

During construction vehicles would access the precinct via the Illawarra Highway and Tongarra Road. Proposal traffic will use local roads including Escarpment Drive, and Yellow Rock Road. Once within the precinct, vehicles would use the existing precinct road or established access tracks used for precinct development. The alignment will cross the Illawarra Highway, which is a classified road. Traffic control or partial closures may be required during construction. Consultation with TfNSW and a Road Occupancy Licence may also be required for works. The Delivery Contractor will consult with Council and TfNSW about the proposal.

Total vehicle numbers and movements are expected to be low, with up to 20 vehicles at one time. The vehicles would be located at individual sites for short periods of time and would be moving progressively along the alignment. Some private property access and street parking may be temporarily impacted during the works. In addition, the Endeavour Energy access tracks would be optimised, therefore minimising the use of public roads during construction. It is unlikely that the predicted traffic movements associated with construction vehicles would substantially impact upon the operation of the surrounding road network.

Traffic associated with the operation of the proposal would be for maintenance and so would be minor and temporary and therefore would not pose a significant impact.

Safeguards

Prepare a Traffic Management Plan (TMP) in consultation with the relevant traffic authority.

Meet *NSW Roads and Maritime Service's Traffic Control at Worksites Manual v5* requirements for TfNSW roads. The Contractor will obtain a Road Occupancy Licence (ROL) from TfNSW, including if works are within 100m of traffic signals when construction commences.

Minimise traffic impacts near residential properties, schools and businesses by consulting with them (eg no major materials deliveries at school drop off or pick up times etc.).

Manage sites to allow people to move safely past the works, including alternative pedestrian, bicycles, pram and wheelchair access.

Consult with the relevant traffic authority 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 proposed works and any temporary road closures.

Ensure work vehicles do not obstruct vehicular or pedestrian traffic, or private driveway, public facility or business access unless necessary and only if appropriate notification has been provided.

The Construction Contractor will consult with relevant waterway authority for waterway access.

6.2.9 Social and visual

Existing environment and potential impacts

All the works are underground and therefore, the proposal would not alter the visual character of the environment. However, the proposal will service the new residential development area which will permanently change the character of the environment in the area. The proposed alignment has been positioned according to the developer's road alignment and lot layout to minimise any social and visual impacts of the infrastructure.

There will also be some temporary visual impacts associated with the establishment of site compounds and worksites during construction. These temporary visual impacts would be mitigated in consultation with stakeholders, such as Council and residents and the safeguards listed below.

Safeguards

Undertake works in accordance with Sydney Water Communications policies and requirements including:

- notify impacted residents and businesses
- erect signs to inform the public on nature of work
- personnel treat community enquiries appropriately.

Work sites will be restored to pre-existing condition or better.

Minimise visual impacts (eg retain existing vegetation where possible).

Direct artificial light away from sensitive receivers where possible (ie residents, fauna or roadways).

Maintain work areas in a clean and tidy condition.

No smoking within National Parks or in bushland areas.

6.2.10 Cumulative and future trends

Potential environmental impacts

The proposal is in an area that is subject to significant and continued development until the Calderwood precinct is finished. There is the potential for cumulative impacts associated with works within the development area, however cumulative impacts are likely to be negligible given the small scale of the proposal relative to the overall works planned within the development area. The Contractor will work with local developments to reduce impacts as required.

Climate change-related factors such as bushfires, flooding, and wet weather events that could impact the proposal were considered in the flora and fauna, and water and drainage sections of this REF. The proposal is unlikely to further exacerbate future trends due to the limited scope of works.

The proposal will expand Sydney Water's network of drinking water infrastructure to ensure there is sufficient capacity to meet the demands of projected population growth.

Safeguards

Liaise with local developers to reduce construction impacts due to concurrent work schedules, timing of work, access to site etc.

6.2.11 General Environmental Management

Safeguards

Prepare a Construction Environmental Management Plan (CEMP) addressing the requirements of this environmental assessment. The CEMP should identify 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 and boundaries of the work area (eg AHIP zones professionally surveyed) and boundaries of the work area including locations of lay-down and storage areas for materials and equipment
- location of environmental controls (including erosion and sediment controls, any fences or other measures to protect vegetation or fauna, spill kits, stockpile areas)
- location and full extent of any vegetation disturbance.

Sydney Water's Project Manager (after consultation with the Project's environment 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 meet the following principles:

- limit proximity to sensitive receivers
- no disruption to property access
- no impact to known items of non-Aboriginal and Aboriginal heritage
- outside high-risk areas for Aboriginal heritage
- use existing cleared areas and existing access tracks
- no impacts to remnant native vegetation or key habitat features
- no disturbance to waterways
- potential environmental impacts can be managed using the safeguards in this REF
- no disturbance of 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.

Prepare an Incident Management Plan (IMP) outlining actions and responsibilities during:

- predicted/ onset of heavy rain during works
- spills
- unexpected finds (eg. heritage and contamination)

- other potential incidents relevant to the scope of works.

All site personnel should be inducted into the IMP.

To ensure compliance with legislative requirements for incident management (eg *Protection of the Environment Operations Act 1997*), Sydney Water's employees and contractors will follow [SWEMS0009](#). Attach [SWEMS0009](#) to the CEMP.



7 Conclusion

Sydney Water has prepared this REF to assess the potential environmental impacts of the Calderwood Package 3A1 – Mount Terry Water Lead-in Mains proposal. The proposal is required to provide necessary water infrastructure to enable development in the area.

During construction, the main potential environmental impacts of the proposal are typical construction impacts such as impacts to ecology, Aboriginal heritage, and noise. It is considered that, given the nature, scale and extent of impacts and implementation of the safeguards outlined in this REF, the proposed work is unlikely to have a significant impact on the environment and an environmental impact statement is not required under Division 5.1 of the EP&A Act.

The proposal has been considered in accordance 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.



8 References

- Office of Environment and Heritage (OEH), 2010a. *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales*. Office of Environment and Heritage, Sydney.
- OEH, 2010b. *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales: Part 6 National Parks and Wildlife Act 1974*. Department of Environment, Climate Change and Water NSW, Sydney.
- OEH, 2010c. *Aboriginal cultural heritage consultation requirements for proponents*. Department of Environment, Climate Change and Water NSW, Sydney.
- OEH, 2011. *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW*. Department of Environment, Climate Change and Water NSW, Sydney.
- Shellharbour City Council, 2017. *Macquarie Rivulet Flood Study*. WMA Water. Shellharbour City Council, Sydney.

9 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 construction activities and traffic movements to and from the area. These impacts will be temporary. There will be environmental improvements by providing a reliable water service to the local community.
Any transformation of a locality	The proposed work will not result in the transformation a locality.
Any environmental impact on the ecosystems of the locality	The proposed work will not result in environmental impacts to ecosystems of the locality. There will be environmental improvements by ensuring a reliable water service.
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality	The proposed work will not result in a reduction of 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 proposed work 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. No impact to archaeological or cultural sites is expected as the work will either be within existing AHIP boundaries, in areas of low archaeological potential, or be designed to avoid existing sensitive areas.
Any impact on the habitat of any protected animals (within the meaning of the <i>Biodiversity Conservation Act 2016</i>)	The proposed vegetation removal has been assessed in Appendix D to ensure that it will not impact on the habitat requirements of protected animals. The proposed work will not have any impact on the habitat of protected animals.
Any endangering of any species of animal or plant or other form of life, whether living on land, in water or in the air	Although the current alignment has considered avoidance principles of intact vegetation within the locality, it will still benefit from design amendments such as minor route deviations, or proposed underboring, to allow for avoidance for threatened ecological communities as described in Appendix D .
Any long-term effects on the environment	The proposed work will not have 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 proposed work will not cause the degradation of the quality of the environment.
Any risk to the safety of the environment	The proposed work will not increase risk to the safety of the environment. Safeguards have been identified to prevent and minimise risk to the environment during construction.
Any reduction in the range of beneficial uses of the environment	The proposed work will not have any reduction in the range of beneficial uses of the environment.
Any pollution of the environment	Environmental safeguards will mitigate the potential for the proposed work to pollute the environment. No pollution of the environment is expected.
Any environmental problems associated with the disposal of waste	The disposal of wastes will be conducted in accordance with the environmental safeguards, and no environmental problems associated with the disposal of waste is expected.
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply	The proposed work 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 proposed work will not have any cumulative environmental effect with other existing or likely future activities.
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	The proposed work will not have any impact on coastal processes or hazards.
Any applicable local strategic planning statements, regional strategic plans or district strategic plans made under the EP&A Act, Division 3.1	The proposed works are to service growth and the applicable strategic planning statements or plans have been considered in the system planning and options selection process, including the WDURA servicing strategy development.
Any other relevant environmental factors.	The proposed work 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?		✓
Involve connection to, and have a substantial impact on, the capacity of a council owned sewerage system?		✓
Involve connection to, and use of a substantial volume of water from a council owned water supply system?		✓
Involve installation of a temporary structure on, or enclosing, a public space under council's control that will cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential?		✓
Involve excavation of the surface of, 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 located on flood liable land (that is land that is susceptible to flooding by the probable maximum flood event) and will they alter flood patterns other than to a minor extent?		✓
Section 2.13, flood liable land – consultation with State Emergency Services		
Will the work be located on flood liable land (ie. 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 located on land adjacent to land reserved under the <i>National Parks and Wildlife Act 1974</i> or to land acquired under Part 11 of that Act? <i>If so, consult with DPIE (NPWS).</i>		✓
Will the proposal be located on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone? <i>If so, consult with DPIE (NPWS)</i>		✓
Will the proposal comprise a fixed or floating structure in or over navigable waters? <i>If so, consult TfNSW</i>		✓
Will the proposal be located on land in a mine subsidence district within the meaning of the <i>Coal Mine Subsidence Compensation Act 2017</i> ? <i>If so, consult with Subsidence Advisory NSW.</i>		✓
Will the proposal involve clearing of native vegetation on land that is not subject land (ie non-certified land)? <i>If so, notify DPIE 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.</i>		✓



Appendix C – Calderwood Package 3A-1 Mt Terry lead-in watermain drawings





Appendix D – Biodiversity Assessment





Appendix E – Aboriginal Heritage Due Diligence

Aboriginal heritage information must not be made publicly available or be published in any form or by any means by Sydney Water or our contractors / joint ventures, unless where approval has been sought from DPC's AHIMS Registrar and provided in writing to Sydney Water.

For those REFs which are being publicly displayed, all Aboriginal heritage information which identifies individual sites must be removed.



Appendix F – Pre-construction agreement





Appendix G – Consultation Letter from DPI – Fisheries

