Review of Environmental Factors

Badgerys Creek Wastewater Stage 2 (November 2024)

SW 57 02/25

Sydney WATER

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Determination

This Review of Environmental Factors (REF) assesses potential environmental impacts of Badgerys Creek Wastewater Phase 2. 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 are typical construction impacts such as erosion and sedimentation, vegetation removal, noise and dust, emissions, and traffic impacts. The proposal will also impact Aboriginal heritage which will require an Aboriginal Heritage Impact Permit (AHIP) under the *National Parks and Wildlife Act 1974*. During operation the potential impacts will be minor. 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, the proposal does not require an Environmental Impact Statement (EIS) and may proceed.

Certification

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

Prepared by:	Reviewed by:	Endorsed by:	Approved by:
[redacted]			
REF author Sydney Water Date: 19/11/2024	Snr Env Scientist Sydney Water Date: 19/11/2024	Senior Project Manager Sydney Water Date: 19/11/2024	[redacted] A/ Senior Manager Environment and Heritage Sydney Water Date: 25/11/24

1 Executive summary

Sydney Water plans to build the Badgerys Creek Stage 2 Wastewater Network (the proposal), to meet growing demand for servicing in the South West Growth Area.

Construction is expected to start early 2025 and take approximately two years. The proposal will be constructed in private property, Council and TfNSW land.

The proposal is in the suburbs of Badgerys Creek and Kemps Creek, in the local government areas (LGA) of Liverpool City Council (south of Elizabeth Drive) and Penrith City Council (north of Elizabeth Drive). The proposal crosses several development precincts. These include Badgerys Creek, Dwyer Road, Agri-business, Northern Gateway, Aerotropolis Core precinct and Western Sydney Airport precincts.

As part of this REF, several options and refinements to the design and construction methodology were made to minimise environmental impact. This includes the adoption of trenchless construction methods to avoid sensitive locations and disruptions to traffic. The construction footprint, including the location of construction compounds, was also optimised as far as practicable to reduce environmental impacts.

Much of the work area has been previously disturbed by road and utilities construction or cleared for agricultural purposes. The main construction environmental impacts associated with the proposal are construction impacts such as vegetation clearing, soil erosion, impacts to Aboriginal heritage, noise and traffic. A Construction Environmental Management Plan (CEMP) will be prepared by the contractor to mitigate potential environmental impacts during construction. During operation, the main impacts are associated with air quality and visual amenity.

The proposal will provide a reliable wastewater network that facilitates further development of the South West Growth Area and Western Sydney International Airport, aligned with the principles of ecologically sustainable development.

The main components of the proposal being assessed include:

- new wastewater pumping station SP1230
- approximately 10.6 km of gravity carriers
- approximately 1.8 km of pressure mains.

2 Introduction

2.1 Context

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

Sydney Water 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 Badgerys Creek Wastewater Stage 2 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.

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

Aspect	Relevance to proposal
Proposal need	The proposal is part of the Upper South Creek Wastewater program. The proposal is required to provide wastewater services to parts of Badgerys Creek, Dwyer Road, Agri-business, Northern Gateway and Aerotropolis Core precincts as well as the proposed Western Sydney Airport. The new wastewater infrastructure is dependent on the completion of adjacent catchment projects in planning or construction, to service the South West Growth Area (SWGA). All flows from the current proposal will ultimately connect to the Upper South Creek (USC) Advanced Water Recycling Centre (AWRC) and will be operated under the future USC system Environmental Protection Licence (EPL). Until the future USC system EPL is in place, a scheduled development work licence under s47 of the *Protection of the Environment Operations (POEO) Act 1997* will be required for construction of the proposal.
Proposal objectives	The proposal objective is to provide wastewater servicing for the growth expected within the Badgerys Creek catchment as part of the Western Sydney Aerotropolis Growth Area (WSAGA).
Consideration of alternatives/options	An options assessment process informed the design of the proposal. The process identified several alignment options. Sydney Water assessed these options to determine their feasibility and ultimately select the most appropriate option. Options were assessed against their ability to deliver the proposal objectives, technical feasibility, potential environmental impacts and performance, social and community outcomes, and cost. The presented

Aspect	Relevance to proposal
	proposal was selected as the preferred option as it would achieve the proposal objectives with an acceptable level of risk at the least cost.

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 mitigation measures have been designed to reduce scientific uncertainty relating to the proposal. The proposal has been designed to minimise impact to the environment by employing alternative construction methodologies (trenchless installation), minimising vegetation removal, and positioning infrastructure in previously disturbed areas such as road corridors where possible.
Inter-generational equity - *the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.*	The proposal will help to meet the needs of future generations by providing a reliable wastewater service.
Conservation of biological diversity and ecological integrity - *conservation of the biological diversity and ecological integrity should be a fundamental consideration in environmental planning and decision-making processes.*	The proposal will not significantly impact on biological diversity or impact ecological integrity. The proposal has been designed to avoid impacting significant vegetation where possible. Impacts to native vegetation will be offset where required.
Improved valuation, pricing and incentive mechanisms - *environmental factors should be included in the valuation of assets and services, such as 'polluter pays', the users of goods and services should pay prices based on the full life cycle costs (including use of natural resources and ultimate disposal of waste) and environmental goals*	The proposal will provide cost efficient use of resources and provide optimum outcomes for the community and environment.

3 Proposal description

3.1 Proposal details

Table 3-1 describes the proposal and Figure 3-1 shows the location and key environmental constraints.

Table 3-1 Description of proposal

Aspect	Detailed description
Proposal description	The proposal includes: • new wastewater pumping station SP1230 • approximately 10.6 km of gravity carriers • approximately 1.8 km of pressure mains. Associated network infrastructure, including connection mains, will be delivered by developers and will be covered by separate environmental planning approvals.
Location and land ownership	The proposal is located within the SWGA, about 40 km south west of the Sydney CBD in the suburbs of Badgerys Creek and Kemps Creek, in the local government areas (LGAs) of Liverpool City Council (south of Elizabeth Drive) and Penrith City Council (north of Elizabeth Drive). The proposal is located on private property, Council and TfNSW land. SP1230 will be located within Lot 72 DP1277011. A portion of this lot will need to be acquired and an access easement established.
Site establishment and access tracks	Site establishment includes delineating the construction sites, storage and laydown areas, erosion and sediment controls, traffic management and vegetation removal. Site establishment may also include surveys, service location, geotechnical investigations or other investigations required prior to construction. It may also include service relocation where services are identified that may be affected. Access to the alignment and construction sites will generally be via existing roads and along the pipeline construction footprint. Temporary access tracks may be established where necessary. The location of these will be chosen by the contractor, in consultation with the landowner(s) and approved by Sydney Water's Project Manager as described in the mitigation measures in Section 6. Temporary access tracks will be removed at the completion of construction.
Ancillary facilities (compounds)	Construction compound(s) will likely be required to house site sheds, construction amenities and materials laydown. The exact location of these will be chosen by the contractor in consultation with the landowner(s) and approved

Aspect	Detailed description
	by Sydney Water's Project Manager as described in the mitigation measures in Section 6.
Methodology	The construction phase of the proposal will include pressure mains, gravity mains, pumping station including overflow pipes, associated fittings, and vent shafts. The proposal area is shown in Figure 3-1. **Investigation/site establishment** The following activities may be required: • investigative works including geotechnical, contamination and survey • soil sampling and waste classification. • site preparation works including: - establishing temporary compounds - installing erosion and sediment controls - traffic management measures - vegetation trimming/removal. **Pipelines** The wastewater pipelines would be installed underground using a combination of open excavation (trenching) and trenchless construction methods (horizontal directional drilling (HDD), horizontal auger boring (HAB) and microtunnelling). Open trenching will be used in areas that are accessible and have minimal environmental constraints. Trenchless methods will be used for difficult to access locations or environmentally sensitive areas. **Open trench construction** Open trenching construction will generally occur progressively where a section will be trenched, a section of pipe will be installed, and that section will then be backfilled and restored to pre-existing conditions. Installation dimensions will range from about 1 m to about 6.5 m deep and 1.2 m to 2 m wide. Construction by open trenching will involve: • stringing pipe sections along the construction corridor • excavating trenches, stockpiling spoil material beside the trench • benching or shoring up trenches, depending upon trench depths • spreading granular bedding material such as sand or gravel in the trench • installing a section of pipe in the trench • pressure/vacuum testing pipeline

Aspect	Detailed description
	• backfilling trench with compacted bedding material and spoil • restoring disturbed areas and replacing topsoil • reinstating any areas where the road surface has been disturbed in accordance with the requirements of local council. **Trenchless construction** Trenchless techniques such as microtunnelling, HDD and HAB will be used to mitigate environmental impacts and avoid sensitive areas including key fish habitat (KFH), waterways, heritage and biodiversity where specified, and some road crossings. Microtunnelling and HAB will involve the excavation of pits approximately 4 m by 6 m at either end of each trenchless section that serve as launch and receival points for the pipeline. HDD generally involves drilling from the surface. Excavation dimensions of HDD pits may be required and will be 4 m by 10 m. Pipes installed using trenchless techniques would be up to about 16 m deep. For drilling, a potable water source will be fed to the drill rig, which in turn will be fed to the drill head for lubrication. The drilling fluid will make its way back to the launch site of the drill rig progressively. The bore slurry would be pumped into a recycling unit where it would be agitated to remove clay cuttings and separate solids for off-site disposal to appropriately licensed EPA facility. Following the clay removal, the recycled fluid would be re-used and sent back to the bore head for lubrication. This cycle would continue for the duration of the drilling operation. Construction by horizontal directional drilling will involve: • stringing pipe at the receival pit • positioning directional drilling plant at the launch pit • drilling pilot hole from the surface at the launch pit to the receival pit • back reaming of pilot hole from receival pit to launch pit • pulling pipe back from the receival pit to the launch pit • grouting around the pipe • restoration around launch and receival pits. Construction by micro-tunnelling and horizontal auger boring will involve: • excavating launch and receival pits to the depth of the pipeline at either end of the microtunnelling sections (within the construction footprint) • shoring up pits using sheeting and bracing structures • lowering the drilling plant into the launch pit • lowering sections of pipe into the launch pit

Aspect	Detailed description
	• using the plant to push the cutting head, followed by the sections of pipe, to the receival pit • managing waste generated from soil displacement • reinstating road pavement, road verge and vegetation where required. There will be vent shafts, maintenance holes, scour pits and air valves at various locations along the alignment. The construction area is anticipated to be up to 5 m x 5 m for ancillary structures and will be within the construction footprint of pits; all being located within the 50 m construction corridor. Vent shafts will be about DN300 and will allow ventilation of odours form the mains into the atmosphere at an indicative height of 18 metres and maximum spacing of 400 m, subject to confirmation during detailed design. **Pumping station construction** One pumping station is proposed. Required excavations for construction are anticipated to be up to about 20 m below ground surface level. Construction of the pumping station will include emergency storage, odour control unit (OCU) and chemical dosing unit (CDU). An above ground electrical kiosk and switch room building are also proposed. SP1230 will consist of an in ground wet well, valve chamber and inlet maintenance hole. Construction of the pumping station will include: • installation of site boundary fencing and gates • installation of the pumps and equipment • bulk earthworks to establish required levels • piling and shoring works, dependant on excavation depths • installing emergency overflow pipelines, with headwall configuration using open trenching techniques • deep excavation works for the pumping station sub-structure • deep pipework installation via trenchless methods • installation of concrete structures including inlet maintenance hole, wet well, EST and valve chamber • backfill and installation of shallow pipework and discharge maintenance hole • installation of slab foundations for the OCU, switch room and substation and associated services • building and mechanical fit out works

Aspect	Detailed description
	• permanent power supply works • site electrical works • access road, hardstand and ancillary works • site restoration and landscaping • testing and commissioning of the station. Construction of the proposal will involve vegetation clearing and excavation. The areas to be disturbed will include a construction corridor for trenched areas, including overflow pipelines, pits for trenchless sections, establishing construction compounds, and the pumping station site. Cleared material will be temporarily stored within the construction footprint and removed from the site if not suitable for reuse during restoration. The excavated material will generally be stockpiled adjacent to excavations and used as backfill. Topsoil will be stockpiled separately and then placed on top of backfilled sub soil.
Commissioning	Commissioning involves testing and running the new equipment to ensure it works correctly and is integrated with existing plant operations. The exact commissioning steps depend on the type of the equipment, but typically include: • testing utilities, telemetry and switchboards • inspection and performance testing of equipment, pipes, pumps and fittings • testing of any emergency systems in place.
Restoration	Non-operational areas of the work site will be restored to the pre-existing condition following construction in consultation with landowners. The Construction Environmental Management Plan (CEMP) will detail site restoration works to be undertaken once construction works are finished. Native vegetation removal will be replaced in consultation with Council and offset in accordance with the Sydney Water Biodiversity Offset Guideline. Any required revegetation will be carried out in accordance with Sydney Water procedure *SWEMS0025.11 Guideline for native revegetation following construction*. Site restoration activities would include: • backfilling of trenches • dismantling compounds, removal and disposal of waste material and removing construction signage • restoring ground cover and vegetation • restoration of road pavement surfaces and drainage

Aspect	Detailed description
	• removing erosion and sediment control, fencing and traffic management measures.
Materials/ equipment	**Materials** Typical materials likely to be used include but are not limited to: • Polyethylene (PE) pipe for the pressure pipelines • GRP pipe for the gravity pipelines • pumps and other equipment • building materials, steel and timber • fuel for minor plant and equipment • topsoil, bitumen and concrete • valves and other fixtures • concrete for encasement • granular materials • reused excavated material for pipe trench fill. **Equipment** Typical equipment likely to be used includes but is not limited to: • excavators • rock breakers / jackhammers • compactors • padfoot roller / vibration roller • slurry extractor • concrete truck and pump • concrete saws • drill rig • microtunneling / HDD equipment • horizontal auger • backhoe • tipper trucks • bogie / truck and dog • light and heavy vehicles

Aspect	Detailed description
	• street sweeper • water truck • cranes • generators • air compressors • skip bins • dump trucks • portable pumps and sediment tank • welding equipment and power • tools (various) • confined spaces safety equipment (eg gantry/davit) • site facilities and amenities • storage containers. Construction of the proposal will involve excavation, and while excavated material will generally be used as backfill, it is likely that there will be excess materials, including material generated from trenchless construction. The management of this and other waste material generated by construction is discussed in Section 6.
Work hours	Work and deliveries will be scheduled to occur during standard daytime hours of: • 7 am to 6 pm, Monday to Friday • 8 am to 1 pm, Saturdays. The proposal is expected to require work outside these hours, for safety and/or to reduce impacts to traffic during work in roads or delivery of oversize equipment. This has been assessed and mitigation measures are provided in Section 6.
Proposal timing	Construction is expected to start early 2025 and take about 24 months.
Operational requirements	Sewage treatment is a scheduled activity. The proposal will convey wastewater to the USC AWRC and will be operated under the future system EPL. Until the system EPL is established a scheduled development work licence will be required for construction of the proposal. Once operational, proposed pumping station will operate largely without the need for permanent presence at the site. The proposal will be subject to

Aspect	Detailed description
	standard and routine maintenance activities such as inspections, testing and repairs as necessary.

Figure 3-1 Location of proposal, CPCP and Key Fish Habitat mapping

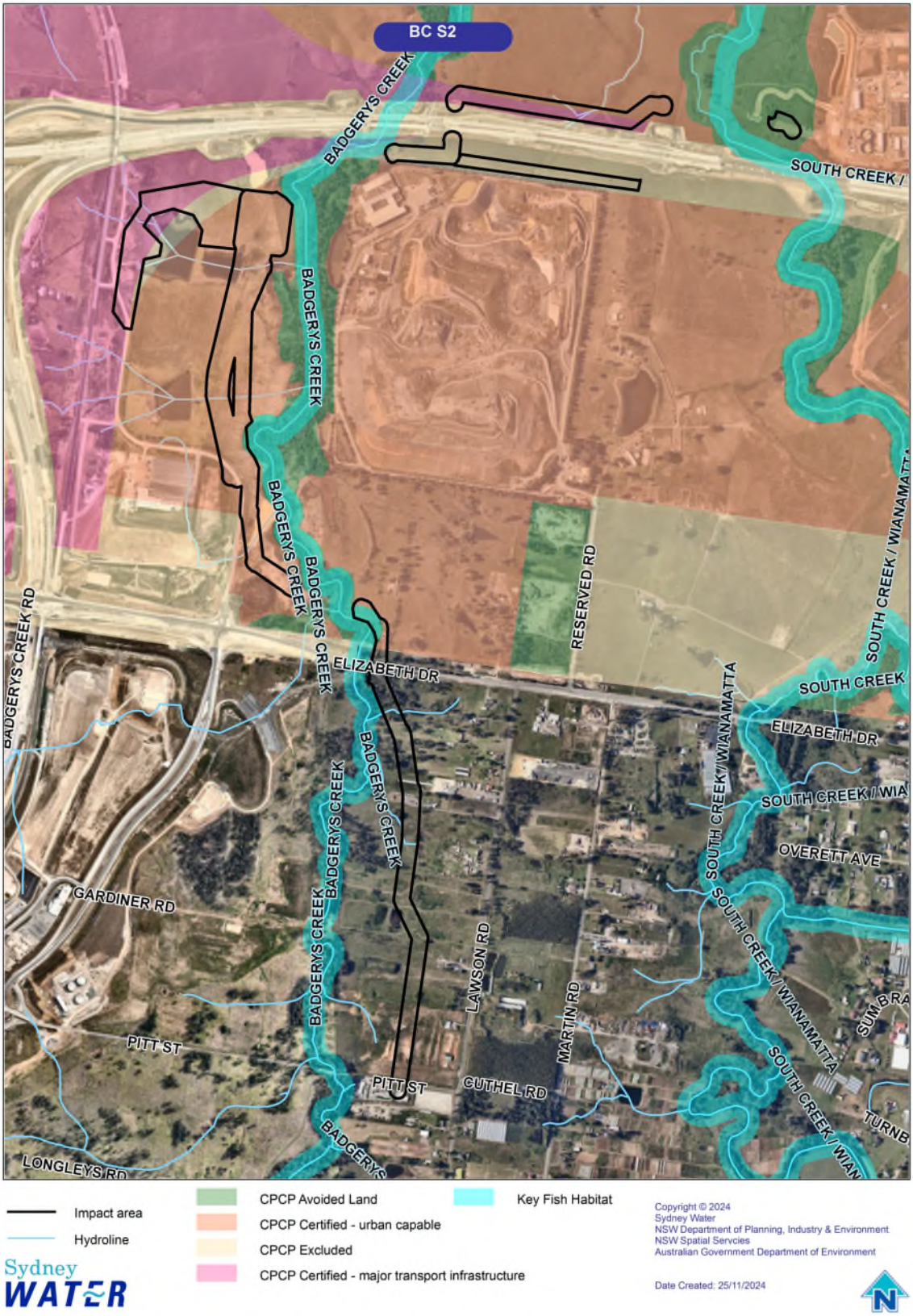


Figure 3-2 Location of proposal and potential key ecological constraints (mapped vegetation data)

Figure 3-3 Location of proposal and key heritage constraints

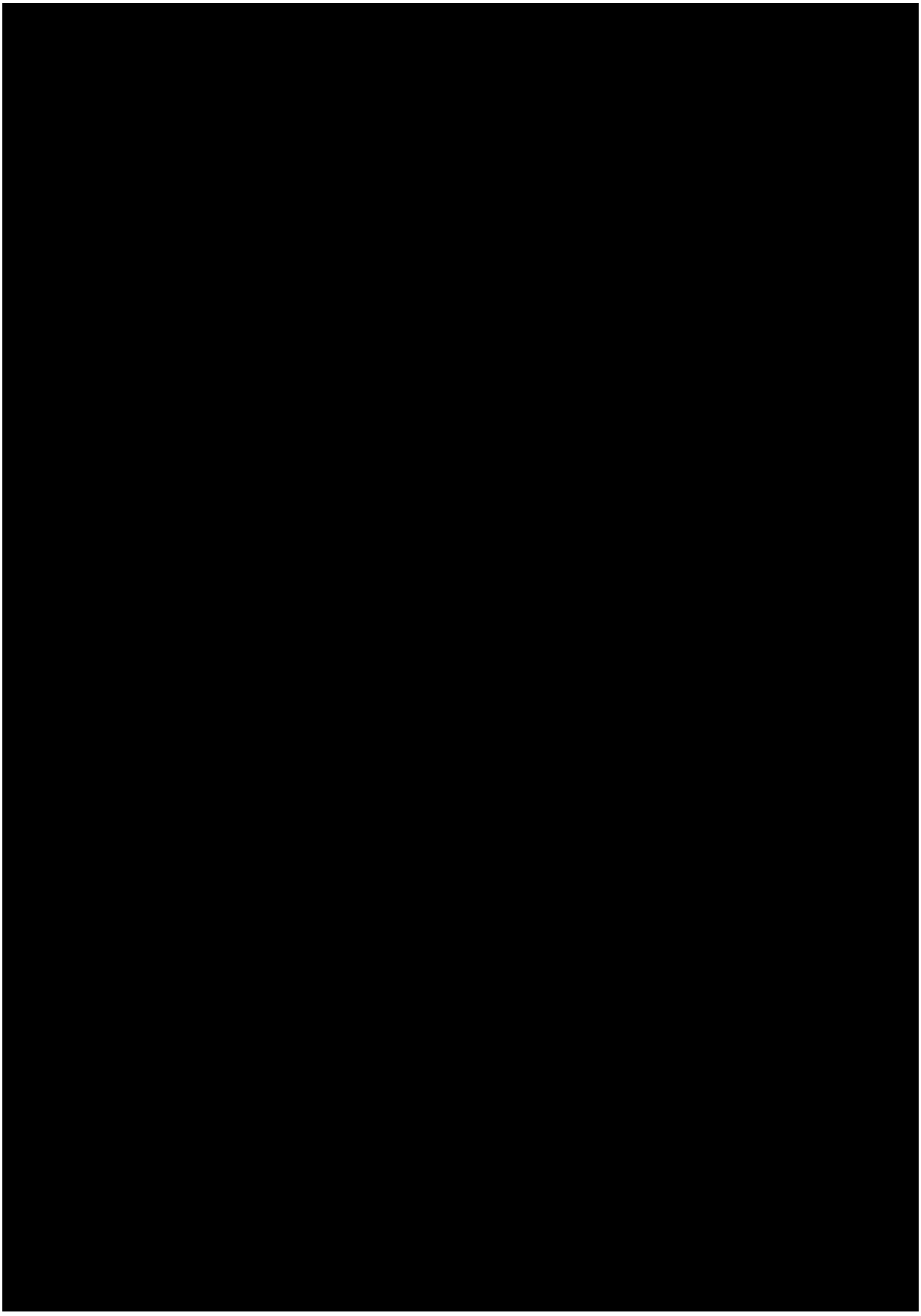


Figure 3-4 Fleurs Radio Telescope Relic No-Go zones

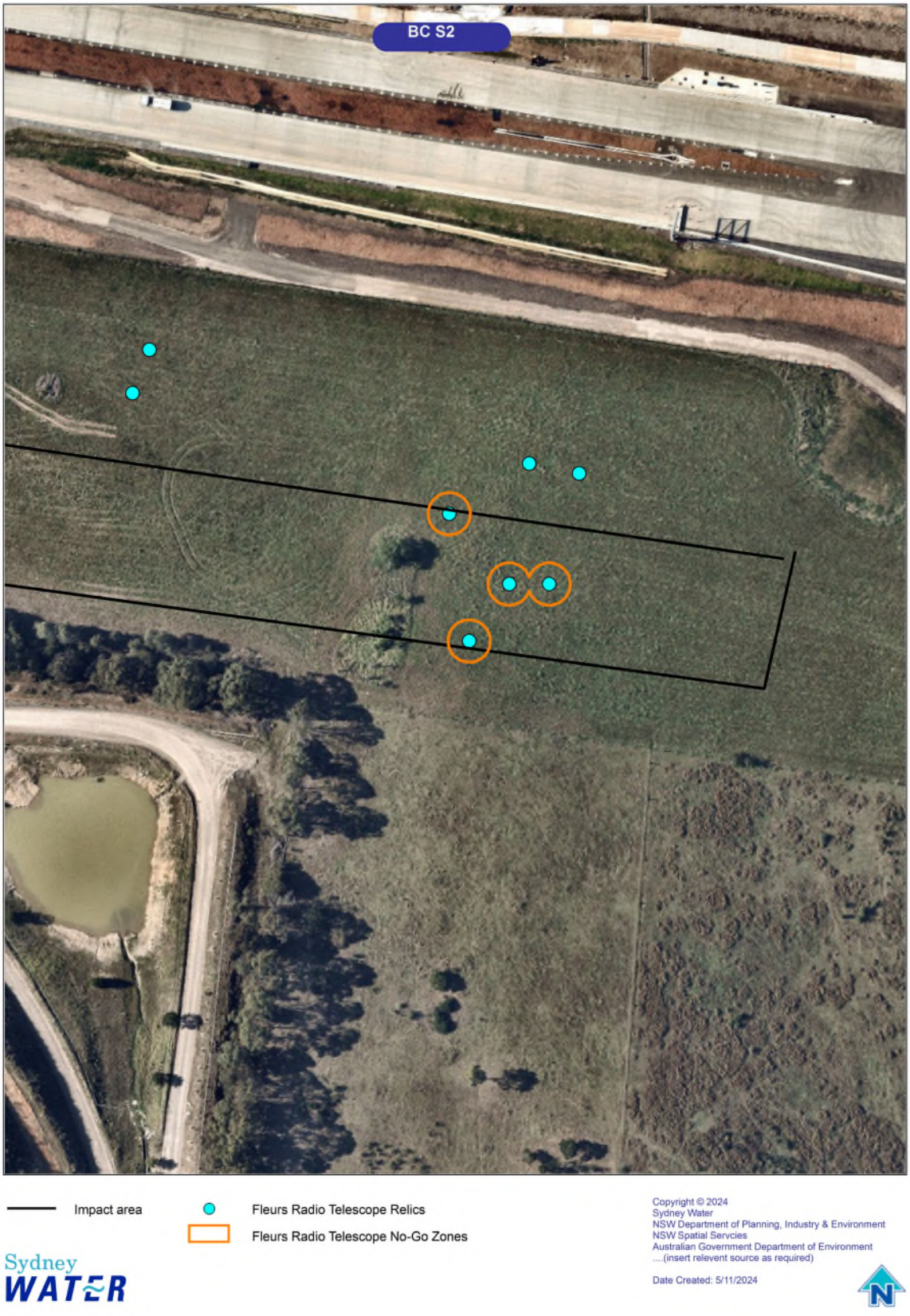


Figure 3-5 Avoided Land (HBV mapping), ENV and Certified land mapping within proposal area

3.2 Impact area and changes to the scope of work

The assessed impact area comprises a 25 m buffer around pipeline alignments (50 m corridor) and the footprint for the pumping station. The impact area also includes new access roads and launch/receival pits of about 50 m by 50 m for trenchless sections. The final alignment, including the construction footprint and precise location of pits, may change based on further design or construction planning.

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

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

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

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

4 Consultation

4.1 Community and stakeholder consultation

Our approach to community and stakeholder consultation is guided by 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, Sydney Water 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.

Sydney Water will also provide local councils with reasonable notice when the works will commence. Local council(s) will be consulted about matters identified in environmental planning instruments (refer Section 4.2 below). This includes public safety issues, temporary works on council land, and full or partial road closures of council managed roads.

Sydney Water has consulted with a range of stakeholders regarding the proposal, these include:

- briefings with Government and Regulatory entities: Local Councils, Department of Primary Industries and Regional Development (DPIRD), Western Parkland City Authority (WPCA) and Local Aboriginal Land Councils
- regular discussions with developers and landowners directly impacted by the proposal
- working with landowners to facilitate access for site investigations
- ongoing phone and emails between Sydney Water and landowners
- landowner meetings and discussions with landowners impacted by partial acquisition for the pumping station location.

Further consultation will be undertaken with council and property owners regarding construction activities, access and easements required for the proposal. The broader community will also be informed of the proposed infrastructure and construction activities.

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 proposal involves underboring within Key Fish Habitat beneath Badgerys Creek and Wianamatta South Creek. DPIRD Fisheries were notified under s.199 of the *Fisheries Management Act (1994)* on 6 September 2024 regarding the proposal as the proposed underboring meets the definition of dredging under the Act. DPIRD responded on 3 October and have no objections to the proposed works, provided Sydney Water follow their suggested environmental mitigation measures (refer to Section 6 and Appendix B).

Sydney Water has consulted with the Western Parkland City Authority on 6 September 2024 as the proposal has a capital investment value of over $30 million and is in the Western City operational area. No response was received.

Sydney Water's Wastewater and Environment (WW&E) Custodians and Major Projects team consulted with the EPA regarding the USC AWRC and network EPL requirements under the *Protection of the Environment Operations Act 1997*. The EPA confirmed that a scheduled development work licence will be required for construction of any network, where the works are not connecting to an existing licenced system. This REF must be provided to the EPA as part of the scheduled developed work licence application. EPL requirements are further discussed in Section 6.2.2.

5 Legislative requirements

5.1 Strategic context

5.1.1 Greater Sydney Region Plan

The Greater Sydney Region Plan – A Metropolis of Three Cities (Greater Sydney Commission, 2018) is a long-term strategic plan for the Greater Sydney area. The plan focuses on developing a more liveable, productive, and sustainable city by dividing the metropolitan area into three interconnected cities: the Western Parkland City, the Central River City, and the Eastern Harbour City.

The Plan sets a 40-year vision (to 2056) and establishes a 20-year plan to manage population growth and change for Greater Sydney in the context of social, economic and environmental matters. It aims to create new jobs, provide more housing choices, improve transport connectivity, and enhance the natural and built environment. The Plan is structured around the following key strategies:

- infrastructure and collaboration – including investing in water and wastewater infrastructure
- liveability
- productivity
- sustainability.

The proposal directly supports the first key strategy area by State government investment through Sydney Water's delivery of critical wastewater infrastructure in future growth areas. It also supports the other key strategies by improving and expanding wastewater servicing to enhance liveability for current and future populations, enables development and greater productivity opportunities, and improves sustainability of the region by connecting existing wastewater infrastructure to an integrated water cycle. Specifically, the proposal is located within the Western Parkland City which is discussed further below.

5.1.2 Enabling development, home and job growth in the Western Parkland City

Greater Sydney's population is forecast to reach eight million people over the next 40 years, and about half of those people are expected to be living west of Parramatta. Much of this growth will occur in the Western Parkland City, driven by the new Western Sydney International Airport.

Over the coming years, the region is set to become the economic powerhouse of Greater Sydney. This area will need commercial and industrial developments to host the businesses, residential areas to house the workforce and infrastructure to service their access and utility needs.

The NSW Government's vision for the Western Parkland City is focused on creating jobs, a highly skilled workforce and an innovation economy. However, it also seeks to support a landscape-led approach to new urban communities that will create quality places for the community, keep water resources in the catchment to protect the local climate from heat island effects, value Aboriginal

and non-Aboriginal heritage and support the emerging circular economy. Development of the Western Parkland City presents a significant opportunity to maximise productivity, liveability and sustainability.

In the Western Parkland City, the Western Sydney Aerotropolis Growth Area (WSAGA) and SWGA are expected to be home to up to 650,000 people by 2056. Most of the WSAGA and SWGA are not serviced by Sydney Water and use on-site systems such as septic tanks. The proposed new urban communities require water and wastewater services to be established to support the anticipated population growth and economic productivity, and to provide equitable servicing across Sydney's metropolitan areas.

New water and wastewater services also bring considerable opportunity to maintain treated water in the local context, enhance the quality of public spaces, the health of the community and environment, and be a focal point for a new circular economy.

In developing a new wastewater service for the region, the proposal is focused on achieving the best outcome for Western Sydney, and therefore for Greater Sydney more broadly. The proposal will enable growth and development of the region and offer wastewater services that our customers expect.

5.1.3 Greater Sydney Water Strategy

The NSW Government developed the Greater Sydney Water Strategy (DPE, 2022b), which establishes a direction for delivering sustainable and resilient water services to Greater Sydney for the next 20 to 40 years. The strategy sets out priorities and actions for the delivery of water infrastructure into the future to support a sustainable, liveable and productive Greater Sydney.

The Strategy recognises that wastewater management plays a crucial role in achieving a variety of outcomes for the region. Not only does it protect public and environmental health, and help keep our waterways healthy, but it also contains valuable resources that have previously gone unused. Only about 7% of wastewater in Greater Sydney is recycled. Most wastewater is directed to treatment plants and then discharged to the ocean. As Greater Sydney continues to become denser and extend into new areas of growth, the reuse and recycling of wastewater will be essential to support a more productive and sustainable region.

Sydney Water's AWRC will contribute to improving wastewater management and resource recovery from wastewater in Greater Sydney. The AWRC will recover high-quality treated water for environmental flows to waterways, organic material known as biosolids for use as an alternative to chemical fertilisers in farming and gardening, use industry-leading technology to harness renewable energy from co-generation processes, and enable other sustainable practices.

The proposal will enable the wastewater collected in the surrounding area to be directed to the AWRC where treatment and resource recovery can take place through an integrated water cycle process.

5.1.4 Local Strategic Planning Statements

The proposal is located within the local government areas of Liverpool City Council and Penrith City Council. Both councils have prepared a Local Strategic Planning Statement (LSPS) in

accordance with section 3.9 of the EP&A Act. The LSPS guides land use planning in the LGA, taking into consideration economic, social, and environmental factors.

Each LSPS outlines a vision for the future of land use for their respective local government area, focusing on sustainability, liveability, and growth. The statements identify key directions, such as promoting sustainable development, enhancing community infrastructure, supporting economic development, and preserving the natural environment. The plans aim to provide a framework for future development and guide decision-making to ensure continued growth and prosperity while preserving the area's unique character and natural assets.

Penrith LSPS acknowledges the significant role Sydney Water has to ensure that the growth areas within the LGA can be adequately serviced. It also notes that some of the growth areas, such as the Western Sydney Aerotropolis, currently either lack the water-related infrastructure to cater for growth or are limited in their ability to provide additional capacity. Sydney Water is planning water and wastewater infrastructure throughout the region and is delivering critical assets to support the wider network that will service areas of growth. This includes the AWRC and the proposal that will unlock the potential to service a substantially greater population in Western Sydney.

Liverpool LSPS contains a number of planning priorities that relate to infrastructure and aligning with growth while being sustainable and protecting the natural environment. In particular, planning priority 15 aims for Liverpool to be a green, resilient and water-sensitive city. The proposal will support this priority, by providing a means for wastewater from the surrounding area to be transferred to the AWRC. The wastewater will then be treated to a high-quality that will be suitable for reuse in a range of applications.

Additionally, given the majority of the proposal will be located below ground, it is unlikely to affect a council's ability to implement any potential future land use plans.

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. This proposal has been assessed under Division 5.1 of the EP&A Act. This REF has concluded that the proposal is unlikely to have a significant impact on the environment.

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.

Table 5-1 Environmental planning instruments relevant to the proposal

Environmental Planning Instrument	Relevance to proposal
State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP)	Section 2.126(6) of the TISEPP permits development by or on behalf of a public authority for sewage reticulation systems without consent on any land in the *prescribed circumstances*.

Environmental Planning Instrument	Relevance to proposal
	As Sydney Water is a public authority, the proposal is permissible without consent.
State Environmental Planning Policy (Precincts—Western Parkland City) 2021 (Western Parkland City SEPP)	The proposal is located on land zoned Environment and Recreation (ENZ), Enterprise (ENT) and Infrastructure (SP2). The proposal is located within the LGAs of Liverpool City Council and Penrith City Council, however the land is zoned under SEPP (Precincts – Western Parkland City) 2021. **Sydney region growth centres (Chapter 3)** The Western Parkland City SEPP coordinates the release of land for residential, employment and other urban development, in the Western Parkland City area. Chapter 3 applies to growth centres, including the SWGA. The southern portion of the proposal (south of Elizabeth Drive) is located within the SWGA and is subject to the conditions of the Biodiversity Certification Order (BCO) of the former *State Environmental Planning Policy (Sydney Region Growth Centres) 2006.* The BCO establishes certified areas in which proponents of developments do not need to undertake assessment of impacts on threatened ecological communities, species and populations, or their habitats that would normally be required by the *Environmental Planning and Assessment Act 1979.* The BCO also identifies non-certified areas where impacts to existing native vegetation (ENV) (as defined in the BCO) must be assessed and offset in accordance with the BCO. The proposal will avoid impacts to ENV in non-certified land. **Western Sydney Aerotropolis (Chapter 4)** The proposal is located within land to which Chapter 4 of this SEPP applies. The proposal is located on land zoned as Environment and Recreation (ENZ), Infrastructure (SP2) and Enterprise (ENT). As per Subsection 4.5, the provisions of the TISEPP still apply as the proposal does not meet the exceptions noted in that clause. Therefore, the proposal can be undertaken without development consent.
State Environmental Planning Policy (Biodiversity and Conservation) 2021 (BCSEPP)	**Vegetation in non-rural areas (Chapter 2)** The proposal is in an area or zone listed in subsection 2.3(1). However, subsection 2.4(1) states: '*This Policy does not affect the provisions of any other SEPP….*', and as the

Environmental Planning Instrument	Relevance to proposal
	works are permissible under the TISEPP, a council permit to clear vegetation under this SEPP is not required. **Koala habitat protection 2021 (Chapter 4)** Chapter 4 of this SEPP applies to the local government area of Liverpool, however subsection 4.4(3) provides that the Chapter does not apply to land on which biodiversity certification is in force. As the proposal within the Liverpool local government area is on land to which a biodiversity certification is in force, this Chapter does not apply. **Water catchments (Chapter 6)** Chapter 6 of this SEPP applies as the proposal is within the Hawkesbury-Nepean Catchment, a regulated catchment area. Section 6 of this REF assessed potential environmental impacts on water quality and quantity, aquatic ecology, flooding, access, cultural heritage, flora and fauna, and scenic quality. The assessment confirmed that potential impacts are minimal and meet the requirements of part 6.2 of the SEPP. **Strategic conservation planning (Chapter 13)** The works are within the Cumberland Plain Conservation Plan (CPCP) area which includes land mapped as certified – urban capable, excluded and avoided land. Chapter 13 of this SEPP sets out planning controls to achieve the development and biodiversity outcomes of the CPCP released by the DPE in August 2022. The CPCP establishes several land categories to which certain planning controls are applied: • avoided land • certified-urban capable land • land in a strategic conservation area. Any parts of the proposal on avoided land must follow the notification and reporting requirements in section 201A of the Environmental Planning and Assessment Amendment (Avoided Land) Regulation 2022. This proposal includes works on avoided land however it will not impact any native vegetation within avoided land. Sydney Water notified DPHI on 22 November 2024 of the proposed works within avoided land. Sydney Water has taken into consideration

Environmental Planning Instrument	Relevance to proposal
	the requirements of this Chapter. Refer to Section 6.2.3 of this REF.
Cumberland Plain Conservation Plan Guidelines for Infrastructure Development 2022 (CPCP)	The proposal is located on land classified under the CPCP as: • certified – urban capable land • excluded land • certified – major transport corridor • avoided land. The proposal has been designed to avoid native vegetation impacts on avoided land and meets the objectives listed in Section 2.3 and Section 3.3 of the CPCP, so no restrictions apply to these activities.

Table 5-2 Consideration of key environmental legislation

Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
Protection of the Environment Operations Act 1997 (POEO Act)	Sewage treatment is a scheduled activity under the Act. The proposal involves construction of part of a new sewage treatment system which will convey wastewater to the AWRC and will be operated under a future sewage treatment system EPL. Until the system EPL is established, or an existing EPL is in place, a scheduled development work licence will be required for construction of the proposal.	Scheduled Development Work (s47 licence) System EPL (s48 licence)	Pre-construction, Contractor Pre-operation, Sydney Water
Biodiversity Conservation Act 2016 (BC Act)	The BC Act lists threatened species, populations and ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats. If any of these could be impacted by the proposal, an assessment of significance 'Test of Significance' (ToS) that addresses the requirements of section 7.3 of the BC Act must be completed to determine the significance of the impact. The certification of land is governed by Part 8 of this Act. Section 8.4(5) states that a determining authority under Part 5 of the EP&A Act is not required to consider the effect on biodiversity of an	REF (and consent from Minister if needed)	Pre-construction, Sydney Water

Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
	activity, to the extent that it is carried out on biodiversity certified land.		
National Parks and Wildlife Act 1974 (NPW Act)	This Act provides for the establishment, preservation, and management of areas such as national parks, state conservation areas, nature reserves, and Aboriginal areas. This Act also provides for the protection of Aboriginal heritage, including Aboriginal objects and places. The proposal in not within National Parks, State Conservation areas or nature reserves. An Aboriginal Heritage Impact Permit is required for the works as they will disturb known areas of Aboriginal heritage. Aboriginal heritage is described in Section 6.2.4.	AHIP	Post REF, pre-construction, Sydney Water (for AHIP)
Heritage Act 1977	The *Heritage Act 1977* provides protection for those items of environmental heritage (historic-period) that are of value to the state of New South Wales.	s.139(4) REF	Pre-construction, Sydney Water
Fisheries Management Act 1994 (FM Act)	The FM Act protects threatened species, populations and communities of fish and marine vegetation, commercial and recreational fishing areas, in NSW waters. A permit and/or notification is required under Part 7 of the FM Act for activities that involve dredging and reclamation work, temporarily or permanently obstructing fish passages and or harming marine vegetation. The proposal will require dredging of Key Fish Habitat. Under s.199 of the FM Act a public authority can carry out dredging or reclamation work without a permit provided that: • the Minister is given written notice of the proposed work • consider any matters concerning the proposed work that are raised by the Minister within 21 days after the giving of the notice (or such other period as is agreed between the Minister and the public authority) In accordance with s.199 of the FM Act, the proposal was referred to DPIRD Fisheries for	Notification	Pre-construction, Sydney Water

Legislation	Relevance to proposal	Permit or approval	Timing and responsibility
	comment 6 September 2024. DPIRD Fisheries responded on 3 October 2024 with consultation advice, including mitigation measures that have been included in this REF.		
Water Act 1912/ Water Management Act 2000	Under section 91B of the WM Act, Sydney Water is required to obtain a Water Supply Work Approval (WSWA) for the temporary dewatering of groundwater. In addition, a Water Access Licence (WAL) (section 60A) would be required if more than three megalitres (ML) of groundwater is likely to be extracted, in accordance with Schedule 4 of the Water Management (General) Regulation 2018. If a WAL is required, water shares must be secured prior to works commencing. A groundwater assessment for the proposal was completed and confirmed dewatering of approximately 1.9 ML of groundwater will be required. A WSWA will be obtained prior to commencement of any groundwater dewatering.	WSWA (for <3ML)	Pre-construction, Sydney Water
Roads Act 1993	This Act regulates works in, on, or over a public road. Approval under Section 138 of this Act is required for carrying out works in, digging up, or disturbing a public road. Much of the alignment passing through open fields or proposes trenchless construction methods. A Road Occupancy Licence (ROL) would be required from the relevant road authority prior to work on public roads and any temporary road closures during construction of the proposal.	Road Occupancy Licence	Pre-construction, contractor
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act provides the framework for Commonwealth environmental approvals. This REF finds that the proposal is unlikely to have a significant impact on any matters of national environmental significance.	Not applicable	Not applicable

6 Environmental assessment

Section 0 describes the existing environment and assesses direct and indirect impacts of construction and operation. It also identifies mitigation measures to minimise impacts. These will be incorporated into contract documents and a Construction Environmental Management Plan prior to starting work.

6.1 Existing environment

The proposal is in the suburbs of Badgerys Creek and Kemps Creek, in the local government areas (LGA) of Liverpool City Council (south of Elizabeth Drive) and Penrith City Council (north of Elizabeth Drive). The Badgerys Creek Stage 2 catchment crosses several development precincts including, Badgerys Creek and Northern Gateway.

The proposed wastewater infrastructure generally runs through rural, vegetated and/or agricultural lots, avoiding environmentally sensitive areas and minimising impacts to private property. Existing land use is mostly rural/agricultural and extensive past clearing of native vegetation and intensive grazing by cattle is evident across the landscape. Environmentally sensitive areas include Badgerys Creek and associated riparian areas. Much of the remnant native vegetation tends to be along the waterway and mainly consists of threatened ecological communities.

Aboriginal heritage sites are found throughout south western Sydney, particularly around waterways and impacts will require an Aboriginal Heritage Impact Permit (AHIP). Non-Aboriginal heritage items are also listed in the vicinity of the proposal but will not be directly affected by the work as construction methods and asset designs which are sympathetic to heritage values (eg trenchless techniques, alignment adjustments) have been adopted.

The environmental features within and adjacent to the study area are detailed in Section 6.2.

6.2 Environmental aspects, impacts and mitigation measures

6.2.1 Topography, geology and soils

Existing environment and potential impacts

The proposal will require ground disturbance, removal of vegetation and stockpiling of soil which could result in potential offsite erosion and sedimentation to surrounding land and waterways.

Construction of batters to raise the structure of SP1230 above the current flood level may cause permanent but localised changes to the surface topography and drainage patterns of the area. The rest of the proposal area will be returned to its original topography and drainage pattern following construction.

Trench dimensions will be about 6.5 m deep and 2.0 m wide. The maximum trenchless depth is expected to be about 16 m. The dimensions of the launch and retrieval pits are typically around 6

m deep by 3 m wide and 3 m in length. Deep excavation is required to construct the pumping station. The wet well would be about 20 m deep and 8 m in diameter.

Construction activities would be staged to minimise the extent of soil disturbance at any given time and disturbed areas would be stabilised and reinstated as soon as practical. Stringent erosion and sediment controls would be implemented to prevent the migration of sedimentation downstream of the work site, especially where excavating in proximity to creek lines and their tributaries.

All excavation works associated with the proposal will occur in areas with moderate to high potential for salinity. Disturbance of saline soils has the potential to impact the local environment if not managed appropriately. The erosion and transfer of saline sediments offsite has the potential to alter the water quality of receiving environments which in turn has the potential to impact upon flora and fauna that are sensitive to elevated levels of salinity.

Implementation of the safeguards and mitigation measures outlined in the following section would ensure that impacts associated with improper management or re-use of excavated soils are avoided during construction and impacts from salinity are considered unlikely.

The works are not proposed to cause major permanent change the surface topography and drainage patterns of the area. With the exception of SP1230, the area will be returned to its original topography and drainage pattern following construction. No topography, geology or soil impacts are anticipated during operation.

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, 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. These are to be maintained in good working order for the duration of the works and subsequently until the site has been stabilized and the risk of erosion and sediment movement from the site is minimal.
Minimise ground disturbance and stabilise disturbed areas progressively.

Mitigation measures
Contractor to ensure imported material is certified for intended use and is free from contamination including asbestos.
Stop work in the immediate vicinity of suspected contamination. Indicators of contamination include discoloured soil, anthropogenic fill material, asbestos, strong 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. Sydney Water Project Manager to contact Contamination and Hazardous Materials Team for advice regarding management options.
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.
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: • (if relevant) treat existing salinity with gypsum • (if relevant) establish salt tolerant species in existing or potential salinity problem areas after construction • 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.
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.

6.2.2 Water and drainage

Existing environment and potential impacts

Groundwater

Regional groundwater flow direction is expected to be consistent with the topography, moving towards Badgerys Creek or Wianamatta South Creek. Badgerys Creek is a designated high potential terrestrial groundwater dependent ecosystem (GDE) and Wianamatta South Creek is a designated high potential aquatic groundwater dependent ecosystem. Terrestrial GDEs (patches of

remnant vegetation) are present within the study area. There are no recognised subterranean ecosystems present within the study area.

Impacts associated with dewatering excavations, such as aquifer supply loss or issues associated with the management of silt-laden construction water, would be temporary and manageable with standard safeguards. During construction, groundwater is expected to be encountered between 1.7 – 6.6 m bgl along the gravity carrier, between 5.8 – 6.6 m bgl along the pressure main and between 6.3 – 6.6 m bgl at the pumping station based on the 2023 Badgerys Creek Catchment Wastewater Network Dewatering Assessment (Sydney Water, 2023).

A groundwater assessment for the proposal was completed and confirmed dewatering of approximately 1.9 ML of groundwater will be required. A Water Supply Work Approval is required for all activities that involve dewatering of groundwater. The volume of dewatered groundwater would be monitored across the proposal area.

The proposed work is in an area that contains terrestrial GDEs. As the proposed work only involves minor vegetation clearing and dewatering of groundwater will be minimised by using trenchless techniques, the viability of these ecosystems is not considered to be at risk such that the water-table of groundwater on which they depend will be altered.

Construction impacts

The project area runs adjacent to and beneath Badgerys Creek and Wianamatta South Creek, which are part of the Hawkesbury-Nepean catchment area and both are Key Fish Habitat. The pipeline alignment also runs adjacent to and intersects with several unnamed ponds.

Poor site management may lead to potential sedimentation impacts to local waterways. Creek crossings will be completed using trenchless methods to minimise impacts to water quality and avoid surface water impacts adjacent to and within waterways. Trenchless methods beneath waterways have potential to result in frac outs. Geotechnical investigations have been undertaken to understand the potential for frac outs and the proposal has been designed to avoid them.

The proposal requires disturbance of groundcover, excavation of soils, and the establishment of temporary soil stockpiles. These activities increase the risk of sediment-laden runoff which has the potential to enter waterways and cause turbidity and additional sedimentation. This can result in decreased light levels for submerged aquatic vegetation and smothering of benthic organisms.

Flood maps for Badgerys Creek and Wianamatta South Creek from publicly available flood studies from Liverpool City Council and Penrith City Council show that the proposal is mostly bordering with and partially within the extent of a 1:100 ARI (1% AEP) flood. The eastern side of SP1230 is located partially within the 1% AEP, as such earthworks and construction of batters are proposed to elevate SP1230. The proposal and is not likely to adversely affect flood behaviour as the only permanent changes to surface topography and drainage patterns will be the pump station and pump station access road. The pump station and access road have been designed to maintain existing drainage patterns.

During periods of high rainfall, there is the risk that higher water levels in the creeks and surrounding flooding may impact on construction. Flooding has the potential to increase soil erosion and siltation from the construction site. Pollutants such as sediment, soil nutrients,

construction waste, chemicals and gross pollutants have the potential to enter drainage lines and creek systems, particularly during high rain events, which potentially could result in a decline of water quality.

Spillage of fuel during refueling, leakage of hydraulic, lubricating oil from plant and equipment, rinse water from plant washing or concrete slurries would all have the potential to enter drainage lines. This could potentially result in a decline of water quality. Control of construction water run-off is therefore necessary to avoid these potential impacts to surrounding waterways.

Operational impacts

Potential impacts to the hydrology of the study area during operation of the proposal may arise from:

- discharge of wastewater during commissioning activities
- repairs to wastewater pipelines and pumping station, which may involve excavation to access the pipeline.

Repairs to wastewater infrastructure are anticipated to occur infrequently.

Regarding impacts to water quality and quantity, and to Badgerys Creek and Wianamatta South Creek, the network and pumping station is designed to store a quantity of wastewater during wet weather events, preventing wastewater discharges most of the time. During extreme weather events however, the wastewater storage capacity of the network and pumping station may be exceeded and untreated wastewater has the potential to flow to overflow points. Wastewater system design requires overflow points as a contingency, so wastewater does not back up into houses and businesses if pipeline capacity is exceeded. This is a standard global approach to wastewater system design and Sydney Water also aligns with relevant Water Services Association of Australia (WSAA) codes and standards. During these overflow events, wastewater would have the potential to impact Badgerys Creek, potentially 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 new infrastructure has been designed for a maximum of 10 spill events in 10 years with overflow infrastructure only provided at the pumping station and not along the pipeline network. The network has been designed to be leak tight which will minimise infiltration of flood waters into the wastewater system.

The proposal will be operated under the future USC system Environmental Protection Licence (EPL). Until the future USC system EPL is in place, a scheduled development work licence under s47 of the *Protection of the Environment Operations (POEO) Act 1997* will be required for construction of the proposal.

Mitigation measures

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

Table 6-2 Environmental mitigation measures — water and drainage

Mitigation measures
Bund potential contaminants and store on robust waterproof membrane, away from drainage lines.
Keep a functioning aquatic spill kit on site for clean-up of accidental chemical/fuel spills in mapped key fish habitat. Keep the spill kits stocked and located for easy access.
Locate portable site amenities away from watercourses or drainage lines.
Keep stockpiles to a minimum and ensure adequate contingency measures are in place to prevent sedimentation of waterways in the event of a large flood event.
Sydney Water will obtain a groundwater Water Supply Approval. The Delivery Contractor is responsible for: • preparing a Dewatering Management Plan • complying with the approval conditions (such as protecting water quality; minimising aquifer extraction volumes, monitoring extraction with flow meters and recording volumes).
Discharge all water in accordance with Sydney Water's Discharge Protocols Standard Operating Procedure (WPIMS5021), including erosion controls, discharge rate, dechlorination, monitoring. Re-use potable / groundwater water where possible.
Dewater excavations in accordance with the Delivery Management Guidance Standard 9.1 *Excavation Dewatering*.
If discharge to the environment is not possible, seek approval and discharge criteria from the relevant Sydney Water Business Customer Accountsprior to discharge to the wastewater system. Otherwise, tanker by a licensed waste contractor and dispose off-site to an appropriately licensed facility.
Store all chemicals and fuels in accordance with relevant Australian Standards and Safety Data Sheets. Record stored chemicals on site register. Bunded areas to have 110% capacity of stored liquid volume. Chemicals and fuels in vehicles must be tightly secured. All chemicals to be clearly labelled.
Conduct refuelling, fuel decanting and vehicle maintenance in compounds where possible. If field refuelling is necessary, designate an area away from waterways and drainage lines with functioning spill kits close by.
Conduct any equipment wash down within a designated washout area.
Ensure equipment is leak free. Repair oil/fuel leaks immediately or remove from site and replace with a leak-free item.
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).

Mitigation measures
On completion of the works all disturbed soil is to be levelled, smoothed and sown with a mixture of sterile/native grass seeds to encourage rapid revegetation and planted out with native endemic riparian vegetation.
Prior to use at the site, machinery is to be appropriately cleaned, degreased and serviced.
DPIRD Fisheries (1800 043 536) and the Environment Protection Authority (EPA) (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 cease until the issue is rectified and approval is given by DPIRD Fisheries and/or the EPA for the works to proceed.

6.2.3 Flora and fauna

A search of aerial imagery and existing vegetation mapping published on the State Vegetation Type Map (SVTM) NSW extant PCT (OEH, 2024) identified areas of vegetation with potential to be impacted by the proposal. The proposal has been modified to minimise impacts to flora and fauna by underboring riparian vegetation and moving the proposal to previously cleared areas where possible. However, there is still potential for some impacts to vegetation and therefore Aurecon were engaged to complete a Biodiversity Assessment Report (BAR). The assessment included a literature review, database search, field assessment and impact assessment. The complete BAR is summarized below and provided as Appendix C. The BAR assesses the worst case scenario impacts to flora and fauna. Impacts are likely to be less than those described in the BAR due to proposed underboring and impacts to vegetation being avoided where possible during construction.

Existing environment and potential impacts

The area surrounding the proposal is highly disturbed, adjacent to roads, active construction sites and residential houses. Vegetation within the surrounding area primarily consists of weeds and planted vegetation. The proposal area however is manly comprised of riparian vegetation and agricultural land with several scattered native trees. The proposal is generally located adjacent to Badgerys Creek and Wianamatta South Creek, where remnant riparian vegetation remains. Some sections of the proposal contain native vegetation and are mapped as areas of 'Avoided Land', 'Excluded Land' under the CPCP and 'Existing Native Vegetation' under the Biodiversity Certification Order (BCO) associated with the of the Western Parkland City SEPP (refer to Figure 3-5).

The BAR identified the vegetation communities within the proposal area, assessed impacts, and identified appropriate mitigation measures. Biodiversity features were identified during a site visit (Figure 6-1). Plant Community Type (PCT) 4025 Cumberland Red Gum River-flat Forest is present within the proposal area, comprising *of Eucalyptus moluccana, Casuarina glauca, Melaleuca stypheliodes* and *Microlaena stipoides*. PCT 4025 is associated with TECs listed under the BC Act and EPBC Act. Native vegetation within PCT 4025 matched the criteria for the BC Act listed EEC River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney

Basin and Southeast Corner Bioregions. However, due to the presence of a significant number of non-native ground-cover species and weeds, no native vegetation in the Study Area matched the criteria for any of the above EPBC Act listed communities. Therefore, the BAR found no EPBC Act listed TEC's occurring within the impact area. Other vegetation within the proposal area was found to be planted native or exotic vegetation including invasive weeds.

Fauna habitats present within the proposal area include:

- endemic native trees and shrubs – providing habitat for common bird species
- hollow-bearing trees – providing habitat for bird species, microbats and small mammals
- planted trees – providing foraging resources for birds
- fallen branches and logs – providing habitat for ground-dwelling reptiles, gastropods, birds and small mammals
- stick nests – providing habitat for common bird species.

No threatened flora or fauna were sighted during the visit. Threatened fauna species Cumberland Plain Land Snail *Meridolum corneovirens* (Endangered, BC Act) and Little Bent-winged Bat *Miniopterus australis* (Vulnerable, BC Act) were considered to have a moderate or higher likelihood of occurrence within the proposal area. The majority of potential habitat for these two species occurs within the native vegetation recorded along Badgerys Creek and South Creek (PCT 4025). These areas of potential habitat are outside of the impact area and will not be impacted by the proposal.

These areas fall within existing biodiversity-certified zones. Under Section 8.4(5) of the BC Act, a determining authority under Part 5 of the EP&A Act is not required to assess the impact of activities on biodiversity in certified areas. Therefore, impacts to these species are not further considered.

For development activities on 'Avoided Land' and 'Certified – Urban Capable Land', the objectives set out in Sections 2.3 and 3.3 of the *Cumberland Plain Conservation Plan Guidelines for Infrastructure Development* (DPE, 2023) must be met. In addition, the proposal must adhere to the mitigation requirements outlined in Section 3.3, Table 1 of the Infrastructure Guidelines, which apply to ecological values protected under both the BC Act and the EPBC Act. Relevant mitigation measures from the *Cumberland Plain Conservation Plan Guidelines for Infrastructure Development* are included in Table 6-3. These must be addressed in a statement (as per regulation 201A of the EP&A Regulation 2021) to demonstrate consistency with Section 2.3 of the CPCP Infrastructure Guidelines. This statement is currently being prepared by Sydney Water and any mitigation measures suggested by DPE should be included in the CEMP.

No native vegetation that is part of a TEC will be impacted by the works (field validated). Up to six planted non-native trees and up to 18 native trees are proposed to be impacted within the section of the main pipeline alignment immediately north of Elizabeth Drive (Figure 4). The non-native species are Camphor Laurels (*Cinnamomum camphora*). The native trees include five Grey Box (*Eucalyptus moluccana*), 13 Eucalyptus sp. and a Cabbage Gum (*Eucalyptus amplifolia*). A hollow-bearing Grey Box was identified within the impact area. Minor branch trimming of this tree may be required to complete the proposal, however the tree and hollows will be retained.

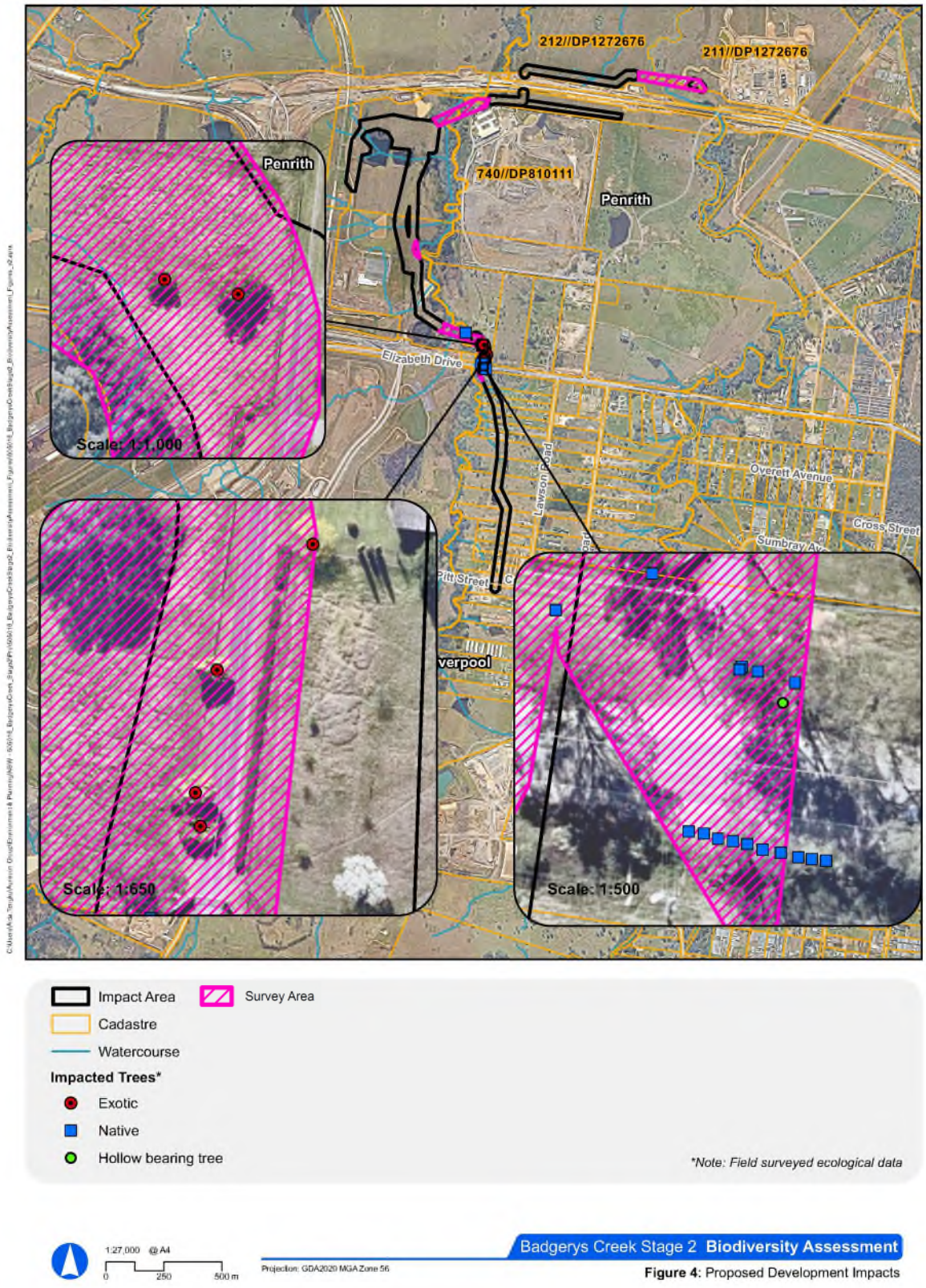
Although formal offsets are not required under the BC Act, Sydney Water has committed to deliver a 'maintained or enhanced' biodiversity outcome if proposals have biodiversity impacts. Offsets will be required in accordance with Sydney Water's Biodiversity Offset Guidelines and the tree offset multiplier is shown in Table 6-3. Offsets will be determined after vegetation removal as the number of trees to be removed has not yet been finalised. The number of trees to be removed is likely to be less than those identified in the BAR.

Table 6-3 Tree offset multiplier

Tree	Offset Multiplier
Locally native	3
Non-locally native	1
Exotic	1
Tree hollow	2 nest boxes or salvaged hollows (for each removed)

Several environmental weeds were recorded within the Study Area. Although these weeds are not declared priority weeds, they still pose a risk to the surrounding vegetation and biodiversity. The spread of environmental weeds will be limited with the implementation of mitigation measures listed in Table 6-4.

Figure 6-1 Proposed ecological impacts identified in BAR



Operational impacts

No direct operational impacts are anticipated to flora or fauna. Indirect operational impacts to biodiversity may result from noise disturbance and infrequent wastewater discharge during overflow events associated with flooding. Bushfire risk is considered low as the above ground infrastructure is clear of surrounding vegetation.

Mitigation measures

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

Table 6-4 Environmental mitigation measures — flora and fauna

Mitigation measures
Provided it is essential for delivering the project, Sydney Water's Project Manager can approve the following vegetation removal and tree trimming, without additional environmental assessment (but only after consultation with the Environmental and Community Representatives and affected landowners). Sydney Water considers vegetation removal in these circumstances has minimal environmental impact. • Any minor: - vegetation trimming or - removal of exotic vegetation or - removal of planted native vegetation where the vegetation is not a threatened species (including a characteristic species of a threatened community or population), heritage listed, in declared critical habitat, in a declared area of outstanding biodiversity value, in areas mapped as ENV or RBM 12 under the Sydney Growth Centre Biodiversity Certification Order or in land mapped as avoided land or strategic conservation area under the Cumberland Plain Conservation Plan. • Any removal of remnant vegetation where there is no net change to environmental impact (eg a different area of vegetation is removed but the total area is the same or less than assessed in the EIA). Written explanation of the application of this clause (including justification of the need for trimming or removal and any proposed revegetation) should be provided when seeking Project Manager approval.
Map and report native vegetation clearing to the Sydney Water Environmental Representative. Track vegetation clearing as per SWEMS0015.26 Contractor Native Vegetation Clearing and Rehabilitation template. Supporting documentation/evidence must be provided in the report including photos, marked up maps and GIS layers. If an ecologist is doing a preclearance survey they can provide GIS layers of the areas to be cleared.
Physically delineate vegetation to be cleared and/or protected on site and install appropriate signage prior to works commencing.
Adjust methodology (eg avoid area, hand excavate, implement exclusion fencing) to protect sensitive areas where possible (such as mature trees, known threatened species, populations or ecological communities).

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

Manage biosecurity in accordance with:

- Biosecurity Act 2015 (see NSW Weedwise), including reporting new weed infestations or invasive pests
- contemporary bush regeneration practices, including disposal of sealed bagged weeds to a licenced waste disposal facility.
- record pesticides and herbicides use in accordance with SWEMS00017

If replanting near Sydney Water pipelines refer to *'Which trees can damage wastewater pipes? '* link from Sydney Water website.

In TOBAN period:

1. Check specific TOBAN notice to confirm whether the work can be carried out under standard exemptions (Govt Gazette No18 Feb 2018)

If not, apply to RFS for specific exemption.

Where practical, open trenches will be covered at the end of each work day to avoid potential for native fauna to become trapped in open trenches.

Any native vegetation to be cleared within the Impact Area will be clearly identified and marked. Native vegetation to remain will be clearly delineated as No-Go-Zones to avoid risk of clearing. Clearing and No-Go-Zone maps to be prepared and approved by SWC prior to works commencing. Signage stating No-Go-Zone should be clearly displayed and all staff will be made aware of No-Go-Zones during induction.

Tree removal is to be confirmed by an arborist due to potential to retain these trees if impact to the Tree Protection Zone is minimal. Tree Protection Zone details are provided within the *Australian Standard 4970-2009 Protection of trees on development sites.*

A Weed management plan is to be developed and implemented by the Contractor and approved by Sydney Water prior to works commencing. The plan will be established and implemented to avoid spread and establishment of weeds during construction. Measures will include:

- A hygiene protocol must be prepared by the Contractor prior to works starting and implemented by the Contractor during works to avoid introduction of pathogens in machinery, tools, PPE or imported soils.
- All equipment and plant machinery to be appropriately cleaned before the start of works.
- All priority weeds within the Impact Area are to be cleared and disposed of at a registered waste management facility.

Mitigation measures
• If herbicide is to be used, this must be applied by a person trained to do so and that has a certificate of competency, or a statement of attainment issued by a registered training organisation. Herbicide will only be used in accordance with the label/permit. • Conduct toolbox talks to identify high risk priority weeds and weeds of national significance to on-site staff • Weed vegetation requiring clearing and removal should be disposed of at a registered waste management facility.
Offset residual impacts to native vegetation and trees in accordance with the Biodiversity Offset Guideline (SWEMS0019.13).
Where possible, limit clearing to trimming rather than the removal of whole plant.
Protect trees in accordance with the requirements of Australian *Standard 4970-2009 for the Protection of Trees on Development Sites*. Do not damage tree roots unless absolutely necessary and engage a qualified arborist where roots >50mm are impacted within the Tree Protection Zone. Protect trees in accordance with the Program Delivery Guidance Standard 9.3 Biodiversity Management (EV-GS-003).
Inspect vegetation for potential fauna prior to clearing or trimming. If native fauna is encountered on site, stop work and allow the fauna to move away unharassed. If fauna is present and does not move away, or ecological assessment has determined high likelihood of native fauna presence (including hollow bearing trees), engage WIRES or a licenced ecologist to inspect and relocate fauna before works.
Retain dead tree trunks, bush rock or logs in-situ unless moving is unavoidable. Reposition material elsewhere on the site or approved adjacent sites.
If dewatering farm dams, engage a licensed ecologist to undertake fauna relocation (e.g., turtles, frogs, etc) into an appropriate nearby habitat.
If any threatened species (flora or fauna) is discovered during the works, stop work immediately and notify the Sydney Water Project Manager. Work will only recommence once the impact on the species has been assessed and appropriate control measures implemented.
If green waste is likely to contain herbicides or other chemical or physical contaminants (including man-made and other foreign materials), do not send for offsite recycling.
Consult Taronga Zoo's Ben Zerbes (Mobile: 0417 201 180, Email: bzerbes@zoo.nsw.gov.au) prior to the removal of vegetation to determine the usefulness of vegetation waste as koala feed.
Any mitigation measures received from DPE in response to statement to demonstrate consistency with Section 2.3 of the CPCP Infrastructure Guidelines should be included in the CEMP.
CPCP mitigation requirements for activities on 'Certified – Urban Capable Land'

Mitigation measures

Habitat features and connectivity:

1. Retain large trees that are greater than or equal to 50 cm diameter at breast height (including dead trees but excluding noxious weeds) where possible and apply tree-protection measures for all vegetation to be retained. This is to provide ongoing roosting and foraging opportunities for fauna

2. Retain areas of high density proteaceae shrubs where possible, particularly along riparian corridors, to retain foraging resources, habitat and movement corridors for the Eastern Pygmy-possum.

3. Before any disturbance, all structures potentially providing habitat for microbats (bridges, culverts, mine shafts, storm water tunnels, old or derelict buildings) must be inspected by a qualified ecologist at an appropriate time of year. Where microbats are found, the structure providing habitat must not be affected, or a bat management plan must be prepared by a microbat specialist which allows for:

- exclusion mechanisms to reduce the risk of direct physical harm to the microbats; and/or

- supplementary habitat to compensate for lost habitat: and/or

- regular inspections of structures and briefing of relevant construction staff.

Pests

4. Before construction works begin, a pest control strategy must be prepared. This strategy must be implemented during construction and operation of the development. This strategy must include pest

control methods that reduce the risk of secondary poisoning (for example, from Pindone or second generation rodenticides)

Disease

5. Incorporate best-practice site hygiene protocols to manage the potential spread of pathogens, such as

Phytophthora and myrtle rust adjacent to potential habitat for species targeted by the CPCP.

Weed invasion

1. Implement mitigation measures to manage weeds during construction and operation of the development, taking into account relevant guidance in the CPCP's Weed Control Implementation Strategy.

Disease

2. Incorporate best-practice site hygiene protocols to manage the potential spread of pathogens, such as Phytophthora and myrtle rust adjacent to potential habitat for TECs.

6.2.4 Heritage

Aboriginal Heritage

A search of the Aboriginal heritage information management system (AHIMS) undertaken by Sydney Water in November 2024 identified several Aboriginal heritage sites within the proposal area. Due to the proposal being within 200 m of waterways and AHIMS sites, the proposal was identified as having potential to impact Aboriginal heritage. Aboriginal heritage due diligence was

undertaken by Kelleher Nightingale Consulting (KNC) and an Aboriginal Cultural Heritage Assessment Report (ACHAR) was completed. The ACHAR is summarised below. The assessment included a database search for Aboriginal heritage sites, a desktop assessment, field surveys and archaeological test excavations. The complete assessment is provided as Appendix D.

Existing environment and potential impacts

A search of the AHIMS and review of prior Aboriginal heritage studies identified several Aboriginal heritage sites in the region. The identified sites were a combination of artefacts, potential archaeological deposits (PADs), an area of grinding groves and a culturally modified tree.

A field survey was carried out by KNC in May 2024 to expand on the findings of the desktop assessment. No surface stone artefacts were identified within the assessment area during the survey. The survey found that outside of the identified Aboriginal archaeological sites and PADs, much of the study area displayed low archaeological potential due to ground surface disturbance from land use practices and natural processes such as erosion and flooding. Additional information was required on the nature and extent of any subsurface archaeological deposits within the proposal area, therefore archaeological test excavations were undertaken by KNC in September and October 2024.

The test excavations confirmed the locations of six previously recorded Aboriginal sites (comprising 9 AHIMS registrations) within the proposal area and identified three previously unrecorded Aboriginal archaeological sites within the proposal area.

In general, results supported the existing understanding of the archaeological landscape within this part of the Cumberland Plain, namely that more intensive, focused and/or repeated Aboriginal occupation took place on landforms associated with the larger creek corridors. Much of the study area traverses the terraces, flats and floodplain rises adjacent to the Badgerys Creek and Wianamatta South Creek watercourses.

The ACHAR impact assessment found that all sites within the project study area were likely to be impacted by construction of the proposal, resulting in a partial impact to six sites (comprising eight AHIMS registrations) and a total impact at three sites (Table 6-5). If impact to these sites cannot be avoided through adjustments to the project scope (construction methodology/alignment), then a land based AHIP should be obtained under section 90 of the *National Parks and Wildlife Act 1974* for the project, for all areas not already covered under an existing approval/AHIP. At the time of assessment, the AHIP should include Aboriginal objects associated with sites identified in Table 6-5.

The consequence of harm includes total and partial loss, with the significance of harm ranging from low to moderate (Table 6-5). Depending on the existing archaeological value and proposed impact, salvage excavation and/or surface collection has been recommended as part of mitigation measures. The archaeological value of the sites is linked to the information that they contain. Recovery of this information through archaeological salvage excavation would help to mitigate the impact of the proposal. Offering an opportunity to better understand the activities which were undertaken at these sites and the effect of land use disturbance and natural processes on subsurface archaeological deposits in the vicinity of Badgerys Creek and Wianamatta South

Creek. As conservation is the primary goal of all Aboriginal heritage management all archaeological excavation undertaken will be restricted to the actual construction corridor and approved AHIP area. All other areas will be appropriately demarcated and protected as no-go zones that will be identified in the CEMP.

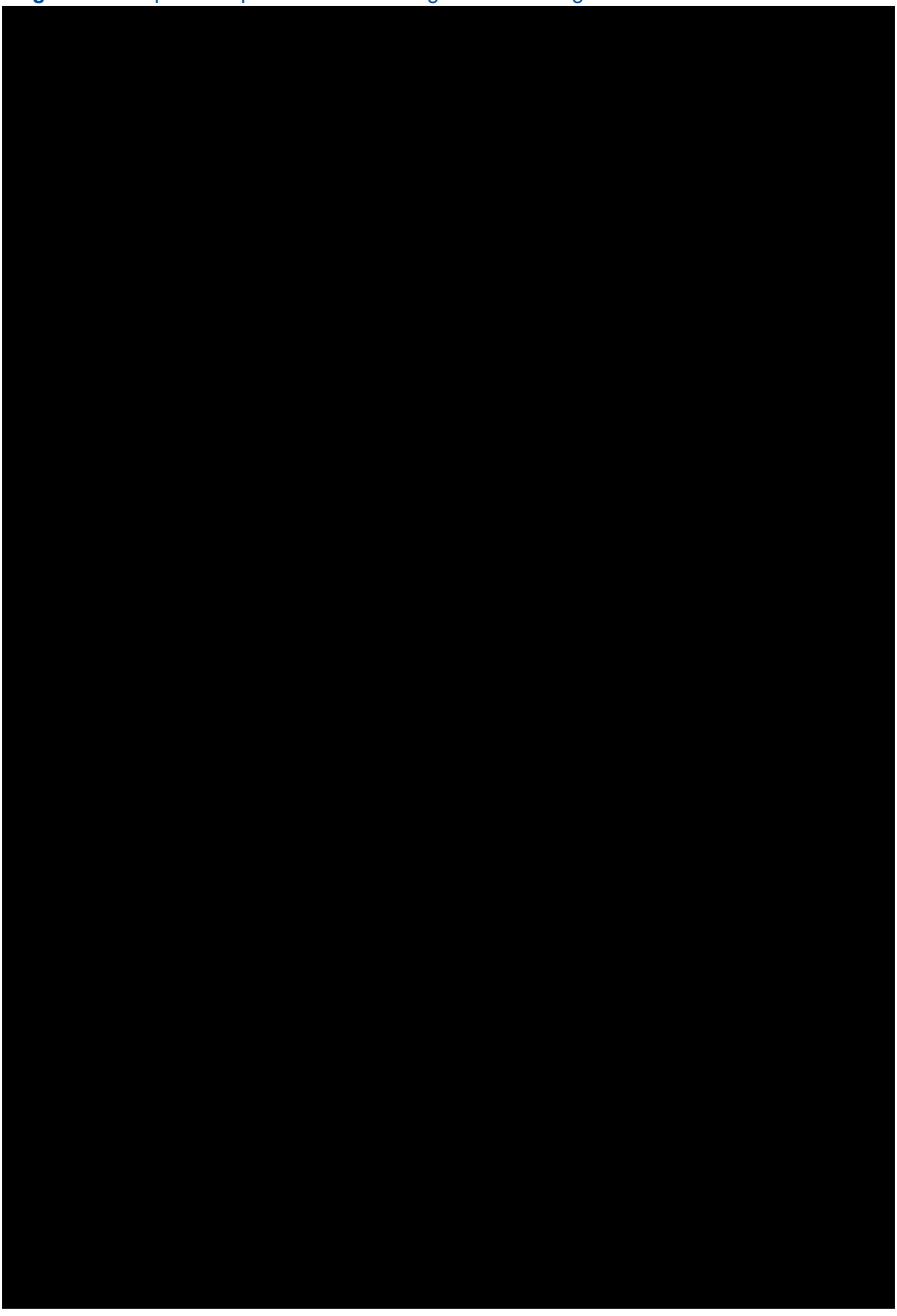
The proposal overlaps several areas that have been previously assessed for Aboriginal cultural heritage values under existing State Significant Infrastructure (SSI) approvals and AHIPs. Existing approvals/AHIPs are for major infrastructure projects, including: the M12 Motorway (SSI 9364), AWRC (SSI 8609189), Sydney Metro Western Sydney Airport (SSI 10051) and Western Sydney International (Nancy-Bird Walton) Airport. These approvals/AHIPs are active/current where they intersect the current proposed works, and include conditions related to Aboriginal heritage considerations within their boundaries. These areas are therefore excluded from impact assessment for the current project and Sydney Water must ensure that any works for the current project undertaken within these existing approvals/AHIPs comply with all relevant conditions.

Table 6-5 Summary of Aboriginal archaeological sites along the proposed construction corridor, including site significance, proposal impact, significance of harm, and proposed mitigation measures.

ID	AHIMS	Site feature	Archaeological significance and significance of harm	Consequence of harm	Mitigation
[redacted]					

ID	AHIMS	Site feature	Archaeological significance and significance of harm	Consequence of harm	Mitigation
[redacted]					

Figure 6-2 Proposed impact area and Aboriginal archaeological sites



Non-Aboriginal heritage

Listed non-Aboriginal heritage items in the vicinity of the proposal, are summarised below.

- The Fleurs Radio Telescope Site
  - State Environmental Planning Policy (Precincts – Western Parkland City) 2021, Schedule 2 – I5, Local significance
  - Penrith LEP 2010, Item 832, Local significance (*expired listing*)
- Fleurs Aerodrome, item of potential (Local) heritage significance

The Fleurs Radio Telescope Site (I5)

The Fleurs Radio Telescope Site is in Kemps Creek, in the Penrith local government area, approximately two (2) kilometres north from Elizabeth Drive. The area is bisected by South Creek which meanders through the landscape on a north-south axis, dividing the area into an eastern and western portion. Several large construction projects, including the Sydney Water Upper South Creek Advance Water Recycling Centre (USC AWRC) and M12 Motorway, wholly or partially fall within the heritage curtilage of the site. These projects have greatly changed the landscape within the heritage curtilage (Extent Heritage, 2021; Jacobs, 2019).

The current proposed works north of the M12 construction alignment fall within the curtilage of the Fleurs Radio Telescope Site. The works north of the M12 extend east towards the USC AWRC site, crossing beneath South Creek. Construction of the USC AWRC is currently underway and has caused significant changes to the site, including removal of many of the above ground features that added much value to the heritage listing of the Fleurs Radio Telescope Site (CRM, 2019; Extent Heritage, 2021).

Site significance

The Fleurs Radio Telescope Site was highly significant for its role in the development and innovation of radio astronomy in Australia. The landscape of Fleurs Radio Telescope Site has endured several programs of removal and demolition throughout the 1990s and early 2000s. The existing landscape is highly fragmented with little integrity for the original site configuration across the site, but particularly east of South Creek due to recent construction of the USC AWRC (Extent Heritage, 2021; CRM, 2019).

In 2019, the University of Sydney (owners of the Fleurs Radio Telescope Site) commissioned Cultural Resources Management (CRM) to complete a heritage assessment to identify the cultural resources that remain within the site and determine the heritage significance of the site (CRM, 2019). This included completion of a site survey to identify and map areas of high archaeological potential, including physical remnants scattered throughout the site (refer Figure 3-3).

In a later heritage impact assessment, for the development of the USC AWRC, it was determined that the construction of the facility will '… *see the last remaining evidence of the sites' use removed*' (Extent Heritage, 2021, p. 170). In agreement with the 2019 report, the 2021 report identified two localised areas with high potential for archaeology (ie two collapsed timber bridges on South Creek, having potential state significance). Additional potential archaeology reported included subsurface cables, machinery foundations, service pits, remnants of staff

accommodation, and structural evidence of the former telescopic array. It was determined that the latter was *'… likely highly fragmentary, truncated and of generally poor intactness and integrity as a result of site clearing and remediation in the early twenty-first century* ', and that *'…the archaeological resource associated with Fleurs Radio Telescope Site is unlikely to meet the threshold for local significance'* (Extent Heritage, 2021, section 5.4).

The extensive remnants identified on site were also found to have *"…limited potential to provide new insight into the operations of the telescope installations, particularly as they are highly truncated and fragmentary*…[and] *they would also be considered 'works', as defined by the Heritage Act, and not afforded protection under the 'relics provision' of the Heritage Act"* (Extent Heritage, 2021, p. 95).

Construction and operational impacts

The current proposal falls within the curtilage of heritage item I5 Fleurs Radio Telescope Site (local significance), and survey areas 7 and 9 as defined in the 2019 CRM study. The proposed construction activities within the Fleurs Radio Telescope Site will be at a localised scale and low intensity and would not adversely affect the significance of the heritage item. The proposed alignment has been designed to minimise ground disturbance, including impact to known heritage features identified by CRM (2019), through less destructive construction methods (trenchless technology), whilst positioning of the alignment and site access is designed to avoid known heritage features.

Construction activities closest to items with known or potential heritage value as identified by CRM (2019), include:

- horizontal directional drilling (HDD), including excavation for entry and exit pits
- setup and laydown of equipment compounds, with the exact location to be selected during detailed design and positioned away from known heritage features
- site traversal (vehicles and equipment, and personnel), to be confirmed and designed to avoid known heritage features.

The potential for proposed construction activities to impact the heritage significance and values of the Fleurs Radio Telescope Site, or unknown relics is expected to be minor when considering:

- recent impacts to the broader site from ongoing construction within the region (eg USC AWRC and M12 Motorway developments), which have removed many key heritage values/features of the site
- the preferred proposed construction method being HDD – minimising aboveground surface disturbance by reducing the area of excavation required
- the small footprint of the proposed construction, relative to the area of the site
- prior assessment that *'…the archaeological resource associated with Fleurs Radio Telescope Site is unlikely to meet the threshold for local significance'* (Extent Heritage, 2021, section 5.4)

- prior assessment that the remaining fragments and remnants of unknown structures above and beneath the ground "…*would also be considered 'works', as defined by the Heritage Act"* (Extent Heritage, 2021, p. 95)
- the implementation of the mitigation measures proposed below, including no-go zones where areas of known high potential heritage value are located and inclusion of an unexpected finds protocol.

The potential for the assets to impact the heritage significance and values of Fleurs Radio Telescope Site during operation is expected to be inconsequential as the proposal:

- will avoid items listed as part of the heritage listing
- the proposal area is to be returned to pre-existing conditions post construction work, including areas where ground disturbance is required for drill work. Therefore, the proposal's potential impact to the aesthetic values associated with the existing open rural landscape will be temporary.

The current proposal will avoid impacts to surveyed archaeological points of this potential heritage item using 5 m buffer no-go zones shown in Figure 3-4. The potential impact of the proposal on this item of potential heritage significance is therefore considered negligible.

There would be no impact to non-Aboriginal heritage during operation.

Mitigation measures

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

Table 6-6 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.
Harm to any Aboriginal objects and declared Aboriginal places is only permitted once an Aboriginal Heritage Impact Permit (AHIP) has been granted. Include Aboriginal Heritage Management Plan (AHMP) in CEMP to address AHIP conditions.
The boundary of the AHIP area adjacent to the non-impacted parts of the Aboriginal sites must be demarcated with protective fencing and listed in the CEMP. These areas must be identified as "no-go zones" on the CEMP maps and workers inducted as to appropriate protection measures and requirements to comply with conditions in the adjacent AHIP.
Surface collection of Aboriginal objects is to be completed prior to commencing construction works within the impacted portion of the following Aboriginal archaeological sites; [redacted]

Mitigation measures
[redacted]
Archaeological salvage excavation of Aboriginal objects is to be completed prior to commencing construction works within the impacted portion of the following Aboriginal archaeological sites; [redacted].
If reburial is to be undertaken of objects, Requirement 26 “Stone artefact deposition and storage” in the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* must be complied with, unless the registered Aboriginal stakeholders agree to an alternative deposition method. If reburial is to take place, registered Aboriginal stakeholders would be notified and given the opportunity to attend, and the reburial recorded on AHIMS.
If any Aboriginal object or non-Aboriginal relic is found, cease all excavation or disturbance in the area and notify SW Project Manager in accordance with SWEMS0009.
All site personnel must be inducted by a heritage specialist (or delegate) before starting work on site. The induction should include clear explanation of heritage constraints, go and no-go areas, processes and measures to avoid impacts, stop work procedures, and contact details to obtain further heritage guidance if needed.
At Fleurs Radio Telescope Site access to, and equipment laydown/compound areas to remain outside areas where known sites are located as per Figure 3-3 and 3-4. This includes remnants of buildings, rubbish piles, brambles, timber bridge footings, power poles, parabolic antennae, and other structures on site.
No-go areas, including location of known heritage features, are to be delineated prior to works beginning on site.
Chance discovery of relics must be notified to the Heritage Council of NSW by means of an s146 notification.

6.2.5 Noise and vibration

Existing environment and potential impacts

The proposal is in a predominantly rural residential/agricultural setting. Existing noise levels in the study area are primarily influenced by traffic on surrounding local roads, noise from nearby development sites, the mixed rural residential environment and construction activities within the growth area. With future planned development and growth throughout the region, the surrounding area will provide land for a range of uses predominantly related to residential, employment, industry and environmental uses.

Proposed activities/ equipment and timing of works

The scope of work assessed in this noise memo is briefly summarised below (Table 6-7). The construction program is about 24 months total. At its closest, the proposal is approximately 20 m from sensitive receivers while most of the proposal is located at least 610 m from sensitive receivers and would not be intrusive. To minimise disruption to traffic and potential safety risks to construction personnel and road users, some of the work along Elizabeth Drive may be carried out outside of standard hours if required by the Road Occupancy Licence (ROL). Night works are anticipated to occur for a cumulative 25 nights total during the construction phase.

The proposal will generate noise and vibration during construction from plant and associated construction activities. Equipment, vehicles and machinery that would typically be used during construction of the proposal and that have potential to generate the most noise include:

- excavators (maximum 36 tonne excavator with hammer)
- rock breakers / jackhammers
- drill/piling rig
- backhoes
- concrete/demo saws
- compactor
- concrete pumps
- air compressors
- generators
- HDD equipment
- light and heavy vehicles movements.

Proposed use of noisy equipment during construction is summarised in Table 6-7 below. Use of a 36 t excavator with hammer may be required during excavation activities.

Table 6-7 Proposed scope of work and approximate duration of activities

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
Site demobilisation	Remove compounds and restore disturbed areas	1-2 months
BCGC01	Open trench and underbore	11-12 months
BCPM01	Open trench and underbore	11-12 months

Scope	Activities	Duration
SP1230 and overflow	Construction including: • overflow pipe • emergency storage structure • electrical switchroom • odour control unit • access road • wet well • inlet maintenance hole • valve chamber • surge tank slab and platform • intermediate maintenance hole • access road and fending around site.	22-24 Months

Table 6-8 Proposed use of noisy equipment during construction

Activity	Noisier equipment required	Tasks requiring this equipment	Frequency of use of noisy equipment
Site mobilisation/ demobilisation	Grinders, compactors, excavators	Install fence/ footpath	Less than an hour, intermittently, about 20 times during mobilisation
Compound use	Grinders, delivery trucks	Cut pipe	Daily
Open trench	Grinders, 36 t excavators with hammer	Cut pipe/ reinforcement, excavation	Daily
HDD (trenchless)	36 t excavators with hammer	Cut pipe and reinforcement	Daily
Microtunnelling (trenchless)	36 t excavators with hammer	Cut pipe/ reinforcement Excavation of launch/ receival pits	Daily
Pump station construction	Piling rig, grinders, 36 tonne excavators with hammer	Piling, excavation works	Daily

Based on the above details, the noisiest activity for both day and night works would be use of 36 t excavator with hammer with direct line of sight. The likelihood of noise impact from the proposal

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

The quantitative noise assessment was completed based on the following worst case (noisiest) activities. It is noted that the worst case activities are short-lived and 'rare' in the context of the total duration of the construction period as they will occur for short periods of time.

- Activity 1: Use of 36 t excavator with hammer at night with line of sight to receptors. This activity may occur at the underbore crossing of Elizabeth Drive.
- Activity 2: Use 36 t excavator with hammer during standard daytime construction hours with line of sight to receptors. This activity may occur at all above ground construction locations of the proposal, excluding access tracks.

Most work and deliveries would be scheduled to occur during standard daytime hours during the working week:

- 7am to 6pm, Monday to Friday
- 8am to 1pm on Saturday
- No work on Sundays or public holidays.

The proposal is expected to take up to 2 years to construct, with much of the work set back from potential residential receivers or businesses or in low density rural settings, and therefore, only a limited number would be affected for extended periods of time.

For construction of the pipelines, much of the work would be completed using trenchless methods which require less ground disturbance, with noise impacts buffered by depth below ground. Where open trenching methods are applied, the works at any one location are of short duration and will progress along the alignment. Although they still have the the potential to temporarily impact on sensitive receivers, a receiver would not be exposed to noise impact for every shift over the project duration. The closest sensitive receiver to trenched sections of the proposal is located about 50 m from the proposal area. The closest sensitive receiver to a trenchless entry/exit pit is approximately 20 m from the proposal area.

For the construction of the pumping station, the noisiest activities would be associated with earth works, including excavation and potential rock breaking or grinding. Sensitive receivers around the proposal are likely to be noise impacted to some extent over most shifts during the two-year construction period. These works are static and include a mix of noisier activities (grinders, excavator with hammer) and less noisy (light vehicle movement, excavator without hammer) activities. The closest sensitive receiver to SP1230 is located about 800 m from the construction footprint and potential noise impacts are considered minor for this site.

Due to the potential for noise impacts, a noise impact assessment was completed and are presented below. The noise impact assessment considered impacts from stationary activities at the pumping station and transient activities that will move along the proposed pipeline alignment.

Noise impact assessment

A noise impact assessment was completed using the Transport for NSW (TfNSW) Construction and Maintenance noise estimator tool (TfNSW, 2022).

The likelihood of noise impact during transient and stationary construction activities was assessed using Table 2 of the Draft Construction Noise Guideline (EPA 2020). The review indicated that the likelihood of noise impact will be low-medium risk and a quantitative noise impact assessment was undertaken. This risk level was selected as construction outside of standard construction hours is unlikely to be regular or often, being a semi-rural setting there are few sensitive receivers in proximity, and noisy works will occur only intermittently throughout the construction program.

Noise area category

The TfNSW Construction and Maintenance noise estimator tool can be used to perform a basic noise assessment to capture predicted noise impacts at different distances for different types of receivers. The noise area category is chosen from the noise estimator tool to define an approximate background noise level for the environment surrounding the proposal (Table 6-8). The noise area category is chosen based on several factors, including:

- surrounding land use and receiver types
- traffic volumes on nearby roads
- other transport infrastructure eg trains, airports/flight paths.

The noise area category R1 was chosen for both day and night work, because:

- background noise is influenced by road traffic noise and low volumes of traffic from local roads and,
- the surrounding area is predominantly a rural residential/agricultural setting.

Table 6-9 Background noise levels and noise management levels applied for assessment of stationary and transient construction activities

	Noise area category	R1
RBL or L_{A901} Background level (dB(A))	Day	40
	Evening	35
	Night	30
$L_{Aeq(15minute)}$ Noise Management Level[2] (dB(A))	Day	50
	Day (OOHW)	45
	Evening	40
	Night	35

Notes: [1]LA_{90} = Background noise level
[2]*Noise Management Level for works during standard hours = Background level plus 10dB(A)*
Noise Management Level (NML) for out of hours works = Background level plus 5dB(A).

Worst-case noise impact scenarios

The purpose of the noise assessment is to assess the predicted worst-case noise impacts. This will identify recommended additional mitigation measures for impacted receivers at different distances from the works, which will guide the community engagement for the sites.

For construction activities, the noisiest plant was chosen, the 36 t excavator with hammer (the largest size able to be selected in the tool). As a conservative, worst-case approach, the noisiest

plant for day work (excavator with hammer/ bulk earthworks) was also assessed as part of night work, even though the use of this equipment outside of standard construction hours is unlikely to be regular or often.

These assessments are sufficient to predict and assess worst-case noise impacts as:

- the noisiest equipment would not be used all shift, every shift, during both day and night work, and is therefore a conservative estimate
- 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
- for transient construction activities, no individual receiver would be impacted by noise every shift from these activities over the proposed two-year construction period.

A receiver may have line of sight, or no line of sight, to the proposal. Line of sight is the straight line between the noise source and the receiver. Receivers with line of sight would typically include those in front of the work, who do not have their view blocked by barriers such as terrain, permanent noise walls or other buildings. Receivers with no line of sight (all other factors being equal, such as distance to the work and type of equipment) will experience less noise than receivers with line of sight. Typically, these include the receivers who have their view blocked from the works by barriers including those listed above.

Noise impact summary

In summary, two scenarios were considered:

- Activity 1: OOHW night – line of sight – 36 t excavator with hammer distance based (noisiest plant)
- Activity 2: standard construction hours (day work) – line of sight – 36 t excavator with hammer distance based (noisiest plant).

Based on the above scenarios, the predicted worst case noise impacts for residential receivers associated with transient and stationary activities during day and night work are shown in Table6-10 and Figures 6-3 and 6-4. These outputs include recommended mitigation measures at different distances from sensitive receivers, as identified by the noise estimator tool. These are to be considered by the community team and offered where appropriate.

Table 6-10 Affected distance (metres) for residential receivers during Activity 1 and Activity 2

Activities	$L_{Aeq(15minute)}$ noise level above background (L_{A90})		
	20 to 30 dB(A)	> 30 dB(A)	$L_{Aeq(15minute)}$ 75dB or greater
	Moderately intrusive	Highly intrusive	Highly affected
Activity 1 – 36 t excavator at night with line of sight	610 m Recommended mitigation measures:	290 m	95 m

Activities	$L_{Aeq(15minute)}$ noise level above background (L_{A90})		
	20 to 30 dB(A)	> 30 dB(A)	$L_{Aeq(15minute)}$ 75dB or greater
	Moderately intrusive	**Highly intrusive**	**Highly affected**
	Notification (N), phone call (PC), standard notification (SN), respite period 2 (R2), duration respire (DR)	Recommended mitigation measures: Alternate accommodation (AA), N, PC, SN, R2, DR	Recommended mitigation measures: N, PC, respite offer (RO)
Activity 2 – 36 t excavator during daytime hours with line of sight	290 m Recommended mitigation measures: N, PC, SN, R2, DR	140 m Recommended mitigation measures: AA, N, PC, SN, R2, DR	95 m Recommended mitigation measures: N, PC, RO

Figure 6-3 Noise impact distances of Activity 1

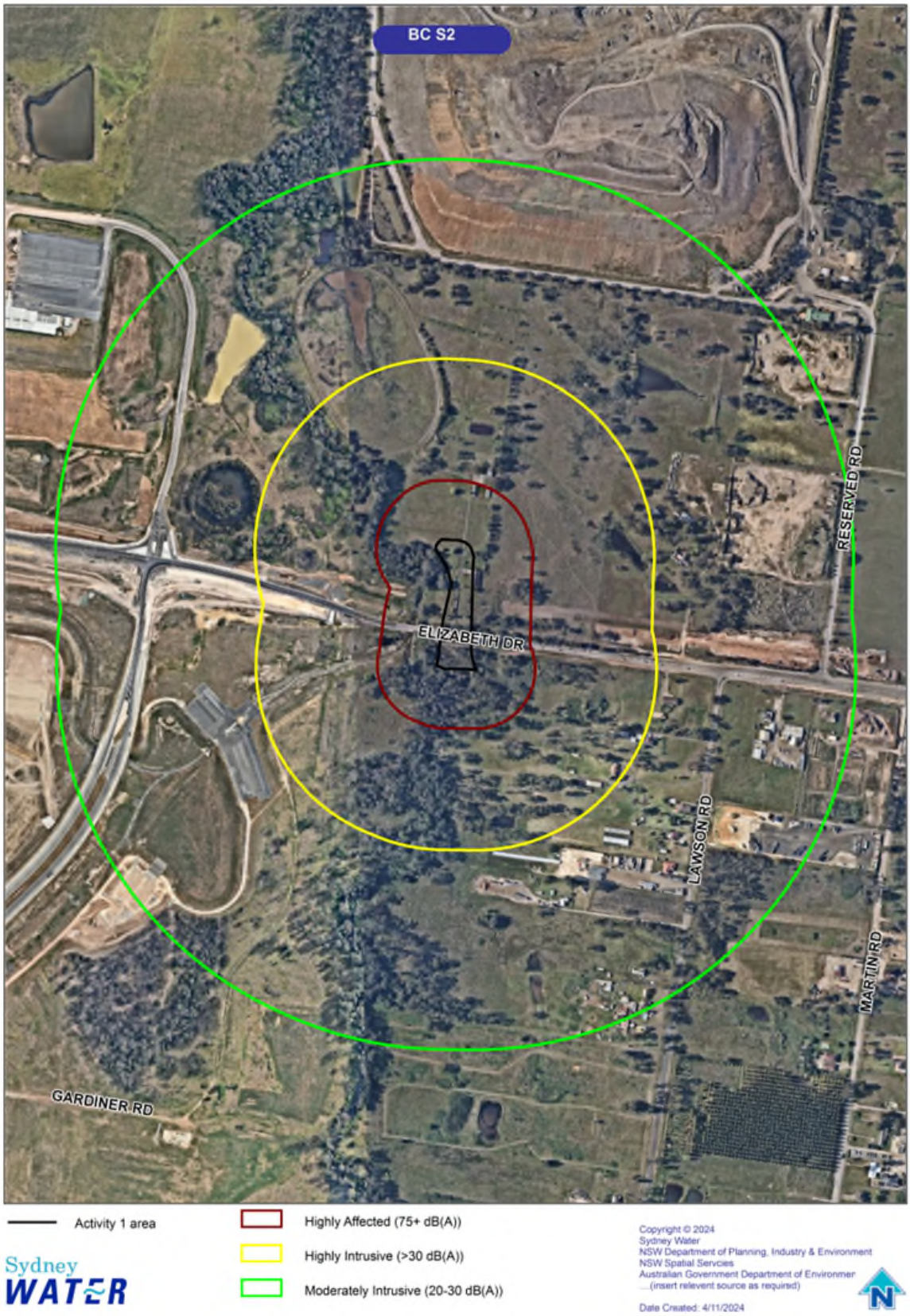
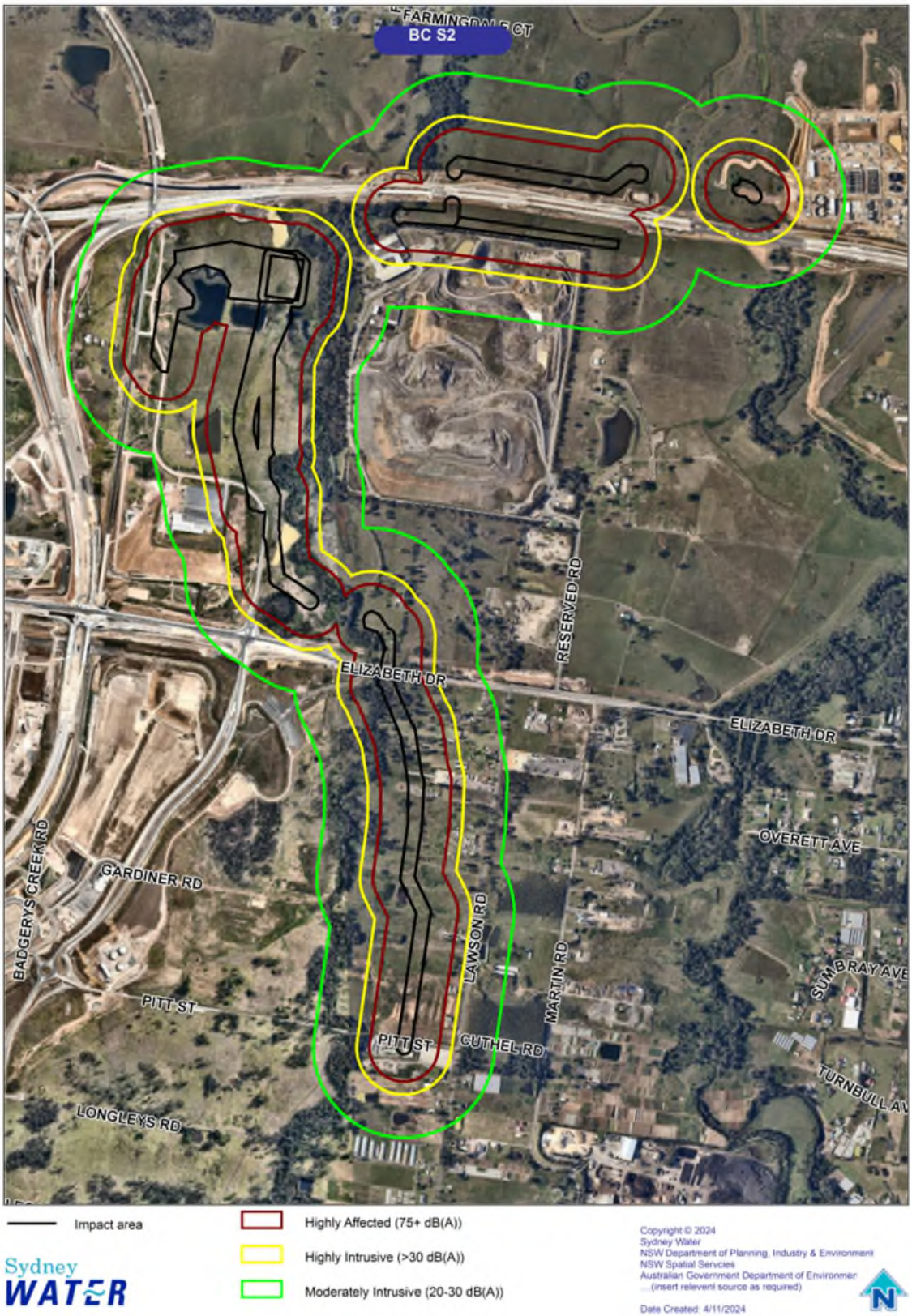


Figure 6-4 Noise impact distances of Activity 2



All reasonable and feasible measures will be implemented to reduce noise impacts during construction, therefore potential noise impacts in the surrounding area are considered minor.

Operational impacts

During operation, the alignment will be beneath the ground and no noise impacts are anticipated. Operational noise from the pumping station is likely to be minimal and would not result in a detectable noise increase perceptible to existing nearby residents. The pumping station is not expected to be intrusive to potential future receivers that would be in closer proximity as it consists of underground, submersible pumps and will be designed to comply with the EPA Noise Policy for Industry (2017). Operational noise levels will be assessed during detailed design and any noise attenuation measures identified and implemented to ensure compliance with the Noise Policy for Industry (EPA, 2017).

Noise may be generated during operational maintenance activities; however, these would generally be of short duration and mitigated.

Vibration

The noise estimator includes some indicative minimum working distances for different vibratory plant and equipment. These distances will vary depending on the 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 anticipated for this proposal, 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
- Mechanised bored tunnelling works (Horizontal Directions Drilling, Mircro-tunnelling) – minimum working distance of 5 m to 21 m.

There is potential that some nearby residential buildings may be impacted by vibration when using the excavator with hammer; however, no substantial vibration-generating construction work would be occurring directly adjacent to physical structures. The entry/exit pit and MH location approximately 100 m north of Elizabeth Drive is within 22 m of a residential structure and could therefore potentially be impacted by use of a 36 t excavator with hammer. To avoid impacts to this structure use of smaller and less vibratory plant will be adopted within 22 m of the structure. A dilapidation survey will also be completed before and after construction.

In relation to human comfort, the minimum working distance of 73 m for 36 t excavator with hammer relates to continuous vibration. Vibration emissions will be intermittent in nature and for this reason higher vibration levels, occurring over shorter periods are consistent with *Assessing vibration – a technical guideline* (DEC 2006). Significant vibration impacts are therefore considered to be unlikely.

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 minor.

Table 6-11 Environmental mitigation measures — noise and vibration

Mitigation measures
Works must comply with the Interim Construction Noise Guideline (DECC 2009), including schedule work and deliveries during standard daytime working hours of 7am to 6pm Monday to Friday and 8am to 1pm Saturday. No work to be scheduled on Sundays or public holidays. The Proposal will also be carried out in accordance with: • Sydney Water's Noise Management Procedure SWEMS0056 • 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. All community notification will begin prior to work commencing on site.

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

If night works are needed, the Contractor would: • justify the need for night works

Mitigation measures
• consider potential noise impacts and implement the relevant standard daytime and out of hours safeguards and other reasonable and feasible management measures • identify community notification requirements (ie for scheduled night work (not emergency works)), • notify all potentially impacted residents and sensitive noise receivers not less than one week prior to commencing night work • seek approval from the Sydney Water Project Manager in consultation with Sydney Water's Environment and communications representatives.
If works on Sundays or public holidays are required, the Contractor would: • justify why all other times are not feasible • consider potential noise impacts and, implement relevant standard daytime, out of hours and night-time safeguards and other reasonable and feasible management measures • identify community notification requirements • seek approval from the Sydney Water Project Manager in consultation with Sydney Water's Environment and communications representatives.
Consider less vibration intensive methodologies where practicable and use only the necessary sized and powered equipment.
Conduct a dilapidation survey / asset condition assessment prior to works which have potential to damage existing structures.
For works within 22 m of a residential structure, use of smaller and less vibratory plant rather than the 36t excavator should be adopted.

6.2.6 Air and energy

Existing environment and potential impacts

The proposal is in a rural-residential area that will be transformed from lower density and less intensive land use to employment, industry, and residential use. The main existing sources of air pollutants within the study area include emissions from motor vehicles and dust from nearby development. A search of the National Pollutant Inventory, maintained by the Department of Environment and Energy, was conducted for the study area on 20 August 2024. The search identified Elizabeth Drive Landfill Facility as the only pollutant emitting facility within 1 kilometre of the study area.

Potential sensitive receivers include:

- residents, pedestrians and road users
- industrial warehouse and development sites

- primary production properties.

Construction impacts

During construction, the following activities would potentially generate air emissions and dust which could impact air quality:

- emissions from machinery, equipment and vehicles used during construction
- dust generated by construction vehicles travelling on disturbed/unsealed access routes, prior to installation of the sealed access road
- during excavation and stockpiling.

During construction, dust and exhaust gases (air emissions) could impact the air quality and amenity of nearby sensitive receivers, and would be influenced by atmospheric conditions. Construction work and restoration of disturbed areas will be undertaken progressively. This will minimise potential air quality impacts and reduce the exposure of any one sensitive receiver to air emissions. These potential air quality impacts will be localised and short-term in nature, and unlikely to have a significant impact with the application of the environmental mitigation measures.

Operational impacts

The proposal has been designed with appropriate ventilation and odour management systems to avoid any operational odour impacts being experienced by sensitive receivers. Odour and corrosion modelling will be completed during detailed design of the project. The locations of vent shafts along the alignment will be determined during detailed design. In addition space has been allocated within the pumping station footprint for an odour control unit (OCU).

Ventilation of the sewer is essential, and maintenance holes will be equipped with educt and induct vents at maximum spacings of 400 m along the alignment. Vent shafts are designed to be close to existing or future open spaces where possible to reduce visual and odour impacts. Vent shafts are nominally sized with a DN300 shaft and height of 18 m, subject to confirmation by Sydney Water during detailed design.

During operation, wastewater maintenance holes and the pumping station may be opened when maintenance or repair works are required. This may result in odour impacts to nearby receivers which would largely be dependent on wind direction and strength. These impacts would be temporary in nature and appropriate safeguards would be implemented to minimise the potential for adverse impacts wherever possible.

During operation, the pumping station would require energy usage, and 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 relating to air and energy can be adequately managed, and residual impacts are expected to be minor.

Table 6-12 Environmental mitigation measures — air and energy

Mitigation measures
Use alternatives to fossil fuels where practical and cost-effective.
Track energy use as per SWEMS0015.28 Contractor NGER template.
Maintain equipment in good working order, comply with the clean air regulations of the *Protection of the Environment Operations Act 1997*, have appropriate exhaust pollution controls, and meet Australian Standards for exhaust emissions.
Switch off vehicles/machinery when not in use.
Implement measures to prevent offsite dust impacts, for example: • water exposed areas (using non-potable water source where possible such as water from excavation pits) • cover exposed areas with tarpaulins or geotextile fabric • modify or cease work in windy conditions • modify site layout (place stockpiles away from sensitive receivers) vegetate exposed areas using appropriate seeding.
Cover all transported waste.
Minimise the potential for odours through the following where possible: • select appropriate heights for vent stacks • install carbon canisters on existing air valves • minimise the number of open access chambers.

6.2.7 Waste and hazardous materials

Existing environment and potential environmental impacts

One of Sydney Water's corporate objectives is to increase resource recovery with an increasing portfolio of circular economy products and services. This includes reducing waste through recycling and re-use and encouraging our suppliers to minimise waste.

The proposal has the potential to generate the following waste streams:

- 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 that is not suitable for backfilling, from trenching and other excavations

- groundwater dewatered from excavations
- wastewater and drilling fluid generated from trenchless construction and the compound sites
- interim operating plan (IOP) tank and associated pipework and fittings.

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

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

Construction by trenchless methods will involve the use of drilling fluids. The drilling fluids that will be used will be an environmentally benign substance such as bentonite. The drilling fluids will be circulated through the trenchless section and then screened to remove drill cuttings. Any waste drill cuttings and drilling fluid will be tested, classified, treated and disposed of appropriately.

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

No hazardous wastes are expected to be generated. It is not expected that the proposal will involve managing hazardous waste or hazardous building materials (HBM). Should the works uncover asbestos or any other hazardous or contaminated material, it will be managed through the unexpected finds procedures in table 6.17 and the incident management plan.

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

Operational impacts

Operation of the proposal may generate minor volumes of waste during maintenance activities. Any wastewater overflow discharged would be in accordance with Sydney Water's EPL. 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 6-13 Environmental mitigation measures — waste and hazardous materials

Mitigation measures
Manage waste in accordance with relevant legislation and maintain records to show compliance eg waste register, transport and disposal records. Record and submit SWEMS0015.27 Contractor Waste Report.
Provide adequate bins for general waste, hazardous waste and recyclable materials.
Minimise the generation of waste, sort waste streams to maximise reuse/recycling in accordance with the *Waste Avoidance and Resource Recovery Act 2001*.
Manage waste and excess spoil in accordance with the NSW EPA 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.
Minimise stockpile size and ensure delineation between different stockpiled materials.
If fibro or other asbestos containing material is identified, restrict access and follow Sydney Water's Asbestos Management – Minor Works procedure, Document Number 746607. Contact Sydney Water Project Manager (who will consult with Contamination and Hazardous Materials Team propertyenvironmental@sydneywater.com.au).
The 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 and potential impacts

The majority of the proposal is on private property, with some crossings beneath or running adjacent to several local and classified roadways, including the M12 Motorway (currently under construction) and Elizabeth Drive (State road). Partial and temporary road closures may be required during the construction where open trenching and/or excavation for pits is required within the road reserve. Sydney Water or the Contractor will consult with Council and TfNSW as required by the TISEPP to obtain any road occupancy licences required.

The proposal will require a construction workforce of up to 50 people with up to 27 light vehicles and 22 heavy vehicles on site at a given time. There will be very few vehicle movements during operation. The proposal will be accessed via existing local roads, a proposed permanent access road, temporary access tracks and informal access tracks through paddocks. The availability of street parking is not anticipated to be impacted during the works.

New access tracks will be required for SP1230. The proposed main access for SP1230 will be from Elizabeth Drive. Permanent access to the pumping station will include a dual lane all-weather sealed access road (min 8 m wide), with kerb and gutter plus surface and subsurface drainage systems (as required) to the nearest public road. A vehicle turning area designed to fit a 19 m semi-trailer will be provided at the pumping station. A minimum of four spaces for vehicle parking will be allowed for. Bollards shall be placed, where required, to protect the wet well, valve chamber, and above ground structures from vehicles.

Access to private property may be temporarily affected during construction of the pipelines. Properties will only be affected for a relatively short period of time. Some fence lines may need to be temporarily removed for access. Property owners will be informed of any potential loss of access and appropriate measures will be negotiated to either provide an alternative access or reinstate access at the end of the day. Any access ways or fences affected by construction will be reinstated to their original condition.

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.

Table 6-14 Environmental mitigation measures — traffic and access

Mitigation measures
Prepare a Traffic Management Plan (TMP) in consultation with the relevant traffic authority.
Meet NSW Roads and Maritime Service's Traffic Control at Worksites Manual v5 requirements for TfNSW roads. The Contractor will obtain a Road Occupancy Licence (ROL) from TfNSW, including if works are within 100m of traffic signals when construction commences.
Minimise traffic impacts near residential properties, schools and businesses by consulting with them (eg no major materials deliveries at school drop off or pick up times etc.).
Manage sites to allow people to move safely past the works, including alternative pedestrian, bicycles, pram and wheelchair access.
Consult with the relevant traffic authority about managing impacts to pedestrian traffic, signposting, meters, parking, line-marking or if traffic control or pavement restoration is required.
Erect signs to inform road users of the proposed works and any temporary road closures.
Ensure work vehicles do not obstruct vehicular or pedestrian traffic, or private driveway, public facility or business access unless necessary and only if appropriate notification has been provided.
The Contractor must consult with the M12 constructor about traffic management in and around the M12 construction corridor.

6.2.9 Social and visual

Existing environment and potential impacts

The existing visual environment is representative of a rural-residential area interspersed with areas of new development including residential estates, road construction and upgrades, and Western Sydney Airport (WSA) west of the proposal. Residential properties are predominantly single or double story detached dwellings on acreage lots. The proposal is currently within a rural-residential area, however future changes anticipated for the area include employment, industry, and higher density residential growth.

The proposed wastewater infrastructure is located within 200 m of several light industrial or agricultural businesses including Cleanaway Kemps Creek Resource Recovery Park, Gill Roadways Logistics Company Sydney and Joe Ducks & Chickens. The study area is also surrounded by rural, rural living and/or agricultural lots, and lots undergoing earthworks for future growth, including the development of the USC AWRC.

The proposal could potentially impact on social amenity in a variety of ways, some of which have been assessed in other sections of this REF:

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

The proposal will have an overall positive impact on the community by providing a wastewater network that supports the growth of the precincts and establishment of new jobs in Western Sydney.

Construction impacts

During construction, there would be temporary impacts on visual amenity from equipment, generation of waste and construction activities such as earthworks within the study area. There will also be some temporary visual impacts associated with the establishment of site compounds and worksites during construction. These temporary visual impacts would be mitigated in consultation with stakeholders, such as council and residents, and the mitigation measures listed below.

Following the completion of the works, all items associated with construction would be removed and the site would be remediated. Disturbed areas would be rehabilitated to pre-existing condition or better, as far as practicable; however, restoration, such as revegetation, may take a longer period to become established. Restoration of work areas would ensure that the potential for long term adverse visual impacts is minimised. Overall, potential impacts on social and visual amenity are considered minor as the works would be temporary and short-term.

Operational impacts

The works will involve the construction of new, permanent above ground structures, including the pumping station building and vent stacks. Considering the future use and growth of the precincts, these new above ground structures are not expected to significantly impact the visual character of the environment. Rather, once operational, the proposal would have significant social benefits,

enabling the development of the region by providing a wastewater network that supports planned growth in Western Sydney.

The pumping station will be landscaped to minimise any permanent visual impacts. The pipelines will be entirely underground and will not be visible. There will be a positive social impact during operation by capturing and transferring wastewater for treatment.

Mitigation measures

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

Table 6-15 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 (eg retain existing vegetation where possible).
Direct artificial light away from sensitive receivers where possible (ie residents, fauna or roadways).
Maintain work areas in a clean and tidy condition.
Site restoration including roads, verges and vegetation is to be performed in consultation with private property owners and council.
Continue to consult with key stakeholders that are constructing infrastructure in the area with a view to coordinate works where practicable.
Regular engagement with the local community and relevant stakeholders will be performed in accordance with the project Community and Stakeholder Engagement Plan to manage any impacts and ensure the scope of works performed by Sydney Water is communicated accurately.

6.2.10 Cumulative and future trends

Potential environmental impacts

The proposal is located in an area that is subject to ongoing development associated with the precinct and growth planning in Western Sydney. Cumulative impacts are minimal given the small scale of the proposal relative to the overall works planned within the growth centre.

A search of the Department of Planning, Housing and Infrastructure Major Projects Planning Portal was undertaken and identified several urban release projects planned for the area.

Cumulative impacts with other local development occurring in the area may include:

- cumulative noise and air quality impacts from works being undertaken concurrently
- potential traffic management issues during construction
- increased waste production
- community construction fatigue resulting from works being undertaken simultaneously or concurrently.

The proposal is required to support the future population growth in the south west and as such facilitates the progression of residential developments in the locality. Implementing mitigation measures will reduce the scale and extent of any potential cumulative impacts.

During operation, minor increases in noise and traffic are anticipated due to maintenance activities of proposed infrastructure. However, with the rapid development of the broader region, these additions to the greater environment are considered negligible.

Future trends such as climate change were considered including factors such as bushfires, flooding, extreme heat, and extreme storm events that could impact the proposal. The proposal is unlikely to be impacted by future trends because most infrastructure is proposed to be located below ground or will be situated predominantly outside the 1% AEP flood level.

Mitigation measures

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

Table 6-16 Environmental mitigation measures — cumulative and future trends

Mitigation measures
Coordination of works with other ongoing or proposed developments would be required to minimise negative impacts or conflicts with construction scheduling.

6.2.11 General environmental management

Table 6-17 Environmental mitigation measures — general environmental management

Mitigation measures
Sydney Water's Project Manager (after consultation with Sydney Water's environmental and community representatives and affected landowners) can approve temporary ancillary construction facilities (such as compounds and access tracks), without additional environmental assessment or approval if the facilities meet the following principles: • limit proximity to sensitive receivers • no disruption to property access • no impact to known items of non-Aboriginal and Aboriginal heritage • outside high risk areas for Aboriginal heritage • use existing cleared areas and existing access tracks

Mitigation measures

- no impacts to remnant native vegetation or key habitat features
- no disturbance to waterways
- potential environmental impacts can be managed using the safeguards in the EIA
- no disturbance of contaminated land or acid sulfate soils
- will be rehabilitated at the end of construction.

The Contractor must demonstrate in writing how the proposed ancillary facilities meet these principles. Any facilities that do not meet these principles will require additional environmental impact assessment.

The agreed location of these facilities must be shown on the CEMP site plan and appropriate environmental controls installed.

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

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

- go/ no go areas and boundaries of the work area
- 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.

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

- predicted/onset of heavy rain during works
- spills
- unexpected finds (eg heritage and contamination)
- other potential incidents relevant to the scope of works.

All site personnel must be inducted into the IMP.

The Contractor must obtain a Scheduled Development Work Licence prior to construction of the proposal from the EPA. This REF must be submitted to the EPA as part of the application.

Works within the M12 construction boundary and/or within the area subject to the M12 – Central Environment Protection Licence (EPL no. 21596) must not affect the ability of Transport for NSW and its contractors to comply with conditions of the EPL.

Where there is doubt, the Contractor is to contact the Sydney Water Project Manager and Environment Representative for further advice. If an impact occurs to any control or monitoring instrument associated with EPL no. 21596, Transport for NSW and its principal construction contractor (or relevant site contact) must be notified. The EPA must be notified immediately (or as soon as it is safe to do so) on 131 555 if any such impact has or will cause material harm to the environment.

Mitigation measures

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

Should the methodology or alignment change from the EIA, no further environmental assessment is required provided the change:

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

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

7 Conclusion

Sydney Water has prepared this REF to assess the potential environmental impacts of Badgerys Creek Wastewater Stage 2. The proposal is required to ensure Sydney Water is acting in accordance with the Sydney Water Act and providing the community with access to wastewater service options in compliance with its Operating Licence.

The main potential environmental impacts of the proposal are construction impacts such as erosion and sedimentation, Aboriginal heritage impacts, vegetation removal, noise and dustemissions, and traffic impacts. During operation, the main potential impacts are associated with air quality and visual amenity. 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.