Review of Environmental Factors

Yallah Marshall Mount Water and Wastewater Servicing (May, 2024)





Sydney WATER









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This Review of Environmental Factors (REF) assesses potential environmental impacts of Yallah Marshall Mount water and wastewater servicing (the proposal). The REF was prepared under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Sydney Water both the proponent and determining authority.

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

Decision Statement

The main potential construction environmental impacts of the proposal include impacts to ecology, Aboriginal heritage, water quality, soil, and from traffic and noise. During operation, wet weather overflows will comply with the existing Environment Protection Licence (EPL) and noise from the pumping station will comply with industry standards. The proposal will not be carried out in a declared area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities, or their habitats. Therefore, a Species Impact Statement (SIS) and/or Biodiversity Development Assessment Report (BDAR) is not required.

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

Certification

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

Prepared by:	Reviewed by:	Endorsed by:	Approved by:
Grace Corrigan REF author Sydney Water Date: 14/05/2024	Sarah Mitchell Environment Representative Sydney Water Date: 14/05/2024	Sam Ali Senior Project Manager Sydney Water Date: 14/5/2024	Murray Johnson Environment and Heritage Manager Sydney Water Date: 22/05/2024



1 Executive summary

The Yallah Marshall Mount Precinct is within the West Lake Illawarra Growth Area. It is on the lower slopes of the Illawarra Escarpment and has been largely used for grazing and cattle farming. Future development proposed in the precinct includes about 4,000 residential properties and a town centre.

There is currently no reticulated water or wastewater infrastructure within the precinct. The proposal would provide this infrastructure to support future development by constructing and operating:

- about 1.64 km of DN375 water main along Yallah Road
- about 3.9 km of DN300 water main along Marshall Mount Road
- about 2.42 km of DN300 to DN450 gravity wastewater main along Duck Creek
- about 2.37 km of OD280 and DN225 rising wastewater main along Marshall Mount Road, Huntley Road, and Penrose Drive
- a new wastewater pumping station (SP1201).

Construction is expected to start in late 2024 and will be completed by late 2026. Sydney Water has prepared this Review of Environmental Factors (REF) to satisfy its obligations under Part 5 of the EP&A Act. The REF assesses the potential environmental impacts of the proposal and provides measures to avoid, minimise and mitigate impacts on the environment.

About 0.804 ha of native vegetation communities will be cleared and offset as part of the proposal. The construction corridor has been designed to avoid and minimise impacts to sensitive ecological features as much as possible. This design is mostly within areas that have been already developed, historically cleared, or contain degraded vegetation. For example, the rising main and water main largely follow the existing and future road corridors.

In addition, an AHIP would be required

During construction, the main potential environmental impacts of the proposal include impacts to ecology, Aboriginal heritage, water quality, soil, and from traffic and noise. During operation, wet weather overflows will comply with the existing Environment Protection Licence (EPL) and noise from the pumping station will comply with industry standards.

Given the nature, scale and extent of impacts and implementation of the mitigation measures outlined in this document, it is considered that the proposal is unlikely to have a significant impact on the environment. An environmental impact statement is not required under Division 5.1 of the EP&A Act.

2 Introduction



2.1 Context

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

We are a statutory State-owned corporation and are classified as a public authority, and a determining authority for the proposal under Division 5.1 of the EP&A Act. This REF assesses the potential environmental impacts associated with Yallah Marshall Mount Water and Wastewater Servicing and identifies mitigation measures that avoid or minimise potential impacts.

2.2 Proposal background and need

Table 2-1 summarises the proposal need, objectives and consideration of alternatives.

Aspect	Relevance to proposal			
Proposal need	The West Lake Illawarra Growth Area is about 15 km south-west of Wollongong within the Wollongong and Shellharbour Local Government Areas (LGAs) (Figure 1). This growth area was formerly known as West Dapto Urban Release Area (WDURA) and adjacent growth areas (AGA). This growth area is about 550 hectares in size and will require wastewater and drinking water services for about 30,000 residential and non-residential properties by 2048. Construction of these services will be delivered in stages. The proposal assessed in this REF will provide water and wastewater services to the Yallah Marshall Mount Precinct (Figure 2-2). It will manage the future service demand expected from about 4,000 new properties within this precinct.			
Proposal objectives	 The primary objectives of the proposal are to: provide drinking water and wastewater services to the Yallah Marshall Mount Precinct support the orderly rollout of land release and infrastructure meet Sydney Water's statutory and regulatory obligations. The secondary objectives are to provide services that: protect public health protect catchment and river health are affordable and efficient are resource and energy efficient. 			
Consideration of alternatives/options	Water This options analysis incorporates servicing of both the Yallah Marshall Mount Precinct and the adjacent Calderwood and Tallawarra Precincts (Sydney Water and ENSure JV, 2016). Discussion of the servicing of Calderwood and Tallawarra			

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

Review of Environmental Factors | Yallah Marshall Mount Water and Wastewater Servicing

Aspect

Relevance to proposal

precincts is not included here. The options assessment for water infrastructure was based on lifecycle cost estimates, and a high-level assessment of non-cost criteria. Costs were relatively similar across all options, as the main route and overall length were similar, with the main differences related to pipe diameters and construction staging. The main routes are largely along existing road alignments and infrastructure corridors.

The preferred option for water infrastructure for this proposal includes:

- Water main along Yallah Road, connecting into an existing water main at the Princes Highway.
- Water main along Marshall Mount Road, between the new wastewater pumping station to the north and Calderwood Road to the south.

The new water infrastructure will connect to the Dapto Reservoir, within the Illawarra Water Supply System.

The preferred option was chosen as it was the lowest lifecycle cost and allows for the best staging of assets in time with the expected development rollout.

Wastewater

The new wastewater infrastructure will operate under Environmental Protection Licence (EPL) number 218 for the Wollongong Sewage Treatment System. An options analysis was performed for wastewater servicing for the former WDURA, with a preferred servicing option identified for each precinct (MWH+PB, 2011). There were 22 long-list options which were reduced to 6 for short-listing. The preferred option was chosen as it was the lowest lifecycle cost and had an acceptable risk level for non-cost criteria including stakeholder acceptability and environmental impacts.

The preferred option for wastewater infrastructure for this proposal includes:

- Transfer wastewater from South Yallah to Shellharbour (part of the Shellharbour EPL) through the wastewater infrastructure for the Calderwood Precinct.
- Transfer wastewater from remainder of Yallah Marshall Mount to Port Kembla (part of the Wollongong EPL) via a new wastewater pumping station.

The alignment, location, and size of the assets identified as part of these preferred options have been further refined during design, due to factors such as changes to proposed road alignments and changed growth and demand projections.



Figure 2-1 Location of the West Illawarra Growth Area. Yallah Marshall Mount Precinct is part of the West Dapto housing release area, bordering Calderwood to the south (DPIE, 2021)



Figure 2-2 Location of the Yallah Marshall Mount Precinct within the West Dapto housing release area (Wollongong City Council, 2021)



2.3 Consideration of Ecologically Sustainable Development

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

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

Principle

Proposal alignment

Precautionary principle— *if there* are threats of serious or irreversible environmental damage, lack of scientific uncertainty should not be a reason for postponing measures to prevent environmental degradation. Public and private decisions should be guided by careful evaluation to avoid serious or irreversible damage to the environment where practicable, and an assessment of the risk-weighted consequences of various options. The proposal will not result in serious or irreversible environmental damage and there is no scientific uncertainty relating to the proposal. For example, there is a high level of scientific confidence relating to the site types, contents, and archaeological significance for the archaeological investigations (Appendix C).

The REF has been prepared based on the results of specialist assessments, including fieldwork. The proposal has been developed to avoid environmental impacts where possible, and mitigation measures would be implemented to minimise impacts. This proposal is therefore considered to be consistent with the precautionary principle.

Once operational, the proposal would connect new properties into the water and wastewater network. The proposal would support continued compliance with the EPL, which would reduce the risk of any serious or irreversible environmental damage from the new assets.

Inter-generational equity—- the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. The proposal would not result in any impacts that are likely to significantly impact on the health, diversity or productivity of the environment for future generations. The proposal involves activities that have the potential for environmental and social disturbance, however these would be managed by implementing the mitigation measures provided in this REF. The proposal would benefit future generations as it would provide water and wastewater infrastructure to service future residents and businesses within the precinct. The development of the wider West Lake Illawarra Growth Area requires water and wastewater servicing. This proposal provides the infrastructure necessary to support the development of the area in a way that protects the environment, by managing predicted water and wastewater volumes. The proposal has also been developed to avoid or minimise environmental impacts where possible, such as avoiding direct impacts to coastal wetlands and Key Fish Habitat (KFH).



Principle

Proposal alignment

diversity and ecologicalinintegrity---conservation of thebiological diversity and ecologicalointegrity should be a fundamentaleconsideration in environmentaltyplanning and decision-makingoprocesses.o

Conservation of biological

The proposal will not significantly impact on biological diversity or impact ecological integrity. Where able, the proposal has been designed to impact areas cleared as part of previous land uses, or that would be impacted by future urban development, such as earthworks and road widening. Water mains and rising mains are typically installed in previously disturbed areas such as the road corridor or road verge.

The construction corridor has been designed to avoid and minimise impacts to sensitive ecological features as much as possible. This includes having no-go zones to reduce impacts to vegetation, and avoiding direct impacts to coastal wetlands. Additionally, implementing non-statutory biodiversity offsets will also support future improvement of the biological diversity and ecological integrity of the area.

Improved valuation, pricing and incentive mechanisms--

environmental factors should be included in the valuation of assets and services, such as 'polluter pays', the users of goods and services should pay prices based on the full life cycle costs (including use of natural resources and ultimate disposal of waste) and environmental goals The proposal will provide cost efficient use of resources and optimum outcomes for the community and environment. This has been achieved through actions including:

- sizing the mains based on growth predictions, to reduce the risk of needing future duplication or upgrade
- identifying cost-efficient use of resources during construction, e.g. re-use of waste material
- identifying non-intrusive construction methodologies such as trenchless construction in specific areas to minimise environmental impacts to waterways and other sensitive areas
- providing suitable water and wastewater infrastructure for future population demands and optimum outcomes for the community and environment.



3 Proposal description

3.1 Proposal details

Table 3-1 describes the proposal and Figures 3-1 to 3-4 show the location and key environmental constraints.

Table 3-1 Description of proposal

Aspect	Detailed description				
Proposal description	The proposal involves installing the following mains (Figure 3-1):				
	Asset	Length (km)	Northern/ western end	Southern/ eastern end	
	DN375 water main along Yallah Road	1.64	Intersection with Marshall Mount Road	Existing network at Princes Highway	
	DN 300 water main along Marshall Mount Road	3.90	New wastewater pumping station	Calderwood Road	
	DN300 to DN450 gravity main along Duck Creek	2.42	New wastewater pumping station	346 Marshall Mount Road	
	OD280 and DN225 rising main	2.37	Existing network at Avondale	New wastewater pumping station	
	The new wastewater pur includes: emergency relief valve chamber electrical switchro chemical dosing of chemical delivery emergency storage wet well inlet maintenance access road. Some of these structures	mping station (SF structure (ERS) oom unit (CDU) bund ge structure a hole s will be below gr	P1201) at 102 Marsh	all Mount Road	
Location and land ownership	The Yallah Marshall Mount precinct is in the suburbs of Yallah, Marshall Mount, and Avondale within the Wollongong City Council local government area (LGA). The southern section of water main, between Marshall Mount Creek and				



Aspect

Detailed description

Calderwood Road, is in the suburb of Calderwood within the Shellharbour City Council LGA. The lots within the construction corridor are owned by a mix of landowners, including council, private landowners and developers. These lots include:

Lot and DP	Construction proposed within this lot	
Lot 101, DP 1076242	Water main	
Lot 2 and 4, DP 608205	Rising main	
Lot 11 and 12, DP 790746	Water main	
Lot 12, DP 1129850	Water main	
Lot 5, DP 24143	Water main	
Lot 2 and 3, DP 2534	Water main	
Lot 1, DP 414126	Gravity main, rising main	
Lot 101, DP 879381	Gravity main, water main, compound, access road	
Lot 101, DP 1070360	Rising main	
Lot 102, DP 1070360	Rising main, new pumping station, gravity main	
Lot 1 and 2, DP 1297661	Water main	
Lot 1 and 2, DP 540838	Water main	
Lot 8, DP 626078	Water main	
Lot 3, DP 1280031	Rising main	
Lot 5, DP 1280030	Gravity main, water main, access road	
Lot 1, DP 1280028	Gravity main, water main, compound, access road	
Lot 203 and 209, DP 1235464	Water main	
Lot 119, DP 261114	Rising main	
Lot 7, DP 661162	Rising main	
Lot 1, DP 557844	Rising main	

spect	Detailed description		
	Lot 1, DP 1039888	Water main, gravity main	
	Lot B, DP 415546	Water main	
	Lot 1, DP 517460	Water main	
	Lot 202, DP 1235464	Water main	
	Lot 1, DP 1286227	Gravity main, water main	
	Lot 2, DP 105826	Water main	
	Lot 7, DP 626078	Water main	
	Lot 1, DP 1277366	Gravity main, water main, access road, compound	
	Lot 2, DP 1277366	Gravity main, water main	
	Lot 35, DP 1233491	Water main	
	Lot 100, DP 712786	Water main	
	Lot 1 and 21, DP 1282203	Water main	
	Lot 1, DP 1279697	Water main	
	Lot 1, DP 396100	Water main	
	Lot 1, DP 439059	Water main	
	Lot 4, DP 658267	Water main	
	Lot 201, DP 803486	Water main	
	Lot 1, DP 234771	Water main	
	Lot 1, DP 396101	Water main	
ite establishment and	Site establishment would include:		
access tracks	 marking out and establishing the construction corridor, access roads, construction compounds and any no-go zones 		
	installing erosion and sediment controls		
	stripping and stockpiling topsoil for reuse during restoration		
	removing vegetation approved for clearing. The main eccess points to the construction corridor and construction eccess and the construct		
	are along Marshall Mount Road. Temporary access roads will be required within private properties to install the gravity main. Access roads will be constructed within the mapped construction corridor shown in Figure 3-1 and Figure 3-3, or in areas that avoid high Aboriginal archaeological significance and other		



Aspect	Detailed description		
	environmentally sensitive areas. It is expected that across all worksites (gravity main, rising main, water main, pumping station, and compound), there would be about 24 light vehicle and 18 heavy vehicle movements per shift.		
Ancillary facilities (compounds) Construction compounds will likely be required to house site sheds, or amenities and materials laydown. Indicative locations for the compounds shown in the figures below. The proposed locations may shift outside indicative areas shown in this REF. The exact locations of these com- be chosen by the delivery contractor and remain within the construct Locations will be chosen in consultation with landowners and approv Sydney Water's Project Manager as described in the mitigation mean Section 6.			
Methodology	Following site establishment, the methodology would include main and pumping station installation.		
	Mains would be installed underground using a mix of open trenching and trenchless methodology. Generally, trenching is the preferred method for main installation in locations without significant environmental or development constraints as it allows open access to the main during construction. The width of the construction corridor disturbed by open trenching would vary depending on the ground conditions and depth of excavation required. About 13 m of pipe would be installed each shift using this method. Excavation depths for these mains using this methodology is expected to range between about 1.2 m to 8.4 m depth. The width of the trenching corridor is expected to be about 0.7 m for the rising main, about 1.2 m for the water main, and up to 15 m for the gravity		
	stringing pipes along the construction corridor		
	excavating trenches, including stockpiling spoil material beside trenches		
	 shoring trenches or benching the trench profile, depending on trench depths 		
	 spreading granular bedding material such as sand or gravel along the base of the trench before pipe laying 		
	installing the main		
	 constructing maintenance holes and maintenance shafts 		
	backfilling the trench with compacted bedding material and excavated soil		
	 replacing topsoil and restoring areas disturbed by construction 		
	testing the main		
	• connecting the main to the existing wastewater and water network.		
	Trenchless techniques such as micro-tunnelling and Horizontal Directional Drilling (HDD) will be used in more sensitive areas, including waterways, or where there are constraints around geology or existing services. About 10 m of pipe would be installed each shift using this method. Launch and receival pits		

Aspect	Detailed description
Азреек	are expected to be about 7 m length and 4 m width, with depth to about 9 m.
	Methodology for trenchless excavation includes:
	excavating the launch and receival pits
	stockplling excavated material beside launch and receival pits
	benching the excavation
	micro-tunnelling the wastewater main
	managing waste generated from soil displacement
	refilling the pits once the wastewater main has been installed
	 reinstating road pavement, road verge and vegetation where required. Both methods would be performed sequentially, with areas being reinstated progressively to minimise impacts on the operation of the road network and surrounding receivers.
	Ventilation shafts will also need to be installed along the wastewater main alignments at regular intervals. They are about 300 mm in diameter and will allow ventilation of odours from the mains into the atmosphere at a height of about 8-16 m. Location and height of the ventilation shafts are indicative and will be confirmed during detailed design.
	Pumping station
	The pumping station is expected to have a maximum flow rate of about 130 L/s, with available emergency storage of about 1068 kL. The footprint of the pumping station is about 32 m width and 47 m length. Construction of the pumping station includes:
	 earthworks (to about 11 m depth) to establish required levels and install underground assets
	 construct concrete pad and pumping station building
	construct inlet maintenance hole
	construct wet well
	construct emergency storage structure
	construct valve chamber
	install pumps and switchroom
	install connecting mains
	install ERS at Duck Creek
	install CDU and chemical delivery bund
	perform electrical and mechanical fitout
	construct permanent site access and any landscaping
	perform site commissioning
	demobilise and restore site.
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Aspect	Detailed description					
Commissioning	Commissioning involves testing and running the new equipment to ensure it vorks correctly and is integrated with existing plant operations. The exact ommissioning steps depend on the type of the equipment, but typically include:					
	• mains					
	 test pressure leaks and repair any leaks if found 					
	\circ check all equipment and safe	 check all equipment and safety devices 				
	 performance testing including sampling where required 					
	pumping stations					
	 disinfect and pressure test pipes 					
	 perform acceptance testing on pumps 					
	 dewater pipes and repair lea 	ks if any are found				
	 install signage and labelling 	of equipment				
	• train operators and prepare	maintenance manuals.				
Restoration	The construction corridor will be restored to construction in consultation with landowners and Shellharbour City Council. This may inc re-installing hardstand. The proposal would agricultural landscape and road reserve. An construction would be restored according to Guideline for native revegetation following of	the construction corridor will be restored to the pre-existing condition following onstruction in consultation with landowners, including Wollongong City Council and Shellharbour City Council. This may include re-planting, re-turfing, and/or -installing hardstand. The proposal would largely occur within cleared gricultural landscape and road reserve. Any native vegetation removed during onstruction would be restored according to Sydney Water SWEMS0025.11 uideline for native revegetation following construction.				
Materials/ equipment The machinery and equipment to be used d confirmed by the Delivery Contractor and is		luring construction would be likely to include:				
	rescue equipment	 water carts and pump 				
	• skip bins	skid steer loader				
	concrete pumps	hydro-excavators				
	air compressors	shoring				
	generators	• tip trucks				
	concrete saws	concrete agitator trucks				
	• dozers	tunnelling equipment				
	• jackhammers	light vehicles				
	hand tools	compactor				
	• site facilities and amenities	• telehandlers				
	storage containers	• truck and dogs				
	• excavators	• tip truck				
	padfoot and rollers	• cranes				
	• grader	• signage				

Aspect	Detailed description
	 horizontal borers hydraulic pipe jackers grinders Wherever possible, machinery and equipment would be removed from site each day or stored in a construction compound between shifts.
Vork hours	 Work and deliveries will be scheduled to occur during standard daytime hours of: 7am to 6pm, Monday to Friday 8am to 1pm, Saturdays. At this stage, no night works are planned. However, some work outside of standard construction hours may be required for: trenchless construction truck deliveries continuous work, e.g. concrete pours works requiring low flows in the wastewater network, e.g. connections. Sydney Water's Project Manager can approve work outside of standard daytime hours. The approval process is described in the mitigation measures in Section 6.
Proposal timing Operational requirements	Construction is expected to start late 2024 and take about 2 years to complete. The proposal would be constructed, operated and maintained to meet Sydney Water's obligations under EPL 218. As required by the EPL, the proposal has been designed to avoid dry weather overflows. The program of works would be operated according to standard Sydney Water procedures and policies. Sydney Water would access the new pumping station on a regular basis via Marshall Mount Road to undertake general maintenance and deliver materials. Maintenance activities would be undertaken in line with Sydney Water's existing maintenance procedures. These would be subject to supplementary environmental impact assessment if required by Sydney Water's procedures.



Figure 3-1 Location of proposal

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



Figure 3-3 Location of proposal and key environmental constraints - gravity main and pumping station

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Figure 3-4 Location of proposal and key environmental constraints – rising main

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3.2 Field assessment area and changes to the scope of work

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

An addendum is not required provided the change:

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

The field assessment area incorporates the construction corridor shown in Figure 3-1 to Figure 3-4.

Changes to the proposal outside the field assessment 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 delivery contractor/s 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 engagement representatives.



4 Consultation

4.1 Community and stakeholder consultation

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

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

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

The nature, scale and extent of the proposal's potential impact has been evaluated in this REF. If our work impacts the community in some way, we will consult with affected groups throughout the proposal. This includes engaging the broader community and stakeholders during plan or strategy development or before making key decisions. Consultation will be performed in accordance with a project-specific Community and Stakeholder Action Plan (CSAP) and Communication Strategy.

Key stakeholders identified to date include:

- councils
- utility owners
- developers
- property owners and adjacent residential receivers impacted by the proposal
- registered Aboriginal parties as part of the Aboriginal Cultural Heritage Assessment Report (ACHAR) (Appendix C).

A summary of recent consultation performed for the proposal, including some consultation outcomes, are shown below.

Table 4-1 Consultation summary

Stakeholder	Consultation type	Queries	Outcomes
Wollongong City Council	Regular meetings	 Discussions around alignments and design timeframes. Sharing of master plans, neighbourhood plans, 	 Council preference for mains to follow future road alignments.

Stakeholder	Consultation type	Queries design drawings. • Interface between water main alignments and future council road upgrades.	Outcomes
Developers	Regular meetings	 Sharing of developer plans, design drawings. Discussing timeframes of different approvals. Discussion on size of pumping station footprint. Discussion around road crossings and council road upgrades influencing alignments. Discussion on connections between trunk mains and individual properties. The wastewater gravity main changed from the original concept design with some catchments becoming pressure systems. This was discussed with impacted developers. 	 Footprint to be reviewed as part of due diligence activities. Delivery may include multiple work packages (multiple contractors working in multiple different locations). There are different options for connecting into the trunk mains from individual properties, which could be decided by landowners. The pressure system allowed Sydney Water to reduce the depths of the main, maintenance holes and wet wells at the new wastewater pumping station. This also included some changes to movement around lots and reaching the new pumping station.
Impacted property owners including residential receivers	Individual meetings	 Preference to have mains follow fence lines or roadways for future subdivision, or go through other properties. 	 Some main alignments depend on future road upgrades or are constrained by presence of other

	Consultation type	Queries	Outcomes
		 Whether existing properties would be able to be connected to the new mains. Interested to understand location of above ground assets e.g. ventilation shafts. Concern around noise from day works for shift workers. Concern around the location of the pumping station. Concern around impacts to existing vegetation and dams. 	 infrastructure. Connections may be discussed with a Water Servicing Coordinator. Detail of these assets would be provided in detailed design. The location of the pumping station has been moved to be further away from residential properties, while remaining within the assigned lot. We will look at minimising these impacts for individual properties during detailed design.
egistered Aboriginal	Done by the heritage specialist, Kelleher Nightingale Consulting (KNC), with stakeholders about the test excavation methodology for the ACHAR. The draft ACHAR was provided to these stakeholders	KNC's response to queries from these stakeholders about the test excavation methodology is detailed in section 5 of Appendix C. No responses opposed the methodology. Details about the replies to the draft ACHAR are provided in section 5 of Appendix C.	No issues were raised with the outcomes of the ACHAR. Responses have been provided to specific questions and comments raised around the salvage excavation methodology.

Sydney Water and/or the delivery contractor will continue to consult with stakeholders throughout pre-construction and construction of the proposal.



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. This is specified in the State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP).

The ongoing consultation with Wollongong City Council and Shellharbour City Council includes consultation on items relevant to TISEPP, such as:

- Temporary partial lane closures and road closures of council roads.
- Impacts to council roads.

A TISEPP consultation letter highlighting the above matters was submitted to both councils on 4 April 2024, under clauses 2.10(1)(e) and 2.10(1)(f) of TISEPP. Sydney Water and/or the delivery contractor will continue to consult with council throughout pre-construction and construction on TISEPP matters, in conjunction with the matters discussed in Section 4.1. As of 20 May 2024, no feedback has been received from Shellharbour City Council. Wollongong City Council provided a formal TISEPP response on 1 May 2024. A summary of feedback from this letter is provided below:

- Temporary partial land closures require notification to council's Civil Assets Team with a Notice of Entry. Council also requested Traffic Guidance Plans (TGPs) for lane closures be provided where available.
- Restoration of excavation within the road verge is to comply with council's standard restoration requirements. Restoration of longitudinal trenching through existing pavement should be in accordance with:
 - o Heavy Bound Base or 14:1 cement stabilised backfill
 - o 2 x 50 mm AC14 layers keyed into existing pavement.
- Regarding the 5-tonne limit on the 2 bridges on Marshall Mount Road (between 84 and 129 Marshall Mount Road, over Duck Creek), council recommended the use of alternative routes or temporary strengthening of the structures.
- Council recommended that if the heavy equipment being brought in requires vehicles other than General Access Vehicles (e.g. oversize/over mass), an application will be required through the National Heavy Vehicle Regulator portal.

Council responses have been considered in Section 6.2.8 of this REF.

As detailed in Appendix B, no other TISEPP consultation was required.

The Department of Primary Industries (DPI Fisheries) was notified on 2 May 2024 during REF preparation, as we will be underboring Key Fish Habitat (KFH). There may be some indirect impacts to KFH. Trenchless construction will be performed under all waterways mapped as KFH within the construction corridor. Excavation, and vegetation impacts, below top of bank are not expected. Fisheries responded on 13 May 2024 requesting best practice erosion and sediment control measures to be used during construction to avoid sediment input into nearby waterways.





Part of the construction corridor overlaps with mapped Crown Land. A section of Marshall Mount Road between North Marshall Mount Road and Yallah Road is Crown Land. Sydney Water has consulted with Crown Land on 4 April 2024. Advice received from Crown Lands on 10 April 2024 identified that this section of road is not a Crown Road.



5 Legislative requirements

5.1 Strategic context

5.1.1 Illawarra Shoalhaven Regional Plan 2041

This plan (DPIE, 2021) aims to protect and enhance the region's assets and plan for a sustainable future. It is the overarching policy document guiding strategic land use planning in the region. It applies to the local government areas of Wollongong, Shellharbour, Kiama, and Shoalhaven. Among other aspects, the plan informs local councils' land use planning, assists agencies in asset and infrastructure planning for future growth, and informs the wider community of the NSW government's approach to creating a connected, sustainable, innovative, and vibrant region.

This plan identifies 15 regionally significant precincts that will drive job creation, housing diversity, and vibrant communities. In total, these precincts represent more than 2,300 hectares of land and opportunity for around 38,000 new homes.

One of these precincts is the West Lake Illawarra Growth Area. The proposal is within this growth area. To realise the vision for the region and deliver more homes and space for business, the area will require essential utility services. Sydney Water is planning to deliver water and wastewater infrastructure to the West Dapto area to service this planned future growth. This proposal is consistent with this regional plan by supporting future development in the area.

5.1.2 Wollongong Local Strategic Planning Statement 2020

This Planning Statement (Wollongong City Council, 2020) demonstrates how council will continue to implement the actions contained in the Illawarra Shoalhaven Regional Plan and other state government policy documents as required and as applicable. It provides the 20-year vision for the area and identifies details future land use actions, studies and strategies to be undertaken by Council as well as used as a guide in the assessment of planning proposals to ensure they have strategic merit and are consistent with Council's vision for the local government area.

The Planning Statement identifies that the West Dapto area is planned to provide about 19,500 homes over the next 40-50 years. To facilitate this, it recognises infrastructure as a key consideration in future land use planning.

The Planning Statement also notes that most of the existing residential properties are connected to Sydney Water's water and wastewater networks. The proposal would support the land use planning identified for the West Dapto area in the Planning Statement by providing connection to Sydney Water's network. The Planning Statement also refers to Council's West Dapto Vision 2018 (Wollongong City Council, 2018). This vision is outlined below.

5.1.3 West Dapto Vision 2018

This vision (Wollongong City Council, 2018) sets out the vision for the West Dapto area as communities that are healthy, sustainable, and resilient with active and passive open space accessible by walkways, cycleways and public transport. To support this, the vision notes that





timely implementation of infrastructure is necessary to deliver sustainable and high-quality suburbs with diverse housing choices. The proposal supports the vision for West Dapto area by providing important infrastructure to support future development in the area.

5.1.4 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 the managing the future growth of the city based on economic, social and environmental needs over the next 20 years. It demonstrates and 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 precinct to meet future population demands and provide optimum outcomes for the community and the environment.

5.1.5 Draft Biodiversity Certification Assessment Report and Conservation Strategy – West Dapto Urban Release Area (WDURA)

Wollongong City Council have proposed Biodiversity Certification for the former WDURA. If endorsed, this certification will be used alongside the Wollongong LEP to guide future development in the certification area. All sections of this proposal within Wollongong City Council fall within the proposed Biodiversity Certification area.

At the time of drafting this REF, consultation on the proposed certification has finished and Council are considering feedback received and working with the NSW Government to implement it. Sydney Water have worked with Wollongong City Council on the location of our proposed infrastructure and to avoid and minimise impacts to vegetation. We have reviewed the draft Biodiversity Certification Assessment Report and the overall objective to maintain and improve biodiversity values. We will implement voluntary biodiversity offsets from native vegetation clearing required for this proposal and will consult council on suitable locations for these.

5.2 Environmental legislation

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

The following environmental planning instruments (Table 5-1) and legislation (Table 5-2) are relevant to the proposal. Table 5-2 also documents any licences and permits required, and timing and responsibility for obtaining them.



Environmental Planning Instrument	Relevance to proposal		
Wollongong Local Environmental	The proposal is located on land zoned:		
Plan (LEP) 2009	DM – Deferred Matter (also R1 – General Residential)		
	R2 – Low Density Residential		
	R3 – Medium Density Residential		
	RU2 – Rural Landscape		
	C2 – Environmental Conservation		
	C3 – Environmental Management		
	C4 – Environmental Living		
	E1 – Local Centre		
	• MU1 – Mixed Use		
	E4 – Light Industrial		
	RE1 – Public Recreation		
	• SP2 – Infrastructure.		
Shellharbour LEP 2013	The proposal is located on land zoned RU1 – Primary Production.		
State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP)	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.		
	Section 2.126(6) of the TISEPP permits development for wastewater reticulation systems without consent on any land in the prescribed circumstances. Development is carried out in the prescribed circumstances if it is carried out by or on behalf of a public authority. The <i>Standard Instrument – Principal Local Environmental Plan (2006)</i> identifies that reticulation systems include pumping stations.		
	The proposal is not on National Parks land, therefore clauses 2.159(5) and 2.126(8) do not apply.		
	As Sydney Water is a public authority, the proposal is permissible without consent.		
State Environmental Planning Policy	The proposal is located on land zoned:		
(SEPP) (Precincts – Regional) 2021	R1 – General Residential		
	C2 – Environmental Conservation		
	C3 – Environmental Management.		

Table 5-1 Environmental planning instruments relevant to the proposal



Environmental Planning Instrument

Relevance to proposal

The Precincts – Regional SEPP does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted without development consent under TISEPP. As the proposal is permissible without consent under the TISEPP, the consent requirements of Precincts – Regional SEPP do not apply.

State Environmental Planning Policy (Biodiversity and Conservation) 2021 (BCSEPP)

Vegetation in non-rural areas (Chapter 2)

The proposal is in zones listed in subsection 2.3(1). However, subsection 2.4(1) states: 'This Policy does not affect the provisions of any other SEPP....', and as the works are permissible under the TISEPP, a council permit to clear vegetation under this SEPP is not required.

Koala habitat protection (2020 and 2021) (Chapters 3 and 4)

The proposal is located within the Wollongong LGA which forms part of the South Coast Koala Management Area. Shellharbour LGA is not associated with a Koala Management Area. The proposal involves removal of about 0.8 hectares of potential habitat including feed trees. Specialist ecology advice indicates that the survey area does not support key areas of habitat for larger populations of koala likely present in the escarpment area (Appendix D). This vegetation impact is not considered to be a significant area of habitat or important to the long-term survival of the koala. Further assessment is provided in Section 6.2.3.

State Environmental Planning Policy (Resilience and Hazards) 2021 (RHSEPP)

Coastal management (Chapter 2)

The proposal is on land to which Chapter 2 of the RHSEPP applies (Figure 3-2 and Figure 3-3).

No works would be performed within coastal wetlands. In 2 locations, the construction corridor intersects with land mapped as proximity area for coastal wetland under the RHSEPP. Therefore, the requirements of clause 2.8 would be considered. The proposal must not significantly impact:

- the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest
- the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.

The above clauses have been considered as part of the assessment of impacts to proximity areas for coastal wetland in Section 6.2.3 of this REF.



Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
Protection of the Environment Operations Act 1997 (POEO Act)	The proposal is consistent with an existing activity under EPL 218. Temporary relaxation of the EPL is not required during construction or commissioning. A variation to the EPL is not required for operation.	NA	NA
	There is a requirement under Part 5.7 of the POEO Act to immediately report any pollution incidents to the relevant authority where material harm to the environment is caused or threatened. The definition of material harm and the relevant authorities are defined in Part 5.7 of the POEO Act. The delivery contractor is responsible for immediately reporting such incidents in accordance with <i>SWEMS0009</i> <i>Responding to incidents with an environmental</i> <i>impact.</i>		
Biodiversity Conservation Act 2016 (BC Act)	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.	NA	NA
	Section 7.3 of the BC Act requires that the significance of the impact on threatened species and endangered ecological communities or their habitats is assessed using a five-part test. Where a significant impact is likely to occur, a species impact statement (SIS) must be prepared in accordance with the Environment Agency Head's requirements, or a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM).		
	Assessments of significance were conducted for threatened entities with the potential to occur in the Study Area (Appendix D). These assessments concluded that the proposal is not likely to result in a significant impact upon any threatened entity under the BC Act. Therefore,		

Table 5-2 Consideration of key environmental legislation



Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
	an SIS or BDAR is not required.		
National Parks and Wildlife Act 1974 (NPW Act)	The proposal is not on National Parks land. Under section 86 of this Act, it is an offence to harm or desecrate and Aboriginal place or object unless authorised by an Aboriginal heritage impact permit (AHIP). Under section 90(1) of the Act "the Director- General may issue an Aboriginal heritage impact permit". The regulation of AHIPs is provided in Part 6 Division 2 of the Act, including requirements relating to consultation (section 90N). An AHIP is require for an activity which will harm an Aboriginal object. Under section 87(1) it is a defence against prosecution if "(a) the harm or desecration concerned was authorised by an AHIP and (b)	AHIP	Pre- construction, Sydney Water
	 the conditions to which that AHIP was subject were not contravened". Section 87(2) provides a defence if "the defendant exercised due diligence to determine whether the act or omission constituting the alleged offence would harm an Aboriginal object and reasonably determined that no Aboriginal object would be harmed". An ACHAR was undertaken for the REF (Appendix C). 		
	Based on the results of the test excavation and impact assessment a land-based AHIP under section 90 of the NPW Act is required.		
Heritage Act 1977	The <i>Heritage Act 1977</i> 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.	NA	NA
	Impacts to non-Aboriginal heritage items have been assessed in Section 6.2.4. No direct impacts are expected.		


Legislation	Relevance to proposal	Permit or approval	Timing and responsibility	
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.	NA	NA	
	If the proposal involves dredging work (excavation in water land) or obstructs fish passage in Key Fish Habitat (KFH), and/or harms marine vegetation then a permit from NSW DPI Fisheries may be needed.			
	DPI Fisheries has been notified of the proposal as works will involve underboring Key Fish Habitat (KFH). When in KFH, waterway crossings will be trenchless, and excavation, and vegetation impacts, will remain above top of bank. Section 6.2.1, 6.2.2 and Section 6.2.3 of this REF identify mitigation measures to manage impacts to KFH.			
Water Act 1912/ Water Management Act 2000	All dewatering activities require an approval under Section 91B of the Water Management Act 2000.	WSWA/WAL	Pre- construction, Sydney Water and delivery contractor	
	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.			
	Section 60A of the Water Management Act states that it is an offence to take water without a licence. A Water Access Licence (WAL) is required under section 61 where groundwater extraction is greater than 3 ML.			
	Groundwater is likely to be extracted during construction. It has been calculated that over 3 ML of groundwater would be extracted per year. A WSWA application will be submitted to Department of Climate Change, Energy, the Environment and Water (DCCEEW) (formerly DPE Water). Once approved, the WSWA will be linked to Sydney Water's existing Sydney Basin South WAL (44923).			
Roads Act 1993	This Act regulates works in, on or over a public road. Approval under Section 138(1) of this Act	Road Occupancy	Pre- construction,	



Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
	is required for carrying out works in, digging up, or disturbing a classified road.	Licence (ROL) or	delivery contractor
	The works occur mostly on private land and would mostly be accessed using local roads under the control and management of Wollongong City Council and Shellharbour City Council. Permits for lane closures from council would be required where works are in or near the road corridor.	equivalent approval	
	The alignment will cross under the Princes Motorway and finish near Princes Highway. These roads are classified roads managed by Transport for NSW (TfNSW). Traffic control or partial closures may be required on Princes Highway during construction. Consultation with TfNSW and a Road Occupancy Licence may be required for works.		
Biosecurity Act 2015	This act provides the framework to protect our community from the adverse effects from animal and plant pests, diseases and weeds to maintain market access and protect infrastructure and other important assets. The Act also provides the framework to help protect our environment from invasive pests and diseases.	Compliance with biosecurity duty	Construction, delivery contractor
	The Act is tenure neutral. This means that all land managers, regardless of whether it is private or public land, have the same responsibilities. The action taken by the land manager will be guided by legislation, regional strategic management plans (including weed and pest animal plans) and what is reasonably practicable to eliminate, prevent or minimise a risk.		
	The construction corridor contains several weed species, 6 of which are listed under the Act and have an associated biosecurity duty. These weeds and appropriate mitigation measures have been discussed in Section 6.2.3 of the REF.		
Environment Protection and	Matters of National Environmental Significance (MNES) relevant to the proposal include	NA	NA

Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
Biodiversity Conservation Act 1999 (EPBC Act)	nationally threatened species and ecological communities. An ecological assessment (Appendix D) confirmed that:		
	 it is unlikely that a significant on a MNES will result from the project 		
	 a referral of the proposed action to the Australian Government Minister for the Environment for approval under the EPBC Act is not required. 		



6 Environmental assessment

Section 6.1 describes the existing environment and assesses direct and indirect impacts of proposal construction and operation. It also identifies mitigation measures to minimise impacts. These will be incorporated into contract documents and a Construction Environmental Management Plan (or similar) before starting work.

6.1 Existing environment

The proposal is in the suburbs of Yallah, Marshall Mount, and Avondale, within the Wollongong Local Government Area (LGA), and Calderwood in the Shellharbour LGA. Yallah, Marshall Mount, and Calderwood are suburbs consisting mostly of large rural lots with open grassland, scattered vegetation, and some waterways. Avondale consists of low-density residential lots.

Other nearby land uses include a campus of the Illawarra TAFE on the western side of Marshall Mount Road, and electrical transmission line and gas main easements. The South Coast Railway runs roughly north to south, east of the construction corridor. Shellharbour Airport is about 1.3 km south of the proposal at its closest point.

The proposal is located on multiple properties along Marshall Mount Road, Yallah Road, Huntley Road, and Penrose Drive. The water mains and rising mains mostly follow the existing road corridor and road verges. The gravity main mains follow and cross the road corridor and private properties, including waterways and open grassland. The wider area around the proposal includes native vegetation, KFH, coastal wetlands and proximity areas, and Aboriginal archaeological items. Large areas of native vegetation within the wider area extend west to the Illawarra Escarpment. Waterways and wetlands in the construction corridor and surrounding area drain directly to Lake Illawarra.

6.2 Environmental aspects, impacts and mitigation measures

6.2.1 Topography, geology and soils

Existing environment

The proposal is on undulating land, sloping downhill to watercourses. The highest elevation within the proposal area is about 60 m Australian Height Datum (AHD), near the intersection of Marshall Mount Road and North Marshall Mount Road. Marshall Mount Road then slopes generally downhill to the north and south of this point. The pumping station is at about 14 m AHD.

The regional soil landscape mapping indicates that the construction corridor overlaps the following soil landscapes:

 Fairy Meadow (SWfa) – swamp landscape, overlying Quarternary sediments. Characterised by alluvial plains, floodplains, valley flats and terraces. Limitations of this soil landscape include flood hazard, highly permeable topsoils, and high water table.



- Wattamolla Road (TRwt) transitional and depositional landscape of red and yellow podzolic soils. Characterised by long sideslopes and undulating to rolling hills. Limitations of this soil landscape include run-on, localised mass movement, and strongly acid.
- Shellharbour (ERsh) erosional landscape comprising a range of different soil types. Characterised by rolling low hills and broad drainage plains. Limitations of this soil type include localised mass movement and localised water erosion hazard.
- Albion Park (ERap) erosional landscape of red and yellow podzolic soils, and soloths. Characterised by short steep upper slopes and long footslopes. Limitations of this soil landscape include waterlogging and seasonally high water tables.

There are no Environmental Protection Authority (EPA) listed contaminated sites within 1 km of the proposal. A review of the historic aerial imagery (NSW Government, 2023) indicates that previous land use is generally consistent with current land use. The risk of historical contamination is low. However, illegal dumping is common in bushland and on road verges, and can include contaminated materials such as asbestos.

Additionally, the proposal:

- is not in an area mapped as salinity hazard or acid sulfate soils
- is not in an area mapped as impacted by an existing exploration or mining title
- has small areas which are mapped as potentially unstable soils (patches along the gravity main).

Potential impacts - construction

The main potential impact to topography, geology and soils during construction is erosion and sedimentation. Construction activities involve trenching, excavation and temporary stockpiling of excavated material.

The mains would be installed using a combination of open trenching and trenchless methodologies. About 5.5 km of water mains (about 1.2 m to 2.7 m depth) and 4.8 km of wastewater mains (about 2 m to 9 m depth) are to be installed. Trenchless methodologies, although not as intrusive as open trenching, still require excavation for launch and receival pits at regular intervals. Excavation will also be required for the new pumping station, at depths of up to 11 m. These intrusive activities have the potential to cause erosion and sedimentation. Excavation will expose soil and increase the risk of soil mobilising during rain or windy conditions.

Surface earthworks will also be required for ground levelling and installing temporary and permanent access roads. Temporary access roads will be required during construction. All temporary access roads will be removed following the completion of construction and the pre-existing ground levels restored. Some access roads may be used by developers where they tie-in to the new road network for new residential properties.

In the event of rainfall, stockpiled material has the potential to erode and lead to sedimentation on land and within waterways. Excavated material will be stockpiled within the construction corridor, next to the open trenches, launch and receival pits, or within compound and laydown areas. The environmental risk will be greatest where trenching, excavating and stockpiling occurs close to





waterways such as Marshall Mount Creek and Duck Creek. Some minor waterways will be trenched. In these cases, excavated material will be stockpiled as far as practicable from waterways. The potential impacts of erosion and sedimentation are expected to be readily managed with implementation of the mitigation measures below.

The potential for instability can restrict main construction methods and the choice of construction materials. Works are proposed to be trenchless close to potentially unstable soils, or where there are waterways, road crossings, or infrastructure crossings.

While no significant soil or groundwater contamination, acid sulfate soils, or salinity have been identified, there remains the potential for these conditions to be encountered during construction. Mitigation measures are provided below to avoid, mitigate and manage these potential impacts.

Potential impacts - operation

The proposal would result in negligible impacts to the local topography because excavated areas would be backfilled to match the existing ground level. The new pumping station would require filling to elevate it above the 1:100 year flood level and this would have a localised impact on topography. Impervious areas (i.e. hardstand) would increase during operation, mostly at the new pumping stations. Management of the minor changes to stormwater flows due to increased hardstand and changed topography would be considered during detailed design. Stormwater will be locally managed through drainage of the pumping station footprint.

Sydney Water would maintain the proposal during operation and this may involve localised excavation if assets need to be exposed. Erosion and sedimentation mitigation measures would be implemented to ensure that maintenance activities have minimal impact on soils.

The location of an ERS would be determined during detailed design. Overflows would be directed from the new pumping station to Duck Creek or its tributaries. There is a risk that additional surface water flows could result in erosion. The risk of erosion and turbulence from overflow events would be minimised during detailed design by incorporating erosion protection measures such as rip rap. No vegetation would be cleared downstream of the ERS (see Section 6.2.3), which would also help to dissipate flows and protect from erosion.

There is a minor risk of soil contamination due to spills of any chemicals stored at the new pumping station for the CDU. This risk would be minimised by storing all chemicals in bunded and sealed areas and by ensuring that the storage area is designed in accordance with the relevant standards.

Mitigation measures

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

Table 6-1 Environmental mitigation measures — topography, geology and soils

Mitigation measures

Prevent sediment moving offsite in accordance with Managing Urban Stormwater, Soils and Construction,



Mitigation measures

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.

Delivery 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 delivery 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.

Erosion and sediment mitigation devices are to be erected in a manner consistent with current best management practice (i.e. Managing Urban Stormwater: Soils and Construction 4th Edition Landcom, 2004) to prevent entry of sediment into the waterway before any earthworks being undertaken. These are to be maintained in good working order for the duration of the works and subsequently until the site has been stabilised and the risk of erosion and sediment movement from the site is minimal.

Where required, 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.

Any material removed from a waterway and temporarily stored on land is to be located away from the waterway and to be contained by appropriate erosion and sediment control devices.



Mitigation measures

If found, manage acid sulfate soils in accordance with the Acid Sulfate Soils Management Advisory Committee: Acid Sulfate Soils Assessment Guidelines (ASSMAC, 1998) and prepare an Acid Sulfate Soils Management Plan (ASSMP).

If found, adopt appropriate soil salinity mitigation measures in accordance with Western Sydney Salinity Code of Practice (Western Sydney Regional Organisation of Councils, 2003). This may include:

- stabilise existing areas of erosion
- minimise water use on site
- avoid rotation and vertical displacement of the original soil profile
- backfill excavations deeper than one metre in the same order, or treat or use this material as fill at depths more than one metre from the finished level.

6.2.2 Water and drainage

Existing environment

The construction corridor crosses Marshall Mount Creek, Duck Creek, and multiple tributaries of both waterways. The gravity main alignment follows Duck Creek. Duck Creek and Marshall Mount Creek are both mapped as KFH. In 2 locations, the construction corridor overlaps with proximity areas to coastal wetlands (Figure 6-1 and Figure 6-2). Three farm dams (D1, D2 and D3) are adjacent to the construction corridor (Figure 6-3 and Figure 6-4). The construction corridor does not encroach on land mapped as coastal wetland (Figure 6-1 and Figure 6-2).

Preliminary investigations indicate that groundwater is likely to be encountered during construction (Douglas Partners, 2022). 28 boreholes were drilled during these investigations. Groundwater was found at 8 locations during auger drilling, and at all 7 locations where a groundwater well was installed.

Localised flooding around Marshall Mount Creek and Duck Creek, and their tributaries, are mapped to occur during a 1 in 100-year flood event (Rhelm, 2019 and WMAWater, 2017).





Figure 6-1 Crossing of Marshall Mount Creek and proximity to coastal wetland





Figure 6-2 Crossing at Yallah Road/tributary of Duck Creek and proximity to coastal wetland







Figure 6-3 Farm dams adjacent to the construction corridor (1 of 2).







Figure 6-4 Farm dams adjacent to the construction corridor (2 of 2).



Potential impacts – construction

Waterway crossings will be required at locations shown in Table 6-2.

Table 6-2 Crossings of mapped waterways within the construction corridor

Scope	KFH	Waterway	Strahler number	Lot and DP	Methodology
Water main	Yes	Marshall Mount Creek	4	Lot 2, DP 2534	Trenchless
Water main	No	2 tributaries of Marshall Mount Creek	1 and 2	Lot 3, DP 2534	Open trench
Water main	No	Tributary of Duck Creek	2	Lot 7, DP 626078	Open trench
Water main	No	Tributary of Duck Creek	2	Lot 1, DP 234771	Open trench
Water main	No	Tributary of Duck Creek	1	Lot B, DP 415546	Open trench
Water main	No	Tributary of Duck Creek	1	Lot 100, DP 216769	Open trench
Rising main	Yes	Duck Creek	4	Lot 102, DP 1070360	Trenchless
Rising main	No	Tributary of Duck Creek	2	Lot 102, DP 1070360	Trenchless
Rising main	No	2 tributaries of Duck Creek	1	Lot 2, DP 608205	Trenchless
Gravity main	Yes	Tributary of Duck Creek	2	Lot 5, DP 1280030	Trenchless
Gravity main	Yes	Duck Creek	3	Lot 1, DP 1280028	Trenchless
New pumping station	No	Tributary of Duck Creek	2	Lot 1, DP 234771	Construction of ERS

Waterway crossings for the gravity main would be trenchless. However, sections of the gravity main construction corridor, which do require open trenching, overlap with mapped KFH and mapped waterways (above top of bank). In these sections, vegetation clearing will be performed above bank only, where practical. These actions may cause indirect impacts to KFH.



Lot and DPs where these overlaps with KFH and mapped waterways occur include:

- Lot 2, DP 1277366
- Lot 5, DP 1280030
- Lot 1, DP 1280028
- Lot 101, DP 879381.

All waterway crossings of KFH are proposed to be trenchless construction. The launch and receival pits for trenchless construction would be located above the top of bank. Sydney Water has notified DPI Fisheries as all waterway crossings of KFH are proposed to be trenchless construction. The launch and receival pits for trenchless construction would be located above the top of bank.

DPI Fisheries were notified on 2 May 2024 of these trenchless crossings and of the overlaps with KFH and mapped waterways. Fisheries responded on 13 May 2024 requesting best practice erosion and sediment control measures to be used during construction to avoid sediment input into nearby waterways.

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 before the disturbance.

Six trenchless crossings are proposed. Trenchless construction has 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). If not adequately managed, construction in or near waterways has the potential to cause sedimentation and impact water quality and aquatic flora and fauna.

The proposal involves excavations and ground disturbance within the proximity area for coastal wetlands. The construction corridor has been sited to be outside of coastal wetlands. Coastal wetlands may be indirectly impacted should uncontrolled erosion lead to increased turbidity and reduced water quality. Impacts to coastal wetlands and proximity areas, including water quality, have been assessed in Table 6-10.

Surface water quality of local waterways may be impacted during construction. If not managed appropriately, the introduction of pollutants could result in the following impacts to water quality:

- changed pH, electrical conductivity, dissolved oxygen and/or temperature
- reduced light penetration due to increased turbidity
- increased sediment load, organic matter and turbidity (reduces light penetration)
- increased amount of gross pollutants, and toxic pollutants such as construction fuels, oils, grease and chemicals.

Mitigation measures will assist in minimising changes to surface water quality, including minimising works in waterways and containing potential runoff and pollutants.

The ERS would be constructed from land. Sandbags or similar will be placed around the outlet throughout construction to ensure water does not enter the construction footprint. The pumping





station will need to be constructed to 300 mm above the 1 in 100-year flood level. Earthworks required for this construction would change the local topography and may change flood patterns and surface water flows. These impacts are unlikely to be significant due to the localised impact area. Most compounds are close to waterways and are fully or partly within the 1 in 100-year flood level. The flood profile and topography of these compounds will be restored following construction.

Groundwater would be encountered during pumping station construction, open trenching for main installation, and excavation of launch and receival pits for trenchless construction. The use of exclusion methods would result in a reduction of inflows into open pits. However, it is expected that groundwater dewatering and a WSWA will be required. It is likely that amount of dewatering undertaken will be more than 3 ML. Therefore, once approved, the WSWA will be linked to Sydney Water's existing Sydney Basin South WAL (44923). A WSWA application will be submitted to DCCEEW (formerly DPE Water) following REF approval.

The proposal may require on-site fuel and chemical storage, which will be managed in accordance with the mitigation measures below to avoid any pollution of nearby waterways. Fuels and chemicals would typically be stored within site compounds. A wastewater bypass would likely be required where the rising main connects into the existing network. This is expected to take about 2-3 days to complete.

Potential impacts - operation

Once complete the proposal would be underground with limited surface infrastructure. The new mains would be underground and most of the infrastructure for the new pumping station would also be below ground. We do not anticipate any long-term impacts on surface water, drainage, flooding or groundwater. The SP1201 site has been designed with permeable surfaces to reduce runoff.

The new pumping station is designed to store wastewater during wet weather events, preventing wastewater discharges most of the time. During extreme weather events, the wastewater storage capacity at the new pumping station may be exceeded and untreated wastewater could flow from an ERS. The new pumping station has been designed with one ERS. This is necessary to avoid internal surcharges in the wastewater system. These overflow events will impact water quality in Duck Creek, contributing to an increase in background nutrient loads, pathogen levels and trace pollutant loads. The impact of these temporary and infrequent wastewater discharges would be minimised by the large catchment flows that occur during extreme wet weather events.

The mains will connect to the existing wastewater network and will be managed under existing licences (e.g. EPL) and operating procedures. The proposal would be designed to comply with EPL No. 218. Modelling indicates that there would not be any dry weather overflows under normal operating conditions and this is consistent with the EPL.

Mitigation measures

With the implementation of the mitigation measures below, impacts to water and drainage can be adequately managed, and residual impacts are expected to be low. No impacts are anticipated during operation.



Table 6-3 Environmental mitigation measures — water and drainage

Mitigation measures

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 KFH. 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 proposal.

Sydney Water will obtain a groundwater Water Supply Works Approval. Where dewatering is > 3 ML per water year (from 1 July), Sydney Water will also obtain a Water Access Licence from DCCEEW. The delivery contractor is responsible for:

- preparing a Dewatering Management Plan prior to construction
- complying with the conditions of the approvals (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, dichlorination, 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). Extracted groundwater would be tested and (if required) treated before disposal directly into the environment.

Dewater excavations in waterways as follows:

- pumps used in waterways are to be screened with mesh of no greater than 6 mm 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 before 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.



Mitigation measures

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.

Before 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.

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.

Within compounds that are within the 1 in 100 year flood zone:

- During the works, stockpiles are to be kept to a minimum to ensure that off-site disposal within 1 day is possible in the event of a large flood warning.
- Stockpiles are to be retained within sediment fencing and kept covered overnight.

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.

The width of the trench through waterways are to be minimised as far as is practical to conduct the works.

If possible, avoid open cut trenching through riffle zones.

Works are to be undertaken during low flows in the waterway.

DPI Fisheries (1800043536) and the Environment Protection Authority (131 555) are to be notified immediately if any fish kills occur in the vicinity of the works. In this situation, all works other than emergency response procedures are to stop until the issue if rectified and approval is given by DPI Fisheries and/or the EPA for the works to proceed.

If wastewater bypass is required:

pressure test hoses before, and monitor during bypass



- monitor wastewater flows to ensure critical flows are not reached
- stop bypass if leaks occur
- bund access chambers
- contain wastewater spills and pump back to wastewater system or disposal tanker.

Where required use exclusion methods to reduce groundwater ingress into open excavations.

Locate launch and receiver pits in dry areas of the construction corridor, away from the coastal wetlands and larger waterbodies.

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

Consider the DPI Water <u>Guidelines for laying pipes and cables in watercourses on waterfront land</u> during the design and construction of works within 40 m of waterways to protect waterfront land.

Include evidence that the design conditions have been reviewed, and why or why not they can be implemented.

6.2.3 Flora and fauna

A Flora and Fauna Assessment Report was completed by Arcadis in April 2024 (Appendix D). This report incorporates findings from previous surveys performed in 2012 and 2016. The areas assessed include:

- Construction corridor as shown in Figure 3-1 to Figure 3-4.
- 50 m buffer around the construction corridor.
- Survey area, which covers the area surveyed during fieldwork. The survey area incorporates the construction corridor and most areas within the 50 m construction corridor buffer.

For impact assessment, it is assumed all vegetation within the construction corridor would be cleared. The assessment is considered to present a worst-case scenario and it is likely that impacts can be minimised on site through minor reductions in the construction corridor where feasible.

Existing environment

The precinct is centred around Marshall Mount Road, which links Princes Highway to the east and Calderwood Road to the west. Existing land use includes rural activities such as dairy farming, grazing, and horse studs. Other land uses include a TAFE campus off Marshall Mount Road, and electrical and gas easements. It includes large semi-rural lots of land elevated above the floodplains of Marshall Mount Creek in the south. Large areas of native vegetation within the precinct provide a habitat corridor extending west to the Illawarra Escarpment. Five Plant



Community Types (PCTs) are present within the survey area, and 3 of these are within the construction corridor.

Vegetation communities

Five different PCTs were present within the survey area following field surveys:

- PCT 3327 Illawarra Lowland Red Gum Grassy Forest
- PCT 3330 South Coast Lowland Woollybutt Grassy Forest
- PCT 3153 Illawarra Escarpment Bangalay x Blue Gum Wet Forest
- PCT 4084 Southern Escarpment River Oak Forest
- PCT 4051 South Coast Lowland Red Gum-Swamp Oak Forest.

Features of these communities are summarised below (Table 6-4).

Table 6-4 Existing environment within the Study Area

РСТ	PCT description	Associated TEC	Area (ha) within survey area	TEC listing
3327	Illawarra Lowland Red Gum Grassy Forest	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion (BC Act) Illawarra and south coast Iowland forest and woodland ecological community (EPBC Act)	0.73	Within the survey area, all 0.73 ha is consistent with both the BC Act listing and EPBC Act listing.
3330	South Coast Lowland Woollybutt Grassy Forest	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion (BC Act) Illawarra and south coast Iowland forest and woodland ecological community (EPBC Act)	3.89	Within the survey area, all 3.89 ha is consistent with both the BC Act listing and EPBC Act listing.
3153	Illawarra Escarpment Bangalay x Blue Gum Wet Forest	None	0.26	None
4084	Southern Escarpment River Oak Forest	None	0.09	None



РСТ	PCT description	Associated TEC	Area (ha) within survey area	TEC listing
4051	South Coast Lowland Red Gum-Swamp Oak Forest	None	0.02	None

Impacts to these vegetation communities have been assessed in Table 6-6.

Priority weeds

A total of 65 exotic species were recorded in the survey area during field surveys. Of these, 6 are listed as 'priority weeds' under the *Biosecurity Act 2015* for the South East Local Land Services region, which includes the construction corridor. These 6 weeds listed below have a mandatory biosecurity duty (a person must not import into the state or sell) for:

- Bridal creeper (Asparagus asparagoides)
- Blackberry (*Rubus fruticosus spp. agg.*)
- Lantana (Lantana camara)
- Fireweed (Senecio madagascarensis)
- Prickly pear (Opuntia spp.)
- Willow (Salix spp.).

Threatened flora and fauna

Desktop searches identified 47 threatened flora species as recorded or predicted to occur within 10 km of the survey area. Before performing site surveys, 7 species were identified as having a moderate or higher likelihood of occurrence.

Desktop searches identified 82 threatened and migratory fauna species as recorded or predicted to occur within 10 km of the survey area. Before performing site surveys, 33 species were identified as having a moderate or higher likelihood of occurrence.

Field surveys targeted areas which represented suitable habitat for threatened species identified as a moderate or higher likelihood of occurrence. Two threatened flora and 2 threatened fauna species were identified during field surveys in 2022 and 2024:

- *Chorizema parviflorum Benth*. In the Wollongong and Shellharbour Local Government Areas (flora species)
- Lespedeza juncea subsp. sericea in the Wollongong Local Government Area (flora species)
- White-bellied Sea-Eagle (Pandion cristatus)
- Dusky Woodswallow (Artamus cyanopterus cyanopterus).



Field surveys in 2012 identified a further 11 threatened and migratory species present on site. All these threatened fauna species known to occur have been assessed in Table 6-9.

Flora and fauna habitat

The survey area contains potential terrestrial and aquatic habitat for threatened and non-threatened fauna and flora (Table 6-5).

Habitat feature	Presence within survey area	Fauna association	Importance to fauna
Artificial structures such as culverts and bridges	Yes – several abandoned and dilapidated sheds.	Threatened microbats	Roosting habitat
Koala feed trees	Yes – <i>Eucalyptus</i> <i>tereticornis</i> (Forest Red Gum), <i>E. globoidea</i> (white stringybark), and <i>E. longifolia</i> (woollybutt) within PCT 3327 and PCT 3330.	Koala, within the South Coast management area	Feed trees
Waterbodies and creek lines	Yes – Duck Creek and Marshall Mount Creek. Duck Creek includes alluvial deposits, small snags, and emergent instream vegetation. Both creeks are Key Fish Habitat. Coastal wetland is adjacent to the construction corridor at Marshall Mount Creek. Six farm dams within the survey area.	Mullet Creek is KFH – relevant to aquatic fauna. Farm dams – aquatic biota, terrestrial flora, terrestrial fauna such as common ducks, wetland birds, and frogs. No potential habitat for any threatened fish or dragonfly species.	KFH provides important foraging and breeding habitat, and shelter. Farm dams – habitat and potential foraging habitat for common ducks, wetland birds, and frogs. Marginal habitat for green and golden bell frog. Coastal wetland – potential habitat for threatened frogs.
Fallen debris and logs	Yes – within woodland in the survey area	Reptiles	Refuge habitat
Myrtaceous trees and shrubs	Yes – within woodland in the survey area	Some nectivorous birds and threatened species	Foraging habitat
Hollow-bearing trees (HBT)	Yes – 17 within the survey area (25	Arboreal species	Habitat

Table 6-5 Potential flora and fauna habitat within the survey area



Aquatic habitat

Aquatic habitat is present within the survey area.

Duck Creek and Marshall Mount Creek are both within the construction corridor. These waterways are Type 2 moderately sensitive KFH (freshwater habitats that are not highly sensitive) and provide fish passage to Lake Illawarra. No aquatic fauna were observed during field surveys. There is no potential habitat for any threatened fish or dragonfly species in the survey area. There is no potential habitat mapped on the DPI Fisheries NSW Spatial Data Portal.

There are 6 farm dams within the survey area, and 3 adjacent to the construction corridor.

The survey area includes mapped coastal wetlands and proximity areas for coastal wetlands. Coastal wetlands are located along Marshall Mount Creek and a tributary of Duck Creek. The construction corridor avoids coastal wetlands, but is within the proximity areas. The wetland canopy is dominated by Swamp Oak (*Casuarina glauca*) and Forest Red Gum (*E. tereticornis*). The wetland areas contain bullrush (*Typha orientalis*), which can provide habitat for threatened frogs.

Several areas within the survey area are considered to have a high, moderate, or low potential for groundwater dependent ecosystems (GDE) to occur. Areas with higher potential include along waterways, within coastal wetlands, and within stands of vegetation.

Potential impacts

During construction, the proposal involves direct and indirect impacts to native vegetation and habitat.

Direct impacts to vegetation are summarised below in Table 6-6 and Figure 6-5 to Figure 6-11. Vegetation impacts assessed here are the maximum areas to be impacted. The construction corridor and pipeline alignments have been designed as much as possible to avoid threatened vegetation, large patches of contiguous vegetation, and coastal wetlands. A total area of 1.024 ha of vegetation is expected to be impacted (0.804 ha of which is associated with a PCT), out of the 6.16 ha of vegetation identified within the survey area.

Direct and indirect impacts to fauna habitat are summarised below (Table 6-7). Impacts to threatened flora are assessed in Table 6-8 and impacts to threatened fauna are assessed in Table 6-9.



Table 6-6 Direct impacts to vegetation

РСТ	PCT Name	TEC	Area of impact	Significance	Assessment of significance
3327	Illawarra Lowland Red Gum Grassy Forest	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion (BC Act)	0.004 ha	Test of Significance (ToS) (BC Act) assessment only. The EPBC Act listed community is outside of the construction corridor. Unlikely to be a significant impact.	 The removal of about 0.654 hectares across PCT 3327 and 3330 would have an adverse effect on the extent of the ecological community, but not to the extent that the local occurrence is likely to be placed at risk of extinction. The proposal would impact 2 small, isolated patches of TEC that are already impacted by exotic weed species and fragmentation. The proposal would not further fragment or isolate this patch of the TEC, and impacts are constrained to a small area.
3330	South Coast Lowland Woollybutt Grassy Forest	Illawarra Lowlands Grassy Woodland in the Sydney Basin Bioregion (BC Act)	0.65 ha	Test of Significance (ToS) (BC Act) assessment only. The EPBC Act listed community is outside of the construction corridor. Unlikely to be a significant impact.	 The removal of about 0.654 hectares across PCT 3327 and 3330 would have an adverse effect on the extent of the ecological community, but not to the extent that the local occurrence is likely to be placed at risk of extinction. The proposal would impact 2 small, isolated patches of TEC that are already impacted by exotic weed species and fragmentation. The proposal would not further fragment or isolate this patch of the TEC, and impacts are

constrained to a small area.

РСТ	PCT Name	TEC	Area of impact	Significance	Assessment of significance
3153	Illawarra Escarpment Bangalay x Blue Gum Wet Forest	None	0.15 ha	NA	NA
4084	Southern Escarpment River Oak Forest	None	0.00 ha		
4051	South Coast Lowland Red Gum-Swamp Oak Forest	None	0.00 ha		
NA	None	Planted native/exotic	0.22 ha		

Table 6-7 Direct and indirect impacts to fauna habitat

Habitat feature	Type of impact	Predicted impact
Artificial structures such as culverts and bridges	None	No signs of occupation were found.
НВТ	Direct	Four HBTs are proposed to be removed within the construction corridor. This includes 3



Habitat feature	Type of impact	Predicted impact
		HBTs which provide habitat for threatened owls. HBTs suitable for owls near the proposal would experience indirect noise and vibration impacts. These direct and indirect impacts would impact breeding.
		Other species which may be impacted by HBT removal include threatened microbats, spotted-tailed quoll, and hollow dependant birds.
Koala feed trees	Direct	About 0.654 ha of vegetation containing koala feed trees in PCT 3330 will be removed. About 0.80 ha of potential suitable habitat (PCT 3330 and PCT 3153), which may contain breeding habitat, will be removed.
		The likelihood of occurrence for koala is high, due to the presence of feed trees. Koala are listed as endangered under the EPBC Act and BC Act. Therefore, a Significant Impact Criteria assessment was performed under the EPBC Act. An Assessment of Significance was also performed under the BC Act.
		There are 67 records of koala within 20 km of the survey area, most of these within the Illawarra Escarpment west of the survey area. No koala have been recorded within the survey area, including during recent and historical surveys. The survey area does not support the key areas of habitat for this population.
		Feed tree removal is scattered and patchy. The relatively small area of removal is already fragmented remnant stands of these 2 PCTs along the roadside. Marshall Mount Road and Yallah Road are already existing barriers to dispersal. A significant impact to koala from removing these feed trees is unlikely.
Waterbodies and creek lines	Direct and indirect	• Duck Creek and Mullet Creek, which are both KFH, will be underbored.
		 Excavation and ground disturbance (including vegetation removal) will be set back from top of bank as much as practical to minimise direct and indirect impacts.
		 There is the potential to go below top of bank as sections of KFH are within the proposed construction corridor.



Habitat feature	Type of impact	Predicted impact	
		 Three farm dams will require dewatering. Similar habitat resources are common in the local landscape and can be exploited by any displaced fauna. No dams mapped as coastal wetlands will be dewatered or directly impacted. 	
Foraging and breeding vegetation	Direct	0.804 ha of native vegetation would be removed. This vegetation would impact foraging and breeding resources for threatened fauna living in woodland. This includes fallen debris, logs, and myrtaceous species.	
Vegetation	Direct and indirect	Fauna injury and mortality may occur during vegetation clearing, vehicle collisions, or accidental entrapment in plant or equipment. Clearing of HBTs is the highest risk activity for injury and mortality. Mitigation measures would be implemented to minimise this risk.	



Impacts to threatened flora

Vegetation clearing would result in the loss of habitat for threatened flora species considered to have a moderate or higher likelihood to occur in the Study Area.

There are areas within the construction corridor that may provide habitat for threatened species likely to occur. Some areas of PCT 3330 (marked as 'preliminary veg mapping' in Figure 6-5 to Figure 6-11) were not able to be surveyed during field surveys as property access was not available. Targeted pre-clearing surveys should be undertaken during specified survey periods in these previously unsurveyed areas for the 5 threatened flora species listed below in Table 6-8 to check for presence.

ToS and SIC assessments have been undertaken for the threatened flora species identified as having a moderate or higher likelihood to occur and have suitable habitat that will be impacted by the proposal. Refer Appendix C and Appendix D of the specialist report in Appendix C of this REF.

It was determined that the proposal is unlikely to have a significant impact on the threatened flora species listed in Table 6-8 for the following reasons:

- All known records of *Chorizema parviflorum* are outside the construction corridor.
- There is an exclusion zone of 30 metres around the Lespedeza juncea subsp. sericea.

No individuals would be directly

impacted.

- Targeted surveys for the other 3 species did not find any individuals. Based on the small area of vegetation impact, a significant impact is not expected.
- The patches of potential habitat (PCT 3330 and PCT 3153) are in poor to modified condition with evidence of exotic vegetation. These areas do not represent significant potential habitat.

Table 6-8 Impacts to threatened flora

Species	Habitat impacted in construction corridor	ToS	SIC
Solanum celatum	Removal of 0.15 ha of potential habitat (PCT 3153).	Yes	No
Chorizema parviflorum Benth. in the Wollongong and Shellharbour Local Government Areas	Removal of 0.65 ha of potential habitat (PCT 3330).	Yes	No
<i>Lespedeza juncea</i> subsp <i>. sericea</i> in the Wollongong Local Government Area	Removal of 0.65 ha of potential habitat (PCT 3330).	Yes	Yes
Pimelea curviflora subsp. curviflora	Removal of 0.65 ha of potential habitat (PCT	Yes	Yes

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Species	Habitat impacted in construction corridor	ToS	SIC
	3330).		
<i>Pterostylis gibbosa</i> Illawarra Greenhood	Removal of 0.65 ha of potential habitat (PCT 3330).	Yes	Yes

Impacts to threatened fauna

Vegetation clearing would cause habitat loss for threatened fauna considered to have a moderate or higher likelihood to occur in the survey area. Coastal wetlands, riparian corridors and open woodland within the survey area may provide roosting and/or foraging habitat for threatened species.

Removal of vegetation will result in the loss of feed trees for arboreal mammals and other nectivorous mammals and birds. Removal of hollow bearing trees will impact available habitat for arboreal species.

ToS and SIC assessments have been undertaken for 27 threatened fauna species identified as having a moderate or higher likelihood to occur and have suitable habitat that will be impacted by the proposal. This includes previously observed migratory fauna species. Refer to Appendix C and Appendix D of the specialist report in Appendix C of this REF.

It was determined that the proposal is unlikely to have a significant impact on the threatened fauna species listed in Table 6-9 for the following reasons:

- The areas of potential habitat to be removed are small and fragmented in the landscape.
- It is unlikely that any habitat to be removed would be essential breeding habitat. Larger areas of higher quality, more suitable habitat will be retained in the broader Study Area and locality.
- Most are bird or bat species that are highly mobile and able to traverse the landscape in search of suitable habitat resources.

Species type	Species names	Habitat impacted in construction corridor	ΤοS	SIC
Arboreal mammals	Spotted-tailed quoll (<i>Dasyurus</i> <i>maculatus</i>) Squirrel glider (<i>Petaurus</i> <i>norfolkensis</i>) Koala (<i>Phascolarctos cinereus</i>)	HBT removal – 4 trees – 3 providing habitat for quoll and glider. Indirect noise and vibration impacts would impact breeding. Koala – 0.654 ha of feed tree removal (PCT 3327 and	Yes, to all	Yes, for quoll and koala
		PCT 3330).		
Hollow roosting microbat	Eastern False Pipistrelle (Falsistrellus tasmaniensis)	HBT removal – 4 trees – 3 with habitat for all listed species. Indirect noise and	Yes to all	No to all

Table 6-9 Impacts to threatened fauna requiring ToS and SIC assessments

Species type	Species names	Habitat impacted in construction corridor	ΤοS	SIC
species	Eastern Coastal Free-tailed Bat (<i>Micronomus norfolkensis</i>)	vibration impacts would impact breeding.		
	Yellow-bellied sheathtail bat (Saccolaimus flaviventris)			
	Greater Broad-nosed Bat (Scoteanax rueppellii)			
Culvert roosting microbat species	Little Bent-winged Bat (<i>Miniopterus australis</i>) Large Bent-winged Bat (<i>Miniopterus orianae</i> oceanensis)	Buildings containing potential roosting habitat not proposed for removal. Possible indirect impacts from construction noise and vibration.	Yes to all	No to all
	Southern Myotis (<i>Myotis</i> <i>macropus</i>)			
Tree nesting woodland and nectivorous birds	Scarlet Robin (<i>Petroica boodang</i>) Varied Sittella (<i>Daphoenositta chrysoptera</i>) Flame Robin (<i>Petroica</i>	0.804 ha of native vegetation removal (PCT 3327, PCT 3330, PCT 3153). Impact on foraging and breeding resources.	Yes to all	No to all
	phoenicea)		Vec to	No. to all
Hollow-nesting woodland birds and cockatoos	Dusky Woodswallow (Artamus cyanopterus cyanopterus) Gang-gang Cockatoo (Callocephalon fimbriatum) Glossy-black Cockatoo (Calyptorhynchus lathami lathami)	HBT removal – 4 trees – 3 with suitable habitat for all listed species. Indirect noise and vibration impacts would impact breeding.	Yes, to all	NO, TO AII
	Little Lorikeet (<i>Glossopsitta</i> <i>pusilla</i>)			
Raptor and owl species	Little Eagle (<i>Hieraaetus</i> <i>morphnoides</i>) Square-tailed Kite (<i>Lophoictinia</i> <i>isura</i>) White-bellied Sea-eagle (<i>Haliaeetus leucogaster</i>)	HBT removal – 4 trees – 3 with habitat for threatened owls. These larger birds have a large dispersal distance. Indirect noise and vibration impacts would impact breeding.	Yes, to all	No, to all
	Powerful Owl (<i>Ninox strenua</i>) Masked Owl (<i>Tyto novaehollandiae</i>) Spotted Harrier (<i>Circus</i>	0.804 ha of native vegetation removal (PCT 3327, PCT 3330, PCT 3153). Impact on resources.		

Species type	Species names	Habitat impacted in construction corridor	ToS	SIC
	assimilis)			
Other	White-throated Needletail (<i>Hirundapus caudacutus</i>) Green and Golden Bell Frog	Green and Golden Bell Frog: Waterbodies that provide potential habitat	Green and Golden	Yes, to all
	(<i>Litoria aurea</i>) Grey-headed Flying fox	would be underbored. Direct impacts unlikely, indirect impacts possible from	Bell Frog and	
	(Pteropus poliocephalus) Rufous Fantail (Rhipidura rufifrons)	construction noise and vibration. All others: 0.804 ha of native vegetation removal (PCT 3327, PCT 3330, PCT 2152) Impact on recourses	Grey- headed Flying fox only.	







Figure 6-5 Biodiversity features within the Study Area (1 of 7).

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Figure 6-6 Biodiversity features within the Study Area (2 of 7).







Figure 6-7 Biodiversity features within the Study Area (3 of 7).







Figure 6-8 Biodiversity features within the Study Area (4 of 7).





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Figure 6-10 Biodiversity features within the Study Area (6 of 7).






Figure 6-11 Biodiversity features within the Study Area (7 of 7).



Impacts to coastal wetlands and proximity areas

The proposal is not within coastal wetlands. However, sections of the construction corridor are near or adjacent to coastal wetlands. These sections are on land mapped as proximity area for coastal wetlands.

Section 2.8(1) of the RHSEPP states that the "consent authority should be satisfied that the proposed development will not significantly impact on: a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or b) the quality and quantity of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest."

Development consent is not required; however Sydney Water has considered the above requirements to ensure the proposal will not significantly impact on coastal wetlands (Table 6-10). No significant impacts are expected. Direct impacts to proximity areas, and indirect impacts to both coastal wetlands and proximity areas, can be managed through the mitigation measures in this REF (Table 6-13).

Clause	Consistency with the clause		
(a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or	The proposal has been positioned to avoid impacts to mapped coastal wetlands and minimise encroachment on mapped proximity areas for coastal wetlands.		
	Native vegetation will be removed within proximity areas. Regardless, the proposal will result in impacts likely to modify the biophysical characteristics of the areas. The ecological integrity of the proximity area may be impacted where native vegetation is being removed.		
	Mitigation measures have been developed to minimise the risk of construction activities on mapped coastal wetlands when being undertaken in proximity areas. Measures have also been identified to restore disturbed areas progressively following works to minimise impacts upon the biophysical, hydrological and ecological integrity of proximity areas for coastal wetlands.		
(b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.	The proposal has the potential to impact surface and groundwater flows in proximity areas for coastal wetlands. Construction activities upslope of coastal wetlands have the potential to increase sedimentation in surface flows, which may run into wetland areas and decrease water quality. Incorrect discharge of water from farm dams upstream of coastal wetlands could cause erosion issues, sedimentation impacts to coastal wetlands and/or damage to emergent and native aquatic vegetation. Groundwater may flow into open pits that are adjacent to coastal wetlands, which may indirectly impact these wetlands if there are excessive groundwater volumes taken.		
	Mitigation measures will be implemented and maintained to assist in controlling risks to surface and groundwater flows to adjacent coastal wetland areas. Mitigation measures include actions to remediate disturbed land progressively following works, and manage groundwater flows.		
	With implementation of these mitigation measures, it is unlikely that there will be a significant impact to these water flows.		

Table 6-10 Consideration of impacts to coastal wetlands and proximity areas



Other impacts

There is a possibility of impacts to GDEs within the construction corridor. Impacts could occur through drawdown of the water table because of excavation activities requiring groundwater extraction, creation of potential barriers to underground flow, and wastewater or chlorinated water entering the environment due to pipe failure during operation. Mitigation measures within this REF would reduce the risk of impacts to GDEs.

Indirect impacts are summarised below (Table 6-11) and can be mitigated by following the mitigation measures in Table 6-13.

Table 6-11 Indirect impacts from the proposal

Description of impact	Assessment of impact
Edge effects on native vegetation	The clearing of areas of vegetation may create some new edges to adjacent urban and rural areas. These new edges could be subject to degradation by the establishment and spread of weeds and enriched runoff from the use of the maintenance access roads.
Invasion and spread of weeds, pathogens and disease	An increase in the movement of people, vehicles, machinery, vegetation waste and soil during construction may facilitate the introduction or spread of exotic grasses and other weeds. The proposal has the potential to increase the spread of pathogens that threaten native biodiversity values, such as soil-borne pathogens.
Erosion, sedimentation and changes to hydrology	The construction corridor intersects creek lines and riparian vegetation. Vegetation removal and ground disturbance has the potential to present an erosion and sedimentation risk to these nearby aquatic environments if measures to mitigate these impacts are not implemented.

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 outcomes 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 mitigation measures below.

Table 6-12 outlines the restoration requirements for impacts to vegetation from the proposal, including listed TECs present within the construction corridor.

Table 6-12 A summary of offsets obligation for proposal impacts

Vegetation Community	Impact Area (ha) / Number of Trees	Offset Multiplier	Maximum Offset Requirement
Illawarra Lowlands Grassy Woodlands (TEC)	0.654 ha	3:1	1.962 ha
PCT 3153 Illawarra Escarpment Bangalay x Blue Gum Wet Forest	0.15 ha	2:1	0.30 ha



Vegetation Community	Impact Area (ha) / Number of Trees	Offset Multiplier	Maximum Offset Requirement
Planted native/exotic	Contains mostly ornar native trees. Offsets a	nental existing tre re not required fo	es and planted r these trees.
HBTs	4 HBTs	2:1 (2 nest boxes or salvaged hollows per HBT removal)	8 HBTs
Total	0.804 ha		2.262 ha

With the implementation of the mitigation measures below, impacts to flora and fauna can be adequately managed, and residual impacts are expected to be low. No impacts are anticipated during operation.

Table 6-13 Environmental mitigation measures — flora and fauna

Mitigation measures Any native vegetation removed during construction would be restored according to Sydney Water SWEMS0025.11 Guideline for native revegetation following construction.

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 <u>SWEMS0015.26 Contractor Native Vegetation Clearing and Rehabilitation template.</u>

If replanting near Sydney Water mains refer to '*Which trees can damage wastewater pipes*?' link from <u>Sydney Water website.</u>

For TOBAN:

For maintenance and construction activities that are not essential/emergency works, the use of fire in the open, including for general purpose hot works must not proceed without an exemption being approved. Contact to submit an exemption request:

CDResiliencePrograms@sydneywater.com.au or CustomerHub.DutyManager@sydneywater.com.au

Where practical, underbore in sensitive areas such as KFH and proximity areas for coastal wetlands. Further assessment will be required in these areas if the methodology changes.

Wash down vehicles and all equipment at appropriate depot or wash down facility to limit weed and pathogen spread.

Have appropriate stockpiling, locate construction facilities and vehicle turning areas in already cleared areas.

Pre-clearance surveys would identify any breeding or nesting activities by native fauna and as far as practical no breeding sites would be disrupted.





During pre-clearance surveys, any HBTs not previously identified in or near the construction corridor would be marked by an ecologist so they are retained and avoided.

A suitably qualified ecologist would accompany the delivery contractor to complete a pre-clearing assessment of the site before starting work. This would include:

- searches for frogs within 100 m of waterbodies in the construction corridor:
 - o at creek crossings and dam dewatering within 24 hours of the event
 - o along the gravity main at the start of construction.
- stag watches on HBTs suitable for forest owl species that are to be removed
- stag watches on identified HBTs suitable for forest owl species that are within 100 m of the vegetation being cleared, if clearing vegetation between May and August (first preference is to avoid clearing between May and August)
- pre-clearing for koala in any mature eucalypt species to be removed in PCT 3320 and PCT 3327
- areas previously inaccessible during field surveys in PCT 3320 and PCT 3327 (for the 5 threatened flora species).

Toolbox talk to be held identifying likely species to be found (e.g. frogs), and the unexpected finds procedure to be followed if any are identified.

Areas of preliminary vegetation mapping within the 50 m buffer of the construction corridor (i.e. any areas not previously surveyed) should be surveyed and ground-truthed if any impacts are expected.

Where HBTs are to be removed and replacement hollows are to be used, an appropriately qualified ecologist should be consulted on the most effective location for replacement hollows.

If any priority weeds are identified during construction, these would be removed and disposed of at an appropriate waste facility. The equipment used for removing them would be cleaned to minimise the likelihood of transferring and exotic plant materials.

Vehicles, equipment, materials, and footwear are to be clean on entry (free of soil, mud and/or seeds) to minimise the risk of introduction or spread of *Phytophthora cinnamomi*.

Where fauna species are identified in vegetation to be cleared, animals would be removed and relocated to adjacent bushland prior to felling. If this is not possible, the tree would be sectionally dismantled or soft felled under the supervision of an ecologist or wildlife carer, before relocating the animal.

Cover open trenches overnight to avoid fauna becoming trapped. Additionally, trenches should be checked each morning for possible trapped fauna.

Where possible, construction activities will be limited to normal working hours to avoid noise and lighting impacts to fauna using habitat near the survey area. If night works are required, then standard noise and light mitigation measures should be applied.

The delivery contractor will offset any impacts from the proposal in accordance with the Sydney Water Biodiversity Offset Guide. We will continue to consult developers/ council about locations to implement our voluntary offsets.



No disturbance or removal of vegetation in mapped coastal wetlands.

A suitable minimum clearance level beneath the floor of waterbodies adjacent to coastal wetlands is to be determined to minimise the risk of waterbody breaches during trenchless.

Minimise the removal of vegetation within proximity areas for coastal wetlands during detailed design and construction.

Physically markup construction corridor to ensure all works are out of the coastal wetlands (marking the coastal wetlands as a no-go zone), and provide toolbox talks to construction personnel around the significance of the wetland and measures required.

Locate launch and receiver pits in dry areas of the survey area, away from the wetlands and larger waterbodies.

Works adjacent to Coastal Wetlands should be conducted during dry weather, when the groundwater level is lower.

De-watering activities being completed in farm dams should not release water that will flow into the mapped patches of coastal wetlands unless:

- It is discharged in accordance with the project-specific Dewatering Management Plan.
- It is released in a controlled manner that does not decrease water quality in down slope/stream aquatic habitats, or land or creek bank erosion.

Physically delineate native vegetation to be protected and designate those areas as 'no-go zones', including signage where required.

Exclusion zones for threatened flora should be clearly demarcated and be communicated to construction crews during inductions and pre-starts. Areas where *Lespedeza juncea* subsp. *sericea* and *Chorizema parviflorum* were identified should be demarcated and shown as 'no-go zones'. Their locations and descriptions should be communicated to construction crews during toolbox talks.

For the endangered population of *Lespedeza juncea* subsp. *sericea* in the Wollongong Local Government Area:

- a re-survey of the current 30 m exclusion zone will be required if more than 12 months elapses between the surveys as part of this assessment (January 2024) and the construction start date.
- This re-survey must be performed by a suitability experienced ecologist. If the survey falls outside the required survey months (January March), then any individual identified to the *Lespedeza* genus will be assumed to form part of the endangered population.

Revegetating following completion of trenching works with endemic species.

Protect Groundwater Dependent Ecosystems by:

 Visual monitoring of the GDE locations would be undertaken. If signs of drying out are evident at any GDE sites during construction, mitigation responses would be undertaken, which might include, but not be limited to, watering the GDE areas regularly until the associated excavation is backfilled and groundwater is no longer being pumped.



- Use exclusion methods to reduce groundwater ingress into open excavations.
- Where practicable, do not de-water excavation areas if works are not taking place, to prevent further ingress.
- Continue to monitor actual ingress, where possible distinguishing between groundwater and surface water ingress, to refine the radius of influence as and if needed to amend monitoring responses if not required.
- Minimise extraction of groundwater and removal of native vegetation.

No vegetation removal or excavation permitted below top of bank in Key Fish Habitat.

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

6.2.4 Heritage

Aboriginal heritage

A specialist Aboriginal cultural heritage assessment report (ACHAR) was undertaken by Kelleher Nightingale Consulting Pty Ltd (KNC) and is summarised here. This ACHAR includes an assessment of the context of the Study Area, test excavation results, stakeholder consultation outcomes, and assessment of the test excavation results. The complete assessment is provided as Appendix C.

Existing environment

The Study Area for this assessment includes the construction corridor assessed in this REF. The geology and soil landscapes within the Study Area are capable of conserving archaeological deposits. Quartz and other materials suitable for artefact making would have been found within the region. Most of the Study Area is within the Duck Creek catchment, one of the major tributaries of Lake Illawarra. Landforms within the Study Area have been shaped by this creek system. The Study Area includes pasture grasses and scattered regrowth trees. The region remains important to Aboriginal people with continued connection to the area.

The Study Area has been subject to historical disturbance, varying in nature and intensity. These disturbances include vegetation clearing, agricultural land use, waterway alteration, and installing houses, roads, utilities, and other infrastructure. Regional archaeology has been impacted by current and historical land use, as well as natural processes. Higher value archaeological deposits are likely to be restricted to areas where disturbances and impacts are limited, particularly in flat raised areas adjacent to permanent waterways.

Several archaeological investigations have been conducted within, and in the vicinity of, the current Study Area. Previous archaeological investigations have primarily been undertaken as part of planning for residential and commercial developments and associated infrastructure projects within the region.



Archaeological test excavation

Archaeological test excavation was performed at 8 test areas within the construction corridor in December 2023. Test excavations were done to obtain further information about the nature and significance of the Aboriginal archaeological sites at these locations and how they may be impacted. Test excavations were completed in December 2023, as recommended by the Aboriginal due diligence assessment and in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010b). Details of the test excavation locations are provided in Appendix C.

Aboriginal Community Consultation

The aim of consultation is to integrate cultural and archaeological knowledge and ensure registered stakeholders have information to make decisions on Aboriginal cultural heritage. For the preparation of this ACHAR, consultation with Aboriginal people has been undertaken in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010a) and the requirements of Clause 60 of the National Parks and Wildlife Regulation 2019. Twenty-nine Aboriginal community individuals and groups were engaged as Registered Aboriginal Parties for project-specific consultation. Details of this stakeholder consultation is provided in Appendix D.

Aboriginal archaeological sites within the Study Area

Aboriginal archaeological sites within the Study Area, identified following test excavation, are shown below (Table 6-14).

Specific cultural, social or aesthetic values for the sites within the study area were not provided by the registered Aboriginal stakeholders following the review of the draft ACHAR.

Table 6-14 Significance assessment of the Aboriginal archaeological sites identified during test excavation





Potential impacts





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 the AHIMS Registrar and provided in writing to Sydney Water. Sydney Water has removed this information out of respect for Aboriginal cultural heritage and the Aboriginal community.





Figure 6-12 Proposed impact areas and Aboriginal heritage in the northern portion of the Study Area



Figure 6-13 Proposed impact areas and Aboriginal heritage within the southern portion of the Study Area

Non-Aboriginal heritage

There are three non-Aboriginal heritage items adjacent to the proposal. All three are local heritage listed items along Marshall Mount Road, adjacent to the construction corridor for the proposed water main (Figure 3-2). These items are shown in Table 6-16.

Item Name	Location	Listing ID	Significance
Marshall Mount Homestead and Barn	Marshall Mount Road, Calderwood (part Lot 2, DP 2534)	Item listing 1 on the SEPP (Precincts – Regional)	Within the state significant precinct – Calderwood site
Former Marshall Mount School and master's residence	456 Marshall Mount Road, Marshall Mount (Lot 100, DP 712786)	Item listing 5983 on Wollongong LEP	Local
Marshall Mount Progress Association Hall	450 and part of 410 Marshall Mount Road, Marshall Mount (Lot 1, DP 396100 and part of Lot 12, DP 790746)	Item listing 61027 on Wollongong LEP	Local

Table 6-16 Non-Aboriginal heritage items in the vicinity of the proposal





The proposal will not encroach on the curtilage of any listed heritage items. No direct impacts are expected. Indirect impacts related to vibration are assessed in Section 6.2.5 of this REF.

Mitigation measures

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

Table 6-17 Environmental mitigation measures — heritage

Mitigation measures

Do not make publicly available or publish, in any form, Aboriginal heritage information on sites / potential archaeological deposits, particularly regarding location.

Repeat the basic AHIMS search if it is older than 12 months. Conduct additional assessment if new sites are registered and could be impacted by the works.

If any Aboriginal object is found outside the AHIP area, cease all excavation or disturbance in the area and notify Sydney Water Project Manager in accordance with <u>SWEMS0009</u>.

Impact to Aboriginal heritage sites can only occur when an AHIP has been granted and any required surface collection and salvage has been complete. Works within the AHIP must be undertaken in accordance with AHIP conditions. Comply with all AHIP conditions during construction.

Toolbox talk covering Aboriginal heritage and Cultural Awareness Training should be completed by all onsite staff, prior to commencement of all activities. The toolbox talk is to be approved by a heritage specialist and should include:

- clear explanation of heritage constraints
- go and no-go areas, processes and measures to avoid impacts
- stop work procedures
- contact details to obtain further heritage guidance if needed.

If any non-Aboriginal object is found, cease all excavation or disturbance in the area and notify Sydney Water Project Manager in accordance with <u>SWEMS0009</u>.



6.2.5 Noise and vibration

Existing environment

The proposal site has low background noise levels, consistent with its semi-rural nature and low density of residential development. The large semi-rural blocks are subject to future residential development. Other nearby land uses include education, public recreation, places of worship, and industrial. The dominant influences on background noise levels are general rural activities and road traffic, with receivers close to roads generally experiencing higher background noise levels during day and evening peak hours. The F6 Motorway, Princes Highway and South Coast Railway Line are the main contributors to noise levels for nearby receivers.

Some nearby noise sensitive receivers include:

- Calderwood Valley Golf Course about 500 m west of the southern end of the water main on Marshall Mount Road and Calderwood Road.
- Large rural lots with residential properties along Marshall Mount Road. Most of these properties are set back from the road corridor.
- Industrial developments along Yallah Road.
- Hayward Bay residential suburb about 170 m east of the watermain on Yallah Road.
- TAFE campus along Marshall Mount Road the nearest building is about 100 m from the proposal.
- Low density suburban residential properties in Avondale and Dapto.
- Mount Brown Public School, about 300 m east of the rising main at Marshall Mount Road and Huntley Road.
- Avondale Early Childhood Education Centre, 16 Dale Street, north of the Orthodox Church.
- Saint John the Baptist Serbian Orthodox Church, 20 Dale Street, Avondale, about 200 m north of the northern end of the construction corridor for the rising main.
- The Church of Jesus Christ of Latter-day Saints, 53-73 Avondale Road, Dapto, about 400 m north of the northern end of the construction corridor for the rising main.

The closest sensitive receivers to the proposal are residential properties adjacent to the mains, compounds, access roads, and pumping station. Within the large semi-rural properties, the houses are typically set back from the road by about 20 to 100 m.

Some of the individual receivers named above have been included in Figure 6-14 below.





Figure 6-14 Noise sensitive receivers near the proposal.





The likelihood of noise impact was assessed using Table 2 of the Draft Construction Noise Guideline (EPA 2020). The review indicated that the likelihood of noise impact is medium risk and therefore a quantitative noise impact assessment was undertaken and presented below. This quantitative assessment was performed using the Transport for NSW (TfNSW) Construction and Maintenance noise estimator tool (TfNSW, 2022).

The construction program and proposed use of noisy equipment is shown below (Table 6-18 and Table 6-19).

Table 6-18 Proposed construction program

Scope	Activities	Duration
Site mobilisation	Install compounds and access road, delineate construction corridor, install environmental controls, strip stockpiles, remove vegetation	1-2 months
Compound use	Ongoing use of amenities, storage, laydown, parking areas	24 months
Water mains	Open trench – progress about 10 metres per shift	18-20 months
Water mains	Underboring – progress about 13 metres per shift	3-4 months
Gravity main	Open trench – progress about 10 metres per shift	10-11 months
Gravity main	Underboring – progress about 13 metres per shift	1-2 months
Rising main	Open trench – progress about 10 metres per shift	8-9 months
Rising main	Underboring – progress about 13 metres per shift	1-2 months
New pumping station (SP1201)	Construction including: ERS valve chamber electrical switchroom CDU chemical delivery bund emergency storage structure wet well inlet maintenance hole access road.	18 months
Site demobilisation	Remove compounds and restore disturbed areas	1-2 months



Table 6-19 Use of noisy equipment

Activity	Noisier equipment required	Tasks requiring this equipment	Frequency of use of noisy equipment
Site mobilisation/ demobilisation	Grinders, concrete saws	Install fence and footpath	Less than an hour, intermittently, about 10 times during mobilisation
			Generally hand tools will be used with noisier equipment required for cutting
Compound use	Grinders, demo saw	Cut pipe	Daily
Open trench	Grinders, demo saw 36 tonne excavators with hammer	Cut pipe and reinforcement	Daily
Underboring	Demo saw, excavator with hammer	Cut pipe and reinforcement	Daily
New pumping station (SP1201) construction	Concrete saw, grinders, 36 tonne excavators with hammer	Excavation works	Daily

Construction noise impacts

The noisiest plant chosen for the noise assessment is the 13.5 t excavator with hammer, as this is the closest size equipment in the noise estimator tool to the 36 t excavator with hammer that may be used.

Although at this stage no night works are planned, this same equipment will also be assessed for night work, as a worst-case, conservative approach.

This assessment is considered appropriate to predict and assess worst-case noise impacts, since:

- The noisiest equipment would not be used constantly each shift.
- Multiple pieces of equipment may be used at any one time for different activities at different locations. Assessing use of the noisiest plant across the full construction corridor is a representation of the cumulative noise impacts that may be experienced.

Non-residential receivers, including the TAFE, recreational facilities in Avondale, and industrial assets along Yallah Road are predicted to be noise impacted during day work. Notification is recommended to these properties within 110 m of the proposal.

Residential receivers within 70 m with no line of sight and 170 m with line of sight are predicted to be noise impacted during day work.





During night work, residential receivers within 590 m of the proposal and industrial receivers within 70 m are predicted to be impacted. There is potential for sleep disturbance impact on residential receivers within 390 m of the proposal during use of 13.5 tonne excavator with hammer during night works.

During night work, the 2 nearby places of worship may be noise impacted during night work up to 390 m from the proposal, as their opening hours include times outside of standard construction hours:

- Saint John the Baptist Serbian Orthodox Church: 10am to 3pm Tuesdays, 5pm to 9pm Fridays, 8am to 1pm Sundays
- The Church of Jesus Christ of Latter-day Saints: 9am to 6pm Monday to Saturday, 9:30am to 11:30am Sundays.

Open trenching and underboring are a linear activity. These activities would not cause noise impacts to any one receiver for every shift over the 24 months of construction.

Sensitive receivers around the compounds, access roads, and new pumping station are likely to be noise impacted over most shifts over the 24 months of construction. These works are static and include a mix of noisier (e.g., concrete saw, excavator with hammer) and less noisy (e.g. light vehicle movement, excavator without hammer) activities (Figure 6-15 to Figure 6-19).

Cumulative noise and vibration impacts may be experienced by nearby sensitive receivers if residential and industrial development is being constructed at the same time as the works in this proposal. At this stage, the timing of these other developments is unknown.



Figure 6-15 Predicted noise impacts for non-residential receivers during day work



Figure 6-16 Predicted noise impacts for residential receivers during day work



Date Created: 9/04/2024

Figure 6-17 Predicted noise impacts for non-residential receivers (industry) during night work



Figure 6-18 Predicted noise impacts for non-residential receivers (places of worship) during night work



Figure 6-19 Predicted noise impacts for residential receivers during night work



Construction vibration impacts

The noise estimator includes some indicative minimum working distances for different vibratory plant and equipment. These distances will vary depending on the particular item of plant, local geotechnical conditions, and the frequency of vibration. However, where works are performed within the minimum working distances of a structure, structural damage may occur, and additional mitigation measures are recommended. Based on the plant and equipment list in Section 3 of the REF, the following vibratory plant and equipment may be used:

- Small (5 to 12 tonne) hydraulic hammer minimum working distance of 2 m
- Medium (12 to 18 tonne) hydraulic hammer minimum working distance of 7 m
- Large (18 to 34 tonne) hydraulic hammer minimum working distance of 22 m
- Hand held jackhammer minimum working distance of 1 m (nominal)
- 1-2 tonne vibratory roller minimum working distance of 5 m
- 2-4 tonne vibratory roller minimum working distance of 6 m
- 4-6 tonne vibratory roller minimum working distance of 12 m
- 7-13 tonne vibratory roller minimum working distance of 15 m
- 13-18 tonne vibratory roller minimum working distance of 20 m
- More than 18 tonne vibratory roller minimum working distance of 25 m

Some nearby residential buildings and local heritage listed items adjacent to the construction corridor may be within these minimum working distances if larger pieces of equipment are used. Potential vibration impacts will be considered when choosing the size of equipment to be used. Vibration impacts to these receivers will be minor and managed by the mitigation measures listed below.

Operational impacts

During operation, the proposal would not result in any operational noise from the water or wastewater mains. Noise impacts would potentially occur during maintenance or emergency works. However, these would be short-term and managed by implementing the mitigation measures below.

Noise generated from the new pumping station will not exceed the noise criteria in the Noise Policy for Industry (EPA, 2017). Noise levels are tested during commissioning to confirm they are compliant. Any plant operating under normal conditions that does not meet the requirements for noise during site testing must be rectified and retested.

Mitigation measures

With the implementation of the mitigation measures below, impacts to noise and vibration can be adequately managed, and residual impacts are expected to be low. No impacts are anticipated during operation.



Table 6-20 Environmental mitigation measures — noise and vibration

Mitigation measures

Works must comply with the ICNG (DECC, 2009), including scheduling 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 Sunday nights or public holidays. Any proposed work outside of these hours must be justified.

The proposal will also be carried out in accordance with:

- Sydney Water's Noise Management Procedure SWEMS0056
- Noise Policy for Industry (EPA, 2017).

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

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

- identify and consult with the potentially affected residents before the start of work:
 - describe the nature of works; the expected noise impacts; approved hours of work; duration, complaints handling and contact details
 - determine need for, and appropriate timing of respite periods (e.g. times identified by the community that are less sensitive to noise such as mid-morning or mid-afternoon for works near residences)
- implement a noise complaints handling procedure
- 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 (e.g. 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 (e.g. generators away from sensitive receivers, site set up to minimise use of vehicle reversing alarms, site amenities and/ or entrances away from noise sensitive receivers)
- use natural landforms/ mounds or site sheds as noise barriers
- 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 delivery 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 document all



reasonable and feasible management measures to be implemented

- identify additional community notification requirements and outcomes of targeted community consultation
- seek approval from the Sydney Water Project Manager in consultation with the environment and communications representatives.

Community engagement will begin before work starts, with notification to impacted residents and businesses within the zone of influence. Consider worst-case noise impact scenarios during night works and day works when identifying stakeholders to be notified.

This may also include face to face engagement and door knocks. Consultation will include number of night shifts per week and mitigation measures to be adopted (if night works are required).

Community preference will determine if shifts can extend to more than 2 night shifts per week and the appropriate respite periods (if night works are required).

Ongoing engagement will continue on an ad-hoc basis. For sensitive receivers / highly impacted residents, regular follow-up will be done (i.e. one-on-one meetings, emails, texts, phone discussions).

Engagement during construction will be ongoing and include proactive management of issues to minimise complaints. Where complaints and enquiries arise, action will be taken to address these with appropriate mitigation adopted.

Regular project updates will be sent to surrounding community and emailed to key stakeholders.

Continuous noise monitoring may be considered if complaints are received and/or when noisier works (e.g. excavator with hammer) are being performed.

Perform respite during the day when rock breaking (e.g. continuous blocks of up to 3 hours work, followed by at least 1 hour break).

Noise barriers would be considered during noisy works at night on the road corridor.

Noisy/annoying work will only happen before 12am midnight, where practical.

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

Monitor compliance with the recommended vibration levels in DIN 4150-3 1999: Structural Vibration – Part 3; Effects of vibration on structures if working within the minimum working distances listed in this REF.

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



6.2.6 Air and energy

Existing environment

The air quality in the proposal site is typical of a semi-rural/rural residential area on the urban fringe. Local pollution sources include odours from agriculture, vehicle emissions, solid fuel heaters, bushfires, backyard burning and on-site wastewater systems. Some sites listed on the National Pollutant Inventory (NPI) (DCCEEW, 2023) may contribute to localised air pollution:

- Yallah Main Line Valve (Jemena Eastern Gas Pipeline), Marshall Mount Road, no emissions data recorded
- Viva Energy, Shellharbour Airport, aircraft refuelling main pollutant is total volatile organic compounds (VOCs)
- Tallawarra MLV and Meter Station (gas supply) and EnergyAustralia Tallawarra (electricity generation), Yallah Bay Road, about 2.4 km north-east of the proposal main pollutants are total VOCs, carbon monoxide, oxides of nitrogen, and sulfur dioxide.

For most of the proposal, the nearest existing potentially sensitive receivers are residents located on rural properties.

Potential impacts - construction

During construction, the proposal has the potential to impact on air quality by generating:

- dust during general construction and excavation, including ground disturbance, earthworks, stockpiles, movement of vehicles on unsealed areas, and use of imported fill
- emissions including greenhouse gas emissions from machinery, equipment and vehicles used during construction, including:
 - o construction equipment
 - o delivery vehicles transporting materials to construction sites
 - o vehicles removing waste materials from construction sites
 - o staff vehicles
- odour generated by construction activities including:
 - o works connecting to the existing wastewater network including temporary bypass.

If inadequately controlled, this could result in air quality impacts at nearby sensitive receivers. Potential impacts on air quality could be readily managed by implementing standard mitigation measures.

Potential impacts - operation

Potential operational impacts on air quality would include odours from the new pumping station and ventilation shafts. Offensive odours generally occur when the wastewater becomes anaerobic (lacking oxygen) due to poor ventilation or stagnant conditions in the mains which may be caused





by low or no flows. As population increases, and the flow of wastewater increases, this would reduce likelihood of these odours being generated.

Ventilation will be managed by the ventilation shafts, which would vent out air at a height of about 8-16 m. Residents may experience some odour from ventilation shafts, but appropriate design and location would reduce the likelihood of odour impacting on amenity. Construction of the new pumping station would be designed to minimise offensive odours. Odours from the pumping station would be managed by chemical dosing.

Sydney Water would manage odour in accordance with the requirements of the POEO Act and Sydney Water's existing procedures. All odour complaints would be registered and investigated. We would implement engineering, operational or other odour reduction measures where verified complaints are received about odour releases from the wastewater system. Significant odour impacts from operation of the proposal are considered unlikely.

The proposal would require increased energy to operate the new pumping station and this would marginally increase Sydney Water's total energy use. The proposal would be operated in accordance with energy use procedures that apply to Sydney Water's existing network.

Mitigation measures

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

Table 6-21 Environmental mitigation measures — air and energy

Mitigation measures

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

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.

Minimise the potential for odours (e.g. minimise the number of open access chambers, close maintenance holes overnight).



Ensure odour control measures are available and ready to use during the works, such as such as deodoriser sprays or temporary installation of ventilation fans to draw odours away from heavily trafficked or odour sensitive areas.

Design the mains with adequate slope and ventilation to reduce the risk of odour emissions.

6.2.7 Waste and hazardous materials

Existing environment

Our corporate objectives include to be a resource recovery business with an increasing portfolio of circular economy products and services. This includes reducing waste through recycling and reuse, and encouraging our suppliers to minimise waste.

No known hazardous materials were identified from existing assets within the construction corridor.

Potential environmental impacts

The proposal has the potential to generate the following wastes:

- surplus materials used during site establishment such as safety fencing and barriers which may include plastics and metal. This is expected to be minimal as it is likely that prefabricated structures would be used
- general construction waste such as excess concrete, redundant pieces of pipe/fittings, broken bricks, timber, paper, plastic and metal
- green waste from clearing vegetation including weeds
- domestic waste including food scraps, aluminium cans, glass bottles, plastic and paper containers, and putrescible waste generated by site construction personnel
- wastewater and grey water from temporary amenities
- spoil from trenching and other excavations that is not suitable for backfilling
- contaminated material such as asbestos, if it is encountered
- groundwater that needs to be dewatered from excavations
- wastewater and drilling fluid generated from trenchless construction and the compound sites.

The largest volume of waste generated by construction would be excess spoil from excavation for the new mains and pumping station. Wherever possible, suitable excavated spoil would be re-used on site for backfilling, landscaping and other uses. 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, spoil would be tested and classified according to the Waste Classification Guidelines (EPA, 2014) and disposed of at an appropriately licensed facility.

Significant volumes of liquid wastes, including oils or fuels are unlikely to be generated during construction. Cutting heads and drilling equipment used for boring would be lubricated using slurry formed from 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.

The proposal would intercept groundwater and it is likely that deeper excavations would need to be dewatered (refer to Section 6.2.2). Water that is extracted would be pumped, treated and disposed of in accordance with the POEO Act. This would involve implementing the measures below. Measures would be implemented to manage acid leachate if geotechnical investigations undertaken by the delivery contractor confirms that the proposal would impact on actual or potential acid sulfate soils.

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

Opportunities to reduce, recycle and reuse on this project during construction would be sought with the delivery contractor and documented in the CEMP.

Minor volumes of waste would be generated during operation and maintenance of the proposal and these would be managed in accordance with Sydney Water's existing procedures and policies.

Operational impacts

Operation of the proposal may generate minor volumes of waste during maintenance activities. Any wastewater discharged would be in accordance with Sydney Water's Discharge Protocols Standard Operating Procedure. Any operational wastes generated during maintenance would be managed and disposed of in accordance with Sydney Water's standard operating procedures and disposed of at an appropriately licensed waste disposal or recycling facility.

Mitigation measures

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

Table 6-22 Environmental mitigation measures — waste and hazardous materials

Mitigation measures

A Waste and Resource Recovery Plan (WRRP) must be prepared to appropriately manage and classify any materials including soils, construction/demolition wastes and associated stockpiles.

The plan will be prepared by the delivery contractor (or nominated environmental consultant) and approved by the Sydney Water Project Manager in consultation with the Environmental Representative



and Property Environmental Services.

Manage waste in accordance with relevant legislation and maintain records to show compliance e.g. waste register, transport and disposal records. Record and submit <u>SWEMS0015.27 Contractor Waste</u> <u>Report.</u>

Provide adequate bins for general waste, hazardous waste and recyclable materials.

Minimise stockpile size and ensure delineation between different stockpiled materials.

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.

An unexpected finds procedure to be implemented for any unexpected contamination or hazardous materials identified on site.

The delivery contractor should use the Sydney Water Material Stockpile and Material Receiver Dashboard and Register to identify potential opportunities for spoil reuse between projects. The Material Receiver Dashboard can also be used to identify suitable waste facilities for material that cannot be reused. It can be accessed via the SWDelivery Portal.

6.2.8 Traffic and access

Existing environment

Water and wastewater mains would be constructed within the following existing road reserves (Table 6-23).

Road	Lanes	Speed limit	Pedestrian facilities/ active transport/ public transport
Yallah Road	2	80 km/h	Formalised footpath along localised section of southern road verge. No bus stops within construction corridor.
Marshall Mount Road	2	80 km/h	No formalised footpaths. Bridge over Duck Creek is one lane only. Road signage indicates that the road can be used as a bicycle route to Dapto.

Table 6-23 Local roads and bus routes intersecting with the proposal



Road	Lanes	Speed limit	Pedestrian facilities/ active transport/ public transport
Huntley Road	2	50 km/h	Formalised footpath along northern road verge. One bus stop within construction corridor (routes and timings described above).
Penrose Drive	2	50 km/h	No formalised footpaths. Two bus stops within the construction corridor (routes and timings described above).
Melaleuca Avenue	2	50 km/h	No formalised footpaths. No bus stops within construction corridor.

There are two bus routes which pass along Penrose Drive and Huntley Road:

- 33 5:30am to 9:40pm Monday to Friday, 7 am to midnight Saturdays, 8:40am to 9pm Sundays and public holidays
- 43 7am to 6:50pm Monday to Friday, 8:45am to 5:45pm Saturdays, 8:45am to 4:45pm Sundays and public holidays.

The South Coast Railway Line, which links Sydney and Bomaderry, runs from north to south, east of the construction corridor. At its closest point, the railway line is adjacent to the construction corridor at the intersection of Marshall Mount Road and Huntley Road. The nearest railway stations to the construction corridor are Dapto (about 2.5 km north) and Albion Park (about 3.2 km south-east).

Potential impacts - construction

A range of vehicles would be required to construct the proposal, and this would temporarily increase the number of traffic movements along the road network. During construction planning, the delivery contractor would confirm the number of vehicle movements likely to be required and this would depend on whether work would occur concurrently at multiple work sites. Estimate vehicle movements for each work site are:

- 4 light vehicles and 4 heavy vehicles for water main
- 2 light vehicles and 2 heavy vehicles for rising main
- 4 light vehicles and 4 heavy vehicles for gravity mains
- 14 light vehicles and 8 heavy vehicles for new pumping station/compound per shift.

Small vehicles would likely park within site compounds. Light vehicle movements are likely to peak at the start and end of the shift.

These existing local roads are likely to have relatively low traffic, due to the sparsely populated surroundings. Therefore, these increased traffic volumes from construction vehicle movements may be noticeable to surrounding receivers, particularly during peak traffic times. Localised traffic management solutions (such as scheduling times for deliveries) may need to be implemented if there are localised traffic delays. Impacts to local roads and bus routes are summarised below





(Table 6-24). A traffic management plan (including organising any required ROLs from council) would be prepared in consultation with Wollongong City Council and Shellharbour City Council before construction starts.

Road	Overlap with construction corridor	Impact	Mitigation
Yallah Road	Water main	 Lane closures likely to be required. 	• Private property access and footpath access to be managed through traffic control.
Marshall Mount Road	Water main Rising main Gravity main	 Lane closures likely to be required. Road may be less accessible for cyclists during construction. Vehicles turning in and out of compounds and access roads. 	 Private property access and bicycle access to be managed through traffic control. Plant and equipment movements in/out of the compounds and access roads may require traffic control.
Huntley Road	Rising main	 Bus routes: may require temporary relocation or closure of bus stops, and timetable delays due to reduced speed limits and reduced lane availability. 	 Private property access and footpath access to be managed through traffic control. Consult with bus authorities.
Penrose Drive	Rising main	 Bus routes: may require temporary relocation or closure of bus stops, and timetable delays due to reduced speed limits and reduced lane availability. 	 Private property access to be managed through traffic control. Consult with bus authorities.
Melaleuca Avenue	Rising main	 Lane closures likely to be required. 	 Private property access to be managed through traffic control.

Table 6-24 Impacts to local roads during construction





Lane closures would be required for main installation. We will minimise traffic impacts and aim to avoid detours in narrow construction corridors such as the one-lane bridge on Marshall Mount Road over Duck Creek. Mains are being designed to be installed in the road verge of the future road upgrades for Marshall Mount Road and Yallah Road. Lane closures are not expected to be required for the pumping station. Full road closures are unlikely, due to the length of detours and loss of property access. A Traffic Management Plan (TMP) developed with council will define specific timeframes and closures.

Along all roads, private property driveways would be temporarily impacted from pipe installation. As this is a linear activity, the driveways would not be blocked for a significant amount of time. Any loss of driveway access would be communicated to the residents in advance and managed through traffic control. The construction corridor crosses private properties, road reserves and electricity transmission line easements. The delivery contractor would liaise with the relevant landholders to confirm site access arrangements.

Temporary access roads will be constructed to access the gravity main. A permanent access road will also be required to the pumping station, within one of the compound areas. Existing road access, using the roads listed above, will be required to access the site. Access road locations will be finalised based on landowner consultation, and existing driveways or paths would be used as a preference. The current proposed access roads created within private properties have been sited to minimise potential environmental impacts. These tracks would avoid Aboriginal sites and potential archaeological deposits. While it is expected that access would be maintained, property owners would be informed of any potential loss of access. Appropriate measures to either provide an alternative access or reinstate access at the end of the day would be negotiated. Any driveways affected by construction would be reinstated to their original condition.

Potential impacts - operation

Operation of the proposal would result in negligible impacts to traffic or access, as maintenance works would be minor in nature and infrequent. Maintenance activities would be undertaken in accordance with Sydney Water's existing procedures which would minimise the potential for traffic and access impacts. Once the area around the new pumping station is developed, the access road will be handed back to the developer to be used as a public local road. There would be no private access to the pumping station. This should not cause traffic impacts during operation, as members of public would not be able to access the pumping station and there should be enough space within the new pumping station for staff vehicles to park.

Mitigation measures

With the implementation of the mitigation measures below, impacts to traffic and access can be adequately managed, and residual impacts are expected to be low. No impacts are anticipated during operation.



Table 6-25 Environmental mitigation measures — traffic and access

Mitigation measures

Prepare a Traffic Management Plan (TMP) in consultation with councils before construction starts. Wollongong City Council, Shellharbour City Council, emergency services, bus companies and the community would be notified of traffic control arrangements including the timing of any temporary lane closures, and road closures (if required).

Temporary partial land closures require notification to Wollongong City Council's Civil Assets Team with a Notice of Entry. Traffic Guidance Plans (TGPs) for lane closures to be provided to Wollongong City Council where available.

The location of temporary access roads outside the construction corridor would be confirmed by the delivery contractor and would be subject to additional environmental assessment that must be submitted to Sydney Water for approval. Property owners would be consulted regarding potential reductions in access to portions of their property and the location of access roads, and temporary access arrangements would be developed for the duration of the construction period.

Regarding the 5-tonne limit on the 2 bridges on Marshall Mount Road (between 84 and 129 Marshall Mount Road, over Duck Creek), the use of alternative routes or temporary strengthening of the structures is recommended.

If the heavy equipment being brought in requires vehicles other than General Access Vehicles (e.g. oversize/over mass), an application will be required through the National Heavy Vehicle Regulator portal.

Minimise traffic impacts near residential properties, schools and businesses by consulting with them (e.g. 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 proposal, and any temporary road or lane 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.

6.2.9 Social and visual

Existing environment

The proposal is mostly on the fringes of existing suburban areas. The alignment passes through areas of both urban and rural visual components. Development associated with the Yallah Marshall Mount Precinct will cause the social and visual characteristics of the area to change over time.





Most of the construction corridor and surrounding area is used for rural purposes such as horse studs and hobby farms. The proposal site includes land that is currently used for residential properties, agricultural purposes, and road infrastructure.

For most of the proposal, the nearest existing potentially sensitive receivers are residents located on rural properties. The proposal also passes through existing urban areas at Avondale and the nearest sensitive receivers are residents of the adjacent residential properties, located about 20 m from the indicative main alignments and pumping station.

The visual appearance of the construction corridor and surrounding area is characterised by its semi-rural/urban fringe location. There are also areas of remnant bushland, particularly along road reserves and drainage lines. Major elements of urban infrastructure are also present in the construction corridor and surrounding area including the F6 Southern Freeway, Princes Highway, Illawarra Railway Line and high voltage electricity lines.

Due to its position to the east of the Illawarra Escarpment, the construction corridor and surrounding area is considered to have moderate to high scenic quality, particularly in areas that have views to the escarpment, Lake Illawarra and the coastline.

The visual landscape in the vicinity of the proposal will change from rural to urban as development progresses in the Yallah Marshall Mount precinct, and surrounding West Lake Illawarra Growth Area.

Potential impacts

The proposal could impact social amenity in a range of ways, some of which have been assessed elsewhere in this REF:

- Noise and vibration (Section 6.2.5)
- Air quality (Section 6.2.6)
- Traffic and access (Section 6.2.8).

Construction

Construction is likely to result in minor direct and indirect impacts on amenity or views from residences. Construction is unlikely to have any significant long-term impacts on the local community. Local residents and other sensitive receivers may experience some minor and temporary disruptions to local road use and access to their properties. Adjacent receivers may be disturbed by activities that generate noise and dust. Visual impacts would be associated with the presence of plant, machinery and construction compounds. Visual amenity would be affected by work sheds and equipment that would remain on-site during construction.

Visual and other amenity impacts at individual locations would occur for a short duration because construction would progress along the main alignments at about 10 to 13 metres per shift. Areas disturbed by construction would be progressively rehabilitated to reduce visual impacts.

The new pumping station would require a stationary construction site. Plant and equipment would be visible at these locations over a longer time period relative to the mains. Potential amenity impacts would be minor as the nearest sensitive receivers are about 20 m from the new pumping


station, on large-semi-rural lots. Construction compounds would be sited using the criteria outlined in Section 6.2.11 to minimise potential impacts on surrounding land use. The compounds would include ancillary facilities such as administration facilities, washrooms, meal rooms, and security fencing. These compounds would be demobilised and the areas rehabilitated once construction is complete. Some construction access roads may be re-used by future developers.

In general, while there would be some negative impacts on the community during construction, potential impacts would be short-term and minimised by implementing the mitigation measures detailed in this REF.

Operation

Once operational, the proposal would have significant social benefits, by enabling housing development in Yallah Marshall Mount.

The water mains and wastewater mains would be below-ground. Above ground assets include:

- ventilation shafts, including one at the pumping station
- ERS at Duck Creek
- some pumping station structures such as:
 - electrical switchroom
 - o chemical dosing building and bund
 - o electrical substation
 - o bypass valves
 - o various fittings and fixtures
 - o hose, eye wash station and bollards.

The proposal would include the installation of ventilation shafts. The ventilation shafts would generally consist of a 300 mm diameter supported pipe, which would be about 8-16 m tall. The final location and height of these ventilation shafts would be confirmed during detailed design but would be in proximity to existing and future residential receivers. Currently views for nearby residents are unrestricted in all directions. Before future development starts, visual impacts of these ventilation shafts may have a moderate impact to nearby residents. Ventilation shafts would be constructed from either matte stainless-steel material or glass fibre reinforced plastics and would remain unpainted. Consultation with affected landowners would be undertaken. Detailed design would consider reducing the scale of ventilation shafts where feasible.

The proposed pumping station would have both underground and aboveground assets installed. Underground assets include wet well/valve chamber, inlet maintenance hole, overflow gas check structure, vent shaft footing, and pipework. As detailed in Section 6.2.2, elements of the pumping station will need to be located a minimum of 300 mm above the one in 100-year flood extent. This would be consistent with the Sewerage Pumping Station Code of Australia, Sydney Water edition (WSA04-2005-2.1) and reduces the potential for flood events to impact on operation of the proposal. Filling of the site will be required to bring the pumping station above the existing ground level. The height of the above ground structures would be up to 16 m (ventilation shaft). This would





increase the visual prominence of the pumping station to current surrounding receivers, as well as future residents in the precinct.

As the Yallah Marshall Mount precinct is planned to be developed for urban purposes, the visual and social context in which the proposal would be operated would differ from that which is present before construction. For example, any above-ground structures would become less prominent so the visual impacts would reduce over time.

Mitigation measures

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

Table 6-26 Environmental mitigation measures — social and visual

Mitigation measures

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 (e.g. retain existing vegetation where possible).

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

Maintain work areas in a clean and tidy condition.

The scale of ventilation shafts, and their final locations, would be confirmed during detailed design and would consider visual impacts on receivers. Consultation with affected landowners would be undertaken, and if required, painting of ventilation shafts in a sympathetic colour would be considered.

Site restoration including roads, verges and vegetation is to be performed in consultation with private property owners and council.

Restoration of excavation within the road verge is to comply with council's standard restoration requirements. Restoration of longitudinal trenching through existing pavement should be in accordance with:

- Heavy Bound Base or 14:1 cement stabilised backfill
- 2 x 50 mm AC14 layers keyed into existing pavement.

Sydney Water would incorporate measures to minimise the visual impact of the pumping station and this would consider the future land use in the immediate vicinity of the pumping station.



6.2.10 Cumulative and future trends

Potential environmental impacts

The proposal is in an area that is subject to ongoing development. Cumulative impacts are likely to be negligible given the small scale of the proposal relative to the overall works planned within the development area and the proposed timeline of the broader development within Yallah Marshall Mount. Construction of residential properties by the developers is not anticipated to begin while construction of this proposal is underway. Regular engagement with developers (such as the meetings summarised in Section 4.2 of this REF) will assist in understanding construction schedules including potential cumulative impacts.

The proposal is in an area that is subject to significant and continued development until the Yallah Marshall Mount precinct is finished. An example of potential significant development is the Illawarra International Health Precinct. It is proposed to be located on the corner of Avondale Road and Huntley Road, about 300 m west of the proposal. 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 delivery 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 water and wastewater infrastructure to ensure there is sufficient capacity to meet the demands of projected population growth.

Mitigation measures

With the implementation of the mitigation measures below, impacts can be adequately managed, and residual impacts are expected to be low/minor. No impacts are anticipated during operation.

Table 6-27 Environmental mitigation measures — cumulative and future trends

Mitigation measures

Sydney Water would continue to consult with the developers in the Yallah Marshall Mount precinct on construction programming and minimise potential impacts on the local community and amenity.

6.2.11 General environmental management

Table 6-28 Environmental mitigation measures — general environmental management

Mitigation measures

Prepare a Construction Environmental Management Plan (CEMP) addressing the requirements of this environmental assessment. The CEMP should identify licence, approval and notification requirements.



Mitigation measures

Before 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
- 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.

Should the proposal change from the EIA, no further environmental assessment is required provided the change:

- remains within the construction corridor for the EIA and has no net additional environmental impact; or
- is outside the construction corridor for the EIA but:
 - o reduces impacts to biodiversity, heritage or human amenity; or
 - o avoids engineering (for example, geological, topographical) constraints; and
 - o after consultation with any potentially affected landowners and relevant agencies.

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

Sydney Water's Project Manager (after consultation with the environmental and community representatives and affected landowners) can approve temporary ancillary construction facilities (such as compounds and access roads), 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 roads
- no impacts to remnant native vegetation or key habitat features
- no disturbance to waterways
- potential environmental impacts can be managed using the mitigation measures in the EIA
- no disturbance of contaminated land or acid sulfate soils
- will be rehabilitated at the end of construction.

The delivery 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.



Mitigation measures

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 (e.g. 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 (e.g. *Protection of the Environment Operations Act 1997*), Sydney Water's employees and contractors will follow <u>SWEMS0009</u>. Attach <u>SWEMS0009</u> to the CEMP.

Complaints to be managed in accordance with Sydney Water's Complaints Procedure and Community Engagement Plan.

Assign single person with accountability for coordinating communication and information flow across contractors and consultants and provide the contact details of this person in the CEMP.



7 Conclusion

Sydney Water has prepared this REF to assess the potential environmental impacts of Yallah Marshall Mount Water and Wastewater Servicing (the proposal). The proposal is required to provide this infrastructure to the precinct to support future development.

During construction, the main potential environmental impacts of the proposal include impacts to ecology, Aboriginal heritage, water quality, soil, and from traffic and noise. During operation, wet weather overflows will comply with existing Environment Protection Licence (EPL), and noise from the pumping station will comply with industry standards.

Given the nature, scale and extent of impacts and implementation of the mitigation measures outlined in this REF, the proposal is unlikely to have a significant impact on the environment. Therefore, an environmental impact statement is not required under Division 5.1 of the EP&A Act.

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



References

BMT WBM Pty Ltd, 2018. Mullet Creek Flood Model Update, April 2018

Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2023. *NationalMap.* Available at: <u>https://nationalmap.gov.au/#share=s-m8hoOm7ffYJB3t4lexCQ56f05HF</u>

Department of Planning, Industry and Environment (DPIE), 2021. *Illawarra Shoalhaven Regional Plan 2041*, May 2021

Douglas Partners, 2022. *Report on Geotechnical Investigation, Proposed Yallah Marshall Mount Package 32*, December 2022

MWH+PB, 2011. West Dapto Water and Wastewater Detailed Planning Wastewater Detailed Planning – Wastewater System Options Report, November 2011. Document reference: 2114469B PR_5503

NSW Environmental Protection Authority (EPA) 2017, *NSW Noise Policy for Industry*, NSW Government Sydney

NSW Environment Protection Authority (EPA) 2020, *Draft Construction Noise Guideline*, NSW Government Sydney

NSW Government, 2023. *Historical Imagery*. Available at: <u>https://portal.spatial.nsw.gov.au/portal/apps/webappviewer/index.html?id=f7c215b873864d44bccd</u> <u>dda8075238cb</u>

Rhelm, 2019. *Duck Creek Flood Study Final Report*, May 2019 (prepared for Wollongong City Council)

Shellharbour City Council, 2022. Shellharbour City Local Strategic Planning Statement

Sydney Water, 2012. Water and wastewater servicing of the West Dapto Urban Release Area and Adjacent Growth Area Environmental Assessment (EA), September 2012

Sydney Water and ENSure JV, 2016. Yallah Marshall Mount and Tallawarra Lands – Detailed Planning and Concept Design – Planning and Scheme Report, April 2016

WMAWater, 2017. *Macquarie Rivulet Flood Study*, February 2017 (prepared for Shellharbour City Council)

Wollongong City Council, 2018. West Dapto Vision 2018

Wollongong City Council, 2020. Wollongong Local Strategic Planning Statement, June 2020

Wollongong City Council, 2021. *Wollongong Development Control Plan 2009 – Chapter D16: West Dapto Release Area*, October 2021

Wollongong City Council, 2024. *Biodiversity Certification Assessment Report and Conservation Strategy – West Dapto Urban Release Area*, April 2024.





Appendices

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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 during construction from noise and traffic, and to soil, water quality, ecology, and Aboriginal heritage. During operation, wet weather overflows will comply with existing Environment Protection Licence (EPL) and noise and odour from the pumping station will comply with industry standards. New above ground structures (e.g. ventilation shaft, pumping station assets) will impact visual amenity during construction. There will be environmental improvements by providing a reliable wastewater and water service to the local community.	
Any transformation of a locality	The proposal will not result in the transformation of a locality.	
Any environmental impact on the ecosystems of the locality	The proposal will result in minor environmental impacts to ecosystems of the locality, including vegetation and waterways. The proposal will lead to environmental improvements by ensuring a reliable wastewater service to collect and treat wastewater, minimising any impacts on the ecosystem. It will also allow for safe drinking water to be provided.	
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality	There will be a minor impact on the aesthetic, recreational, scientific or other environmental quality or value of the locality Above-ground assets at the pumping station, and the ventilati shafts, will be visible during operation.	
Any effect upon a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or any other special value for present or future generations	The proposal will have a minor impact 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. Three non-Aboriginal heritage items may be indirectly impacted by vibration. Five Aboriginal sites will also be partly impacted by the proposal.	
Any impact on the habitat of any protected animals (within the meaning of the <i>Biodiversity Conservation Act 2016</i>)	The proposal will have a minor impact on the habitat of protected animals. Some habitat features will be impacted, with offsets to be implemented.	
Any endangering of any species of animal or plant or other form of life, whether living on land, in water or in the air	The proposal will not be endangering any species of animal, plant or other form of life, whether living on land, in water or in the air.	
Any long-term effects on the environment	The proposal will not have any long-term impacts on the environment but will have a long-term benefit by providing a reliable and modern water and wastewater service for the area.	



Section 171 checklist	REF finding		
Any degradation of the quality of the environment	The proposal will not cause the degradation of the quality of the environment.		
Any risk to the safety of the environment	The proposal will not increase risk to the safety of the environment.		
Any reduction in the range of beneficial uses of the environment	The proposal would partly reduce the range of beneficial us of the environment. The construction corridor, compounds, a access roads would be unavailable for use by others during construction by others. Space available on the road corridor would be reduced while temporary lane closures are in place The new pumping station would be on land that would no lo be able to be used for another purpose (e.g. recreation, residential).		
Any pollution of the environment	Environmental mitigation measures will mitigate the potential the proposal to pollute the environment. The proposal will operate in accordance with EPL 218 during construction and operation.		
Any environmental problems associated with the disposal of waste	Waste disposal will be in accordance with the environmental mitigation measures, and no environmental problems associated with the disposal of waste are expected.		
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply	The proposal will not increase demand on resources, that are, or are likely to become, in short supply.		
Any cumulative environmental effect with other existing or likely future activities	The proposal may have a cumulative environmental impact with other existing or likely future activities (e.g. residential development, hospital construction).		
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	The proposal will not have any impact on coastal processes or hazards, and coastal processes and coastal hazards will not have any impact on the proposal.		
Any applicable local strategic planning statements, regional strategic plans or district strategic plans made under the EP&A Act, Division 3.1	The proposal is to service growth and the applicable strategic planning statements or plans have been considered in the system planning and options selection process.		
Any other relevant environmental factors.	The proposal has been assessed against the factors listed above, and there are no other relevant environmental factors to consider.		



Appendix B – Consideration of TISEPP consultation

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





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Appendix C – Aboriginal Cultural Heritage Assessment Report (ACHAR)

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 written approval has been provided to Sydney Water from <u>DPE's AHIMS Registrar</u>.

For publicly displayed REFs, all Aboriginal heritage information that identifies individual sites must be removed.





Appendix D – Ecological assessment





Appendix E – Noise and vibration assessment





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