Greater Parramatta and Olympic Peninsula Water Cycle Management

Environmental Impact Statement – SSI 74258485

February 2026

Acknowledgement of Country

Sydney Water respectfully acknowledges the Traditional Custodians of the land and waters on which we work, live and learn. The project is on the land of the Wangal and Wallumedegal clans. Their lore, traditions and customs have nurtured and continue to nurture the water, creating wellbeing for all. We pay respect to Elders past and present.

Executive summary

1 Project overview

What is the project?

Sydney Water is proposing to construct and operate a new water resource recovery facility (WRRF) and associated infrastructure at Camellia-Rosehill. The WRRF would divert wastewater from the Northern Suburbs Ocean Outfall Sewer (NSOOS) via the Camellia pumping station and produce advanced treated water which would be released locally to the Parramatta River. The WRRF and associated infrastructure together form the Greater Parramatta and Olympic Peninsula (GPOP) Water Cycle Management project (the project).

EIS process

This project is State significant infrastructure (SSI) and approval for the project is required under section 5.14 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Sydney Water has prepared this Environmental Impact Statement (EIS) in accordance with Preparing an Environmental Impact Statement – Appendix B to the SSI Guidelines (DPE 2022a). The EIS addresses the Planning Secretary's environmental assessment requirements (SEARs) issued by the NSW Department of Planning, Housing and Infrastructure (DPHI). Approval for the project is required from the Minister for Planning and Public Spaces.

Sydney Water has considered various options to meet the future wastewater servicing needs of the region. The proposed new WRRF at Camellia-Rosehill and associated infrastructure was preferred and a preliminary design (known as a reference design) was prepared. This EIS describes Sydney Water's assessment of the potential impacts of the preferred option on a broad range of environmental and community factors. In addition, the EIS sets out how those impacts are avoided, minimised or effectively managed.

This EIS is one step in a broader approvals process. It provides the information that will allow DPHI, other NSW and local stakeholders and the community to understand and assess the project, ask questions and raise concerns. The EIS will be placed on public exhibition, which gives all stakeholders and the community an opportunity to review the findings and make submissions. If approved, DPHI will provide conditions by which the project must be constructed and operated. Figure ES 1 shows the key steps in this approvals process.

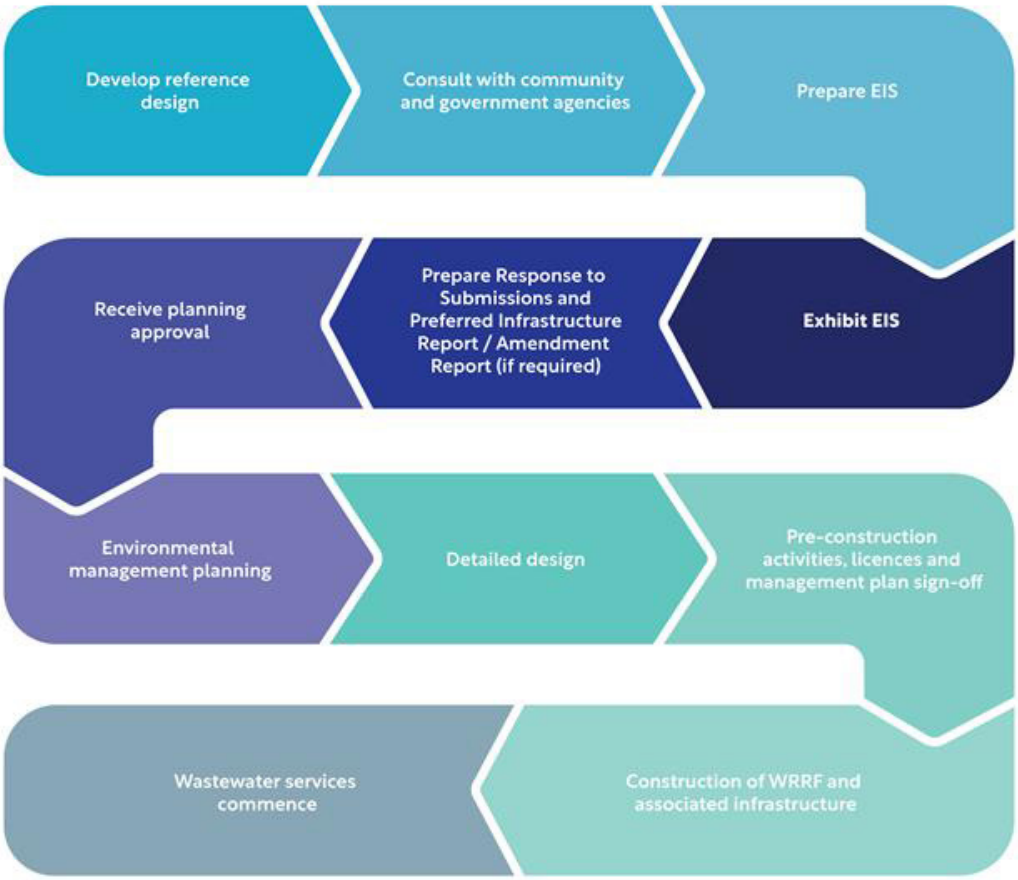


Figure ES 1: Planning approvals process

What is included in this executive summary?

This executive summary includes:

- Section 1: Project overview
- Section 2: Why is the project needed?
- Section 3: What alternatives were considered?
- Section 4: What is the project?
- Section 5: How have community and stakeholders been involved?
- Section 6: What are the main impacts?
- Section 7: How would environmental impacts be managed?
- Section 8: Evaluation.

2 Why is the project needed?

Sydney's population is growing. To help manage future housing and commercial development and ensure that Sydney can meet the future needs of the population, significant investment is required to improve existing and deliver new infrastructure.

Sydney Water owns and manages an expansive wastewater system. Wastewater is collected from houses and businesses and transferred by a network of pipelines and pumping stations to one of Sydney Water's 30 WRRFs for treatment. The Northern Suburbs Ocean Outfall Sewer (NSOOS) and North Head WRRF are one of the largest wastewater treatment systems in Sydney Water's network and forms the northern suburbs wastewater system. Approximately 75% of wastewater currently generated in the GPOP area and surrounds is transferred by the NSOOS to the North Head WRRF.

As Sydney's population grows and demand for wastewater management increases, the pressure on the NSOOS and treatment capacity at the North Head WRRF will increase. Capacity in the northern suburbs wastewater system is expected to be reached around 2031. The proposed WRRF at Camellia-Rosehill is needed to:

- reduce wastewater flows into the NSOOS and North Head WRRF, relieving operational constraints, minimising network wide risks of overflows into the environment and ensuring compliance
- future-proof the wastewater network to manage flows generated by the growing population
- implement advanced wastewater treatment methods that contribute positively to the environment.

3 What alternatives were considered

Sydney Water completed a comprehensive options analysis to identify the best strategic option to achieve the project objectives. These options are summarised in Table ES 1. Sydney Water also considered options relating to project location, pipeline alignments, release location and more. The various options considered for these project elements are summarised in Table ES 2. Avoiding or minimising social and environmental impacts, while maximising project benefits, were key considerations in the options analyses.

Table ES 1: Strategic options considered for water cycle management

Strategic option	Description
'Do nothing' option	Failure to increase capacity within the northern suburbs wastewater system would: • jeopardise housing and commercial development • overload the system, resulting in non-compliances with existing environment protection licence conditions • increase the risk of uncontrolled releases from the NSOOS causing unacceptable public health and environmental outcomes. As a consequence of not providing essential wastewater services, Sydney Water would be in breach of its operating licence requirements.
Duplicate the NSOOS and expand the North Head WRRF	This option was found to be unsuitable to address Sydney's future wastewater needs. This was due to: • significant financial costs and environmental and social impacts associated with duplicating the NSOOS • Commonwealth and State heritage areas and significant ecological values limit the potential to increase treatment capacity of the North Head WRRF. These limitations would hinder Sydney Water's ability to expand the existing wastewater system. This option also prevents the ability to provide for future recycled water uses.
Construct a new WRRF	Sydney Water's preferred strategy is to construct a new WRRF that produces advanced treated water for river release in the medium-term, with flexibility to transition to potential recycled water options in the long-term. As well as providing sustainable solutions and an adaptable pathway, the project provides the highest benefit with lowest cost to enable housing and commercial development in the GPOP area, and capacity in the northern suburbs wastewater system.

Table ES 2: Design options considered for the project

Project element	Description
WRRF location	Camellia-Rosehill was identified as the preferred location for a new WRRF as it is strategically located within the GPOP area and provides the opportunity for centralised servicing to the area. The Camellia-Rosehill industrial precinct comprises large parcels of land that will retain its heavy industrial land zoning. Given the size of the lots and the adjacent compatible land uses the area was deemed a suitable location for a new WRRF. Several land parcels within the Camellia-Rosehill industrial precinct were investigated. Sydney Water chose the proposed WRRF site as it had less contamination compared to other options, was a suitable size to cater for future development, had no existing house or leases for existing businesses and had opportunities to enhance amenity.
Upgrade to Camellia pumping station	Camellia pumping station was chosen to relieve the capacity constraints within the northern suburbs wastewater system because it is the largest pumping station within the system. Therefore, flow diversion from Camellia pumping station would considerably reduce flows into the NSOOS and North Head WRRF. To enable bi-directional flow at the pump station and transfer of wastewater to the Camellia-Rosehill WRRF as well as to the NSOOS, upgrade works at the pumping station are required, as detailed in Section 3.5.
Pipeline sizing and alignments	Several alignment options were considered for the transfer, brine and river release pipelines. Alignments were assessed against criteria such as property and road impacts, community concerns, environmental constraints (including potential contamination) and cost. During early design stages, Sydney Water sought opportunities to select or refine the pipeline footprint as far as practical to minimise environmental impacts, particularly on biodiversity and heritage, and address matters raised by stakeholders. In areas with environment and heritage constraints, Sydney Water has sought to narrow these corridors where possible or use trenchless construction methods to avoid and minimise impacts. Sydney Water has also sought opportunities to repurpose existing infrastructure to minimise cost and environmental impacts.
Release location	Several potential sites were assessed for the release location including Bedlam Point at Gladesville, Pulpit Point at Hunters Hill, Wentworth Point and John Whitton Bridge at Meadowbank. Evaluation criteria included water quality and mixing ability, potential for sediment disturbance, visual impacts, flood impacts, public safety, ferry operations, marine (i.e. river) activities, construction access and impacts, maintenance requirements and cost. A river release at John Whitton Bridge scored best against these criteria and was selected as the preferred release location. The river here is sufficiently deep presenting a lesser risk to water quality and marine traffic. Land-based areas for construction are available on either side of the bridge, at Meadowbank Park.

4 What is the project?

The overall project

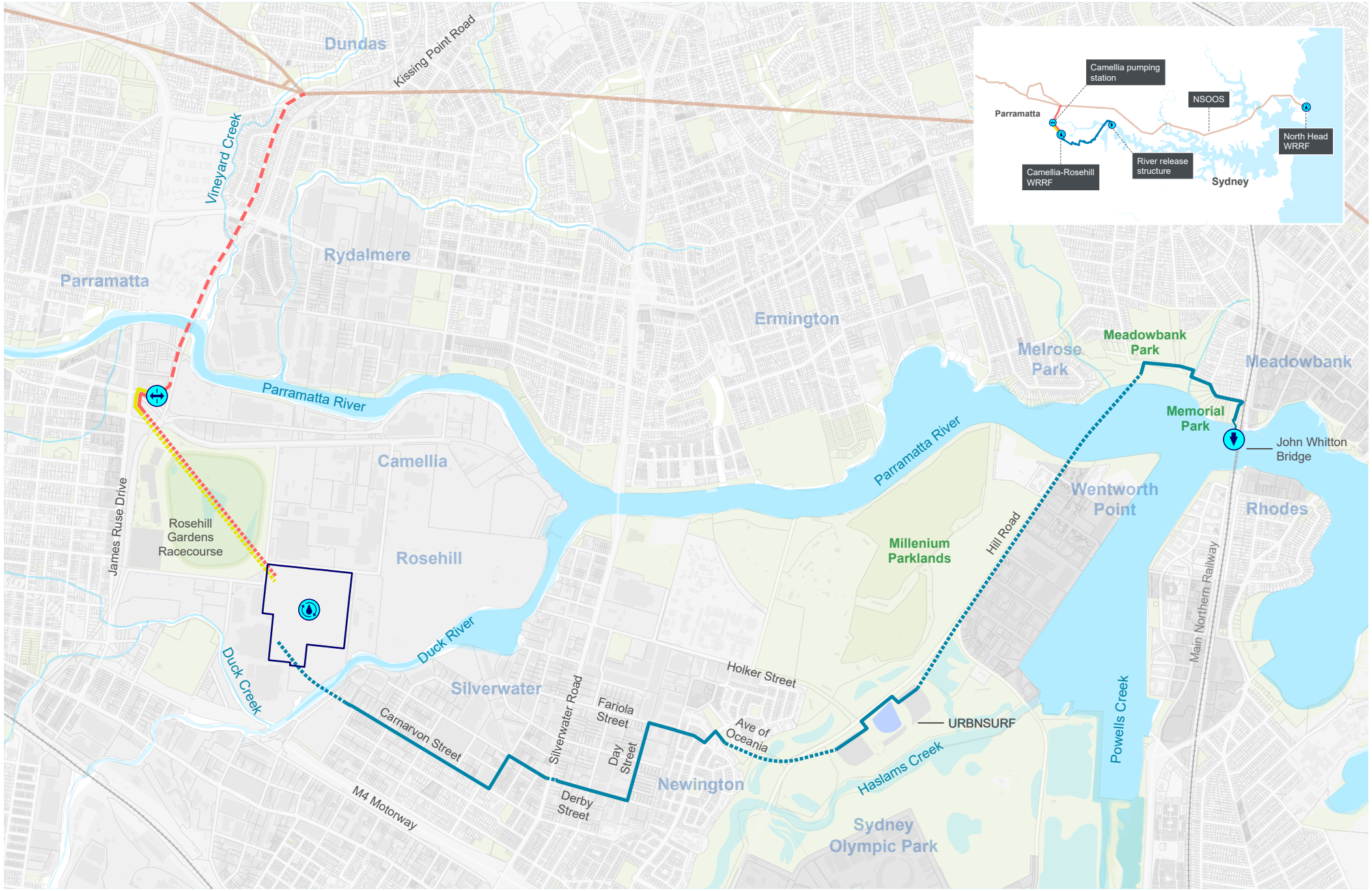
Sydney Water is proposing to construct and operate a new WRRF at Camellia-Rosehill. The new WRRF is needed to provide additional wastewater capacity to support housing and commercial development across Sydney, and in the GPOP development corridor.

The project includes:

- a new WRRF within Camellia-Rosehill to treat wastewater and produce advanced treated water
- upgrades to the existing pumping station at Camellia
- a new wastewater transfer pipeline from the Camellia pumping station to the WRRF
- a new brine pipeline and relining of an existing pipeline to transfer brine from the WRRF to the NSOOS
- a new river release pipeline to transfer advanced treated water from the WRRF to Parramatta River
- a new river release structure in Parramatta River at Meadowbank
- a range of ancillary infrastructure.

Construction for the project is planned to start in 2028. The project would operate 24 hours per day, 7 days per week from 2031.

The EIS includes a detailed project description outlining the component infrastructure for the project, including the ancillary infrastructure and temporary works required to enable the efficient delivery of the project. Figure ES 2 shows an overview of the project and key project components.



Camellia-Rosehill WRRF
Camellia pumping station
River release structure

Proposed pipelines
Brine pipeline
Transfer pipeline
River release pipeline

Pipeline construction method
Open trench
Trenchless
Relining

Northern Suburbs Ocean Outfall Sewer (NSOOS)
Railway

Figure ES 2 Project overview

0 500 1000 1500 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

N

WRRF

The proposed WRRF is located within Camellia-Rosehill and would have capacity to treat 70 megalitres per day (ML/day). The WRRF would produce advanced treated water to minimise impacts on Parramatta River. In addition to the advanced treated water, the reverse osmosis (RO) treatment process within the WRRF would generate brine as a by-product.

The main components of the WRRF include:

- inlet works
- primary, secondary and tertiary wastewater treatment process units
- advanced treatment processes involving reverse osmosis
- disinfection systems
- biosolids handling facilities
- odour control facilities.

The WRRF would require a range of process infrastructure such as tanks, bioreactors and digestors. The operation of the WRRF would also require ancillary facilities and infrastructure such as an administration building, associated car park, chemical storage and stormwater infrastructure.

Camellia pumping station

The existing Camellia pumping station would be upgraded to divert wastewater to the WRRF. Upgrades would include the installation of new pumps to deliver wastewater flows to the new WRRF. Existing pumps would continue to pump excess existing flows and brine produced by the WRRF to the NSOOS. Upgrades would also include a new electrical switch room building.

Pipelines

The transfer pipeline is about 2.2 kilometres (km) and would transfer wastewater from the Camellia pumping station to the WRRF for advanced treatment.

The advanced treated water would be transferred via the river release pipeline for release to the Parramatta River at John Whitton Bridge.

The proposed river release pipeline is approximately 7.6 km long commencing at the WRRF and then traversing through the suburbs of Silverwater, Newington, Sydney Olympic Park and Meadowbank. The river release pipeline would release advanced treated water into the Parramatta River near John Whitton Bridge and Memorial Park at Meadowbank.

Above ground infrastructure is limited to concrete bridge-style aerial crossings over minor waterways in Meadowbank Park, and an approximately 8 metre (m) high barometric loop located near the existing toilet block in Memorial Park.

The brine pipeline is approximately 4 km in length and would transfer brine from the WRRF to the NSOOS for treatment at the North Head WRRF and eventual release. The brine pipeline comprises a new pipeline between the WRRF and Camellia pumping station and an existing pipeline which would be reused between Camellia and the NSOOS.

Release structure

The proposed river release pipeline would split into 8 parallel smaller pipes below ground at Memorial Park. The 8 pipelines would enter Parramatta River to the west of John Whitton Bridge. These pipelines vary in length and connect to the multiport diffuser that would release water upstream of the John Whitton Bridge.

Construction timing

The construction phase of the project is expected to start in 2028. Construction would likely be staged progressively. The indicative timeframes for construction is included in Table ES 3.

Table ES 3: Indicative timeframe for construction of the project

Project element	Indicative timeframe for construction
WRRF	Q3 2028 – Q4 2030
Camellia pumping station upgrade works	Q2 2029 – Q2 2030
Transfer (2 pipelines) and brine pipeline (one pipeline)	Q3 2028 – Q3 2029
Brine pipeline (relining)	Q3 2028 – Q3 2029
River release pipeline	Q3 2028 – Q2 2030
River release structure	Q4 2029 – Q2 2030
Commissioning	Q4 2030 – Q4 2031

Placemaking

The project would contribute to improved urban design and landscape amenity outcomes for the Camellia-Rosehill precinct. The design of the WRRF would include:

- areas for landscaping along Devon Street and part of Unwin Street (along the front of the site)
- a façade that is creative, contemporary and contextually appropriate for the landscape and surrounding land uses.

During detailed design, Sydney Water would explore opportunities to reflect Aboriginal cultural heritage in the final design of the WRRF. This would be done in collaboration with members of the Aboriginal community.

Future stages

Sydney Water determines the capacity of its treatment plants using projected population and other demographic forecasts. As population growth can be unpredictable, Sydney Water needs to be flexible and design treatment plants so they can be easily upgraded to cater for increased populations before they arrive.

The Camellia-Rosehill WRRF has been designed to safeguard for potential future expansions. During operation, the project would treat 70 megalites per day (ML/day) of wastewater based on current population growth projections to 2056. The site layout and pipeline infrastructure has been designed to safeguard the ability for Sydney Water to expand the treatment capacity of the site if required. In the future, the Camellia-Rosehill WRRF may be able to accommodate flows of up to 150 ML/day, depending on future population growth and treatment technology. Some of the pipelines proposed for the project would be sized to manage increased future treated flow volumes. This is a proactive and cost-effective approach in safeguarding Sydney Water's wastewater network to manage future housing and commercial development.

This EIS assesses the impacts associated with the treatment of 70 ML/day of wastewater. Increases to the treatment capacity and potential associated infrastructure do not form part of this EIS and would be subject to a separate approval.

5 How have community and stakeholders been involved?

How has Sydney Water consulted?

Sydney Water first began actively engaging stakeholders with the potential to be impacted by the project, or who have interests in the project in 2017. These activities are summarised in Figure ES 3 below and fully detailed in Chapter 5 (Engagement) of the EIS.

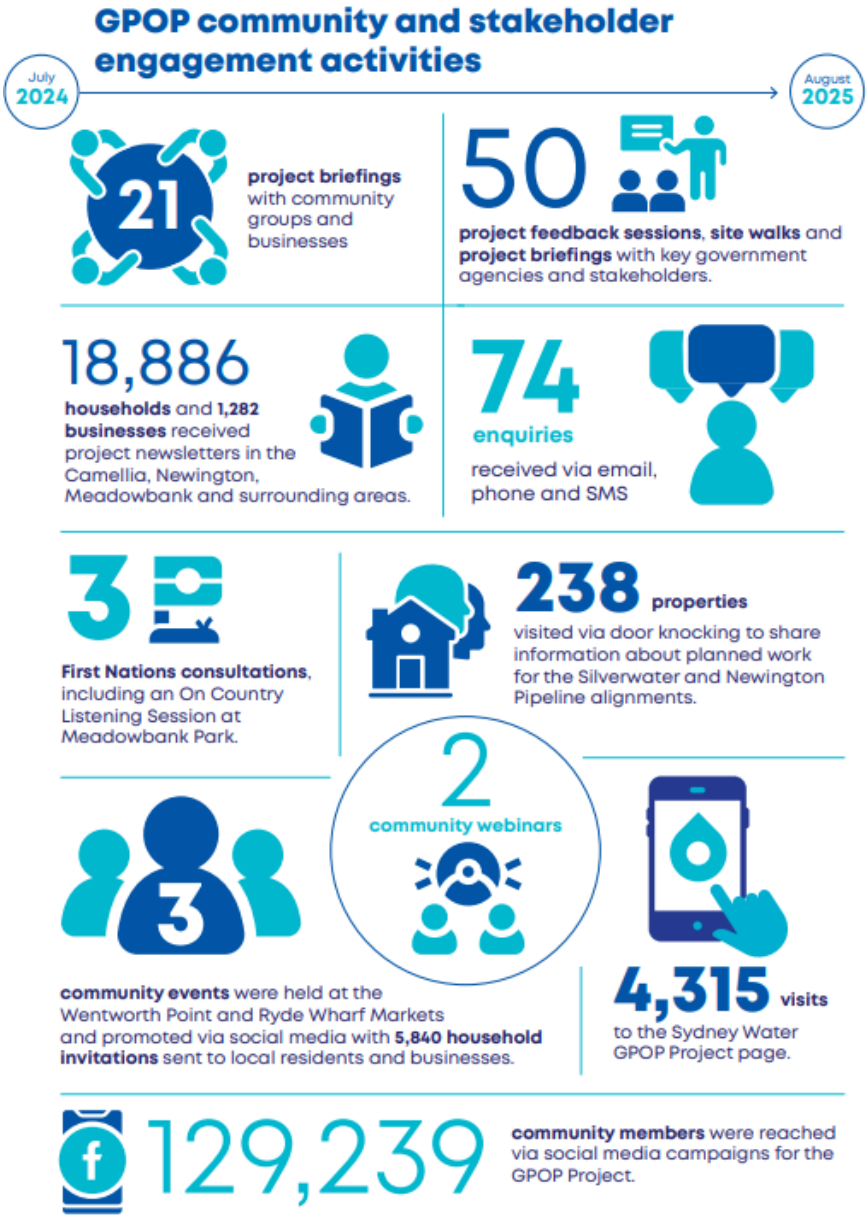


Figure ES 3: Summary of community and stakeholder engagement

Key issues that were raised

Sydney Water consulted with NSW government agencies, local councils, interest groups, local communities and directly affected landowners. The main issues raised included:

- management of construction impacts (including traffic and noise)
- reduced amenity and impacts to way of life from temporary loss of open public spaces
- cumulative impacts with other projects and construction fatigue
- flooding in the Camellia-Rosehill precinct
- quality of water to be released in the Parramatta River
- potential effects on swim sites in the Parramatta River.

This input has already informed and influenced the project, and consultation will continue to inform the project as it progresses to more detailed stages of design. Input from stakeholders and the community is also key in developing the design and construction methodology and construction management documentation. It allows Sydney Water to ensure detailed construction methodologies and management are designed with input from those directly affected. In response to feedback received on the project to date, Sydney Water has made a number of design and constructability changes. These changes include (but are not limited to):

- adjusting construction hours to suit preferences of residents and businesses
- locating pipeline infrastructure either below ground or adjacent to existing infrastructure and roads to minimise property and environmental impacts
- adjusting the alignment of the proposed pipelines to avoid impacts to heritage, including:
  - areas of known Aboriginal cultural heritage value, as well as known Aboriginal heritage objects and sites
  - areas of known archaeological potential
  - sites with non-Aboriginal heritage significance, including the grave of Eliner Magee and Child (Parramatta Local Environmenta Plan 2023) (I7)
- revising the construction methodology for Meadowbank Park, specifically:
  - limiting the size of construction compounds to cover one sportsfield rather than multiple
  - co-locating the river release pipeline along the existing waterway crossings at Vineyard Creek and Charity Creek to reduce visual impacts
  - adjusting the pipeline installation methodology to open trenching which can be carried out faster than trenchless methods.

Sydney Water will consider feedback raised by stakeholders and the community during exhibition of this EIS. Following exhibition of the EIS, Sydney Water will review all submissions received and prepare a Submissions Report. The Submissions Report will detail how Sydney Water has considered the submissions that have been received. If changes to the project are required as a result of issues raised in submissions, Sydney Water will prepare a Preferred Infrastructure Report and/or an Amendment Report.

6 What are the main impacts

The EIS assesses the project's impacts on a broad range of environmental aspects. For each environmental aspect, Sydney Water and a series of expert specialist consultants completed an assessment of the project's potential impacts. The assessment is in line with existing guidelines and the SEARs issued by DPHI.

Each assessment includes identification of the impacts, an assessment of their significance and a description of the actions that were taken to either avoid or minimise the impacts. Where impacts could not be avoided, mitigation measures have been identified to manage residual impacts to acceptable levels. Specialist consultants have developed these measures based on best practice, guidelines and industry standards. The proposed measures therefore represent Sydney Water's best understanding of the most effective way to manage residual impacts.

Waterways assessment

The project is located in the Parramatta River catchment. The waterways in this catchment have been subject to historical impacts associated with urban and industrial land use. The water quality in the Parramatta River is generally poor, with elevated levels of nutrients and gross pollutants entering the waterway. But it is also an important recreational waterway, particularly for the western suburbs of Sydney.

Receiving water

Advanced treated water would be released into the Parramatta River during operation. Water quality impacts are predicted to be predominantly positive. Predicted improvements generally consist of lower concentrations of nutrients, chlorophyll and pathogens, as well as minor elevations in concentrations of dissolved oxygen.

Tertiary treated water would also be released into the Parramatta River when the advanced treatment process is offline temporarily due to power outage or maintenance. Potential risks for short-term deterioration of water quality were predicted. However, the effects of these infrequent short-term releases are expected to be assimilated relatively rapidly within the river.

Predicted impacts from the releases were compared to project specific waterway objectives. While some minor impacts to water quality are predicted, on balance, the treated water releases to Parramatta River are expected to maintain and protect the waterway objectives. Sydney Water would implement a post-commissioning monitoring program to monitor treated water quality and the ambient water quality of the Parramatta River.

Surface water

Excavation and earthworks during construction at the WRRF site and along the pipeline alignments have the potential to cause localised erosion and increased sediment loads to local waterways. Construction of the river release structure may disrupt and mobilise contaminated sediments into the water column of the Parramatta River, and impact water quality within the river. In addition, any accidental chemical spills or inappropriate management of waste have the potential to result in other contaminants entering waterways. These

construction impacts can be effectively managed through standard erosion and sediment control and spill mitigation measures.

Pipelines would be designed and maintained to avoid leaks during operation. The operation of the pipelines and release structures would have limited potential to cause surface water impacts. For this reason, the assessment focuses on impacts related to the operation of the WRRF.

The WRRF would increase the extent of impervious surfaces on the site, which could increase runoff and pollutant loads to Duck River. However, Sydney Water has modelled the water balance at the WRRF site and the effectiveness of stormwater management measures in managing additional runoff and pollutant loads. The stormwater management measures would include roof drainage for all buildings, foul water system, gross pollutant traps and first flush capture. By implementing these measures, pollution load reductions in surface runoff are expected and project specific waterway objectives would be protected and maintained.

Geomorphology

The catchment has a long history of significant industrial land use, contributing to contaminated sediments from discharge of harmful substances into the waterway, particularly in Homebush Bay. Known sediment contaminants include dioxins, furans and heavy metals. Over time, the contaminated sediments have been remobilised throughout large parts of the Sydney estuary by hydrodynamic processes, caused by tides, high winds and flood events.

Construction of the river release structure has the potential to impact geomorphic attributes of the Parramatta River. The geotextile mattress (or similar performing structure) would be laid on the riverbed prior to placement of the river release structure. This would prevent any disturbance of underlying sediments and permanently cap those materials in place. Any residual increase in sediment load caused by the construction would be comparable to sediment loads generated at Meadowbank by existing waterway processes such as high winds and tides. Overall, the potential impacts to sediment mobilisation are not expected to be significant and can be adequately managed through the implementation of mitigation measures.

During operation, the release of treated water may increase flow volumes in the Parramatta River, which may potentially impact on geomorphic attributes of the river. Modelling indicates that it is highly unlikely that the river release would contribute to any detectable change in the sediment transport regime of the Parramatta River, both upstream and downstream of the river release structure. The risk of contaminated sediment remobilisation is also low due to the placement of a geotextile mattress (or similar performing structure) beneath the river release structure.

Aquatic biodiversity

Key aquatic habitats identified within the project include Parramatta River, Duck River and Vineyard Creek, which are all mapped as Key Fish Habitat (KFH). No species of threatened or protected species of fish, marine mammals or reptiles were identified as being likely to occur within or in the vicinity of the project.

Potential construction impacts include direct disturbance to aquatic and riparian habitats (including KFH), temporary mobilisation of sediments and legacy contaminants (including metals and dioxins), changes to water quality, and localised disturbance from work vessels. The project would result in the permanent loss or alteration of existing habitats with presence of construction equipment. These areas are small in scale, of generally low ecological value or represent already disturbed environments. Potential indirect impacts to waterways and aquatic biodiversity, including increased turbidity, mobilisation of contaminants, and risks associated with acid sulfate soils, can be effectively managed through standard construction safeguards (such as sediment containment), site-specific management plans, and targeted monitoring of contaminants.

During operation, the presence of the river release structure on the riverbed would alter the existing soft sediment habitat. This is expected to increase habitat complexity and may provide surfaces for colonisation by sessile organisms. Release of treated water would also provide local improvements in the water quality of the Parramatta River. These improvements generally consist of lower concentrations of nutrients, pathogens and algal biomass, as well as higher levels of dissolved oxygen. These are expected to have improvements in aquatic health, KFH and biodiversity.

Providing that all mitigation and management plans are implemented, the project is not expected to result in significant adverse impacts on aquatic biodiversity or sensitive environmental values of the Parramatta River and its tributaries.

Flooding

The project is not expected to significantly alter flooding conditions. The Camellia-Rosehill WRRF has been designed to be above the projected 1% annual exceedance probability (AEP) event (with the consideration of future climate change). Flooding impacts resulting from the operation of the project are generally predicted to be minor across all flood events, including the Probable Maximum Flood (PMF) and 1% AEP events under climate change scenarios.

There is potential for changes to flooding behaviour in Charity Creek and unnamed Creek in Meadowbank Park as a result of the proposed aerial crossings over both waterways. Sydney Water would continue to refine the design of the aerial crossings to prevent impacts associated with flooding in these waterways.

Flooding impacts during construction are expected to be minor. Some construction compounds are located in high flood hazard areas. These risks would be managed through site-specific flood mitigation measures and during detailed construction planning.

Soils and contamination

There are a number of sites across the project area that are contaminated. The most common contaminants include asbestos, heavy metals, hydrocarbons and acid sulfate soils. During construction, some disturbance of contaminated soil would be required. With the implementation of appropriate mitigation measures the environmental and human health risks would be low.

Sediments containing zinc and dioxins were found in the Parramatta River at the John Whitton Bridge in the general location of the river release structure. The design of the river release structure has been developed to avoid disturbance of these sediments.

Contaminants are also found in soil on the WRRF site. Remediation works have been carried out by the previous land owner. Sydney Water has carried out further environmental management works under a separate planning approval to manage residual contamination. Residual contamination would be managed through long-term environmental monitoring plans (LTEMP).

Groundwater

The project has been designed to avoid and minimise impacts to groundwater. Construction methods proposed as part of the design would reduce interaction with groundwater, including the use of trenchless methods to cross sensitive environments, such as Duck River and the Parramatta River.

Much of the groundwater in the project area is contaminated, with acid sulfate soils also present, requiring careful management and disposal. Where groundwater interaction and drawdown may occur, it is expected to be minor and temporary in duration until the installation of pipeline infrastructure is complete. Excavation for construction of the project would require dewatering of approximately 5.2 ML of groundwater. No impact to groundwater dependent ecosystems are predicted during construction. Sydney Water would implement the mitigation measures proposed to manage potential impacts to groundwater during construction.

The risks associated with any potential operational groundwater impacts are considered low. No groundwater take is required during operation of the project, and no drawdown associated impacts to groundwater dependent ecosystems, waterways or nearby users are anticipated. Project operation is unlikely to cause perceptible change to regional groundwater systems.

Terrestrial biodiversity

The project has been designed and located to avoid and minimise impacts on native vegetation where possible.

During construction, the project would remove up to 4.97 hectares (ha) of native vegetation. Most of this is planted native vegetation (about 4.78 ha), with minimal impacts to threatened ecological communities (about 0.18 ha). Most of the impact area represents marginal and disturbed habitat for threatened species. Sydney Water would offset these impacts, in accordance with the NSW Biodiversity Offset Scheme.

Construction of the river release structure in the Parramatta River is within habitat mapped as important to the endangered Curlew Sandpiper and Bar-tailed Godwit. Impacts are unlikely given the high level of existing maritime traffic. Foraging habitat would not be directly impacted.

Operation of the project is expected to have minor or negligible impacts on terrestrial biodiversity.

Sydney Water would implement a range of management measures to minimise terrestrial biodiversity impacts including pre-clearance surveys, delineating no-go zones to protect vegetation and restoring areas where native vegetation is removed.

Noise and vibration

Noise would not exceed noise management levels during the construction of the Camellia-Rosehill WRRF or during Camellia pumping station upgrades. However, during construction of the pipelines, construction noise would exceed both standard and out of hours noise management levels. Exceedances would occur predominately in the areas of Rosehill, Silverwater, Newington, Melrose Park and Meadowbank. These results are representative of the worst case of construction works. Pipeline installation work is progressive in nature and is expected to progress at a rate of about 10 m – 25 m per day. As a result it is expected that the highest noise and vibration impacts would be experienced while construction works are occurring near receivers and that impacts would reduce as works move along the impact area. This means that not all receivers would be impacted at the same time and there is the potential that the actual noise levels would be less than those predicted.

The worst-case assessment also assumes that the noisiest pieces of equipment are being used continuously through the day or night. In reality, it is not likely that noisy equipment would be used continuously.

Management measures included within the Noise and Vibration Management Plan of the CEMP would be implemented to minimise impacts on identified sensitive receivers including non-residential receivers located in the surrounding areas.

During operation the predicted noise levels of the Camellia-Rosehill WRRF did not exceed trigger levels or sleep disturbance screening levels at sensitive receivers, including those identified in the Camellia-Rosehill Place Strategy (DPE, 2022a). Predicted operational noise levels of the upgraded Camellia pumping station were found to be consistent with current operation.

Traffic, transport and access

Construction traffic would increase average delay and queuing at the James Ruse Drive/Grand Avenue and Wentworth Street/Parramatta Road intersections during the AM and PM peaks (7 am to 8 am and 5:15 pm to 6:15 pm respectively). Mitigation measures have been identified to minimise these impacts. The Grand Avenue/Colquhoun Street intersection would continue to operate well during the AM and PM peaks, with minimal changes in delays and queuing lengths.

Various roads would be partially closed at different stages of project construction, with one lane remaining open. These roads include: Grand Avenue North, Carnarvon Street, Vore Street, Derby Street, Day Street, Fariola Street, Hill Road and Holker Street. A section of Meadowbank Crescent, Comaneci Avenue, and the northbound lanes on Newington Boulevard would also be temporarily closed during construction works. Potential detour routes have been identified to minimise impacts on commuters. Given the temporary nature of construction works, impacts from road closures are not expected to be significant.

Some properties along the river release and brine pipeline alignments and their compounds might be impacted by the project temporarily. Sydney Water would work with delivery contractors to ensure safe access in and out of affected properties as required. Construction workers would be advised to not impact driveways at these locations and property owners would be advised of construction works near their properties before they occur. Given the temporary nature of construction works, impacts to property access are not expected to be significant.

Parking for construction workers would be provided at the WRRF site. On-street parking is also available on nearby streets. Along the pipeline alignments, car parking may be provided within construction compounds. Open trenching works and the erection of some compounds would temporarily reduce car parking availability, including on-street parking opportunities. The compounds would only be set up for a short duration to minimise the impact to nearby businesses and commuters that use these parking spaces. If additional parking is required, construction staff may use on-street parking opportunities nearby. Workers would also be encouraged to use other forms of transport, such as car-pooling, public and active transport. Given the temporary nature of construction works, impacts to on-street parking is not expected to be significant.

Bus routes 533, 540 and 544, as well as several bus stops along the pipeline alignments, would be temporarily impacted by the project. Temporary detours would be required and bus stops may be temporarily relocated, subject to consultation with bus operators and Transport for NSW (TfNSW). Given the temporary nature of construction works, impacts on public transport are not expected to be significant.

Several shared paths near the project would be temporarily closed at different stages due to open trenching works and the erection of compounds. Pedestrians and cyclists would be detoured to other paths through signage and traffic controllers.

Ferries and other ships would be temporarily impacted by works for the river release structure and be required to detour around the work area for construction compound C30. The detour would be provided through signage at John Whitton Bridge and at the Meadowbank Ferry Wharf. Sydney Water would consult with the relevant ferry service operators around temporary changes to ferry services.

The project would be designed and constructed to facilitate access for special events at Rosehill Gardens Racecourse and Sydney Olympic Park (including Sydney Showground). Special event mitigation measures have been identified.

The operation of the project is not expected to have adverse traffic, transport or access impacts.

Non-Aboriginal heritage

Sydney Water would require excavation in the footprint of 3 non-Aboriginal heritage items to install the brine and transfer, and river release pipelines. The 3 items include:

- Rydalmere Hospital Precinct (former) (State Heritage Register Item no. 00749)
- Sewage Pumping Station 67 (State Heritage Register Item no. 01643)
- Memorial Park (including obelisk) and remnants of former Meadowbank baths (Ryde Local Environmental Plan (LEP) Item no. I72).

In the Rydalmere Hospital Precinct, relining of the existing rising main would minimise the extent of excavation required. Where excavation work is required, it would be isolated to the eastern boundary of the site and would primarily occur in existing roads and carparks where archaeological potential is low. Construction work would occur about 200 m from the significant built heritage features of the site and would not directly impact significant fabric. This item would experience little to no impact from the project.

There would be some direct impacts to built heritage at the Sewage Pumping Station 67 (the Camellia pumping station). Sydney Water would remove some existing pipework and pumps inside the building to accommodate new pump infrastructure. New electrical connections to the building would also be required. It is expected that some drilling would be required through heritage brickwork although Sydney Water would seek to minimise this wherever possible. The site has low archaeological potential and as a result, open trenching works for the brine and transfer pipeline would be unlikely to impact archaeology. This item would experience a minor adverse impact during construction of the project.

Open trenching for the river release pipeline would occur through the curtilage of the Memorial Park (including obelisk) and remnants of former Meadowbank baths. This work would avoid directly impacting significant features of the park, however, would result in a minor adverse impact. There is moderate potential for remnants of the Meadowbank baths to be present at Meadowbank Park and in the Parramatta River. This item would experience a minor adverse impact from the project.

All 3 items would experience temporary indirect visual impacts during construction.

In operation, there would be visual impacts to the sightlines from the curtilage of the Capral Aluminium site to the Camellia-Rosehill WRRF site. However, this would not change the setting of the area due to the surrounding industrial land uses. Upgrade of the Camellia pumping station would improve the pumping station overall and it would maintain its continued use. There are no impacts of the pipelines in operation except for views at Memorial Park due to the operation of the barometric loop. There would be opportunities to provide integrated visual screening for park users which may include vegetation or heritage interpretation.

Landscape and visual amenity

Visual and landscape character impacts during construction are associated with visible construction compounds, machinery and equipment, stockpiles and at some locations, vegetation removal. The duration of impacts would vary across the impact area and at some locations, impacts would be limited to just the construction phase. This is due to most of the project's operational infrastructure being located below ground or in buildings where it would not be visible from public areas.

The WRRF would be visible from Unwin Street, Devon Street and part of Colquhoun Street in Rosehill during operation. The visual impact would be low to moderate due to the facility being in an existing industrial area with compatible surrounding land uses. New landscaping would be delivered to enhance the street frontage at Unwin Street and Devon Street.

During operation, the barometric loop would be visible from multiple areas within Memorial Park. The barometric loop would be located adjacent to public footpaths within the park that link Meadow Crescent to the Parramatta River. Some vegetation within the Park would be required to be removed and would not be replaced in the same location. As a result, there would be a low-moderate visual impact at Memorial Park.

Social impacts

Various potential social impacts were identified during construction. These impacts broadly included changes to visual amenity, noise impacts, dust impacts, Aboriginal cultural heritage impacts and environmental health impacts. With the implementation of appropriate mitigation measures, no potential construction impacts would have a high risk.

No significant negative social impacts were identified for operation. The project's contribution towards delivering a resilient wastewater system for Sydney as well as the potential to deliver long-term benefits for the health of the Parramatta River is seen as a positive social impact.

Generally the community values the natural environment and waterways, including the Parramatta River, and recognise the importance of projects that promote environmental health. Community values also include a strong interest in recreation, sporting and wellbeing, as well as amenity and open spaces. Some members of the community are experiencing construction related fatigue due to a high number of current and future projects planned in the area.

Overall, while construction would temporarily affect local communities, the project would have positive long-term benefits, particularly regarding waterway health and water resilience.

Cumulative impacts

Potential cumulative impacts have been identified for the following technical areas:

- flooding
- contamination
- biodiversity
- air quality
- noise and vibration
- traffic, transport and access
- non-Aboriginal heritage
- landscape and visual amenity
- social and economic impacts
- waste.

Most potential cumulative impacts would be able to be adequately managed through the implementation of mitigation measures. The exception is for traffic, transport and access impacts in the Camellia-Rosehill precinct. This is due to the:

1. precinct being geographically constrained with limited access roads to the broader road network
2. number of other major projects occurring concurrently in the precinct.

The largest amount of potential cumulative impacts are associated with construction of Sydney Metro West Stage 3 (SMW Stage 3) and Parramatta Light Rail (PLR) Stage 2 . Both projects are expected to be in construction at the same time as this project. Ongoing engagement with Sydney Metro and TfNSW (regarding PLR) would continue.

Other impacts

Table ES 4: Other impacts

Other impacts	Summary
Air quality	Construction of the Camellia-Rosehill WRRF, upgrades to the Camellia pumping station and pipeline construction or relining works have the potential to generate dust. The impact area is predominately in sealed roadways with lower dust potential. While these works are adjacent to a high number of properties, due to the sealed nature of the impact area and the progressive nature of the works, dust impacts were considered manageable. Odour from operation of the Camellia-Rosehill WRRF would be mostly contained within the site. There are no sensitive receivers nearby that are predicted to be impacted by odour. Modelling undertaken also considered potential receivers in accordance with the Camellia -Rosehill Place Strategy (DPE, 2022a). Operation of the cogeneration units would also comply with air quality requirements.
Aboriginal heritage	There are several registered Aboriginal sites in proximity to the impact area. The project has been designed to specifically avoid these areas. The impact area has experienced significant disturbance associated with agricultural industry in the late 1800's, as well as urban, industrial and residential development from the early 1900's to current day. As a result, there is low potential for construction work to encounter archaeological remains. The project would not negatively impact Aboriginal cultural values during construction or operation. The project would have a positive impact on the Parramatta River and surrounding waterways which are recognised as having cultural value.
Waste	During construction of the project, the primary waste streams are expected to be generated from site preparation, use of the construction site offices, and construction works, such as building and installation of equipment. Waste would be temporarily stored in the construction compounds for on-site reuse or collection for off-site treatment or disposal. Excess spoil material generated during construction would be reused on-site where possible. Key waste streams expected to be generated during operation include brine, biosolids, dewatered screenings, dewatered grits, and general waste from operation and maintenance. Approaches embedded in the 'avoid, minimise, reuse' waste management hierarchy would be implemented to reduce the waste generated, and recycle wherever possible. The segregation,

Other impacts	Summary
	storage and transport of any residual waste would be carefully managed. Following the implementation of mitigation measures, the project would have low waste impacts.
Dangerous goods and hazardous development	The storage of dangerous goods during construction is not expected to exceed storage thresholds outlined in the State Environmental Planning Policy (Resilience and Hazards) 2021. However, during operation, a number of chemicals stored at the WRRF would exceed the storage thresholds. Several worst-case hazard scenarios were assessed for the project. This included the unlikely event of an explosion associated with the digester gas holder which was assessed to potentially injure people located within 120 m of the digester gas holder. However, off-site building damage, structural damage, and fatalities are not expected to occur. A leak of biogas due to a hole or broken valve could result in a fire. The consequences of this would be contained on-site. Following implementation of appropriate mitigation measures, all scenarios would carry a negligible off-site risk to current and future land uses and would have a low probability of occurring. Therefore, the project is unlikely to have any impact on off-site receivers, including the nearby dangerous goods pipelines and major hazards facility.
Human health	With the implementation of appropriate environmental management and monitoring, the project would have negligible impacts to the health of the community during construction and operation. Potential impacts to human health have been assessed in regards to water quality, air quality, noise, soils, groundwater, safety and traffic, transport and access.
Sustainability and climate change	The project provides essential wastewater treatment services to Sydney. Sydney Water would seek to achieve sustainable outcomes by: • producing high quality advanced treated water which could be used for non-drinking recycled water purposes • facilitating pathways to long-term independent rainfall supply to meet population growth and community needs Through detailed design for the project, Sydney Water would seek to achieve: • a Silver IS Rating certification for design and as built stages • carbon reductions of at least 20% • solutions to reuse biogas for energy and heating • solar panels in the Camellia-Rosehill WRRF • 100% beneficial reuse of biosolids. The annual operational emissions of the project would not exceed the NSW Guide for Large Emitters (NSW EPA, 2025) for fuel consumption, vegetation clearance and electricity consumption.

Other impacts	Summary
Land use and property	Impacts to private properties have been minimised through the design of the project. Wherever possible, the design has prioritised locating infrastructure in land currently owned and operated by Sydney Water. Sydney Water acquired the Camellia-Rosehill WRRF site in 2024. The Camellia pumping station and surrounding property is currently owned and maintained by Sydney Water. Where it has not been feasible to use land owned by Sydney Water, the design has been adapted to prioritise locating infrastructure and construction within public roads and public parks as well as private and public car parking areas. Sydney Water's use of these areas would be temporary for the duration of construction work and would be subject to lease agreements with the relevant landowners and authorities. At the completion of construction, leased areas would be generally reinstated to their previous condition except where agreed with landowners. This would not include an area of Memorial Park at Meadowbank where the barometric loop is proposed to be permanently located. Sydney Water would continue to work with City of Ryde Council on the operational outcomes for Memorial Park. Where new pipeline infrastructure is proposed less than 9 m below ground, Sydney Water would carry out the acquisition of easements. Private residential properties are not expected to be subject to easement acquisition.

7 How would environmental impacts be managed?

Construction

After the EIS has been submitted and during detailed design, the construction contractor(s) would prepare a Construction Environmental Management Plan (CEMP) containing a series of sub-plans as shown in Figure ES 4. Many of these sub-plans may be reviewed and approved by DPHI as part of approval conditions. These plans would draw on the mitigation measures defined in the EIS and would be in place before construction starts. These plans would include roles and responsibilities, how the plans would be implemented and how they are to be communicated to everyone working on the construction of the project.

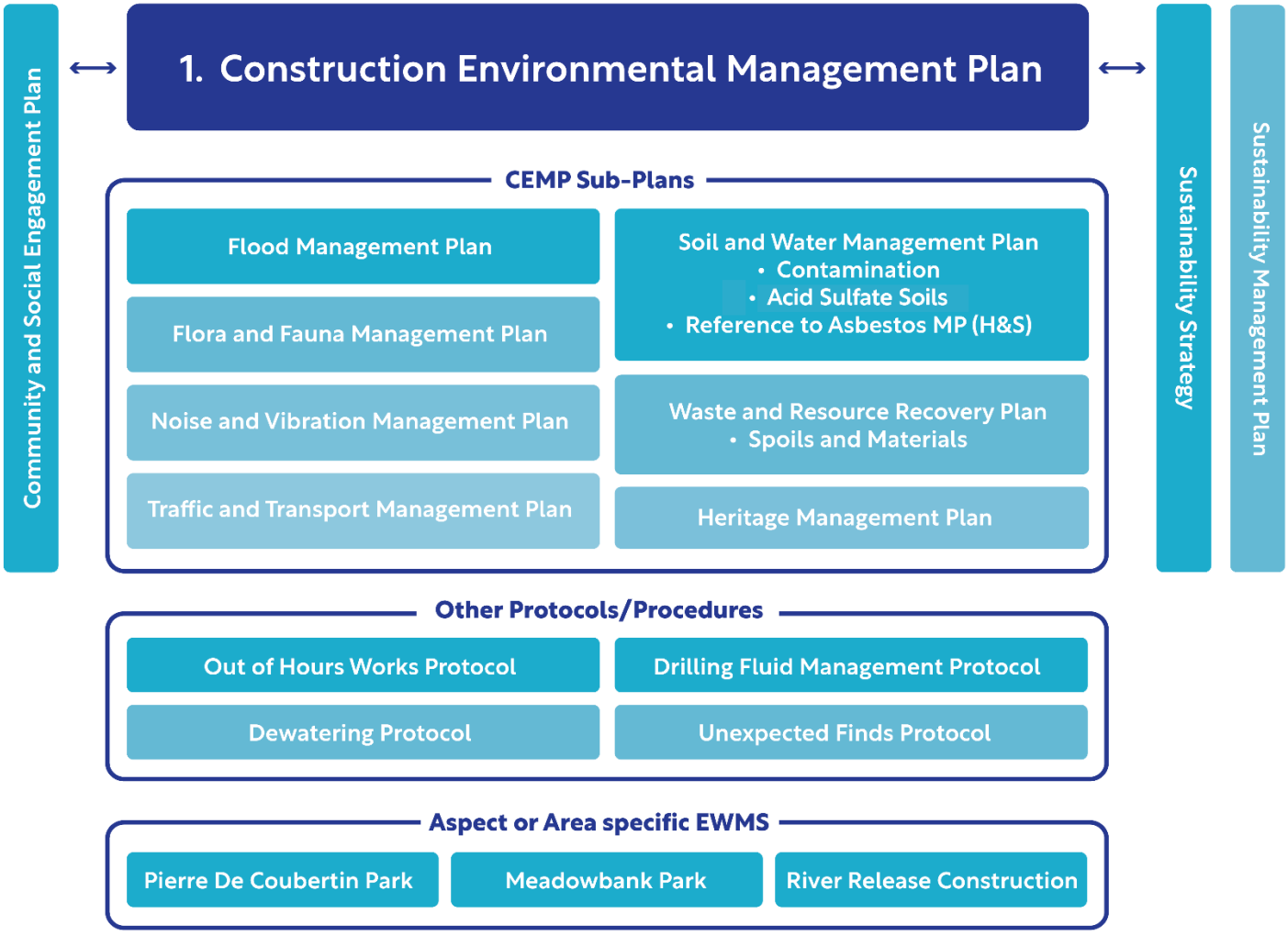


Figure ES 4: CEMP, management sub-plans and related management procedures

Operation

Sydney Water has a range of existing management systems that would be applied during project operation. These are based on international standards and apply across Sydney Water. They capture accountabilities, processes, policies and procedures and manage quality, safety, environmental and asset-related risks. They also provide a platform for Sydney Water to continually improve its processes. If Sydney Water engages another party to operate the WRRF, they would also be required to have equivalent management systems.

In 2017, Sydney Water developed an operational environmental management roadmap which demonstrated to DPHI how its management systems fulfil the requirements of a project specific Operational Environmental Management Plan (OEMP). DPHI approved modifications to existing conditions of approval for Sydney Water's State significant projects to reflect this. Sydney Water proposes to continue this established approach for the project. By managing operations in accordance with Sydney Water's existing management systems (or contractor management systems) there is no need for an OEMP. Sydney Water would incorporate operational management measures from the EIS and any operational phase conditions of approval into the relevant component of its existing management systems.

8 Evaluation

Sydney Water submitted a Scoping Report to DPHI in July 2024 and received SEARs in September 2024. The EIS prepared by Sydney Water meets the SEARs provided by DPHI. The project provides essential infrastructure and an opportunity to improve liveability, sustainability and the environment across GPOP. It also aligns with ESD principles (Section 24.4). Through a rigorous options assessment process, the project has been identified as the best option to achieve project objectives.

Through an iterative process, the environmental assessments undertaken as part of this EIS has allowed Sydney Water to avoid impacts where possible and reduce or mitigate impacts that could not be avoided. This EIS identifies mitigation measures that are appropriate to the impacts identified. This means Sydney Water would be able to construct and operate the project in a way that minimises impacts to the environment and the community.

EIS declaration and certification

Project details	
Project name	Greater Parramatta and Olympic Peninsula Water Cycle Management
Application number	SSI-74258485
Address of the land in respect of which the infrastructure is to be carried out	• Camellia-Rosehill Water Resource Recovery Facility, 9 Devon Street, Rosehill (Lot 1 DP1308385) • Camellia pumping station, 1B Grand Avenue, Camellia (Lot 2 DP1248547) • Land between the Camellia-Rosehill Water Resource Recovery Facility and Camellia pumping station for a distance of about 2.2 km • Land between the Camellia pumping station and the NSOOS at Kissing Point road, Dundas for a distance of about 3 km • Land between the WRRF and the river release point west of John Whitton Bridge for a distance of about 7.6 km.
Description of infrastructure	Construction and operation of a new Water Resource Recovery Facility at Rosehill and associated pipelines for wastewater transfer, brine transfer, and advance treated water releases into Parramatta River. It also includes associated infrastructure and ancillary development as described in this Environmental Impact Statement (EIS).

Proponent details	
Proponent name	Sydney Water
Proponent address	2 Parramatta Square Parramatta NSW 2150

EIS prepared by	
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Professional qualifications	Bachelor of Science (Marine Science), Master of Environmental Management

EIS reviewed by	
Name	Kris Bradley, Project Director, Sydney Water Murray Johnson, Senior Manager Environment and Heritage Services, Sydney Water
Revision number	1

Responsible person	
Name and position	Paul Plowman, Executive General Manager, Water and Environment Services
Address	Sydney Water, 2 Parramatta Square Parramatta NSW 2150

Declaration by registered environmental assessment practitioner:	
Name	Ruth Kelly (Baker)
Registration number	General certification number 1928; IA Specialist certification number 1A11111; REAP certification number R80055
Organisation registered with	Environment Institute of Australia and New Zealand
Declaration	The undersigned declares that this EIS: • has been prepared in accordance with the Environmental Planning and Assessment Regulation 2021 • contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates • does not contain information that is false or misleading • addresses the Planning Secretary's environmental assessment requirements (SEARs) for the project • identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments • has been prepared having regard to the Department's State Significant Infrastructure Guidelines – Preparing an Environmental Impact Statement (DPE, 2022a) • contains a simple and easy to understand summary of the project as a whole, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development • contains an accurate summary of the findings of any community engagement • contains a consolidated description of the project in a single chapter of the EIS and • contains an accurate summary of the detailed technical assessment of the impacts of the project as a whole.
Signature	
Date	6 February 2026

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Abbreviations

Abbreviation	Term in full
ABL	Assessment Background Level
ABN	Australian Business Number
ABS	Australian Bureau of Statistics
ACHAR	Aboriginal Cultural Heritage Assessment Report
ACM	Asbestos Containing Material
AEI	Area of environmental interest
AEP	Annual Exceedance Probability
AFFF	Aqueous film forming foam
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
AMP	Asbestos Management Plan
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines
AQIA	Air Quality Impact Assessment
AQMS	Air Quality Monitoring Station
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ARR	Australian Rainfall and Runoff
AS	Australian Standard
AS/NZS	Australian and New Zealand Standard
ASS	Acid Sulfate Soil
ASSMAC	Acid Sulfate Soils Management Advisory Committee
ASSMP	Acid Sufate Soil Management Plan

Abbreviation	Term in full
ATC	Australian Turf Club
AVTG	Assessing Vibration - a technical guideline
B(a)P	Benzo(a)pyrene
BAM	Biodiversity Assessment Method
BAM-C	BAM - Calculator
BC Act	*Biodiversity Conservation Act 2016*
BCS	Biodiversity, Conservation and Science
BCSEPP	State Environmental Planning Policy (Biodiversity and Conservation) 2021
BDAR	Biodiversity Development Assessment Report
BH	Borehole
BoM	Bureau of Meteorology
BOS	NSW Biodiversity Offset Scheme
BS	British Standard
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
BTP	Brine and transfer pipelines
CALPUFF	California Puff Model
CBD	Central Business District
CCRA	Climate Change Risk Assessment
CCTV	Closed circuit television
CEEC	Critically endangered ecological community
CEMP	Construction Environmental Management Plan
CFD	Computational fluid dynamics
CFU	Colony forming unit

Abbreviation	Term in full
CHETRE	Centre for Health Equity Training, Research and Evaluation
CIMP5	Coupled Model Intercomparison Projects Global Climate Models
CLM Act	*Contaminated Land Management Act 1997*
CMP	Conservation Management Plan
CMSP	Contamination Management Sub-Plan
CNVMP	Construction Noise and Vibration Management Plan
CONCAWE	Conservation of Clean Air and Water in Europe
COPC	Contaminants of potential concern
COPD	Chronic Obstructive Pulmonary Disease
CORMIX	Numerical software for the analysis of near field mixing of wastewater in watercourses
COVID	Coroniavirus disease
CPHRG	Conservation Prograns, Heritage and Regulatory Group (within DCCEEW)
CPSS	Certified Professional Soil Scientist
CSAM	Contaminated Site Assessment and Management
CSEP	Community and Stakeholder Engagement Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CT	Contaminated Threshold
CTMP	Construction Traffic Management Plan
dB(A)	A weighted decibels
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DEC NSW	Department of Environment and Conservation NSW
DECC	Department of Energy and Climate Change
DECCW	Department of Environment, Climate Change and Water NSW

Abbreviation	Term in full
DETSI	Department of the Environment, Tourism, Science and Innovation
DEWHA	Department of the Environment, Water, Heritage and the Arts
DG	Dangerous goods
DIN	Deutsches Institut für Normung (German Institute for Standardisation)
DN	Diameter Nominal
DoS	Degree of Saturation
DP	Deposited Plan
DPE	NSW Department of Planning and Environment
DPHI	NSW Department of Planning, Housing and Infrastructure
DPI	NSW Department of Primary Industries
DPIE	NSW Department of Planning, Industry and the Environment
DPIRD	NSW Department of Primary Industries and Regional Development
DSI	Detailed site investigation
DSRRC	Downer Rosehill Sustainable Resource Centre
EEC	Endangered ecological community
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ENM	Excavated Natural Materials
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
EPI	Environmental Planning Instruments
EPL	Environment Protection Licence

Abbreviation	Term in full
ER	Environmental Representative
ESD	Ecologically Sustainable Development
eSPADE	Online database containing soil profile and soil map information published by the NSW Department of Planning, Industry and Environment
EWMS	Environmental Work Method Statement
FAQ	Frequently asked questions
FFA	Flood frequency analysis
FIRA	Flood impact and risk assessment
FM Act	*Fisheries Management Act 1994*
FRMSP	Floodplain Risk Management Study and Plan
FRP	Filterable reactive phosphorus
GANSW	Government Architect NSW
GDE	Groundwater Dependent Ecosystems
GHG	Greenhouse Gas
GPOP	Greater Parramatta and Olympic Peninsula
GPOP WCM	Greater Parramatta and Olympic Peninsula Water Cycle Management
ha	Hectare
HDD	Horizontal Directional Drilling
HDPE	High density polyethylene
HEVAE	High Ecological Value Aquatic Ecosystem
HIA	Health Impact Assessment
HIPAP	Hazardous Industry Planning Advisory Paper
HV	High voltage
IA	Impact Area

Abbreviation	Term in full
IAQM	Institute of Air Quality Management
IChEMS	Industrial Chemicals Environmental Management Standard
ICNG	NSW Interim Construction Noise Guideline
ICOMOS	International Council on Monuments and Sites
ID	Identification
IEE	Infrastructure Engagement Excellence
IHM	Important Habitat Mapping
INSW	Infrastructure NSW
IPART	Independent Pricing and Regulatory Tribunal
IS	Infrastructure Sustainability
ISC	Infrastructure Sustainability Council
ISO	International Organisation for standardisation
KFH	Key fish habitat
KTP	Key Threatening Process
LAF	A-weighted, sound level, measured with a fast time-constant.
LAeq	The equivalent continuous sound level in dB(A) that, over the period 07:00-23:00 hours, contains the same sound energy as the actual fluctuating sound that occurred in that period.
LALC	Local Aboriginal Land Council
LCU	Landscape character unit
LCV	Landscape character and visual
LEP	Local Environmental Plan
LGA	Local government area
LHD	Local Health District

Abbreviation	Term in full
LNAPL	Light Non-Aqueous Phase Liquid
LoS	Level of Service
LTEMP	Long Term Environment Management Plan
LV	Low voltage
mbgl	Metre below ground level
MCA	Multi criteria analysis
ML	Megalitres
ML/day	Megalitres per day
MNES	Matters of National Environmental Significance
MOUSE	Model for Urban Sewers
MPN	Most probable number
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
MW	Megawatt
MWH/year	Megawatt hours per year
NARCLiM	NSW and Australian Regional Climate Modelling
NATA	National Association of Testing Authorities, Australia
NCA	Noise Catchment Area
NCCARF	National Climate Change Adaptation Research Facility
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NML	Noise Management Level
NO_2	Nitrogen dioxide

Abbreviation	Term in full
NO_x	Nitrogen oxides
NPfI	Noise Policy for Industry
NPI	National Pollutant Inventory
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Services
NSOOS	Northern Suburbs Ocean Outfall Sewer
NSW	New South Wales
NSW WQO	NSW Water Quality Objectives
NTU	Nephelometric Turbidity Unit
NVIA	Noise and vibration impact assessment
OCP	Organochlorine pesticides
OCU	Odour Control Unit
OEH	NSW Office of Environment and Heritage (former)
OEMP	Operational Environmental Management Plan
OLM	Ozone Limiting Method
OOHW	Out of hours works
OPP	Organophosphate pesticides
OU	Odour Units
PACM	Potential asbestos containing material
PAD	Potential Archaeological Deposit
PAH	Polycyclic aromatic hydrocarbons
PASS	Potential Acid Suplhate Soils
PCB	Polychlorinated biphenyls

Abbreviation	Term in full
PCT	Plant Community Type
PDC Park	Pierre De Coubertin Park
PE	Polyethylene
PFAS	Per- and polyfluoroalkyl substances
PFOS	Perfluorooctanesulfonic acid
PG	Packing group
PHA	Preliminary Hazard Assessment
PLR	Parramatta Light Rail
PM	Particulate Matter
PMF	Probable Maximum Flood
POEO Act	*Protection of the Environment Operations Act 1997*
PPE	Personal protective equipment
PRaWN	Parramatta River and Waterways Network
PRCG	Parramatta River Catchment Group
PRW	Purified Recycled Water
PSI	Preliminary Site Investigation
PSU	Practical salinity unit
PV	Photovoltaics
PVC	Poly Vinyl Chloride
QRA	Quantitative Risk Assessment
RAP	Registered Aboriginal Party
RBL	Rating Background Level
RCE	Riparian Channel and Environmental Inventory

Abbreviation	Term in full
RCP	Representative Concentration Pathway
RE	Recreation
REAP	Registered Environmental Assessment Practicitioner
RNP	Road Noise Policy
RO	Reverse osmosis
RRP	River Release Pipeline
RRSC EWMS	River Release Structure Construction Environmental Work Method Statement
RRWS	Resilient and reliable water supply
RTA	Roads and Traffic Authority
SAC	Site assessment criteria
SAII	Serious and Irreversible Impacts
SAL	Suburb and locality
SAR	Site Audit Report
SAS	Site Audit Statement
SEARs	Planning Secretary's environmental assessment requirements
SEPP	State Environmental Planning Policy
SES	NSW State Emergency Services
SHR	State Heritage Register
SIA	Social impact assessment
SIDRA	Mirco-analytical traffic model that similates vehicle movements through intersections
SIIA	Serious and Irreversible Impact Assessment
SMS	Short message service
SMW	Sydney Metro West

Abbreviation	Term in full
SO_2	Sulfur dioxide
SOHI	Statement of Heritage Impacts
SOPA	Sydney Olympic Park Authority
SOR	Sustainability Opportunities Register
SP	Sewer Pump
SPL	Sound Power Level
SSCTMP	Site Specific Construction Traffic Management Plan
SSD	State Significant Development
SSI	State Significant Infrastructure
SWAM	Sydney Water Aquatic Monitoring
SWEMS	Sydney Water Environment Management System
SWMP	Soil and Water Management Plan
TAFE	Technical and Further Education
TAHE	Transport Asset Holding Entity of NSW
TAM	Transport Asset Manager
tCO2e	tonnes of carbon equivalent
TEC	Threatened ecological community
TISEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021
TOD	Transport Oriented Development
TOTEX	total expenditure
TRH	Total recoverable hydrocarbons
TTIA	Traffic and Transport Impact Assessment
TUFLOW	TUFLOW (Two-Dimensional Unsteady Flow) is a computer program which is used to simulate free-surface flow for flood and tidal wave propagation.

Abbreviation	Term in full
UCL	Urban Centre Locality
UFP	Unexpected Finds Protocol
UNSW	University of New South Wales
USEPA	United States Environment Protection Agency
UWS	University of Western Sydney (now Western Sydney University)
VENM	Virgin Excavated Natural Material
VI	Vulnerability Index
VOC	Volatile organic compounds
VP	Viewpoint
WAL	Water Access License
WARR Act	*Waste Avoidance and Resource Recovery Act 2001*
WIRES	Wildlife Information, Rescue and Education Service
WM Act	*Water Management Act 2000*
WQRM	Water quality response modelling
WRRF	Water resource recovery facility
WRRP	Waste and Resource Recovery Plan
WSU	Western Sydney University
WSUD	Water sensitive urban design
ZTV	Zone of theoretical visibility

Introduction

1 Introduction

1.1 Background

The water and wastewater needs of Sydney are changing. With significant population and employment growth forecast there is an increasing need for effective resilient and adaptable water and wastewater management. Population growth and additional housing needs will increase the demand for drinking water and wastewater services. New industries such as data centres will require reliable access to water resources.

In response to this need, Sydney Water is proposing to build and operate a new water resource recovery facility (WRRF) and associated infrastructure at Camellia-Rosehill. The proposed WRRF would provide additional wastewater services to support housing and commercial development across Sydney and Greater Sydney extending between Blacktown in the west to Manly in the east and including the Greater Parramatta and Olympic Peninsula (GPOP) area. The WRRF and associated infrastructure together form the GPOP Water Cycle Management project (the project).

The project would provide capacity in the existing northern suburbs wastewater system, which includes the Northern Suburbs Ocean Outfall Sewer (NSOOS) and the North Head WRRF. These critical assets provide wastewater services to around 1.7 million people. With current population growth projections and without this project, they will reach capacity and compliance requirements by 2031. The project would provide a local, integrated water management approach to support the vision of a sustainable, resilient and productive Sydney. By recovering wastewater and producing advanced treated water locally, the project provides the flexibility needed to transition to a future with recycled water options. The project would be designed to allow for future expansion, and to be adaptable to a circular economy future.

1.2 Project overview

1.2.1 Key features

The key features of the project include:

- a new WRRF within Camellia-Rosehill to treat wastewater and produce advanced treated water
- upgrades to the existing pumping station at Camellia
- a new wastewater transfer pipeline from the Camellia pumping station to the WRRF
- a new brine pipeline and relining of an existing pipeline to transfer brine from the WRRF to the NSOOS
- a new river release pipeline to transfer advanced treated water from the WRRF to Parramatta River
- a new river release structure in Parramatta River at Meadowbank
- a range of ancillary infrastructure.

Construction for the project is planned to start in 2028. The project would operate 24 hours per day, 7 days per week from 2031. Figure 1-1 shows the proposed locations of these project components. Chapter 3 (Project description) describes the project in detail.

1.3 Planning approvals

This project is State significant infrastructure (SSI) and approval for the project is required under section 5.14 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). An application has been submitted to the Minister for Planning and Public Spaces to declare the project to be Critical SSI, meaning the project is essential to the State for economic, environmental or social reasons. Sydney Water has prepared this Environmental Impact Statement (EIS) in accordance with Part 8 of the *Environmental Planning and Assessment Regulation 2021* (the EP&A Regulation), as well as Preparing an Environmental Impact Statement – Appendix B to the SSI Guidelines (DPE, 2022a). The EIS addresses the Planning Secretary's environmental assessment requirements (SEARs) issued by the Department of Planning, Housing and Infrastructure (DPHI).

1.4 The proponent

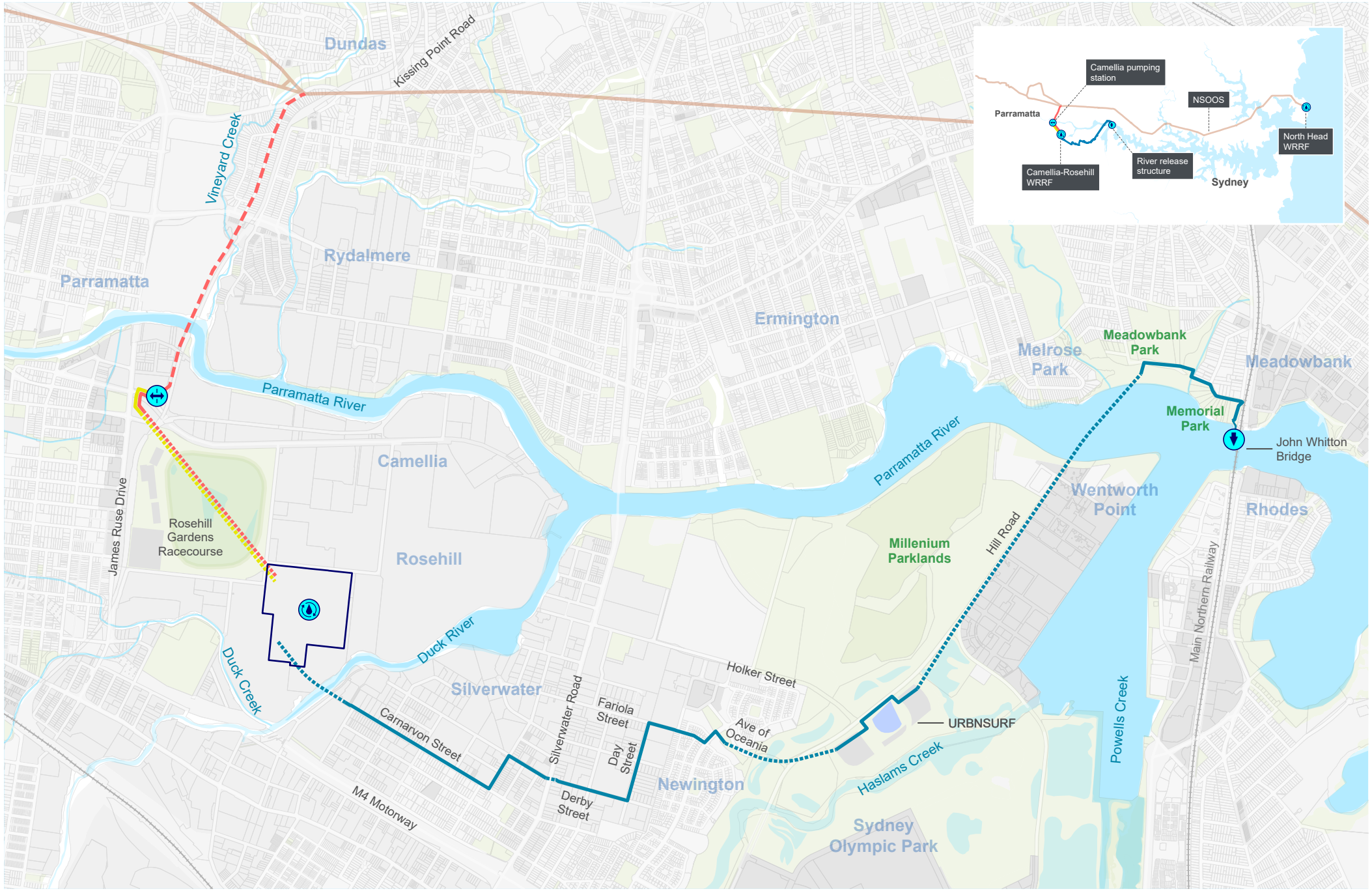
Sydney Water is the proponent for the project. Sydney Water is a statutory State-owned corporation, wholly owned by the NSW Government. We are Australia's largest water utility, supplying water, wastewater, recycled water and stormwater services to more than 5.4 million people in Greater Sydney. Our area of operation covers about 12,800 square kilometres (km^2).

Sydney Water operates under an Operating Licence that sets out our operating standards and requirements and is subject to regular review. These requirements are underpinned by Sydney Water's vision of creating a better life with world-class water services.

Further details of the proponent are provided in Table 1-1.

Table 1-1: Proponent details

Required information	Response
Proponent	Sydney Water Corporation
Address	2 Parramatta Square Parramatta NSW 2150
ABN	49 776 225 038



Camellia-Rosehill WRRF
Camellia pumping station
River release structure

Proposed pipelines
Brine pipeline
Transfer pipeline
River release pipeline

Pipeline construction method
Open trench
Trenchless
Relining

Northern Suburbs Ocean Outfall Sewer (NSOOS)
Railway

Figure 1-1 Project overview and locality

0 500 1000 1500 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

N

1.5 Sydney Water as a utility and service provider

Under the *Sydney Water Act 1994*, Sydney Water can provide, construct, operate, manage, and maintain systems and services for:

- storing or supplying water
- providing wastewater services
- providing stormwater drainage systems.

Sydney Water's objectives under the Act include:

- to exhibit a sense of social responsibility by having regard to the interests of the community in which it operates
- to protect the environment by operating in compliance with the principles of ecologically sustainable development.

Sydney Water services residential, commercial and industrial customers across Greater Sydney, Blue Mountains and the Illawarra. Every day, Sydney Water supplies about 1,500 megalitres (ML) of drinking water to its 5.4 million customers, sourced from dams (managed by WaterNSW) and the Sydney Desalination Plant (operated by Veolia Water Australia). Sydney Water then collects about 1,300 ML of wastewater per day from the same customers and treats it at one of 16 wastewater treatment plants or 14 water recycling plants. Most treated water is currently released to the ocean via one of 3 deep ocean outfalls at Malabar, Bondi and North Head.

Last year, Sydney Water produced about 40,100 ML of recycled water from its water recycling plants. This included about 10,300 ML that went to residential, commercial and industrial uses and 6,300 ML that was used for irrigation of recreational and agricultural land. This saved about 13,000 ML of drinking water. In addition, 5,600 ML went to environmental flows (including to the Hawkesbury-Nepean River) to enhance river water quality and for agriculture purposes, and Sydney Water reused about 17,900 ML at its own plants. Using recycled water provides a source of water that can be used for a variety of purposes to keep water in the landscape, reduce pressure on the water supply system and build resilience in the face of droughts and climate change.

A key part of Sydney Water's role is to ensure water and wastewater services are well-managed and maintained for future generations and that water supplies are protected. Demand for water is growing, including in new technologies such as data centres. There is considerable opportunity to increase the use of recycled water to further save Sydney's drinking water supplies, improve liveability and environmental outcomes in line with the principles of ecologically sustainable development. Having treatment plants that can treat water to a high quality is the first step in this direction.

1.6 Sydney Water's wastewater network

Wastewater is produced as an output from residential, commercial and industrial facilities. In Greater Sydney, about 70% of wastewater is generated by households. It is collected in sinks, showers, laundries, toilets and other drains within buildings.

Sydney Water owns and manages an expansive wastewater system. The Sydney Water-owned wastewater system consists of (Sydney Water, 2024a):

- about 27,000 km of pipes
- 30 WRRFs treating over 1,300 ML of wastewater every day
- 695 wastewater pump stations.

Wastewater collected from houses and businesses is transferred by a network of pipelines and pumping stations to one of Sydney Water's 30 WRRFs. After screening and biological treatment, the majority of the treated water is typically released to the ocean. Sydney Water is also managing WRRFs which release treated water to inland waterways.

At some of Sydney Water's water recycling plants, a portion of treated wastewater is further treated to a more advanced level to provide recycled water suitable for industrial and agricultural use, irrigating playing fields, or for non-drinking household use. The 4 main types of treatment and disinfection for wastewater are summarised in Table 1-2.

Sydney Water's facilities treat wastewater to a standard that is suitable for its intended use, and to ensure it meets the required water quality level for release to the environment – including creeks, rivers and the ocean. The treatment level needed depends on:

- the location of the facility
- where the treated wastewater will be released or reused
- the nature of the facility's catchment area, including wastewater quality.

Table 1-2: Main types of treatment and disinfection for wastewater

Treatment type	Summary
Primary treatment	Involves screening and sedimentation of the wastewater to remove large solids and grit.
Secondary treatment	Includes biological treatment using microorganisms to reduce nutrients such as nitrogen and phosphorous.
Tertiary treatment and filtration	Removes nearly all biodegradable and suspended matter to further improve quality.

Treatment type	Summary
Advanced tertiary treatment	Uses ultrafiltration and reverse osmosis processes. Microfiltration or ultrafiltration uses hollow fibres to remove some fine particles, bacteria and viruses. Reverse osmosis further improves the quality of the water by removing viruses, nutrients and dissolved salts at high pressure (using fine barrier membranes). Reverse osmosis filters are so fine they can trap particles smaller than one 10 millionth of a millimeter.
Disinfection	Is the last step for all types of recycled water. The water is disinfected by chlorination, ultraviolet light, or both processes.

1.7 Project objectives

The overarching objective of the project is to relieve constraints within the existing wastewater network and provide capacity for population growth. Sydney Water has developed a series of strategic objectives for the project. In summary, these objectives aim to:

- provide a water cycle management solution that responds to housing and commercial development
- provide efficient and cost-effective services to the community
- deliver sustainable solutions to water supply and contribute to improvements in overall waterway health
- deliver infrastructure that is resilient to changing environments and technology
- deliver infrastructure that is adaptable to changes in resource demand and technology.

The project objectives are shown in Figure 1-2.

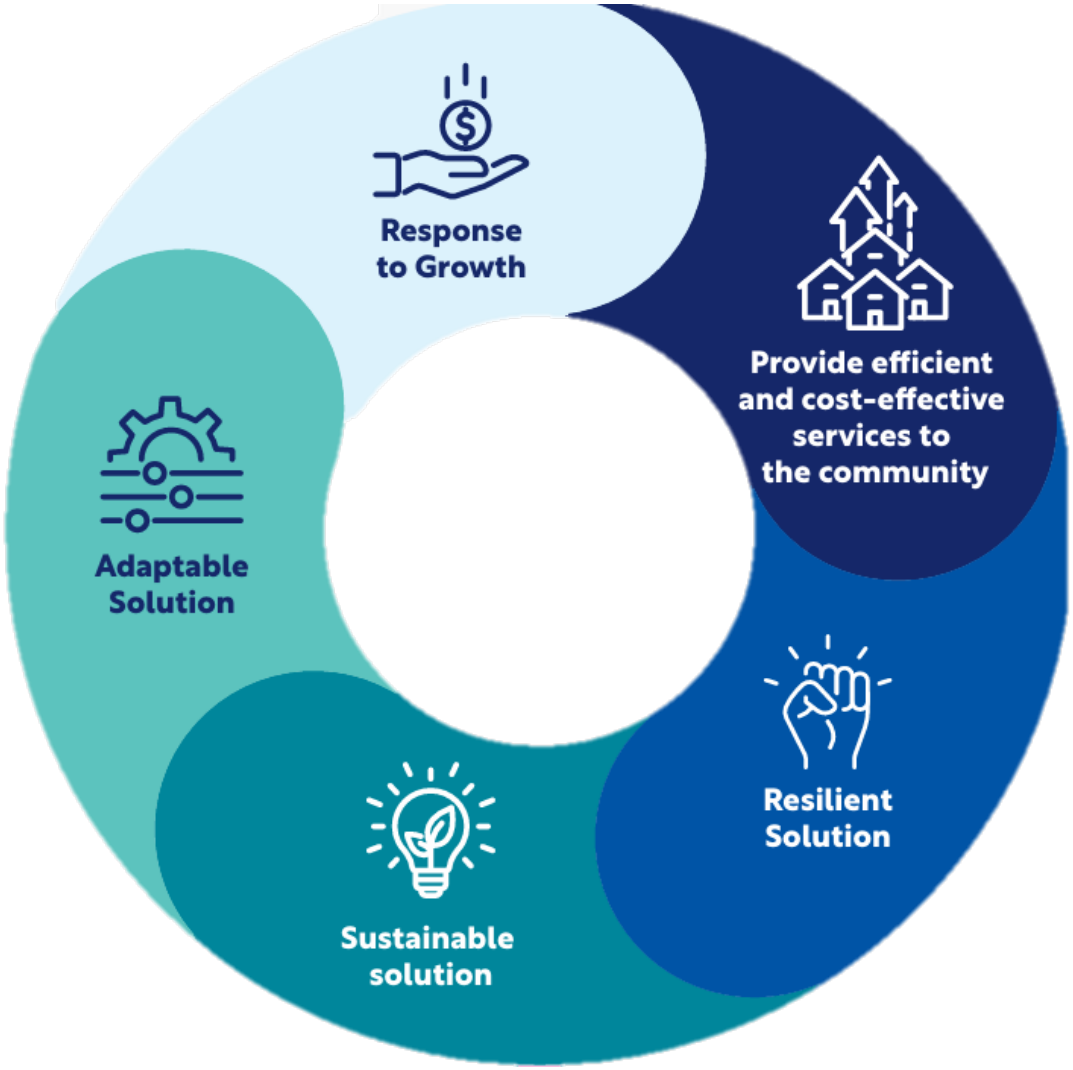


Figure 1-2: GPOP Water Cycle Management project objectives

1.8 Related development

The following sections describe related developments and activities that are outside the scope of the project.

1.8.1 Contamination and land management at Camellia-Rosehill

Sydney Water acquired the site for the proposed Camellia-Rosehill WRRF in 2024. Prior to Sydney Water's acquisition, the site was subject to a significantly contaminated land declaration under the *Contaminated Land Management Act 1997* (CLM Act) (Declaration No. 20131110, 2016). The previous site owner undertook remediation works under the Western Area Remediation Project (SSD 9302) and 4 site audit statements relating to the site were issued by an independent auditor. The site audit statements concluded the site was suitable for commercial / industrial land use with slab on grade construction subject to the implementation of Long-Term Environmental Management Plans (LTEMPs) to manage residual contamination. The significantly contaminated land declaration was repealed in July 2022.

Sydney Water has engaged an accredited independent site auditor to advise on land acquisition and ongoing contamination matters. A site auditor will be involved with the site until the project is operational.

1.8.1.1 Site environmental management works

Sydney Water is undertaking environmental management works at the site of the proposed Camellia-Rosehill WRRF. These works involve raising part of the site by about 1.7 metres (m) above ground level with natural imported materials. This will stabilise the site and minimise potential environmental and community impacts for future infrastructure works. This means, the works would:

- minimise the risk of workers and the community being exposed to residual contaminated materials
- reduce the potential risk of pollution entering the surrounding environment
- reduce flooding risks for structures and infrastructure on the site.

Sydney Water assessed and determined the site environmental management works in a Review of Environmental Factors on 1 October 2024 under Division 5.1 of the EP&A Act[1].

1.8.1.2 Water main relocation

Sydney Water is planning to relocate an existing water main that currently crosses the Camellia-Rosehill WRRF site. This water main is a critical water asset within the network, supplying over one million people. Following acquisition of the site in 2024, Sydney Water identified that the asset should be relocated for several reasons, including:

- to improve access to the water main for maintenance and operational reasons
- to avoid potential damage to the asset while works are being carried out on the site
- to reduce design constraints for future uses of the site.

The water main needs to be relocated before the project commences to avoid damage to the ageing main and allow future access for operation and maintenance purposes. The relocation would be mostly contained within the WRRF site and would ensure that a reliable drinking water supply is not affected by future works.

Sydney Water assessed and determined the relocation of the drinking water main in a Review of Environmental Factors under Division 5.1 of the EP&A Act on 30 September 2025.[2]

1.8.2 Recycled water

The project would produce advanced quality treated water, which has the potential to be used for non-drinking recycled water purposes. Sydney Water currently has 14 WRRFs that recycle water. Recycled water can be used for irrigation, flushing toilets, washing cars, fighting fires, and in some industrial manufacturing and commercial settings, such as data centres.

[1] The Review of Environmental Factors is available on the Sydney Water website: [Greater Parramatta and Olympic Peninsula water cycle management].

[2] The Review of Environmental Factors is available on the Sydney Water website: [Greater Parramatta and Olympic Peninsula water cycle management].

There is existing recycled water infrastructure within the area and along the alignment, which could use recycled water such as for irrigation of playing fields. As part of this project, Sydney Water has proposed recycled water offtakes along the river release pipeline in consultation with local councils and other recycled water users. The location of these offtakes would be confirmed during detailed design. These offtakes would enable use opportunities if recycled water is produced in the future by the WRRF. Recycled water schemes and associated pipeline infrastructure are excluded from this project scope, and subject to separate planning approvals and commercial agreements.

New data centres planned across Sydney are predicted to require large amounts of water for cooling purposes. The advanced quality treated water produced by the WRRF would be suitable for use in nearby data centres. Supply of recycled water to data centres is not part of the project scope and would be subject to separate planning approvals and commercial agreements.

The GPOP WCM project has been designed to be future ready for additional recycled water treatment options in the future. In this case, the release of advanced treated water into the Parramatta River would progressively reduce and instead be integrated for recycled water purposes. These types of treatment enhancements are out of scope for this project and would be subject to separate planning approvals in the future. Although these are not assessed as part of this project, the Camellia-Rosehill WRRF has been designed to allow space for additional treatment facilities in the future.

1.8.3 Improvements to the NSOOS and North Head WRRF

Sydney Water is currently carrying out restoration and improvement works to the NSOOS and North Head WRRF. Under Sydney Water's current operating licences, Sydney Water is required to maintain the system to avoid environmental harm and to continue to provide essential wastewater services. As a result, improvement works are an existing maintenance obligation and do not form part of the project.

Along the NSOOS, improvement works include:

- desilting to remove sediment build ups
- structural reinforcements to extend the life of the system.

These works are vital for preventing wastewater overflows into Sydney Harbour and will extend the life of the NSOOS by at least 50 years.

The North Head biosolids upgrade project includes the upgrading of equipment and construction of 2 new digesters at the North Head WRRF. These upgrades will ensure the ongoing reliability of the facility. The digesters will increase sludge processing from 40 to 70 tonnes per day by 2043.

More information on the NSOOS and North Head WRRF is included in Chapter 2 (Strategic context).

1.8.4 Other related development

Aside from the connections to existing infrastructure at Camellia pumping station and the NSOOS, there is no existing or approved development or infrastructure that would be incorporated into the project. Sydney Water will continue to undertake separate projects and activities on some of the existing sites on which the project is located, including property management and minor works and maintenance.

1.8.4.1 Utility upgrades

Utility upgrades (e.g. high voltage power supply and upgrades to existing stormwater infrastructure) may be required as a result of the project. These works would be delivered under separate planning approvals by the relevant utility provider.

1.8.4.2 Odour control works at Camellia pumping station

The Camellia-Rosehill Place Strategy (DPE, 2022b) identifies odour at the Camellia pumping station as a potential impact to residents of the future Camellia town centre. Sydney Water is planning an odour control upgrade at Camellia pumping station. These works will be undertaken ahead of and separate to this project, under separate planning approvals.

1.8.4.3 Property management

Sydney Water may need to carry out a range of property management activities on the Camellia-Rosehill WRRF site and continue with property management activities at the Camellia pumping station before the project is approved and during operation. These activities are general property management activities excluded from the project scope and would be subject to separate planning approvals if needed. The types of property management activities include:

- relocating or adjusting utility connections
- vegetation management
- site drainage management
- establishing site security
- demolition works
- land remediation activities.

1.8.4.4 Minor works and maintenance

Once the project is operational, any maintenance, replacement and repair of that infrastructure or any minor works or upgrades would be out of scope of the project and assessed in separate planning approvals if needed. Similarly, any activities or works that improve environmental performance or have a neutral environmental impact are excluded from the project scope.

1.8.4.5 Other consents

There are 2 development consents that relate to the land and the land of adjoining landowners. These consents are State Significant Development (SSD) Central Sydney Industrial Estate and Downer Sustainable Road Resource Centre (SSD-10459) and Viva Energy Clyde Western Area Remediation Project (SSD-9302). As these development consents relate to activities that are no longer applicable, Sydney Water will not be continuing the developments proposed by the previous owner so far as they relate to the site.

Strategic context

2 Strategic context

The population of Sydney is growing. Greater Sydney's population will grow from 4.9 million in 2021 to 6.3 million people by 2041 (NSW Government, 2025a). In Greater Sydney, an additional 172,900 homes are expected to be delivered between 2023 and 2029. This averages about 28,800 additional dwellings every year (NSW Government, 2025b). Around half of the population are expected to live west of Parramatta (Greater Sydney Commission, 2018a). To help manage this housing and commercial development and ensure that Sydney can meet the future needs of the population, significant investment is required to improve existing infrastructure and deliver new infrastructure.

2.1 Strategic planning framework

Strategic planning sets the future vision and development goals for states, regions, cities and localities, and is usually guided by a range of strategies, policies and plans. The main strategic planning documents that are relevant to this project are outlined below.

2.1.1 Commonwealth government

2.1.1.1 The Infrastructure Priority List

The Infrastructure Priority List (Infrastructure Australia, 2025) is a nationally coordinated investment pipeline designed to guide public and private sector decisions on infrastructure development. It identifies critical infrastructure, including water and wastewater services, that are required for the GPOP growth area. The list also highlights water security for Greater Sydney as a high priority, recognising that:

- the area will experience future challenges from climate variability, population growth, and ageing assets
- communities expect governments to improve waterway health and use more water for city greening and cooling

The project has been designed to service a growing population as well as enabling an adaptive pathway to address future water security concerns as it has the flexibility to transition to future recycled water pathways.

2.1.2 State Government

2.1.2.1 Staying Ahead: State Infrastructure Strategy 2022 – 2042

The State Infrastructure Strategy (Infrastructure NSW, 2022) outlines several key priorities for water infrastructure in NSW. The Strategy highlights a need for NSW to enhance long-term water security by:

- finding opportunities to utilise wastewater for non-potable and eventually potable purposes
- delivering infrastructure to support advanced treatment technologies to support safe reuse
- investing in rainfall independent water sources such as desalination or purified recycled water (PRW)
- identifying opportunities for targeted improvements to ageing infrastructure.

The design of the project provides the ability to transition to future recycled water pathways in the future.

The Strategy also identifies that the speed of technological change is a challenge for infrastructure providers. The project has been designed to be adaptable, with the ability to service a growing population as well as to potentially service the needs of other infrastructure supporting housing and commercial development such as data centres.

2.1.2.2 Greater Sydney Water Strategy 2022

The Greater Sydney Water Strategy 2022 (DPE, 2022c) charts a direction for delivering sustainable and resilient water services to Greater Sydney for the next 20 to 40 years, servicing a growing Greater Sydney, including the Illawarra and Blue Mountains, and safeguarding the region even in times of prolonged drought and extreme weather events.

The strategy sets out priorities and actions for the delivery of water, wastewater, recycled water and stormwater services into the future in a way that is integrated with land use planning.

The project moves from traditional coastal treatment and ocean releases to local and more sustainable treatment services with the adaptability to build in future resilient water services.

2.1.2.3 Greater Sydney Region Plan – A Metropolis of Three Cities

The Greater Sydney Region Plan (Greater Sydney Commission, 2018a) sets a 40-year vision and establishes a 20-year plan to manage Greater Sydney's housing and commercial development and change. The plan is built on a vision for growing Greater Sydney based on a metropolis of 3 cities – the Western Parkland City, Central River City and Eastern Harbour City – where most residents live within 30 minutes of jobs, education, health facilities, and other services. The Central River City is centred around Parramatta.

GPOP is identified as integral to the vision of the Central River City, being the 'connected and unifying heart'. Investment in infrastructure is identified as critical in developing the GPOP economic corridor and enabling a better connected and more competitive city.

The project would support the directions set out in the Greater Sydney Region Plan by:

- providing necessary wastewater treatment infrastructure to meet the needs of the future population
- improving the health of waterways, including the Parramatta River
- delivering infrastructure that is adaptable to support potential future recycled water pathways, contributing to a circular economy future.

2.1.2.4 Our Greater Sydney 2056 – Central City District Plan

The Central City District Plan (Greater Sydney Commission, 2018b) sets the 20-year plan for the implementation of planning priorities and actions in the Greater Sydney Region Plan (Greater Sydney Commission, 2018a). The Central City District includes the Blacktown, Cumberland, the Hills and Parramatta local government areas (LGAs). The Plan identifies the GPOP corridor (Figure 2-1) as an opportunity for a precinct-scale approach to change the way water resources are managed. It also:

- proposes a new wastewater treatment facility in the precinct, to shift the reliance away from coastal treatment and ocean release of treated wastewater
- recognises opportunities for innovative and integrated resource recovery with respect to recycled water, co-digestion of biosolids and food waste to generate energy and the potential for electricity export to the grid.

The project provides a localised water management solution producing advanced quality water which improves water quality in the Parramatta River. The project is adaptable to future recycled water production and identifies opportunities for cogeneration of heat and energy for use within the WRRF as well as beneficial reuse of biosolids.

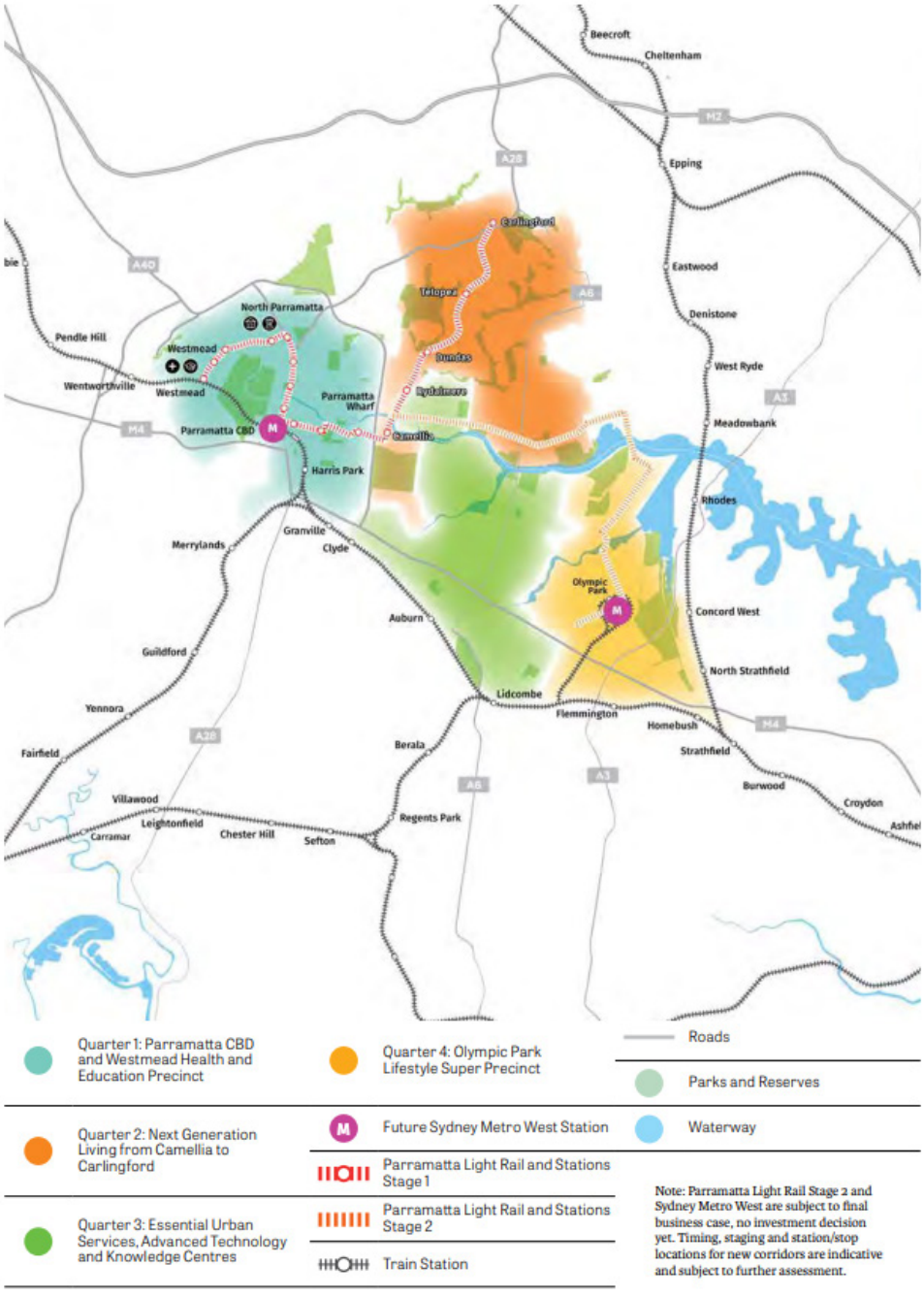


Figure 2-1: The GPOP economic corridor showing planned precincts, urban centres and supporting infrastructure (Greater Sydney Commission, 2018b)

2.1.2.5 The Sydney Plan (Draft)

The Sydney Plan (Draft) (DPHI, 2025a) sets out the NSW Government's 20 year strategic land use planning objectives. Once finalised, the Sydney Plan will replace the Greater Sydney Region Plan – A Metropolis of Three Cities (Greater Sydney Commission, 2018a) and associated district plans. The plan seeks to focus housing and commercial development around existing and planned infrastructure and urban areas. It also outlines a need for the sustainable management of urban water resources recognising that in the future, Sydney's industrial lands will support new technologies, such as data centres. The Plan outlines that with the forecasted population growth and drought conditions for the next 20 years, there is a need for integrated water cycle management solutions that are sustainable and resilient.

2.1.2.6 Transport Oriented Development Precincts

In 2023, the NSW Government announced the Transport Oriented Development (TOD) Program. This program builds on the objectives in the Greater Sydney Region Plan (Greater Sydney Commission, 2018a) by introducing new high density housing precincts near metro and rail stations. Since the announcement of the program, 8 high-density TOD precincts have been announced at Bankstown, Bella Vista, Crows Nest, Homebush, Hornsby, Kellyville and Macquarie Park. These precincts will deliver a significant uplift in housing supply.

The project would provide wastewater servicing required to support housing and commercial development including in TOD precincts.

2.1.2.7 A City Supported by Infrastructure – Place Based Infrastructure Compact Pilot

The Place-based Infrastructure Compact Pilot (Greater Sydney Commission, 2019) recognises the economic and strategic importance of the GPOP development area. It identifies infrastructure needs and costs, defines growth scenarios, and recommends sequencing for the delivery of infrastructure to support the area's housing and commercial development.

The strategy acknowledges the need for a new WRRF with the ability to provide recycled water to support the GPOP precincts, which the project would provide.

2.1.2.8 Camellia-Rosehill Place Strategy

The Camellia-Rosehill Place Strategy (DPE, 2022b) contributes directly to the vision for the Central River City by setting out the goals for sustainable urban renewal, job creation, and housing supply in the Camellia-Rosehill precinct. The Camellia–Rosehill Precinct is being transformed through a 20-year strategy into a vibrant mixed-use area with a new town centre at Camellia, providing up to 15,400 jobs and 10,000 new homes. New active and public transport links form part of the Camellia-Rosehill Place Strategy (DPE, 2022b) and support urban renewal of industrial and commercial land.

The project would support the strategy by:

- providing wastewater infrastructure to service the expected housing and commercial development within the new precinct

- providing the ability to deliver integrated water management by producing advanced treated water for potential future use
- developing a place and design framework to ensure the new WRRF complements the surrounding areas and developing precinct
- including opportunities for renewable energy generation and beneficial reuse of biosolids to deliver sustainable outcomes and support net-zero targets
- locating the brine and transfer pipelines underneath the Rosehill Gardens Racecourse in consultation with the Australian Turf Club (ATC) to have minimal impact on racing operations and potential future development of the racecourse land. This aligns with the objectives of the strategy, which identifies the importance of the Rosehill Gardens Racecourse in enhancing the entertainment value of the precinct. Further detail on consultation with ATC is contained in Chapter 5 (Engagement).

The Camellia-Rosehill Place Strategy (DPE, 2022b) included a road and active transport link through the proposed Camellia-Rosehill WRRF site. Due to operational safety and security requirements, Sydney Water was not able to accommodate this in the design of the Camellia-Rosehill WRRF. City of Parramatta Council and DPHI have been consulted about alternative locations for the road and options for active transport links.

2.1.2.9 Sydney Olympic Park Master Plan 2050

The Draft Sydney Olympic Park Master Plan 2050 (Sydney Olympic Park Authority (SOPA), 2024) ensures that a coordinated, long-term development plan is prepared for the whole of Sydney Olympic Park and outlines detailed precinct controls to guide sustainable growth. The master plan has been prepared to address shifts in the local and regional planning context. It includes:

- identification of necessary major regional infrastructure investments
- identification of opportunities to address housing shortages
- an approach to revitalise Sydney Olympic Park into a thriving urban community.

The Master Plan identifies a range of new facilities and local infrastructure required to support the precinct. It also includes a requirement that new developments include connections to recycled water and utilise effective water demand management practices. Opportunities are identified for recycled water within toilets, fountains and water features, playing fields, irrigation of parklands and gardens and commercial air conditioning towers.

2.1.2.10 DUBA, BUDU, BARRA – Ten Steps to a Living River – The Parramatta River Masterplan

The DUBA, BUDU, BARRA[3] – Ten Steps to a Living River (Parramatta River Masterplan) (Parramatta River Catchment Group (PRCG), 2018) masterplan aims to improve waterway health and establishes the actions required to achieve a swimmable Parramatta River by 2025. As long-standing members of the Parramatta River Catchment Group, Sydney Water has collaborated to deliver on the mission of making the river swimmable

[3] Duba, Budu, Barra translates to 'land, water, sky'.

again. The project proposes to release advanced treated water into the Parramatta River which would make a positive contribution to improving the health of the waterway.

The project builds on an existing pipeline of investment contributed by Sydney Water to improve the waterway health and recreational outcomes of Parramatta River. Sydney Water's recent Our Water, Our Voice stakeholder engagement program also identified that maintaining clean and healthy waterways and water recreation areas is the third highest priority for customers, right after providing safe drinking water and affordable bills.

Chapter 7 (Waterways assessment) describes the water quality to be released into Parramatta River and the improvements to waterway health predicted as a result of the project.

2.1.3 Local government

The project traverses the City of Parramatta and City of Ryde LGAs. Local planning priorities for both LGAs are set out in the Local Strategic Planning Statements.

The City of Parramatta Council Local Strategic Planning Statement (City of Parramatta Council, 2020a) acknowledges the critical need for infrastructure to support the anticipated housing developments within the Parramatta LGA. The Local Housing Strategy (City of Parramatta Council, 2020b) further outlines the timing and location of future housing developments through to 2036 and beyond. The Strategy highlights the growing pressure on wastewater services and emphasises Sydney Water's role in ensuring infrastructure readiness. It also identifies Camellia as a suitable location for a wastewater treatment facility.

The project would deliver essential wastewater infrastructure to accommodate the increasing population. It additionally supports Parramatta's vision of becoming a low carbon city by incorporating renewable energy into the design.

The City of Ryde's Local Strategic Planning Statement (City of Ryde Council, 2020) outlines a clear vision for housing and commercial development and revitalisation along the Parramatta River including at Melrose Park and Meadowbank. It highlights aspirations to protect biodiversity and improve water quality in Parramatta River while also delivering infrastructure for a growing population.

The project would support a growing population through delivery of essential wastewater infrastructure using a solution that would improve the water quality in Parramatta River.

2.2 Project justification

This section details the various options considered for the project and the justification for the project. It includes a summary of the criteria used to select the preferred alignment of pipelines, as well as the release location into the Parramatta River.

2.2.1 The existing northern suburbs wastewater system

The northern suburbs wastewater system is Sydney Water's second largest wastewater system. It is made up of 2 key components:

- the NSOOS
- the North Head WRRF.

It services an area of 452 km^2, from Seven Hills in the west, south to Yagoona and north to Ku-ring-gai and Collaroy. Approximately 75% of wastewater currently generated within the GPOP corridor and surrounds is transferred by the NSOOS to the North Head WRRF. The GPOP corridor contributed around 60 ML per day (ML/day) to the NSOOS. By 2056, this is estimated to increase to over 100 ML/day. The North Head WRRF treats around 336 ML of wastewater each day. Wastewater is treated to a primary level, before being released via a deep ocean outfall, about 3.6 km offshore.

The alignment of the NSOOS, surrounding growth areas and the location of the North Head WRRF is shown in Figure 2-2.

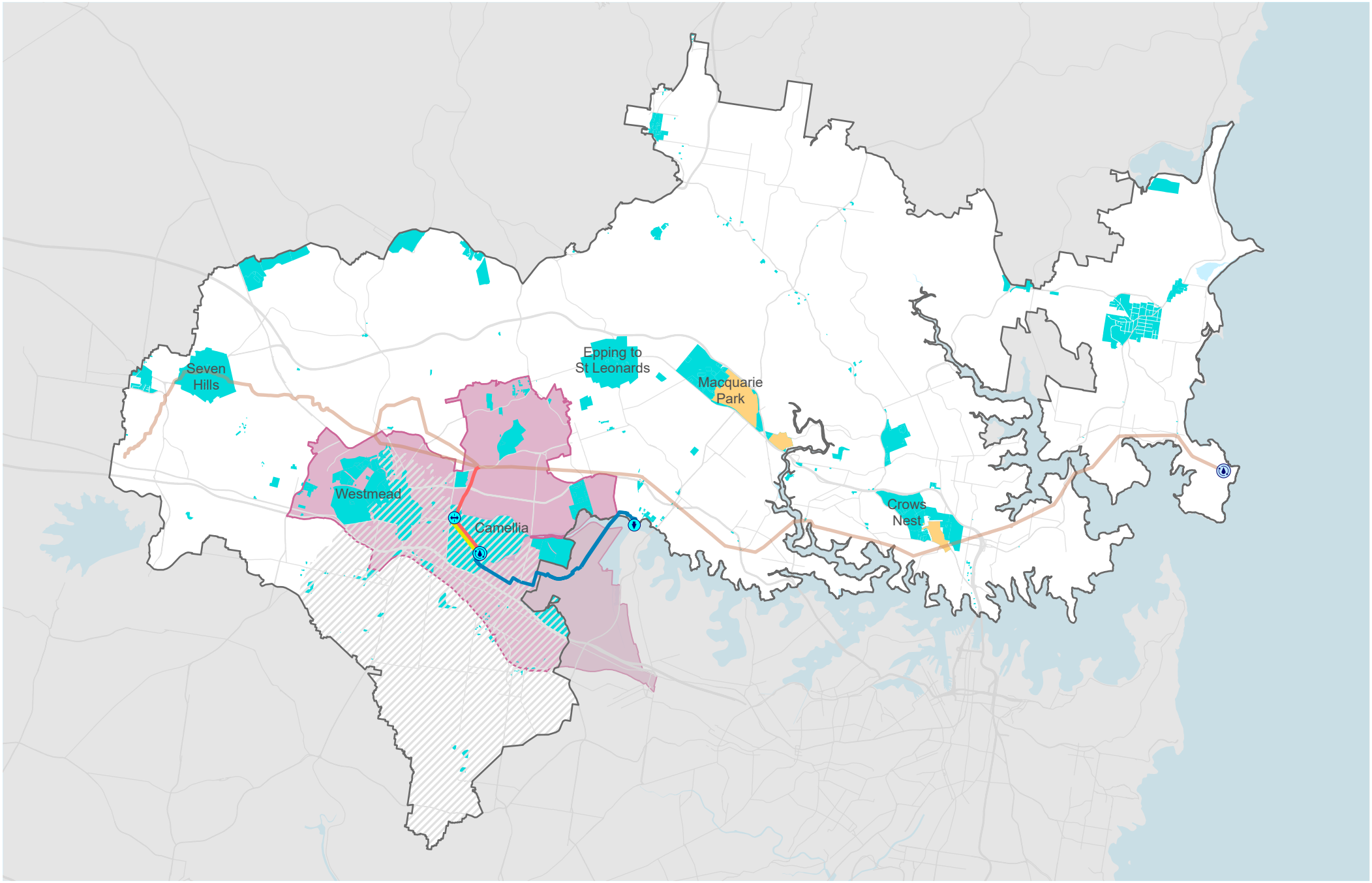


Figure 2-2 The existing northern suburbs wastewater system, the NSOOS and North Head WRRF servicing an extensive area of Greater Sydney (including Bankstown, Yagoona and the Northern Beaches)

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:165,000 @ A4
GDA2020 MGA Zone 56

2.2.2 Challenges for the northern suburbs wastewater system

2.2.2.1 Ageing infrastructure

The NSOOS is a large tunnel sewer, constructed progressively between 1916 and 1933 (Figure 2-3). It travels mainly through deep underground areas that required significant excavation of rock. A concrete lining was laid in the NSOOS to protect the surrounding rock from corrosion caused by wastewater. Over time, this concrete has deteriorated, causing pieces of concrete and rock to drop into the tunnel to the floor. These pieces obstruct flows, collect silt and debris from wastewater that passes through the tunnel each day. The silt reduces the drainage capacity of wastewater pipelines and increases the risk of blockages and overflows.

Sydney Water are working to repair sections of the NSOOS. Rehabilitation efforts are complex due to:

- deep access points
- confined space hazards including sewer gases
- lack of oxygen
- limited working windows which are dependent on flow conditions for safe working.

As Sydney's population grows and demand for wastewater management increases, the pressure on the NSOOS will increase. Climate change is also expected to worsen impacts to the ageing northern suburbs wastewater system. In periods of extreme flooding, the wastewater system can become inundated with flows. This overloads the system and can wash pollutants into waterways as uncontrolled overflows while further deteriorating the system.

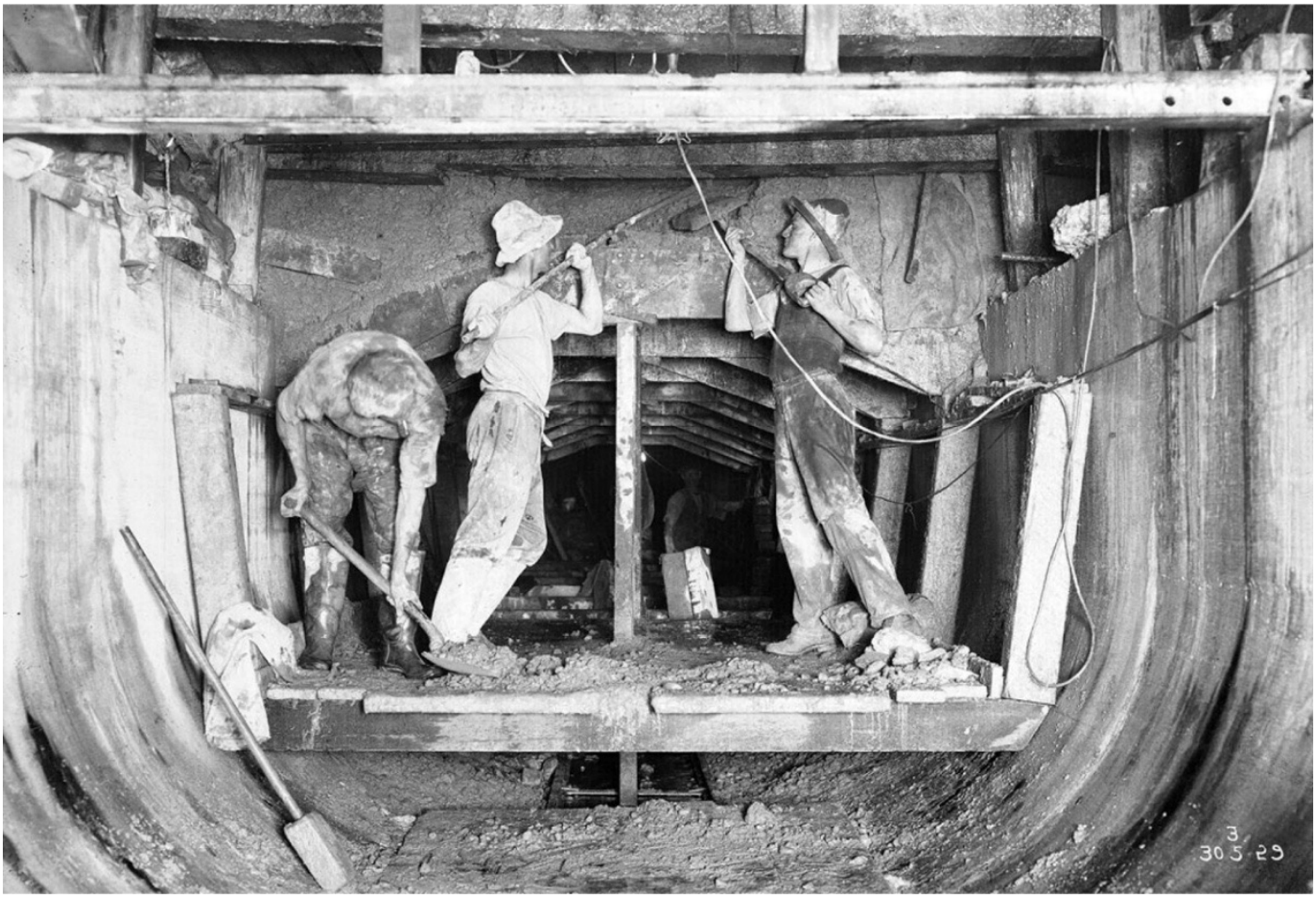


Figure 2-3: Construction of the NSOOS in the 1920s (Source: Sydney Water)

2.2.2.2 Limitations to meet future demand

The northern suburbs wastewater system is regulated in accordance with the *Protection of the Environment Operations Act 1997* under an Environment Protection License (EPL) (EPL No. 378). The EPL sets strict conditions around the quality and quantity of discharge that is permitted from the North Head WRRF. It also regulates the operations and management of the northern suburbs wastewater system.

To avoid environmental harm, Sydney Water manages wastewater at the North Head WRRF in line with the terms of the existing EPL. The EPL includes conditions on the amount of nitrogen that is allowed to be treated at the North Head WRRF. Nitrogen is commonly found and stored in natural materials and is also found in wastewater. When waterways contain too much nitrogen they can experience a range of environmental impacts including algal blooms, which reduce oxygen in the waterway and can have detrimental impacts on ecology. With the current projected population growth, the North Head WRRF is expected to exceed the limitations of the EPL by the early 2030's.

Breaches of the EPL could be avoided in 2 ways:

1. expand the North Head WRRF operations to include either secondary, tertiary or advanced wastewater treatment. This would allow more nitrogen to be treated at the North Head WRRF under an amended EPL
2. control flows to the North Head WRRF to avoid overloading the system capacity.

The below information explains the limitations with the first approach above and context on the system capacity (second approach).

Environmental constraints at North Head

The North Head WRRF is surrounded by Sydney Harbour National Park. In 2006, about 277 hectares of land at North Head were formally listed on the National Heritage List (*Environmental Protection and Biodiversity Conservation Act 1999*) (EPBC Act). This listing recognises the area as having significant value to Australia's natural and cultural history. The North Head WRRF was excluded from the listing, however, is surrounded by land protected under the EPBC Act as well as the NSW *National Parks and Wildlife Act 1974* (NPW Act). The significant cultural and ecological values surrounding the North Head WRRF limit the opportunity for Sydney Water to expand the site and implement additional treatment methods (Figure 2-4).

Figure 2-4: Significant cultural and ecological values surround North Head WRRF (Source: Sydney Water)

Existing system capacity constraints

Figure 2-1 shows the expected population growth areas within the northern suburbs wastewater catchment and the daily volume of wastewater exceeding the capacity of the NSOOS. As discussed above, the NSOOS is overloaded during extreme flood events and will experience an increase in overflows with increased flows associated with population growth. Addressing the overloaded system by controlling flows is essential to addressing the problem.

2.3 Project alternatives and suitability

Sydney Water has been proactively exploring options to meet the wastewater needs of the growing population while delivering positive environmental outcomes. The options that have been considered are summarised in Table 2-1.

Table 2-1: Summary of options considered for the project

Option	Summary of option	Summary of limitations and opportunities	Suitability
Option 1: Do nothing	All residents and businesses in the existing northern suburbs wastewater system catchment would continue to have wastewater transferred to the North Head WRRF for treatment and ocean disposal. Other development areas in northern Sydney would also continue to transfer wastewater through this system.	This option would not adequately address the critical wastewater needs of Sydney's growing population. Consequences of this option include: • overloading of the northern suburbs wastewater system capacities, resulting in non-compliances with existing EPL conditions • increased risk of uncontrolled releases and overflows from the NSOOS causing unacceptable public health and environmental outcomes • limit residential and commercial development potential along the northern suburbs wastewater system (including in the GPOP corridor).	Not preferred

Option	Summary of option	Summary of limitations and opportunities	Suitability
Option 2: Duplication of the NSOOS and upgrades to the North Head WRRF	Sydney Water would construct a second wastewater transfer pipeline in a similar alignment to the existing NSOOS. This alignment would be generally below ground and would require significant excavation and tunnelling. The duplicated NSOOS would transfer wastewater to the North Head WRRF. Sydney Water would continue to maintain and operate the existing NSOOS as part of the system. Sydney Water would be required to expand the North Head WRRF to accommodate for increased flows. Modifications to the existing infrastructure in the facility would be required to integrate new pipelines.	This option has 2 significant limitations. They include: • large financial, environmental and social costs associated with delivering extensive new pipeline infrastructure and integrating assets into the existing North Head WRRF • limited potential to expand the North Head WRRF to increase treatment capacity.	Not preferred
Option 3: Recycled water	A new WRRF is constructed. Some wastewater is collected and treated to tertiary standards at the new WRRF to provide recycled water to homes and businesses. The remaining wastewater would be transferred to the northern suburbs wastewater system for treatment and ocean release.	This option has several limitations. They include: • uncertainty in immediate demand for recycled water • significant investment into the northern suburbs wastewater system still required • least economic value compared to other options without non-drinking recycled water • no opportunity for future PRW provision.	Not preferred

Option	Summary of option	Summary of limitations and opportunities	Suitability
Option 4: River release	A new WRRF is constructed. Some wastewater is collected and treated to advanced standards before release into nearby waterways in accordance with environmental standards. In future, water treated by the new WRRF has the potential to be adapted for recycled water initiatives including PRW, or reused (such as for data centres). The remaining wastewater would be transferred to the northern suburbs wastewater system for treatment and ocean release.	This option presents several opportunities. They include: • relieves operational constraints on the northern suburbs wastewater system • improves the wastewater network capacity to respond to the needs of a growing population • minimises environmental impacts by reducing network wide risks of overflows • enables flexibility in delivery and servicing • treats water locally and could improve waterway health • aligns with government policy to work towards delivering rainfall-independent water sources.	Preferred (the project)

2.4 Design development and options considered for the project

As outlined in Table 2-1, Option 4 was identified as the preferred option. A new WRRF with the capacity to treat wastewater to an advanced standard would address the capacity constraints of the northern suburbs wastewater system. The following sections summarise why the WRRF site and pumping station was selected, and how the options for the pipeline alignments were considered.

2.4.1 WRRF site selection

Sydney Water identified Camellia-Rosehill as a suitable location for the new WRRF for the following reasons:

- Camellia-Rosehill is strategically located within the GPOP development area and provides the opportunity for centralised servicing to the area
- proximity to the existing Camellia pumping station, which services the GPOP catchment and comprises 25% of the total flow in the NSOOS. Reducing inflow into the NSOOS would substantially relieve its capacity and future compliance risks
- the Camellia-Rosehill industrial precinct comprises large parcels of land with industrial land uses. Under the Camellia-Rosehill Place Strategy (DPE, 2022b), it was expected that a portion of the precinct will retain industrial land uses in the future
- a WRRF in the Camellia-Rosehill precinct aligns with strategic planning objectives for the precinct (Section 2.1).

Several land parcels within the Camellia-Rosehill industrial precinct were investigated including hybrid options connecting 2 sites. Due to the long industrial history at Camellia-Rosehill, legacy contamination was a key issue for site selection. Other constraints included avoiding sites with key ecological habitat constraints, unsuitable geotechnical conditions, and distance from sensitive receivers including residential areas.

A suitable site was selected at Devon Street, Rosehill and is shown in Figure 2-5. This site was selected for the following reasons:

- suitable size to cater for future housing and commercial development and facility expansion
- lower levels of contamination compared to other areas reviewed
- suitable distance from sensitive receivers
- limited ecological values and vegetation coverage
- minimal property impacts due to no existing houses or leases for businesses on the land.

2.4.1.1 Sizing and staging of the Camellia-Rosehill WRRF

Sydney Water determines the capacity of its treatment plants using projected population and other demographic forecasts, converting these to equivalent expected flows. Sydney Water sizes plants to

accommodate flows from the servicing area in normal and average wet weather conditions, to minimise the risk of overflows and EPL breaches.

Sydney Water balances cost and environmental factors to stage capacity upgrades. As population growth can be unpredictable, Sydney Water needs to be flexible and design treatment plants so they can be easily upgraded to cater for increased populations before they arrive.

This project has been sized to treat 70 ML of wastewater per day based on population growth projections to 2056. However, Sydney Water has identified that there would need to be future expansions of the WRRF, and the site layout has been designed to reflect this. In the future, the Camellia-Rosehill WRRF may be able to accommodate flows of up to 150 ML per day, depending on future housing and commercial development, and treatment technology. Some of the pipelines proposed for the project would be sized to manage increased future treated flow volumes. This is a proactive and cost-effective approach in safeguarding Sydney Water's wastewater network to manage future development.

Increases to the treatment capacity and potential associated infrastructure do not form part of this EIS and would be subject to separate approvals.

2.4.2 Camellia pumping station

Camellia pumping station was chosen to relieve the capacity constraints within the northern suburbs wastewater system because it is the largest pumping station within the system. The pumping station contains existing operational infrastructure that can be adapted and upgraded to accommodate for future flows. Diverting flows from Camellia pumping station would considerably reduce flows into the NSOOS and North Head WRRF. This would help address the forecast capacity constraints for the system (Section 2.2.2). To enable bi-directional flow at the pump station, and transfer of wastewater to the Camellia-Rosehill WRRF as well as to the NSOOS, upgrade works are required. These upgrades are detailed in Section 3.5.

2.4.3 Options considered for pipelines

Sydney Water has considered a number of potential alignments for the brine, transfer and river release pipelines. Potential alignments have been analysed to identify potential risks, impacts, limitations and opportunities. Through this process, several options were short-listed. These options are shown in Figure 2-5. Sydney Water carried out a multi-criteria analysis for each option with the objective of identifying a preferred alignment for the project. The multi-criteria analysis included consideration of the following matters:

- protection of environmental and human health
- environmental constraints (including contaminated land and heritage)
- potential to avoid and minimise environment, community and property impacts
- potential to avoid and minimise impacts to other infrastructure, such as utilities and major roads
- public transport services and assets
- major projects (including Parramatta Light Rail (PLR) Stage 2 and Sydney Metro West)

- constructability (including construction methodologies)
- community concerns
- value for money (including opportunities to repurpose existing infrastructure)
- sustainability targets (including carbon dioxide emissions)
- consequences of delays to network improvements
- longevity of assets
- project objectives.

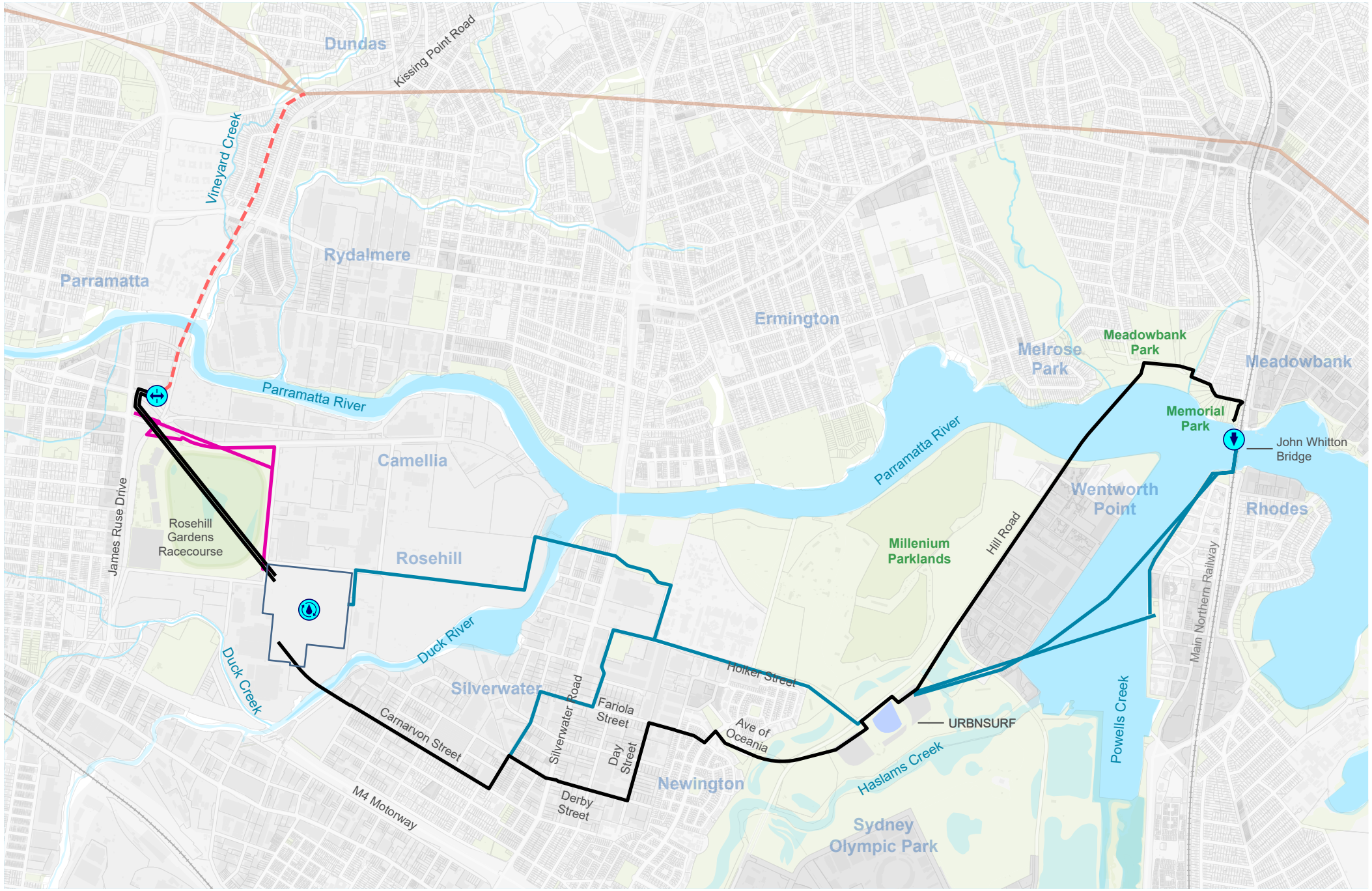


Figure 2-5 Options considered for pipeline alignments

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

2.4.3.1 Preferred brine and transfer pipeline alignment

The multi-criteria analysis (Section 2.4.3) identified that for the northern part of the brine pipeline (between the Camellia pumping station and the NSOOS) reuse of an existing (unused) wastewater pressure pipeline would be the most suitable option. This was due to:

- the opportunity to minimise environmental and community impacts
- ability to increase the operational life of the existing unused pipeline
- value for money and sustainability opportunities by repurposing the unused pipeline
- greater cost efficiencies when compared to the cost of building new infrastructure by:
  - utilising the existing river crossing at the Parramatta River, avoiding the need to build a new bridge or tunnel beneath the river
  - avoiding acquisition for easements in private properties, including at Western Sydney University (WSU)
  - minimising disruptions to WSU from construction
  - avoiding costs of reinforcing or relocating utility infrastructure.

Sydney Water has actively consulted with several key stakeholders on the location and design of the brine and transfer pipelines between the Camellia pumping station and Camellia-Rosehill WRRF. This has included Sydney Metro, PLR, the ATC (regarding the Rosehill Gardens Racecourse), and Endeavour Energy. Sydney Water has considered the outcomes of the multi-criteria analysis in addition to feedback received from key stakeholders.

Several options were not feasible due to unacceptable impacts to significant infrastructure including utilities such as electrical, gas and telecommunications. The proposed alignment in this area was preferred as it:

- minimises conflicts with utility services, avoiding potential disruption and costs of relocating services
- minimises potential construction in roadways, avoiding closures of Colquhoun Street and Grand Avenue which are main roads for the precinct
- avoids disruptions to events at Rosehill Gardens Racecourse
- avoids potential disruptions to construction of Sydney Metro West and PLR Stage 2
- minimises potential disturbance of acid sulfate soils (ASS) and contaminated soils
- reduces construction time, cost and environmental impacts by adopting a shorter, more direct route between the Camellia-Rosehill WRRF and Camellia pumping station
- aligned with the future land uses proposed on the Rosehill Gardens Racecourse site as outlined in the Camellia-Rosehill Place Strategy (DPE, 2022b).

2.4.3.2 Preferred river release structure and pipeline

River release location

Sydney Water has been investigating the potential for river release to Parramatta River for several years in discussion with the NSW Environment Protection Authority (NSW EPA). The proposal to treat wastewater locally and release high quality treated water to the river is consistent with many inland WRRFs. This aligns with the current strategic planning priorities to reduce reliance on coastal treatment and ocean release of treated wastewater (Section 2.1.2). Parramatta River was also favoured because of its proximity to the Camellia-Rosehill WRRF, suitability of water depth and opportunity to improve waterway health.

The Greater Parramatta, Olympic Peninsula Water Cycle Scoping Report (SSI-74258485) (Sydney Water, 2024b) identified several potential locations along the Parramatta River for the release of advanced treated water. Table 2-2 summarises the suitability of the potential locations. Sydney Water assessed the suitability of these locations using the below criteria:

- construction duration and impacts
- site access, including for pipe stringing
- maintenance requirements
- water quality and mixing ability
- sediment disturbance and river scour
- impact from flood events
- public safety and traffic
- visual impact of water release during calm river conditions
- disturbance at the water level and induced current
- risk to ferry operations and other marine activities
- futureproofing (ability to increase flows)
- cost.

Table 2-2: River release location options and summary of suitability

Option	Summary of limitations and opportunities	Suitability
Bedlam Point, Gladesville	• releases would occur into Parramatta River, about 9 km from the Camellia-Rosehill WRRF site • opportunity to locate release pipeline in deep water of the Parramatta River channel • distance from the Camellia-Rosehill WRRF site would result in large construction cost and impacts to the community, vegetation and potentially heritage values.	Not preferred
Pulpit Point, Hunters Hill	• releases would occur into Parramatta River, about 12 km from the Camellia-Rosehill WRRF site • opportunity to locate release pipeline in deep water of the Parramatta River channel that would enable dispersion • distance from the Camellia-Rosehill WRRF site would result in large construction cost and impacts to the community, vegetation and heritage values.	Not preferred

Option	Summary of limitations and opportunities	Suitability
Duck River, Rosehill	• releases would occur into Duck River, adjacent to the Camellia-Rosehill WRRF site • proximity to the Camellia-Rosehill WRRF site would reduce construction cost and impacts to the community and environment • shallow water would risk sediment disturbance and potential water quality impacts.	Not suitable
Wentworth Point	• releases would occur into Parramatta River, about 5 km from the Camellia-Rosehill WRRF site • high density area limits potential construction areas • severe interruptions to ferry services with limited alternative public transport options.	Not suitable
Meadowbank	• releases would occur into Parramatta River, about 5.5 km from the Camellia-Rosehill WRRF site • proximity to the Camellia-Rosehill WRRF site would reduce construction cost and impacts to the community and environment • opportunity to locate release pipeline in moderately deep water of the Parramatta River channel that would enable dispersion • availability of open space areas including parks which can temporarily be used as potential construction areas • avoids major disruptions to public transport services. While some temporary closures of the Parramatta River would be required, this would be limited in duration and alternative transport services would be developed.	Suitable and preferred

River release pipeline between the Camellia-Rosehill WRRF and URBNSURF

A multicriteria analysis was used to determine the most suitable alignment, using the same criteria as outlined in Section 2.4.3. The preferred alignment was selected for the following reasons:

- significantly less interface with an existing high-pressure fuel pipeline, therefore improving constructability
- least exposure to ASS and contaminated land, resulting in reduced cost and risk associated with excavation and removal of contaminated soils
- less disruption to road users during construction and operation (maintenance)
- reduced interface with private property and therefore less requirements for land acquisition, land easements
- reduced disruption to key stakeholders by minimising impacts to State Heritage Register-listed items, conservation areas along Holker Street, the Wilson Park Bioremediation site, and Silverwater Correctional Complex.

Sydney Water has investigated opportunities to refine the pipeline footprint as far as practical to minimise environmental and community impacts. Various sizing and staging options were considered for the pipelines. Smaller pipelines can have the potential to have smaller environmental and community impacts during the initial construction phase of the project. Despite this, smaller pipelines would require continual upgrades or eventual duplication as the operational demands on the Camellia-Rosehill WRRF increase.

Sydney Water is proposing to construct pipelines with adequate capacity to service the future demands of the network from housing and commercial deveopment. This approach is cost effective and minimises impacts to the community in the future by avoiding the need to reconstruct and duplicate pipelines in the short-term to mid-term.

2.5 Key features of the site and surrounds

This section provides a summary of the key features of the project corridor and surrounds that could affect or be affected by the project. It also outlines how the project would interact with other major projects that are nearby.

2.5.1 Local and regional community

The project is located within the suburbs of Camellia, Rosehill, Silverwater, Newington, Wentworth Point, Parramatta, Dundas and Olympic Park, within the Parramatta LGA and within the suburb of Meadowbank within Ryde LGA.

The WRRF and proposed pipelines are in highly developed areas, dominated by industrial and commercial development, as well as some residential and recreational land uses. Land use zoning is shown in Figure 2-6. Further detail about the local and regional community is provided in Chapter 18 (Social and economic impacts).

2.5.2 Important natural, cultural and built features

2.5.2.1 Natural features

Important natural features near the project include:

- major waterways including Parramatta River, Duck River, Homebush Bay, Haslams Creek and Powells Creek
- wetlands (Narawang and Nuri in Sydney Olympic Park) and mangroves and saltmarsh in Duck River and at Meadowbank Park
- nature reserves and parks including the Newington Nature Reserve, Millennium Parklands, Sydney Olympic Park, Meadowbank Park and Vineyard Creek Reserve.

These features are shown in Figure 2-7. Although these natural features are near the project, most are outside the project impact area and would not be negatively affected by the project. At some locations, the impact area would overlap with wetlands and major waterways, Sydney Water would use trenchless construction methods to install infrastructure below wetlands and the Parramatta River and Duck River to avoid impacts to these natural features.

2.5.2.2 Cultural heritage features

The area surrounding the project has substantial Aboriginal and non-Aboriginal historical context.

Aboriginal people have lived in the area now known as Greater Sydney for thousands of years. Prior to colonisation many Aboriginal people lived along the Parramatta River and surrounding waterways. These areas provided important resources for food, shelter and tools. Areas near the project provides evidence of this occupation, such as remnant campsites, archaeological deposits and artworks. It also includes remnant vegetation which is reflective of the reciprocal relationship between Aboriginal people and Country (land, waterways and oceans). Further detail on Aboriginal cultural heritage values is contained in Chapter 16 (Aboriginal Heritage).

The project is near several non-Aboriginal heritage features that are reflective of the development of Parramatta and Greater Sydney from a penal colony and farmland to a rapidly urbanising city. Pipelines would be constructed within the curtilage of the following non-Aboriginal heritage items:

- Rydalmere Hospital Precinct (former) - State Heritage Register (00749)
- Sewage Pumping Station 67 - State Heritage Register (01643)
- Memorial Park (including obelisk) and remnants of former Meadowbank baths - Ryde Local Environmental Plan (LEP) 2014 (I72) (City of Ryde Council, 2014).

The pipelines would also travel beneath the Wetlands (Parramatta Local Environmental Plan 2023 (I11/ I623) (City of Parramatta Council, 2023a) at Duck River, Rosehill.

Non-Aboriginal heritage items are further described in Chapter 15 (Non-Aboriginal heritage).

2.5.2.3 Socio-cultural features

The project is also near important community and recreational facilities, including Rosehill Gardens Racecourse, Sydney Olympic Park, Meadowbank Park and Memorial Park at Meadowbank. Rosehill Gardens Racecourse and Sydney Olympic Park support a high number of sporting and entertainment events which attract visitors from outside of the locality and region. Meadowbank Park includes several sporting fields which host weekend sporting events, weekday school sporting activities as well as casual recreation for neighbourhood locals. Memorial Park is connected to Meadowbank Park by an active transport link adjacent to the Parramatta River.

2.5.2.4 Key infrastructure

The project is in the vicinity of several major transport projects. They are:

- Stage 1 of PLR, which commenced operations in 2024
- Stage 2 of PLR, which commenced construction in 2025
- Sydney Metro West, which is under construction and expected to commence operations in 2032.

More information on how the project would interact with PLR and Sydney Metro West is included in Chapter 23 (Cumulative impacts).

Major roads include the M4, Silverwater Road and James Ruse Drive. Important educational facilities are located nearby, namely WSU. Overhead and underground transmission lines, and high-pressure gas and fuel pipelines are also located near the project, as well as major industrial facilities like Viva Energy. As the precinct is a growth area, development of major infrastructure and industry will continue.

City of Parramatta Council is currently delivering the Duck River Nature Trail. This is a staged project which delivers new active transport paths over several kilometres through Duck River between Camellia and Silverwater. Stage 3 of the Duck River Nature Trail project will occur in land directly adjacent to the Camellia-Rosehill WRRF site, with construction planned to commence in 2027.

These developments have been addressed as part of the cumulative impact assessment in Chapter 23 (Cumulative impacts).

2.5.3 Key risks or hazards

Risks and hazards in the area include contamination from historical industrial activity and landfills (refer to Chapter 9 (Soils and contamination)), areas of flood-prone land (refer to Chapter 8 (Flooding)), and existing hazardous development within the Camellia-Rosehill precinct. This includes Viva Energy's Clyde Terminal, which is classified as a major hazard facility under the *Work Health and Safety Act 2011*. A number of pipelines that handle dangerous goods, including the Jemena gas pipeline and Ampol fuel pipeline are also located along Grand Avenue. These industries pose a potential risk that may affect the community in the unlikely event that a chemical spill, explosion or other unforeseen accident occurred. The project is not expected to impact the risks associated with these hazardous items, as discussed in Chapter 22 (Dangerous goods and hazardous development).

2.5.4 Interactions with Sydney Metro West and Parramatta Light Rail

As outlined in Section 2.5.2, the project is surrounded by a number of major projects including Sydney Metro West and PLR. Sydney Water has been engaging with Sydney Metro and PLR to understand likely construction timeframes, as well as operational and construction requirements.

Sydney Water has prioritised designing the project to avoid impacts to both projects. This has included:

- locating pipeline infrastructure away from the Sydney Metro tunnels and PLR tracks
- minimising the need to relocate and reinforce utility infrastructure during construction to avoid disruptions to power supply at Sydney Metro and PLR
- consideration of potential alternative traffic routes where road network constraints have been identified
- designing the Camellia-Rosehill WRRF site to not worsen precinct-wide flooding issues.

The interactions between the project and other major projects, including Sydney Metro and PLR have been detailed in Chapter 23 (Cumulative impacts).

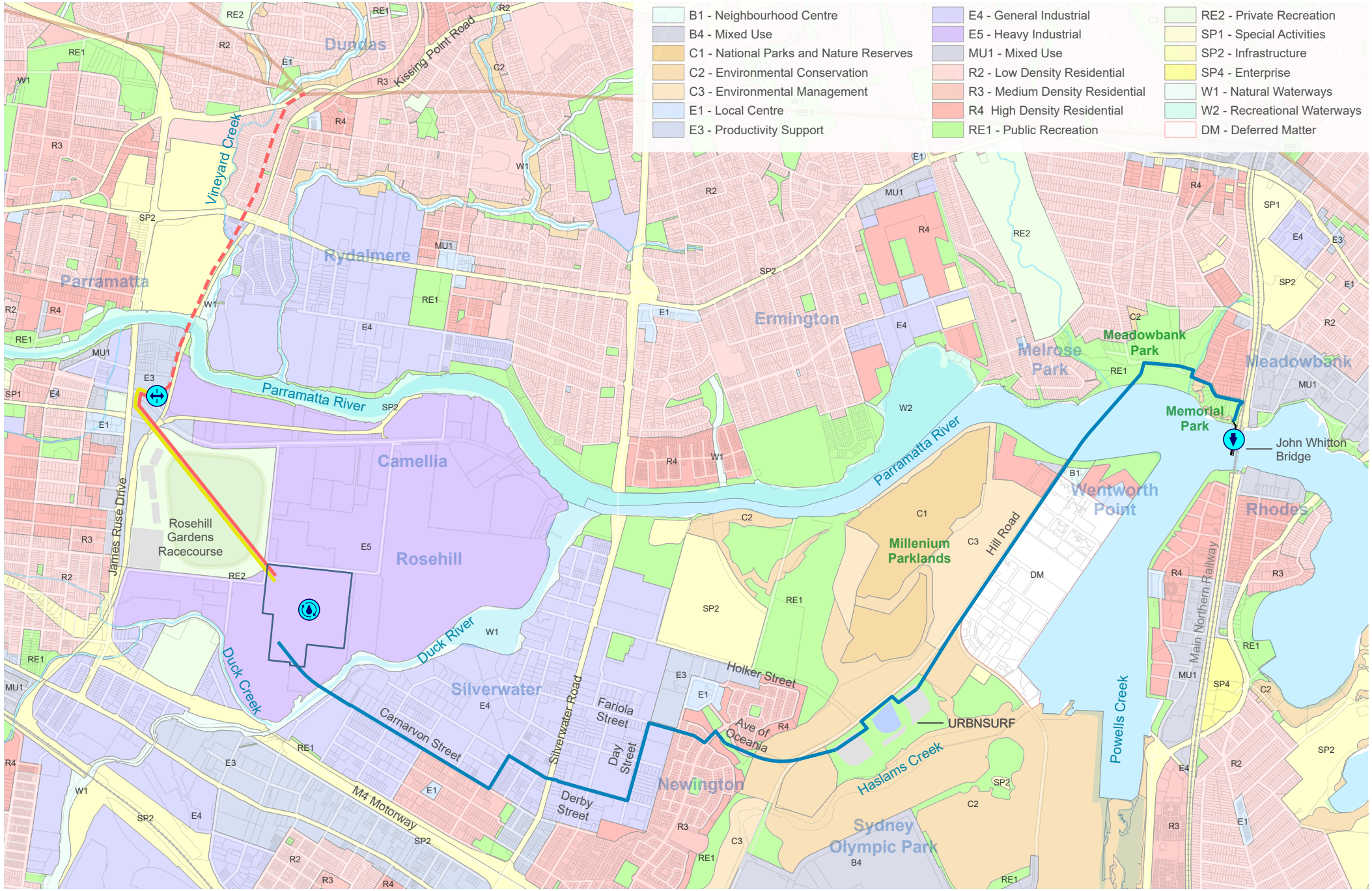
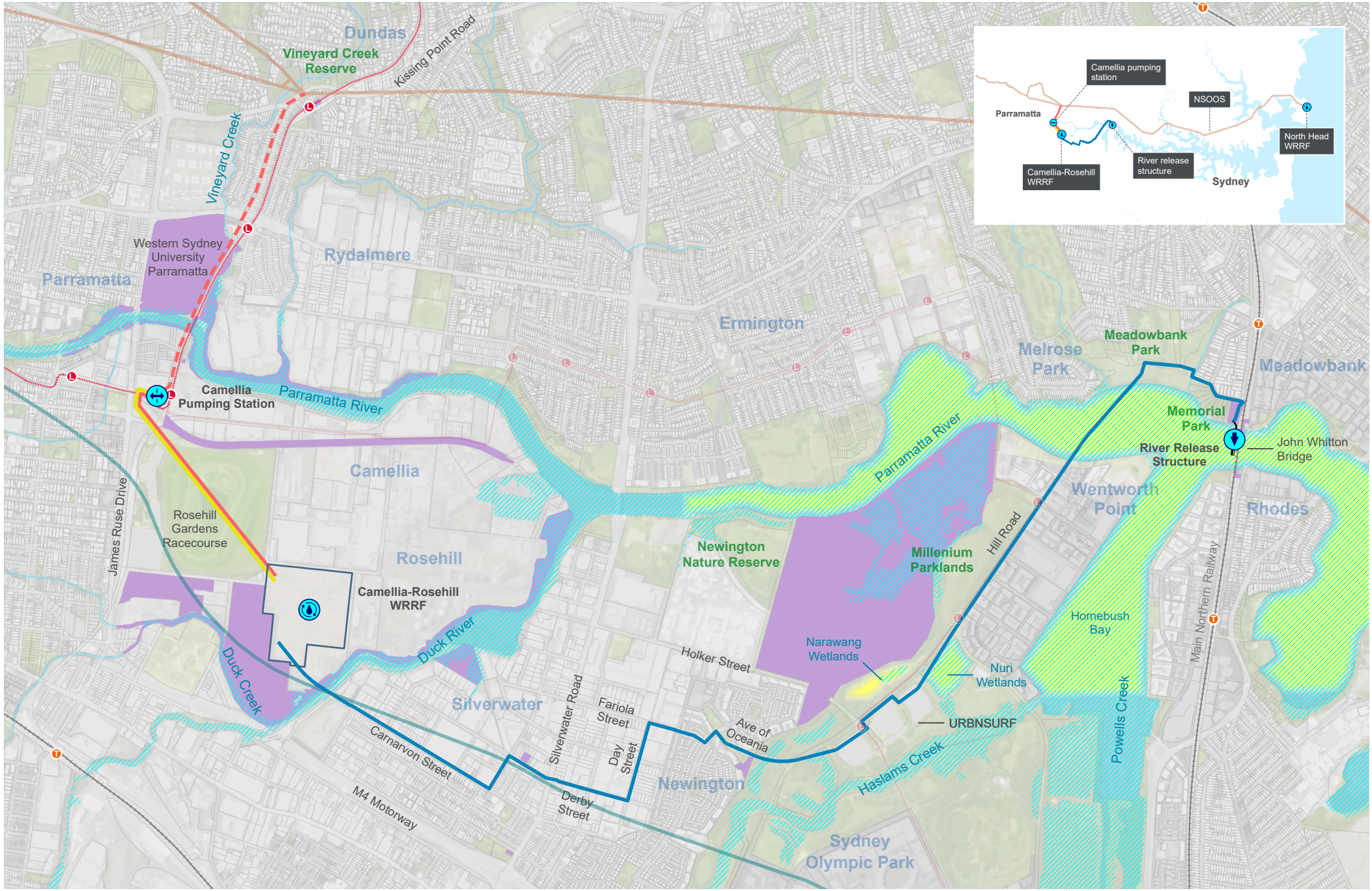


Figure 2-6 Surrounding land use zoning context

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56



Camellia-Rosehill WRRF
Camellia pumping station
River release structure
Northern Suburbs Ocean Outfall Sewer (NSOOS)

River release pipeline
Transfer pipeline
Brine pipeline
Existing pipeline to be relined for brine pipeline

Railway
Sydney Metro tunnel
Parramatta Light Rail Stage 1
Parramatta Light Rail Stage 2 (under construction)

Key Fish Habitat
Heritage item
Migratory shorebird important habitat mapping (IHM)

Figure 2-7 Key features

0 500 1000 1500 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

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Project description

3 Project description

3.1 Project overview

Under existing conditions, wastewater is transported in the northern suburbs wastewater system towards North Head WRRF with the help of gravity and pumping stations along the network. This project would redirect some of the wastewater at the Camellia pumping station towards a new WRRF, where it would be treated to advanced quality and released to Parramatta River. As part of the advanced treatment process, the WRRF would produce brine which is a concentrated salty solution. The brine would be redirected back to the Camellia pumping station for transport via the NSOOS towards North Head WRRF. An overview of the key project elements is provided in Table 3-1. More detail is provided in Sections 3.4 to 3.6.

Table 3-1: Project description summary

Aspect	Description
Project elements	A WRRF located in Camellia-Rosehill, upgrades to Camellia pumping station, transfer pipeline, brine pipeline, river release pipeline and a river release structure in Parramatta River.
Project location	The project is in the Parramatta and Ryde LGAs. The project crosses into the suburbs of Dundas, Rydalmere, Rosehill, Camellia, Silverwater, Newington, Sydney Olympic Park, Wentworth Point and Meadowbank. Property on which the project is located is shown in Appendix B (Detailed maps and plans).
Land acquisition and easements	No land acquisition is required. Easements would be required over the project pipelines where it is: • anywhere other than in dedicated public roads / pathways or Sydney Water owned land • installed at a depth of less than 9 m.
Access	The WRRF would be accessed from the existing access point at the corner of Unwin Street and Colquhoun Street, and an egress would be constructed onto Devon Street.
Capacity	The project would have capacity to treat up to 70 ML of wastewater per day.
Proposed treatment process infrastructure	• inlet works for preliminary treatment (screening) • primary, secondary and tertiary wastewater treatment process units • advanced treatment processes involving reverse osmosis • disinfection systems • biosolids handling facilities, including cogeneration for heat and energy production • odour control facilities.

Aspect	Description
Permanent ancillary facilities	The WRRF includes a range of process infrastructure such as tanks, bioreactors and digestors. A range of ancillary infrastructure would be required including an administration building, internal roads, connection to power, car parking, chemical storage and stormwater infrastructure.
Operational products	• high quality advanced treated water • brine • biosolids.
Operational timeframe and hours	The project would operate 24 hours per day, 7 days per week from 2031.
Workforce (full time workers)	• up to 255 people per day during peak construction • up to 10 people per day during operation.
Construction timeframe and hours	Construction would take around 36 months. Most construction work would be conducted during standard construction hours. However, certain activities would need to be carried out outside these hours including: • material deliveries as required by the NSW Police or other authorities for safety reasons • emergency situations where it is required to avoid the loss of lives and properties and/or to prevent environmental harm • situations where agreement is reached with project neighbours, such as pipeline construction work at night to minimise impacts to busy roads, commercial and residential receivers • where directed by TfNSW under a Road Occupancy Licence (ROL), limiting road closures during busy day periods • works that cannot be completed within the standard respite periods for engineering reasons including trenchless pipe installation and any long concrete pours • construction activities within Parramatta River that require weekend closures of the river to traffic for safety reasons and to avoid peak ferry use times.
Temporary construction facilities	Indicative locations of construction compounds are shown in Figure 3-1 to Figure 3-5. The number of construction compounds are shown as a worse case. Alternative compound locations may be proposed during detailed design and construction planning.

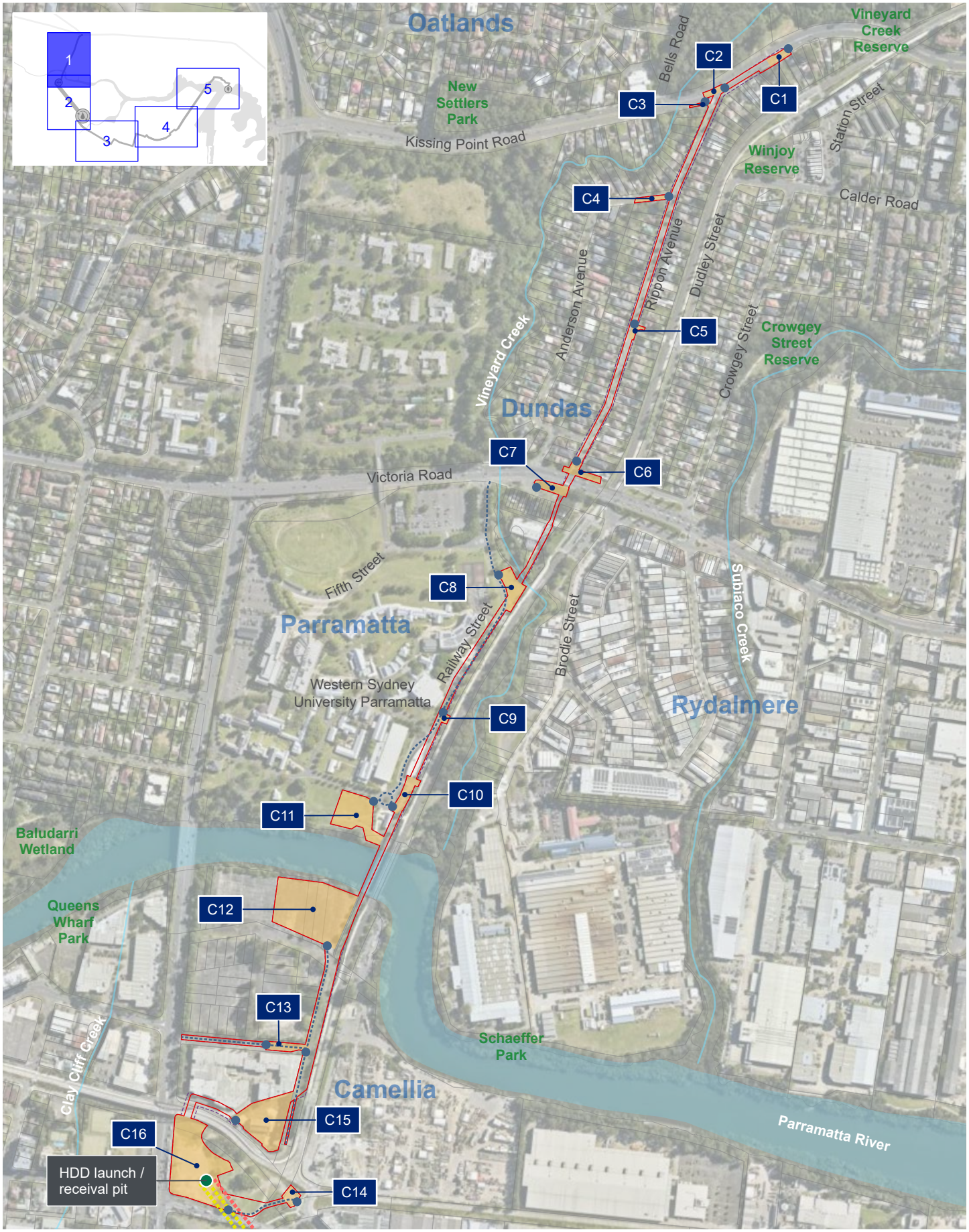
3.2 Impact area of the project

Figure 3-1 to Figure 3-5 shows the project area assessed in this EIS as well as indicative construction compounds. This EIS considers both the impact area and the impact assessment area being:

- impact area - the project footprint, which is the area directly impacted by the project.

- impact assessment area - wider area in which Sydney Water is seeking flexibility to locate project infrastructure (provided that the overall impact does not change).

Within the impact assessment area, if impacts are worse than those assessed in this EIS, Sydney Water would consult with DPHI and modify the approval where appropriate. If the impacts are demonstrably the same or better than those presented in this EIS based on a consistency assessment, then works may proceed. This flexibility allows Sydney Water to maintain the delivery program and therefore efficiently contain and manage impacts to the community and environment.



Impact area (IA)
Impact assessment area (IAA)
Proposed Transfer Pipeline - Trenchless
Proposed Brine Pipeline - Trenchless
HDD launch / receival pit
Indicative compound access
Indicative compound access routes
Indicative construction compounds

Figure 3-1 Project impact area including indicative construction compounds

Sheet 1 of 5 0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

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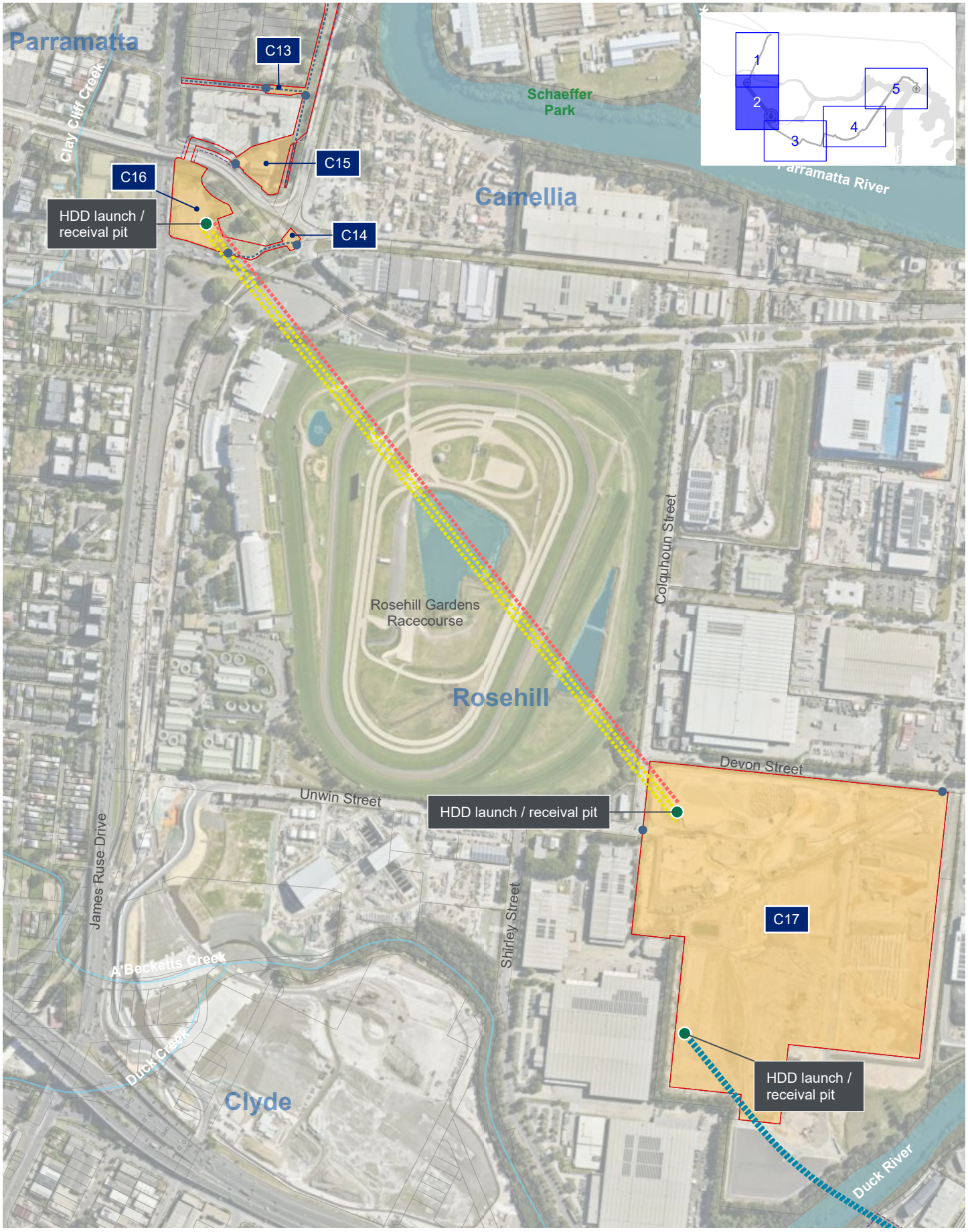

Impact area (IA)
Impact assessment area (IAA)
Proposed Transfer Pipeline - Trenchless
Proposed Brine Pipeline - Trenchless
Proposed River Release Pipeline - Trenchless
HDD launch / receival pit
Indicative compound access
Indicative compound access routes
Indicative construction compounds

Figure 3-2 Project impact area including indicative construction compounds

Sheet 2 of 5

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

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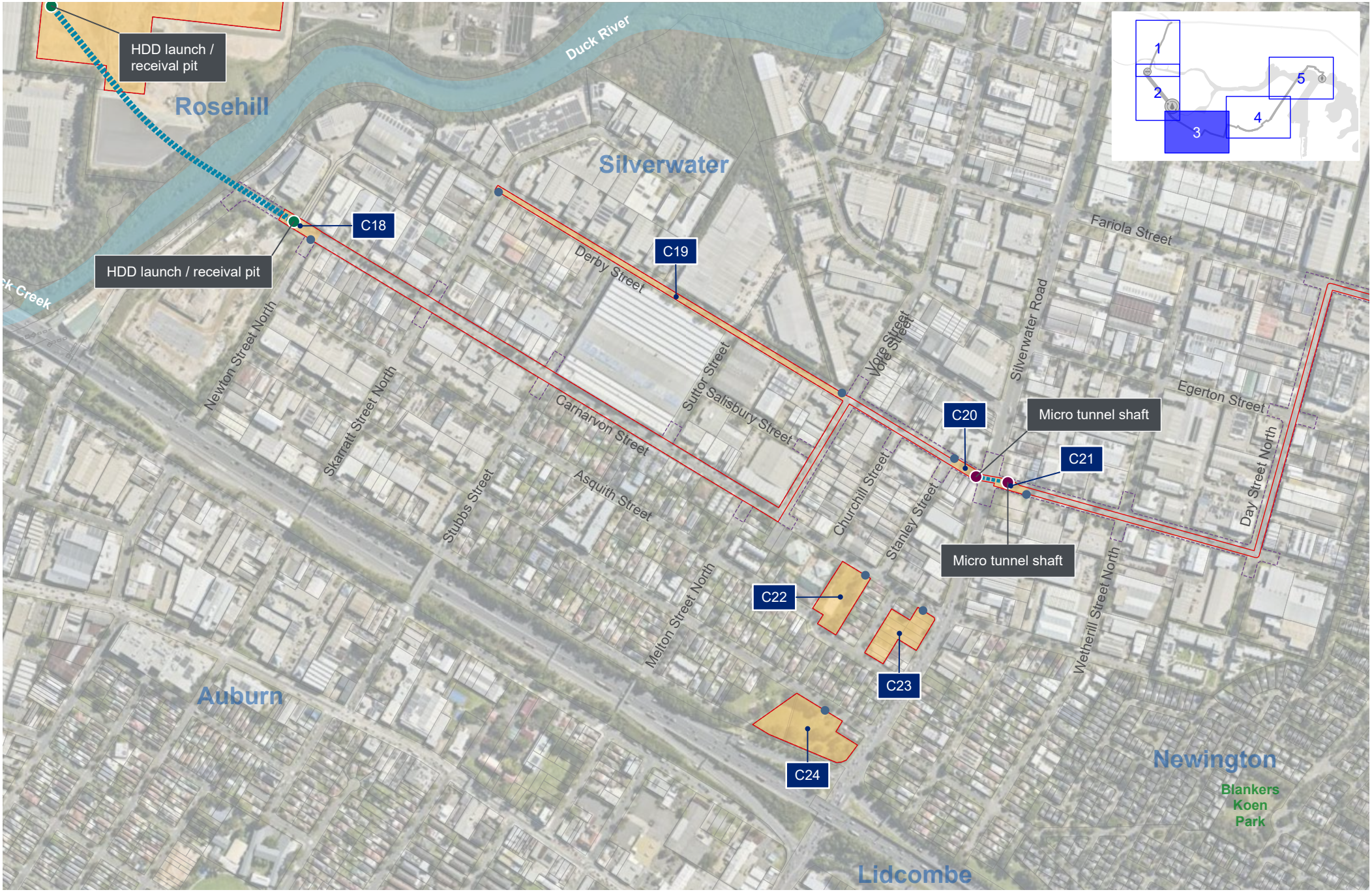

Impact area (IA)
Impact assessment area (IAA)
Proposed River Release Pipeline - Trenchless
HDD launch / receival pit
Micro tunnel shaft
Indicative compound access
Indicative construction compounds

Figure 3-3 Project impact area including indicative construction compounds

Sheet 3 of 5

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

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Impact area (IA)
Impact assessment area (IAA)
Proposed River Release Pipeline - Trenchless
HDD launch / receival pit
Indicative compound access
Indicative construction compounds

Figure 3-4 Project impact area including indicative construction compounds

Sheet 4 of 5

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

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Impact area (IA)
Impact assessment area (IAA)
Proposed River Release Pipeline - Trenchless
HDD launch / receival pit
Indicative compound access
Indicative compound access routes
Indicative construction compounds
Indicative Parramatta River construction area

Figure 3-5 Project impact area including indicative construction compounds

Sheet 5 of 5

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

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3.3 Timing and sequencing

Figure 3-6 provides an overview of the project timeline.

Figure 3-6: Project timeline

The EIS is seeking approval to:

- build and operate the WRRF to treat up to 70 ML/day
- construct and operate pipelines to transfer and release treated water with some pipelines catering for future treated water volumes.

The following sections provide more detail.

3.3.1 Operational capacity

The WRRF has been designed to allow flexibility in the future for:

- expansion to increase treatment capacity (considering future housing and commercial development, and demand needs)
- upgrades to support potential recycled water avenues.

The ultimate capacity of the WRRF based on the site area is up to 150 ML/day. If required, the timing and size of expansions to reach this operating capacity would be established over time to align with population growth and changing treatment technology. The brine pipeline and some sections of the river release pipeline have been designed in this project to accommodate future flows. This is to avoid substantial additional construction impacts on the environment and communities in the future.

Future expansions may only be required for the transfer pipeline and the process units of the WRRF in response to increased servicing demand. The works required for such expansions are expected to be small in scale with associated manageable impacts. Therefore, the WRRF and transfer pipeline have been sized for an operational capacity of 70 ML/day.

Sydney Water expects that future expansions in relation to this project would be subject to separate planning approvals under Division 5.1 of the EP&A Act.

3.3.2 Construction timeline

The construction phase of the project is planned to start in 2028. Table 3-2 shows the indicative construction timeframe of key project elements. Construction, including at the WRRF, would be staged progressively. The impact assessment in this EIS assumes a worst-case impact scenario that all infrastructure is installed in one overarching construction phase. A construction staging plan would be developed during detailed design and construction planning.

Table 3-2: Indicative construction timeframe

Project element	Indicative timeframe for construction
WRRF	Q3 2028 – Q4 2030
Camellia pumping station upgrade works	Q2 2029 – Q2 2030
Transfer (2 pipelines) and brine pipeline (one pipeline)	Q3 2028 – Q3 2029
Brine pipeline (relining)	Q3 2028 – Q3 2029
River release pipeline	Q3 2028 – Q2 2030
River release structure	Q4 2029 – Q2 2030
Commissioning	Q4 2030 – Q4 2031

3.4 WRRF

3.4.1 Location

The WRRF would be located at 9 Devon Street, Rosehill, 2142 (Lot 1 DP1308385). The site is owned by Sydney Water and is about 21.5 hectares. Figure 2-7 in Chapter 2 (Strategic context) shows the location of the site in Rosehill and its key surrounding features. Existing vehicle access is at the corner of Colquhoun Street and Unwin Street, along the western boundary of the site. The project includes a new egress onto Devon Street, at the northern boundary of the site.

The site has a history of heavy industrial use. It is the location of a former refinery and is known to contain contaminated material. As described in Section 1.8, the majority of the WRRF site has been raised by about 1.7 m with imported natural material (such as tunnel spoil) from other major projects in Sydney. The site raising was carried out under a separate planning approval. The raising of the site enables most excavation for project infrastructure to be within this new ‘clean’ material, avoiding potential contamination, health and safety risks. The new ground level would be about 6.5 m Australian Height Datum (AHD), which is above the 1% Annual

Exceedance Probability (AEP) flood level. The south-western area of the WRRF site is an existing overland flood flow path.

3.4.2 Design

The WRRF would comprise the wastewater and advanced water treatment infrastructure including inlet works, tanks and process chambers, advanced treatment buildings, interconnecting pipelines, digesters, pumping stations, odour treatment units, and biosolid treatment units. There would also be a range of ancillary infrastructure such as roads, car parking, an administration building, security fencing and retaining walls. Other features ancillary to the main treatment process include chemical handling facilities, and potential energy production infrastructure including solar, battery and co-generation facilities. The indicative site layout of the WRRF is shown in Figure 3-7. The Camellia-Rosehill WRRF has been designed with the following measures:

- locating odour control facilities and chemical storage areas towards the centre of the site, away from the site boundary and neighbours
- covering odour sources (inlet works, primary treatment, biosolids handling area) to contain odour
- preference for chemicals with lower risk profile for environmental harm
- locating noise generating plant and machinery inside buildings where possible
- locating the administrative building and staff amenities at the front of the site to increase passive surveillance
- safeguarding setbacks from the property boundary on Devon Street to allow for public domain enhancements and to create opportunities for landscaping and greenspaces in the site
- limiting the operational footprint of the WRRF to the raised portion of the site (under a separate planning approval) to limit flood and contamination risks.

Sydney Water is seeking flexibility regarding equipment at the WRRF site, including the treatment technology, layout, structure sizes and number of units. Any change to the WRRF design with the potential to effect treated water quality criteria and other effects including noise, air quality (dust and odour) and visual impacts, would be assessed for consistency with the EIS. If the impacts are worse than those assessed in the EIS, Sydney Water would consult with DPHI to modify the approval where appropriate. If the impacts are demonstrably the same or better than those presented in the EIS based on a consistency assessment, then works may proceed.

The indicative key infrastructure proposed for the WRRF are set out in Sections 3.4.3, 3.4.5 and 3.4.6. There would also be a complex suite of pipes, pumps, valves, screens and other treatment equipment that form part of the project that would be refined through the detailed design process. Most of the infrastructure would be above ground, with some below-ground components across the area including footings, pipelines, cables, utilities and stormwater elements.

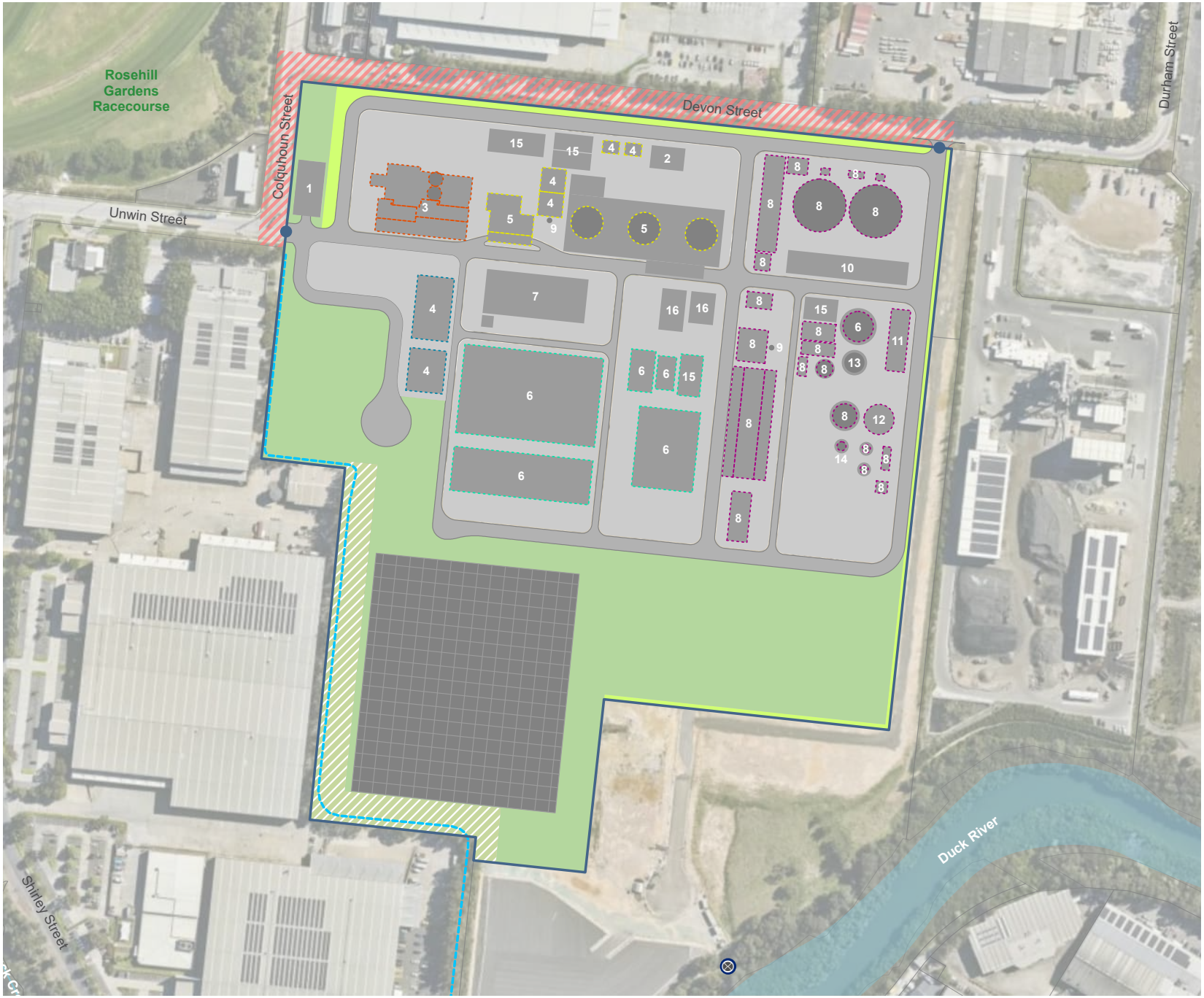


Figure 3-7 Indicative layout of the WRRF

3.4.3 Treatment process

The WRRF would process wastewater through a series of primary, secondary, tertiary and advanced treatment processes. Each stage provides a higher level of treatment to remove more inorganic and organic material. Several technologies including primary sedimentation tanks are available for primary treatment and may be adopted during detailed design.

Figure 3-8 shows the flow of wastewater through the different WRRF treatment processes.

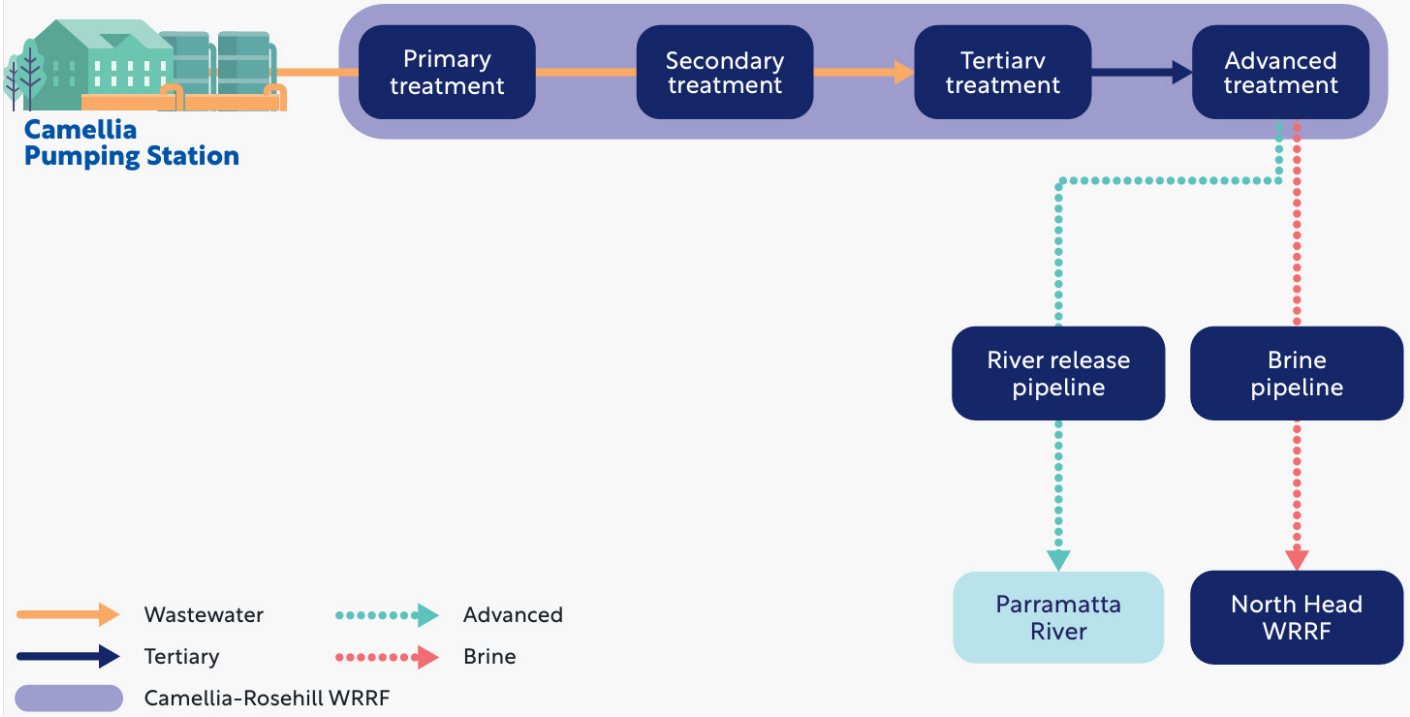


Figure 3-8: Flow of wastewater for treatment through the WRRF

Table 3-3 describes the treatment process, outputs and key design details of the WRRF infrastructure. Figure 3-9 and Figure 3-10 provides an indicative view of what some of these key treatment process units look like.

Table 3-3: Treatment process

WRRF infrastructure	Key design details	Process	Output	Figure 3-7 reference
Inlet works (preliminary treatment)	A combination of covered concrete structures with mechanical screening equipment. The main chamber of the inlet works is typically long and narrow and could be about 70 m x 23 m and 8 m deep.	Removal of materials such as rags, plastics, papers and large objects through mechanical screens. Removal of sand and gravel (grit) through swirling motion.	Solid screenings and grit waste for offsite disposal or reuse. Water to continue to primary treatment process. Air captured and transferred to odour control unit for treatment.	3

WRRF infrastructure	Key design details	Process	Output	Figure 3-7 reference
Primary treatment	2 covered concrete tanks about 8 m high with possible dimensions of 50 m x 50 m and 30 m x 25 m.	Removal of some organic solids through settling out of solids at the bottom of sedimentation tanks.	Organic solids transferred to digesters for further treatment through thickening process. Water to continue on to secondary treatment. Air captured and transferred to odour control unit for treatment.	4
Secondary treatment	2 large covered concrete tanks about 100 m x 60 m and 100 m x 30 m, both 6 m in height. Internal walls would provide separate chambers. The tanks may be constructed at ground level, or partially buried.	Removal of nutrients, particularly organics, nitrates, ammonia and phosphorus through biological processes. Secondary treatment would use a combination of anoxic and aerobic treatment (in the presence and absence of oxygen, respectively).	Organic solids transferred to digesters for further treatment through thickening process. Water to continue on to tertiary treatment.	6
Tertiary treatment	The tertiary unit is likely to consist of one large covered concrete tank with internal walls. The tank may be constructed at ground level or partially buried and measure about 50 m x 20 m and 5 m in height.	Removal of further organic and inorganic solid components through a semi-permeable filtration barrier that retains impurities. The process can be designed to remove bacteria, viruses and parasites that are harmful to public health through chlorination or ultra-violet treatment.	Retained impurities are returned to prior treatment phases. Water to continue to the advanced treatment process.	6

WRRF infrastructure	Key design details	Process	Output	Figure 3-7 reference
Advanced treatment	Large equipment slab to house pipework and tanks, a reverse osmosis (RO) building and disinfection buildings. The RO building would be concrete, masonry or steel framed with cladding construction and measure about 80 m x 16 m and 6 m in height. The disinfection buildings would be about 37 m x 17 m x 9 m.	Removal of any remaining impurities through reverse osmosis. Removal of bacteria, viruses and pathogens through chlorination or ultra-violet treatment.	Brine transferred to the NSOOS. Advanced treated water for river release.	8
Thickening and digestion of solid wastes (biosolids)	Thickening tanks with concrete floors would be about 4 m in diameter and 6 m in height. Three digesters would be concrete or steel tanks about 25 m in diameter and 25 m in height to the top of the domed biogas holder.	Reduction of water content in biosolids using tanks containing rotating drums. This is followed by biological digestion to break down and stabilise thickened biosolids. Digestion reduces the mass of the biosolids as well as pathogens and odour.	Removed liquid pumped back to earlier processes for treatment. Digested solids transferred for dewatering. Biogas to be used for renewable energy generation (see Section 3.4.5.2).	5
Biosolids dewatering	Building likely concrete and steel measuring about 25 m x 7 m x 7 m. Access doors for outloading would assist in containment of odour.	Separation of solids and liquids using centrifuge (spinning motion).	Removed liquid pumped back to earlier processes for treatment. Biosolids transported off-site for beneficial reuse or disposal (see Section 3.4.5.4). Air captured and transferred to odour control unit for treatment.	5

WRRF infrastructure	Key design details	Process	Output	Figure 3-7 reference
Odour control	Centralised concrete slab, housing fans, large fibreglass ductwork, and an array of fibreglass tanks. The tanks would be about 10 m high and with stacks about 20 m high.	Treatment of odour using biotrickling filters, activated carbon filters, or similar.	Treated air released to atmosphere. Waste gas disposed of in burners	7

Figure 3-9: Example primary treatment area (left) and secondary treatment area (right) from an existing Sydney Water facility (Source: Sydney Water)

Figure 3-10: Example odour control unit from an existing Sydney Water facility (Source: Sydney Water)

3.4.4 Treated water

3.4.4.1 Treated water quality

The WRRF would primarily produce advanced (very high-quality) treated water, which would be released to Parramatta River. In the rare event that the advanced treatment process equipment is undergoing maintenance or is not at specification, tertiary (high quality) treated water would be released instead. An assessment based on this occurring for 2 days, around twice a year has been undertaken. Chapter 7 (Waterways assessment) provides indicative concentrations and measurements of different water quality parameters for the different levels of treatment scenario.

Toxicant analysis has also been completed on advanced treated water from other Sydney Water treatment plants. This analysis has assisted in predicting the likely toxicant load and concentrations in the treated water. This detail is provided in Chapter 7 (Waterways assessment).

3.4.4.2 Treated water releases

During normal operation, all advanced treated water would be released to the Parramatta River. Flow from the Camellia pumping station would be halted once the capacity for tertiary treatment is reached. Any additional wastewater would be pumped to the NSOOS using the existing transfer main. The halt in flow to the WRRF would prevent an overflow of primary treated wastewater to Duck River. There are no planned releases to Duck River. Any release to Duck River would be through an existing release pathway in the scenario of a catastrophic plant failure.

Table 3-4 shows the different treatment levels for the incoming wastewater volume scenarios and proposed release locations.

Table 3-4: Release scenarios for the WRRF

Treatment level	Release scenario	Frequency	Indicative volume	Receiving watercourse
Advanced	WRRF operating at 70 ML/day	Continuous	63 ML/day [4]	Parramatta River
Tertiary	Exceptional operating regime	2 days, about 2 times per year	70 ML/day	Parramatta River
Any level	Emergency during catastrophic failure	Extremely rare	70 ML/day	Duck River

3.4.4.3 Brine volume and quality

The advanced treatment process produces brine as a by-product that would be transferred to Sydney Water's NSOOS to be treated at the North Head WRRF. Brine production is typically at a rate of 10-20% of the treatment flows. An increase in the percentage of brine production would result in a decrease in the volume of treated water released to Parramatta River, and vice versa. To ensure a conservative assessment approach for both release to Parramatta River and to the NSOOS, the maximum volumes for each release location have been assessed. With respect to brine, that is:

- 20% brine production returning to the NSOOS (i.e. the maximum return amount)
- 10% brine production returning to the NSOOS (i.e. the maximum amount of water released into Parramatta River).

Chapter 7 (Waterways assessment) gives an indicative breakdown of the concentration of different analytes likely to make up the brine stream.

The WRRF would remove and treat flow that would otherwise be directed to the NSOOS. As a result, the NSOOS and North Head WRRF would have capacity to convey and treat the brine product from the WRRF. A small tank for brine is included in the WRRF design as part of the balancing process. No overflow brine storage is proposed as part of the WRRF design.

3.4.5 Supporting processes and infrastructure

3.4.5.1 Transfer pumping stations

Two pumping stations (one for treated water and one for brine) would be located at the WRRF site in a single standalone building (see Figure 3-7). The treated water pumping station would pump advanced and tertiary treated water to the river release pipeline. The brine pump station would pump the brine to the brine pipeline. Both pumping stations would be automatically controlled.

[4] Advanced treated water process also produces brine as a by-product, resulting in around 10-20% less treated water production. Tertiary treatment does not produce brine, resulting in a release of the maximum volume of tertiary treated water.

Additionally, there would be pumps to transfer the wastewater around the treatment processes of the WRRF where gravity fed transfers are not possible.

3.4.5.2 Renewable energy

Indicative renewable energy generation has been proposed for the project as described below. However, during project procurement and detailed design, process options or technology to reduce carbon across the life of the project would be selected and the renewable energy components identified below may change. Chapter 20 (Sustainability and climate change) provides additional details on this.

Biogas produced in the anaerobic digesters would be delivered to co-generation engines to generate electricity and provide digester heating. Biogas would be produced in the digesters and mainly comprises methane and carbon dioxide. Biogas would be temporarily stored in the top portion of the digesters prior to transport to the co-generation engines. It is estimated that the WRRF would produce up to 3.5 million cubic metres (m^3) of biogas each year when operating at 70 ML/day.

Biogas volumes above the maximum amount the co-generation engines can consume would be combusted in the waste gas burners. This would be required only if generation of biogas exceeds co-generation and storage capacity. The WRRF is proposed to have up to 1.5 megawatt (MW) co-generation capacity that would convert the biogas to electricity.

In addition to co-generation, the WRRF would also include rooftop mounted solar panels on the administration building and workshops. A ground mounted solar array would be located on the southern portion of the site. The panels would be arranged in an area of about 2.5 ha. Given the area is an overland flow path for flood water, the panels would be mounted on poles about 2 m high to minimise impediment of any flood water moving through this area.

When the WRRF is operating at capacity of 70 ML/day, the peak power demand is estimated up to about 83,830 megawatt hours per year (MWh/year). The amount of renewable energy generated on site and supplying the WRRF would fluctuate over time. Together, the cogeneration engine(s), roof and ground mounted photovoltaic (PV) cells amounts to a combined 5 MW system and is expected to have a combined generation capacity of around 11,700 MWh/year in the first year. This represents about 13% of energy supply to the WRRF contributed by onsite renewables during peak flow conditions. The site of the combined system (5 MW) would also allow Sydney Water to connect to the grid under a standard connection scheme, where excess renewable energy generated (that cannot be used for the WRRF) may be exported to the grid.

3.4.5.3 Chemical storage

Various chemicals would be required to dose the wastewater at different stages of the treatment process. These would be added for a range of reasons including as neutralising agents, and to combine components of the wastewater together to assist in their removal. Each chemical required for dosing would require a storage tank and dosing pump. Chemical storage tanks would be installed in dedicated concrete bunds to contain any spills and covered with protective coatings to prevent concrete corrosion.

Each chemical storage area would ideally be located close to the dosing point to minimise transport and pumping around the site. Chemicals would be delivered to the site on a frequent basis via truck. The size, location and number of tanks and pumps required for chemical storage and dosing will be detailed during the next design phase. Chapter 22 (Dangerous goods and hazardous development) provides an indicative list of the chemicals that would be stored on site that are required for operation of the WRRF. The indicative location of chemical storage areas is shown in Figure 3-7.

3.4.5.4 Resource recovery (biosolids)

Biosolids from the anaerobic digesters would be dewatered before being taken off-site for beneficial reuse. This is typically the standard operational phase practice for biosolids management at Sydney Water's WRRFs. Biosolids are currently handled in accordance with the NSW EPA's Environmental Guidelines – Use and Disposal of Biosolids Products (1997). Targets for biosolids quality include Grade B stabilisation and Grade C contaminant. The WRRF would produce about 18 tonnes of dewatered biosolids per day. Whilst the ultimate destination and use of biosolids generated at the WRRF is not part of the scope of the EIS, biosolids are primarily reused for land application in agriculture, forestry or further processed into compost. The EPA is currently reviewing their biosolids guidelines. Sydney Water would comply with the environmental obligations set by the NSW EPA.

3.4.5.5 Power supply

The WRRF is proposed to be supplied via the nearby Endeavour Energy Rosehill Zone Substation, subject to feasibility. It is likely that cabling would be installed via trench across Colquhoun Street.

The incoming power supply is proposed to be routed through a main 11 kilovolt (kV) switchroom within the site, where it would be distributed to the different areas for electricity supply purposes.

The WRRF would include permanently installed and connection backup power supplies that could be quickly brought online in case of unexpected power failures. This would enhance the overall resilience of the power supply system and reduce risk of off-specification water treatment. Such backup provisions may include:

- solar panels on the roof of the administration building (as mentioned above)
- battery backup to maintain chemical dosing
- uninterruptible power system to maintain operation of the control systems.

There are likely to be several electrical switchrooms at the WRRF site to supply the various process units. Switchrooms would typically be concrete, masonry or prefabricated sandwich panel and measure about 40 m x 15 m and 6 m in height. Switchrooms would typically be located close to major mechanical equipment on site, as shown on Figure 3-7.

3.4.6 Ancillary infrastructure

The WRRF site would also have a range of other steel and concrete tanks, mechanical equipment mounted on concrete slabs, and minor buildings for storage. All process units would be comprehensively fitted with pipework, supports, mechanical equipment and instrumentation, pumping equipment and electrical cabling. A range of other ancillary infrastructure would be required across the site, including but not limited to perimeter fencing (to Sydney Water standards), security, lighting, first flush stormwater system, cabling (power, telecommunications connections) and a workshop(s) for maintenance activities.

3.4.6.1 Administration building

An administration building would house the control room, laboratory, lunchroom, meeting rooms, communications room and amenities. It is likely to be located close to the Unwin Street entrance of the WRRF for security, convenience, and managing deliveries and visitors. The building would have a height of 9 m, with the rooms and amenities on the first storey, and a carpark containing about 20 car spaces located below, at ground level.

3.4.6.2 Road network

Primary site access would be from the corner of Unwin Street and Colquhoun Street. An entry and egress would also be provided from Devon Street. Internal roads would divide the WRRF to provide operational and maintenance access to the process units for delivery vehicles and cranes. While the plant would be arranged to support access and functionality, consideration would be given to water sensitive urban design. This includes reducing the percentage of impervious area on site to reduce the overall runoff generated and leaving the site.

Surface treatments for hardstand surfaces may include blue metal loose rock areas surrounding structures rather than concrete or compacted earth, where possible.

3.4.6.3 Stormwater management

The stormwater management system would include:

- roof drainage for all buildings
- pit and pipe system connected to the existing stormwater network
- a first flush tank to capture run off from impervious areas (e.g. hardstand, roads, covered structures).

Stormwater from the inlet works would be captured and transferred to the inlet works, where it would be treated, rather than entering the stormwater management system.

The WRRF site has an existing stormwater system that is made up of twin underground pipes running north-south through most of the site and through the adjacent lot, from where there is an existing discharge into Duck River. The roof drainage system would be connected to this existing stormwater system. Kerb, guttering and pits would be installed to convey stormwater runoff from (pervious) grassed, planted and gravelled areas to the existing stormwater system.

For impervious areas (including site roads, secondary and tertiary treatment areas and the odour control area), kerb, guttering and pits would be installed to convey runoff to an underground first flush tank located as shown on Figure 3-7. The first flush tank has been sized to capture run off up to minor storm events from these areas. This would aim to mitigate the potential risk of industrial spills, wash down overflow and prevent them from entering Duck River without treatment. The contents of the first flush volume would be pumped to the inlet works for treatment as part of the wastewater stream.

Gross pollutant traps would likely be installed at both inlets to the first flush tank as well as the existing stormwater outlet from the WRRF entering Duck River. The gross pollutant traps would capture and retain gross pollutants, sediments, and oils and need to be emptied at the end of each rainfall event.

There is an existing low point on Devon Street that experiences localised flooding. To assist with improving stormwater management in this area, a drainage pipeline would be installed along the northern boundary of the WRRF site to transfer stormwater from Devon Street into the WRRF's stormwater system. Flooding impacts are described in Chapter 8 (Flooding).

3.4.6.4 Offtakes

Demand for treated water is growing. The Camellia-Rosehill WRRF would be adaptable with the ability to supply treated water for additional uses in the future, including for data centres. Pipeline offtakes for secondary uses of treated water do not form part of this project and would be subject to separate approvals and assessment (if required).

3.4.7 Urban design and placemaking

The place making vision for the WRRF is a design that would enhance the surrounding precinct through provision of landscaped streetscapes and frontages, with a public facing water-themed garden around the new administration building on the corner of Colquhoun and Devon Streets. Sydney Water aims to enhance the ecology of the precinct and waterways by maintaining the existing ecological values along the western boundary. Restoration of the area's natural water system would help naturally filter surface water before it enters Duck River and would facilitate existing overland flow paths across the site and precinct.

Design Principles for the WRRF have been developed based on workshops and discussions with interdisciplinary stakeholders and include:

- **Focus on Integration**: integrate and connect the site with the wider precinct by focusing on interfaces, providing diverse landscaped frontages and streets for people that are high amenity buffers.
- **Establish a Legacy**: incorporate Design Excellence processes and outcomes to demonstrate Sydney Water's commitment to sustainability, place and community.
- **Founded on Respect**: collaborate with the Dharug people to develop a design that Connects with Country and daylights their stories and connection to the place.
- **People Focused**: design with people at the heart, ensuring employee, visitor and community focused streetscapes and interfaces.

- **Celebrate Water**: incorporate water themes and features in public interfaces and meaning whilst maintaining the site's industrial character.
- **Drive Operational Efficiency and Safety**: deliver best practice water treatment and safety measures with built in flexibility to evolve and innovate over time, future proofing and ensure longevity of this essential infrastructure into the future.
- **Regenerative**: respect and work with the land to restore natural processes.
- **Preserve and Connect**: preserve and expand ecological values on the western boundary of the site into the site to strengthen habitat connectivity.
- **Healthy Systems**: better integrate and connect green networks through and around the site so that it is multifunctional for humans and non-humans alike.
- **Adaptive**: give space and buffers that are flexible so that the landscape can evolve and change over time to withstand climate change and other environmental challenges.

Further information relating to the place and design framework for the project is provided in Chapter 17 (Visual, landscape and placemaking).

3.4.8 Maintenance activities

The WRRF would require regular maintenance to ensure optimum and efficient operation. Maintenance activities generally involve inspections, planned maintenance, refurbishment and minor improvements to the mechanical and electrical assets of the WRRF and pumping stations. Maintenance work is usually carried out by a small number of staff using light vehicles, primarily by operational staff already working at the WRRF.

As outlined in Section 1.8, ongoing maintenance activities are outside the scope of this project. Sydney Water would seek separate environmental approvals if needed for maintenance activities.

3.4.9 Operational workforce and hours

Typically, the WRRF would operate in automatic mode. The WRRF may require up to 10 operational staff involved in:

- responding to alarms (including out of business hours)
- taking equipment offline for maintenance activities
- carrying out inspections to check operation of plant and equipment and safety
- reviewing operating trends and performance
- troubleshooting faults with instrumentation or the Supervisory Control and Data Acquisition system
- sampling and testing wastewater
- assisting contractors and maintenance workers

- maintaining management systems
- intervening in extreme weather and power outages.

The WRRF and pipelines would operate 24 hours a day, 7 days a week. Operational staff would likely only be present during standard hours unless emergency work or maintenance is required.

The WRRF would be designed to operate autonomously and would be linked to Supervisory Control and Data Acquisition and Integrated Instrumentation Control Automation and Telemetry System systems for remote operation.

3.4.10 Operational transport and access

Vehicle movements during operation of the WRRF would relate to:

- staff journeys (up to 14 two-way trips or 28 total movements each day)
- biosolids, screenings and grit removal (about one truck per day at peak biosolids production)
- other deliveries (typically between 5 and 10 vehicles each day for chemical deliveries)
- maintenance requirements (typically daily).

3.4.11 Operational waste

The WRRF would produce a range of operational waste including special, liquid, hazardous and general solid waste. Most of the waste produced by the WRRF would be the screenings separated from the incoming wastewater at the inlet works and the dewatered grit, including sand. Other waste generated by the WRRF relates to the biosolids, maintenance of equipment, such as oil, batteries, chemical containers, and waste generated by the operational staff such as food waste and electronic waste. Chapter 21 (Waste management) provides further details on the types and quantities of waste the project would produce during operation, including the management measures that would be implemented.

3.5 Camellia pumping station

Camellia pumping station currently contributes about 25% of flows to North Head WRRF, servicing 250,000 people. This project would enable flows to be diverted from the pumping station to the WRRF at up to 70 ML/day. The indicative upgrades to the pumping station are shown in Figure 3-11.

The upgrade works would include the installation of new and replacement pumps to deliver wastewater flows to the new WRRF. Existing pumps would pump excess flows from the catchment and the brine produced by the WRRF to the NSOOS via existing pressure mains. New connections would be installed to divert the wastewater into the transfer pipeline.

The existing site sheds would be replaced with new electrical switchrooms, transformers and high voltage (HV) cabling along the eastern boundary of the site. As part of the ongoing design development process, further evaluation of HV alignments and alternative options is likely to occur in consultation with key stakeholders.

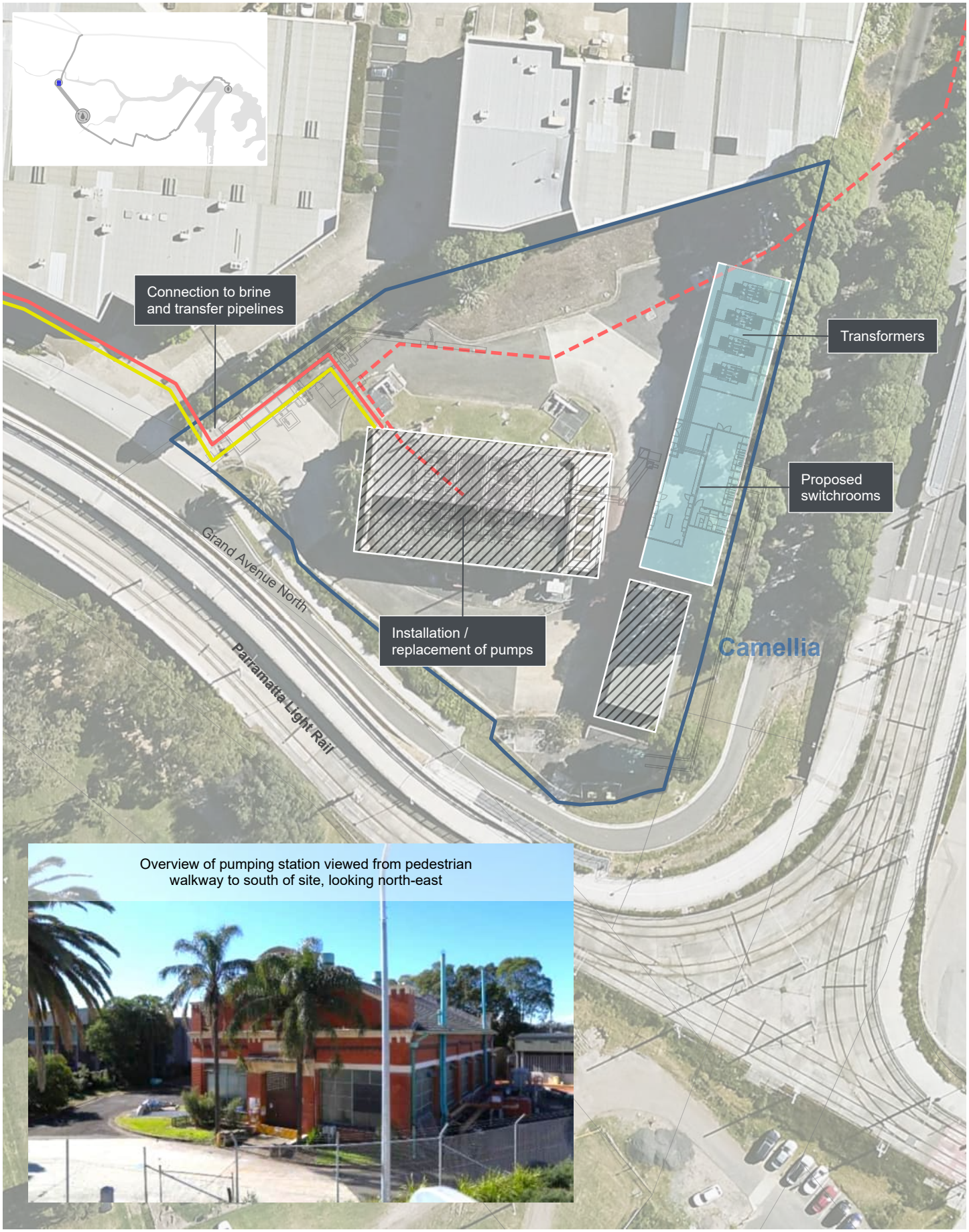
To ensure sufficient power for the upgraded pump station, an electricity supply route would be installed. An indicative route has been developed from the Endeavour Energy Rosehill Zone Substation located on the corner of Unwin and Colquhoun Streets to the pumping station. The power supply route would be assessed under separate planning approvals, see Section 1.8, and as such is not within the scope of this EIS.

There would be no changes to the operation of Camellia pumping station in terms of workforce, operating hours or vehicle numbers.

A number of mitigation measures have been built into the physical design and layout of the Camellia pumping station. During construction, upgrade works to the pumping station would occur within the footprint of the existing site, minimising impacts to neighbouring properties. Adverse heritage impacts would be avoided by prioritising drilling through mortar rather than significant brickwork when installing plumbing and electrical infrastructure.

During operation of the project, majority of the infrastructure at the Camellia pumping station would be below ground or inside the building. This would:

- avoid an increase in noise levels (beyond the current operational noise levels)
- minimise permanent visual impacts to the heritage significance of the building.



Camellia pumping station boundary
Existing pipeline to be relined for brine pipeline
Proposed brine pipeline
Proposed transfer pipeline
Existing buildings to be retained
Existing buildings to be replaced

Figure 3-11 Indicative changes to Camellia pumping station

0 10 20 30 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:750 @ A4
GDA2020 MGA Zone 56

N

3.6 Pipelines

The project includes a pipeline to transfer wastewater from the Camellia pumping station to the WRRF, and pipelines to take treated water and the brine away from the WRRF. Pipelines required from the WRRF include the treated water (river release) pipeline to Parramatta River at Meadowbank and the brine pipeline from the WRRF to the existing Sydney Water wastewater system (NSOOS) at Dundas. All pipelines would be operated under pressure.

All pipelines would be predominantly below ground. However, there would be some above ground components including a barometric loop and above ground crossings of minor waterways. Maintenance holes, valve pits and covers would generally be at surrounding ground level.

3.6.1 Transfer pipeline

The transfer pipeline would be about 2.2 km long from the Camellia pumping station to the WRRF for the transfer of wastewater. The pipeline would have a capacity of up to 70 ML/day.

A single pipeline with a diameter of about 0.9 m would exit through the driveway of the Camellia pumping station site and continue through the access road and carpark of the commercial complex at 175 James Ruse Drive (Lot 2 DP1248546), before crossing Grand Avenue North to the open area of Lot 10 DP1285283. This section would be about 250 m long.

The pipeline would then split into 2 parallel pipelines, each with a diameter of 0.8 m, and proceed south-east for about 1.9 km beneath Rosehill Gardens Racecourse, reaching a maximum depth of around 45 - 50 m, until it surfaces in the north-western portion of the WRRF site, near the proposed inlet works. The indicative alignment of the transfer pipeline and the key features of the surrounding area are shown on Figure 3-13 to Figure 3-14.

3.6.2 Brine pipeline

The brine pipeline would be about 5.2 km long in total. It includes 2.2 km between the WRRF to the Camellia pumping station (co-located with the transfer pipeline) and a 3 km relined section between the Camellia pumping station to a connection point at the NSOOS in Kissing Point Road, Dundas. The pipeline would typically transfer up to about 14 ML/day when the WRRF is operating at 70 ML/day. However, the pipeline has been sized to have capacity for about 35 ML of brine per day. This oversized capacity allows transfer of brine amounts produced from a future WRRF operating scenario of up to 150 ML/day. This prevents the need to duplicate the pipeline in the future, avoiding additional environment and community impacts.

The alignment of the pipeline and key features of the surrounds are shown on Figure 3-12 to Figure 3-14. The section between the WRRF and Camellia pumping station would be a new pipeline of about 0.6 m in diameter, co-located with the transfer pipeline and installed beneath Rosehill Garden Racecourse. From there, the brine pipeline would continue north-east, crossing Grand Avenue North and through the access road and carpark of 175 James Ruse Drive (a commercial complex) to the pumping station. This section would be 250 m long with a diameter of about 0.5 m.

Proposed pipeline

Proposed brine pipeline

Pipeline construction method

Relining

Figure 3-12 Indicative alignments of brine and transfer pipelines

Sheet 1 of 3

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

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Figure 3-13 Indicative alignments of brine and transfer pipelines

Sheet 2 of 3

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

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Camellia-Rosehill WRRF boundary

Proposed pipeline

Proposed brine pipeline

Proposed transfer pipeline

Pipeline construction method

Trenchless

Figure 3-14 Indicative alignments of brine and transfer pipelines

Sheet 3 of 3

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

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Between Camellia pumping station and the NSOOS, the project would reline an existing wastewater pipeline. The existing pipeline has a diameter of 0.75 m and was previously used to transfer wastewater to the NSOOS for treatment at North Head, along with a larger pipeline of about 1.2 m in diameter, both of which are in operation.

The existing pipeline exits the pumping station site at the north-eastern boundary and continues north along a Sydney Water easement that is adjacent to the PLR railway corridor to Parramatta River. The existing pipeline crosses the river via a dedicated pipe bridge into WSU's Parramatta Campus and continues north beneath Railway Street. The existing pipeline (and easement) crosses Vineyard Creek and continues beneath a commercial property to Victoria Road and intersects A40 Victoria Road, which is a NSW State classified road. The pipeline continues north beneath the road corridor of Rippon Avenue for about 640 m to Kissing Point Road, which is a 6-lane NSW State classified road. The existing pipeline connects to the NSOOS under the westbound carriageway of Kissing Point Road about 120 m east of the junction with Rippon Avenue.

3.6.3 River release pipeline and release structure

The river release pipeline would be about 7.6 km long from the WRRF to Parramatta River at Meadowbank, near John Whitton Bridge and would be built as dual pipelines in some sections. The pipeline would be up to 1.4 m diameter.

The pipeline would be built:

- from the WRRF, beneath Duck River to Carnarvon Street
- within the road corridor and verges through the industrial area of Silverwater (along Carnarvon Street, Vore Street, Derby Street, crossing beneath Silverwater Road, to continue along Derby Street before turning north along Day Street North)
- east across an easement into Fariola Street and the residential area of Newington
- along Comaneci Avenue and Newington Boulevard to Pierre de Coubertin Park
- beneath the wetlands of Sydney Olympic Park
- within the road corridor/reserve of, and beneath, Hill Road
- in the car park of URBNSURF
- beneath Parramatta River to Meadowbank Park. A new easement would be required through Meadowbank Park to the residential area of Meadowbank, where the pipeline would follow the road reserve of Meadow Crescent
- south through Memorial Park to the river release structure for release into Parramatta River.

The alignment of the pipeline and key features of the surrounds are shown on Figure 3-15 to Figure 3-19.

Some sections of pipeline would have capacity to transfer advanced treated water at volumes produced by a future WRRF expansion to 150 ML/day treatment to cater for future expansion. Advanced treated water up to about 70 ML/day would be released into Parramatta River via a river release structure. Additional diffusers would need to be installed on the river release structure to increase capacity to 120 ML/day should future expansions require it.

Recycled water offtakes along the pipeline would provide future opportunities for high quality recycled water users to access the water, subject to commercial agreements and separate planning approvals (refer Section 1.8).

Camellia-Rosehill WRRF boundary
Proposed River Release Pipeline - Open trench
Proposed River Release Pipeline - Trenchless

Figure 3-15 Indicative river release pipeline alignment

Sheet 1 of 5 0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

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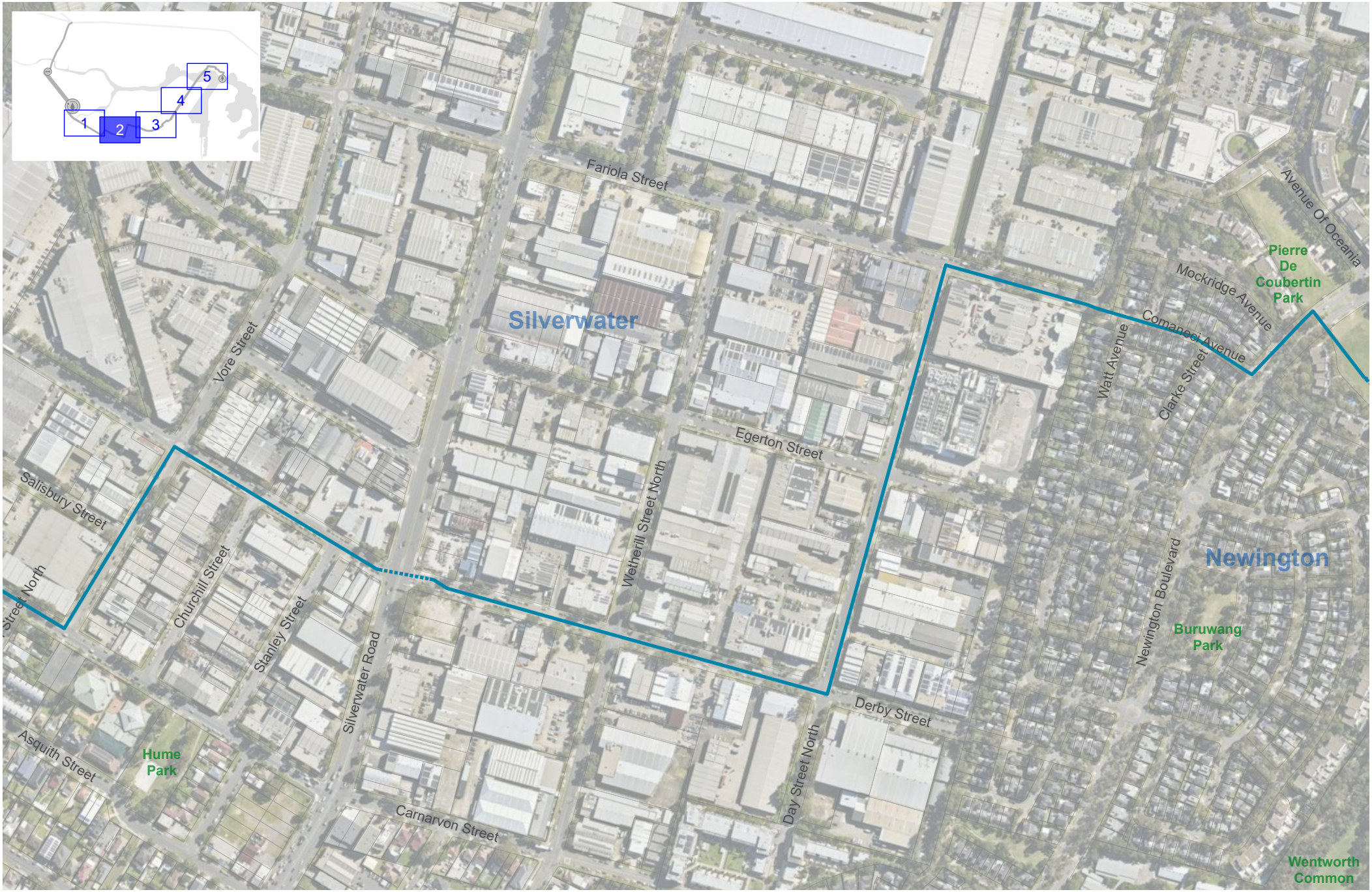

Proposed River Release Pipeline - Open trench

Proposed River Release Pipeline - Trenchless

Figure 3-16 Indicative river release pipeline alignment

Sheet 2 of 5

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

N

Proposed River Release Pipeline - Open trench

Proposed River Release Pipeline - Trenchless

Figure 3-17 Indicative river release pipeline alignment

Sheet 3 of 5

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

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Proposed River Release Pipeline - Open trench

Proposed River Release Pipeline - Trenchless

Figure 3-18 Indicative river release pipeline alignment

Sheet 4 of 5

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

N

Figure 3-19 Indicative river release pipeline alignment

Sheet 5 of 5

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

N

The permanent above ground components would include aerial crossings of waterways through Meadowbank Park and an 8 m high barometric loop located in Memorial Park. Maintenance holes, valve pits, covers, scour chambers and ventilation structures would generally be around ground level.

The river release pipeline would split into 8 parallel smaller pipes, each with a diameter of about 0.3 m below ground at Memorial Park. The 8 pipes would enter Parramatta River at the carpark to the west of John Whitton Bridge. The pipes would lay on a geosynthetic fabric and grout mattress (or similar performing structure), to prevent disturbance of sediments on the riverbed. Pipeline protection may consist of several concrete mattresses (or similar) which would lie over the pipes to 'anchor' them to the riverbed (Figure 3-20). The pipelines would extend between about 75 m to 130 m into the river, as shown in Figure 3-21 and release treated water via duck-billed diffusers. The pipelines have been sized to allow for sufficient clearance between maritime traffic using Parramatta River.

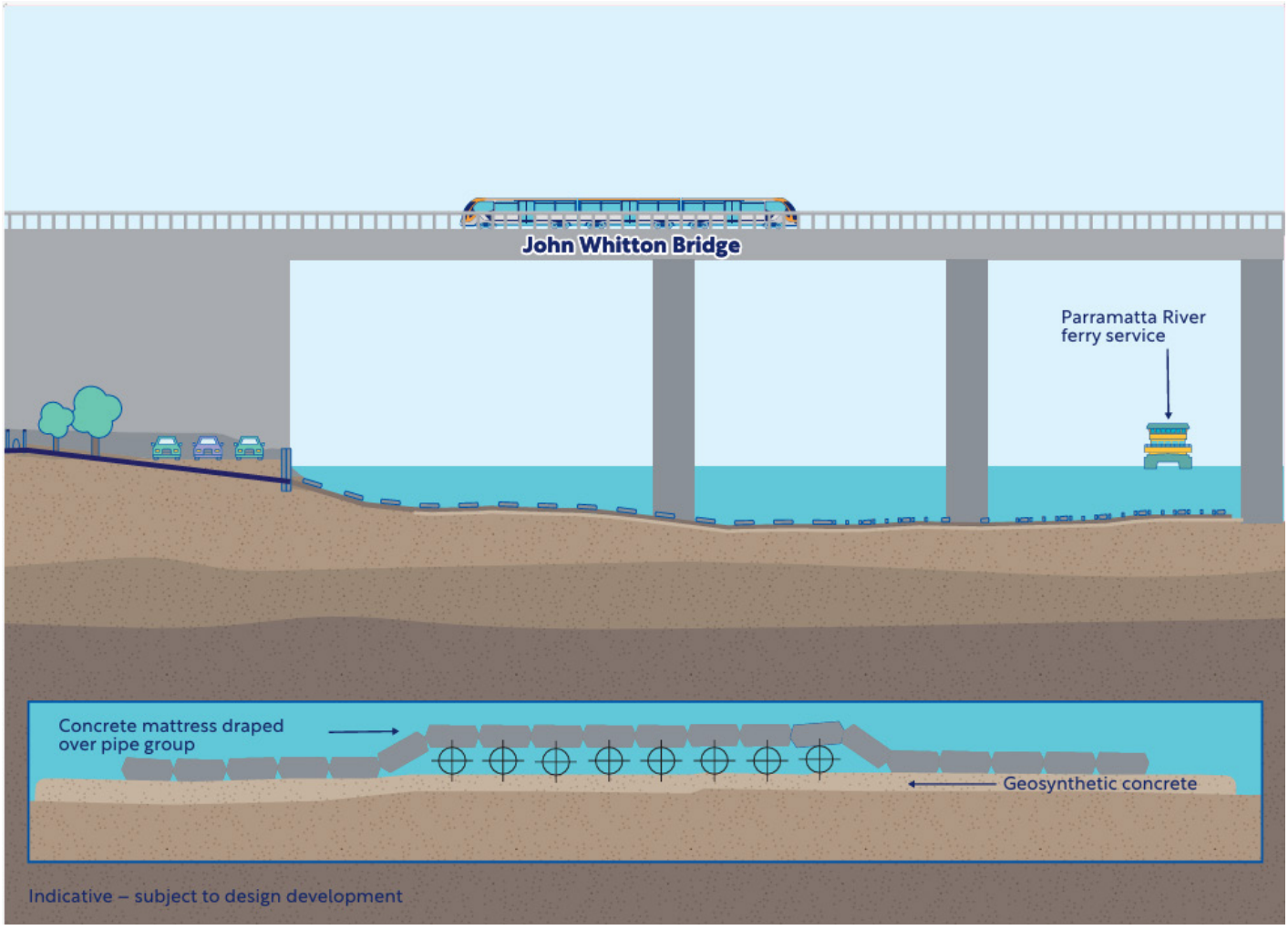
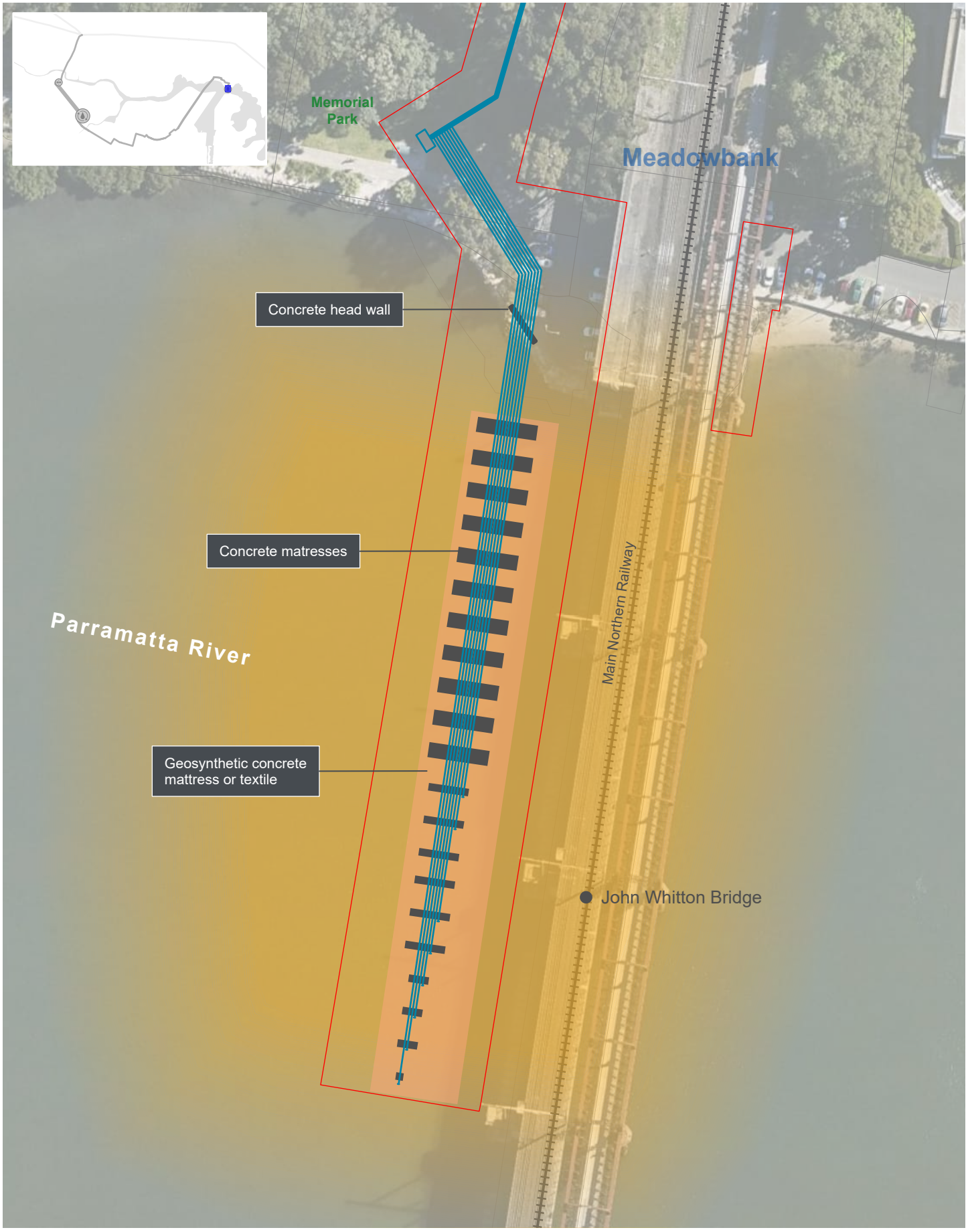


Figure 3-20: Indicative placement of the river release structure when in operation



Concrete mattress
Geosynthetic concrete mattress or textile
Impact area (IA)
Indicative Parramatta River construction area
Proposed River Release Pipeline
Railway

Figure 3-21 Indicative layout of the proposed river release structure

0 10 20 30 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:1,000 @ A4
GDA2020 MGA Zone 56

N

3.6.4 Ancillary infrastructure

The pipelines would be supported by ancillary infrastructure to enable them to be easily monitored, accessed and operated. These include:

- air valves – located at high points of the pipeline and used to expel air when the pipeline fills with water. Air valves also prevent a vacuum being formed when emptying the pipeline for maintenance. Air valves would be inside the pipe, however a small cover at ground level would be required.
- scour valves and scour chambers - scour valves are located at low points in a pipeline to allow sections to be drained or flushed for maintenance. Scour valves may also be connected to a scour chamber that allows the fluid to be pumped to a tanker for disposal at a suitable facility. Releases from the river release pipeline may be directed to the nearest waterway by overland flow. However, this would be determined during detailed design. No above-ground infrastructure is proposed for these structures.
- isolation valves – are used on trenched sections of pipe to stop or control the flow of fluid along a pipeline. They can be manually or automatically operated and usually provided for maintenance or safety purposes. They are located below ground.
- maintenance holes – are circular access points at ground level that provide access into the pipeline system for inspections and maintenance. Each scour valve would discharge into a scour pit which would be a standard precast maintenance hole. There would be as many maintenance holes as there are scour valves.
- flowmeters – are inground instruments along a pipeline that measure fluid flow rate.

The exact number of valves, maintenance holes and flowmeters and their locations would be determined during the detailed design phase.

A barometric loop would also be required on the river release pipeline. Barometric loops are used on pressure pipelines that have a high point somewhere along the pipe that is higher than the outlet point at the end. A barometric loop would be critical to the operation of the pipeline as it prevents the line from draining from the high point when the pumps are turned off, as shown in Figure 3-22. This avoids negative pressure and cavitation within the pipeline. A barometric loop about 8 m high is proposed at the last high point in the pipeline at Memorial Park in Meadowbank. This is an optimal height to avoid any failures in minimum pressure requirements and also to comply with Sydney Water standards. Flow downstream of the barometric loop would gravitate to the release point in Parramatta River.

The barometric loop would be a prefabricated stainless steel structure transported to site for installation. It may be incorporated into, or co-located with, or adjacent to, the existing toilet block. Should installation of the barometric loop require closure of the existing toilet block, temporary replacements would be provided during construction. If required, the toilet block replacement or upgrade design would be developed through detailed design in consultation with City of Ryde Council, as owners of the facility and with the park masterplan in mind. Sydney Water would continue to work with City of Ryde Council on the integration of the barometric loop into Memorial Park during detailed design and construction.

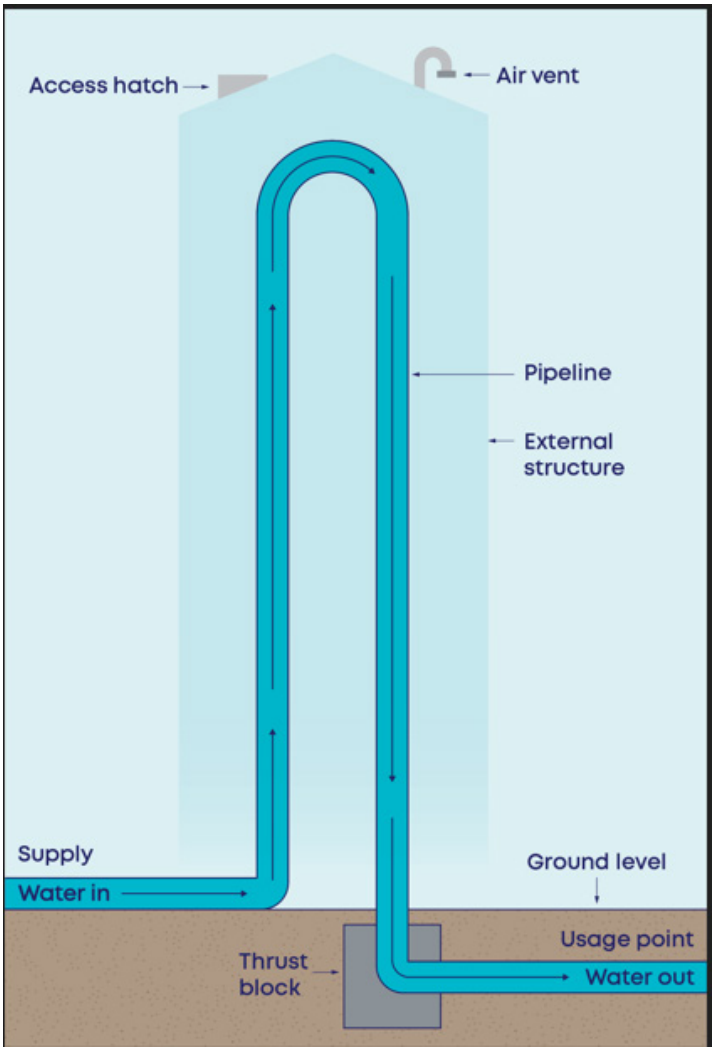


Figure 3-22: Schematic of the barometric loop

Recycled water offtakes would be installed along the pipeline to facilitate connection for potential future recycled water uses. The offtakes would be small, branched connections about 0.25 m in diameter, from the river release pipeline to ground level. The number and location of offtakes would be developed through the detailed design phase of the project. However, as described in Section 2.3, indicative locations have been identified based on potential demand along the pipeline alignment.

3.6.5 Maintenance activities

Maintenance of assets can be planned or unplanned and is required throughout the life of the infrastructure. Planned maintenance includes visual condition assessments to ensure long-term operation of the assets. Unplanned maintenance relates to activities in response to a failure or emergency.

Maintenance activities would be required during early stages of operation with an increased focus on inspection and testing. This is particularly important for the release structures at the Parramatta River to monitor flow and erosion.

As noted in the project scoping report and in Section 1.8, maintenance activities are outside the scope of the project.

3.6.6 Operational workforce and hours (pipelines)

The pipelines would not require any permanent staff, but there would be regular routine inspections and maintenance of the pipelines and release structures during operation. These inspections would be completed as needed and typically by a small number of workers about once every 6 months in any location and in accordance with Sydney Water's standard operational protocols. Water quality sampling at the release structure would occur about once a quarter, or as required under release conditions. The pipelines would operate 24 hours a day, 7 days a week.

3.6.7 Operational transport and access (pipelines)

A small number of operational vehicle movements would be required for operation and maintenance of pipelines. Activities would include condition assessments, wastewater and water sampling and monitoring of flow conditions. Vehicle movements would be infrequent and scattered across all pipeline alignments and are expected to have negligible impact on the local traffic network.

No permanent sealed access tracks for operational use would be required.

3.7 Construction

3.7.1 Early construction work and site investigations

Some site investigations and early works would be required before the main construction work begins. These works are generally low impact activities relating to preparing the work sites, gathering additional information and installing some environmental controls. These early works would be managed with separate environmental management plans or work method statements prior to preparation of the Construction Environmental Management Plan (CEMP) for the overall project.

Site investigations and early works may include:

- archaeological investigations and salvage work
- survey work and geotechnical/contamination investigations
- positive identification, relocation and protection of existing services
- site establishment activities:
  - removal of waste and management of site contamination where appropriate
  - preparation and installation of community advisory signs
  - installation of security fencing
  - construction of site access points

  - installation of environmental controls
- activities prior to vegetation clearing:
  - pre-clearance surveys
  - delineation of 'no-go' zones
- other activities the project's environmental representative considers would have minimal impact on the environment.

3.7.2 Construction of the WRRF

Construction of the WRRF would occur in 7 phases (Table 3-5).

Although these phases represent the general progression of construction activities, these phases are expected to overlap. The overall duration of construction at the WRRF site is expected to be about 36 months, starting in early 2028.

Table 3-5 provides details about the construction phases, including indicative duration, typical activities and typical equipment required. These would be developed in more detail by the construction contractor during detailed design and construction planning.

Table 3-5: WRRF construction phases, timing, activities and required equipment

Phase	Duration	Typical construction activities	Typical equipment	
Phase 1: Site establishment and mobilisation	About 2 months	• install environmental controls and delineate site • ancillary construction works such as access roads and fencing • traffic control • plant and equipment delivery • establish site compound and construction access.	• backhoe loaders • chainsaws • concrete saws • cranes • dozers • dump trucks • excavators.	• excavators hammer • front end loaders • hand tools • trucks • water trucks.
Phase 2: Site earthworks	About 12 months	• cut and fill activities to prepare site, including stockpiling topsoil, movement/placement of material including spoil, and importing material for pipeline project components • establish temporary site drainage and soil and water management controls • excavate for underground infrastructure etc. • excavation dewatering	• backhoe loaders • chainsaws • compactors • concrete saws • cranes • dozers • dump trucks • excavators	• front end loaders • grader • hand tools • pumps • roller • paver • profiler • trucks

Phase	Duration	Typical construction activities	Typical equipment	
		• waste disposal/appropriate management (including spoil if required).	• excavators hammer.	• water trucks.
Phase 3: Civil works	About 12 months	• construct roads and stormwater infrastructure • construct permanent internal roads and utility connections.	• compactors • concrete pumps • concrete trucks • cranes • dozers • excavators • front end loaders • grader.	• hand tools • piling rig • road paving • machinery • roller • trucks • water trucks.
Phase 4: WRRF structure construction	About 18 months	• construct buildings, treatment infrastructure, erect storage tanks and other treatment process units • install treatment equipment • build pipelines.	• concrete pumps • concrete trucks • cranes • dozers • front end loaders • grader.	• hand tools • piling rig • roller • trucks • water trucks.
Phase 5: Mechanical and electrical installation	About 18 months	• utility connections • operation equipment installation and testing.	• hand tools • light vehicles • trucks.	• cranes • delivery trucks.
Phase 6: Landscaping and rehabilitation	About 3 months	• native planting and landscaping works on WRRF operational area • remove environmental controls.	• hand tools • light vehicles.	
Phase 7: Commissioning	6 to 12 months	• equipment testing and commissioning • operational testing • process proving • release commissioning wastewater.	• light vehicles • trucks • pumps • cranes.	

3.7.3 Camellia pumping station works

The works to upgrade the existing pumping station are anticipated to include:

- demolition of the storage shed
- clearing of vegetation along the western boundary
- connection of the brine and transfer pipelines to the existing infrastructure. This would require excavation to a depth of around 6 m
- removal of existing pumps and redundant pipework
- breakout sections of concrete flooring to allow for the new pump intake arrangements
- installation of replacement pumps and supporting pipework
- construction of a new electrical switchroom
- installation of HV transformers in a yard to be located next to the proposed switchroom
- installation of new HV and low voltage (LV) connections within the site
- replacement of the seal on the front flood gate.

3.7.4 Pipeline construction phases and timing

There main phases of pipeline construction are:

- Phase 1 – site establishment and mobilisation, ancillary construction works such as roads/ tracks, site compounds and fencing, installation of traffic and environmental controls, such as erosion and sediment control, plant and equipment delivery and any required clearance.
- Phase 2 – site earthworks, including excavation of trenches, launch and receival pits for trenchless pipeline sections and to access the existing pipeline for relining. Contamination testing of excavated material and appropriate management and or disposal. Dewatering of excavations if required.
- Phase 3 – installation of pipe bedding material and pipelines, including placement of the pipes near the trench in a line (pipe stringing) before it is installed for horizontal directional drilling (HDD). Installation of valves and offtakes. Backfilling of excavations. Civil works such as pipeline and ancillary infrastructure including the barometric loop and toilet block at Meadowbank (if required) would also take place during this stage.
- Phase 4 – construction of river release structure.
- Phase 5 – commissioning.
- Phase 6 – landscaping works and rehabilitation including road restoration.

Construction of the pipelines would likely occur in several locations at one time, rather than moving progressively from one end to the other, and each location is likely to be in a different phase at different times. The construction program would be established by the construction contractor during detailed design and construction planning.

Open trench construction would progress at a rate of about 10 m - 25 m per day and have a duration of between 8 to 10 weeks in any given area.

Trenchless construction would have a duration of between about one month to about one year (depending on the location, length and depth of bore. Indicative durations for the HDD and microtunneling sections are provided in Table 3-6.

3.7.5 Pipeline construction methodology

All pipelines would be constructed using a combination of open trench and trenchless construction methods (HDD or microtunneling). Most of the pipelines would be constructed by open trenching, follow existing road alignments, either in the road or road verge. Trenchless construction is planned beneath some existing and proposed infrastructure, waterways and environmental constraints. Trenchless construction may be used in additional locations provided it does not result in any additional environmental impact. Where pipelines would cross waterways or wetlands, the project would avoid impacts by trenchless construction (see Section 3.7.5.2) or via aerial crossings over waterways in Meadowbank Park, in line with existing infrastructure (see Section 3.7.5.3).

3.7.5.1 Open trench construction

Open trenching involves digging a long linear trench in which the pipeline is placed. This requires excavation of the ground surface progressively, likely in 30 m - 50 m sections at a time. This method of construction is the most conventional for pipeline installation when depths are relatively shallow and there are minimal constraints such as structures, vegetation and large waterways.

The project would use a range of open trenching methods for pipeline installation. Depending on the depth of the pipeline and the size of the trench, the construction area required can vary. If deep excavation is required, the trench needs to be benched, stepped or reinforced with shoring or sheet piling to prevent collapsing. The typical construction corridor width for open trench construction is 10 m - 20 m and accounts for safety and access considerations (Figure 3-23). The width of the trench itself would be up to 2.2 m for the river release pipeline, and 3 m for the brine and transfer pipelines through Grand Avenue and the commercial complex carpark on James Ruse Drive.

Generally, a narrower corridor is adopted when constraints like vegetation or water bodies are present. Where there are no environmental constraints, a wider corridor is adopted, allowing additional space for movement of machinery, people and construction materials where possible. A large proportion of the pipelines would be constructed within the road corridor, and where feasible would typically be constrained to one lane to minimise traffic impacts.

All trenched sections of the brine and transfer pipelines would be concrete encased. The river release pipeline would be concrete encased along Hill Road.

Open trench pipeline construction would include:

- traffic management:
  - where the new pipeline is located within a local road corridor, one lane would remain open where possible
  - busy roads (including State roads) may require complete overnight closure for safety reasons under a ROL
- installation of appropriate environmental and safety measures including erosion and sediment controls, noise blankets, etc where necessary
- cutting into the existing ground surface (mainly road pavement, or turf through open spaces and parks)
- excavation of trenches, with stockpiling of excavated material on the up slope of trenches, within skip bins or at temporary construction compounds. Different soil types (i.e. topsoil, fill and natural material) would be managed separately in order to enable reinstatement and reuse/recycling of suitable materials.
- shoring and dewatering of trenches, depending on trench depth and groundwater levels
- installation of section of pipeline within trench
- pipe welding
- backfill of the trench with bedding material (likely sand), or concrete encasement of pipeline, and appropriate excavated material where deemed suitable
- compaction of trench fill material and temporary restoration
- installation of ancillary structures including valves
- restoration of areas disturbed by the construction works, including road pavement surfaces and groundcover (laydown of topsoil and turf or seeding where appropriate)
- site demobilisation and restoration.

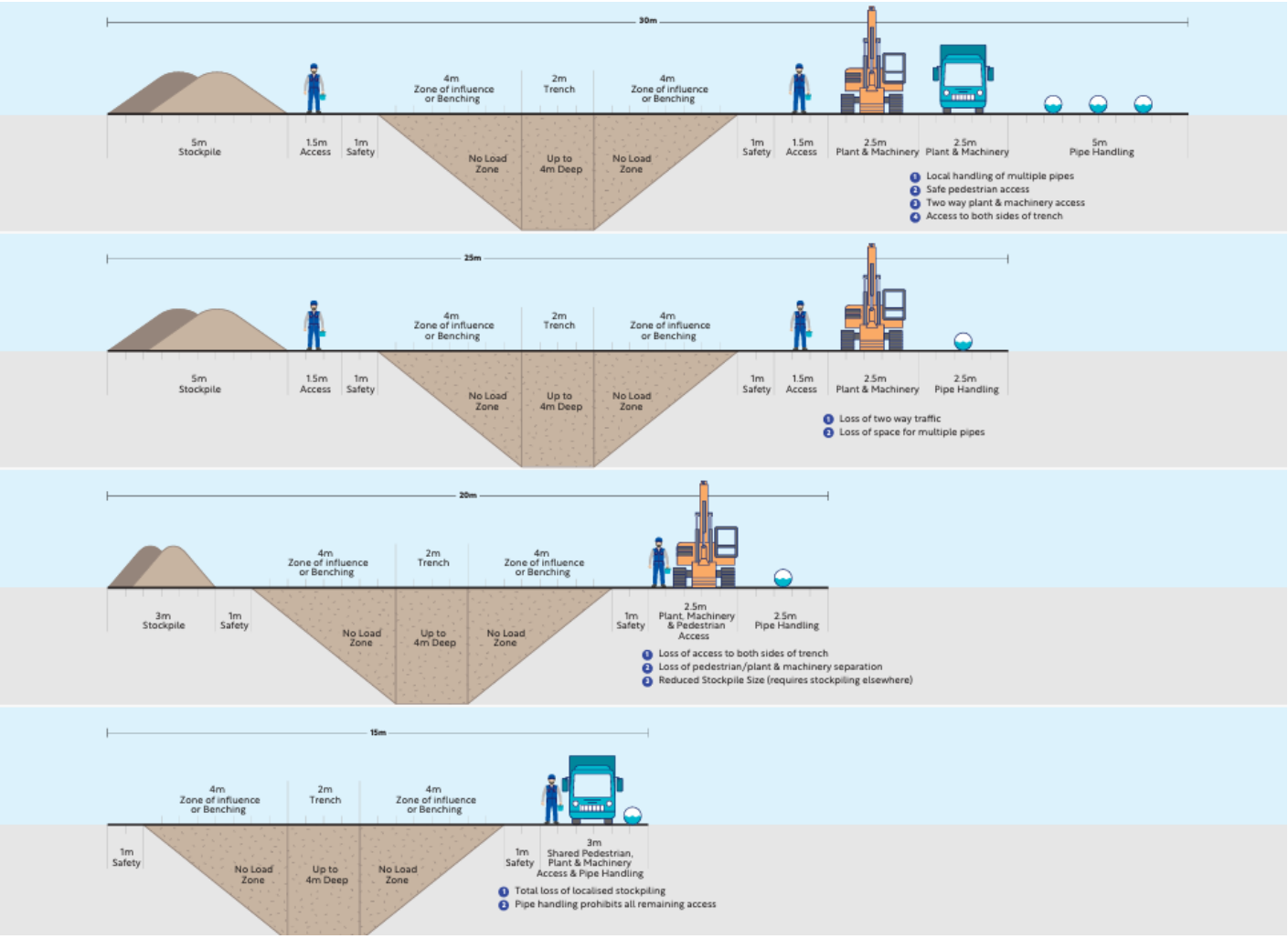


Figure 3-23: Safety and access considerations for open trenching construction methods

Typical plant and equipment required for trenched construction would include:

- backhoe loaders
- chainsaws
- concrete saws
- cranes
- compactors
- delivery trucks
- dozers
- dump trucks
- excavators
- excavators hammer
- front end loaders
- hand tools
- trucks
- water trucks
- shoring equipment
- powered hand tools
- semi-trailers
- pumps and other dewatering equipment
- side booms or pipe layers
- light vehicles.

3.7.5.2 Trenchless construction

Building a pipeline using trenchless construction involves the drilling of an underground bore in which the pipe is installed. This method of construction can reduce environmental and community impacts by minimising the amount of excavation and ground disturbance required. Unlike open trenching, trenchless construction disturbs the ground at the surface only at each end of the pipeline (the launch and receiving pits).

Trenchless construction is proposed at several locations including:

- construction of the transfer pipelines and brine pipeline between the WRRF and James Ruse Drive
- construction of the river release pipeline:
  - crossing Duck River between the WRRF and Carnarvon Street in Silverwater
  - crossing Silverwater Road along Derby Street
  - crossing the Narawang Wetlands
  - between Sydney Olympic Park and Meadowbank Park under Hill Road and crossing Parramatta River.

The construction methodologies likely to be used include microtunneling and HDD, but these would be confirmed during detailed design. Figure 3-24 shows a typical HDD set-up including the excavated pits at either end, the path of the bore beneath the constraint, and the placement of the pipeline that is pulled through.

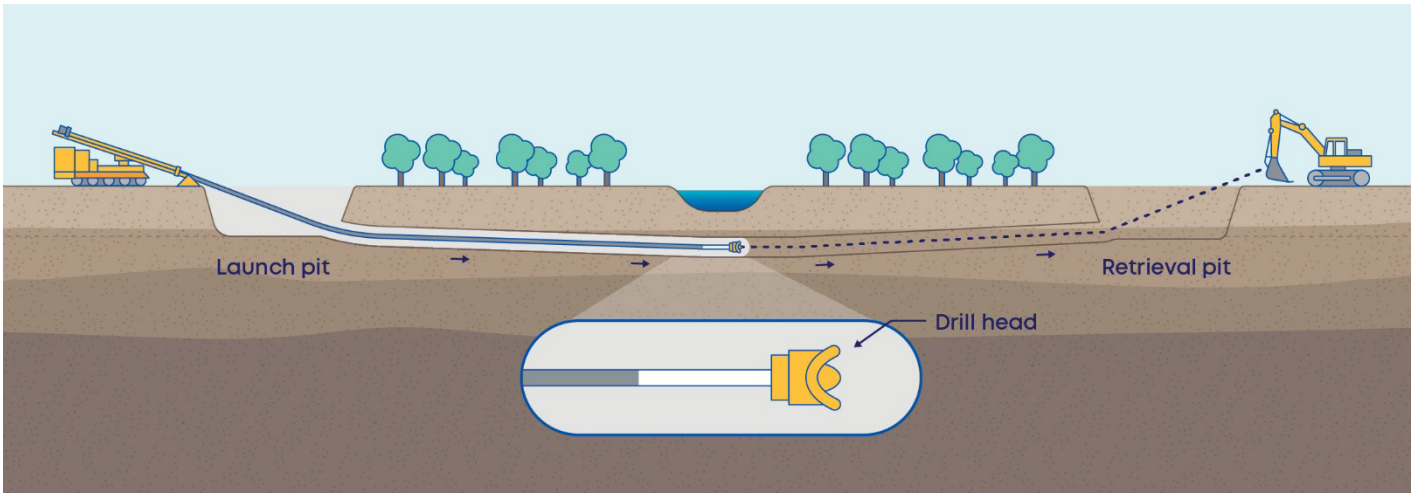


Figure 3-24: Example of HDD construction for illustrative purposes only

For HDD, the pipeline cannot be installed in small sections. The entire length of pipeline is laid out and joined together above ground in a process called pipe stringing. The pipeline is pressure tested prior to it being installed in the bore.

General construction activities and methodology for trenchless sections include:

- survey, delineation of pipeline alignment and working corridor
- site set up, including mobilisation of drilling rig, set up of drilling return lines (if required) and installation of environmental controls
- excavation of launch and receival pits for drilling rigs, including shoring/sheet piles

- contamination testing and management as required
- dewatering of excavations
- drilling of pilot hole and pipe bore
- stringing and welding of pipe together into one continuous length
- pressure testing of pipe
- installation of pipe – reaming of the bore and then pulling pipe through. There may be 2 or 3 reaming passes per section of pipeline so installation of pipe may take several days
- connection of trenchless to trenched sections
- site remediation and restoration
- commissioning.

Table 3-6: Indicative construction parameters for trenchless activities

	Duck River HDD	Silverwater Road microtunnel	Narawang wetlands HDD	Parramatta River HDD	Rosehill Gardens Racecourse HDD
Length	About 520 m	About 50 m	About 630 m	About 2.2 km	About 1.9 km
Pipe diameter	0.8 m (2 pipelines), and 1.35 m casings (x2)	1 m, with 1.35 m casing	0.80 m (2 pipelines)	0.80 m (2 pipelines)	0.6 m (one pipeline) 0.80 m (2 pipelines)
Typical depth	15 m	4 m	18-25 m	48 m	45-50 m
Indicative launch and receival pits	15 m x 4 m x 2 m (WRRF site to Carnarvon Street)	Launch shaft 2.5 m x 4.5 m x 10 m (Derby Road west) Receival shaft 3.5 m x 4.5 m x 10 m (Derby Road east)	15 m x 4 m x 2 m (P5A Carpark URBNSURF to Pierre de Coubertin Park)	Launch shaft 4 m x 50 m x 6.5 m (P5C Carpark URBNSURF) Receival shaft 15 m x 4 m x 2 m (Meadowbank Park)	12 m x 4 m x 2 m (WRRF site to Grand Avenue)
Pipe stringing location	WRRF site	N/A	P5A Carpark (URBNSURF)	P5A Carpark (URBNSURF)	WRRF site
Construction hours	24 hours	24 hours	Standard hours	24 hours	24 hours

Indicative construction layout for the HDD site at Meadowbank Park are shown in Figure 3-25.

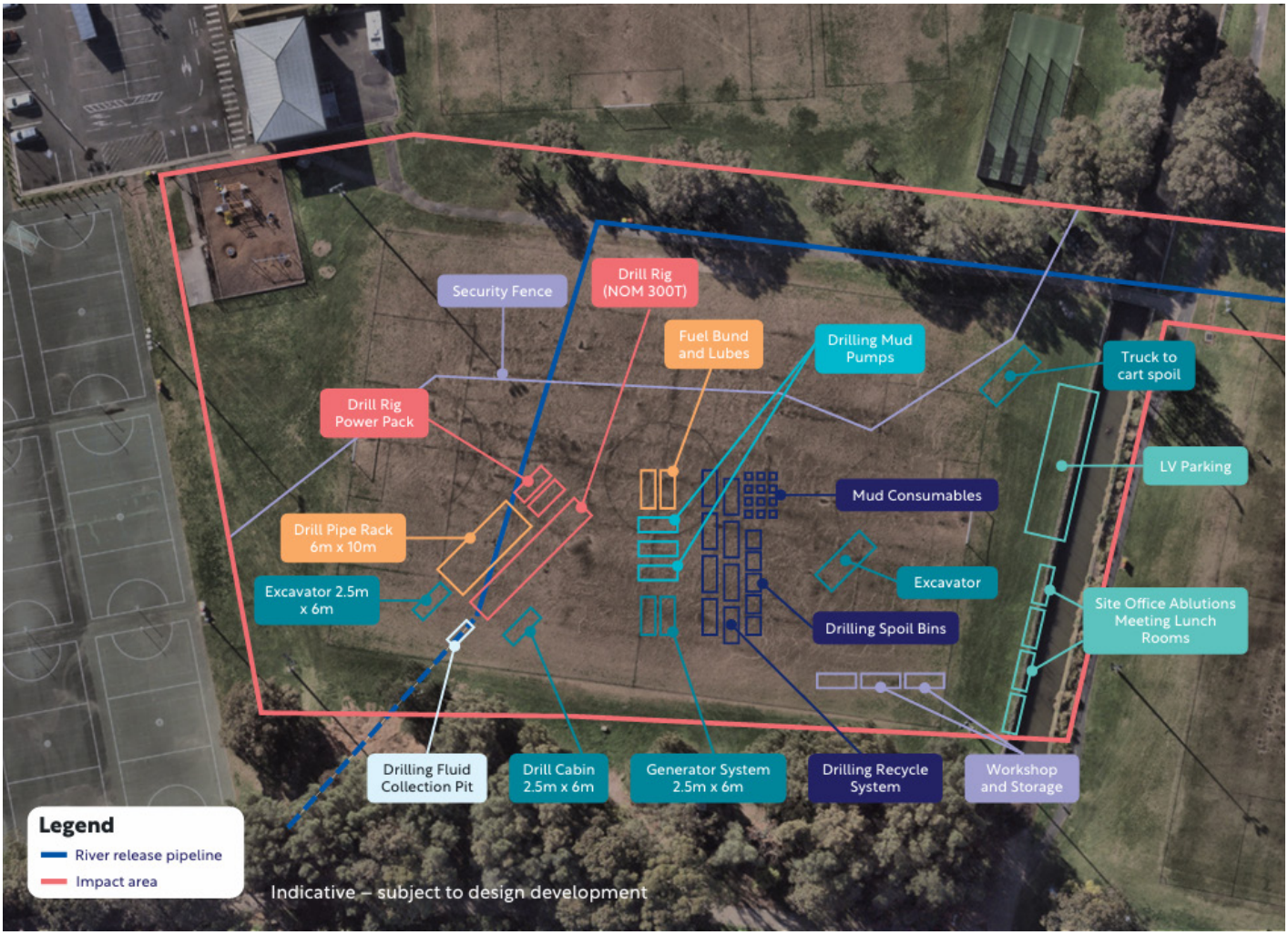


Figure 3-25: Construction layout at Meadowbank Park

3.7.5.3 Aerial waterway crossings

Where pipelines would cross the minor waterways of Charity Creek and unnamed creek in Meadowbank Park, aerial (i.e. above ground) pipeline crossings would be constructed in line with existing gas pipeline infrastructure. The above ground pipeline would be fully concrete encased, with any valves located in a secured cage to prevent unauthorised access. The design would be developed further during detailed design in consultation with the City of Ryde Council.

3.7.5.4 Construction of the river release structure

The release structure at the Parramatta River would take about 12 months to construct.

The existing sandstone headwall at the riverbank would be deconstructed to allow trenched installation of pipelines to the edge of the Parramatta River. The grout and concrete mattresses (or similar form of underwater pipeline protection) would be fabricated offsite and transported to the construction work area either via barge or heavy vehicles, dependent on the location of the supplier. Geotextile fabric or mattress (or similar) would be laid on top of the riverbed sediment at the location of the river release. Sections of pipe would then be floated

into position by barge, then flooded and guided into place by tugs and divers. A crane (either land-based or barge-based) would be used to place the pipeline protection system.

When floating these pipelines into position, the upstream ends of the pipelines would be floated into a flooded cofferdam or other temporary structure. Once secured in place, the cofferdam would be sealed off from the river, possibly using temporary large sandbags. The cofferdam would then be dewatered and the upstream ends of these pipelines connected to a common manifold with isolation valves. This would allow individual pipelines to be removed or brought into service if required.

The valves would be located below ground in concrete chambers with removable and trafficable covers. To minimise the impact on users of the parking area below the John Whitton Bridge, this chamber would be located in Memorial Park beyond the parking area kerb and gutter.

After connection of the marine pipes to the common manifold, the section of the pipelines that pass below the existing sandstone sea wall would be concrete encased. The sandstone sea wall would then be reconstructed and the land-side area back filled and reinstated. Finally, the temporary sandbag and cofferdam wall would be removed. An indicative layout for the construction of the river release structure is provided in Figure 3-26.

Indicative plant and equipment used for the construction of the river release structure include:

- barge
- tugs
- specialist diving equipment
- cranes
- powered hand tools.
- cofferdam or other temporary structure
- truck and dog
- excavators
- light vehicles
- pumps and dewatering equipment.

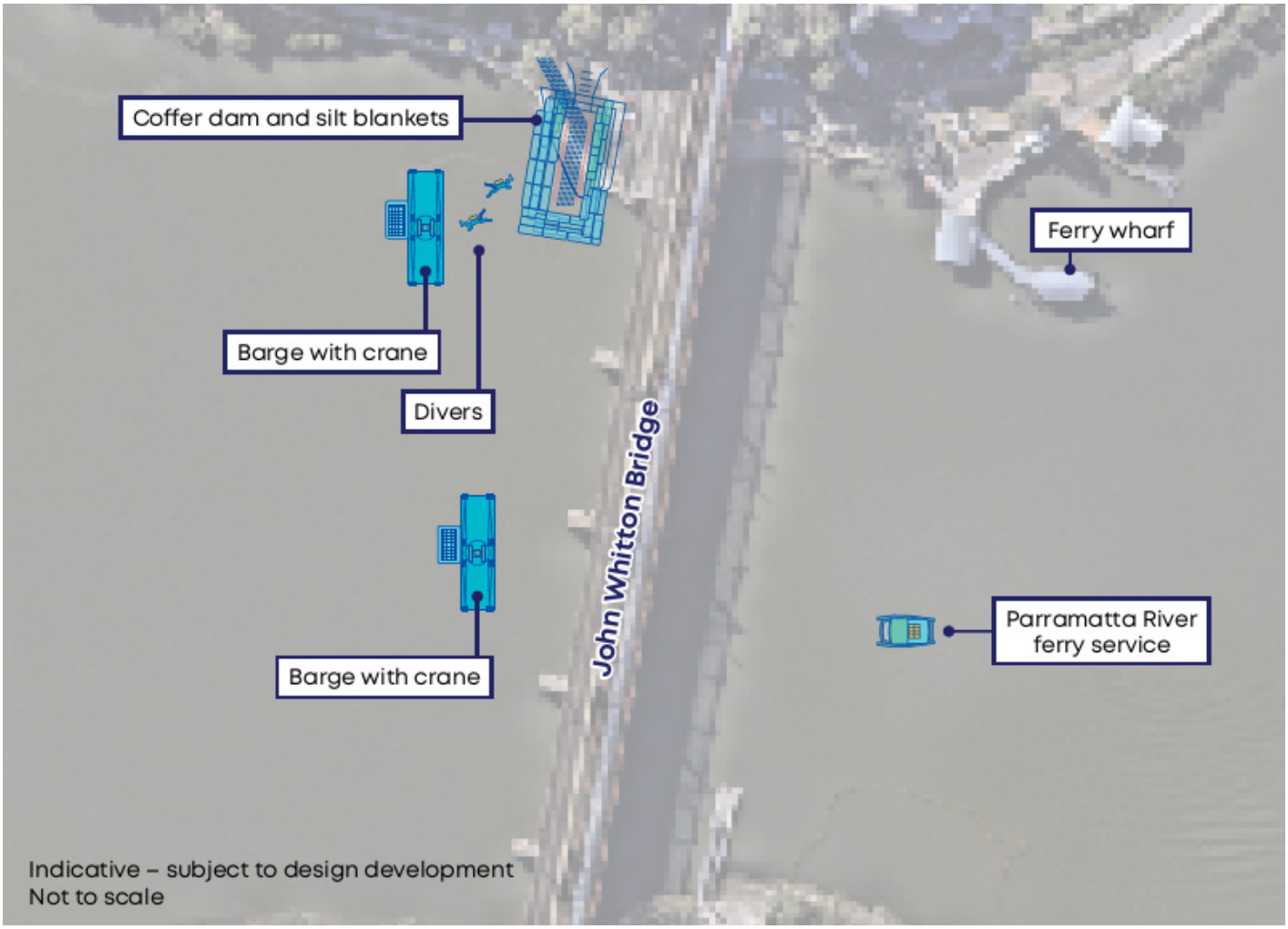


Figure 3-26: Indicative construction methodology for river release structure

3.7.5.5 Relining the existing pipeline

The section of the brine pipeline between Camellia pumping station and the NSOOS at Dundas would consist of a repurposed existing rising main and would include:

- isolation of the flow through the pipeline
- excavation of pits to access the existing rising main (progressively along the alignment)
- if required, conduit cleaning involving removing silt, slime, roots, litter and encrustation of the existing pipeline to enable relining. This may be achieved by jet flushing or robotic cleaning through the pipeline
- remote controlled closed-circuit television (CCTV) for video footage may be used to confirm adequate cleaning. It would also determine whether a non-structural or structural liner (high density polyethylene (HDPE) pipe) is required for the pipeline
- insertion of a new liner (pipe) within the existing pipeline (slip lining), from one maintenance hole or excavated access pit to the next

- grout filling the annulus (area between the new and existing pipes)
- commissioning tests such as pressure testing of the pipeline
- restoration, including backfill of excavations, reinstatement of pavement or replanting of vegetation, disposal of waste and any surplus excavation, and demobilising from site.

Where it is not feasible to reline sections of pipeline using a slip lining approach, the pipeline would be installed using a pipe-bursting approach. Pipe-bursting is a technique for replacing pipes by breaking them open from within, while a sleeve or a new pipe is simultaneously pulled in behind the bursting tool. A bursting tool moves through the existing pipeline applying radial forces to break open or split the pipe. Fragments of the pipe can then be removed.

Typical relining rates using either method are approximately 80 m/day. The number of access pits would be minimised as much as possible, and the typical distance between pits is likely to be 50 m - 100 m. Typically pits would be located at bends in the pipeline where additional engineering may be required. Access pits would be about 15 m long by 4 m wide and 1 m deep. These pits would generally be backfilled at the end of each working day. Any access pit not backfilled would be covered and securely fenced to ensure safety.

Typical plant and equipment required for the relining of the existing pipeline would include:

- backhoe loaders
- chainsaws
- concrete saws
- cranes
- dozers
- dump trucks
- excavators
- excavators hammer.
- front end loaders
- hand tools
- trucks
- water trucks
- pumps and other dewatering equipment
- specialist pipe bursting equipment
- compactors
- pressure hoses.

3.7.5.6 Landscape and restoration

All areas impacted by pipeline construction would be restored upon completion of works. Where possible, impacted areas would be restored to their pre-construction condition. Some vegetation may not be replanted in the original location. This is to minimise the risk of vegetation establishing roots that have the potential to damage pipelines. Sydney Water would consult with relevant landowners, stakeholders and local councils in planning for restoration after pipeline construction.

Typical plant and equipment that would be used for landscaping and restoration works would include:

- compactors
- excavators
- graders
- road paving machinery
- rollers.
- loaders
- hand tools
- water carts
- hydromulchers.

3.7.6 Construction compounds

Construction compounds would store equipment and materials and provide site office facilities and parking for construction staff. They would be required throughout the construction phase of the project at several locations close to the project. Table 3-7 and Table 3-8 describe indicative types and locations of compounds required.

Sydney Water may not need all compounds that are proposed which are shown as a worse case. Alternative locations may be required and Sydney Water would be in ongoing consultation with relevant stakeholders as the project progresses. Depending on the type of compound, they would be required for different lengths of time during construction. In general, main compounds would be required for the entire 36-month construction duration, and smaller satellite and trenchless construction compounds would be required for about one to 18 months.

Sydney Water is seeking approval for the construction compounds identified in Figure 3-1 to Figure 3-5 and set out in Table 3-8. Sydney Water is also seeking flexibility for potential alternative construction compounds, where those alternative compounds meet the criteria outlined in Table 3-12, and are approved by DPHI's Environmental Representative for the project as having minimal environmental or community impact. Compound locations, layouts and their timing would be established during detailed design and construction planning.

Whilst not defined as 'compounds', active worksites would be established at pipeline construction sites. These worksites would delineate work areas and may be used for storage of materials, plant and equipment on a short-term basis during active construction works. These worksites would only be required for short periods of time and would move along the pipeline alignments within the impact area as construction progresses. As such, these worksites have not been individually identified in this EIS.

Table 3-7: Types of proposed construction compounds

Compound type	Key activities and description	Duration
Main	• large compounds that would be active for the entire construction of the project • temporary buildings such as offices and meeting rooms, amenities and first aid facilities • stockpiling and sorting of excavated material prior to disposal or reuse • storage of site equipment, including bunded storage for any chemicals such as fuel • construction works including excavation and earthworks would also take place within these compounds.	Entire construction periods of the project

Compound type	Key activities and description	Duration
Satellite	• smaller compounds that would have similar activities to main compounds • compounds for material, spoil, plant and equipment storage during construction activities. There would not be any excavation at these compounds.	About one to 18 months at a time
Trenchless construction	• only identified for larger trenchless locations where an increased construction presence would be required • include the launch and receival pits for sections of pipeline constructed by trenchless methods • accommodate activities associated with drilling such as the drill rig, spoil management and pipe placement • only required during trenchless construction.	About 2 to 8 months at a time
Laydown	• only required for short-term storage of construction equipment and materials.	About 2 months at a time

Table 3-8: Numbering, location and type of indicative compounds

Number	Location	Compound type	Likely duration[5]	Hours of construction
C1	Kissing Point Road, Dundas	Satellite	One month	24 hour (State road)
C2	Junction of Kissing Point Road and Ripon Avenue, Dundas	Satellite	One month	24 hours (State road)
C3	Kissing Point Road verge, Dundas	Laydown	One month	24 hours
C4	Anderson Avenue, Dundas	Satellite	One month	Standard construction hours
C5	Anna Maria King Park, Dundas	Satellite	One month	Standard construction hours
C6	Victoria Road North, Dundas	Satellite	One month	24 hours
C7	Victoria Road South, Dundas	Satellite	One month	24 hours
C8	Railway Street, Dundas	Satellite	One month	Standard construction hours

[5] extended durations may be required in the event of delays in available spoil disposal locations.

Number	Location	Compound type	Likely duration[5]	Hours of construction
C9	Railway Street South, Parramatta	Satellite	One month	Standard construction hours
C10	Western Sydney University Carpark, Parramatta	Satellite	One month	Standard construction hours
C11	Western Sydney University South, Parramatta	Satellite	One month	Standard construction hours
C12	181 James Ruse Drive, Camellia	Satellite	One month	Standard construction hours
C13	175 James Ruse Drive, Camellia	Satellite	One month	Standard construction hours
C14	Grand Avenue North Car Park, Rosehill	Satellite	4 months	24 hours (intermittent)
C15	Camellia pumping station compound	Main	24 months	Standard construction hours
C16	Grand Avenue, Rosehill	Trenchless construction	4 months	24 hours (intermittent)
C17	WRRF Compound	Main	36 months	24 hours (for 3 months) otherwise standard construction hours with occasional out of hours work (OOHW)
C18	Carnarvon Street, Silverwater	Trenchless construction	4 months	Standard construction hours, some OOHW intermittently
C19	Derby Street, Silverwater	Satellite	18 months	Out of hours (Night time/weekend)
C20	Silverwater Road West, Silverwater	Trenchless construction	4 months	24 hours
C21	Silverwater Road East, Silverwater	Trenchless construction	4 months	24 hours
C22	Hume Park, Silverwater	Satellite	18 months	Standard construction hours
C23	Grey Street, Silverwater	Satellite	18 months	24 hours
C24	Deakin Park, Silverwater	Satellite	18 months	Standard construction hours

Number	Location	Compound type	Likely duration[5]	Hours of construction
C25	Pierre de Coubertin Park North, Silverwater	Satellite	18 months	Standard construction hours
C26	Pierre de Coubertin Park South, Silverwater	Trenchless construction	6 months	Standard construction hours
C27	URBNSURF Carpark, Olympic Park	Trenchless construction	6 months (Carpark P5A)	Standard construction hours (Carpark P5A), some OOHW
C28	Meadowbank Park, Meadowbank	Main	8 months (Carpark P5C)	24 hours (Carpark P5C)
C29	Memorial Park	Satellite	8 months	24 hours
C30	John Whitton Bridge West, Meadowbank	Satellite	7.5 months	Standard construction hours
C31	John Whitton Bridge East, Meadowbank	Satellite	6 months	Standard construction hours with 2 x 24 hour weekends and some OOHW

3.7.7 Construction materials

During construction, a wide range of materials would be required. The indicative types of materials include:

- sand
- stabilised sand
- gravel
- clay
- spoil (backfilling)
- concrete
- steel (both pipe and reinforced concrete)
- structural steel and cladding
- carpet
- paint
- gyprock
- timber framing
- structural aluminium and cladding
- insulation building materials
- copper/electrical cabling
- waterproofing membranes
- polyurethane coatings
- sarking
- compressed fibre cement sheeting
- bitumen/asphalt
- Polyethylene (PE) pipe
- Poly Vinyl Chloride (PVC) pipe
- copper pipe
- PE liner for ponds
- fibre glass
- plastic (pipe and civil construction)
- geo textile
- glass (buildings)
- timber (formwork)
- epoxy mortar

- paint for corrosions protection (chemical bunds and buildings)
- mech install would depend on equipment selected
- brick and block
- cementitious mortar.
- epoxy coating and lining material
- solvent cements, glue, epoxy, polyester resin
- mastics, sealants
- nuts, bolts, screws, fastening hardware, nails
- rubber sheeting, isolators, gaskets.

3.7.8 Spoil management

As noted in Section 1.8.1, the WRRF site has been partially raised with imported natural material. There would be limited spoil removed from the WRRF site, and any suitable excavated spoil would be reused on site, where possible.

Where spoil quality is geotechnically suitable, Sydney Water proposes to use excess spoil from trenched pipeline construction at the WRRF site. Estimates indicate the project would generate about 35,800 m^3 of excess spoil that cannot be reused to backfill pipeline excavations. Excavated spoil would be transported to the WRRF site for storage and reuse or disposed of appropriately. Excess spoil generated from the project would be placed in the south-east area of the site, to raise this area to site levels matching the north-west section of the WRRF site. This area may be raised slightly higher than 1.7 m. This will be confirmed during detailed design.

Temporary storage of excess spoil at compounds may be undertaken, and this would be in accordance with the indicative compound duration outlined in Table 3-7.

Spoil from the HDD construction would not be geotechnically suitable for reuse on the WRRF site. It would be either beneficially reused off site, under a resource recovery order, or disposed of.

Chapter 21 (Waste management) provides further details on waste and excess spoil.

3.7.9 Construction hours

Where reasonable and feasible, construction would be carried out during standard working hours (Monday to Friday – 7am to 6pm, and Saturday – 8am to 1pm) as defined by the Interim Construction Noise Guidelines (DECC, 2009). Due to the size and duration of the project, out of hours work would be required for certain project locations and activities. These include (but are not limited to):

- delivery of oversized plant or structures that police or other authorities determine to require special arrangements to transport along public roads (see Chapter 14 (Traffic, transport and access))
- works to be undertaken in accordance with the conditions of a ROL which includes undertaking works at night to limit impacts to surrounding road network.
- trenched and relining pipeline construction along and across busy roads (including State classified), to minimise traffic impacts
- works that cannot be completed within the standard respite periods for engineering reasons. This includes:

  - large trenchless pipeline construction sections such as under Rosehill Gardens Racecourse, and Hill Road-Parramatta River which might require 24 hours drilling for 3 to 8 months, and microtunneling under Silverwater Road
  - large concrete pours
  - extended electrical works
- construction activities within Parramatta River for the river release structure, e.g. use of barges to arrange pipes and concrete mattresses (or similar) underwater, would require closures of Parramatta River to maritime traffic across 2 weekends for safety purposes. Also underwater work undertaken at night to minimise impacts to ferries operating during the day. The timing would be planned in consultation with TfNSW, the Harbour Master and Sydney Ferries to minimise impacts on marine traffic.

The exact locations and duration of out of hours work would be determined during the construction planning phase of the project when a construction contractor has been engaged. Out-of-hours work would be assessed and managed effectively during construction to reduce incidents and minimise impacts on the community (see Chapter 13 (Noise and vibration). Communities would be notified of any out of hours works in line with the Interim Construction Noise Guidelines and as outlined in the project's Community and Stakeholder Engagement Plan (CSEP).

3.7.10 Construction workforce

The number of construction workers would depend on the schedule of works and construction program which would be developed during the detailed design and construction planning phase of the project. Indicative construction workers for each component of the project are provided in Table 3-9. The number of construction staff would fluctuate across the construction program. It is likely multiple crews would be working at various places along a pipeline at the same time. Therefore, the numbers provided represent the peak construction of the program. It is assumed that all construction workers would reside locally within the Greater Sydney area and would not require local accommodation when working on the project.

Table 3-9: Construction workforce numbers

Project site	Peak workforce (full-time equivalent)
WRRF	200
Camellia pumping station	30
River release pipeline	25
Brine/transfer pipelines	30
Total	**255**

3.7.11 Construction traffic volumes

Construction traffic related to the project would be generated by activities including:

- worker crews - crews undertaking trenchless construction and open trenching along the pipeline alignment
- light vehicles accessing site compounds, including the WRRF construction site
- heavy vehicles accessing site compounds, including the WRRF construction site, to deliver construction materials and equipment and remove waste.

Table 3-10 provides the estimated peak traffic movements for light vehicles and heavy vehicles during construction. Worker crews and heavy vehicles would move progressively along the alignment.

Table 3-10: Indicative construction traffic generated by the project

Project site	Likely route	Estimated peak vehicle daily movements
WRRF	Unwin Street/ Wentworth Street/ Parramatta Road	400 light vehicles 300 heavy vehicles
Camellia pumping station	Grand Avenue Drive/ James Ruse Drive	30 light vehicles 30 heavy vehicles
Brine/Transfer pipelines		
Compounds C1 to C6	Victoria Road/ Anderson Avenue/ Rippon Avenue, and Kissing Point Road	24 light vehicles One heavy vehicle
Compounds C7 to C11	Victoria Road/ Railway Street	24 light vehicles One heavy vehicle
Compounds C12 to C16	James Ruse Drive/ Grand Avenue, and James Ruse Drive/ Grand Avenue North	24 light vehicles One heavy vehicle
River release pipeline		
Compounds C18 to C20 and C22 to C24	Western Motorway/ Silverwater Road/ Carnarvon Street/ Vore Street/ Derby Street.	15 light vehicles 20 heavy vehicles
Compounds C21 and C25	Western Motorway/ Silverwater Road/ Derby Street/ Day Street North/ Fariola Street	15 light vehicles 20 heavy vehicles

Project site	Likely route	Estimated peak vehicle daily movements
Compounds C26 to C28	Western Motorway/ Hill Road/ John Ian Wing Parade/ Newington Boulevard/ Comaneci Avenue	15 light vehicles 20 heavy vehicles
Compound C29	Western Motorway/ Silverwater Road/ Hill Road/ Holker Street	15 light vehicles 20 heavy vehicles
Compounds C30 to C33	Victoria Road/ Adelaide Street/ Constitution Road West/ Bank Street/ Meadow Crescent	15 light vehicles 20 heavy vehicles

Construction worker parking would be provided within some compounds. Where parking is not provided, it is assumed that construction workers would park in local roads in the vicinity of the construction compounds or worksites.

Chapter 14 (Traffic, transport and access) provides further details on likely traffic volumes, haulage routes, and predicted traffic impacts and management.

3.8 Commissioning

Commissioning is the process of managing all activities required to verify and document the compliance, performance, functionality and transitioning to operation of new assets. All assets would need to pass several tests and checks before being integrated into Sydney Water's operational network. Commissioning is an important step that ensures the assets would function and perform in an adequate manner and avoid potential environmental issues after they become operational.

Commissioning is required for all project components, including WRRF treatment process trains, pumping stations, electrical, control elements and pipelines. The activities would ensure the components can perform their required function, in some cases by using drinking water in place of the final process fluid. Once the pre-commissioning tests have passed with drinking water, wastewater would be introduced to complete process commissioning and transition into operation.

The activities involved in commissioning include:

- pressure testing
- factory testing of mechanical and electrical components
- mechanical and electrical installation testing
- software factory acceptance testing, including control functionality check
- dry commissioning

- pre commissioning
- wet commissioning
- site acceptance testing
- reliability testing
- process proving
- training.

Commissioning and testing activities would occur throughout construction, as sections of pipelines and components of the WRRF are installed. Drinking water from the nearby drinking water network would be used for certain aspects of wet commissioning including pressure testing. This water would be treated as required before release into the environment.

Once the pipelines and the WRRF have been commissioned, there would likely be a proving period as the operational arrangement of the treatment processes is optimised in response to the quality of the incoming wastewater. During this interim period, treated water and brine quality is likely to be variable which would require flexibility in the Environment Protection Licence water quality release limits.

3.9 Required project flexibility

This EIS has been prepared based on a reference design, described throughout this chapter. The reference design was prepared throughout the planning phase of the project and would be further developed after appointment of a construction contractor or contractors after the contract is awarded. The detail would develop as detailed design progresses, including the exact location, layout and infrastructure for Phase 1 of the WRRF, within the impact area assessed in the EIS.

Sydney Water's general principle for flexibility is that changes to design, construction and operation would be consistent with or better than the environmental impact, environmental performance outcomes and management measures described in this EIS. In the event that changes result in unavoidable impacts which are worse than those assessed in this EIS, Sydney Water would consult with DPHI to modify the approval where appropriate.

Where flexibility is sought, it has been described in the relevant section of this project description and is summarised in Table 3-11 and Table 3-12.

3.9.1 Design and operation

Table 3-11 outlines the key elements of flexibility Sydney Water proposes during design and operation.

Table 3-11: Flexibility during design and operation of the project

Flexibility proposed	How Sydney Water will confirm the approach
Treatment technology or equipment at the WRRF site, provided it meets the treated water quality specified in the EIS and has no additional noise or air quality impacts on sensitive receivers.	During detailed design
Location, layout, structure sizes and number of units of the WRRF and its ancillary infrastructure within the operational area provided it has no additional noise, air quality or visual impacts on sensitive receivers.	During detailed design
Urban design and landscaping at the WRRF site, providing it aligns with the principles described in Section 3.4.7.	During detailed design for urban design. During landscaping design in construction phase.
Location and size of pipelines provided they are located within the impact assessment area (with respect to above ground construction) described in Section 3.6.	During detailed design
Location of the pipelines where trenchless construction is proposed, provided it meets the following principles: • no changes to construction methodology for trenchless construction • no additional environmental impact, including no additional vegetation removal. This flexibility is needed due to potential geotechnical constraints, that may result in the need to change pipeline alignments.	During detailed design and construction planning
Use and location of drilling return lines, providing no additional environmental impact including no additional vegetation removal.	During detailed design
Location of ancillary infrastructure (excluding barometric loop) on pipelines provided they are located within the impact assessment area described in Section 3.6.	During detailed design
Assessment of low impact activities to be completed before the approval of the project CEMP (see Section 3.7.1).	During detailed design

3.9.2 Construction

Table 3-12 outlines the key elements of flexibility Sydney Water proposes during construction.

Table 3-12: Flexibility during construction of the project

Flexibility proposed	How Sydney Water will confirm the approach
Construction phasing for the WRRF site (number of construction periods).	During detailed design
Pipeline laydown areas with no size, distance or duration limitation that could be implemented without modification or further approval provided it remains: • in the impact area, impact assessment area and existing compounds identified in this EIS • in existing Sydney Water or delivery contractor compounds already in use.	During detailed design and construction planning
Construction compound purpose	During construction planning
Additional pipeline laydown areas without modification (but with Independent environmental representative endorsement and DPHI approval) if they meet the following requirements: • duration of up to 2 months, sized up to 100 m^2 and located within 200 m of the impact area • assessed under the construction traffic management plan as causing minimal impact to existing traffic and with no traffic movements outside standard working hours • with landowner agreement if on private property • only with council agreement if on council land • no disruption to property access • no impacts to heritage items • no remnant native vegetation removal required – use existing cleared land • no disturbance to waterways • no excavation.	During construction planning
Pipeline construction methodology if it can be demonstrated it has equivalent or reduced environmental and community impact (e.g. changing from open trenching to trenchless methods).	During detailed design, construction planning and during construction
Location of construction activities provided they are in the impact area and/or impact assessment area, as described in Section 3.2, and have equivalent or reduced environmental and community impact.	During detailed design, construction planning and during construction
Locations and timings in which out of hours works are required, provided it can be assessed within the CEMP and supporting management plans during detailed design and construction planning.	During detailed design, construction planning, and during construction

3.10 Project exclusions

The related developments described in Section 1.8 are not part of the project and they are therefore excluded from this project description and the application that is the subject of this EIS.

Sydney Water proposes that once the project is operational, any maintenance, replacement and repair of that infrastructure or any minor works or upgrades would be out of scope of the project and assessed in separate planning approvals if needed. Similarly, any activities or works that improve environmental performance or have neutral environmental impact will be excluded from the project scope.

The WRRF, pumping station and pipelines are unlikely to be decommissioned. Instead, infrastructure would be repaired and upgraded throughout its design life to maintain operation. Therefore, decommissioning has been excluded from the scope of this project.

Statutory context

4 Statutory context

4.1 Statutory requirements for planning approval

The statutory requirements relevant to the project are summarised in Table 4-1. These include requirements that are relevant to the justification and evaluation of the project including the power to grant approval, permissibility, other approvals, pre-conditions to the granting of approval, and mandatory considerations.

Table 4-1: Statutory requirements relevant to the justification and evaluation of the project

Category	Application to project
Power to grant planning approval	The project is declared to be SSI under Division 5.2 of the EP&A Act through Schedule 3, section 1(1) of the State Environmental Planning Policy (Planning Systems) 2021 (Planning Systems SEPP) – Sydney Water would otherwise be the determining authority and has concluded that an EIS is required due to the existing environmental constraints and predicted environmental impacts. SSI is the appropriate pathway given all project components are permissible without development consent as outlined below. The approval authority for the project is the NSW Minister for Planning and Public Spaces. Sydney Water has applied for the project to be declared critical SSI in accordance with section 5.13 of the EP&A Act.
Permissibility	The project is permitted without consent in accordance with Division 18 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP) as explained below for the different components of the project. **WRRF** The WRRF would be developed on land zoned as E5 (Heavy Industrial) under the Parramatta Local Environmental Plan (LEP) 2023 (City of Parramatta Council, 2023a). The WRRF is defined as a 'sewage treatment plant' under the Standard Instrument – Principal Local Environmental Plan (Standard Instrument). Sewage treatment plant means a building or place used for the treatment and disposal of sewage. Development for the purpose of a sewage treatment plant may be carried out without consent on land in a prescribed zone in the prescribed circumstances under section 2.126(2) of the TISEPP. E5 is a prescribed zone. The project would occur under the prescribed circumstances because Sydney Water is a public authority. **Camellia pumping station** Camellia pumping station upgrades would be developed on land zoned as E3 (Productivity Support) under Parramatta LEP. The Camellia pumping station is defined as a 'sewage reticulation system' under the Standard Instrument. Sewage reticulation system means a building or place used for the collection and transfer of sewage to a sewage treatment plant for treatment, or transfer of the treated waste for use or disposal. It includes associated pipelines and pumping stations. Development for the purpose of a sewage reticulation system may be carried out without consent on any land in the prescribed circumstances under section 2.126(6) of the TISEPP. Upgrades to the Camellia pumping station would be permissible without

Category	Application to project
	consent because permissibility is not limited to certain land use zones and Sydney Water is a public authority. **Pipelines and associated infrastructure** The transfer, brine and river release pipelines and associated infrastructure, including the river release structure, would be developed in a range of land use zones under the Parramatta LEP (City of Parramatta Council, 2023a) and Ryde LEP 2014 (City of Ryde Council, 2014). These are listed in Appendix C (Statutory compliance). The pipelines and associated infrastructure are defined as a 'sewage reticulation system' under the Standard Instrument. Development for the purpose of a sewage reticulation system may be carried out without consent on any land in the prescribed circumstances under section 2.126(6) of the TISEPP. The pipelines and associated infrastructure would be permitted without consent because permissibility is not limited to certain land use zones and Sydney Water is a public authority. The brine pipeline (relining section) traverses land mapped as 'proximity to coastal wetlands' under the State Environment Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP). The river release pipeline traverses areas mapped as both 'Coastal Wetlands' and 'proximity to coastal wetlands' under the SEPP. These alignments and the mapping are shown in Chapter 7 (Waterways assessment). For the river release pipeline (trenchless section) within the coastal wetland area, development is permissible without consent as certain conditions under section 2.126A of the TISEPP are met. The trenched section of the river release pipeline and works associated with the brine relining section within the 'proximity to coastal wetlands' area would typically require development consent. However, as the project is SSI, the Planning Systems SEPP prevails for permissibility. Further information is included in Appendix C (Statutory compliance). The river release pipeline is partially located within Sydney Olympic Park, which is a State significant precinct under the State Environmental Planning Policy (Precincts – Central River City) 2021 (Central River City SEPP), therefore permissibility of the project is subject to the Central River City SEPP. However, the Planning Systems SEPP prevails to classify this pipeline as permissible without consent and declared to be State significant infrastructure.
Approvals consistent with approved SSI	Section 5.24(1) of the EP&A Act identifies approvals that cannot be refused if they are necessary for carrying out approved SSI and are to be substantially consistently with the SSI approval. The following approvals are listed under section 5.24(1) of the EP&A Act and may be relevant to the project: • an EPL under chapter 3 of the *Protection of the Environment Operations Act 1997* (POEO Act) – Sydney Water holds existing EPL 378 for the Northern Suburbs Sewage Treatment System including operation of the North Head WRRF. Camellia pumping station is part of this system and operates under this EPL. As the project would be connected to this system, it is currently intended to incorporate the project, including the new Camellia-Rosehill WRRF and river release into the existing EPL. • consent under section 138 of the *Roads Act 1993*. This consent would be required given the pipelines would be constructed in and across public roads.
Approvals not required for approved SSI	Section 5.23(1) of the EP&A Act specifies approvals that are not required for approved SSI projects. The following approvals would have been required if the project was not SSI: • a permit under sections 201 of the *Fisheries Management Act 1994*. These permits would have otherwise been necessary for dredging

Category	Application to project
	• an approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*. The project includes upgrades at the Camellia pumping station, which is on the State Heritage Register (SHR). If the project was not SSI approvals under the *Heritage Act 1977* would be required • a water management work approval under section 90, or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000*.
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (Commonwealth)	The project is not expected to have a significant impact on Matters of National Environmental Significance (MNES) listed under the EPBC Act. The impact of the project on listed threatened species, ecological communities and migratory species is detailed in Chapter 11 (Terrestrial biodiversity). Based on the assessments undertaken, Sydney Water has not referred the project to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW).
Other approvals	The project would require the granting of a lease, easement or licence under section 32 of the *Sydney Olympic Park Authority Act 2001* for traversing underneath the Millennium Parklands. It is possible that the project would require a permit for overmass or oversize vehicles under part 4.5 of the *Heavy Vehicle National Law 2013*. This will be confirmed in detailed design.
Pre-conditions to exercising the power to grant approval	There are two pre-conditions to exercising the power to grant approval for the project, contained in section 5.19 of the EP&A Act. The proponent must make an application for the approval of the Minister for Planning and Public Spaces to carry out SSI and the Planning Secretary must provide a report on the SSI to the Minister. The application for the approval of the Minister to carry out the project as SSI was lodged with the Planning Secretary on 31 July 2024, in accordance with section 5.15 of the EP&A Act. The Planning Secretary notified Sydney Water of the environmental assessment requirements for the project on 24 September 2024. This EIS is considered to meet the SEARs as outlined in Appendix A (SEARs table). DPHI will place the EIS on public exhibition for at least 28 days in accordance with section 5.26(2) and clause 12 of Schedule 1 of the EP&A Act. Landowner consent is not required to lodge the application for approval because Sydney Water is a public authority, in accordance with section 181(5)(a) of the EP&A Regulation. However, notice of the application would be required to be given to owners of land in accordance with section 181(6)(b)(ii) of the EP&A Regulation, by publishing an advertisement in a newspaper circulating in the area in which the infrastructure will be carried out. Following the exhibition period, the Planning Secretary will prepare an assessment report for the purpose of the Minister's consideration of the application for approval under section 5.19(1)(b) of the EP&A Act. The Minister or the Planning Secretary may request the Independent Planning Commission provide advice on the project. To ensure the above pre-conditions are met, section 5.18 of the EP&A Act specifies what must be included in the Planning Secretary's report.

Category	Application to project
Mandatory matters for consideration	Under section 5.19(2) of the EP&A Act, the Minister for Planning and Public Spaces is required to consider the following matters in deciding whether to grant approval for the project: • the Planning Secretary's report • any advice provided by the Minister having portfolio responsibility for the proponent (in this case, the Minister for Water) • any findings or recommendations of the Independent Planning Commission following a review in respect of the SSI (if a review by the Commission has been requested). The Minister must also have regard to the objects of the EP&A Act, contained in section 1.3, including the principles of ecologically sustainable development (ESD), as specified in section 193 of the EP&A Regulation. Consistency of the project with these objects, including ESD, is detailed in Appendix C (Statutory compliance). Section 1.7 of the EP&A Act notes that the Act is subject to the provisions of Part 7 of the *Biodiversity Conservation Act 2016* (BC Act). Under section 7.14 of the BC Act, the Minister for Planning and Public Spaces must take into account the likely impact of a proposed development on biodiversity values as assessed in the biodiversity development assessment report. The relevant authority may (but is not required to) further consider the likely impact of the proposed development on biodiversity values. A Biodiversity Development Assessment Report (BDAR) has been prepared (Appendix L). Potential biodiversity impacts are considered in Chapter 11 (Terrestrial biodiversity). Under the *Sydney Olympic Park Authority Act 2001*, the Minister must consider the consistency of the proposed development with the Environmental Guidelines for Sydney Olympic Park prepared by the Sydney Olympic Park Authority. The potential impacts of the project assessed by the EIS encompass the key issues listed in section 4 of the Environmental Guidelines as they relate to the current stage of the design and approval process. Relevant chapters in this EIS include: • Chapter 7 (Waterways assessment) • Chapter 9 (Soils and contamination) • Chapter 14 (Transport, traffic and access) • Chapter 18 (Social and economic impacts) • Chapter 20 (Sustainability and climate change) • Chapter 21 (Waste management). Issues relevant to design and material selection would continue to be considered during design development to ensure consistency with the Environmental Guidelines for Sydney Olympic Park.

4.2 Environmental planning instruments

Section 5.22(2)(a) of the EP&A Act states that environmental planning instruments (EPIs) and development control plans do not apply to State Significant Infrastructure, subject to certain exceptions. EPIs include SEPPs and LEPs. Sydney Water has considered relevant EPIs in preparation of this EIS, as detailed in Appendix C (Statutory compliance). EPIs most relevant to the project have been summarised in Table 4-2.

Table 4-2: EPIs most relevant to the project

EPI	Relevance to project
Central River City SEPP	This SEPP aims to 'facilitate the development, redevelopment or protection of important urban, coastal and regional sites of economic, environmental or social significance to the State so as to facilitate the orderly use, development or conservation of those State significant precincts for the benefit of the State'. The river release pipeline is partially located within Sydney Olympic Park, which is a State significant precinct under this SEPP. Impacts from the project on this precinct would be mitigated using the measures outlined in Appendix E (Mitigation measures).
Resilience and Hazards SEPP	Part of the project is located on land mapped as coastal wetlands and proximity area for coastal wetlands as defined by this SEPP. Measures to protect the biophysical, hydrological and ecological integrity of coastal wetlands have been provided in Chapter 7 (Waterways assessment). A risk screening of the project determined that it is a 'potentially hazardous' development and therefore a preliminary hazard assessment (PHA) has been prepared in accordance with this SEPP. The PHA is contained in Appendix V and summarised in Chapter 22 (Dangerous goods and hazardous development). A contamination assessment has also been carried out in accordance with the requirements in this SEPP. The contamination assessment is contained in Appendix J and summarised in Chapter 9 (Soils and contamination).
State Environmental Planning Policy (Biodiversity and Conservation) 2021	Extensive measures were undertaken to avoid and minimise impacts to native vegetation, threatened species and overall biodiversity values. These measures included using trenchless methods to construct pipelines beneath river crossings and wetlands, moving alignments to avoid native vegetation, and adjusting alignments to minimise impacts to native vegetation. Further detail on biodiversity impacts is available in Chapter 11 (Terrestrial biodiversity). The project is located on land within Sydney Harbour Catchment, which is a regulated catchment under the SEPP. Impacts to water quality and hydrology have been assessed in Chapter 7 (Waterways assessment).

4.3 Statutory compliance

A statutory compliance table is provided in Appendix C (Statutory compliance) that identifies all the relevant statutory requirements for the project and indicates where they have been addressed in this EIS. The project's consistency with applicable policies and guidelines has been discussed in Section 2.1.

Engagement

5 Engagement

5.1 Overview of engagement for the project

Sydney Water first began actively engaging stakeholders with the potential to be impacted by the project, or who have interests in the project in 2017. Engagement for the proposed project has been carried out since early 2024, in line with the Undertaking Engagement Guidelines for State Significant Projects (DPHI, 2024a), as well as the Engagement Institute engagement framework.

A CSEP was developed for the project which guides Sydney Water's approach to engagement throughout the life of the project from design development, through to construction and operation. It includes a series of engagement objectives as well as a framework for measuring the success of engagement. The CSEP has been updated throughout the scoping and development of the project.

External quality assurance by the Australian University's Crawford School of Public Policy on the project's engagement approach and the CSEP assessed the standard as excellent and industry leading.

A summary of the engagement activities undertaken during the EIS engagement phase and outcomes is included in Section 5.3. Section 5.4 describes engagement to be undertaken during the next project stages.

5.2 Engagement methodology

Community and stakeholder engagement for the project has been done in accordance with Undertaking Engagement Guidelines for State Significant Projects (DPHI, 2024a), specifically the requirements to:

- plan early – identify stakeholders and consider appropriate and effective engagement activities
- engage as early as possible – to identify, avoid or manage issues without significant cost or delay
- ensure engagement is effective – provide the information and opportunities that allow stakeholders to engage in a meaningful way
- ensure engagement is proportionate to the scale and impact of the project
- be innovative – use innovative means to enable participation from a broad spectrum of community members
- be open and transparent about what can be influenced.

Table 5-1 outlines the project engagement approach, informed by the key factors in these guidelines.

Table 5-1: Project engagement goals, objectives and measures

Guideline requirement	Goal	Objective	Measure of success
Plan early	Plan and deliver coordinated engagement to support the project.	• provide appropriate visibility to internal stakeholders to support coordination of communications • provide support for external stakeholders to engage with the Project on their areas of interest • coordinate with social impact assessment (SIA) team, as appropriate.	• feedback from internal and external stakeholders • document coordination with other teams including SIA consultants in a Consultation Outcomes Report.
Engage as early as possible Ensure engagement is effective Be innovative	Provide appropriate engagement for community and stakeholders.	• identify and engage those interested or affected by the project and improve their knowledge of the Project • manage enquiries and respond to concerns about the Project • achieve best practice under existing industry frameworks.	• project engagement collateral and initiatives delivered as per the CSEP • all identified stakeholders engaged as per CSEP • project enquiries responded to in accordance with CSEP • deliver on all engagement requirements under the EIS process including DPHI Guidelines and SEARs • complete Infrastructure Engagement Excellence (IEE) Standards Review and external review of CSEP.
Ensure engagement is proportionate to the scale and impact of the project	Minimise project impacts through stakeholder consultation and community engagement.	• facilitate the process for community and stakeholder views to be considered in the development of the Project • embed approaches to minimise impact through the options assessment and concept design process.	• multi-criteria analysis (MCA) for options selection includes community impacts • community Engagement Lead involved in Options Assessments and MCA • engagement participation • public information available on community feedback, articulating how feedback has been used • Consultation Outcomes Report to outline how the project received feedback, what it was, and how the project incorporated it in planning.

Guideline requirement	Goal	Objective	Measure of success
Be open and transparent about what can be influenced	Build and maintain awareness of and trust in Sydney Water and the project.	• trust in Sydney Water remains stable • increased awareness of the Project and RRWS • stable, or better community support for RRWS.	• trust in Sydney Water remains stable • 60%+ of feedback on the project is neutral or positive • project specific feedback on the Project.

Section 5.2.1 outlines the engagement approach designed to support delivery of these objectives.

5.2.1 Engagement phases for the project

Engagement has been carried out over several stages. These stages are summarised in Table 5-2. Sydney Water would continue to review the effectiveness of engagement throughout the project, in line with the goals, objectives and success measures in Table 5-1.

Table 5-2: Engagement phases

Phase	Description
Phase 1 – Early engagement	Carried out during early scoping work to support the Scoping Report and early design development.
Phase 2 – EIS engagement	Caried out during preparation of the EIS. Feedback received is considered during development of the concept design.
Phase 3 – EIS exhibition[6]	Carried out during public exhibition of the EIS.
Phase 4 – Post EIS exhibition	Additional engagement to be carried out with stakeholders and the community based on feedback received on the EIS. The scale of this engagement varies depending on the volume and nature of feedback received during Phase 3.
Phase 5 – Design development	If the project is approved, Sydney Water would engage with relevant stakeholders as part of design development work.
Phase 6 – Project delivery	During construction Sydney Water would continue to engage with relevant stakeholders and affected members of the community to keep them informed of construction works and respond to feedback and concerns.

[6] The Environmental Impact Statement has been placed on public exhibition for a minimum of 28 days (in accordance with Schedule 1 of the EP&A Act.

5.2.2 Identification of stakeholders

As part of the ongoing engagement work for the project, Sydney Water has identified an extensive list of stakeholders who had potential to have interest in the project. The full list of stakeholders who have been engaged with during preparations of the EIS is included in Table 5-3.

Table 5-3: List of stakeholders consulted for the EIS

Category	Stakeholders
NSW government agencies	• DPHI – State-led Rezoning team – Assessments team • Department of Primary Industries and Regional Development (DPIRD) (formerly Department of Primary Industries (Fisheries)) • TfNSW – Sydney Metro – PLR – NSW Maritime (including ferry services) – Traffic Management Centre – Transport Asset Manager (TAM) (formerly Transport Asset Holding Entity (TAHE)) • NSW EPA • NSW State Emergency Services (SES) • Infrastructure NSW (INSW) • SOPA • NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) – Heritage and Regulation group – Conservation and Programs team – Water team • Heritage NSW • Government Architect NSW (GANSW) • National Parks and Wildlife Services.
Local government	• City of Parramatta Council • City of Ryde Council • City of Canada Bay Council.

Category	Stakeholders
Schools, education facilities and childcare businesses	• WSU • Newington Public School • Melrose Park Public School • Explore and Develop Parramatta.
Major landowners and businesses	• ATC • URBNSURF • Downer Rosehill Sustainable Resource Centre • Goodman Rosehill Industrial Estate • VE Property • Viva Energy • Transdev.
Private utility and service providers	• Endeavour Energy • Jemena Gas.
First Nations groups	• Dharug Custodian Aboriginal Consultation • Dharug Strategic Management Group.
Residents and local community groups	• Epping Scouts Club • Yaralla Sea Scouts • Concord Sailing Club • Melrose Park Football Club • Primary School Sports Association – Ryde Zone • Parramatta River and Waterways Network (PRaWN).
Other	• Parramatta River Catchment Group • Local businesses.

5.3 Summary of engagement activities

Project engagement has been supported by a comprehensive range of engagement activities. Engagement activities have been tailored to different stakeholders and their interest in the project. Sydney Water has sought to be proactive in carrying out early engagement for the project. A summary of the engagement activities carried out for the EIS is included in Table 5-4.

Table 5-4: Summary of engagement activities for the EIS

Engagement activities	Detail
Project briefings, workshops and meetings (in person and online)	• offered to councils, impacted businesses and landowners, community interest groups and government agencies (over 50 held since early 2024).
Letterbox drops	• to date, 3x separate letterbox drops to above residents and businesses for project introduction newsletter (30 September 2024), project impacts newsletter (between 19 and 26 January 2025) and site investigation notifications (2 April 2025) • distributed across the project footprint area including Camellia, Newington, Meadowbank and surrounding areas to 18,886 private letterboxes, 1,182 business letterboxes.
Project flyer and awareness signs to promote community drop-in and pop-up display	• to date, 2 x separate flyers distributed to 5,719 private letterboxes and 121 business letterboxes Meadowbank and surrounding area on 15 March 2025 and 6 June 2025 • 6 promotional boards located in Meadowbank Park, Memorial Park and Meadowbank Wharf from 18 March 2025 to 28 March 2025.
Ad hoc emails, phone calls, and SMS	• 74 interactions.
First Nations consultation	• 1x meeting with Dharug Custodian Aboriginal Consultation on 27 February 2025 • 1x meeting with Dharug Strategic Management Group on 6 March 2025 • on Country Listening Session at Meadowbank Park on 18 March 2025.
Community survey	• 'Have your say' survey from July 2024 to February 2025 – 25 survey responses • qualtrics survey from May 2025 to October2025 – 6 responses.
Door knocking	• near the Camellia-Rosehill WRRF: – Devon Street, Unwin Street and Colquhoun Street on 3 September 2024 and 12 February 2025, 6 interactions • along the river release pipeline alignment: – Silverwater Pipeline Alignment on 22 January 2025, 22 interactions, 102 Sorry We Missed You flyers – Newington Pipeline Alignment on 1 April 2025, 20 interactions, 88 Sorry We Missed You flyers.

Engagement activities	Detail
Community pop-up displays	• 3 events within the area: – Wentworth Point Markets on 4 October 2024, 29 interactions – Ryde Wharf Markets on 27 October 2025, 24 interactions – Ryde Wharf Markets on 22 June 2025, 34 interactions.
Webinars	• 2 public community webinars: – 29 January 2025, 1 attendee – 18 February 2025, 2 attendees.
Social media	• digital advertisements on Facebook and Instagram – project Awareness Campaign from 28 October 2024 to 11 November 2024 impressions: 335,642, Reach: 74,824, Clicks: 3,461 • webinar promotion campaign from 12 February 2025 to 17 February 2025 – impressions: 89,096, Reach: 38,551, Clicks: 552 • community drop-in promotion campaign from 16 June 2025 to 22 June 2025 – impressions: 51,076, Reach: 15,864, Clicks: 424.
Project website	• regularly updated with project information (e.g. maps, upcoming events) • Sydney Water talk: 3,556 from 1 July to 5 May 2025 • Sydney Water project webpage: 759 from 5 May 2025 to 31 October 2025.

5.3.1 Social impact assessment integration

Some project engagement was also co-designed or co-delivered with social impact practitioners to support delivery of the project's SIA (Appendix S). Where possible, this engagement was carried out alongside the other engagement for the project including:

- community feedback surveys
- walk on Country
- newsletters
- door knocking
- stakeholder briefings webinars.

The outcomes of this engagement are included in the SIA (Appendix S) and Chapter 18 (SIA).

5.3.2 First Nations engagement

In addition to the engagement activities summarised in Table 5-4, additional targeted engagement with members of the Aboriginal community was carried out to inform:

- the Place and Design Framework (Appendix R) for the WRRF, and
- the Aboriginal Cultural Heritage Assessment Report (ACHAR) (Appendix Q).

The outcomes of this engagement and how Sydney Water have responded to feedback raised is summarised in Appendix R and Appendix Q. Also refer to Chapter 16 (Aboriginal Heritage), Chapter 17 (Visual, landscape and place making).

5.4 Engagement outcomes

The community and stakeholder engagement for this project has been performed in conjunction with engagement for the related development described in Chapter 1 (Introduction). The engagement described in this chapter details engagement carried out for the EIS (Phase 2 of the engagement phases in Table 5-2) which has been undertaken between 1 July 2024 and 31 October 2025. Engagement outcomes in this section specifically apply to the project.

These themes were also shared by stakeholders consulted and are addressed in Section 5.4.1.

5.4.1 Summary of key themes raised

This section provides a summary of the overall key themes raised and outcomes achieved during engagement with the local community and key stakeholders to date. Table 5-5 summarises the key engagement themes raised by stakeholders and the project response. It is noted that not all the stakeholders listed in Table 5-3 raised concerns or matters for further consideration. Where this is the case, those stakeholders have not been included in Table 5-5. The engagement summarised in Table 5-5 is also included in Appendix D (Community engagement table).

Table 5-5: Summary of key engagement themes raised by stakeholders and response

Key theme	Summary of issues raised	Stakeholder	Summary response	Where addressed
Strategic planning and governance	• alignment of the project with relevant government priorities, projections, strategies and plans • compliance with standards, policy and regulatory requirements, including planning requirements • impacts to Meadowbank Park Masterplan • the design of the project should align with the City of Parramatta Development Control Plan (City of Parramatta Council, 2023b).	• DPHI • City of Ryde Council • City of Parramatta Council.	• Sydney Water has developed the project in consultation with DPHI, City of Ryde Council, City of Parramatta Council and other relevant Government stakeholders to align with the relevant strategic planning priorities and objectives • Sydney Water is continuing to consult with City of Ryde Council on the Meadowbank Park Masterplan. Sydney Water would work with City of Ryde Council to mitigate potential impacts during construction and operation • under section 5.22 (2) of the EP&A Act, environmental planning instruments (including Development Control Plans) do not apply to State Significant Infrastructure projects. Sydney Water has sought to align with the relevant objectives of the City of Parramatta Development Control Plan (City of Parramatta Council, 2023b) where reasonable and feasible.	• Chapter 2 - Strategic Context • Chapter 4 – Statutory Context.

Key theme	Summary of issues raised	Stakeholder	Summary response	Where addressed
Cumulative impacts	• construction impacts to John Whitton Bridge • impacts on existing public infrastructure including roads and transport and any heritage items. • alignment of pipelines • degradation of road conditions from multiple major projects • impacts to Sydney Olympic Park due to multiple projects • disruptions to users of Hill Road from the project, PLR Stage 2 and City of Parramatta Council led upgrades.	• TAM • PLR • SOPA • Sydney Metro • Jemena • Endeavour Energy • SOPA • City of Parramatta Council.	• Sydney Water has designed the river release structure to avoid directly impacting John Whitton Bridge • impacts to some roads would be required for the installation of pipelines. Constructing pipelines in roads ensures that they can be accessed in the future for essential maintenance and minimises private property impacts. Sydney Water would use trenchless methods for construction where possible to avoid unacceptable disruptions to main roads • Sydney Water has sought to minimise impacts to heritage items by designing the project to avoid these items. Where construction is required in WSU and Memorial Park, the project has been developed to avoid impacting significant heritage features of both sites • during scoping, feedback from City of Parramatta Council and TfNSW indicated there would be significant impacts where the project would interface with Stage 1 and Stage 2 of PLR, for any open trenching work along Hill Road. To address this concern, a deep horizontal directional drill would be used to travel under Hill Road to Meadowbank Park • Sydney Water would continue to liaise with Sydney Olympic Park during detailed construction planning to understand traffic and access requirements during major events • Sydney Water has been and would continue to work with TfNSW and City of Parramatta Council on the	• Chapter 14 – Traffic, transport and access • Chapter 15 – Non-Aboriginal Heritage • Chapter 23 – Cumulative impacts.

Key theme	Summary of issues raised	Stakeholder	Summary response	Where addressed
			coordination of construction works on Hill Road. This would include investigating opportunities to collocate infrastructure and align construction programs.	
Interface with other projects	• impacts to PLR Stage 2 and Sydney Metro West during construction • potential for pipeline alignments to impact PLR Stage 2 routes • potential impact to PLR Stage 1 routes • impacts to the Duck River Nature Trail Project.	• PLR • Sydney Metro.	• the river release pipeline at Rosehill has been designed to avoid interacting with the nearby Sydney Metro West tunnels • the alignment of PLR Stage 2 was confirmed prior to preparation of this EIS. The brine and transfer pipelines and river release pipeline have been designed to avoid disturbing infrastructure constructed for PLR Stage 2. Sydney Water has considered the construction program for PLR Stage 2. As a result, the construction program for the project has been developed to avoid disruptions to construction for PLR Stage 2. Sydney Water acknowledges that both projects would be carrying out construction in Camellia-Rosehill and Sydney Olympic Park around the same time. Sydney Water would continue to engage with TfNSW during detailed design development to avoid disruptions to PLR Stage 2 construction • the brine and transfer and river release pipeline alignments have been developed to avoid disturbance of PLR Stage 1 infrastructure • Sydney Water would engage with Sydney Metro and PLR during detailed design to avoid impacts to both projects • Sydney Water would continue to work with City of Parramatta Council to ensure that impacts to the	• Chapter 14 – Traffic, transport and access • Chapter 23 – Cumulative impacts.

Key theme	Summary of issues raised	Stakeholder	Summary response	Where addressed
			delivery of the Duck River Nature Trail project are minimised where possible.	
Contamination	• management of contamination at the Camellia-Rosehill WRRF site.	• NSW EPA • DPHI.	• Sydney Water has been managing residual contamination at the Camellia-Rosehill WRRF site under the site environmental management works outlined in Section 1.8.1.1.	• Chapter 1 – Introduction • Chapter 9 – Soils and contamination.
Waterway health - impact of river release on waterways, swim sites and public health	• impacts of river release pipeline during construction and operation to Parramatta River and local waterways • support for water treatment solutions that improve water quality in Parramatta River.	• NSW EPA • DPIRD • Epping Scouts Club • Yaralla Sea Scouts • Concord Sailing Club • Melrose Park Primary School • Melrose Park Football Club • Parramatta River Catchment Group • PRaWN • City of Parramatta Council • City of Ryde Council.	• to reduce the risk of impacts for waterways and public health for swimming sites downstream, the project selected the deeper, alternative water release point near Memorial Park • preparation of River Release Frequently Asked Questions (FAQs) available to the public on the project webpage to build community awareness of the project methodology.	• Chapter 2 – Strategic context • Chapter 3 – Project description • Chapter 7 – Waterways assessment • Chapter 19 – Human health.

Key theme	Summary of issues raised	Stakeholder	Summary response	Where addressed
Traffic	• loss of parking during construction • travel delays due to congestion and detours during construction • impacts to ferry services during construction and operation • impacts to heavy vehicle access for industrial sites in Camellia-Rosehill • reduced access to businesses and residences due to detours or changes to parking.	• NSW Maritime • TfNSW • Transdev • URBNSURF • Explore and Develop Parramatta • Downer Rosehill Sustainable Resource Centre.	• constraints of the transport network have been considered in the design development for the project. Sydney Water has minimised impacts to significant roads by adjusting construction methodologies to include trenchless methods. Where open trenching has been required these routes have been selected in areas where detours can be implemented • Sydney Water would continue to work with businesses and residents on streets where open trenching works are proposed to understand their specific needs for transport and access • Sydney Water would work with ferry services during construction to ensure impacts to transport services are minimised.	• Chapter 14 – Traffic, transport and access • Chapter 18 – Social and economic • Chapter 23 – Cumulative impacts.
Flooding in the Camellia-Rosehill precinct	• property impacts within the precinct including at the Sydney Metro West Clyde site, Downer Rosehill Sustainable Resource Centre and Goodman property on Unwin Street • existing flooding issues on Devon Street.	• Sydney Metro • DPHI • City of Parramatta Council • Downer Rosehill Sustainable Resource Centre • Goodman • NSW DCCEEW • SES.	• Sydney Water has considered feedback provided by key stakeholders including Sydney Metro on the potential flood hazards within the Camellia-Rosehill precinct. In response to these concerns, Sydney Water has designed the Camellia-Rosehill WRRF site to avoid causing adverse flood impacts to neighbouring properties. Sydney Water would continue to liaise with Sydney Metro, DPHI and PLR and City of Parramatta Council throughout the detailed design phase of the project • Sydney Water acknowledges that there is an existing drainage issue on Devon Street, at the frontage of the WRRF site that results in localised	• Chapter 8 – Flooding • Chapter 23 – Cumulative impacts.

Key theme	Summary of issues raised	Stakeholder	Summary response	Where addressed
			flooding during severe weather events. Sydney Water is currently working with City of Parramatta Council on resolving this issue. The final design of the WRRF site would include new drainage infrastructure to manage and reduce flows on Devon Street during weather events.	
Social impact – amenity and way of life	• reduced access to open space at parks during construction • disruption to sporting and recreational activities at local and regional parks (including Memorial Park, Meadowbank Park and Pierre de Coubertin Park) • disruption to sporting and recreational activities in the Parramatta River • general concerns for pedestrian safety during construction.	• City of Ryde Council • City of Parramatta Council • Primary School Sports Association – Ryde Zone • Meadowbank Park User Group committee • local residents.	• Sydney Water has adjusted the location of construction compounds in response to feedback received by City of Ryde Council • Sydney Water has adjusted the construction methodology for Meadowbank Park in response to feedback received by City of Ryde Council, park users and local residents. This has included: – limiting the size of construction compounds to cover one sports field rather than multiple – co-locating the river release pipeline along the existing waterway crossings at Vineyard Creek and Charity Creek to reduce visual impacts – adjusting the pipeline installation methodology to open trenching which can be carried out faster than trenchless methods • ongoing engagement would be carried out with park users including sports clubs and local schools to seek feedback on impacts, peak usage periods, and understand preferences for consultation • ongoing consultation with City of Ryde Council regarding enhancements to existing public amenity in Meadowbank Park.	• Chapter 3 – Project description • Chapter 17 – Visual, landscape and place making • Chapter 18 – Social and economic • Chapter 23 – Cumulative impacts.

Key theme	Summary of issues raised	Stakeholder	Summary response	Where addressed
Business impacts	• impacts to businesses due to loss of parking or construction traffic • disruptions to events at Rosehill Gardens Racecourse.	• URBNSURF • local businesses along Carnarvon Street, James Ruse Drive and near the future Camellia-Rosehill WRRF.	• Sydney Water would continue to engage with impacted businesses to understand specific needs such as parking and access requirements • Sydney Water would use trenchless construction methods to install the brine and transfer pipeline below Rosehill Gardens Racecourse. Trenchless construction methods would avoid ground disturbance within the Racecourse site and ensures that events may occur without construction related disruptions.	• Chapter 18 – Social and economic.
Design and construction methodology	• timing of project and schedule for construction • alignment of pipeline • location of the river release pipeline • construction hours • waste and spoil management • the WRRF design should consider: • views and vistas of the future Camellia-Rosehill precinct • amenity impacts (including odour and noise)	• SOPA • City of Ryde Council • local residents • NSW EPA • GANSW.	• areas with the highest sensitivity for environmental impact or residential use have been selected for trenchless construction instead of open trenching where possible • community feedback on construction impacts including noise and traffic have resulted in shifting work hours from during the day to nightworks where possible along the alignment to minimise impacts to businesses and traffic • the concept design for the Camellia-Rosehill WRRF would: – not substantially impact significant views and vistas in the future Camellia-Rosehill precinct – locate odour and noise generating activities in the centre of the site and away from sensitive receivers – not inhibit new footpaths on Devon Street	• Chapter 17 – Visual, landscape and placemaking • Chapter 18 – Social and economic • Chapter 21 – Waste management • Chapter 23 – Cumulative impacts.

Key theme	Summary of issues raised	Stakeholder	Summary response	Where addressed
	• opportunities for active transport routes • increasing tree canopy and potential mangrove restoration • global standards of design excellence.		– retain existing vegetation on the western boundary of the site and safeguard areas for vegetation planting • the concept design for the Camellia-Rosehill WRRF would not include: – active transport routes on waterfront areas and through the WRRF site. The WRRF site does not share a boundary with Duck River and an active transport link through the WRRF would not be safe for the public and operational staff • rehabilitation of mangroves. The project avoids impacts to estuarine vegetation including mangroves. global examples of other similar facilities have been considered in the concept design.	
Utilities	• avoidance of essential utilities (electricity, gas and pipelines) • further engagement regarding connections and electrical design required to continue as the project progresses • potential impacts to utilities under roads due to degraded road conditions from multiple major projects.	• Jemena • Endeavour Energy.	• the project has been designed to avoid changes to utility infrastructure where possible. Some utility works would be required to connect the Camellia-Rosehill WRRF site to the electricity grid. There may be some temporary disruptions to neighbouring properties while this occurs. Sydney Water would work with Endeavour Energy and Jemena to coordinate this work to avoid power supply disruptions to neighbours.	• Chapter 3 – Project description.

Key theme	Summary of issues raised	Stakeholder	Summary response	Where addressed
Noise and vibration	• noise and vibration impacts to residents and businesses during construction • impacts to horses at Rosehill Gardens Racecourse stables • impacts to product manufacturing.	• ATC • Sensitive receivers • NSW EPA.	• Sydney Water has proactively identified sensitive receivers who have the potential to impacted by noise and vibration. Where there is potential for impacts, Sydney Water would work with impacted stakeholders to minimise impacts. This may include but not be limited to: – using alternative construction machinery and equipment – adjusting work hours to suit needs of stakeholders – Sydney Water would investigate the feasibility of these adjustments through consultation with impacted stakeholders during detailed design and construction.	• Chapter 13 – Noise and vibration.
Recycled water	• access to recycled water for open spaces.	• City of Parramatta Council • SOPA • City of Ryde Council.	• Sydney Water has considered the future recycled water needs of various stakeholders in the GPOP area. The project has been designed with consideration of these needs and has safeguarded the opportunity for landowners to receive recycled water for irrigation of open spaces in the future, by including offtake fittings at locations along the pipeline. Future recycled water use would be subject to separate approvals.	• Chapter 3 – Project description.
Property impacts	• impacts to neighbouring properties during construction • impacts to future development potential	• VE Property • Viva Energy.	• impacts to neighbouring properties would be minimised through implementation of the project's mitigation measures, as well as the CEMP. Sydney Water would continue to engage with neighbouring properties during detailed design development and construction to understand and address concerns	• Chapter 2 – Strategic context • Chapter 23 – Cumulative impacts.

Key theme	Summary of issues raised	Stakeholder	Summary response	Where addressed
	of Rosehill Gardens Racecourse.		• the brine and transfer pipelines below the Rosehill Gardens Racecourse have been designed at a depth that would not limit the potential for future development on the Rosehill Gardens Racecourse site.	
Air quality and dust	• impacts of dust to horses at Rosehill Gardens Racecourse Stables.	• ATC • NSW EPA.	• potential impacts to horses from dust would be minimised through implementation of the project's mitigation measures, as well as the CEMP.	• Chapter 12 – Air quality.
Aboriginal Cultural Heritage	• impacts to culturally significant waterways including the Parramatta River and Duck River due to construction and operation • impacts to locations with known Aboriginal cultural heritage significance and value.	• Dharug Custodian Aboriginal Consultation • Dharug Strategic Management Group • Registered Aboriginal Parties (RAPs) • Community members.	• Sydney Water recognises the importance of waterways, including the Parramatta River on Aboriginal cultural heritage. The project would protect and respect this value through contributing to improved waterway health in the Parramatta River. During construction, waterway health would be protected through the implementation of project mitigation measures as well as the CEMP to minimise sediment run off, erosion and contamination of nearby waterways • Sydney Water has designed the project, including the pipeline alignments to avoid impacts to locations of known Aboriginal cultural heritage significance and value. As a result, no impacts to known Aboriginal heritage objects and sites are expected.	• Chapter 7 – Waterways • Chapter 16 – Aboriginal heritage.

5.5 Ongoing engagement

Sydney Water would continue engaging with the community and stakeholders impacted by this project. Future engagement for the project would follow the same goals and objectives as the engagement performed to date.

The community contact and information channels established for the project (as outlined in Table 5-6) have been in place during the preparation of the EIS and would remain in place during construction.

Table 5-6: Project community contact details

Contact point	Details
Community information line	1800 172 263
Community inbox	gpopproject@sydneywater.con.au
Project webpage	sydneywater.com.au/gpop

5.5.1 EIS public exhibition

The EIS would be on public exhibition for a minimum of 28 days in accordance with Schedule 1 of the EP&A Regulation. During the exhibition period, government agencies, project stakeholders and community members would be able to view the EIS and provide feedback via a written submission to DPHI for consideration in its assessment of the project. Electronic copies of the EIS would be available for viewing and download from DPHI's Major Projects website, with a link available on Sydney Water's website.

Sydney Water would perform additional engagement activities to ensure all interested stakeholders are aware of their opportunity to review and provide feedback on the EIS.

5.5.1.1 Submissions Report

Following exhibition of the EIS, Sydney Water would review all submissions received and prepare a Submissions Report. The Submissions Report would detail how Sydney Water has considered the submissions that have been received.

If changes to the project are required as a result of issues raised in submissions, Sydney Water would prepare a Preferred Infrastructure Report and/or an Amendment Report.

5.5.2 Detailed design and construction

Sydney Water would continue to update the CSEP during detailed design and construction to ensure:

- the community is informed of the project including construction activities, program of works, and associated impacts
- the community is aware of avenues to provide feedback or to register complaints and impacts
- outline the complaints and resolution process.

The community and stakeholder engagement activities to be outlined in the CSEP would include:

- consultation with landowners, stakeholders, council and other government agencies
- notifications for impacted groups and sensitive receivers
- regular project updates to surrounding community including but not limited to start of construction, traffic disruptions, and out-of-hours work
- the process for responding to and managing community complaints
- a dedicated toll-free number for enquiries, as well as a dedicated project website and email
- signage for vehicles and pedestrians.

The CSEP allows Sydney Water to ensure construction methods are developed with input from those directly affected. Sydney Water would continue to use the engagement activities listed in Table 5-4 to proactively engage with landowners, stakeholders and councils.

5.5.3 Operation

Once operation commences, the requirement for ongoing community and stakeholder engagement would be minimal. As the proposed infrastructure moves into its operational phase, any feedback regarding operation would be managed by Sydney Water's dedicated customer service team and customer advocates.

5.6 Complaints management

All complaints relating to the project would be managed in line with Sydney Water's Complaints Management Policy, along with any additional requirements in the Minister's Conditions of Approval should the project be approved.

The Complaint Management Policy is available via the Sydney Water website and is in line with our Customer Contract.

Impact assessment approach

6 Impact assessment approach

6.1 Overview

Chapters 7 (Waterways assessment) to 23 (Cumulative impacts) of this EIS present an assessment of the project's impacts on a range of environmental aspects. The intention of this chapter is to explain Sydney Water's approach to the assessment and include methodology information that would otherwise be duplicated across all chapters.

Broadly, the impact assessments aim to address the specific requirements in the SEARs as well as relevant statutory requirements and guidelines (including DPHI's State Significant Infrastructure Guidelines and State Significant Project Technical Guidelines). The SEARs are included in Appendix A (SEARs table). Appendix A (SEARs table) identifies where each SEAR has been addressed within the EIS.

DPHI has also provided Sydney Water with letters from government agencies and councils that informed their preparation of the SEARs. Sydney Water has reviewed these letters and addressed the matters raised throughout the impact assessment chapters where possible.

For each environmental aspect, Sydney Water and its specialist consultants completed a level of assessment commensurate with the project's potential impacts. Sydney Water has prepared detailed assessments for aspects where the project may result in a significant impact, including cumulative impacts. This approach is consistent with Appendix D of the State significant infrastructure guidelines – preparing a scoping report (DPE, 2022d). Detailed assessments have been prepared for terrestrial flora and fauna and water quality and hydrology, which were identified in the Scoping Report for this level of assessment.

Sydney Water has prepared standard assessments for the remaining aspects in accordance with Appendix D of the DPE guidelines (DPE, 2022d). These aspects have been identified as unlikely to result in significant impacts, including cumulative impacts. For these aspects, impacts are generally well understood, relatively easy to predict using standard methods and capable of being mitigated to comply with relevant standards or performance measures.

Where specialist reports have been prepared to inform a chapter, these are included as appendices, and the chapter provides a summary of that report.

For many aspects, guidelines exist about how to assess the level and significance of impact, which means the approach to this is slightly different for each aspect. Each assessment specifies the source of information used and its date. Information is primarily from studies performed for the project or from other reputable government or consultant sources. The information used is therefore considered reliable with any key uncertainties or limitations documented in the methodology sections of the impact assessment chapters.

6.2 Impact area and impact assessment area

The EIS uses the following terminology when describing impacts:

- impact area – the project footprint, which is the area directly impacted by the project

- impact assessment area – wider area in which Sydney Water is seeking flexibility to locate project infrastructure (provided that the overall impact does not change).

The impact area and impact assessment area are shown in Figure 3-1 to Figure 3-5. While the project would directly impact these areas, some impacts would be experienced outside of these areas (for example water quality and noise). Each specialist study describes the area expected to be impacted for that aspect.

6.3 Cumulative impacts

Other major projects and urban development in the vicinity of the project means there is potential for cumulative impacts with the project. The cumulative impact search area includes the Camellia-Rosehill precinct, major roads and parks, and nearby swim sites. Projects listed on the Major Projects website and large-scale projects undertaken by public authorities were considered.

The cumulative impact assessment considered other projects where adequate public information was available, including potential environmental impacts and timing, and where there is likely to be concurrent construction or operational impacts with the project. For some aspects, cumulative impacts are also inherently part of the methodology (for example in water models which make assumptions about stormwater inputs across catchments).

Sydney Water has assessed cumulative impacts in Chapter 23 (Cumulative impacts). Chapter 23 (Cumulative impacts) combines the findings from the assessments of all environmental aspects covered in Chapters 7 (Waterways assessment) to 22 (Dangerous goods and hazardous development). Specialist studies also considered cumulative impacts from nearby projects where relevant.

6.4 Avoid and minimise impacts

Each impact assessment included assessing whether the identified impacts could be avoided or minimised. Where impacts could not be avoided, Sydney Water has identified environmental mitigation measures to manage these residual impacts to acceptable levels. Specialist consultants have developed these measures based on a range of factors including previous experience and best practice from guidelines or industry standards. The proposed measures therefore represent Sydney Water's best understanding of the most effective way to minimise residual impacts.

The mitigation measures would form part of the CEMP and operational environmental management systems. These plans and systems provide a framework to verify implementation and effectiveness of the mitigation measures through actions such as inspections, auditing, monitoring and continual improvement.

Given the mitigation measures have been identified in a series of specialist reports, in some instances different reports have similar measures. Sydney Water has captured the intent of the measures in each report to develop a consolidated list of mitigation measures. These are listed in each impact assessment chapter and compiled into one list in Appendix E (Mitigation measures). Sydney Water intends to use the consolidated list in Appendix E (Mitigation measures) as the agreed mitigation measures for the project, to minimise duplication or inconsistency and ensure clarity for future compliance reporting.

6.5 Project staging

Section 3.3 provides the proposed construction timeline, noting that some elements of the WRRF would be constructed progressively. The EIS has assessed a worst-case scenario of all construction being completed by 2031.

As described in Section 3.3.1, Sydney Water has designed the project to allow flexibility for future housing and commercial development. This has included sizing the brine and river release pipelines for flow rates higher than required for this project. This approach would minimise construction impacts when future expansion is required. With the exception of the construction impacts associated with larger brine and river release pipeline sizes, the EIS assesses the impacts for a WRRF operational capacity of 70 ML/day. Future expansions would be subject to separate assessment and planning approvals.

Waterways assessment

7 Waterways assessment

The key waterway specialist assessments are highly interdependent and have therefore been considered together in this chapter. A collaborative approach was taken in developing assessment methodologies, model scenarios and sharing results.

This chapter describes the existing waterways impacted by the project and the potential impacts on hydrodynamics and water quality, surface water, geomorphology and aquatic biodiversity. Flooding and groundwater assessments are covered separately in Chapter 8 (Flooding) and Chapter 10 (Groundwater) respectively.

Figure 7-1 provides an overview of the waterway assessments for the project, their scope and where in the EIS they are addressed.

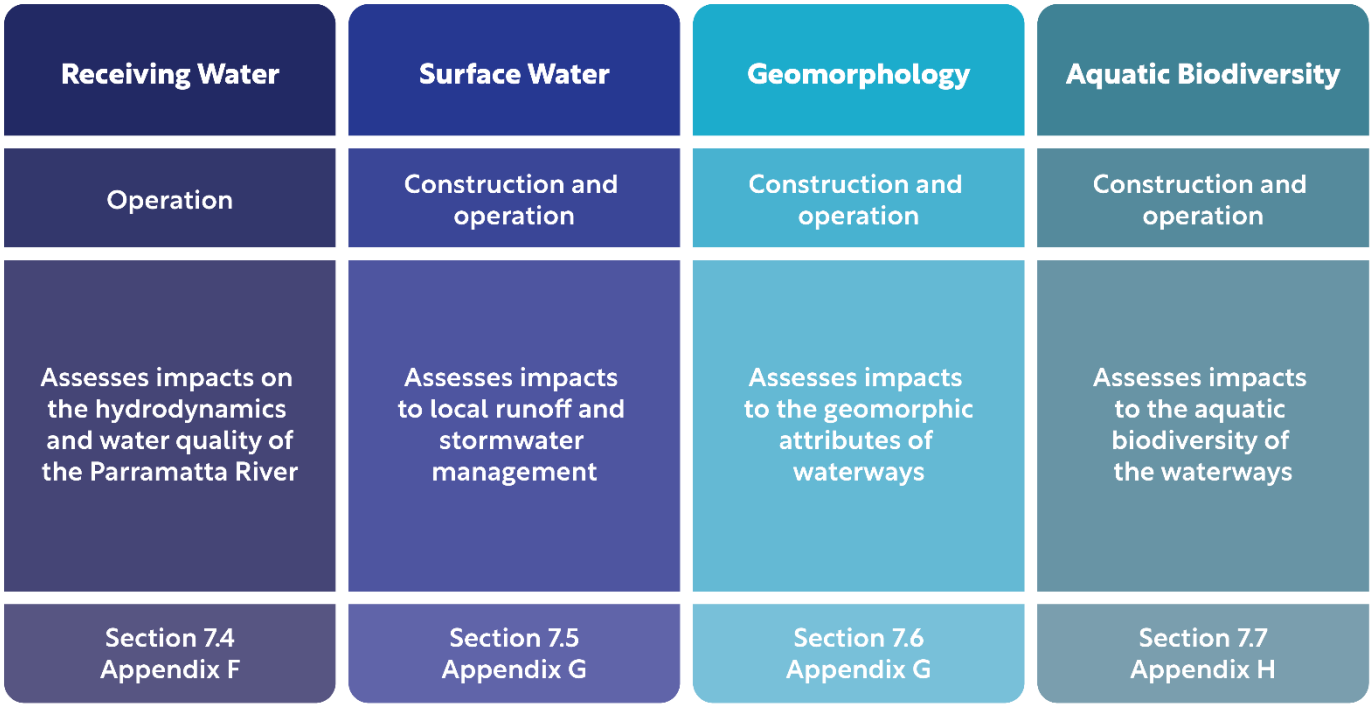


Figure 7-1: Key waterway assessments

Independent experts were engaged to provide advice and review the waterway assessments. Their input focused on environmental impacts from the release of treated water into the Parramatta River. Section 7.8 provides more details on their involvement.

7.1 Secretary's Environmental Assessment Requirements

Table 7-1 lists the SEARs relevant to waterway assessments and where they are addressed in the EIS.

Table 7-1: Project SEARs relating to waterway assessments

SEARs	EIS section where requirement addressed
Water - Quality	
1. Water Quality (surface and groundwater) impacts on waterways potentially impacted by the project, including but not limited to the Parramatta River, Homebush Bay and Haslams Creek, including:	
(a) existing background levels	Section 7.4.2
(b) details on the ambient NSW Water Quality Objectives (NSW WQO) and environmental values for the receiving waters relevant to the project, including the indicators and associated trigger values or criteria for the identified environmental values	Section 7.4.1.1
(c) identification and estimation of the quality and quantity of pollutants that may be introduced into the water cycle by source and discharge point and describe the nature and degree of impact that any discharge(s) may have on the receiving environment, including consideration of all pollutants that pose a risk of non-trivial harm to human health and the environment	Section 7.4.1.3 Section 7.4.5
(d) results of water quality modelling and analysis including descriptions under the full range of operating scenarios, including average or typical through to worst case for any proposed discharge point, including but not limited to the full range of weather conditions, bypasses, and 'off-spec' effluent scenarios	Section 7.4.1.3 Section 7.4.5 Appendix F
(e) outline impacts from the proposal on existing sewage infrastructure including any potential impacts on dry weather and wet weather overflows from the existing reticulation network and any impacts on North Head Water Resource Recovery Facility concentrations and loads discharged and hydraulic and treatment capacity	Section 7.4.5 Section 7.4.6
(f) details on the rainfall event that the water quality protection measures will be designed to cope with	Section 7.4.1.3 Section 7.4.5 Appendix F
(g) the significance of any identified impacts including consideration of the relevant ambient water quality outcomes	Section 7.4.5.2 Section 7.4.5.5 Appendix F

SEARs		EIS section where requirement addressed
(h)	details on how construction and operation of the project will, to the extent that the project can influence, ensure that:	**Receiving water** Section 7.4.5 **Surface water** Section 7.5.3 Section 7.5.4 **Geomorphology** Section 7.6.3 Section 7.6.4
	i. where the NSW WQOs for receiving waters are currently being met they will continue to be protected	**Receiving water** Section 7.4.5.5 **Surface water** Section 7.5.3 Section 7.5.4
	ii. where the NSW WQOs are not currently being met activities will work toward their achievement over time	**Receiving water** Section 7.4.5.5 **Surface water** Section 7.5.3 Section 7.5.4
	iii. the objectives of making the Paramatta River swimmable can be met	**Receiving water** Section 7.4.5.2 **Human health** Section 19.5.1
	iv. migration of contamination is considered and how it will be managed and minimised	Section 7.6.3 Section 7.6.4 Appendix G
(i)	justification for, if required, why the WQOs cannot be maintained or achieved over time	Section 7.4.5.5

SEARs	EIS section where requirement addressed
(j) demonstration that all practical measures to avoid or minimise water pollution and protect human health and the environment from harm are investigated and implemented. This also includes consideration and management of frac out from the temporary loss of drilling fluids and inappropriate storage of chemicals and fuels	Section 7.3 **Receiving water** Section 7.4.5 Section 7.4.7 **Surface water** Section 7.5.4 Section 7.5.5 **Groundwater** Section 10.5 **Human health** Section 19.7
(k) identification of sensitive receiving environments (which may include estuarine and marine waters downstream) and develop a strategy to avoid or minimise impacts on these environments	Section 7.3 **Receiving water** Section 7.4.2 Section 7.4.7 **Surface water** Section 7.5.2 Section 7.5.5 **Geomorphology** Section 7.6.2 Section 7.6.5 **Aquatic biodiversity** Section 7.7.2 Section 7.7.6 **Groundwater** Section 10.3 Section 10.4
(l) proposed water quality monitoring programs, including monitoring locations, monitoring frequency and the parameters that will be monitored pre-construction, during construction and during operation, including justification for these.	**Receiving water** Section 7.4.7 **Groundwater** Section 10.7.1

SEARs	EIS section where requirement addressed
Water – Hydrology	
1. Describe the existing hydrological regime for surface and groundwater resources (including reliance by users and for ecological purposes) likely to be impacted by the project, including stream orders, as per the Framework for Biodiversity Assessment. This must include a description of groundwater levels across the site under a range of wet and dry conditions.	**Surface water** Section 7.5.2 **Groundwater** Section 10.3
2. Map the following features:	
(a) rivers, streams, estuaries, and wetlands (as described in section 3.1.3 of the BAM)	Figure 7-4 Figure 7-10 Section 10.3
(b) groundwater	Figure 10-1 Figure 10-2
(c) groundwater dependent ecosystems	Figure 10-2 Section 10.3.3
(d) proposed discharge locations.	Figure 3-21 Figure 7-4
3. A description of works / activities that may intercept, interfere, extract, use divert or receive surface water and groundwater on a temporary or permanent basis during construction and operation	**Surface water** Section 7.5.3 Section 7.5.4 **Groundwater** Section 10.5 Section 10.6
4. Identify any relevant Water Sharing Plans that may potentially be impacted by the project.	Section 10.2.1
5. Provide a detailed water balance for ground and surface water resources.	Section 7.5.3 Section 7.5.4
6. Surface and groundwater hydrology impacts (both quality and source) of the construction and operation of the project and any ancillary facilities (both built elements and discharges) in accordance with the current guidelines, including:	

SEARs	EIS section where requirement addressed
(a) natural processes within rivers, wetlands, estuaries, marine waters and floodplains that affect the health of the fluvial, riparian, estuarine or marine system and landscape health (such as modified discharge volumes, durations and velocities), aquatic connectivity and access to habitat for spawning and refuge	**Surface water** Section 7.5.3 Section 7.5.4 **Geomorphology** Section 7.6.3 Section 7.6.4 **Aquatic biodiversity** Section 7.7.4 Section 7.7.5 **Groundwater** Section 10.5 Section 10.6
(b) effects to upstream and downstream rivers, wetlands, estuaries, marine waters, floodplain areas and water-dependent fauna and flora (including groundwater dependent ecosystems)	**Geomorphology** Section 7.6.3 Section 7.6.4 **Aquatic biodiversity** Section 7.7.4 Section 7.7.5 **Groundwater** Section 10.5 Section 10.6
(c) impacts from permanent and temporary interruption or interference of groundwater flow, including the extent of drawdown, barriers to flows, implications for groundwater dependent surface flows, ecosystems and species, groundwater users and the potential for geotechnical settlement associated with surface water bodies	Section 10.4 Section 10.5 Section 10.6
(d) changes to environmental water availability and flows, both regulated/licensed and unregulated/rules-based sources	Section 10.5 Section 10.5.6 Section 10.6
(e) direct or indirect increases in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses	Section 7.6.3 Section 7.6.4

SEARs	EIS section where requirement addressed
(f) methods for minimising the effects of proposed stormwater and wastewater management during construction and operation on natural hydrological attributes (such as volumes, flow rates, management methods and re-use options) and on the conveyance capacity of existing stormwater systems where discharges are proposed through such systems	Section 7.5.3 Section 7.5.4
(g) water take (direct or indirect) from all surface and groundwater sources with estimates of annual volumes during construction and operation	**Surface water** Section 7.5.3 Section 7.5.4 **Groundwater** Section 10.5.6
(h) details of the proposed surface and groundwater monitoring to identify construction and operational hydrological impacts, including changes to groundwater levels.	**Surface water** Section 7.5.5 **Groundwater** Section 10.7.1
Biodiversity	
7. Impacts on biodiversity values not covered by the Biodiversity Assessment Method 2020 (BAM) must be assessed. This includes a threatened aquatic species assessment (under Part 7A of *Fisheries Management Act 1994* (FM Act)) to address whether there are likely to be any significant impact on listed threatened species, populations or ecological communities listed under the FM Act.	Section 7.7.4 Section 7.7.5
8. Identify whether the project, or any component of the project, would be classified as a Key Threatening Process (KTP) in accordance with the listings in the BC Act, FM Act and the EPBC Act.	Section 7.7.4.5 Section 7.7.5.4 Section 11.5.4
9. Assess the potential impacts to Key Fish Habitat and / or threatened species from the release of treated wastewater into the Parramatta River.	Section 7.7.5
10. Assess the potential impacts to Key Fish Habitat and / or threatened species from the release of brine to a wastewater system with an ocean outfall or demonstrate how the project will be consistent with the existing environment protection licence (EPL 378).	Section 7.4.6
11. Demonstrate how the design and construction of the project avoids, minimises and mitigates impacts to Key Fish Habitat.	Section 7.3 Section 7.7.4
12. Detail the measures for avoiding and/or minimising impacts on native riparian vegetation, including identification of buffer zones for waterway crossings.	Section 7.7.6

SEARs	EIS section where requirement addressed
Protected and Sensitive Lands	
13. Impacts of the project on environmentally sensitive land and processes (and the impact of processes on the project) including, but not limited to:	Section 7.7.2.5 Section 7.7.4 Section 7.7.5 Section 7.7.6
(a) land defined as a "coastal environment area" under the State Environmental Planning Policy (Resilience and Hazards) 2021	Appendix H
(b) coastal hazards identified in studies completed by local councils or state agencies (including risk mitigation strategies that reduce coastal hazards exposure and funding of such strategies)	Appendix H
(c) coastal processes (including tides, sediment movement etc.) associated with adopted risk mitigation actions	**Receiving waters** Section 7.4.5.1 **Geomorphology** Section 7.6.4
(d) protected areas (including land and water) managed BCS NSW DCCEEW and / or DPI Fisheries under the NPW Act and the *Marine Estate Management Act 2014*	Section 7.7.2.5 Appendix H
(e) Key Fish Habitat as mapped and defined in accordance with the (FM Act)	Section 7.7.2 Section 7.7.4 Section 7.7.5
(f) waterfront land as defined in the Water Management Act 2000	Section 7.7.2 Section 7.7.4 Section 7.7.5
(g) land or waters identified as Critical Habitat under the FM Act or EPBC Act or areas of outstanding biodiversity value under the BC Act	None identified. Appendix H Appendix L
(h) biodiversity stewardship sites, private conservation lands and other lands identified as offsets.	None identified. Appendix H Appendix L

7.2 Legislative and policy context

The assessment of impacts to waterways was undertaken in accordance with the project SEARs, as well as the following legislation, policies and guidance documents:

- *Water Management Act 2000*
- *Protection of the Environment Operations Act 1997*
- *Coastal Management Act 2016*
- *Fisheries Management Act 1994* (FM Act)
- *Biodiversity Conservation Act 2016* (BC Act)
- *Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021 (BCSEPP)
- DUBA, BUDU, BARRA – Ten Steps to a Living River – The Parramatta River Masterplan (Parramatta River Catchment Group, 2018).
- National Water Quality Management Strategy (Australian Government, 2018)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000)
- Greater Sydney Water Strategy (DPE, 2022c)
- NSW Water Strategy (Department of Planning, Industry and Environment, 2021a)
- Guidelines for Managing Risks in Recreational Water (National Health and Medical Research Council, 2008) (NHMRC, 2008)
- Using the ANZECC & ARMCANZ Guidelines and Water Quality Objectives in NSW (DEC NSW, 2006a)
- NSW Water Quality and River Flow Objectives (NSW Department of Climate Change, Energy, the Environment and Water, 2006) (NSW DCCEEW, 2006)
- Risk-based framework for considering waterway health outcomes in strategic land use planning decisions (Office of Environment and Heritage and Environment Protection Authority, 2017)
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (NSW EPA, 2022a)
- Controlled activities – Guidelines for instream works on waterfront land (DPE, 2022e)
- Controlled activities – Guidelines for laying pipes and cables in watercourses on waterfront land (DPE, 2022f)
- Controlled activities – Guidelines for outlet structures on waterfront land (DPE, 2022g)
- Managing Urban Stormwater: Soils and Construction - Volume 1 (Landcom, 2004), Volume 2A and 2C (DECC, 2008)

- Aquatic Ecology in Environmental Impact Assessment (EIA) – EIA guideline (Department of Planning, 2003)
- Policy and Guidelines for Fish Habitat Conservation and Management (Department of Primary Industries, 2013)
- Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (Department of Primary Industries, 2003).

7.3 Avoid and minimise impacts

The project design and construction methodology has included the following measures to avoid or minimise potential impacts to waterways:

- The project has investigated several locations for the release of treated water. An early option identified a location at Wentworth Point, which was ruled out due to water being too shallow. This had potential to cause water quality impacts and disturb sediments. Therefore, the release location at Meadowbank was chosen, which had deeper water, and therefore, less potential risks to the hydrodynamics and water quality within the river.
- The Camellia-Rosehill WRRF would treat the wastewater using reverse osmosis processes and produce advanced treated water. The water quality of the releases therefore has lower concentrations of key contaminants of concern relative to the current water quality of the river.
- Trenchless construction for pipelines is proposed across waterways to avoid impacts to waterways.
- A smaller pipe size for the river release pipelines was selected to mitigate impacts from the releases near the point of release and to allow for sufficient clearance between maritime traffic in the Parramatta River. The duckbill valves oriented at a 30° angle were adopted for release nozzles, which allows optimal dilution of the release and minimises sediment disturbance and mobilisation.
- The river release pipeline would be laid on a geosynthetic fabric (or similar performing measure) to prevent disturbance of sediments on the riverbed.

The above measures are adopted to avoid or minimise impacts to waterways. The impact assessment has been undertaken based on these measures being in place.

7.4 Receiving water

This section assesses how the release of treated water during operation impacts hydrodynamics and water quality in the receiving waters of Parramatta River. It provides an overview of the key findings of the Hydrodynamics and Water Quality Impact Assessment (Sydney Water, 2025) (Appendix H). The construction impacts to surface water quality are covered separately in Section 7.5.

7.4.1 Assessment methodology

The assessment methodology included:

- identification of waterway objectives
- compilation and review of datasets to characterise the existing environment
- assessment of operational impacts to hydrodynamics and water quality, which included:
  - water quality response modelling (WQRM) to simulate the potential impacts from the release of treated water under a suite of scenario conditions that could be expected during the operation of the Camellia-Rosehill WRRF
  - near field and toxicity modelling to assess the potential for toxicity and environmental harm in the immediate vicinity of the river release
  - analysis and interpretation of modelling results against waterway objectives.

These steps are outlined in more detail below.

7.4.1.1 Waterway objectives

Waterway objectives reflect the community's environmental values and uses of the waterway with indicators and guideline values. These objectives have been used as a benchmark to understand the existing condition of the waterways and to evaluate predicted impacts on water quality.

Project specific waterway objectives have been developed. The project would release treated water into the Parramatta River near John Whitton Bridge at Meadowbank. Therefore, the current waterway objectives for the upper estuary of the Sydney Harbour and Parramatta River catchment have been adopted from the NSW Water Quality and River Flow Objectives of the Sydney Harbour and Parramatta River (NSW WQOs) (NSW DCCEEW, 2006). The waterway objectives also incorporated:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) (ANZG, 2018)
- Guidelines for managing risks in recreational water (NHMRC, 2008).

The NSW WQOs specify protection of the following environmental values within the upper estuary:

- **Aquatic ecosystems**: Maintaining or improving the ecological condition of waterbodies and their riparian zones over the long-term

- **Visual amenity**: Aesthetic qualities of waters
- **Primary contact recreation**: Maintaining or improving water quality for activities such as swimming in which there is a high probability of water being swallowed
- **Secondary contact recreation**: Maintaining or improving water quality for activities such as boating and wading, where there is a low probability of water being swallowed
- **Aquatic foods (cooked)**: Refers to protecting water quality so that it is suitable for the production of aquatic foods for human consumption and aquaculture activities.

Waterway objectives relating to 'aquatic foods (cooked)' are considered not relevant to this project, given that the consumption of aquatic species is not permitted in the Parramatta River. However, it is a long-term goal for the waterway, so has been included for completeness.

Table 7-2 summarises the waterway objectives that were adopted for the project.

Table 7-2: Waterway objectives (upper estuary of the Sydney Harbour and Parramatta River catchment)

Environmental value and management goal	Indicator	Numerical criteria (trigger values)	Adopted from which guidelines
Aquatic ecosystems	Total phosphorus	0.03 milligram per litre (mg/L)	NSW WQOs (NSW DCCEEW, 2006)
	Total nitrogen	0.3 mg/L	NSW WQOs (NSW DCCEEW, 2006)
	Chlorophyll *a*	0.004 mg/L	NSW WQOs (NSW DCCEEW, 2006)
	Turbidity	0.5 – 10 NTU	NSW WQOs (NSW DCCEEW, 2006)
	Salinity (electrical conductivity)	No value included for estuaries	NSW WQOs (NSW DCCEEW, 2006)
	Dissolved oxygen	80 – 110% saturation	NSW WQOs (NSW DCCEEW, 2006)
	pH	7 – 8.5	NSW WQOs (NSW DCCEEW, 2006)
	Temperature	Reference data preferred. Default trigger value: • > 80%ile • < 20%ile	Table 3.3.1 of ANZECC & ARMCANZ (2000) guidelines
	Oxidised nitrogen (NOx)	0.015 mg/L	Table 3.3.2 of ANZECC & ARMCANZ (2000) guidelines - default guideline values (DGVs) for slightly disturbed estuarine ecosystems in south-east Australia
	Ammonium ($NH4^+$)	0.015 mg/L	Table 3.3.2 of ANZECC & ARMCANZ (2000) guidelines - DGVs for slightly disturbed estuarine ecosystems in south-east Australia

Environmental value and management goal	Indicator	Numerical criteria (trigger values)	Adopted from which guidelines
	Filterable reactive phosphorus (FRP)	0.005 mg/L	Table 3.3.2 of ANZECC & ARMCANZ (2000) guidelines - DGVs for slightly disturbed estuarine ecosystems in south-east Australia
	Toxicants		
	Total ammonia as N	0.91 mg/L	ANZG (2018) for 95% species protection - marine ecosystem values adopted where available
	Nitrate as N	2.6 mg/L	ANZG (2018) for 95% species protection - marine ecosystem values adopted where available. Value assumes moderately hard water
	Aluminium	37 microgram per litre (µg/L)	ANZG (2018) for 95% species protection - marine ecosystem values adopted where available
	Cadmium	0.7 µg/L	ANZG (2018) for 99% species protection – marine ecosystem values adopted
	Copper	1.3 µg/L	ANZG (2018) for 95% species protection - marine ecosystem values adopted
	Cobalt	6.1 µg/L	Adopted from draft toxicant default guideline values for aquatic ecosystem protection: Cobalt in marine water (ANZG, 2023) for 95% species protection. Confirmed based on personal communication with G. Batley.
	Manganese	300 µg/L	Adopted from draft toxicant default guideline values for aquatic ecosystem protection: Manganese in marine water (ANZG, 2025) for 95% species

Environmental value and management goal	Indicator	Numerical criteria (trigger values)	Adopted from which guidelines
			protection. Confirmed based on personal communication with G. Batley.
	Mercury (inorganic)	0.1 µg/L	ANZG (2018) for 99% species protection – marine ecosystem values adopted
	Iron	540 µg/L	ANZG (2018) for 95% species protection - marine ecosystem values adopted
	Zinc	8 µg/L	ANZG (2018) for 95% species protection - marine ecosystem values adopted
	Total chlorine	0.0072 mg/L	Proposed DGVs in slightly to moderately disturbed marine systems (Batley, G.E. & Simpsons, S.L., 2020)
	Biological assessment indicators	Sydney Water typically monitors aquatic ecosystem health via Signal-SG. As a measure of assessing wastewater impacts on macroinvertebrates, this monitors sensitivity of organisms to organic pollution.	The NSW WQOs do not specify a particular method, but notes that recognised protocols using algae, macrophytes, macroinvertebrates and fish populations may be used.
Visual amenity	Visual clarity and colour	Natural visual clarity should not be reduced by more than 20%. Natural hue of the water should not be changed by more than 10 points on the Munsell Scale. The natural reflectance of the water should not be changed by more than 50%.	NSW WQOs (NSW DCCEEW, 2006)

Environmental value and management goal	Indicator	Numerical criteria (trigger values)	Adopted from which guidelines
	Surface films and debris	Oils and petrochemicals should not be noticeable as a visible film on the water, nor should they be detectable by odour. Waters should be free from floating debris and litter.	NSW WQOs (NSW DCCEEW, 2006)
	Nuisance organisms	Macrophytes, phytoplankton scums, filamentous algal mats, blue-green algae, sewage fungus and leeches should not be present in unsightly amounts.	NSW WQOs (NSW DCCEEW, 2006)
Primary contact recreation	Turbidity	A 200 mm diameter black disc should be able to be sighted horizontally from a distance of more than 1.6 m (approximately 6 NTU).	NSW WQOs (NSW DCCEEW, 2006)
	Faecal coliforms	N/A – values are included in NSW WQOs, but current practice is to monitor for enterococci as representative indicator.	N/A
	Enterococci	95th percentile for intestinal enterococci/100 millilitre (mL): ≤ 40	Guidelines for managing risks in recreational water (NHMRC, 2008)
	Protozoans	Pathogenic free-living protozoans should be absent from bodies of fresh water. (Note, it is not necessary to analyse water for these pathogens unless temperature is greater than 24°C).	NSW WQOs (NSW DCCEEW, 2006)
	Algae and blue green algae	< 15 000 cells/mL	NSW WQOs (NSW DCCEEW, 2006)
	Nuisance organisms	Use visual amenity guidelines, above.	NSW WQOs (NSW DCCEEW, 2006)

Environmental value and management goal	Indicator	Numerical criteria (trigger values)	Adopted from which guidelines
		Large numbers of midges and aquatic worms are undesirable.	
	pH	5.0 – 9.0	NSW WQOs (NSW DCCEEW, 2006)
	Temperature	5°C - 35°C for prolonged exposure	NSW WQOs (NSW DCCEEW, 2006)
	Chemical contaminants	Waters containing chemicals that are either toxic or irritating to the skin or mucus membranes are unsuitable for recreation. Toxic substances should not exceed the concentrations provided in tables 5.2.3 and 5.2.4 of the ANZECC/ARMCANZ (2000) guidelines. Note that concentrations in the guidelines were reviewed as part of the toxicant review. The most conservative value was adopted (refer values under Aquatic Ecosystems).	NSW WQOs (NSW DCCEEW, 2006)
	Visual clarity and colour	Use visual amenity guidelines, above.	NSW WQOs (NSW DCCEEW, 2006)
	Surface films	Use visual amenity guidelines, above.	NSW WQOs (NSW DCCEEW, 2006)
Secondary contact recreation	Faecal coliforms	N/A – values are included in NSW WQOs, but current practice is to monitor for enterococci as representative indicator.	N/A
	Enterococci	95th percentile for intestinal enterococci/100 mL: > 40 and ≤ 200	Guidelines for managing risks in recreational water (NHMRC, 2008)
	Algae and blue-green algae	< 15 000 cells/mL	NSW WQOs (NSW DCCEEW, 2006)

Environmental value and management goal	Indicator	Numerical criteria (trigger values)	Adopted from which guidelines
	Nuisance organisms	Same as primary contact recreation	NSW WQOs (NSW DCCEEW, 2006)
	Chemical contaminants	Same as primary contact recreation	NSW WQOs (NSW DCCEEW, 2006)
	Visual clarity and colour	Same as primary contact recreation	NSW WQOs (NSW DCCEEW, 2006)
	Surface films	Same as primary contact recreation	NSW WQOs (NSW DCCEEW, 2006)
Aquatic foods (cooked)	Algae and blue-green algae	No guideline is directly applicable, but toxins present in blue-green algae may accumulate in other aquatic organisms.	NSW WQOs (NSW DCCEEW, 2006)
	Faecal coliforms	Guideline in water for shellfish: The median faecal coliform concentration should not exceed 14 most probable number (MPN) per 100 mL; with no more than 10% of the samples exceeding 43 MPN/100 mL Standard in edible tissue: Fish destined for human consumption should not exceed a limit of 2.3 MPN E Coli /g of flesh with a standard plate count of 100,000 organisms /gram (g).	NSW WQOs (NSW DCCEEW, 2006)
	Toxicants (as applied to aquaculture activities)	**Metals** Copper: less than 5 µgm/L Mercury: less than 1 µgm/L Zinc: less than 5 µgm/L.	NSW WQOs (NSW DCCEEW, 2006)

Environmental value and management goal	Indicator	Numerical criteria (trigger values)	Adopted from which guidelines
		Given that no aquaculture activities are present downstream of the release, toxicant values for aquatic biodiversity will be adopted. **Organochlorines** Chlordane: less than 0.004 µgm/L (saltwater production) PCB's: less than 2 µgm/L.	
	Physico-chemical indicators (as applied to aquaculture activities)	Suspended solids: less than 40 µg/L (freshwater) Temperature: less than 2 degrees Celsius change over one hour.	NSW WQOs (NSW DCCEEW, 2006)

7.4.1.2 Data compilation and review

An extensive suite of datasets was compiled and reviewed as part of the assessment. These included:

- previous studies relating to hydrodynamic and water quality conditions of the Parramatta River, its tributaries and Sydney Harbour
- water quality monitoring data collected within the receiving waterway, including Sydney Water's baseline water quality monitoring program, Sydney Institute of Marine Science monitoring data, NSW DCCEEW monitoring data and Riverwatch water monitoring program
- land use data for the contributing catchments of the Parramatta River estuary and Sydney Harbour
- water quality monitoring data for treated water from other similar Sydney Water WRRFs to base performance assumptions for the river release
- wet weather overflow data predicted for baseline and future conditions
- meteorological and climate change datasets, including those associated with the project's climate change modelling approach.

7.4.1.3 Hydrodynamics and water quality impact assessment

The Hydrodynamics and Water Quality Impact Assessment (Appendix F) considered how the releases of treated water from the Camellia-Rosehill WRRF may impact the hydrodynamics and water quality in the receiving waters of Parramatta River during its operation. The assessment considered climate change conditions and cumulative impacts of other expected changes in the surrounding catchment. Construction impacts to surface water (including stormwater runoff and management) are covered separately in Section 7.5.

To meet the objectives of the assessment, hydrodynamics and water quality modelling software was used to simulate the existing and future waterway conditions and predict potential impacts from the release of treated water. The following sections outline the methodology in more detail.

Water quality response model

The WQRM was used in the assessment to allow simulation of the relevant hydrodynamic and water quality impacts in the Parramatta River. The model extended from the tidal limits of the Parramatta River and Sydney Harbour downstream to the coastal waters offshore of the Sydney Harbour headlands. The spatial extent of the model is shown in Figure 7-2.

The WQRM has been built on application of the finite volume hydrodynamic modelling software, MIKE 3 Flow Model Flexible Mesh, which is a modelling system based on a flexible mesh approach, developed by DHI Water and Environment. This model was coupled with the MIKE Mud Transport and MIKE Ecolab modules which allow simulation of fine-grained sediments in estuarine environments and simulation of water quality processes such as eutrophication and nutrient dynamics, respectively. The following models were also developed to provide the required inputs and boundary conditions to the WQRM to simulate flows and water quality:

- source catchment models to develop the catchment inflow boundary conditions. Four Source models were developed to represent the catchment areas of Upper Parramatta River, Upper Lane Cove River, Upper Duck River and the remaining catchments draining to the Sydney Harbour estuary including Vineyard Creek
- upper Parramatta River model to develop the boundary conditions of flow and water quality for water overtopping the Charles Street Weir
- wastewater network models using the Model for Urban Sewers (MOUSE)
- Camellia-Rosehill WRRF model in Microsoft Excel to predict future flow and water quality release conditions.

CORMIX modelling software was also used to assess near field impacts and risk of toxicity in the immediate vicinity of the river release.

Figure 7-3 presents an overview of the various models used in the assessment and the interfaces between them.

Development and application of the WQRM were divided into 2 key phases, as follows:

- the first phase involved model development, calibration and validation of the WQRM. Calibration and validation of the WQRM focused on comparing the model predictions against the water quality and hydrodynamic monitoring data. The model was independently reviewed by the University of New South Wales (UNSW) Water Research Laboratory
- the second phase involved compiling input data to characterise the existing and future environment. Model scenarios were developed to simulate baseline and future conditions, then run and analysed, as described in the following sections.

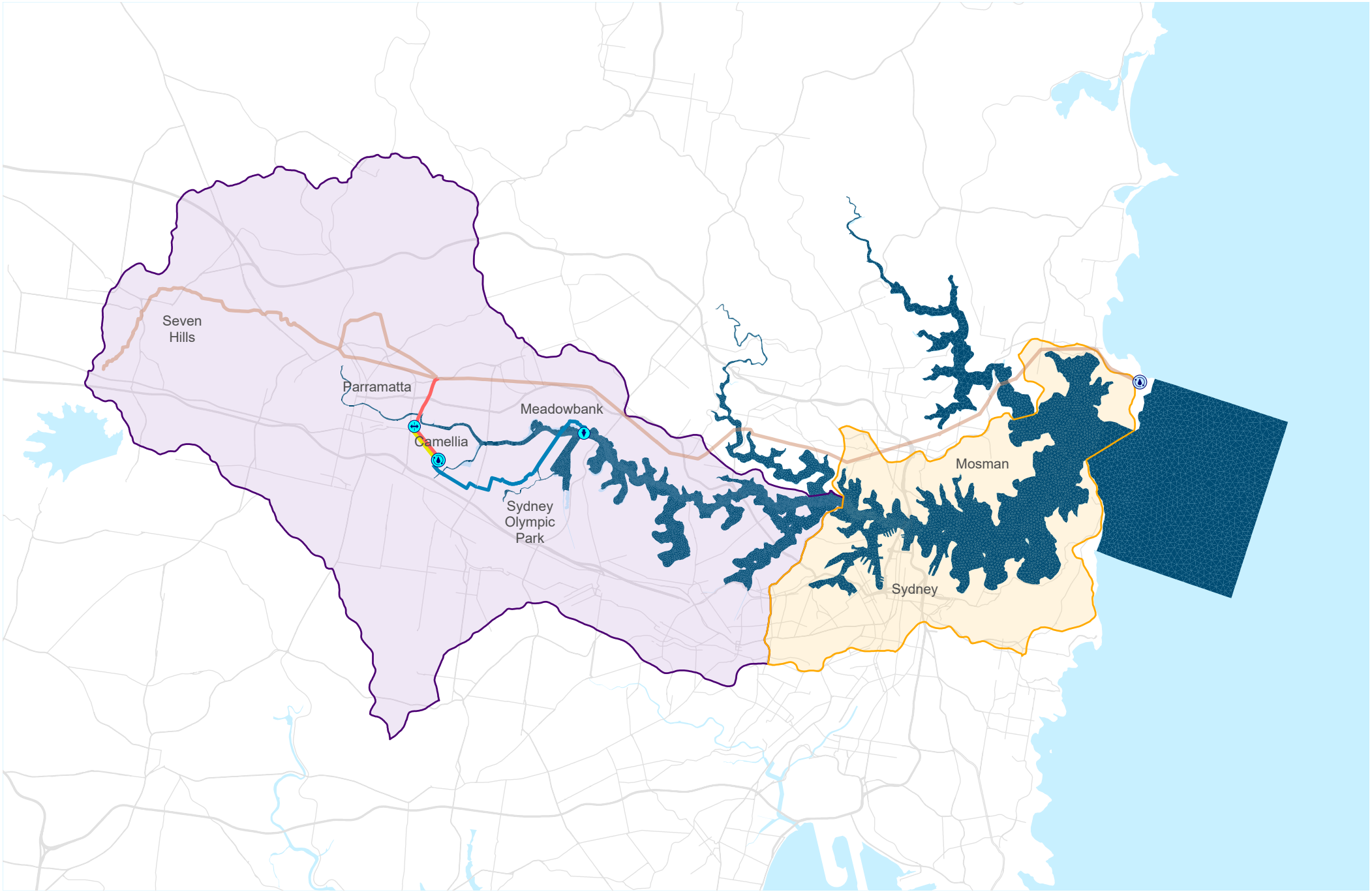


Figure 7-2 Spatial extent of water quality response model

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:175,000 @ A4
GDA2020 MGA Zone 56

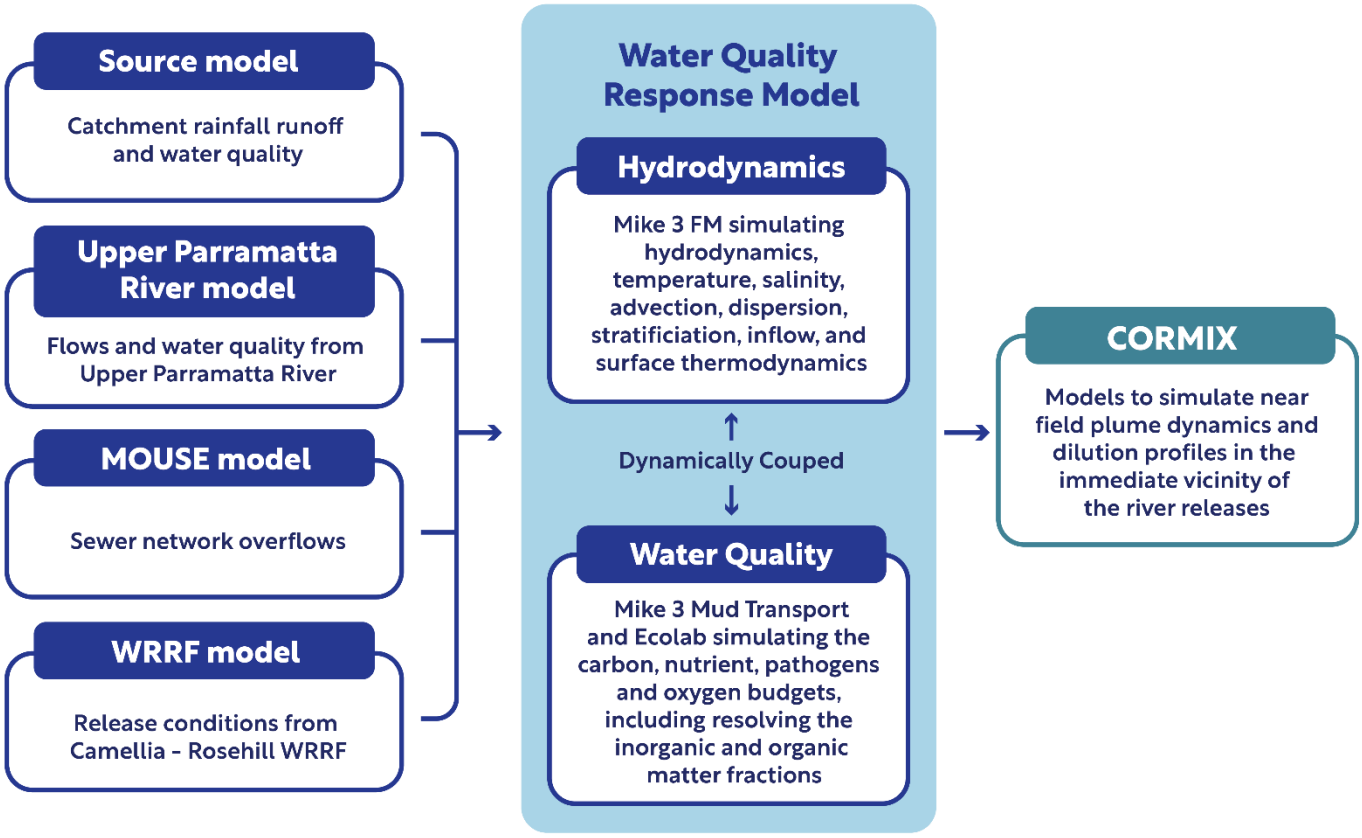


Figure 7-3 Overview of hydrodynamics and water quality response model

Model scenario descriptions

A suite of scenarios was developed to incorporate treated water releases and also a range of catchment conditions such as climate change and wastewater overflow conditions that could be expected during the operational life of the Camellia-Rosehill WRRF.

The operational capacity of the Camellia-Rosehill WRRF was assumed to be 70 ML/day. This is based on housing and commercial development projections to 2056. Therefore, the 2056 planning horizon was selected for the assessment.

With respect to climate change conditions, Sydney Water aims to adapt Representative Concentration Pathway (RCP) 4.5 as a standard requirement to manage climate change risk. A comparison of climate condition predictions between RCP 4.5 and RCP 8.5 by 2056 was undertaken. There was a minimal difference in predictions and consequently, RCP 4.5 was therefore selected to assess the climate change impacts on water quality.

All the scenarios were run for a representative dry, average and wet rainfall year to understand the range of potential impacts under different climatic conditions. Simulation of these climatic years would address how different climatic conditions may affect the impacts from treated water releases.

Table 7-3 describes the scenario types used for the modelling.

Table 7-3: Model scenario descriptions

Model scenarios	Description
Baseline scenario (Sc1)	This scenario represents current conditions (circa 2024 / 2025).
Background scenario (Sc2 and Sc2cc)	This scenario simulates catchment and waterway conditions expected in 2056, which: • includes updated wet weather overflows based on source control works planned by Sydney Water • does not include the operation of the Camellia-Rosehill WRRF (i.e. no releases of treated water into Parramatta River). Sc2 represents the 2056 background conditions. Sc2cc represents the 2056 background conditions, which incorporates climate change conditions based on RCP 4.5.
Impact scenarios (Sc3 and Sc3cc)	These scenarios represent catchment and waterway conditions in 2056 with the inclusion of treated water releases from the Camellia-Rosehill WRRF. This scenario captures: • advanced treated water releases of 63 ML/day. This assessment has assumed that the Camellia-Rosehill WRRF would produce 10% brine (~7 ML/day) through the reverse osmosis technology. The brine would be transferred to the NSOOS for treatment and discharge at the North Head WRRF • two 48-hour events per year where the advanced treatment system (reverse osmosis) is assumed to be offline temporarily due to outage or maintenance. This would release tertiary treated water to Parramatta River. This was conservatively assumed to occur during consecutive dry months. The release volume of tertiary treated water would be 70 ML/day, as no brine would be produced. • associated changes to wet weather overflows from the wastewater network that are predicted from the operation of the Camellia-Rosehill WRRF. Sc3 represents the 2056 conditions with treated water releases. Sc3cc represents the 2056 conditions with treated water releases, which incorporates climate change conditions based on RCP 4.5.

Proposed treated water quality

The expected water quality of treated water releases (advanced treated water and tertiary treated water) is presented in Table 7-4. The median concentrations of indicators have been assumed for each release stream.

Table 7-4: Proposed concentrations of treated water quality

Indicator	Units	Median concentrations	
		Advanced treated water	Tertiary treated water
Flow	ML/day	63	70
Total organic carbon	mg/L	0.5	10
Total nitrogen	mg/L	0.35	3
Organic nitrogen	mg/L	0.1	1.2
Ammonia	mg/L	0.03	0.2
Nitrate	mg/L	0.1	2.5
Total phosphorus	mg/L	0.009	1
Inorganic phosphorus	mg/L	< 0.002	0.002
Organic phosphorus	mg/L	0.003	0.338
Dissolved oxygen	mg/L	6	5.9
Enterococci	colony forming units (cfu)/100mL	0	0
Total suspended solids	mg/L	4	1
Salinity	practical salinity unit (PSU)	0.08	0.75

Scenario analysis and interpretation

The impacts were assessed for a range of hydrodynamic and water quality parameters necessary to evaluate impacts against baseline and background conditions, the waterway objectives, and to address the SEARs. These parameters are shown in Table 7-5.

Annual median concentrations from the modelling results for baseline, background and impact scenarios were compared to the waterway objectives identified in Table 7-2.

Table 7-5: Hydrodynamics and water quality parameters

Parameter	Indicator
Hydrodynamics	• Flow and velocity • Water level
Water quality	• Salinity • Temperature • Nitrogen (ammonia, oxidised nitrogen, total nitrogen) • Phosphorus (filterable reactive phosphorus and total phosphorus) • Chlorophyll *a* (adopted as a primary indicator of phytoplankton abundance and biomass) • Total suspended solids • Dissolved oxygen • Enterococci (adopted as a primary indicator of pathogens).

Near field and toxicity modelling

Both release streams potentially include higher levels of contaminants that could pose a risk of toxicity to the receiving waters and associated biota in the immediate vicinity of the river release. CORMIX modelling was undertaken to simulate near field dilution of the release plume and to assess any potential for toxicity in the near field.

The assessment of near field mixing and toxicity risk included the following steps:

- Potential toxicants in the advanced and tertiary treated water were analysed. The 90th percentile concentrations of toxicants were compared to the waterway objectives in order to identify the risk of toxicity or environmental harm.
- Characteristics and hydrodynamics in the immediate vicinity of the release were analysed. The ambient conditions were derived from:
  - bathymetric data
  - flow rates from the calibrated WQRM model
  - baseline water quality monitoring program.
- Dilution requirements for each toxicant were then evaluated.
- Near field modelling of initial dilution and mixing processes was undertaken for the releases. Modelling included consideration of the expected range of release rates, the reference design of the diffuser and the range of ambient tidal conditions.

- The size and configuration of mixing zones were assessed in accordance with ANZG (2018) and ANZECC & ARMCANZ (2000). In line with these guidelines, mixing zones are defined as the areas of the receiving waterways where waterway objectives are not met (i.e. where relevant toxicant guideline values may be exceeded). As there are no specific technical guidelines and assessment criteria relating to regulatory mixing zones available in NSW, the primary considerations presented in the Queensland Government Technical Guideline (DETSI, 2024) were adopted in the assessment. These guidelines are considered to follow the principles and procedures presented in the ANZECC & ARMCANZ (2000) guidelines.
- Specifically, the following lateral and longitudinal dimensions of the mixing zones and potential interaction with banks and shorelines have been used to determine whether the zones may be consistent or not with the principles of the ANZG (2018) and ANZECC & ARMCANZ (2000) guidelines:
  - the maximum lateral dimension should be the lesser of 50 m diameter or 30% of the waterway width
  - the maximum longitudinal dimension should be the lesser of 300 m or 3 stream widths.

7.4.2 Existing environment

The Parramatta River catchment covers an area of approximately 252 km^2, with Parramatta River being its largest waterway. The catchment is joined by the Upper Parramatta River (upstream of Charles Street Weir), Lower Parramatta River, Vineyard Creek, Duck River, Homebush Bay, Iron Cove Bay, Hen and Chicken Bay and the Ponds Subiaco Creek system. The project is located within the Lower Parramatta River, which ultimately flows into Sydney Harbour.

Given that treated water would be released into Parramatta River during operation, it serves as the primary focus of this assessment. Other waterways such as Duck River, Duck Creek, Haslams Creek and Powells creek have been also considered due to their locality. Figure 7-4 shows the location of the project and relevant waterways.

The following sections describe the existing environment in Parramatta River, particularly the areas near the river release structure. The focus of this section is on the existing water quality, hydrodynamics and recreational uses of the river. More details about the existing environment can be found in the Hydrodynamics and Water Quality Impact Assessment (Appendix F).

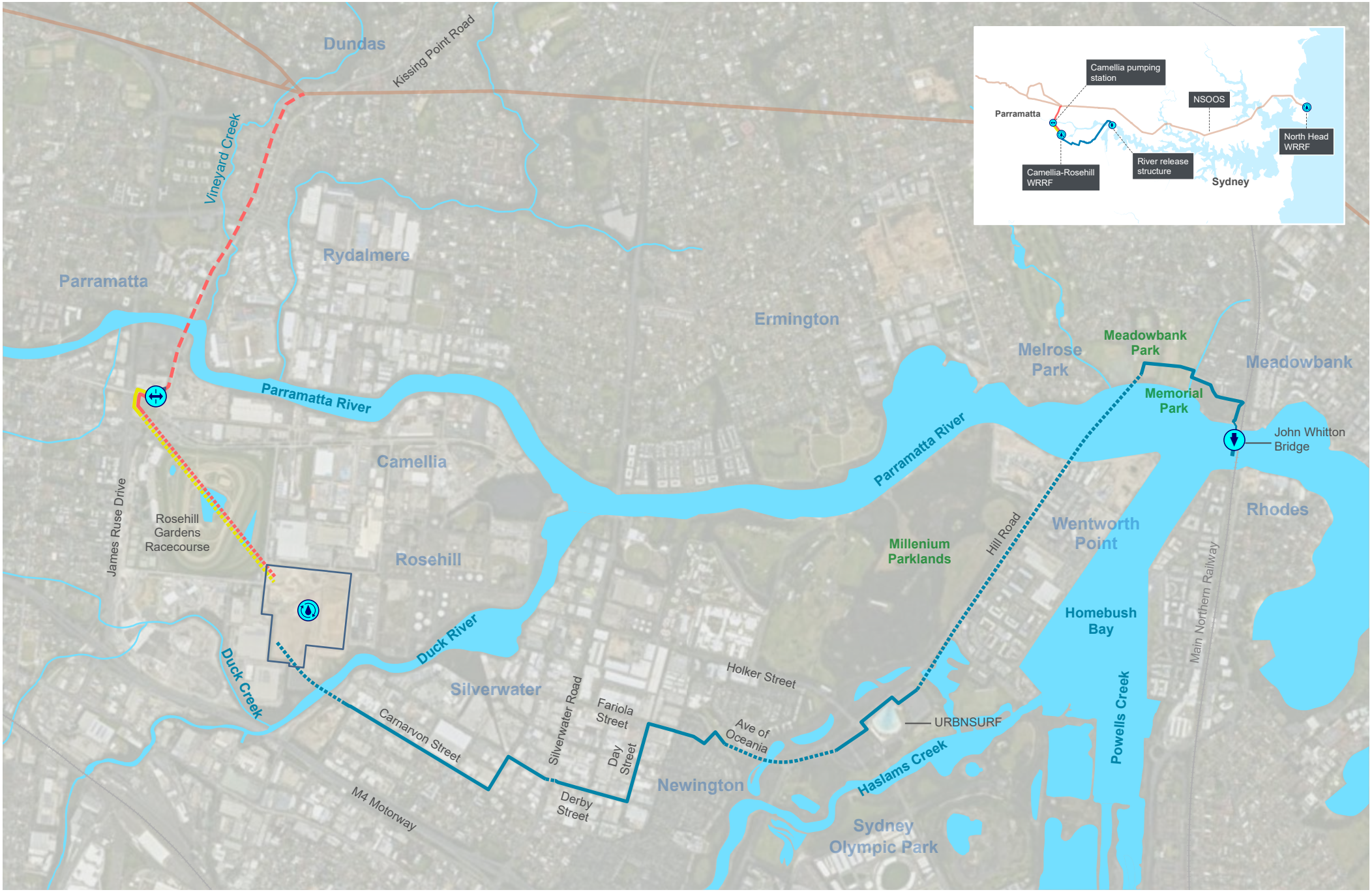


Figure 7-4 Waterways relevant to the project

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

7.4.2.1 Water quality

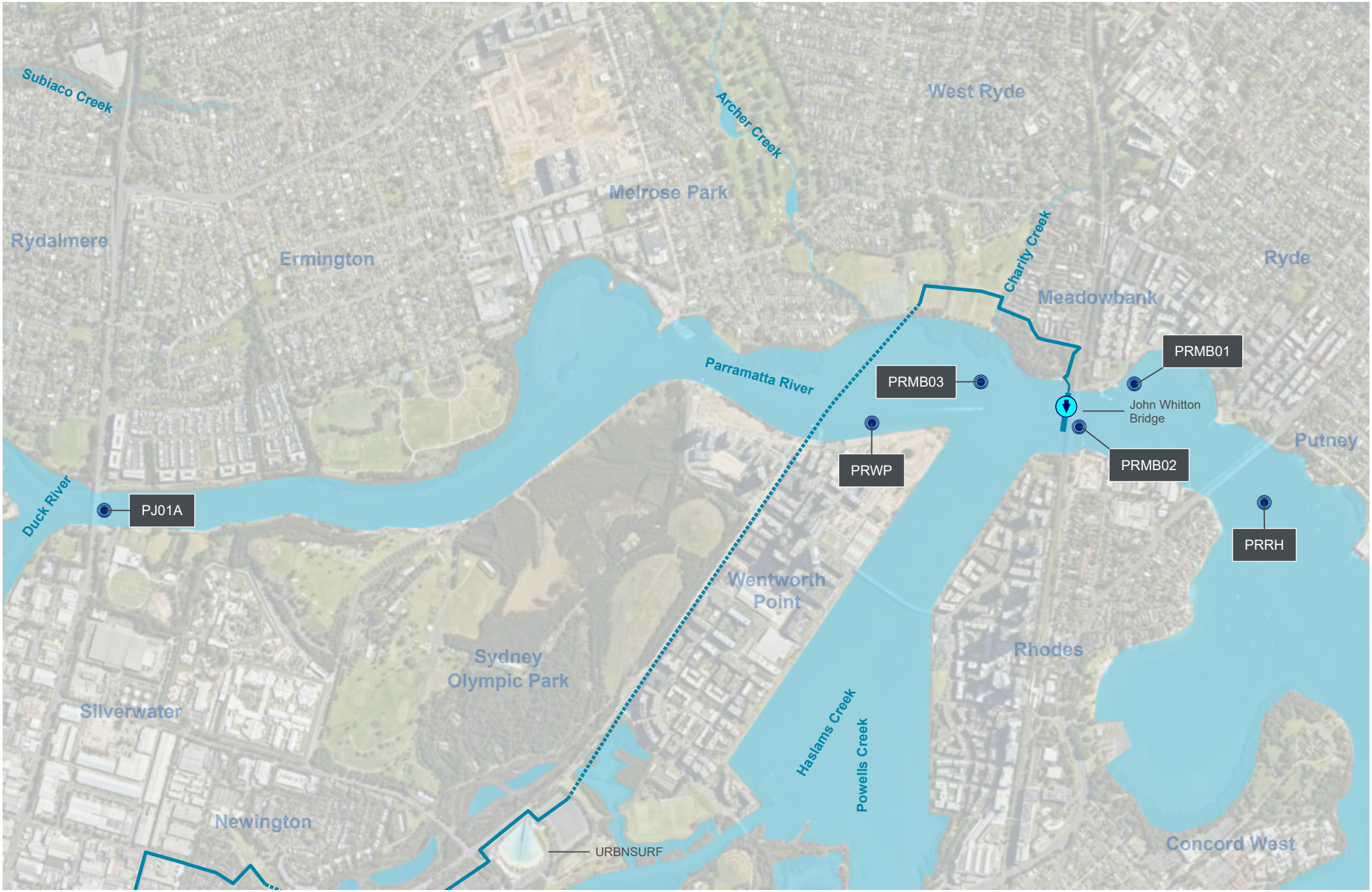
Table 7-6 summarises the existing background water quality conditions in Parramatta River at monitoring sites near the proposed river release structure. This data was collected as part of Sydney Water's baseline water quality monitoring program. Figure 7-5 shows the locations of these monitoring sites.

The project's baseline water quality monitoring program was undertaken to assist in characterising the existing environment. Monitoring sites were located at and in the vicinity of the river release diffuser, as well as upstream and downstream locations. Weekly monitoring at sampling locations PRRH, PRWP, and PJ01A commenced in March 2024, while monitoring for PRMB01, PRBM02 and PRBM03 began in September 2024. The monitoring program was completed in September 2025. This has provided a minimum of 12 months of baseline water quality information.

The catchment has been exposed to persistent stress over the last two centuries due to historical and current industrial impacts. Consequently, the water quality in Parramatta River is generally poor, with elevated levels of nutrients and gross pollutants entering the waterway. Sediment contamination due to urban development and industrial activities has also had an impact on water quality.

In summary, concentrations of key indicators at all monitoring sites are shown to be already above the waterway objectives. An exception is dissolved oxygen saturation levels which are within the waterway objectives in the vicinity of the river release. The data shows:

- elevated concentrations of total nitrogen and total phosphorus. These concentrations increase with distance upstream, which may be due to reduced rates of flushing within the upper reaches of the river and the higher influence from catchment inputs
- elevated concentrations of ammonia and oxidised nitrogen (except at PRMB02), which may be due to higher inorganic loads from existing stormwater and wastewater overflows
- elevated concentrations of enterococci, which may be generally associated with existing catchment runoff and wastewater overflows
- range of salinity concentrations, which are indicative of the influence of episodic rainfall events and increased catchment flows.



River release structure

Proposed River Release Pipeline - Open trench

Proposed River Release Pipeline - Trenchless

Baseline monitoring site

Figure 7-5 Sampling locations of baseline water quality monitoring program

0 200 400 600 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025

Scale: 1:17,500 @ A4
GDA2020 MGA Zone 56

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Table 7-6: Existing background levels from baseline water quality monitoring program

Indicator	Monitoring sites					
	PJ01A (upstream)	PWRP (upstream)	PRMB03 (upstream)	PRMB02 (at river release)	PRMB01 (downstream)	PRRH (downstream)
Total nitrogen (mg/L)	0.52	0.4	0.40	0.36	0.37	0.36
Ammonium (mg/L)	0.05	0.05	0.05	0.05	0.05	0.05
Oxidised nitrogen (mg/L)	0.055	0.02	0.02	0.015	0.02	0.02
Total phosphorus (mg/L)	0.089	0.066	0.065	0.06	0.062	0.056
Filterable reactive phosphorus (mg/L)	0.038	0.029	0.029	0.028	0.028	0.026
Chlorophyll *a* (µg/L)	7.93	5.35	6.71	5.37	6.03	4.72
Enterococci (cfu/100mL)	4830	829	1950	965	1625	372
pH	7.6	7.8	7.8	7.8	7.8	7.8
Conductivity (microsiemens (µS)/cm)	41632	46602	46023	47571	46135	47588
Salinity (PSU)	N/A	28.26	N/A	32.23	N/A	N/A
Dissolved oxygen (%)	N/A	75.65	N/A	86.2	N/A	N/A

Notes on table:

- All monitoring results are presented as medians, except for enterococci presented in 95th percentile to be comparable against waterway objectives.
- Samples PJ01A, PRWP and PRRH cover period from March 2024 to July 2025. Samples PRMB01, PRBM02 and PRBM03 cover period from September 2024 to July 2025. Samples were collected weekly.
- Salinity and dissolved oxygen were only monitored weekly at PRWP (March 2024 to September 2024) and PRMB02 (September 2024 to November 2024).
- Guideline values are taken from waterway objectives outlined in Section 7.4.1.1. Results highlighted in green are above waterway objectives. Results in black are below or equal to waterway objectives, or no values are available (i.e. salinity and conductivity).

7.4.2.2 Hydrodynamics

Early settlement of the area has greatly altered the flow of Parramatta River. Dredging for ferry access has also changed the natural channels of the river, altering the flow conditions.

The Parramatta River is the largest river entering Port Jackson. The river is tidal to the Charles Street Weir in Parramatta, approximately 30 km upstream from the Sydney Harbour headlands. The Charles Street Weir is the artificially imposed limit of tidal influences on the main arm of the river.

Under low rainfall conditions, the river is vertically well mixed. The embayments along the southern shore are likely to be among the most poorly flushed areas. Conversely, the system may become stratified with more significant flushing during substantial rain events.

7.4.2.3 Recreational uses

The catchment is highly urbanised and consists of numerous land uses including residential, commercial, environmental protection, education, industrial, open space and recreation.

Parramatta River is an important recreational waterway, particularly for the western suburbs of Sydney. Designated areas are used for power boating, sailing and other water-based activities. The river has a long historical association with sailing and yachting clubs.

There is an increasing amount of waterfront land becoming accessible to the public through the development of walkways and cycleways in foreshore parks and reserves. There are also regular ferry services along the Parramatta River to Circular Quay with a number of wharves at various points along the river.

Recreational fishing is a popular pastime at numerous locations throughout Parramatta River and Sydney Harbour. However, DPIRD currently advises the following (DPIRD, 2019):

- Due to elevated levels of dioxins, fish and other crustaceans caught west of Sydney Harbour Bridge should not be eaten.
- For fish caught east of the Sydney Harbour Bridge, you should generally not eat more than 150 grams per month. Higher amounts of some fish and crustacean species may be eaten.
- Fishing is not permitted in the waters of Homebush Bay and its tributaries (including Powells Creek and Haslams Creek).

There is a commercial fishing ban imposed throughout the Parramatta River and Sydney Harbour.

The PRCG launched an initiative with the mission to make Parramatta River swimmable again by 2025. The Parramatta River Masterplan (PRCG, 2018) details the steps required to make the river swimmable. This includes improving water quality in the river such as reducing runoff and overflows and improving habitat creation and enhancement. There are active swim sites currently open for the public and planning is underway to create more swim sites. More information on real-time water quality conditions at swim sites in the Parramatta River can be found on the Urban Plunge website.

The following swim / recreational sites in the vicinity of the project were selected for evaluation of water quality impacts as part of this assessment:

- Putney Beach (active swim site)
- Bayview Park (active swim site)
- Bedlam Bay (active swim site)
- Cabarita Park Beach (active swim site)
- Mcllwaine Park (recreational site).

It should be noted that Mcllwaine Park is not a planned swim site in the Parramatta River Masterplan (PRCG, 2018). However, this site is opened to the community for recreational uses. Given the site is in the vicinity of the river release structure, it was selected to assess the potential water quality impacts.

Figure 7-6 shows the location of the swim and recreational sites in the vicinity of the project. Another active swim site, Dawn Fraser Baths in Balmain, situated about 5 km downstream from the river release, was evaluated to represent lower estuarine conditions. For a discussion on human health impacts to primary and secondary recreational activities, see Chapter 19 (Human health) of the EIS.

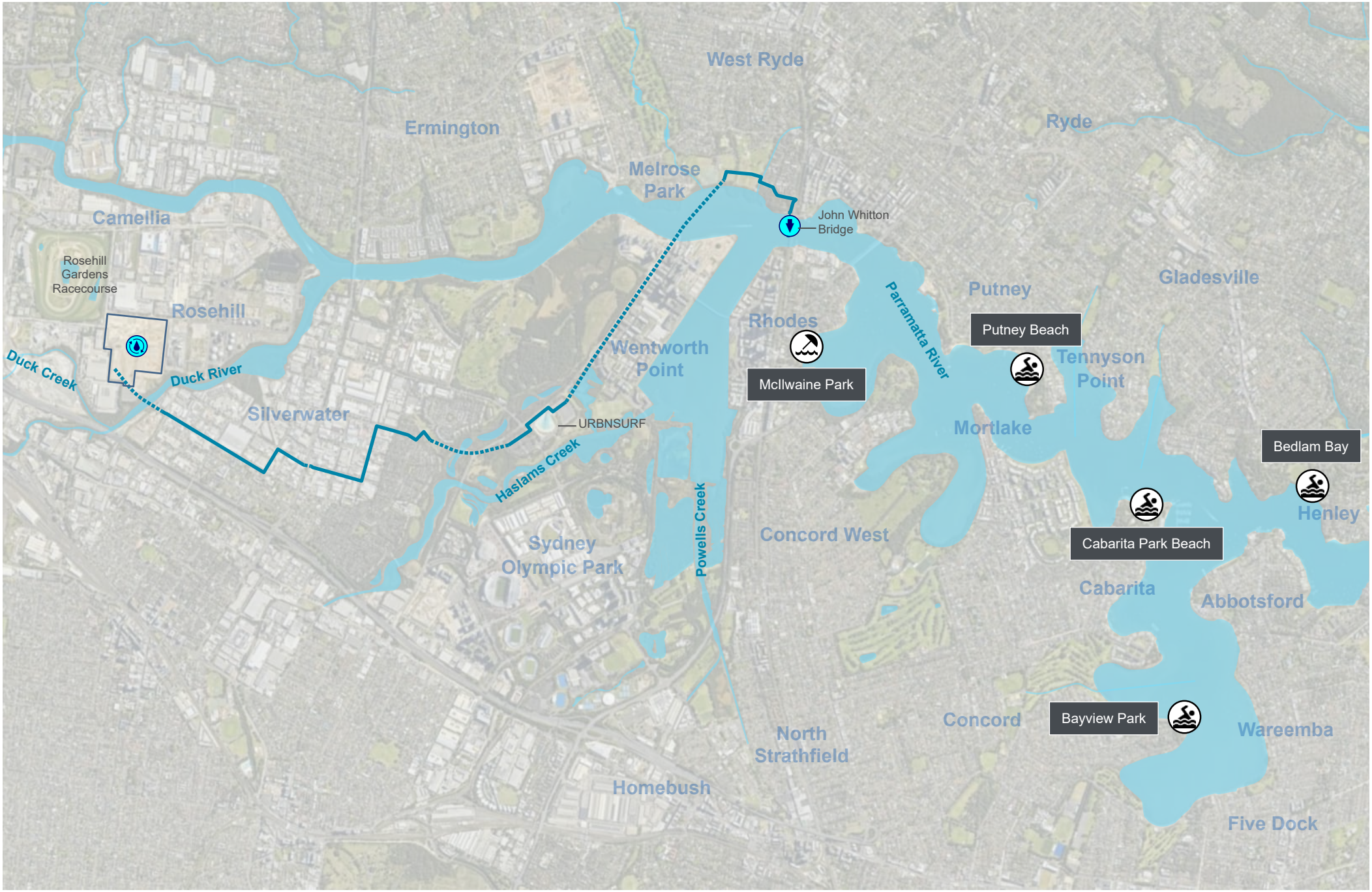

Figure 7-6 Swim / recreational sites in the vicinity of the project

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:39,000 @ A4
GDA2020 MGA Zone 56

7.4.3 Key uncertainties

The hydrodynamic and water quality modelling undertaken for the EIS is a representative approximation to the real world and not without accepted levels of uncertainty. Each model is based on a series of assumptions, and also dependent on the accuracy of its input data. The model results should therefore be interpreted as indicative of impacts, responses and trends in the receiving waters and not absolutes.

Sydney Water has modelled a range of scenarios to test different assumptions and the sensitivity of the results to those assumptions. However, the modelling remains a tool for providing an indication of the scale of impacts and does not represent conditions that should be licensed in an EPL. The pre- and post-commissioning monitoring program proposed by Sydney Water in Section 7.4.7 is a critical part of demonstrating actual changes in water quality due to the project.

7.4.4 Construction impacts

The project would require construction within waterways. The surface water impacts during construction are addressed in Section 7.5.

7.4.5 Operational impacts

The release of treated water has the potential to impact both the hydrodynamics and water quality of the receiving waterway. Treated water can contain elevated levels of nutrients (including nitrogen and phosphorus) and other contaminants that can degrade aquatic ecosystems in the short and long-term. Releases of additional water into the river can also alter the hydrodynamics of a waterway, by altering flow patterns, volumes and water depths.

The WQRM has been undertaken to analyse the likely changes to the hydrodynamics and water quality in the Parramatta River. As discussed in Section 7.4.1.3, the modelling involved the assessment of:

- baseline scenario that represents current conditions (2024 / 2025) (Sc1)
- background scenarios that represent potential future conditions in 2056 without releases of treated water (Sc2 / Sc2cc)
- impact scenarios that represent potential future conditions in 2056 with releases of treated water (Sc3 / Sc3cc).

The following sections provide an overview of the modelling results and predicted changes to water quality in Parramatta River. These include:

- predicted impacts on the hydrodynamics and water quality of:
  - the background scenario (Sc2cc) compared to baseline scenario (Sc1)
  - the impact scenario (Sc3cc) compared to background scenario (Sc2cc). Results for both the average, dry and wet year are considered where relevant.

- near field modelling to assess the potential for toxicity and environmental harm in the immediate vicinity of the river release
- potential impacts to all waterway objectives from the river release.

It should be noted that overflows from the wastewater networks are considered as point sources of untreated wastewater within the Parramatta River. The effects of the planned source control measures by Sydney Water are predicted to reduce nutrients in the waterway. Therefore, both background and impact scenarios have incorporated updated wet weather overflows based on planned source control works.

The results presented in this section are also interpreted within the context of climate change conditions for both background and impact scenarios (Sc2cc and Sc3cc) to better reflect the expected conditions in 2056. Generally, the same trends and patterns were predicted regardless of whether climate change was factored into the scenarios. The following interpretation has therefore focused on the scenarios that included adjustments for climate change.

The Hydrodynamics and Water Quality Impact Assessment (Appendix F) includes a more comprehensive analysis of the various scenarios, including graphs and numerical outputs.

7.4.5.1 Hydrodynamics

Predicted changes in background scenario (Sc2cc)

A sea level increase of up to 0.16 m and slight reduction in tidal velocities are predicted under the background scenario relative to the baseline scenario.

Predicted changes in impact scenario (Sc3cc)

Negligible changes to water level are predicted as a result of the river release, when compared to the background scenario. However, changes to ambient flows and velocities are predicted in the immediate vicinity of, as well as upstream and downstream of the river release.

Once the treated water is released, there is potential for changes in hydrodynamics in the immediate 50 m of the diffuser, when tidal velocities are lower (i.e. slack water condition). During higher tidal velocities, negligible changes in hydrodynamics were predicted. When comparing flows 200 m upstream of the diffuser, the releases are predicted to result in a median change of 0.1 m^3/s relative to the background scenario. Conversely, when comparing flows 200 m downstream of the diffuser, a higher median change of 0.6 m^3/s was predicted relative to the background scenario.

7.4.5.2 Water quality

Predicted changes in background scenario (Sc2cc)

As described earlier, planned source control works are predicted to reduce nutrients in the waterway by 2056, as the works would reduce wastewater network overflows. However, climate change conditions such as changes in rainfall and sea level rise are predicted to potentially increase the concentrations of nutrients in the waterway.

The annual median concentrations of key indicators from the 2056 background scenario relative to the baseline scenario (2024 to 2025) were analysed. Under these conditions, the predicted changes in water quality are summarised below:

- minor variations in salinity are predicted in the vicinity of the river release. Salinity levels are predicted to increase and decrease throughout the year dependent on seasonal trends and also the intensity of rainfall events
- temperatures are predicted to increase by ~1°C throughout the year, with slight variations depending on the season
- with respect to nutrients, a more complex pattern is predicted from the modelling. While some periods exhibit increases in total nitrogen and total phosphorus as a result of climate change, some reductions are also evident in the vicinity of the release as a product of reductions in wastewater network overflows.
- minor increases in total suspended solids are predicted, particularly in the reaches immediately downstream of the Charles Street Weir. These increases may be due to changes in rainfall and runoff in the catchments that flow into Parramatta River.
- minor increases in chlorophyll *a* are predicted during average and lower rainfall years, while reductions are predicted for the higher rainfall year
- negligible changes in dissolved oxygen are predicted
- reductions in wet weather spikes in enterococci are predicted primarily due to the reduction of wastewater network overflows.

Overall, changes to water quality in the background scenario are predicted to be relatively minor with influences from both the planned source control works and projected climate change conditions. As discussed below, further details regarding the predicted changes from the background scenarios are presented in Figure 7-7 and Figure 7-8.

Predicted changes in the impact scenario (Sc3cc)

The impacts from the operation of the Camellia-Rosehill WRRF were assessed by comparing annual percentile concentrations and time series results for key indicators as predicted for the impact and background scenarios. Figure 7-7 and Figure 7-8 present an overview of the predicted impacts on annual median concentrations for key water quality indicators (i.e. salinity, total nitrogen, total phosphorus, chlorophyll *a* and enterococci). These figures summarise the modelling results under representative average rainfall year conditions with climate change conditions simulated. Several locations have been selected for analysis and are presented in the figures. These locations are considered representative for assessing the modelled impacts across the project area. These locations include:

- river centreline locations, including at the diffuser, 2 km and 5 km both upstream and downstream from the river release
- key waterways in the vicinity of the river release as specified in the SEARS, shown as:

  - Duck River (T1)
  - Duck Creek (T2)
  - Haslams Creek (T3)
  - Powells Creek (T4).
- swim / recreational sites (as shown in Section 7.4.2.3).

To assess the impacts on aquatic biodiversity, key sites (AQ1 to AQ6) have been selected for analysis as shown on Figure 7-7. These locations are representative of key habitats identified within the immediate project area. Interpretation of results on aquatic biodiversity are separately summarised in Section 7.7.

The colour coded matrices within the figures provide an indication of predicted protection of waterway objectives. These are based on the annual median model results for the baseline, background and impact scenarios (except for enterococci, which the 95th percentile concentrations were used). These are shown as:

- cells shaded in green indicate that waterway objectives are achieved (i.e. guideline values are met)
- cells shaded in pale pink indicate that waterway objectives are not achieved (i.e. guideline values are not met).

As mentioned earlier, waterway objectives within the upper estuary are consistently not met for the majority of indicators across all scenarios (including current and future scenarios). However, the river release is predicted to reduce annual median concentrations of many of the key indicators, contributing to improved protection of relevant waterway objectives.

For the background and impact scenarios, a trend is also shown as up or down, or unchanged relative to the baseline and background scenarios respectively. In this analysis, a trend was defined as a change of greater than 5%.

The predicted changes in water quality are summarised below:

- reductions in salinity are predicted as a result of the release of treated water and prevailing higher salinity conditions that occur in the absence of substantial freshwater inflows from the catchment and the Upper Parramatta River. During extended periods of low rainfall, the water column is expected to remain well mixed both upstream and downstream of the river release point. This mixing is driven by the diffuser design, which supports dispersion, as well as the relatively high tidal velocities that occur due to the shallow and constricted nature of the river near the John Whitton Bridge. As a result, the risk of stratification or pooling of freshwater layer at the surface is expected to be low.
- annual median temperatures are predicted to increase by up to ~0.05°C, with temporal variations predicted depending on the season
- reductions in total nitrogen are predicted due to the low concentrations in the advanced treated water releases as well as reductions of wastewater network overflows. The tertiary treated water releases are predicted to have increased concentrations of total nitrogen, which the effects of the releases are generally short-lived. The impacts of tertiary treated water releases are predicted to extend further during lower rainfall years, primarily due to reduced levels of flushing.

- the potential for minor increases in ammonia and oxidised nitrogen is predicted due to higher concentrations within the treated water releases relative to ambient background concentration
- reductions in total phosphorus and filterable reactive phosphorus are predicted due to the lower concentrations within the advanced treated water and reduction of wastewater network overflows. The effects of the tertiary treated water releases are also generally short-lived.
- minor reductions in total suspended solids are predicted, primarily due to planned source control works
- reductions in chlorophyll *a* are predicted due to the reduction of wastewater network overflows and the releases of the advanced treated water with low nutrient content. These reductions thereby indicate a potential decrease in algal biomass and blooms within the upper estuary. Periods of higher chlorophyll *a* are predicted when higher nutrient loads were introduced from the tertiary treated water, particularly during the lower rainfall year. However, this was considered to be the worst-case scenario with the tertiary treated water releases timed during extended dry periods during the low rainfall year. Under both the average and higher rainfall years, the effects of the tertiary treated releases are predicted to decrease in magnitude and duration.
- minor increases in dissolved oxygen are predicted due to the operation of the Camellia-Rosehill WRRF
- the treated water would consist of zero pathogenic content. Therefore, the primary impact on enterococci is predicted from abatement of the wet weather overflows. Planned source control works and the operation of the Camellia-Rosehill WRRF are predicted to substantially reduce wastewater overflows. As such, reductions of enterococci are predicted with these in place.

Generally, the predicted impacts at the identified SEARS waterway sites (T1 to T4) are consistent with the findings above, showing similar trends and patterns.

Predicted impacts at swim / recreational sites

The assessment of recreational activities has focused on the impacts on enterococci levels as a primary pathogenic indicator and a measure by which risks to human health can be analysed in terms of both primary and secondary recreational activities. Any human health impacts to primary and secondary recreational activities are addressed in Chapter 19 (Human health) of the EIS.

The modelling results indicate that the operation of the Camellia-Rosehill WRRF presents a potentially beneficial effect regarding pathogenic levels at the swim / recreational sites. Spikes in wet weather concentrations are generally predicted to reduce at each swim / recreational site analysed and across all the rainfall years simulated, due to the associated mitigation of wastewater network overflows.

It should be noted that this modelling approach incorporated datasets beyond the Riverwatch program including simulated worst-case scenarios of wastewater overflows and system failures. The modelling results show modelled and simulated data intended for the EIS. The modelling results therefore do not reflect actual conditions or real risk at swim sites. More information on water quality conditions at swim sites in the Parramatta River can be found on the Urban Plunge website.

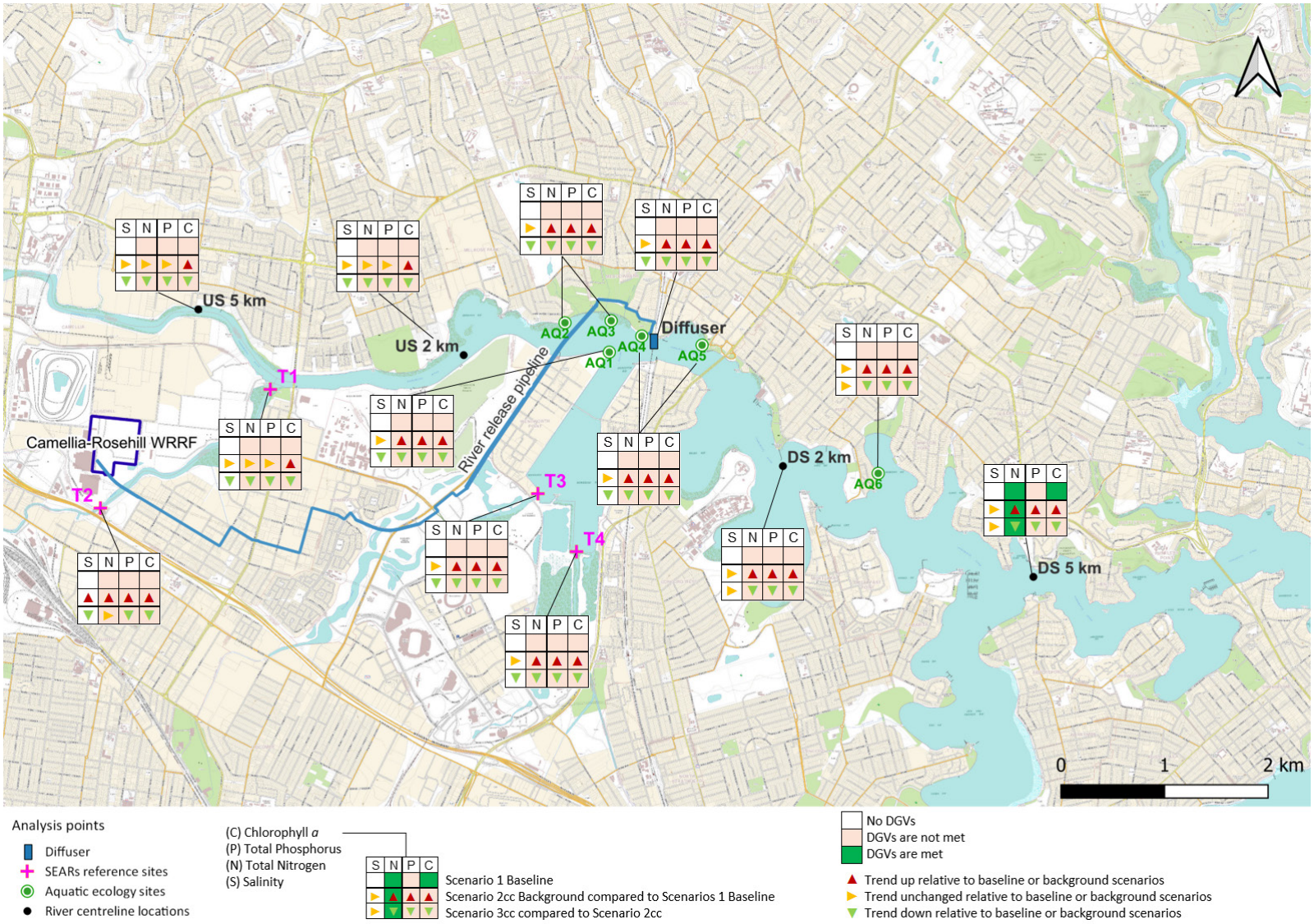

Figure 7-7 Predicted water quality impacts at the diffuser, upstream and downstream from the river release

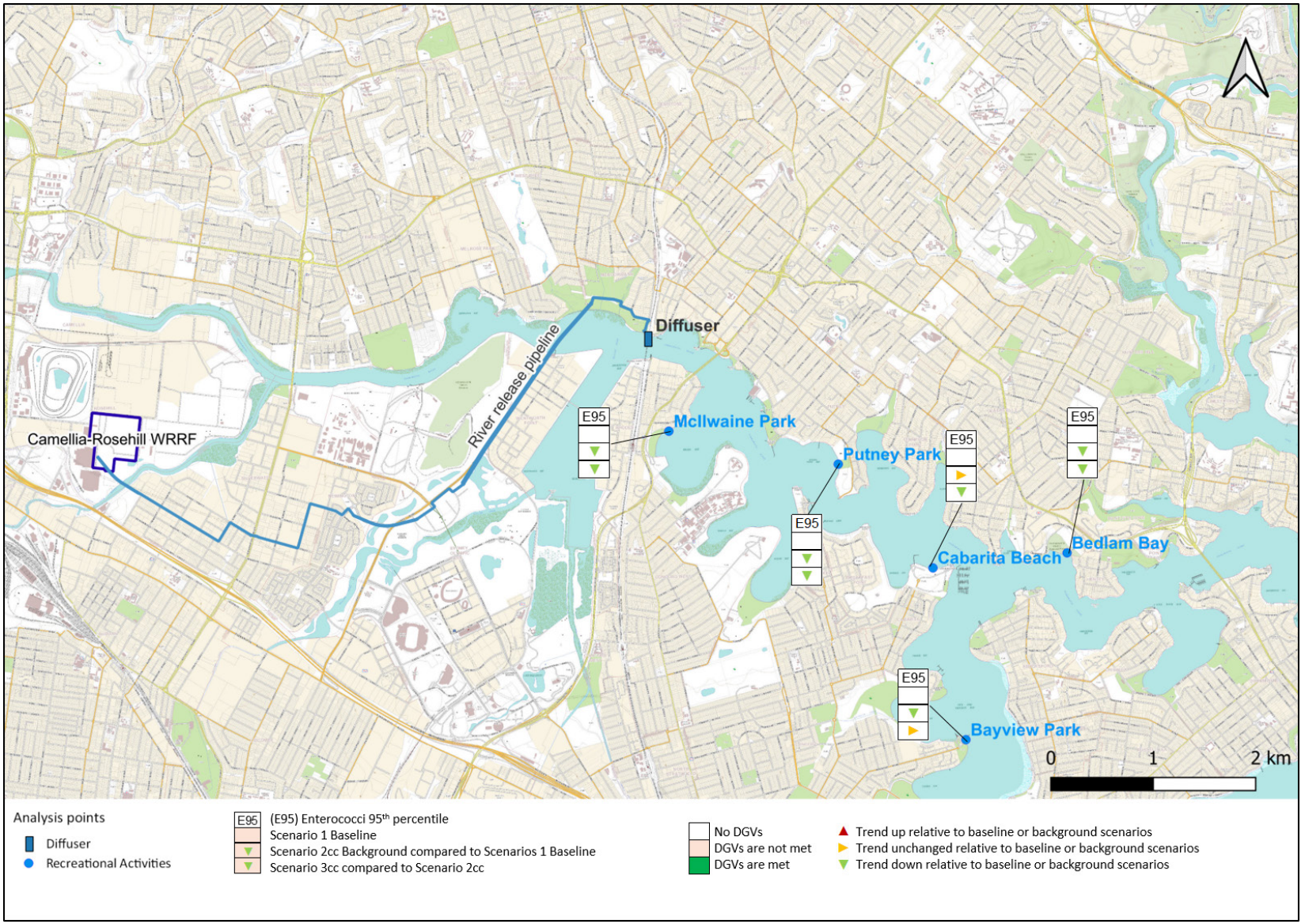

Figure 7-8 Predicted water quality impacts at swim / recreational sites

7.4.5.3 Near field and toxicity assessment

A near field impact assessment was undertaken with respect to the potential for toxicity and environmental harm in the immediate vicinity of the river releases. The results are summarised in Table 7-7.

Table 7-7: Analysis of near field modelling and toxicity assessment

Approach		Analysis
1	Analysis of proposed release conditions to determine contaminants of concern that may present a risk of toxicity or environmental harm	As discussed in Section 7.4.1.3, the toxicant review identified the following potential contaminants of concern for each release stream: • advanced treated water releases: Total chlorine and copper • tertiary treated water releases: Total chlorine, nitrate, aluminium, copper, mercury, and zinc.
2	Analysis of the characteristics and hydrodynamics of the waterway in the immediate vicinity of the release point	The bathymetry in the vicinity of the diffuser is variable with deeper sections found downstream and extending between the central bridge spans. However, a bed elevation of -5 m AHD is typically encountered along the alignment of the diffuser. The following representative tidal velocities were adopted: • peak tide (95th percentile) - 0.243 m/s • median tide (50th percentile) - 0.125 m/s • slack tide (5th percentile) - 0.024 m/s.
3	Evaluation of the dilution requirements for each contaminant of concern	The dilution requirements represent the level of dilution required at the boundary of a mixing zone. The requirements for each release stream are: • advanced treated water releases - dilution factors of ~1.5 are required • tertiary treated water releases - dilution factors typically are below 10 but range up to a maximum of ~30.
4	Near field modelling of the initial dilution and mixing processes with consideration of the expected range of release rates and ambient flow conditions.	From the analysis of near field modelling results, the initial mixing and dilution in the near field is predicted to be relatively high under all the tidal conditions simulated. The initial mixing zone generally extended approximately 30 m downstream of the diffuser ports, before transitioning to more ambient mixing processes.
5	Assessment of the size and configuration of mixing zones	**Advanced treated water releases** The risk of toxicity is predicted to be mitigated in the immediate vicinity of the diffuser ports. Even under the conservative slack tidal conditions, the dilution requirements are predicted to be exceeded within 1 m of the diffuser ports. **Tertiary treated water releases** Under the peak and mid-tidal conditions, the dilution requirements are achieved within 2 m of the diffuser ports, with exception of zinc, which is achieved at 12 m. Even under the more conservative slack tidal conditions, the dilution requirements are predicted to be achieved within 10 m of the diffuser ports, with exception of zinc, which is achieved at ~140 m. Due to its

Approach	Analysis
	comparatively higher concentration in the release relative to its toxicant guideline value, zinc is expected to require a higher dilution requirement than other toxicants. However, it should be noted that this condition represents the transient slack tidal condition, when water movement is minimal, along with the infrequent release of tertiary treated water. It has therefore been considered as a conservative, worst-case scenario to ensure potential impacts are thoroughly assessed. For both release streams, the analysis of mixing zone requirements for copper cannot be assessed because the assumed background water quality and treated water quality already exceed the respective waterway objectives for toxicants.

7.4.5.4 Summary of impacts

The key findings from the assessment are:

- modelling results indicate that the impacts on water quality in the Parramatta River, due to the operation of the Camellia-Rosehill WRRF are predominantly positive, when compared to the respective background scenarios
- with respect to waterway objectives, modelling and monitoring indicate that the majority of sites shown in Figure 7-7 exceed the guideline values, indicating that waterway objectives are consistently not met for baseline, background and impact scenarios. Exceptions are observed for about 5 km downstream from the river release near Bedlam Point, where some indicators meet the waterway objectives.
- as summarised in Table 7-8, while some minor impacts to water quality are predicted, on balance, the operation of the Camellia-Rosehill WRRF is generally expected to maintain and increase protection the environmental values and waterway objectives for the Parramatta River
- short-term deterioration of water quality is predicted following releases of tertiary treated water. However, the effects of these infrequent short-term releases are expected to be assimilated relatively rapidly within the river.
- near field modelling and analysis determined the risk from toxicants in the release water to be low, and no regulatory mixing zones are proposed. Typically, when a mixing zone cannot be achieved, discussions with stakeholders are required to assign regulatory mixing zone. However, in this case, the risk of toxicity is considered to be low, and therefore, a regulatory mixing zone is not considered to be necessary.

7.4.5.5 Waterway objectives

Table 7-8 summarises predicted changes to water quality for all indicators in comparison to waterway objectives identified in Table 7-2. Table 7-8 brings together results from the WQRM and near field modelling.

As shown in Table 7-6, existing water quality in Parramatta River generally exceeds the relevant waterway objectives. Overall, the operation of the Camellia-Rosehill WRRF would provide improvements in the water quality of the river. These improvements generally consist of lower nutrient concentrations, pathogens and algal biomass, and higher levels of dissolved oxygen. Further improvements in water quality are also predicted due to

the project reducing wastewater network overflows. The project is therefore expected to maintain and protect the waterway objectives.

Table 7-8: Predicted changes to water quality in comparison to waterway objectives due to operation of the WRRF

Indicator	Predicted changes due to operation of the Camellia-Rosehill WRRF
Aquatic ecosystems	
Total phosphorus	**Reductions** in annual medians relative to background scenario for all rainfall years
Total nitrogen	**Reductions** in annual medians for average and higher rainfall years. **Minor increases** in annual median under lower rainfall year conditions due to impacts from offline tertiary-treated release events
Chlorophyll *a*	**Reductions** in annual medians relative to background scenario for all rainfall years
Turbidity / Total suspended solids	**Minor reductions** in annual medians compared to background scenario
Salinity / Electrical conductivity	**Reductions** in annual medians compared to background scenario
Dissolved oxygen	**Minor increases** in annual medians compared to background scenario
pH	**No impacts on pH** are predicted and a pH of 7 is achievable for both release streams.
Temperature	**Potential for minor increases in annual medians** compared to background scenario
Oxidised nitrogen (NOx)	**Potential for minor increases in annual medians** compared to background scenario
Ammonium (NH4+)	**Potential for minor increases in annual medians** compared to background scenario
Filterable reactive phosphorus (FRP)	**Reductions** in annual medians compared to background scenario
Toxicants	The potential for toxicity and environmental harm for both streams is predicted to be **low**, as summarised in Section 7.4.5.3.
Biological assessment indicators	Refer to Section 7.7 for aquatic biodiversity impacts
Summary	***While some minor impacts are expected, on balance the project is predicted to protect and maintain the ecological condition of aquatic systems and their riparian zones over time.***

Indicator	Predicted changes due to operation of the Camellia-Rosehill WRRF
Visual amenity	
Visual clarity and colour	Both release streams are free from substances that would inhibit any visual clarity and colour.
Surface films and debris	Both release streams are free from oils, petrochemicals, floating debris and litter.
Nuisance organisms	No overall increase in nuisance organisms is predicted. Overall reductions in chlorophyll *a* indicates a potential decrease in algal biomass in the waterway.
Summary	***Impacts to the visual amenity of the Parramatta River are unlikely. The project is predicted to maintain the visual amenity of Parramatta River***
Primary and secondary contact recreation	
Turbidity	**Reductions** in annual medians for total suspended solids compared to background scenario.
Faecal coliforms	**Negligible** concentrations of faecal coliforms would be present in both release streams.
Enterococci	**Reductions** in annual medians compared to background scenario
Protozoans	**Not present** in both release streams.
Algae and blue green algae	**Overall reductions** in chlorophyll *a* indicates a potential decrease in algal biomass in the waterway.
Nuisance organisms	**No overall increase** in nuisance organisms is predicted.
pH	**No impacts on pH** are predicted and a pH of 7 is achievable for both release streams.
Temperature	**Minor increases i**n annual medians compared to background scenario
Chemical contaminants	The potential for toxicity and environmental harm for both streams is predicted to be **low**, as summarised in Section 7.4.5.3.
Visual clarity and colour	Both release streams are free from substances that would inhibit any visual clarity and colour.
Surface films	Both release streams are free from oils, petrochemicals, floating debris and litter.
Summary	***The project is predicted to improve water quality for recreational activities.***

Indicator	Predicted changes due to operation of the Camellia-Rosehill WRRF
Aquatic foods (cooked)	
Algae and blue-green algae	**Overall reductions** in chlorophyll *a* indicates a potential decrease in algal biomass in the waterway. Also, fishing is not allowed in Homebush Bay due to contamination and there is a commercial fishing ban throughout Parramatta River and Sydney Harbour. Therefore, consumption of aquatic organisms is not recommended.
Faecal coliforms	**Negligible** concentrations of faecal coliforms would be present in both release streams.
Toxicants (as applied to aquaculture activities)	The potential for toxicity and environmental harm for both streams is predicted to be **low**, as summarised in Section 7.4.5.3.
Physico-chemical indicators (as applied to aquaculture activities)	**Overall reductions** in nutrients, turbidity, salinity and dissolved oxygen.
Summary	***This waterway objective is a long-term goal for Parramatta River, given that consumption of aquatic foods west of Sydney Harbour Bridge is currently not permitted.***

7.4.6 Operational impacts on North Head EPL and wastewater system

The previous sections have provided an overview of the potential impacts from the river release within the Parramatta River. This section focuses on the impacts to the overall wastewater system, including how the project would impact compliance with the North Head EPL and impacts to dry and wet weather overflows.

7.4.6.1 Compliance with existing North Head EPL

As outlined in Chapter 4 (Statutory context), Sydney Water holds the existing EPL 378 for the Northern Suburbs Sewage Treatment System, which includes operation of the North Head WRRF. Camellia pumping station is part of this system and operates under this EPL. As the project would be connected to this system, Sydney Water proposes to incorporate the project into the existing EPL.

Sydney Water intends to apply to the EPA to vary the EPL to include operation of the Camellia-Rosehill WRRF and a new release point to Parramatta River. The project would result in improved compliance with the existing concentration and load limits in the EPL, given that there is a net reduction in flows to the NSOOS and North Head WRRF. Sydney Water is having separate discussions with the EPA regarding the overall wastewater system, including a review of existing concentration and load limits.

Table 7-9 compares the expected annual loads for key pollutants of brine with current EPL load limits and actual loads in 2023/24. For most pollutants, there is a substantial decrease in loads to the NSOOS. The forecast loads of key contaminants in the brine are expected to have a minimal impact on the annual loads discharged at the North Head WRRF.

Table 7-9: Forecast brine loads compared to NSOOS EPL Limits

Pollutant	NSOOS current load (kg/year)	EPL licenced load (kg/year)	Estimated reduction in loads from wastewater diversion (kg/L)	Estimated load from brine transfer (kg/year)
Biochemical oxygen demand	24,532,850	35,010, 800	6,898,500	102,200
Total suspended solids	25,300,414	35,010, 800	7,409,500	19,710
Total nitrogen	6,730,340	7,957,000	1,596,875	161,330
Total phosphorus	863,572	1,909,680	200,568	2,920
Cadmium	8	283	2.6	0.5
Chromium	766	3,011	100	3.5
Copper	15,399	37,583	3,794	40
Lead	544	3,568	77	1
Mercury	4	60	1.2	0.03
Selenium	67	2,387	15	0.1
Zinc	33	51,066	3,909	134
Pesticides and polychlorinated biphenyls	2	370	Negligible - concentrations are below detection limit	No change

7.4.6.2 Proposed concentration limits for release to Parramatta River

The EPL would include pollution concentrations for the new release to Parramatta River. The proposed concentration limits are included in Table 7-10. The pollutants listed are those typically covered in an EPL for this type of discharge. The pollutant concentrations differ slightly from the Table 7-4 for operational purposes, however Sydney Water would operate the plant consistent with the impacts assessed in this EIS.

Table 7-10: Proposed EPL concentration limits for release to Parramatta River

Pollutant	Advanced treated water 50th percentile	Advanced treated water 90th percentile
Aluminium (µg/L)	-	150
BOD (mg/L)	-	2
Cadmium (µg/L)	-	0.3
Chlorine (total residual) (mg/L)	-	0.1
Copper (µg/L)	-	1.4
Faecal Coliforms (cfu/100 mL)	-	10 (80th percentile)
Iron (µg/L)	-	120
Nickel (µg/L)	-	3
Nitrogen (ammonia) (mg/L)	0.2	0.5
Nitrogen (total) (mg/L)	0.35	0.7
pH	-	6.5 - 8.5
Phosphorus (total) (mg/L)	0.009	0.03
Total suspended solids (mg/L)	4	8
Zinc (µg/L)	-	8

7.4.6.3 Impacts to dry and wet weather overflows

The project would divert flows from the northern suburbs wastewater system for treatment at the Camellia-Rosehill WRRF and would return brine via the Camellia pumping station. There would be a net reduction of between 56 – 63 ML/day of wastewater in the NSOOS once the Camellia-Rosehill WRRF is operating at full capacity. As a result, the frequency and volumes of wet weather overflows from the downstream wastewater network will reduce. The risk of dry weather overflows would also reduce. This would result in a positive impact on waterways. These benefits have been modelled as part of the hydrodynamic and water quality modelling with results summarised in Section 7.4.5.

The transfer of brine from the Camellia-Rosehill WRRF to the NSOOS has the potential to impact the NSOOS wastewater quality, as brine is more concentrated than wastewater, with higher levels of total dissolved solids, sodium and chloride. This change has the potential to impact the quality of wet weather overflows from the NSOOS (downstream of the connection point).

Sydney Water has prepared a mass balance model to predict the potential impacts of the brine transfer on the water quality of the wet weather overflows. The model predicted that concentrations of total dissolved solids would increase in the overflow discharges. However, these impacts are considered to be minimal given that the overflows are to waterways with existing high levels of total dissolved solids. Also on balance, given the reduction in frequency and volumes of wet weather discharges, the project would potentially have a positive impact on waterways currently impacted by overflows from the NSOOS.

7.4.7 Waterways monitoring

Monitoring of the treated water releases, and also within the receiving waterway, are key to determining the impacts on ambient water quality from operation of the project. These include:

- monitoring of treated water for assessment of the performance of the Camellia-Rosehill WRRF over a range of operating conditions
- monitoring in the Parramatta River for evaluation of impacts on the receiving waterway relative to baseline conditions.

Table 7-11 outlines the proposed monitoring. All monitoring is to follow Sydney Water's standard sampling and laboratory procedures and also align with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (NSW EPA, 2022a).

Table 7-11: Waterways monitoring

ID	Monitoring	Requirement	Timing
WQ01	Treated water quality monitoring	**Frequency** Monitor release volumes daily with a calibrated flow meter, including during offline events/ incidents where tertiary treated water is released. Monitor water quality every 6 days, or daily if tertiary releases occur. **Location** Monitor at suitable locations within the Camellia-Rosehill WRRF that are representative of the final release streams, including for flow metering. **Analysis and reporting** Water quality analysis is to be completed by Sydney Water's Laboratory Services, or an alternative National Association of Testing Authorities (NATA) accredited laboratory. Sydney Water will submit an Annual Return as required by the EPL. The Annual Return will report on pollutants listed in the EPL.	During operation

ID	Monitoring	Requirement	Timing
WQ02	Ambient water quality monitoring of Parramatta River	**Frequency** Monitor river quality every 3 weeks. This is consistent with the Sydney Water Aquatic Monitoring (SWAM) program. **Location** Collect samples at one location upstream and one location downstream of the release. The location of these 2 monitoring sites will be finalised in consultation with the EPA. All water samples to be collected from the surface or within a depth of 0.5 m of the surface. **Analysis and reporting** Analysis is to include duplicate samples. Field-based parameters (such as temperature, dissolved oxygen, pH, conductivity, turbidity) to be recorded for one of the samples. Field observations such as visual indications of pollution, odour and any other important general comments to be noted at each site. Report on parameters appropriate to the release stream and the receiving environment. Analysis is to be completed by Sydney Water's Laboratory Services laboratories, or an alternative NATA accredited laboratory. Reporting protocols to be finalised in consultation with the EPA.	During construction, pre- and post-commissioning and operation

7.5 Surface water

This section summarises the existing surface water environment and the project's potential impacts on surface water during construction and operation. It provides an overview of the key findings of the Surface Water and Geomorphology Impact Assessment (Aurecon, 2025) (Appendix G). Impacts to water quality during operation and geomorphic attributes of waterways are separately addressed in Section 7.4 and Section 7.6 respectively.

7.5.1 Assessment methodology

The assessment methodology included:

- desktop review of available information to describe the existing surface water environment
- estimate of water demands and supply during construction and operation (water balance)
- description of the proposed stormwater management and water sensitive urban design measures (WSUD) at the Camellia-Rosehill WRRF
- assessment of potential impacts to surface water during construction and operation. This included assessing the significance of each potential impact with consideration of the sensitivity of the environment and the magnitude of the expected change. The magnitude of expected change was based on the duration and extent of the impacts and the estimated degree of change from pre-development conditions. Table 7-12 shows the matrix for assessing impact significance.
- modelling using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) to quantify pollutants contributing to stormwater pollutant loads as a result of the project during operation. This included analysing the effectiveness of stormwater management measures by predicting the potential reductions that could be achieved for key pollutants (gross pollutants, total suspended solids, total phosphorus and total nitrogen).
- comparison of impacts against waterway objectives outlined in Table 7-2
- identification of mitigation measures to minimise potential impacts.

Table 7-12: Assessing impact significance for surface water impacts

Magnitude of impact	Sensitivity of environmental values		
	High High conservation waterway within an undisturbed catchment with rare / unique ecological receptors	**Moderate** Moderately disturbed waterway, with a moderate ecological value and/or used for recreation	**Low** Heavily modified waterway, with limited environmental or human value
High Any widespread impact that results in a moderate to large permanent change from pre-development conditions	Severe	Major	Moderate
Moderate Localised impact that results in a moderate to large change from pre-development conditions for short-term to permanent	Major	Moderate	Minor
Low Localised impact that results in minimal change from pre-development conditions for less than one week	Moderate	Minor	Negligible

7.5.2 Existing environment

The project is located in the Parramatta River catchment, as shown in Figure 7-9. Several waterways within this catchment are directly impacted by the project. The Camellia-Rosehill WRRF is situated on the northern shore of Duck River and the river release structure is located in Parramatta River near John Whitton Bridge. The catchment has been largely urbanised and has a long history of industrial development. More details on the Parramatta River catchment have been provided in Section 7.4.2.

The Camellia-Rosehill WRRF site is predominantly flat, and the closest waterway is Duck River which would receive the majority of surface water runoff from the WRRF. Chapter 9 (Soils and contamination) describes existing soil landscape types and characteristics in detail.

Table 7-13 lists the key waterways relevant to the project, their Strahler order and High Ecological Value Aquatic Ecosystem (HEVAE) instream values. The HEVAE values define levels of importance for freshwater river reaches (NSW DCCEEW, 2024a). Also, a higher Strahler stream order means higher flows in the waterway. Figure 7-10 shows the key waterways.

Generally, all waterways are deemed to have low HEVAE instream value, primarily due to the highly urbanised nature of the Parramatta River catchment.

Sydney Water has also undertaken baseline water quality monitoring in the Parramatta River as part of the project. This was to understand baseline conditions upstream and downstream of the proposed river release. Section 7.4.2 provides more detail of the existing water quality.

Table 7-13: Key waterways impacted by the project

Waterway	Strahler stream order	Perenniality and tidal influence	HEVAE Instream Value
Parramatta River	4	Perennial	Low (from Charles Street Weir to Newington Nature Reserve) No values assigned from downstream of Newington Nature Reserve
Duck River	3	Perennial	Low
Vineyard Creek	2	Perennial	Low
Haslams Creek	2	Perennial	Low
Charity Creek	1	Ephemeral	Low
Archer Creek	2	Perennial	Low
Unnamed waterway	1	Ephemeral	Low
Narawang Wetland	N/A	Perennial	No values assigned.

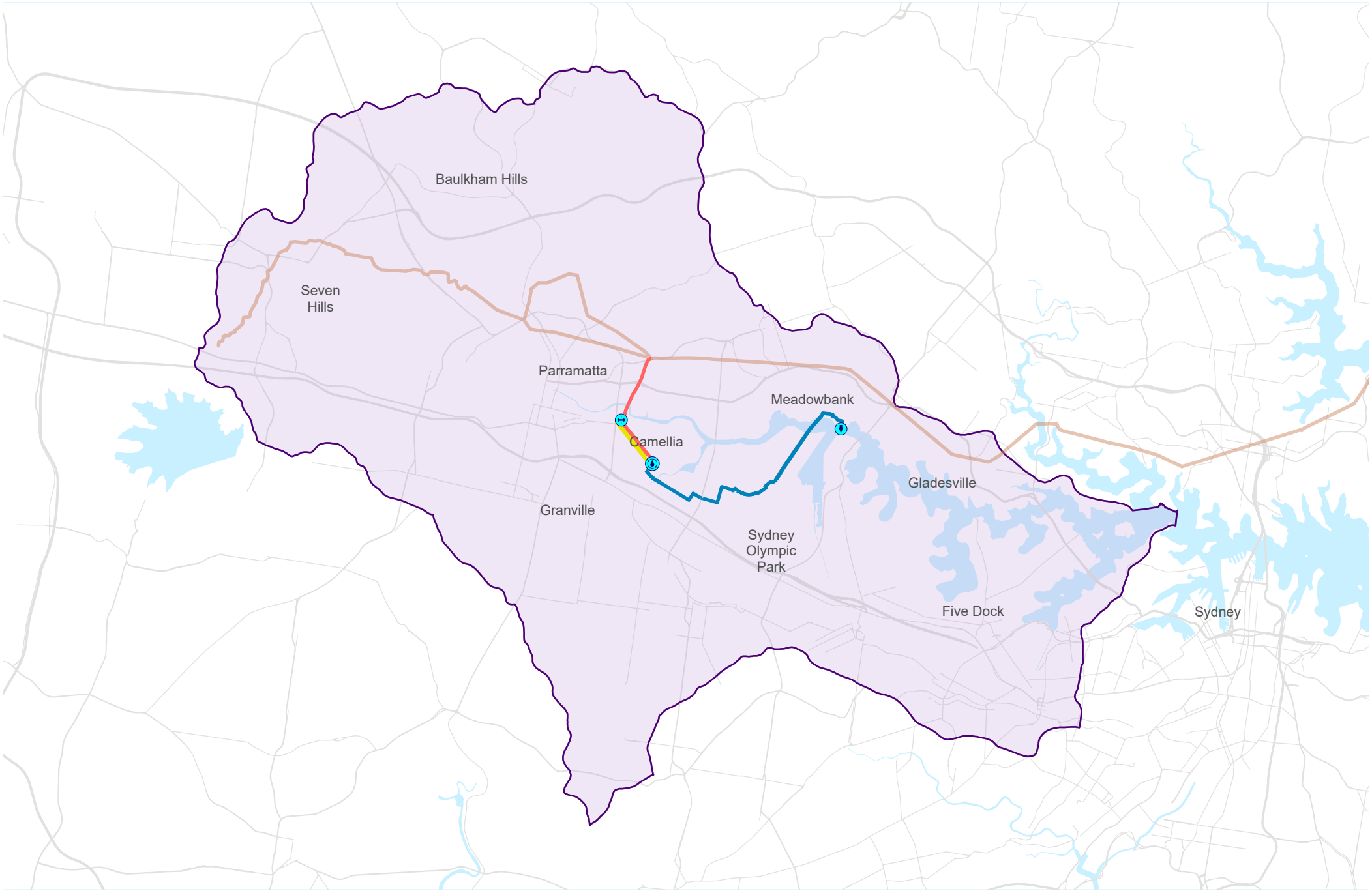

Figure 7-9 Parramatta River catchment

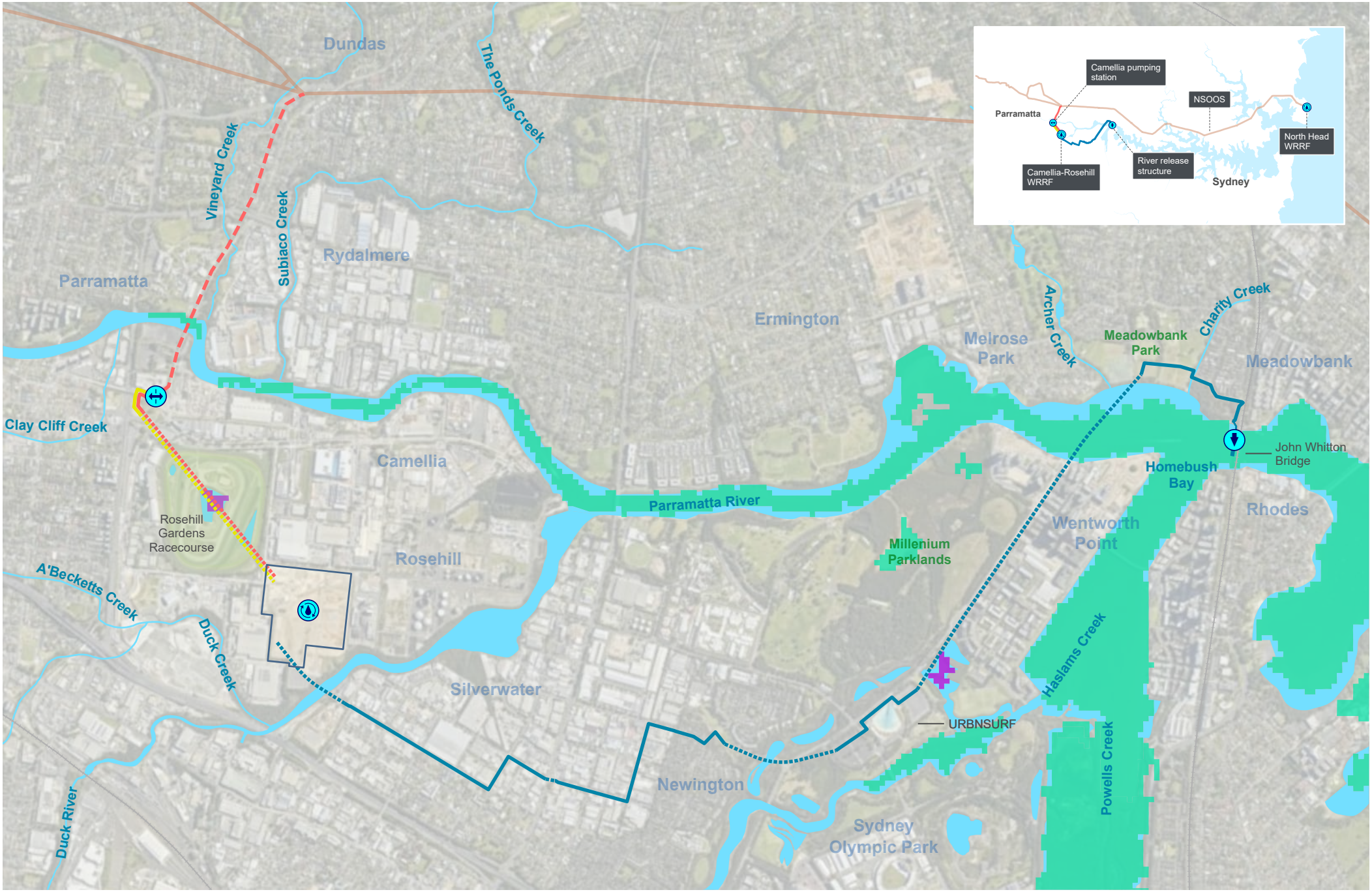

Figure 7-10 Local and regional waterways

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025

Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

7.5.3 Construction impacts

Key construction activities include excavation, earthworks, spoil management, landscaping and stockpiling. These activities have the potential to cause erosion, increase sediment loads and contaminants in surface water runoff and sedimentation in the receiving waterways (including via stormwater drainage).

No extraction of surface water from waterbodies is required during construction.

During construction, key water demands are anticipated from dust suppression, stockpile wetting and hydrostatic testing. Based on evaporation and rainfall differentials, the annual volume of water required during construction is up to 79.3 ML/year.

Table 7-14 summarises potential impacts on surface water, detailing their location, associated construction activities and the significance of each impact. The impact significance rating in the table below is the un-mitigated rating. All impacts are temporary and implementing the mitigation measures in Section 7.5.5 would reduce the impact significance to minor for all of the below impacts.

Table 7-14: Summary of potential surface water impacts during construction

Construction activities	Location	Impact summary	Impact significance
Ground disturbance including earthworks, cutting, stockpiling and trenching	All work sites	Sediment-laden runoff from stockpiles and excavations may enter the receiving waterways. The impact is moderate because: • increased turbidity in waterways due to sedimentation may affect aquatic ecosystems and aesthetics of the water for recreational activities • increased level of nutrients and other pollutants may be introduced in the waterways • contaminated spoil materials such as ASS may generate acidic runoff.	Moderate
Placement of river release structure on the riverbed	Parramatta River near John Whitton Bridge (C30)	The placement of the river release structure on the riverbed and construction of the cofferdam or similar temporary structure may disrupt and mobilise contaminated sediments into the water column. The impact is major because the mobilisation of contaminated sediments may impact water quality within the river and potentially lead to acute toxic effects within the waterway. These impacts are specifically limited to impacts on surface water quality resulting from the disturbance and	Major

Construction activities	Location	Impact summary	Impact significance
		mobilisation of sediments. Impacts to geomorphic attributes of waterways associated with sediment mobilisation are discussed in detail in Section 7.6.	
Storage, transport, use and handling of chemicals	All work sites	Any leaks or spills from the machinery operation, storage, transport, use and handling of chemicals may introduce contaminants to surface water runoff. The impact is moderate because: • contaminated runoff may adversely impact the water quality of the waterways • acute toxicity effects may occur on ecosystems in the receiving waterways.	Moderate
Trenchless construction for pipelines	Where the launch and receiving pits are proposed (C16, C17, C18, C20, C21, C26, C27, C28) and drilling return lines (if required)	Loss of drilling fluids or leaks from drilling return lines during trenchless construction may result in an uncontrolled release of drilling fluids via surface runoff into the local waterways. There is potential for increased turbidity and sedimentation, which may lead to a temporary local ecological degradation in the waterway.	Moderate

7.5.4 Operational impacts

The proposed above ground structures, buildings, roads, and impervious surfaces at the Camellia-Rosehill WRRF site may alter the long-term surface water environment. As most of the pipeline infrastructure is underground, surface water impacts are expected to be minimal. Potential risks are primarily associated with pipe failures, such as leaks or bursts, which could introduce contaminants into adjacent waterways as addressed in Table 7-15. Impacts to water quality due to the treated water releases are addressed separately in Section 7.4. Therefore, the operational assessment focused on the surface water impacts associated with the Camellia-Rosehill WRRF site.

The operational water balance for the Camellia-Rosehill WRRF predicted the following:

- stormwater runoff to Duck River – 149 ML/year
- total water demand for on-site workforce and site maintenance – 0.6 ML/year
- wastewater generated by on-site staff and site maintenance – 0.4 ML/year.

There is an existing stormwater system that is made up of twin underground pipes located in a north-south direction at the Camellia-Rosehill WRRF site. This connects to an existing discharge point into Duck River. There is also an existing drainage channel along the western boundary of the WRRF site that ultimately drains to Duck River. These existing systems would be utilised along with the following proposed stormwater management measures at the Camellia-Rosehill WRRF:

- roof drainage for all buildings
- foul water system to capture runoff including stormwater and any other spills or runoff generated within the operational areas of the Camellia-Rosehill WRRF. The runoff would be pumped back to the inlet works for treatment as part of the wastewater stream
- gross pollutant traps to remove large pollutants from the stormwater runoff before entering the first flush capture system
- first flush capture system to manage on-site stormwater pollutants (which are not collected by the foul water system), including gross solids, oil and grease, accidental spills and chemical leaks. It would be designed to capture the first 10 mm of runoff generated by any rainfall event from the roads and hardstand areas. The first flush capture would be pumped back to the inlet works for treatment as part of the wastewater stream.

No on-site detention basin is proposed for the project. Figure 7-11 shows the proposed stormwater management and WSUD measures that would be implemented at the Camellia-Rosehill WRRF site. Chapter 3 (Project description) describes stormwater management at the Camellia-Rosehill WRRF in more detail.

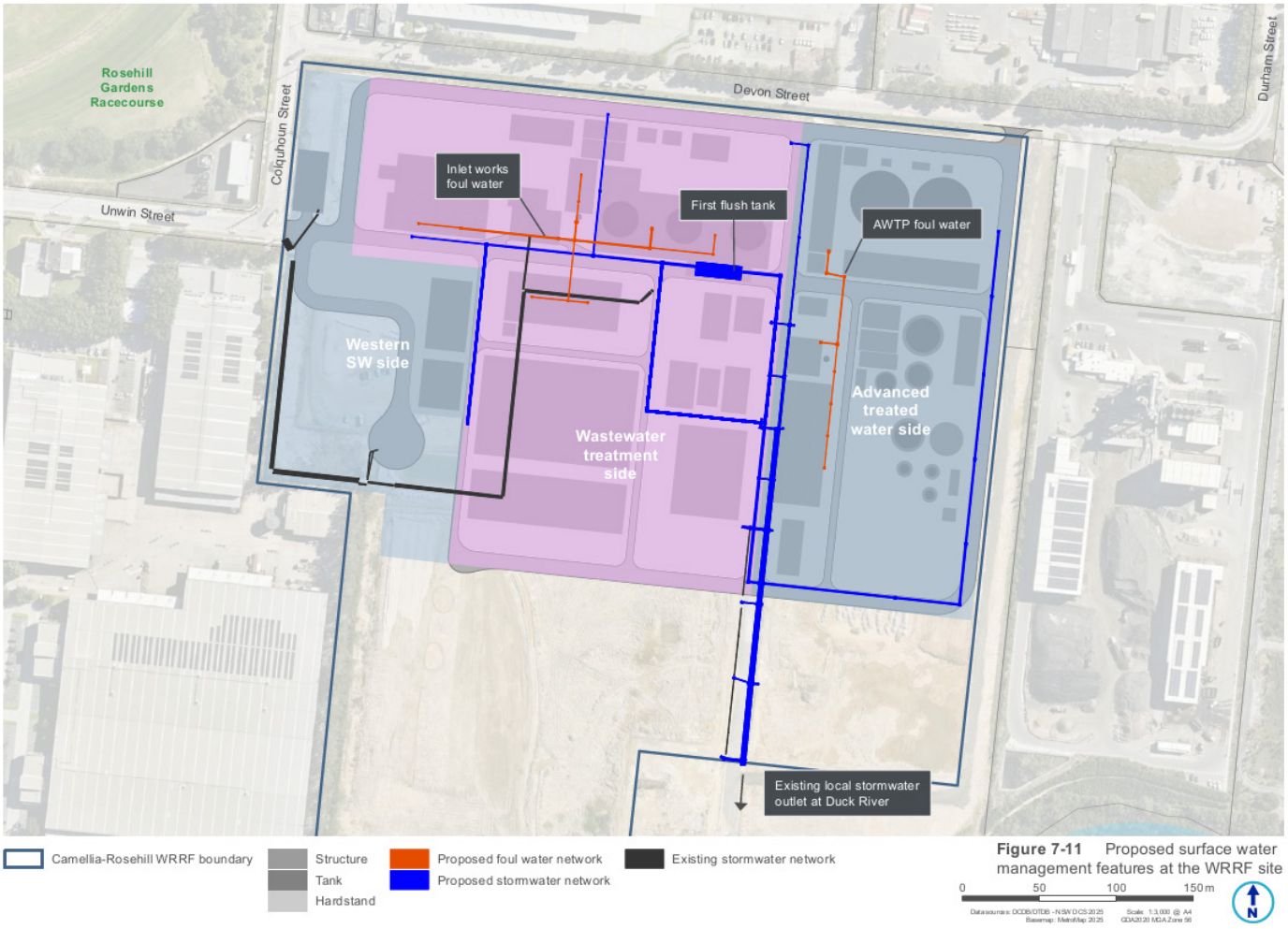

Figure 7-11 Proposed surface water management features at the WRRF site

Figure 7-11 Proposed surface water management features at the WRRF site

Stormwater runoff that is not captured by first flush or foul water system would enter the existing stormwater system and be discharged into the Duck River. Under the BCSEPP, any stormwater released into waterways within the Sydney Harbour catchment should either improve water quality or ensure that pollutant loads do not exceed existing or pre-development levels. Given that the Duck River connects to the Parramatta River, which ultimately drains into Sydney Harbour, the quality of stormwater discharge is important. To comply with this requirement, the implementation of WSUD initiatives is proposed. The outlet of the existing stormwater system is already equipped with gross pollutant traps and energy dissipation structure for scour control. During detailed design, Sydney Water would consider implementing additional WSUD measures, such as filtration cartridges and gross pollutant traps, on assets within the WRRF that connect to the existing stormwater system to demonstrate a net reduction in pollutants entering the Duck River.

By implementing the existing and proposed measures at the WRRF site, MUSIC modelling predicts that pollution load reductions in surface water runoff can be achieved (compared to the existing conditions). The modelling shows potential pollution load reductions of:

- 66% for total suspended solids
- 63% for total phosphorus

- 49% for total nitrogen
- 100% for gross pollutants.

Table 7-15 summarises the project's potential operational surface water impacts. Overall, the project is expected to have minor impacts on the surface water environment during operation with the implementation of the proposed stormwater management measures. The predicted reduction in potential pollutant loads indicates that the project would have a neutral or positive impact on waterway objectives identified in Section 7.4.1.1.

Table 7-15: Summary of potential surface water impacts during operation

Operational activities	Location	Impact summary	Impact significance
New development and impervious surfaces	Camellia-Rosehill WRRF	Increased runoff may occur due to the increase in impervious surfaces discharging to Duck River. There may be increased pollutant loads (total suspended solids, total phosphorus and total nitrogen) in the runoff. The impact is minor because modelling indicates that the pollutant load reductions can be achieved through WSUD. This means that the new development would not adversely impact waterways and is likely to have a neutral or positive impact on waterway objectives.	Minor
Storage, transport, use and handling of chemicals	Camellia-Rosehill WRRF	The operation of machinery, storage, transport, use, handling and spills of chemicals may introduce contaminants to surface water runoff. The impact is moderate because: • contaminated runoff may adversely impact the water quality of the waterways • acute toxicity effects may occur on ecosystems in the receiving waterways.	Moderate
Pipe leaks or bursts	Pipelines	Water leaking from the pipelines may impact water quality in waterways that intersect with the pipelines. The advanced treated water being conveyed via the river release pipeline would be unlikely to cause significant impacts given its high quality. The brine and transfer pipelines would be transferring brine and wastewater respectively, that has potential to cause adverse impacts to the surface water environment. Sydney Water designs its pipelines to a high standard and would be operated under pressure to prevent leaks and failures as described in Chapter 3 (Project description). Sydney Water's standard procedures include regular inspections and incident response procedures, which would also manage this potential impact.	Minor

Operational activities	Location	Impact summary	Impact significance
		The impact significance is minor, because any residual impacts would be local and temporary.	

7.5.5 Mitigation measures

The project has been designed to avoid and minimise impacts to surface water, where feasible. Sydney Water would manage potential impacts during construction through implementation of the CEMP.

Project-specific mitigation measures that would be implemented to manage potential surface water impacts are provided in Table 7-16.

Table 7-16: Surface water mitigation measures

ID	Potential impact	Requirement	Timing
SW01	Surface water runoff impacts, including contamination entering waterways	Develop a Soil and Water Management Plan (SWMP). The SWMP is to identify the locations, general principles (such as storing contaminated and waste materials away from drainage lines) and the nature of key environmental controls (use of silt fences, energy dissipators etc.) that may be adopted across the project area. The SWMP will identify: • roles and responsibilities • monitoring and auditing requirements.	Prior to and during construction
SW02	Spoil impacted by ASS entering waterways	Develop and implement an Acid Sulfate Soil Management Sub-Plan (ASSMP). The ASSMP will be prepared and implemented in accordance with the Acid Sulfate Soils Management Advisory Committee: Acid Sulfate Soils Assessment Guidelines (ASSMAC, 1998).	Prior to and during construction
SW03	Runoff or construction impacted water entering waterways	Develop and implement a dewatering protocol to manage dewatering during the works. This would include: • a process for testing whether water meets discharge criteria • water treatment methods including flocculation and pH adjustment • discharge process and location/s including avoiding erosion or scour • record requirements including test results and location of disposal to offsite at a licenced facility • separate surface water and groundwater management requirements.	Prior to and during construction

ID	Potential impact	Requirement	Timing
SW04	Loss of drilling fluid during trenchless construction	Develop a Drilling Fluid Management Protocol to minimise the potential for impacts, including: • contain and monitor drilling fluids at launch and receival pits • identify, manage and clean-up frac-outs to prevent environmental harm • re-use and/or disposal of drilling fluids appropriately.	Prior to and during construction
SW05	Chemical or fuel spills entering waterways	Incorporate chemical or fuel spill mitigation measures and a spill response procedure in the SWMP. This should include the following measures: • maintain spill kits in appropriate locations in accordance with Australian Standards, including where required inside machinery and vehicles • 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 • all vehicles, plant and equipment to be checked regularly for fuel tank and line leaks or failures • bunds and sumps should be regularly inspected, and capacity maintained by regular draining and disposal. Spill clean-up response protocols would be adopted into operational protocols for the Camellia-Rosehill WRRF as a standard requirement.	Prior to and during construction During operation
SW06	Increased pollutant loads entering Duck River from the Camellia-Rosehill WRRF	Implement additional water sensitive urban design measures, such as filtration cartridges and gross pollutant traps, on assets connecting to the existing stormwater system to demonstrate a net reduction in pollutants entering Duck River from the Camellia-Rosehill WRRF.	During detailed design and operation

ID	Potential impact	Requirement	Timing
SW07	Pipe leaks or bursts	Operate the project in accordance with Sydney Water's existing management systems (or equivalent contractor management systems), including: • Asset Management System (ISO 55001) • Quality Management System (ISO 9001) • Health and Safety Management System (AS/NZ 4801) • Environmental Management System (ISO 14001).	During operation
SW08	Surface water quality impacts (associated with instream works in the river)	Monitor water quality during instream works. Refer to **GE01** (Appendix E).	Prior to and during construction

7.6 Geomorphology

This section summarises the existing geomorphic attributes of waterways and the project's potential impacts on geomorphology during construction and operation. It provides an overview of the key findings of the Surface Water and Geomorphology Impact Assessment (Aurecon, 2025) (Appendix G).

7.6.1 Assessment methodology

The assessment methodology included:

- desktop review and analysis of the following documents and modelling to characterise the existing environment and inform the assessment:
  - publicly available reports and data on Parramatta River and Sydney Harbour processes
  - indicative construction methods of the river release pipeline and structure
  - review of sediment size and chemistry for cores retrieved from the river release site (Birch, G.F. & Batley,
    G.E., 2025)
  - computational fluid dynamics (CFD) modelling for releases in Parramatta River (Jacobs, 2025a) during operation to assess the risk of hydraulic conditions that would cause changes in the rate of sediment resuspension and transport
  - WQRM carried out as part of the Hydrodynamics and Water Quality Impact Assessment (as described in Section 7.4.4).
- assessment of potential impacts to geomorphology during construction and operation
- identification of mitigation measures to minimise potential impacts.

7.6.2 Existing environment

7.6.2.1 Geomorphic conditions

Table 7-17 summarises the river styles, geomorphic conditions and recovery potentials for waterways that are located within the study area. The condition of the Parramatta River foreshore is poor, based on the moderate erosion scarp and shoreline recession observed.

The River Styles Framework (NSW DCCEEW, 2025a) characterises geomorphic river styles, their behaviour, condition and recovery potential. The recovery potential refers to the likelihood that a river reach would improve its geomorphic condition over management timeframes from new development impacts.

Table 7-17: River styles and geomorphic condition of waterways relevant to the project (NSW DCCEEW, 2025a)

Waterway	River style	Geomorphic condition	Recovery potential
Parramatta River	Laterally unconfined, continuous channel, low sinuosity, (tidal), fine-grained bed	Poor	Low

Waterway	River style	Geomorphic condition	Recovery potential
Duck River	Laterally unconfined, continuous channel, low sinuosity and fine-grained bed	Poor	Low
Vineyard Creek	Partly confined, bedrock margin-controlled, low sinuosity, discontinuous floodplain, fine-grained bed	Poor	Moderate
Haslams Creek	Anthropogenic, bedrock margin-controlled, urban watercourse, bedrock bed	Poor	Low
Archer Creek	Anthropogenic, bedrock margin-controlled, urban watercourse, bedrock bed	Poor	Low

7.6.2.2 Sediments

The catchment has a long history of significant industrial land use, contributing to contaminated sediments from discharge of harmful substances into the waterway, particularly in Homebush Bay. The contaminants include dioxins, furans and heavy metals. Sediment sampling undertaken for the project confirmed the presence of these legacy contaminants at elevated concentrations.

Over time, the contaminated sediments have been remobilised throughout large parts of the Sydney estuary by hydrodynamic processes, caused by tides, high winds and flood events. Resuspension of these contaminated sediments have occurred from Homebush Bay into secondary deposition zones in downstream locations, including Meadowbank.

Sediments at Meadowbank are dominated by clay and silt-size particles, indicating a depositional environment of fine materials. The sediment chemistry and sizes have been used to inform the potential impacts on the sediment transport assessment (Birch, G.F. & Batley, G.E., 2025).

7.6.3 Construction impacts

The project would require construction within waterways. This includes the construction of the pipelines and the river release structure. This has the potential to impact the geomorphology of waterways. Impacts associated with surface water quality are covered in Section 7.5.

7.6.3.1 Waterway crossings for pipelines

The transfer pipeline and brine pipeline alignments between the Camellia pumping station and the Camellia-Rosehill WRRF do not intersect with waterways. The brine pipeline between the Camellia pumping station and the NSOOS crosses Parramatta River and Vineyard Creek. This section would involve relining an existing pipeline, so direct impacts to waterways is not required. The river release pipeline would cross Parramatta River, Duck River and Narawang Wetlands. Trenchless methods are proposed for these sections.

The construction of the river release pipeline sections that cross waterways have the potential to impact the geomorphic attributes of these waterways. However, no trenching or open excavations would be undertaken across these waterways. With the exception of the river release structure (discussed below), no water extraction or placement of machinery and environmental controls are proposed within the waterways. As such, no impacts are expected to the geomorphic attributes of waterways due to pipeline construction.

7.6.3.2 River release structure

The project would require the construction of a river release structure that would release treated water into Parramatta River during operation. The river release structure would consist of 8 pipelines placed on the riverbed, with multiport diffusers to be connected. Chapter 3 (Project description) provides further details on how the river release structure would be constructed.

Key construction activities of the river release structure include:

- constructing a cofferdam (or similar temporary structure) at the riverbank to connect the upstream ends of the pipelines to the sections of the river release structure. This would require removal of the existing sandstone seawall, which would be reconstructed once the pipelines are connected. The cofferdam would be sealed off from the river to minimise river water ingress.
- removing cofferdam and temporary sandbags
- laying geotextile mattress on top of the riverbed at the location of the river release
- using barges, tugs and divers to position sections of pipe on top of the geotextile mattress
- using a land or barge-based crane to anchor the pipeline protection system (i.e. concrete mattress) on top of the pipelines.

The cofferdam would extend about 20 m into the channel from the riverbank. This would cause a slight narrowing of the river channel, which may result in locally elevated velocities during the rising and falling tides. The elevated velocities may result in localised increases in sediment transport. However, this would be temporary and it is not expected that the velocities would cause any long-term channel banks or bed material erosion.

The geotextile mattress is intended to minimise the disturbance or resuspension of sediment during placement of the pipelines and diffusers. This would be laid carefully to minimise disturbance to the underlying sediments. During the placement of pipelines and diffusers, the geotextile mattress on the riverbed would prevent any disturbance of underlying sediments and would act to keep bed sediments in place. Therefore, these works pose a minimal risk of adding to sediment bed load and background sediment transport processes.

The concrete mattress (or similar performing structure) is proposed to overlay the pipelines as a pipeline protection measure. It is intended to improve the bearing capacity of the riverbed to support the river release structure, provide scour protection and minimise the risk of mobilising the underlying sediments. Placement of the mattress would occur in sections using cranes to minimise the extent of works on the riverbed at any one time.

Any residual sediment disturbance during construction would represent a relatively localised and instantaneous increase in sediment bed load, which may be transported either upstream or downstream for a short distance. This can be supported by the existing sediment transport processes observed during slack tide conditions (i.e. when the tidal movement is minimal) and in the absence of storm flow. Under these conditions, the majority of sediment is transported to the area immediately downstream between John Whitton Bridge and Ryde Bridge. This zone is found to be a secondary deposition area where contaminated sediments would collect over time from Homebush Bay, as described in Section 7.6.2.2. Therefore, any residual increase in sediment load caused by the construction would be comparable to sediment loads generated by existing waterway processes such as high winds and tides.

Any displaced or disturbed sediments would be contained as much as possible through the use of sediment retention devices such as floating booms and silt curtains. Overall, the potential impacts to sediment mobilisation are not expected to be significant and can be adequately managed through the implementation of mitigation measures outlined in Section 7.6.5.

7.6.4 Operational impacts

The release of treated water may increase flow volumes in the Parramatta River, which may potentially impact on geomorphic attributes of the river. The results of the WQRM (Section 7.4) and CFD model have been used to assess the risk that releases of treated water may contribute to or increase sediment transport compared to existing ambient flow conditions in the Parramatta River.

7.6.4.1 Flow velocity

The WQRM provides a representative approximation of tide flows and velocities along the entire Parramatta River estuary from the Charles Street Weir to the heads of Sydney Harbour. Locations 100 m and 200 m upstream and downstream from the river release structure were selected for analysis. The WQRM results indicate that potential impacts are contained within this range.

The assessment involved a comparison of hydrologic characteristics from the WQRM for the following scenarios (as described in Section 7.4):

- background scenario representing the catchment conditions in 2056 without the operation of the Camellia-Rosehill WRRF (no releases of treated water from the WRRF)
- impact scenario representing the catchment conditions in 2056 with the treated water releases from the Camellia-Rosehill WRRF.

Results from the WQRM indicate the following changes in velocities in the impact scenario relative to the background scenario:

- from 0.125 m/s (background scenario) to 0.12 m/s (impact scenario) in the upstream of the river release structure
- from 0.125 m/s (background scenario) to 0.13 m/s (impact scenario) in the downstream of the river release structure.

Once the treated water is released, the velocities upstream of the river release structure would reduce by up to 5%, while velocities downstream are predicted to increase by a similar percentage. These localised change in velocities are not sufficient to change the sediment depositional or transport potential of the river. The Surface Water and Geomorphology Impact Assessment (Appendix G) provides a more comprehensive analysis, including graphs and numerical outputs.

7.6.4.2 Sediment mobilisation

CFD modelling was also undertaken to determine the sediment transport potential in the immediate vicinity of the river release structure. The models represent the zone extending 135 m upstream and 185 m downstream of the river release structure. The model incorporated the existing and proposed infrastructure and design measures, including diffusers, pipelines, geotextile mattress, surrounding bathymetry and bridge piers beneath the John Whitton Bridge.

Sediment analysis indicated that sediment transport would accelerate in areas where bed shear stress exceeds 0.05 newtons per square metre (N/m^2), which indicates sufficient force to mobilise surface sediments. Additionally, resuspension of bed materials is expected when flow velocities exceed 0.2 m/s. Sediment sampling established this velocity threshold, which serves as the indicative transport limit for bed materials at this site.

Model results predict that the project would not increase bed velocity and shear stress during higher channel flows, including frequent storm events and flood conditions. The largest influence on channel bed velocities is predicted during flood tides and periods of reduced channel flow. Increases in velocity of greater than 0.2 m/s were predicted. However, the changes in velocities are confined within the extent of the proposed geotextile mattress. This means that the shear stress downstream of the river release structure and outside of the geotextile mattress remains below the critical shear stress considered in this analysis (i.e. < 0.05 N/m^2). Therefore, the risk of sediment remobilisation is low, primarily due to the placement of a geotextile mattress under the river release structure.

On this basis, there are negligible changes in velocity and shear stress due to the treated water releases. Therefore, impacts to geomorphic attributes of the Parramatta River are unlikely, particularly given its poor geomorphic sensitivity.

7.6.5 Mitigation measures

The project has been designed to avoid and minimise impacts to geomorphology, where feasible. Sydney Water would manage potential impacts during construction through implementation of the CEMP.

Project-specific geomorphology mitigation measures that would be implemented to manage potential impacts are provided in Table 7-18.

Table 7-18: Geomorphology mitigation measures

ID	Potential impact	Requirement	Timing
GE01	Mobilisation of contaminated sediments	Develop a River Release Structure Construction Environmental Work Method Statement (RRSC EWMS). This document will establish the locations and nature of key environmental controls for mitigating environmental risks during construction of the river release structure. This should be prepared in consultation with relevant stakeholders, including local Councils, NSW Maritime and NSW DPIRD Fisheries. The RRSC EWMS would include: • construction methods for the temporary works (assessed as the cofferdam) and river release structure equipment used to place concrete mattresses (or similar performing structure), pipes and nozzles slowly, carefully and minimising the need for repositioning • barge and watercraft traffic management (if required) • documentation, standard practices and emergency protocols • reference to the SWMP (for contamination and acid sulfate soil management) and the dewatering protocol • measures for: – avoiding aquatic biodiversity impacts – measures to avoid sediment disturbance, including sediment curtains (or similar device) – night works – water quality monitoring as per **WQ02** (Appendix E).	Prior to and during construction
GE02	Scour or changes in bathymetry due to river release	Inspect and take photographs of the zone around the pipeline installation within the river to check for any scour and major changes in local bathymetry in conjunction with asset structure checks. This will be done periodically by diver or remote operated vehicle, every 6 months for 2 years.	During operation

7.7 Aquatic biodiversity

This section summarises the existing aquatic biodiversity within the study area and the project's potential impacts on aquatic biodiversity during construction and operation. It provides an overview of the key findings of the Aquatic Biodiversity Impact Assessment (Stantec, 2025a) (Appendix H).

7.7.1 Assessment methodology

7.7.1.1 Assessment areas

The assessment has been undertaken within the following defined areas:

- impact assessment area and impact area (as defined in Chapter 6 (Impact assessment approach))
- survey area: The area where field surveys were undertaken and potentially be impacted by the project, which includes:
  - Parramatta River near Meadowbank
  - Duck River
  - Vineyard Creek.
- study area: The area which forms the boundary for database searches conducted as part of the desktop review. This covers the aquatic intertidal and subtidal area extending from James Ruse Drive to the Ryde Bridge. This was also based on the extent of potential impacts identified in the Hydrodynamics and Water Quality Impact Assessment (Appendix F) and Surface Water and Geomorphology Impact Assessment (Appendix G).

The survey area and study area are specific to this assessment. The Biodiversity Development Assessment Report included in Appendix L covers a broader range of habitats and species beyond those near waterways. As each assessment focus on different aspects (i.e. terrestrial or aquatic), some inconsistencies may be expected in the information presented.

Figure 7-12 to Figure 7-14 show the aquatic biodiversity features within the study area.

7.7.1.2 Methodology

The assessment methodology included:

- desktop review to determine the potential occurrence of aquatic habitat, vegetation and fauna such as listed threatened, protected and migratory species and marine pests, which includes:
  - a literature review of available scientific literature relating to background water quality and tolerance of aquatic species known to occur in the study area to key water quality indicators. The Aquatic Biodiversity Impact Assessment (Appendix H) details the databases and information sources accessed to inform the desktop assessment.
  - a review of technical specialist studies completed for the EIS including the Hydrodynamics and Water Quality Impact Assessment (Appendix F), Surface Water and Geomorphology Impact Assessment (Appendix G) and Groundwater Impact Assessment (Appendix K).

- field surveys, including:
  - habitat mapping
  - Riparian Channel and Environmental Inventory (RCE) method used to characterise and score the overall condition of each survey area
  - fish habitat type and waterway class assigned based on NSW Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (DPI, 2013) indices and descriptors.
- assessment of potential impacts to aquatic biodiversity during construction and operation
- identification of mitigation measures to minimise potential impacts.

7.7.2 Existing environment

The Parramatta River catchment supports a variety of important habitats, including diverse intertidal and subtidal habitats. Historically, Parramatta River catchment was bounded by substantial riparian forests that formed the transition between terrestrial woodland communities and aquatic habitats. Early clearing removed much of the native riparian forest, degrading streambank stability and increasing nutrient and sediment inputs into the river. Over time, these disturbances contributed to the expansion of mudflats and mangrove communities in the estuary.

7.7.2.1 Estuarine habitats and biota

Key aquatic habitats identified within the project include Parramatta River, Duck River and Vineyard Creek, which are all mapped as Key Fish Habitat (KFH).

Parramatta River

Parramatta River is mapped as Type 2 KFH and also classified as Class 2 (moderate KFH) as it is a permanently flowing estuarine waterway. A desktop review of the study area identified 34 finfish and estuarine macroinvertebrate species. While many of these species appear only once or twice in the dataset, the following species are recorded more frequently:

- mulloway (*Argyrosomus japonicus*)
- yellowfin bream (*Acanthopagrus australis*)
- dusky flathead (*Platycephalus fuscus*)
- sea mullet (*Mugil cephalus*)
- bull sharks (*Carcharhinus leucas*)
- smooth toadfish (*Tetractenos glaber*).

Parramatta River is heavily vegetated with mangroves and saltmarsh, which forms the most extensive marine vegetation community. Grey mangrove (*Avicennia marina subsp. Australasica)* is the dominant species that exist along the boundary of Meadowbank Park and Anderson Park, located on either side of the river release structure. Saltmarsh habitat is also present in patches along the boundary of Meadowbank Park and Wentworth Point. These are shown on Figure 7-12.

Artificial structures, such as seawalls and wharves, are present along the natural shorelines of Parramatta River within the study area. These artificial habitats provide habitat for marine biota and support different species assemblages. However, the diversity of this assemblage would be considered relatively poor as a result of frequent ferry wash disrupting settlement or impaired water quality.

The closest known seagrass beds to the river release structure are located approximately 2.8 km downstream in Morrisons Bay. These beds comprise of *Zostera sp.* and *Halophila sp.* Despite historical records indicating the presence of seagrass beds upstream of Morrisons Bay, it is highly unlikely that any seagrass would be found around or upstream of the river release structure.

Duck River

Duck River is mapped as Type 2 KFH and classified as Class 2 (moderate KFH) as it is also a permanently flowing estuarine waterway. During field surveys, 2 species of adult fish, smooth toadfish (*Tetractenos glaber*) and sea mullet (*Mugil cephalus*) were observed.

The habitat was characterised by a 20 m wide channel and grey mangroves (*Avicennia marina*), both mature stands and saplings in the intertidal zone, as shown on Figure 7-13. These are bordered by exotic terrestrial plant species with a seawall separating the surrounding industrial lots from the river. Small patches of saltmarsh are also recorded along the river.

Vineyard Creek

Vineyard Creek is mapped as Type 3 KFH and classified as Class 3 (minimal KFH), which provides some areas for breeding and feeding of aquatic fauna. No mangrove, saltmarsh or mudflats were recorded. The riparian vegetation within the Vineyard Creek was predominately Plant Community Type (PCT) 3262: Sydney Turpentine Ironbark Forest, as shown on Figure 7-14. During field surveys, it was observed to have slow flows and the pest freshwater fish species, mosquitofish (*Gambusia holbrooki*) was recorded.

7.7.2.2 Threatened and migratory species

Threatened ecological communities

One threatened ecological community (TEC), Subtropical and Temperate Coastal Saltmarsh, which is listed as vulnerable under the EPBC Act, was recorded in the study area. This community was recorded at Meadowbank Park and Wentworth Point, generally associated with Parramatta River and Duck River as shown on Figure 7-12 and Figure 7-13.

Threatened flora and fauna

No threatened species of fish, marine reptiles or flora species were considered to have any likelihood of occurrence within the study area.

Migratory species

Six migratory waterbirds and shorebirds species were considered to have a high likelihood of occurrence within the impact areas. These species are:

- Sharp-tailed Sandpiper (*Calidris acuminata*)

- White-fronted Chat (*Epthianura albifrons*)
- Latham's Snipe (Gallinago hardwickii)
- Australian Pied Oystercatcher (*Haematopus longirostris*)
- White-bellied Sea Eagle (*Haliaeetus leucogaster*)
- Nunivak Bar-tailed Godwit (*Limosa lapponica baueri*)
- Curlew Sandpiper (*Calidris ferruginea*).

7.7.2.3 Marine pests and diseases

The following marine pests have been recorded in Sydney Harbour and have potential to occur in the Parramatta River estuary:

- Pacific Oyster (*Crassostrea gigas*)
- Yellowfin Goby (Acanthogobius flavimanus)
- European Green Crab (*Carcinus maenas*)
- Caulerpa (*Caulerpa taxifolia*).

7.7.2.4 Groundwater dependent ecosystems

A review of the Groundwater Dependent Ecosystems (GDE) Atlas (BoM, 2025) identified 17 terrestrial groundwater dependent ecosystems (GDEs) classified with high potential for groundwater dependence within 500 m of the impact assessment area. There are no aquatic GDEs mapped within 500 m of the impact assessment area. Chapter 10 (Groundwater) provides further details on GDEs.

7.7.2.5 Protected and sensitive lands

Newington Nature Reserve is the only nature reserve within the study area. It is located upstream of the river release structure at Meadowbank. Although it contains known populations of TECs, it does not directly overlap with any impact assessment areas. No State Parks or Aquatic Reserves are present in the study area.

River release structure
Proposed River Release Pipeline - Open trench
Proposed River Release Pipeline - Trenchless
Threatened Ecological Communities

Resilience and Hazards (SEPP 2021)
Coastal wetlands
Coastal wetlands proximity area

Ground-truthed habitat types
Low-Relief Rocky Reef
Sandstone Seawall
Mangroves
Saltmarsh

Figure 7-12 Aquatic biodiversity values and habitats along Parramatta River

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:6,000 @ A4
GDA2020 MGA Zone 56

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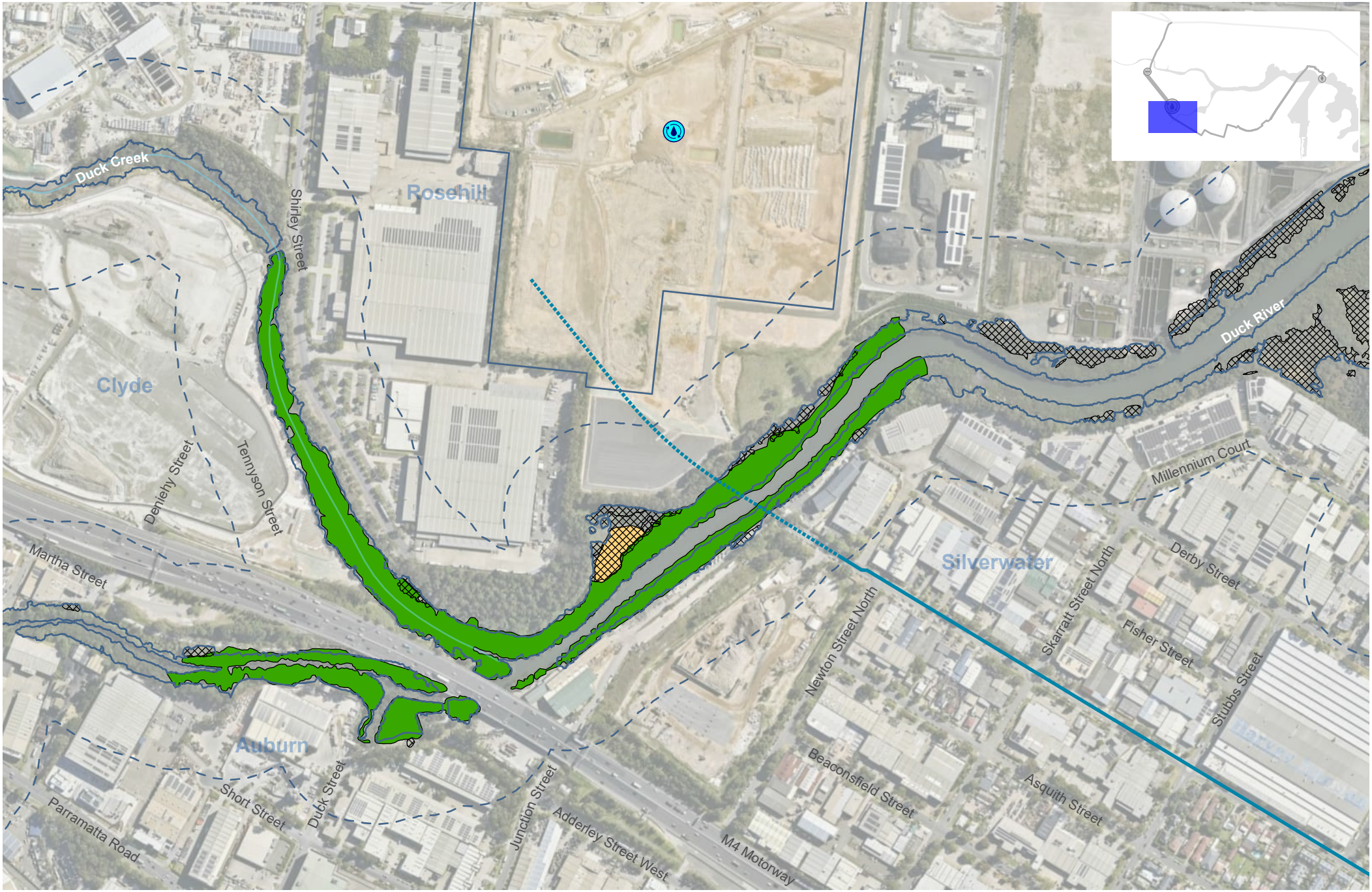
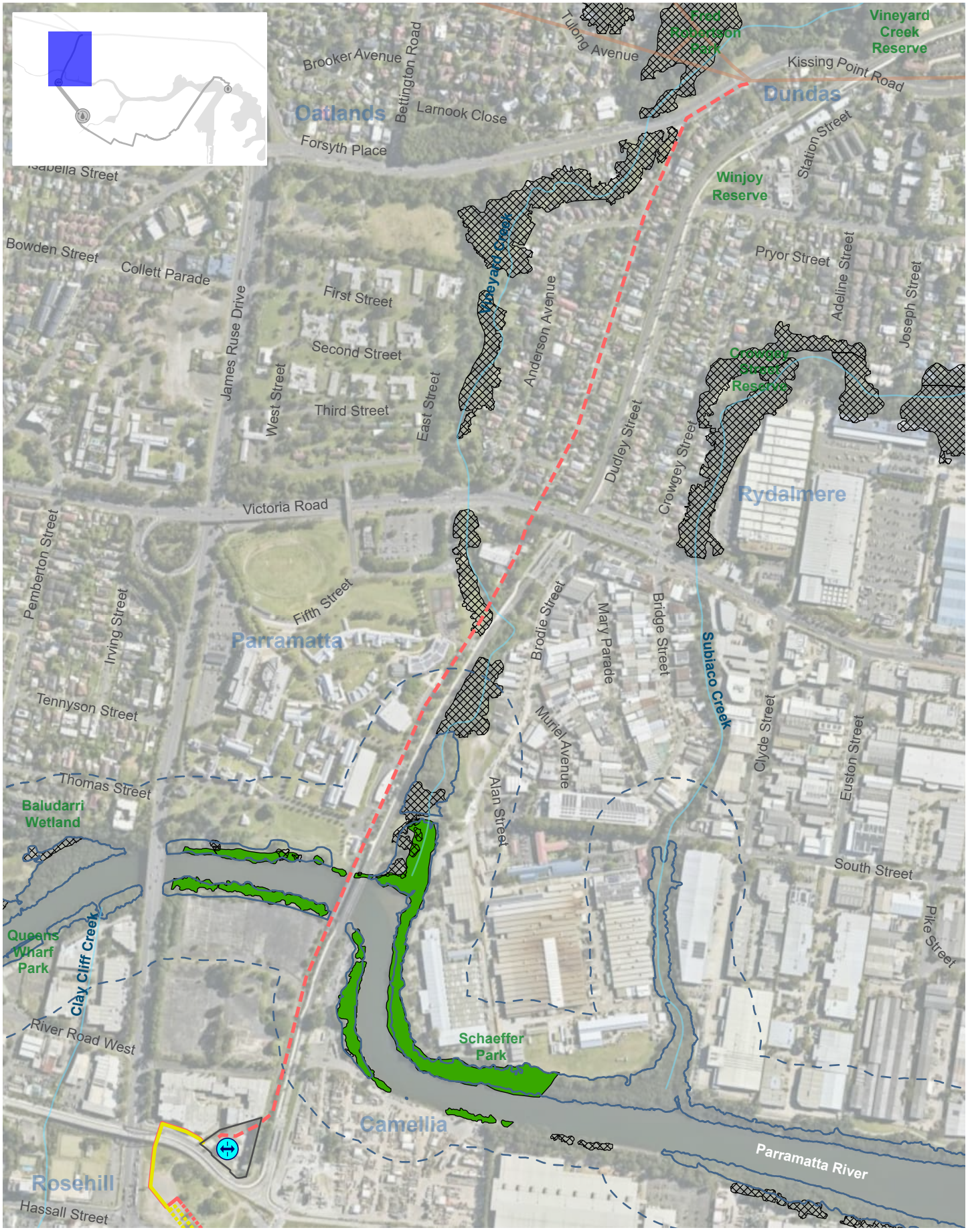


Figure 7-13 Aquatic biodiversity values and habitats along Duck River



- Camellia pumping station
- Proposed Brine Pipeline - Trenchless
- Proposed Brine Pipeline - Open trench
- Existing pipeline to be relined for brine pipeline
- Proposed Transfer Pipeline - Trenchless
- Proposed Transfer Pipeline - Open trench
- Northern Suburbs Ocean Outfall Sewer (NSOOS)
- Threatened Ecological Communities

Ground-truthed habitat types

- Low-Relief Rocky Reef
- Sandstone Seawall
- Mangroves
- Saltmarsh

Resilience and Hazards (SEPP 2021)

- Coastal wetlands
- Coastal wetlands proximity area

Figure 7-14 Aquatic biodiversity values and habitats along Vineyard Creek

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

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7.7.3 Key uncertainties

The desktop review is reliant on the accuracy of data from online mapping tools and databases, and indicative data relating to similar habitats in other similar estuaries only, so cannot be considered definitive.

Biodiversity value observations made at survey sites during field inspections should not be seen as a complete / comprehensive inventory, as the surveys were a qualitative, one-off 'snapshot' at a specific point in time only and do not account for any seasonal or temporal variability.

No quantitative or targeted surveys were undertaken to identify the presence of aquatic threatened species or communities. This was also not considered necessary for the purpose of this assessment.

7.7.4 Construction impacts

Construction activities, including construction of the river release structure at the Parramatta River, trenchless methods and aerial crossing of the waterways, have potential to result in loss or disturbance of aquatic or riparian habitat (including KFH).

7.7.4.1 Construction of the river release structure

Construction of the river release structure at the Parramatta River would involve:

- excavation of the riverbank and temporary construction of a cofferdam (or similar temporary structure)
- placement of a concrete mattress, pipelines and release structure on the riverbed
- use of work barges and construction vessels.

The existing sandstone headwall at the riverbank near John Whitton Bridge would be demolished to allow trenched installation of pipelines to the edge of Parramatta River. This section of riverbank consists of an artificial sandstone seawall, characterised by an assemblage of intertidal invertebrates. However, the field survey indicated that the assemblage is relatively poor in terms of species diversity compared to other representative habitats within the estuary. The loss of this small section of artificial seawall would not therefore represent any notable loss of important or unique intertidal habitat. Once completed, the site would be rehabilitated and landscaped.

The pipes would lie on a geotextile mattress to prevent disturbance of sediments on the riverbed. Placement of the mattress and pipelines, as well as cofferdam construction activities, are expected to cause direct disturbance and loss of habitat within the underlying sediments. These sediments, which primarily consist of silt, are likely to be characterised by high numbers of disturbance tolerant polychaete worms, and potentially mollusc and crustacean. Given the elevated concentrations of several metals and dioxins recorded in the surficial sediments in the area, it would be expected that the existing infaunal assemblage is impaired in terms of diversity and health. The loss of relatively small area of soft sediment habitat would not, therefore represent any loss of important habitat or food source for fish or other aquatic fauna dependent on infaunal invertebrates (or microbiota) further up the food chain.

The works also have the potential to disturb and mobilise sediments containing metals (zinc, copper, lead and arsenic) and dioxins. If mobilised into the water column, these contaminants may become temporarily bioavailable and be taken up by aquatic biota with potentially toxic effects. Sediment containment measures should therefore be put in place to minimise the transport and deposition of potentially contaminated sediments.

The mobilisation of fine sediments may also cause a short-term increase in turbidity and suspended sediment loads. The impact of this would be dependent on the tidal reach and volume of freshwater input at the time of construction, but is likely to be within the level of natural variation (in terms of turbidity and suspended sediments). Sediment-laden water would mostly be diluted and flushed downstream with any localised deposition and would be unlikely to cause any detectable effects to mangroves or saltmarsh.

The use of work barges or cranes introduces the risk of direct and indirect contamination via potential spills or leaks. Releases of hydrocarbon fuels, lubricants, oils, drilling fluids and other chemicals can affect estuarine biota via direct toxicity, smothering and physical fouling, indirect long-term or chronic impacts on behaviour or physiology. However, several standard controls would be in place to minimise the potential spills and leaks occurring.

Overall, the construction activities are not anticipated to result in any obstruction to fish passage up and downstream of the Parramatta River as the works would only take place temporarily within a small section of the river at any one time.

7.7.4.2 Waterway crossings

Trenchless methods

Trenchless methods are proposed at several locations along the river release pipeline near waterways including:

- Duck River between the Camellia-Rosehill WRRF and Carnarvon Street in Silverwater
- Narawang Wetlands
- between Sydney Olympic Park and Meadowbank Park crossing Parramatta River.

Trenchless methods have the potential to cause frac-outs, resulting in a loss of drilling fluid from the bore into the surrounding environment, which may impact nearby waterways. This fluid can impact aquatic biodiversity through reduced water quality from contaminants, as well as increased erosion and sedimentation.

Aerial crossings

The river release pipeline would cross Charity Creek and an unnamed creek in Meadowbank Park via aerial crossings. These waterways are highly modified, concrete lined drainage channels. These channels are not mapped as KFH and would be considered a Class 3 waterway (i.e. have minimal potential for fish habitat). However, it is important that any construction works in the vicinity of these waterways do not impact downstream habitats by increased erosion and sedimentation.

7.7.4.3 Groundwater dependent ecosystems

Groundwater drawdown due to dewatering of excavations is the main pathway via which waterways and GDEs could be affected during construction. As these habitats rely on a stable subsurface water supply to maintain soil moisture, salinity balance, and vegetation health, changes to groundwater supply could have implications for the long-term health and condition of these habitats.

However, the magnitude and extent of drawdown from the project is anticipated to be limited and temporary, with negligible impacts to GDEs. Furthermore, the estimated drawdown extent induced by construction dewatering during excavations does not extend to any waterways.

7.7.4.4 Impacts to threatened species

No species of threatened or protected species of fish, marine mammals or reptiles were identified as being likely to occur within or in the vicinity of the impact assessment area. If any of these species were to occur, it would be considered a rare or transitory event only.

Therefore, no significant impacts are anticipated such that referrals or additional assessments under the EPBC Act, BC Act and/or FM Act are considered necessary for any aquatic species.

7.7.4.5 Key Threatening Processes

KTPs are listed under the BC Act, FM Act and the EPBC Act. A threatening process is generally defined as a KTP if it threatens or may threaten the survival, abundance or evolutionary development of a native species, population or ecological community or could cause species, populations or ecological communities that are not threatened to become threatened.

KTPs with the potential to be caused or exacerbated by the project include:

3. degradation of native riparian vegetation along NSW water courses (FM Act).
4. removal of large woody debris from NSW rivers and streams (FM Act).
5. introduction of non-indigenous fish and marine vegetation to the coastal waters of NSW (FM Act).
6. novel biota and their impact on biodiversity (EPBC Act).

KTPs 1 and 2 would be mitigated via the controls outlined to address direct and indirect habitat loss and to ensure that water quality is maintained. Any large woody debris encountered during construction of the cofferdam or water-based construction would be managed according to DPIRD's best practice as outlined in Section 7.7.6.

KTPs 3 and 4 would also be effectively managed via the mitigation measures outlined in Section 7.7.6.

Overall, the project is not expected to exacerbate or cause any listed KTPs as relevant to aquatic biodiversity during construction.

7.7.5 Operational impacts

The release of treated water into Parramatta River has the potential to impact on aquatic biodiversity in the following ways:

- altering existing habitat with physical presence of new infrastructure and changes to hydrodynamic flows around the new structures
- mobilising legacy contaminants
- changes to water quality.

The Aquatic Biodiversity Impact Assessment (Appendix H) draws heavily on the results of the hydrodynamics and water quality, and geomorphology impact assessments.

7.7.5.1 Alteration of existing habitat

The placement of the river release pipeline and structure, and concrete mattress on the riverbed would replace fine soft sediment with a hard permanent structure. It is possible there would be a small net loss of habitat within the footprint of the new infrastructure. However, this would create an attachment surface suited to a different assemblage of aquatic biota. Rather than burrowing organisms such as polychaete worms, crustaceans, molluscs and other wormlike animals, it would provide a surface more suited to encrusting sessile biota similar to that found on nearby artificial surfaces (e.g. seawalls, wharves and pilings). This could include for example, oysters, barnacles and encrusting algae.

In many instances, pipelines and other artificial structures increase habitat complexity, which attracts small fish and invertebrates, sometimes acting as a 'reef-like' feature. However, existing currents may preclude the settlement and establishment of new biota.

The new infrastructure is not expected to present any physical barrier to fish passage, as the pipelines would extend out to the third bridge pier from the shore of John Whitton Bridge and would not extend vertically. The Surface Water and Geomorphology Impact Assessment (Appendix G) confirmed that the changes in flows would be negligible relative to the magnitude of flows that are currently generated across the tidal cycle and in frequent rain events.

7.7.5.2 Mobilisation of contaminants

As described in Section 7.6.2, surface sediments in the vicinity of the river release pipeline and structure are likely to contain elevated levels of metals and dioxins. The Surface Water and Geomorphology Impact Assessment (Appendix G) confirmed that the river release is unlikely to contribute to any detectable increase in the sediment transport regime of the Parramatta River immediately upstream and downstream of the diffusers. Some localised effects on sedentary biota are expected, but these effects are unlikely to be any more pronounced than the impacts already associated with this area.

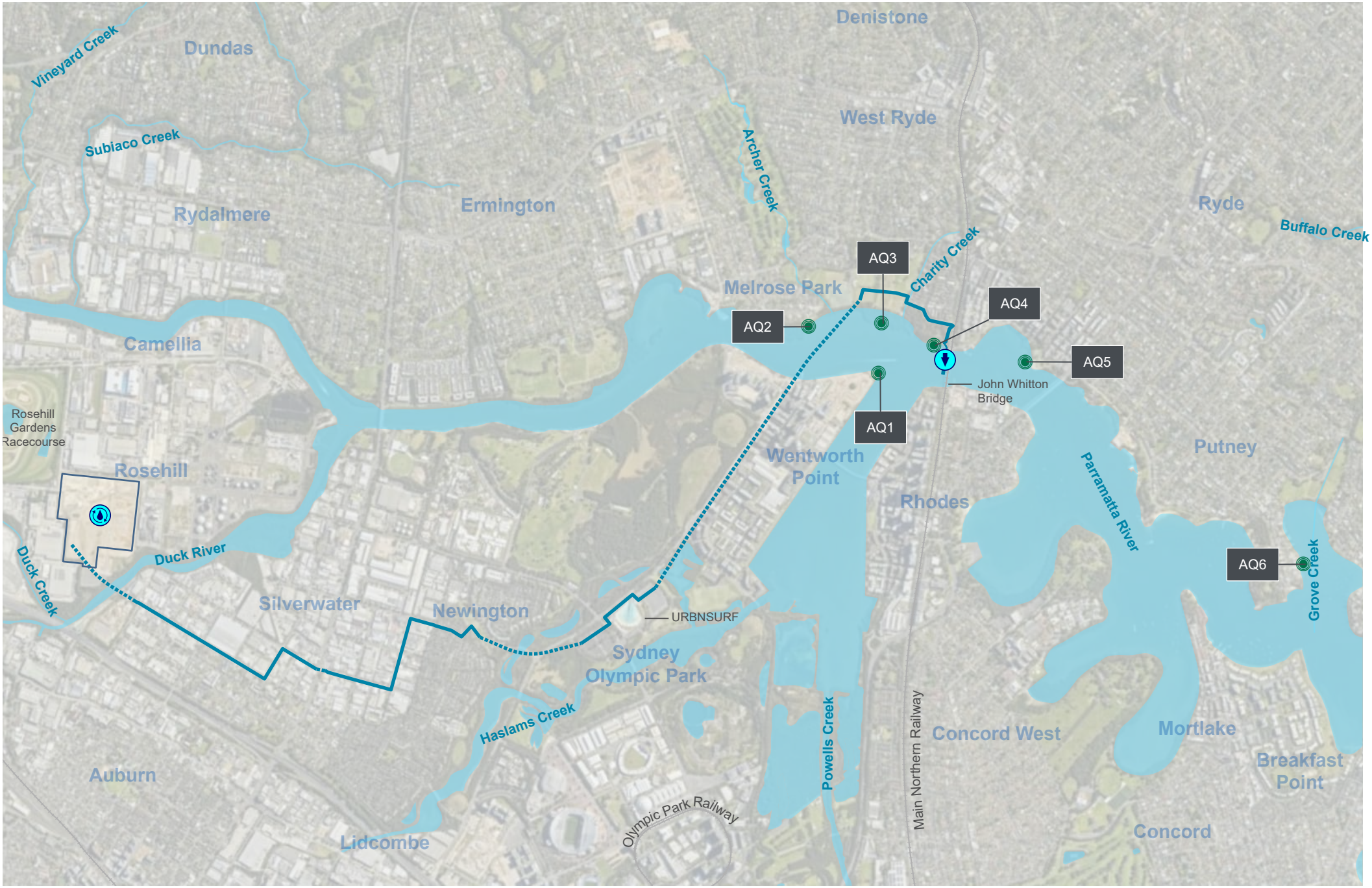
7.7.5.3 Changes to water quality

As described in Section 7.4, the Camellia-Rosehill WRRF is expected to produce a constant stream of advanced treated water continuously over a 24-hour period. The advanced treatment system (reverse osmosis) may be

offline temporarily due to planned or unplanned outage / maintenance. Modelling assumed that this would release tertiary treated water for two 48-hour offline events per year.

The impacts to water quality as a result of the Camellia-Rosehill WRRF operation have been modelled as detailed in Section 7.4. The results from that assessment have been used to assess the impacts to aquatic biodiversity from changes to the physico-chemical properties of the treated water (both advanced and tertiary treated water) and the predicted levels of residual toxicants. The following sensitive aquatic environments were modelled for each indicator, as well as 100 m downstream from the river release structure, as shown in Figure 7-15:

- Meadowbank Park, west of river release structure (AQ2 – AQ4 - sites adjacent to mangroves)
- Anderson Park, east of river release structure (AQ5 - adjacent to mangroves)
- Wentworth Point (AQ1 - saltmarsh habitat)
- Morrisons Bay (AQ6 - intertidal reef).



Camellia-Rosehill WRRF
Camellia pumping station
River release structure
Proposed River Release Pipeline - Open trench
Proposed River Release Pipeline - Trenchless
Key aquatic biodiversity sites

Figure 7-15 Aquatic biodiversity sites of interest

0 500 1000 1500 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:30,000 @ A4
GDA2020 MGA Zone 56

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At all sites, small increases in dissolved oxygen concentrations were predicted. This may have a positive impact on a wide range of aquatic biota, particularly where concentrations of dissolved oxygen have been historically impaired.

At all sites, modelling shows reductions in total suspended solids, total nitrogen, total phosphorus and chlorophyll *a*. These are unlikely to have any negative impacts on sensitive aquatic receptors in the receiving environment. In turn, these reductions have potential for positive impacts on aquatic biodiversity by reducing the risk of excessive algal growth.

Modelling also indicated a reduction in salinity due to the influence of low saline river releases during operation. The sites closer to the river release structure (i.e. AQ1 to AQ5) showed peak reductions in salinity with respect to short-term variations. Many aquatic biotas have wide salinity tolerances, but optimal growth or specific life stages may occur within a more limited range and often influenced by temperature. However, the reductions are well within the tolerances of aquatic biodiversity within the receiving environment. If salinity changes over a long time, there may be localised shifts in assemblages that are better adapted for growth under reduced salinities.

Increases in concentrations are particularly evident for ammonia and oxidised nitrogen. However, the concentrations are not at levels toxic to aquatic biota and are not expected to cause impacts.

Releases of tertiary treated water are predicted to elevate concentrations of nutrients and chlorophyll *a*. These releases are predicted to result in a short-term negative impact on water quality. These changes in water quality are predicted to have minor and temporary impacts on aquatic biodiversity.

The treatment system is highly effective at reducing the levels of contaminants from wastewater. However, some residuals can remain, depending on the quality of the incoming water and the efficiency of the system. These are only likely to present a risk to biodiversity if present in sufficiently high enough concentrations. Toxicity and mixing zone analysis was carried out to understand the necessary dilution factors required to meet dilution requirements as outlined in Section 7.4.

Near field modelling predicts that the dilution requirements for both advanced and tertiary treated water are achieved in the immediate vicinity of the diffuser ports. Therefore, impacts to aquatic biodiversity in the nearfield receiving environment from residual toxicants are expected to be negligible.

7.7.5.4 Key Threatening Processes

Two KTPs related to the long-term operation of the project has the potential to be associated with the project:

1. installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams (FM Act)
2. alteration to natural flow regimes (BC Act).

As discussed in the above sections, alteration of existing habitat and changes in the flow regime from the operation are not considered to exacerbate or facilitate either of these KTPs.

7.7.6 Mitigation measures

The project has been designed to avoid and minimise impacts to aquatic biodiversity, where feasible. Sydney Water would manage potential impacts during construction through implementation of the CEMP.

Project-specific aquatic biodiversity mitigation measures that would be implemented to manage potential impacts are provided in Table 7-19.

Table 7-19: Aquatic biodiversity mitigation measures

ID	Potential impact	Requirement	Timing
AB01	Aquatic habitat loss or disturbance	Rehabilitate disturbed banks and seawalls with appropriate landscaping and habitat features (e.g. complex sandstone, riparian planting). Consider further habitat enhancement using complex sandstone block arrangements and riparian planting to improve habitat heterogeneity and fish habitat as per 'A Guide to Improving the Environmental Value of Seawalls and Seawall-lined Foreshores in Estuaries' (OEH, 2012).	During construction
AB02	Aquatic habitat loss or disturbance	Ensure that contractors are aware of mapped TEC, mangroves and sensitive foreshore habitat and that it is not directly or indirectly disturbed during construction activities.	During construction
AB03	Mobilisation of contaminants	Regular visual water quality checks (for hydrocarbon spills, turbid plumes and other water quality issues) should be carried out when working near any waterways.	During construction
AB04	Vessel movements and operation introducing marine pests	Vessel and marine pest management measures would be captured in the RRSC EWMS (e.g. as part of a vessel management protocols) and include the following: • Provision of designated anchoring zones and 'no go' zones around mangroves. • Contracted work barges should be shallow draft and minimise the use of high-powered thrusters where this is feasible to reduce the risk of sediment disturbance. • All work vessels, barges and equipment used in water should be cleaned and inspected prior to arriving and departing from site. • Ballast water should be managed in accordance with the Australian Ballast Water Management Requirements. • Undertake vessel risk assessments and invasive species inspections for all vessels as	Prior to and during construction

ID	Potential impact	Requirement	Timing
		part of routine biofouling management practice. • If any marine pests are encountered during water-based construction activities, the area must be isolated and NSW DPIRD Fisheries notified promptly.	
AB05	Recreational amenity	Provide advance notice to community and recreational users. Refer to **SIA01** (Appendix E).	Prior to and during construction
AB06	Threatened and protected species	Direct artificial light away from sensitive habitats or areas where possible (i.e. potential waterbird and shorebird habitat).	During construction
AB07	Threatened and protected species	Incorporate standard daytime hours noise management safeguards into the CEMP.	During construction
AB08	Key Threatening Processes	Implement best practice management for instream large-wooded debris: • Lopping (trimming) should be considered as a first option. • Instream realignment should be considered as the next option. • If realignment is not feasible, relocation within the river channel is preferable to removal. • Removal should be considered as a last resort.	During construction
AB09	Mobilisation of contaminants and changes to water quality	Continue to monitor water quality and apply adaptive management actions as required. Refer to **WQ02** (Appendix E).	Prior to and during operation
AB10	Aquatic habitat loss or disturbance	Implement a Soil and Water Management Plan. Refer to **SW01** (Appendix E).	Prior to and during construction
AB11	Aquatic habitat loss or disturbance	Implement sediment curtains or similar sediment capture device. Refer to **GE01** (Appendix E).	During construction
AB12	Mobilisation of contaminants	Implement an Acid Sulfate Soil Management Sub-Plan. Refer to **SW02** (Appendix E).	During construction
AB13	Mobilisation of contaminants	Implement a Waste and Resource Recovery Plan (WRRP). Refer to **W01** (Appendix E).	Prior to and during construction
AB14	Mobilisation of contaminants	Minimise chemicals or fuels entering waterways. Refer to **SW05** (Appendix E).	During construction

7.8 Expert panel review

Four independent experts were engaged to provide advice and review the environmental impacts from the release of treated water into the Parramatta River. The experts were selected based on their expertise in the areas of water quality, hydrodynamics and aquatic biodiversity. The experts are:

- Angus Webb - freshwater ecology
- Anthony Chariton - morphological and molecular ecology and ecotoxicology
- Gavin Birch - marine and estuarine contamination
- Graeme Batley - ecotoxicology risk.

Broadly, the scope of the expert panels includes review of the WQRM and specialist studies, including:

- Hydrodynamics and Water Quality Impact Assessment
- Aquatic Biodiversity Impact Assessment.

The modelling and reports were progressively refined based on comments and feedback from the expert panel.

Flooding

8 Flooding

This chapter summarises the Flood Impact and Risk Assessment (Jacobs, 2025b) (Appendix I) and Independent Peer Review (Appendix I). It outlines existing flood conditions and potential impacts during construction and operation. Modelling for events up to the Probable Maximum Flood (PMF), including climate change scenarios, found the WRRF site is generally flood-free up to the 1% AEP, with only minor inundation in extreme events (outside of the designated flood path). Construction may temporarily obstruct flow paths, but impacts are expected to be minor with mitigation. Operational impacts are negligible to minor, with no additional properties affected. The project meets floodplain risk management requirements and includes measures to manage residual risks.

8.1 Secretary's Environmental Assessment Requirements

Table 8-1 lists the Secretary's Environmental Assessment Requirements (SEARs) relevant to flooding and where they are addressed.

Table 8-1: Project SEARs relating to flooding

SEARs	EIS section where requirement addressed
1. Changes to flood behaviour during construction and operation for a full range of flood events up to the probable maximum flood (taking into account sea level rise and storm intensity due to climate change) must be assessed (and modelled) including:	Section 8.6 Appendix I
(a) time to onset, duration, depth, velocity and hydraulic hazard of any flooding	Section 8.6.1 Section 8.6.2 Appendix I
(b) any detrimental increases in the potential flood affectation of other properties, assets and infrastructure	Section 8.6.1 Section 8.6.2 Appendix I
(c) consistency (or inconsistency) with applicable Council floodplain risk management plans	Section 8.6.1 Section 8.6.2 Appendix I
(d) compatibility with the flood hazard of the land	Section 8.6.1 Section 8.6.2 Appendix I

SEARs	EIS section where requirement addressed
(e) compatibility with the hydraulic functions of flow conveyance in flood ways and storage areas of the land	Section 8.6.1 Section 8.6.2 Appendix I
(f) downstream velocity and scour potential	Section 8.6.1 Section 8.6.2 Appendix I
(g) impacts the development may have upon existing community emergency management arrangements for flooding. These matters must be discussed with the State Emergency Services and Council	Section 8.6.1 Section 8.6.2 Appendix I
(h) any impacts the development may have on the social and economic costs to the community as consequence of flooding.	Section 8.6.1 Section 8.6.2 Appendix I
(i) an independent peer-review, with the findings detailed in the EIS, including how any recommendations and findings have been addressed.	Appendix I
(j) Impact on existing development consents that apply to the site.	Section 8.6.1 Section 8.6.2 Appendix I
Note: Flood modelling is to be undertaken by a suitably qualified engineer consistent with Council's requirements and Australian Rainfall and Runoff. Flood behaviour includes flood volume, extent, depth, level, velocity, duration, rate of rise, flood function and hazard. Impacts of flooding include changes to flood behaviour and risks to the community including emergency management response for the community	Appendix I
2. Flood management objectives and outcomes must be clearly identified and substantiated to address the characteristics of the environment and relevant legislative, management and guidance requirements.	Section 8.6.1 Section 8.6.2 Appendix I
3. A flood impact and risk assessment (FIRA), prepared in accordance with relevant guidelines, and having regard to advice provided by Biodiversity, Conservation and Science Group (Attachment A).	Appendix I

8.2 Assessment methodology

8.2.1 Legislative and policy context

The assessment of flooding impacts was undertaken in accordance with the project SEARs, as well as the following legislation, policies and guidance documents:

- Flood hazard, Flood risk management guideline FB03 (DPE, 2023a)
- Flood Risk Management Manual: The management of flood liable land (DPE, 2023b)
- Australian Rainfall and Runoff (ARR): A Guide to Flood Estimation 2019 (Ball et al., 2019 and consideration of 2024 changes)
- Considering flooding in land use planning: guidance and statutory requirements. Planning circular PS 21-006 (DPE, 2021)
- Planning Circular PS 24-001: Update on addressing flood risk in planning decisions (DPHI, 2024b)
- Practical Consideration of Climate Change (DECC, 2007a)
- Floodplain Risk Management Guide: Incorporating sea level rise benchmarks in flood risk assessments (DECCW, 2010a)
- Parramatta River Flood Study (Stantec, 2024)
- Camellia-Rosehill Place Strategy (DPE, 2022b).

8.2.2 Methodology

The methodology for the flood impact and risk assessment included:

- reviewing previous flood studies and available flood data including adopted risk management studies to characterise existing flooding conditions at the project site and the surrounding area
- developing a hydraulic model for the WRRF site using the flood modelling software TUFLOW
- qualitatively assessing potential flood impacts resulting from and flood risk posed to, Camellia pumping station, the brine pipeline, transfer pipeline, river release pipeline and associated surface works
- qualitatively assessing cumulative impacts with other approved and proposed developments
- reviewing predicted flood model results with project design objectives to ensure compliance
- identifying management measures to avoid, minimise and manage any potential flooding impacts
- reviewing of the flood impact and risk assessment by an independent expert on flooding.

The focus of the assessment was flooding impacts related to the WRRF site, as this project element has the most potential for generating flooding impacts and to be impacted by flooding. This is because, once built, most pipeline infrastructure would be below ground and not expected to impact on flooding during operation.

Similarly, there is limited above ground change at the existing Camellia pumping station site that would affect or be affected by flooding.

Stakeholder consultation was undertaken throughout the assessment, including with NSW DCCEEW (Conservation Prograns, Heritage and Regulatory Group (CPHRG)), DPHI, SES, Sydney Metro, City of Parramatta and City of Ryde Councils and nearby landowners. Consultation was used to inform the approach that the:

- impact of climate change would be based on the interim climate change rainfall growth factors in ARR 2019 (Version 4.1) and sea level rise, for the year 2150 for the RCP 4.5 climate change scenario. For completeness RCP 8.5 has also been assessed
- design case for the assessment would be the impacts of this project, i.e. constructing and operating a new WRRF at the site. The potential flood impacts of the partially raised site were previously assessed and determined by Sydney Water. As such the partly raised site condition forms the base case for the EIS assessment
- City of Parramatta Council flood model would be used for the assessment and tailored for the project, and to confirm approach for any gaps in flood event scenarios in relation to the SEARs
- base case would not include the Camellia-Rosehill rezoning and areas of infill, given there is still uncertainty remaining about the details and timing of the rezoning.

8.2.2.1 Modelling methodology

WRRF

For this assessment, the City of Parramatta Council Parramatta River Flood Study TUFLOW model (Stantec, 2024) was adopted as the basis for the flood modelling. This approach was agreed with stakeholders including City of Parramatta Council, DPHI and NSW DCCEEW (CPHRG). Key updates were then made to the model to account for changes in terrain, inclusion of additional buildings, and to extend the boundaries of the flood model to ensure all potential impacts due to the project were included. Design information for other major projects in the area (including Sydney Metro West and PLR Stage 2) was also included from relevant flood models. This allowed more accurate consideration of potential impacts on the nearby sites.

The model was used to estimate flows for the 10%, 5% and 1% AEP events and the PMF and the 50% of PMF event. The AEP is the chance of a flood from a rainfall event occurring in any given year. For example, the 1% AEP event has a 1% chance of occurring in any given year (and is sometimes called the 1 in 100-year event) and the PMF is the largest possible flood that can occur at this location. As flood events become rarer (i.e. they have less chance of occurring in a given year) they increase in magnitude. The 50% PMF event was used as proxy for a 0.05% AEP event as agreed with key stakeholders. These flooding events were predicted for both the base case (i.e. current conditions), and the design case, which incorporates the project reference design.

The potential impact of climate change was assessed based on guidance ARR 2019 Version 4.1 (Ball et al., 2019) for the 1% AEP with RCP 4.5 and RCP 8.5 for the year 2150 scenarios. The flood model set up, parameters and validation processes are detailed in the Flooding assessment report (Appendix I).

Camellia pumping station

Precinct modelling undertaken for the WRRF was also used for the assessment of flooding at Camellia pumping station. A qualitative flooding assessment for the Camellia pumping station was undertaken due to the minor scale of the proposed upgrade and anticipated limited impacts on flood behaviour.

Pipelines

The brine, transfer and river release pipelines would be primarily below ground and as a result there are no flood impacts expected from the operation of these elements of the project. A qualitive review of above ground infrastructure (aerial crossings and barometric loop) has been undertaken.

8.2.2.2 Flood evauation

The modelled outputs of the base and design case flood scenarios were used to identify potential flood emergency management strategies including potential evacuation routes for workers at the WRRF site. Proposals for flood evacuation were presented to the SES, NSW DCCEEW (CPHRG), DPHI, and the City of Parramatta Council, for discussion to ensure that the proposed evacuation routes aligned with council flood risk management planning and SES emergency planning procedures.

8.3 Existing environment

As noted in Chapter 1 (Introduction), Sydney Water undertook some environmental management works at the site shortly after acquisition in 2024. The works were assessed and determined under a Review of Environmental Factors: Site Environmental Management Works, Camellia (Sydney Water, 2024c). The environmental management works included raising part of the site about 1.7m with imported natural material, to reduce risks associated with residual contaminated material, and assist with flooding. The area of the site that was not raised had a small amount of natural material placed on it (about 100 – 200 mm). There are existing drainage pipes within the site, including:

- pipes along the western boundary of the site that conveys stormwater from the north-western part of the site and Colquhoun and Unwin Streets to Duck River. These will remain in place. City of Parramatta Council have an easement over this drainage area
- an existing flood path (surface) along the western boundary
- pipes running north-south, approximately in line with the Devon Street low point which are not connected to Devon Street. These are proposed to remain in place however this may be amended during detailed design.

As part of the stakeholder engagement undertaken at the time of the site environmental management works, Sydney Water redesigned the site raising works to retain a larger portion of the western area flood path. It is proposed to place native grasses and the ground mounted solar array within this area for the short-medium term, or until it is potentially needed for future expansion of the WRRF. Figure 8-1 shows the retained flood path and existing key stormwater and related features on the site.

8.3.1 Existing flooding conditions

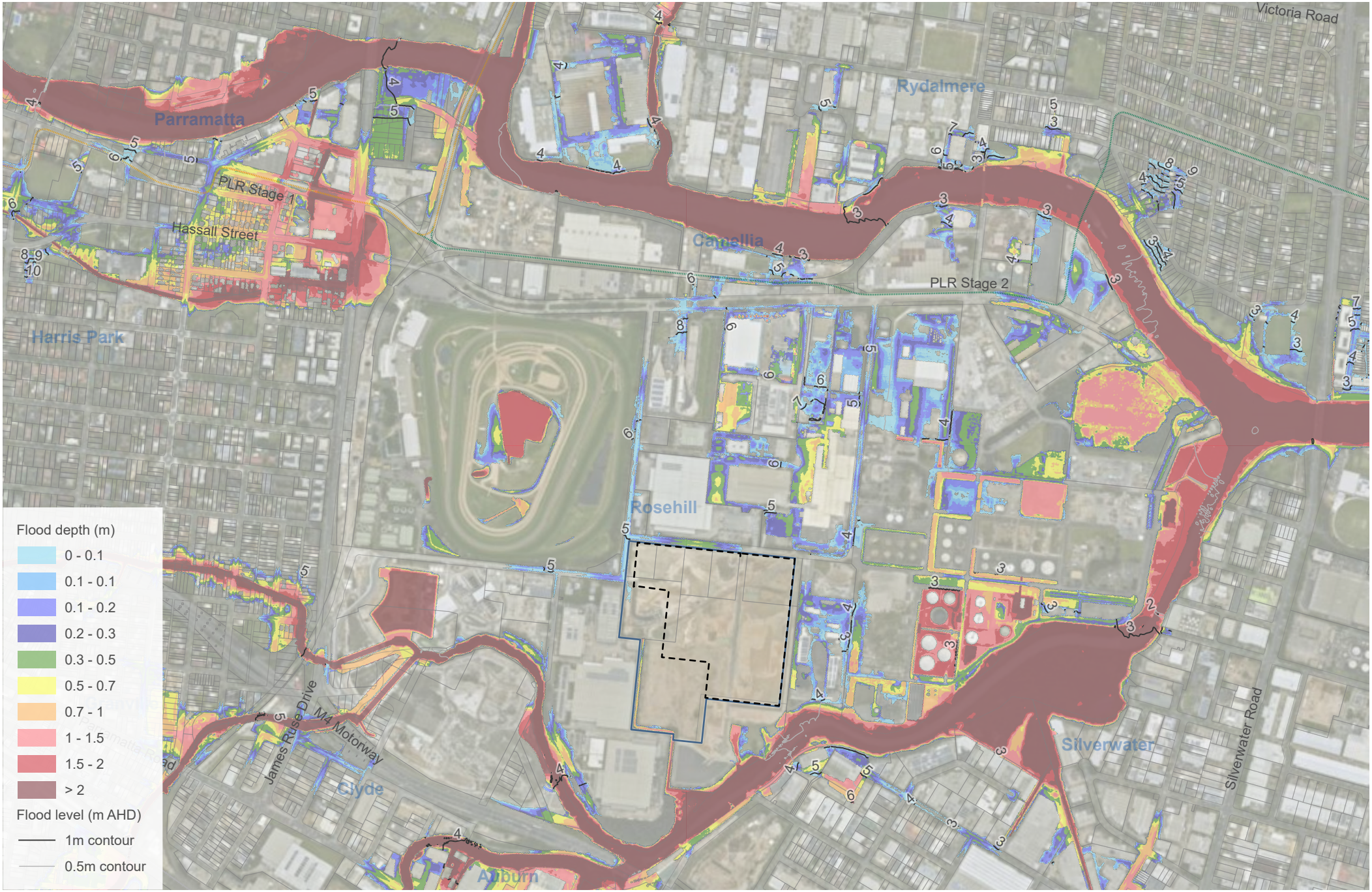
Within the precinct, for events up to and including the 1% AEP, flooding is largely contained within the channel banks of the Parramatta River, Duck River, Duck Creek and other tributaries, with the majority of flooding occurring through overland flow. Mainstream flooding largely affects some low-lying foreshore areas, but flood extents along the mainstream change dramatically when flow is out of bank in events rarer than the 5% AEP. Overbank flooding occurs in the 1% AEP event on Duck River upstream of the M4 Motorway, Duck Creek and A'Becketts Creek. A large area of inundation also occurs in Rosehill on and to the west of James Ruse Drive along Claycliff Creek and its overbank areas.

The PMF affects large areas of the Parramatta River and Duck River floodplain, with almost all of the Camellia – Rosehill Peninsula to the east of James Ruse Drive inundated. Flood levels for the PMF event are shown in Figure 8-3.

The WRRF site is generally not affected by mainstream or overland flooding in up to and including the 1% AEP event. Floodwaters in Duck River during the 1% AEP event rise to levels of 3.5 – 3.7 m AHD adjacent to the site but only extend onto the fringes of the south-eastern corner of the site. There is also backwater flooding up the existing stormwater channel on the western boundary of the site. Local overland flooding is generated in the catchment areas to the north and west of the site. This flooding accumulates in Devon Street, Colquhoun Street and Unwin Street, with limited overflow onto the reserved overland flow path on the western side of the site.

The Camellia pumping station site is outside of the existing 1% AEP flood extent, except for localised flood depths to 0.5 m at the northern boundary of the site. The site is inundated in the 50% of PMF event, with flood depths of 2 m in this event. In the PMF, flood depths on the Camellia pumping station site are typically 4 – 5 m, as shown in Figure 8-4.

Figure 8-1 Existing and proposed key stormwater and flooding features



Camellia-Rosehill WRRF

Site filling outline (Sydney Water, 2024)

Cadastre

Figure 8-2 Existing flood levels and depths during a 1% AEP event

0 200 400 600 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:14,000 @ A4
GDA2020 MGA Zone 56

N

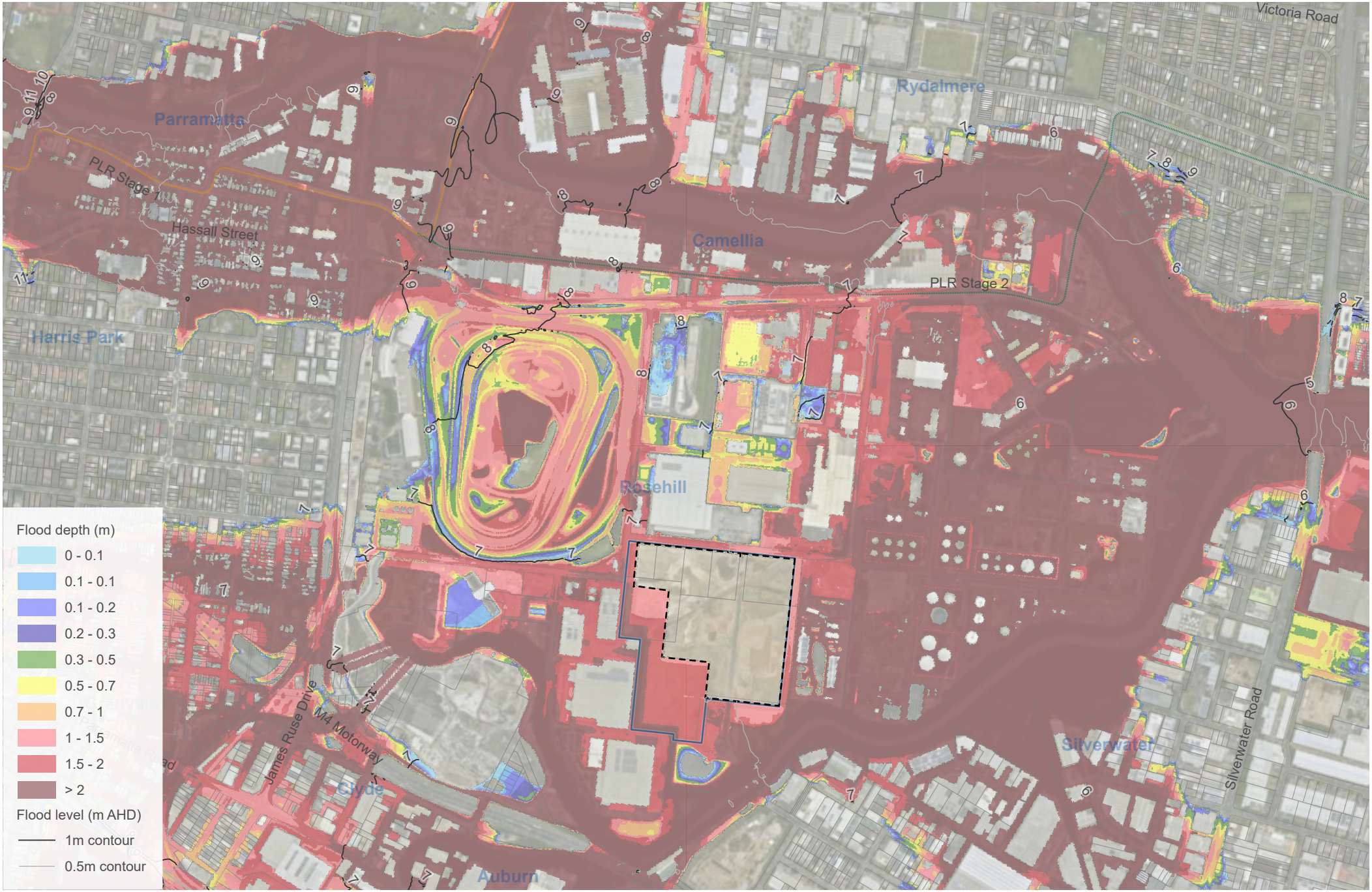


Figure 8-3 Existing flood levels and depths during a PMF event

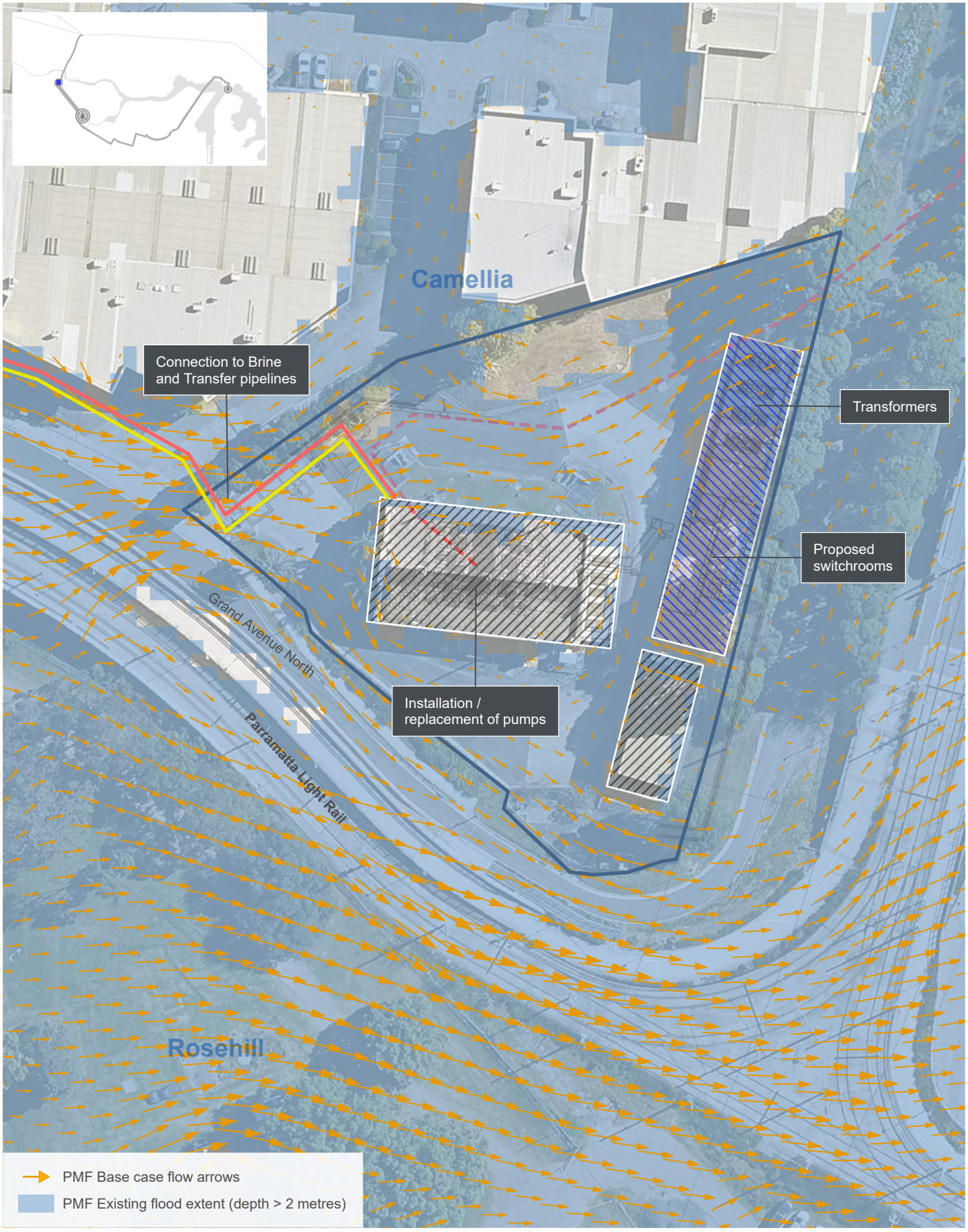


Figure 8-4 Existing flood levels and depths during a PMF event, Camellia pumping station

8.3.1.1 Flooding of key evacuation routes

Key evacuation routes for the WRRF site were confirmed following consultation with the NSW SES and include Grand Avenue, James Ruse Drive and the M4 Motorway. The intersection area of Grand Avenue and James Ruse Drive is a significant flooding evacuation route constraint with depths of flooding in the 10% AEP event exceeding 1.5 m.

Grand Avenue would experience overland flooding at road sag (low) points between Colquhoun Street and Durham Street to depths of 0.2 m in the 10% AEP event and 0.35 m in the 1% AEP event, according to the base case model. This is considered unsafe for vehicles.

The M4 Motorway is elevated above the PMF on a viaduct and hence is considered flood-free in the modelled area. However, access to the M4 Motorway from Camellia-Rosehill is limited due to flooding of local roads.

The modelling confirms that local road and main evacuation routes would quickly become cut (inaccessible) by flooding during storm events, highlighting the need for early evacuation from the Camellia-Rosehill precinct in response to a flood.

8.4 Avoid and minimise impacts

The project design and construction methodology has included the following measures to avoid or minimise potential flooding impacts:

- the design of the WRRF site has been developed to retain the overland flow path along the western boundary
- the location of most of the WRRF's buildings, plant and equipment would be on the raised area of the site above the 1% AEP flood level. Where this is not possible, the design of components has taken this into consideration:
  - the administration building has been designed as a double storey structure, with ground storey carparking, to retain flow paths through the site and ensure the administration areas are above flood levels
  - the ground mounted solar panels in the south-western portion of the WRRF site would be installed on poles to minimise interaction with potential flood waters
- drainage infrastructure would be installed along the northern boundary of the WRRF site to assist with improving stormwater management and localised flooding currently experienced at the existing low point on Devon Street. This drainage infrastructure may be a combination of a shallow grassed channel and piped drainage system, and would be developed further during detailed design in collaboration with the City of Parramatta Council.

8.5 Design criteria and performance outcomes

The design criteria and performance outcomes developed for the project are:

- electrical assets and other critical infrastructure associated with the project would be designed to be located outside of the 1% AEP flood level

- minimise increases in flood levels due to permanent infrastructure during flood events up to and including the 1% AEP event, including climate change impacts
- minimise increases in flood levels due to temporary infrastructure during flood events up to and including the 5% AEP event .
- flood level increase thresholds used for assessment of the flood level impacts:
  - buildings: 10 mm if flooded above floor
  - buildings/open space: 50 mm if buildings not flooded above floor
- potential flood impacts to sensitive receivers including Sydney Metro West would be considered for flood events up to and including the PMF
- durations of inundation not increased by more than 1 hour up to and including the 1% AEP event
- no additional private properties would be affected by flooding up to and including the 1% AEP flood event due to permanent infrastructure
- dedicated evacuation routes would not be adversely impacted in flood events up to and including the PMF
- where possible, facilitate improvements to flooding in the Camellia-Rosehill precinct with appropriate design provisions and proposed drainage infrastructure
- the potential for soil erosion and scouring is reduced for events up to and including the 1% AEP event.

8.6 Impact assessment

8.6.1 Construction impacts

8.6.1.1 Potential flood risks at construction work areas

Several construction activities can potentially change flooding conditions by inhibiting flood flows or displacing flood waters if located in flood-prone land. These activities include temporary earthworks, trenches, stockpiles, portable buildings and site sheds, construction plant or equipment and materials storage. Portable buildings and large unsecured construction objects have the greatest potential to affect flooding. They can be carried away by deeper floodwaters and worsen local flood conditions by blocking bridges, culverts and flood control structures downstream. For all construction compounds and activities, including those located outside of 1% AEP flood-prone areas, overland flow paths during storm events can create hazardous conditions for workers, dislodge machinery and wash stockpiles away.

Where temporary works (such as the aerial waterway crossings) are required close to watercourses during the construction phase, these could also potentially alter flooding conditions.

8.6.1.2 Potential flooding impacts during construction

Pipe relining

Flooding may impact relining activities at pipe access pits at various locations. In particular, those in the vicinity of compound site C8 immediately adjacent to Vineyard Creek. Existing flood depths at this location are typically up to around 0.5 m maximum depth in a 20% AEP event.

Trenching

Flood impact to trench construction is likely during small storm events. This may redirect flows within the catchment resulting in potential increases in flood depths or new areas of flooding around the locations where the redirected flows discharge back to the surface.

HDD

At launch and exit sites, there is a risk of redistribution of flows through tunnels to other parts of the catchment resulting in potential increases in flood depths or new areas of flooding around the locations where the redirected flows discharge back to the surface.

Barometic loop

The barometric loop is predicted to have a very low risk of flood impact during construction as it is located at a high point.

Construction compounds

The potential flood impacts at the construction compounds are outlined in Table 8-2. Where there is anticipated to be more than minor impacts, further information on the impact is outlined in Table 8-2.

Table 8-2: Potential impacts of construction activities on flood behaviour (prior to mitigation)

Risk/impact category	Explanation	Compound
Nil to minimal	Localised impacts	• C1-C7 (C1-C6 affected in PMF only, or not flood affected) • C9-C18 • C20-C21 • C23 • C25-C27 • C29-C31

Risk/impact category	Explanation	Compound
More than minor	Potential increases in flood levels to adjacent areas. Site facilities likely to be flood-impacted. redistribution of flows onto adjacent properties	• C8 - Stockpiles could obstruct active flows and redirect flows, with potential increases in flood levels to adjacent areas – mostly open space. Potential for localised scouring of natural surface. Stockpiles themselves may be eroded by flood flows. Site facilities likely to be flood-impacted. • C19 - Potential to obstruct local overland flood flows with redistribution of flows onto adjacent properties. • C22 and C24 - Potential flood impacts to adjacent properties due to obstruction and redirection of major overland flows. • C28 - Potential flood impacts due to blockage of flows at Unnamed Creek and Charity Creek crossings with trench pipeline laying method. Flood impacts and redistribution of flow onto residential properties along Charity Creek.

8.6.1.3 Impacts on the social and economic costs to the community

Construction activities, such as temporary stockpiles, trenching and pipe works may obstruct and redirect overland flows, resulting in increased flooding depths in adjacent properties. Without mitigation, this may result in increased costs to the community. Appropriate mitigation measures would be implemented during construction to minimise the risk of flood impacts, particularly in areas which intersect main flow paths and with private properties nearby. Refer to Section 8.7 for the proposed management measures.

8.6.1.4 Impacts to emergency management

The main emergency access routes in the vicinity of construction sites include Grand Avenue, James Ruse Drive and Silverwater Road.

Construction site C16 adjoins the intersection of Grand Avenue and James Ruse Drive. There is potential for minor to moderate increases in flood depths in the area depending on the degree of site filling and stockpiling on the site. This can be minimised with management measures such as placing stockpiles outside of flood areas.

The Grand Avenue and James Ruse Drive intersection is already flood-affected in frequent flood events during which vehicle access is likely to be hindered. The construction activities are expected to cause only minor or negligible increases in flood levels during the frequent events. Implementing management measures will minimise impacts to flood depths and durations in larger events. Therefore, with management measures in place, the impact to existing emergency access at Grand Avenue and James Ruse Drive is expected to be minor.

Two microtunneling construction sites (C20, C21) would be located at either side of Silverwater Road at Derby Street. There is potential for construction activities (e.g. temporary stockpiles) to redirect overland flows at this location. Overland flows are expected to be relatively minor and disruption to the trafficability of Silverwater Road is not expected. Therefore, the impact to existing emergency access on Silverwater Road in the construction phase is unlikely.

The project would place an increased population, consisting of approximately 10 WRRF staff, in an area with existing flood evacuation constraints. A flood management plan would be developed for the construction of the WRRF site including procedures for early evacuation of the site in the event of a flood. This has been included as a project mitigation measure.

8.6.2 Operational impacts

8.6.2.1 Potential impact on the Camellia-Rosehill precinct

Impacts to flood levels, depths, extent, velocity, flood hazard and duration of inundation resulting from the project operation phase are generally predicted to be minor in all flood events up to and including the PMF. Figure 8-6 shows the predicted changes in flood depth as a result of the project (i.e. the base case compared to the design case) during the PMF. Table 8-3 identifies the flooding impacts from the project once operational. The complete set of flood mapping is provided in the Flood assessment report (Appendix I).

Table 8-3: Impacts to flooding from the project

Flood event	Flood level increase	Flood velocity
10%, 5% and 1% AEP	• negligible in floodplain and water course areas • reduction of 0.05 m to 0.08 m in Devon Street, Colquhoun Street and Unwin Street.	• generally negligible changes in flow velocities (less than +/- 0.1 m/s change) floodplain and properties outside the site and in watercourses • localised increases in velocities of +0.3 m/s in the roadways of Devon Street, Colquhoun Street and Unwin Street due to reduced flood depths in these streets. These increases are considered acceptable given they occur within the roadway.
50% of PMF event	• increase of 0.01 – 0.02 m on the property to the west of the WRRF.	• generally negligible changes in flow velocities (less than +/- 0.1 m/s change) on the floodplain and properties outside the site and in watercourses • there are localised increases in velocities of up to +0.5 m/s in the roadway of Devon Street, although velocities remain below 1 m/s.
PMF	• increases in flood levels of 0.02 – 0.03 m on property to the west of the WRRF • 0.04 – 0.07 m increase in flood levels in Devon Street and Colquhoun Street and adjoining properties. These are considered minor impacts given the rarity of these flood events, the depths of flooding in the area (up to 1.7 m depth in the PMF) and the nature of the land use (commercial and industrial). • negligible elsewhere.	• negligible changes in flow velocities (less than +/- 0.1 m/s change) on the floodplain and properties outside the site • Rosehill Gardens Racecourse property and a substation at the corner of Colquhoun Street and Unwin Street would increase by up to +0.5 m/s, with velocities of up to 2 m/s on paved surfaces and 1.5 m/s on grassed surfaces. These are considered minor impacts given the rarity of these flood events, the depths of flooding (up to 1.7 m depth in the PMF on the substation site) and the nature of the land use.

The Sydney Metro West Clyde site between Unwin Street and Duck Creek is flood-free in up to and including the flood frequency analysis (FFA) 1% AEP event, apart from the flood detention basin where depths are about 2.5 m. Overland flows from Unwin Street occur in the FFA 1% AEP climate change events. Inundation depths are up to 1 m in the 50% of PMF event and up to 2 m in the PMF.

The flood hazard rating of flow conditions is dictated by the combination of flood depths and flow velocity. Given the negligible to minor changes in flood levels/depths, extents and flow velocities, any changes to flood hazard rating in all assessed flood events would be expected to be negligible.

Flooding around the WRRF site is anticipated to rise within 2 to 4 hours of the start of the storm event and 1 to 2 hours in the 50% of PMF and the PMF events. This confirms the SES' recommendation for early evacuation of the WRRF site upon onset of a storm and flooding event.

Long duration PMF events have the potential to result in extended periods of isolation of the WRRF site. Vehicle access to/ and from the Camellia-Rosehill WRRF site would be hindered due to flooding in Colquhoun Street at Unwin Street by 7 hours in the critical 5 hour storm duration PMF event, and up to 14 hours in the 24 hour storm duration PMF event.

There is negligible increase, if any, in the duration of flooding at the key locations assessed for the project. There are reduced peak flood depths and durations of flooding at Devon Street and Unwin Street as a result of the project.

8.6.2.2 Impact of flooding on the WRRF site

Peak flood levels at the north-western corner of the WRRF site are summarised in Table 8-4. This area of the site has the maximum flood levels and potential for flooding. The Camellia-Rosehill WRRF site sits above the FFA 1% AEP flood level for areas outside this reserved overland flow path. Project works within the flood path area and on the site filled embankment would be 0.5 m above the FFA 1% AEP climate change (RCP 8.5 2150) flood level due to the proposed site grading.

Compared to the existing climate 1% AEP event, the assessment of potential flooding with climate change showed:

- flood levels in the RCP 4.5 2150 climate change scenario increase by 0.5 – 0.6 m in Duck River, with similar flood level increases in the existing stormwater channel on the site western boundary. Increases in flood levels and depths in Devon Street are about 0.01 m and 0.13 m in Unwin Street. There are increases in flood extent on the Camellia-Rosehill WRRF site compared to the existing climate scenario, which are contained in the reserved overland flow path on the western site boundary
- flood levels in the RCP 8.5 2150 climate change scenario increase by 0.7 – 0.75 m in Duck River, and 0.6 – 0.7 m in the existing stormwater channel on the site western boundary. Increases in flood levels and depths in Devon Street are about 0.01 m and 0.2 m in Unwin Street. There are increases in flood extent on the WRRF site compared to the existing climate scenario. The increases in extent are larger than in the RCP 4.5 2150 scenario and which are contained in the reserved overland flow path on the western site boundarythe required flood immunity for the Camellia-Rosehill WRRF is achieved.

The PMF level is slightly above the site filled embankment finished level, with shallow overtopping flows to 0.01 m depth. While there is no design requirement for the site to be above the PMF, the majority of the site at finished ground level is flood free.

There are existing development consents that relate to the land and the land of adjoining landowners to the east of the site. These consents are for the Central Sydney Industrial Estate and Downer Sustainable Road Resource Centre (SSD-10459) and Viva Energy Clyde Western Area Remediation Project (SSD-9302). The results show no to negligible increases in flooding impacts to the land the subject of these consents. This is in all flood events, including the 50% of PMF and PMF event. As such, flooding impacts on the existing development consents that apply to the site from the project are unlikely.

The project is predicted to comply with the design criteria and performance outcomes outlined in Section 8.5, provided that the proposed mitigation measures are implemented. The Flood assessment report (Appendix I) includes more detail on compliance with the performance outcomes.

Table 8-4: Predicted flood levels at the WRRF site

Flood event	Level/ flood level (m AHD)	Height of raised site ground level above flood level (m)	Height of first floor of admin building above flood level (m)
1% AEP	5.10	1.73	3.25
1% AEP climate change (RCP 8.5 2150)	5.12	1.71	3.23
PMF	6.84	-0.01	1.51

Figure 8-5 Predicted changes in flood levels during a 1% AEP event

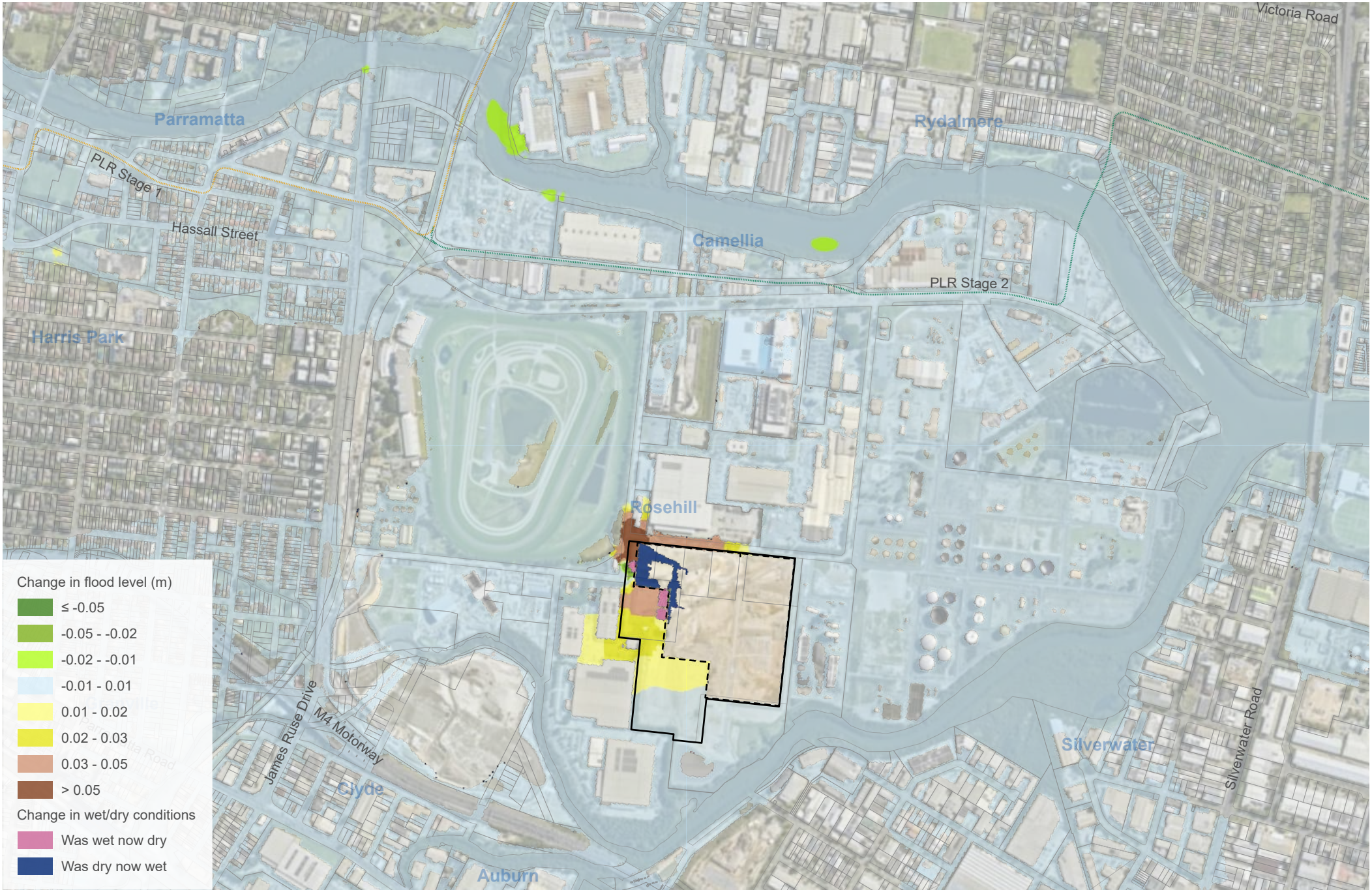


Figure 8-6 Predicted changes in flood levels during a PMF event

8.6.2.3 Camellia pumping station

The upgrade of the Camellia pumping station is expected to have a minor impact on flooding, for the following reasons:

- the small extension of existing building footprint
- limited flood interaction in the 1% AEP event
- existing widespread and deep flooding in the 50% of PMF event and rarer.

Camellia pumping station in the operation phase is generally compatible with the flood hydraulic function in the project area.

The site would change from being flood-free in the current climate FFA 1% AEP event to being inundated during the FFA 1% AEP climate change event (RCP4.5 2150) to depths of 0.2 – 1.0 m. New electrical installations would be designed with consideration of RCP4.5 2150 flood immunity. The Camellia pumping station upgrade also includes improvements to existing flood protection measures.

8.6.2.4 Pipelines

Given there is no new above ground infrastructure proposed for the brine (new and relined sections) and transfer pipelines, there are no flood impacts expected from operation of these elements of the project.

There may be changes to flood behaviour resulting from the aerial crossings of the river release pipeline over Charity Creek and unnamed creek in Meadowbank Park. Changes would depend on the design of the aerial crossing, for example, within channel, restricting flow. If changes were to occur, there could be potential increases in flood depths and levels in the yards and ground level areas (likely to be limited to garages and lobby areas) of adjacent residential apartment properties. As the pipeline design for the aerial crossings progress during detailed design, a review would confirm if potential impacts could occur. The barometric loop is not located in an area affected by flooding, therefore no flood impacts are expected.

Figure 8-7: Existing footbridge crossing of Charity Creek and proposed aerial crossing

The river release pipe structure would be located on the bed of the Parramatta River, with approximately 300 mm diameter pipes and anchoring structures sitting up to about 0.6 m above the riverbed. Given the 200 m width of the river, the deep permanent depth of the river at this location and the low profile of the river release structure compared to the cross section of the river, the flood impacts resulting from the structure are expected to be negligible.

8.6.2.5 Impacts on the social and economic costs to the community

Given the negligible increases in flood levels, the incremental social and economic costs due to the project are expected to be minor.

8.6.2.6 Impact on Camellia-Rosehill Precinct

Based on the low level of predicted impacts of the project, it is expected that the WRRF would have only minor contribution to any cumulative flood impacts as a result of precinct changes. Sydney Water understands that the DPHI is considering precinct planning for the Camellia-Rosehill Precinct and would undertake an assessment of the flood impacts as part of that process. Sydney Water has shared the flood model and assessment for this project with DPHI and would continue to engage with DPHI as needed for precinct planning purposes.

8.6.2.7 Impacts to emergency management

Given the negligible increases in flood levels and duration of flooding at key locations, the impact to existing emergency management arrangements of the Camellia–Rosehill Precinct, including to key evacuation routes, due to the project are expected to be minor.

The project would place an increased workforce population, consisting of approximately 10 WRRF staff, in an area with existing flood evacuation constraints. A flood management plan would be developed for the operation of the WRRF site including procedures for early evacuation of the site in the event of a flood. This has been included as a project mitigation measure.

8.6.2.8 Compatibility with existing floodplain risk management plans

No inconsistencies with the WRRF design compared to the City of Parramatta's Lower Parramatta River Floodplain Risk Management Study and Plan (Sinclair Knight Merz, 2005) (FRMSP) were identified, including to policy and planning controls such as required freeboard above 1% AEP flood level for habitable floors. Further, no flood mitigation works as recommended by the FRMSP are affected by the project.

8.6.2.9 Consideration of climate change impacts

The risk of increased flood impacts and exposure with future climate change is considered negligible to minor for the WRRF. The flooding assessment of climate change impacts to flooding indicates that the future 1% AEP flooding (with climate change) would be contained within reserved drainage flow paths on the WRRF site and that both the raised area of site and the administration building habitable floor levels would be elevated above the FFA 1% AEP climate change flood level.

There is risk of increased flood exposure at Camellia pumping station, with the FFA 1% AEP flood level increasing by 1.1 m from the existing climate scenario. Flood protection levels or flood proofing for the pumping station should appropriately consider the future climate change flood levels. This has been identified in Chapter 20 (Sustainability and climate change) in relation to climate change risk assessment for the project.

8.6.2.10 Independent peer review

BMT completed a detailed review of the flood modelling and associated reporting for the Flood Impact and Risk Assessment (Jacobs, 2025b) and during September and October 2025. The key findings of the review are summarised in the Independent Peer Review for GPOP Flood Modelling (Appendix I). Initial findings were provided to Jacobs with additional supporting details, and after Jacobs responded to each finding, they were further reviewed and commenting on. The scope of work included:

- review of hydraulic model
- review of hydrology update (long duration Probably Maximum Precipitation)
- review of the Flood Assessment Report (Appendix I)
- BMT also reviewed the project SEARs against the GPOP WCM flood assessment and noted that it is BMT's opinion that all the project SEARs have been sufficiently addressed. This was documented in the Flood Assessment Report (Appendix I).

8.7 Mitigation measures

As discussed in Section 8.4, the project has been designed to minimise potential flooding impacts where feasible. Sydney Water would manage potential impacts during construction through implementation of the CEMP (Section 6.4). Project specific mitigation measures that would be implemented to manage potential flood impacts are provided in Table 8-5.

Table 8-5: Flooding mitigation measures

ID	Potential impact	Mitigation measure	Timing
FL01	Flooding impacts on project worksites during construction	Prepare and implement a flood management plan as part of the CEMP for the proposed construction works that will describe the processes for flood preparedness, materials management, weather monitoring, flood incident management and site management during construction. Prepare flood incident management measures in consultation with NSW SES and relevant local councils.	Prior to construction and during construction
FL02	Potential for aerial crossings of Charity creek and the unnamed Creek to cause flood impacts	Review design of aerial crossings over Charity Creek and the unnamed creek for potential flood impacts. If required, refine the aerial crossings design to minimise potential flood impacts.	During detailed design
FL03	Construction activities may exacerbate flooding or lead to pollution	Plan construction activities to locate construction facilities outside high flood hazard areas on a 1% AEP flood, where possible.	Prior to construction
FL04	Open trenches and trenchless construction on flood prone land have the potential to redistribute flood flows	Plan excavation of open trenches and microtunneling / HDD to avoid potential flooding impacts to people and property, including: • planning excavation to avoid periods of forecast heavy rain • backfilling excavations promptly • protecting microtunneling and HDD entry and exit points from floodwater where possible.	Prior to and during construction
FL05	Construction activities may exacerbate flooding or lead to pollution	Plan construction activities to locate spoil stockpiles in areas which are not subject to frequent inundation by floodwater.	Prior to construction and during construction
FL06	Increase in flood depths from construction activities obstructing existing drainage pathways	Maintain existing hydraulic capacity where practicable for activities that may impact existing drainage systems during construction.	During construction

ID	Potential impact	Mitigation measure	Timing
FL07	Emergency preparedness during operation	Prepare and implement a flood management plan for the operation of the WRRF which will describe the procedures for planning and responding to a flood event. Early evacuation preparedness will be implemented in favour of sheltering in place.	Prior to operation and during operation.

Soils and contamination

9 Soils and contamination

This chapter provides an overview of the key findings of the Soils and Contaminated Land Impact Assessment (GHD, 2025a) (Appendix J). The assessment describes the existing soil and contamination within the impact area, and the project's potential impacts from soils and contamination during construction and operation. The assessment determined there was a high probability of the project encountering acid sulfate soils and confirmed multiple types of contamination across the project's boundary. If no mitigation measures are put in place, the project poses a moderate to very high risk during construction and operation. With mitigation measures, potential impacts and risks to the project's construction workforce are considered to be low.

9.1 Secretary's Environmental Assessment Requirements

The SEARs relevant to soils are provided in Table 9-1. The SEARs relevant to contamination are provided in Table 9-2.

Table 9-1: Project SEARs relating to soils and contamination

SEARs	EIS section where requirement addressed
1. Verify the risk of acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Risk Map) within, and in the area likely to be impacted by, the project.	Section 9.3.2
2. The impact of the project on acid sulfate soils (including impacts of acidic runoff offsite) in accordance with the current guidelines.	Section 9.4
3. Identify whether soil salinity is likely to be an issue and if so, determine the presence, extent and severity of soil salinity within the project area, and assess the impacts of the project on soil salinity and how it may affect groundwater resources and hydrology.	Section 9.3.2 Section 9.4
4. The impacts on soil and land resources (including erosion risk or hazard). Particular attention must be given to soil erosion and sediment transport consistent with the practices and principles in the current guidelines.	Section 9.3.2 Section 9.4 Section 9.5

Table 9-2: Project SEARs relating to contamination

SEARs	EIS section where requirement addressed
1. Identify the likelihood of contamination (which includes soils, groundwater, ground gas, surface water and sediments, where applicable) by considering the context of past, existing and future land uses. The EIS must document how the assessment of contaminated land has considered relevant guidelines for contaminated land made or approved under section 105 of the *Contaminated Land Management Act 1997*.	Section 9.3 Section 9.4 Section 9.5 Appendix J

SEARs	EIS section where requirement addressed
2. Where contamination is considered likely based on past or current land uses or other factors (such as offsite contamination migrating onto the site), undertake detailed site investigation/s to determine the nature and extent of the contamination.	Section 9.4 Section 9.5 Appendix J
3. Where contamination exists, assess if remediation of the land is required, having regard to the ecological and human health risks posed by the contamination.	Appendix J No remediation was recommended
4. Any Preliminary Site Investigation, Detailed Site Investigation, or other related reports on contamination (including but not limited to a Sampling Analysis Quality Plan), must be accompanied with an Interim Audit Advice or a Site Audit Statement from a NSW EPA accredited Site Auditor certifying the appropriateness of the assessments. Any risk rating of areas of environmental interest (or areas of environmental concern or any other similar terminology) as well as the proposed mitigation measures must be also reviewed as appropriate by the accredited Site Auditor.	Section 9.3.3 Appendix J
5. Consider potential impacts to the integrity of the Sydney Olympic Park Authority's waste containment systems, in particular at the Woo-la-ra landfill and its leachate gravity drain and vertical cut-off wall south of the waste mound.	Section 9.4 Section 9.5 Appendix J
6. Contamination reports must be prepared or reviewed by a Contaminated Land Consultant certified under either the Environment Institute of Australia or New Zealand's "Certified Environmental Practitioner" (Site Contamination) scheme (CEnvP(SC)) or the Soil Science Australia "Certified Professional Soil Scientist Contaminated Site Assessment and Management" (CPSS CSAM) scheme.	Section 9.2.2
7. A Detailed Site Investigation must be prepared if recommended by a Preliminary Site Investigation unless justification is provided in the EIS on why it is not possible to undertake such an investigation.	Appendix J

9.2 Assessment methodology

9.2.1 Legislative and policy context

The Soil and Contaminated Land Impact Assessment (Appendix J) was undertaken in accordance with, or with reference to, the following key legislation and guidelines:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Contaminated Land Management Act 1997* (CLM Act)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- Protection of the Environment Operations (Waste) Regulation 2014 (POEO (Waste) Regulation)
- State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP).

The assessment has been completed with consideration of guidelines made or endorsed by the NSW EPA under section 105 of the CLM Act, and guidance documents relevant to waste disposal in NSW, acid sulfate soils, and soils and salinity. A full list is provided in the Soils and Contaminated Land Impact Assessment (Appendix J).

9.2.2 Methodology

The key steps undertaken for the assessment included:

- a desktop review of available existing information to understand the existing environment, including Preliminary and Detailed Site Investigations (PSIs and DSIs) undertaken as part of the project (for full list see the Soils and Contaminated Land Impact Assessment (Appendix J)). A certified environment practitioner – Site contamination scheme (CEnvP(SC)) prepared and / or reviewed the reports. These are accompanied by an Interim Audit Advice from a NSW EPA accredited Site Auditor certifying the appropriateness of the assessments (Rebeka Hall of Geosyntec Consultants)
- a site inspection of the pipeline alignments and the WRRF to ground truth the information obtained in the desktop review and the potential contamination within the project footprint
- identification of areas of environmental interest (AEIs) to characterise contamination and assess the potential impacts from the construction and operation of the proposed project
- assessment of the potential impacts of the project on soils and contamination
- identification of mitigation measures and/ or management measures for soils and contamination required during construction and operation
- identification of where further investigation and / or remediation is required
- monitoring requirements during construction and operation.

9.2.2.1 Risk ranking of AEIs

Potential contamination sources are referred to as AEIs. AEIs were identified during preparation of the PSIs and assessed as part of the DSIs undertaken as part of the project.

The Soil and Contaminated Land Impact Assessment (Appendix J) developed a conceptual site model which forms the basis of the impact assessment. The model identifies potential links between the AEIs and receptors, and the pathways through which contamination could migrate. Receptors for this assessment include human, environmental and the built environment.

A qualitative risk assessment was completed in line with AS/NZS ISO 3100:2009. The risk is assessed by estimating the likelihood of the linkages between AEIs and sensitive receptors occurring and the foreseeable consequences of that exposure and their impacts on construction and operation.

After consideration of the likelihood and consequences of the risk, the overall risk ratings were assessed in accordance with Table 9-3.

Table 9-3: Risk ranking matrix

Consequence	Likelihood				
	Rare	**Unlikely**	**Possible**	**Likely**	**Almost Certain**
Severe	Low	Low to moderate	Moderate to high	Very high	Very high
Moderate	Negligible to low	Low	Moderate	Moderate to high	High
Mild	Negligible	Low	Low	Low to moderate	Moderate
Negligible	Negligible	Negligible	Negligible to low	Low	Low

Risk ratings are defined as follows:

- **negligible** – the presence of the identified source does not give rise to the potential to cause major harm
- **low** – it is possible that mild harm could arise to a specific receptor from an identified source
- **moderate** – it is possible that harm could arise to a specific receptor, but it is unlikely that such harm would be major
- **high** – a specific receptor is likely to experience major harm from an identified source without remedial action
- **very high** – there is a high probability that severe harm could arise to a specific receptor from an identified source without appropriate remedial action.

The nominated risk ranking for each of the AEIs will be the highest level risk identified among all the identified receivers. The receptor/s with the highest risk ranking for the AEI are in brackets with the ranking in Table 9-5 to Table 9-7.

9.2.2.2 Impact assessment

The impact assessment incorporated the significance of the risk rating to assess the impacts on construction and operation. The proposed activities associated with the project construction and operation were reviewed to identify those that had the potential to impact or change the soil, sediment, soil vapour, ground gases and groundwater. If required, mitigation measures were developed to minimise contamination migration and impact on human health and the environment.

9.3 Existing environment

The Soils and Contaminated Land Impact Assessment (Appendix J) includes a comprehensive desktop consideration of soil resources and characteristics. The Assessment considers the following:

- soil landscapes
- soil erodibility
- ASS
- salinity and land capability (including where they occur in relation to the WRRF and pipeline components of the project).

9.3.1 Topography and geology

The study area ranges in elevation from 1.9 m to 29 m AHD. The topography of the Camellia peninsula where the WRRF is located is relatively flat, with an elevation ranging between 4 m and 5.3 m AHD. The brine and transfer pipelines and the river release pipeline vary in elevation, traversing across both low river and elevated built environments. Parramatta River's foreshore has approximate elevations of 1.9 m AHD, and Meadowbank has elevations of 18.65 m AHD. The highest elevation, 29 m AHD, is recorded where the brine pipeline (relining section) connects with the NSOOS at Kissing Point Road.

There are 2 main geology profiles across the project footprint, being Ashfield shale to the north of the Parramatta River and Hawkesbury Sandstone to the south of the Parramatta River (Geological Survey of NSW, 1983). The geology on the WRRF site is described as 'human-made fill'. This fill includes dredged estuarine sand and mud, demolition rubble, industrial and household waste and overlies layers of sand, clay, and peat, variably containing iron oxides or rust.

9.3.2 Soil characteristics

9.3.2.1 Water Resources Recovery Facility

Soil landscape mapping on eSPADE (accessed July 2025) shows the WRRF is located on disturbed terrain soil landscapes. These landscapes are present on level plain to hummocky terrain, which has been extensively impacted by human activity. Typical land types prior to human activity were swamps, estuaries and wetlands.

The ASS Risk Mapping, developed by the NSW DCCEEW (NSW DCCEEW, 1998), situates the WRRF footprint in an area classified as 'Class 4' which indicates that ASS are likely to be present beyond 2 m below the natural ground surface. This is supported by the results of recent site investigations, which concluded that soils at the WRRF below a depth of 1.5 m below ground level to 12.95 m below ground level may be considered ASS. Potential environmental risks apply to 'Class 4' sites where the water table is lowered more than 2 m below the natural ground surface.

A review of the Hydrogeological Landscapes of NSW and the Australian Capital Territory dataset (NSW DCCEEW, 2025b) accessed via eSPADE revealed that the WRRF site has a moderate salinity risk. This is attributed to the tidal influence on the extensive flood and alluvial plains with some ponding along Parramatta River. Periodic wetting and drying of the flood and alluvial plains allow for the cycling of salts.

9.3.2.2 Brine and transfer pipeline (including Camellia pumping station)

eSPADE soil landscape mapping shows that most of the brine and transfer pipeline is located within the Gymea soil landscapes. Small areas of the alignment are located within Blacktown soil landscapes, Lucas Heights soil landscapes and Birrong soil landscapes. Gymea soil landscapes are described as undulating to rolling rises, with soil profiles generally of 1 m depth.

A summary of soil erodibility based on soil landscape is provided below:

- Gymea soil landscapes have a high soil erodibility hazard
- Blacktown soil landscapes are associated with moderate erodibility, noting existing erosion is non-existing due to the prevalence of buildings and hardstand surfaces
- Lucas Heights soil landscapes are susceptible to erosion, with a moderate erosion hazard for non-concentrated flows, and high erosion hazard for concentrated flows
- Birrong soil landscapes have a high soil erosion hazard.

The NSW DCCEEW ASS Risk Mapping identifies the project footprint extending from the northern bank of the Parramatta River to the NSOOS pipeline to be classified as 'Class 5', which indicates that ASS are not typically present. To the south of the Parramatta River, including north Camellia to the WRRF, the project footprint is situated in an area classified as 'Class 4' which indicates that ASS are likely to be present beyond 2 m below the natural ground surface. The brine and transfer pipelines DSI reported that one sample in this location exceeded the action criteria specified in the National Acid Sulfate Soil Guidance (Sullivan, L., Ward, N., Toppler, N., and Lancaster, G., 2018), indicating that it is possible that potential ASS (PASS) are present in the natural soils. The DSI reports no indicators of ASS were observed at investigation locations during the drilling and soil sampling undertaken. Further, the DSI reports that the ASS data collected is limited and should be considered indicative only.

The hydrogeological landscape mapping (NSW DCCEEW, 2025) indicates various salinity potential across the brine and transfer pipelines. The impact area is located within the Hawkesbury Sandstone (Dundas to Parramatta), Bankstown (WSU Campus to PLR) and Parramatta/Georges River (Newington to Sydney Olympic Park) hydrogeological landscapes. A summary of the salinity risk and hydrogeological characteristics of these landscapes is provided below:

- Hawkesbury Sandstone has a very low salinity risk, associated with sandy soils and fractured bedrock which enables salts to be flushed from the sandstone matrix preventing accumulation
- Bankstown has a high salinity risk, associated with low permeability soils above alluvial areas restricting downward movement of water, enabling salts in upper soil materials to be mobilised and concentrated at the surface
- Parramatta/Georges River has a moderate salinity risk, due to the tidal influence on the extensive flood and alluvial plains with some ponding along Parramatta River. Periodic wetting and drying of the flood and alluvial plains allow for the cycling of salts.

9.3.2.3 River release pipeline

eSPADE soil landscape mapping shows the river release pipeline is located within Blacktown, Birrong and Ettalong soil landscapes. Blacktown and Birrong soil landscapes are in Newington, Birrong present across the eastern portion whilst Blacktown extends into Silverwater. Ettalong soil landscapes are present on and adjacent to Hill Road.

- a summary of soil erodibility based on soil landscape is provided below:
- Blacktown soil landscapes pertain moderate erodibility, noting existing erosion is non-existing due to the prevalence of buildings and hardstand areas
- Birrong soil landscapes are highly susceptible to soil erosion.

The NSW DCCEEW ASS Risk Mapping identifies the project footprint through Silverwater and Newington is in an area is classified as 'Class 5' which indicates that ASS are not typically present. On the eastern end of Newington and the northern end of Wentworth Point these areas are classed as 'Class 2' which indicates that ASS are likely to be found below the natural ground surface. Along Hill Road towards Wentworth Point, the area is identified as 'disturbed terrain' which means that soil disturbance prevented the identification of the landform and therefore the identification of ASS/PASS. It is, therefore, possible that ASS may occur at these locations. At Memorial Park, the project footprint is in an area classed as 'Class 2' which indicates that ASS are likely to be found below the natural ground surface. To the east and adjacent to the proposed river release structure within Parramatta River, the area is classed as 'Class 5' which indicates that ASS are not typically present.

Results from field testing indicate the potential presence of ASS along the river release pipeline at 4 locations. 3 of these locations (RRP-BH-111, RRP-BH-116, RRP-BH-129) are situated alongside the proposed open trenched sections of the alignment, while one location (RRP-BH-118) overlies a proposed trenchless section. During DSI fieldwork, Jacobs reported that visual indicators of PASS (e.g. shells, odour, change in colour) were observed in soils along the project footprint. While these soils were not sampled, Jacobs indicated that based on the observations, PASS may be present.

The hydrogeological landscape mapping (NSW DCCEEW, 2025) identifies a moderate salinity risk within Wentworth Point, Meadowbank, and the eastern side of Newington. The remainder of the alignment is associated with the Bankstown hydrogeological landscape in Silverwater and Newington with a high salinity risk.

9.3.3 Contamination

AEIs were identified through a combination of desktop searches and site investigations and are summarised in Table 9-4. These AEIs have been reviewed and deemed appropriate by the Site Auditor and are known potentially contaminated areas within and/or adjacent to the project footprint. The locations of the AEIs are presented in Figure 9-1 to Figure 9-4. A full summary of previous investigations and reports reviewed are within the Soils and Contaminated Land Impact Assessment (Appendix J).

9.3.3.1 Previous land uses and regulation history at the WRRF

The Camellia Peninsula has a complex industrial legacy, which since the 1880s has been occupied by a wide range of heavy and light industries. These include a crude oil refinery (part of the Clyde Refinery), chemical manufacturing, asbestos and building materials and other industries such as tanneries, meatworks and lumberyards. The proposed WRRF is located within the land of the former crude oil refinery which was in operation from 1926 to 2012. The site continued as a terminal for the receipt, storage and distribution of finished petroleum products. The refinery was then subdivided and remediated in stages. The area associated with the WRRF is the Stage 2 area of the "Western area remediation project".

Site audit statements (SAS) and site audit reports (SAR) were prepared by the site auditor at the time (Andrew Kohlrusch of GHD) in 2020-2022 for the proposed WRRF site and its surrounding areas. Based on the information that was reviewed, the SASs and SARs detailed that all areas considered are suitable for commercial/industrial land uses subject to implementation of area specific LTEMPs (for further details see the Soils and Contaminated Land Impact Assessment (Appendix J)).

A brief summary of the site's history is outlined below:

- NSW EPA declared the former Clyde Refinery significantly contaminated on 8 June 2016 (#20131110). Following remediation and preparation of the SAS / SARs for portions of the former Clyde Refinery (including the proposed WRRF), NSW EPA reviewed available reports, including SAS's and SAR's, and was satisfied that the contamination at the SAS / SAR land was no longer significant enough to warrant regulation under the *Contaminated Land Management Act 1997*. The repeal notice for the land applying to the SAS / SARs (including the proposed WRRF site) was issued by the NSW EPA in July 2022. The off-site area AA4, located to the south, is still declared a significantly contaminated site.
- to the south of the proposed WRRF boundary is a buried waste area, referred to as ""Southern Buried Waste Area". Remedial works were undertaken by ERM and audited by Andrew Kohlrusch of GHD. This buried material included Asbestos Containing Material (ACM), refinery waste and tar-like materials.
- the WRRF is underlain by fill materials between one m to 3 m in depth on average. Fill material excavated from most sampled locations contained visual contamination and construction wastes. Bitumen with strong anthropogenic odours was observed at isolated locations.

9.3.3.2 Summary of historical contamination

The PSIs and DSIs determined the AEIs based on desktop environmental searches and site investigation activities. These AEIs have been reviewed and confirmed appropriate by the Site Auditor. They are known areas or potential areas with contamination in and/or adjacent to the project impact area.

The Soil and Contaminated Land Impact Assessment (Appendix J) identified 5 AEIs associated with the WRRF, 15 AEIs associated with the brine and transfer pipeline (including Camellia pumping station) and 11 AEIs associated with the river release pipeline. The locations of the AEIs are presented in Figure 9-1 to Figure 9-4. Those AEIs that would, or potentially would, have an impact to the project are outlined in further detail in Table 9-4.

Table 9-4: Summary of historical contamination

AEI	Name and Location	Media and Contaminants of Potential Concern	Historical Contamination Summary
WRRF			
AEI-001	Former Clyde Refinery Entire WRRF site	Asbestos, heavy metals, Light Non-Aqueous Phase Liquid (LNAPL)*, Total recoverable hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic aromatic hydrocarbons (PAHs), Per- and polyfluoroalkyl substances (PFAS)	Potential sources of contamination include historical operation, contaminated fill, contamination from former aqueous film forming foam (AFFF) tank and asbestos in buildings.
Brine and transfer pipelines (including Camellia pumping station)			
AEI-001 – BTP	Former Clyde Refinery Within and adjacent to the alignment	Asbestos, heavy metals, LNAPL[7], TRH, BTEX, PAHs, PFAS.	Historical development, waste disposal, spills and leaks from former refining operation. Known soil, groundwater and soil vapour contamination. Area also contains disturbed terrain (AEI-013 – BTP) and areas of ASS (AEI-014 – BTP).
AEI-006 – BTP	Camellia Pumping Station Within the brine and transfer alignment	Asbestos (bonded and fibrous/friable), ASS, Perfluorooctanesulfonic acid (PFOS)	Sydney Water pumping station. Known soil contamination and potential asbestos.
AEI-010 – BTP	Service station 75 m north-west adjacent to the alignment.	TRH, BTEX, heavy metals	The service station is an active site with potential for hydrocarbon leaks and/or spills from refuelling activities (i.e. underground tanks, fuel bowsers and pumps). Contamination may be present in soil, soil vapour and groundwater exceeding the relevant assessment criteria.

[7] LNAPL – light non-aqueous phse liquid. LNAPL is a product like oil and fuel that is lighter than water and therefore, it sits on top of groundwater. This can release harmful vapours as well as contaminate soil and groundwater.

AEI	Name and Location	Media and Contaminants of Potential Concern	Historical Contamination Summary
AEI-012 – BTP	Commercial/industrial land at Camellia, Clyde and Rosehill Adjacent to the brine and transfer pipeline	Potential: TRH, BTEX, PAHs, Organochlorine pesticides (OCP), Organophosphate pesticides (OPP), Polychlorinated Biphenyls (PCB), phenols, Volatile organic compounds (VOCs), PFAS, heavy metals, asbestos	General historical and industrial land use could potentially have contaminated soil, soil vapour and groundwater exceeding the relevant assessment criteria across the area.
AEI-013 – BTP	Disturbed terrain and anthropogenic deposits Within the entire length of the brine and transfer alignment	Potential: TRH, BTEX, PAHs, OCP, OPP, PCB, phenols, VOCs, PFAS, heavy metals, asbestos	Areas of disturbed terrain and filling with the potential across the length of the alignment. Contamination may be present in soil, soil vapour and groundwater exceeding the relevant assessment criteria across the area.
AEI-014 – BTP	Acid sulfate soils	ASS	ASS is known to be present beneath the WRRF and at the open trench area between the Camellia pumping station and the trenchless methods entry points.
Proposed pipeline access pipes – BTP	Area between the Camellia pumping station and the NSOOS	Asbestos in soils, ASS	Asbestos (friable and bonded) is known to be present in the fill in the alignment area south of the Parramatta River to the Camellia pumping station. Contamination status is unknown for the area north of the Parramatta River.
River release pipeline			
AEI-001 – RRP	Former Clyde Refinery South-west corner of WRRF to Carnarvon Street Southern Buried Waste Area	Benzo(a)pyrene (B(a)P), LNAPL, TRH, BTEX, VOCs, PFOS, heavy metals, methane, ASS, carbon dioxide, asbestos	Potential sources of contamination include historical operation, contaminated fill, contamination from AFFF tank and asbestos in building.

AEI	Name and Location	Media and Contaminants of Potential Concern	Historical Contamination Summary
AEI-002 – RRP	MET Recycling Facility (EPL 20948) Adjacent to alignment	Heavy metals, nutrients PFOS, methane, carbon dioxide	Former landfill, current NSW EPA regulation under the CLM Act is associated with ground gases.
AEI-003 – RRP	Former commercial industrial sites Adjacent to alignment	Chlorinates hydrocarbons, TRH	Former commercial printing facility.
AEI-004 – RRP	Sydney Olympic Precinct. SOPA POD A Carpark to SOPA POD C Carpark Within and adjacent to the alignment	Asbestos (friable), B(a)P, ASS, PFOS, heavy metals, nutrients, ground gases	The Sydney Olympic precinct lands are associated with historical land uses, including but not limited to brickworks, abattoirs, and landfilling/land reclamation.
AEI-005 – RRP	Haslams Reach north and Woo-la-ra Landfill[8] SOPA P5C Carpark to Memorial Park Adjacent to the alignment	PFOS, nutrients, ground gases	Managed waste emplacements. The leachate at these sites is managed by a leachate system which collects leachate for treatment and disposal at the Lidcombe waste facility.
AEI-006 – RRP	Commercial/ industrial land at Silverwater Adjacent to the alignment	Asbestos (ACM) / Potential ACM (PACM), heavy metals, PFAS, PASS	Commercial and industrial properties with the potential for localised contamination areas from Carnarvon Street through to Pierre De Coubertin (PDC) Park.
AEI-007 – RRP	Former armory Within and adjacent to the alignment	ASS	Historical use of the area as a general armory.
AEI-008 – RRP	Commercial/ industrial land Adjacent to the alignment	PFAS, nutrients	Historical commercial/industrial use including brickworks and an abattoir.

[8] It is noted that the project would not intersect the Woo-la-ra landfill system

AEI	Name and Location	Media and Contaminants of Potential Concern	Historical Contamination Summary
AEI-009 – RRP	Landfilling and land reclamation at Wentworth Point Within and adjacent to the alignment	Asbestos, TRH, BTEX, PAHs, heavy metals, nutrients, PFAS, ground gas, ASS	Historical land filling and reclamation.
AEI-010 – RRP	Landfilling and land reclamation Memorial Park Within and adjacent to the alignment	B(a)P, PACM, PFAS, nutrients and ground gases	Memorial Park historically had landfilling and land reclamation.
AEI-011 – RRP	Disturbed terrain / anthropogenic deposits Within and adjacent to the alignment – WRRF, SOPA, Wentworth Point and Meadowbank	Potential: TRH, BTEX, PAHs, OCP, OPP, PCB, phenols, VOCs, PFAS, heavy metals, asbestos, ASS and PASS	Areas of disturbed terrain and filling with the potential across the length of the alignment at WRRF, SOPA, Wentworth Point and Meadowbank. Contamination may be present in soil, soil vapour and groundwater exceeding the relevant assessment criteria.
AEI-012 – RRP	Acid sulfate soils, within and adjacent to the alignment	ASS	ASS is known to be present beneath the WRRF and at the open trench area between the camellia pumping station and the trenchless methods entry points.
	Dioxins from Parramatta River and Homebush Bay	Dioxins/furans, zinc and ASS	Parramatta River has a legacy industrial activity particularly from the manufacture of chlorinated pesticides. Contamination is present in the surficial sediments at the Bridge. Despite remedial efforts, residual contamination remains.

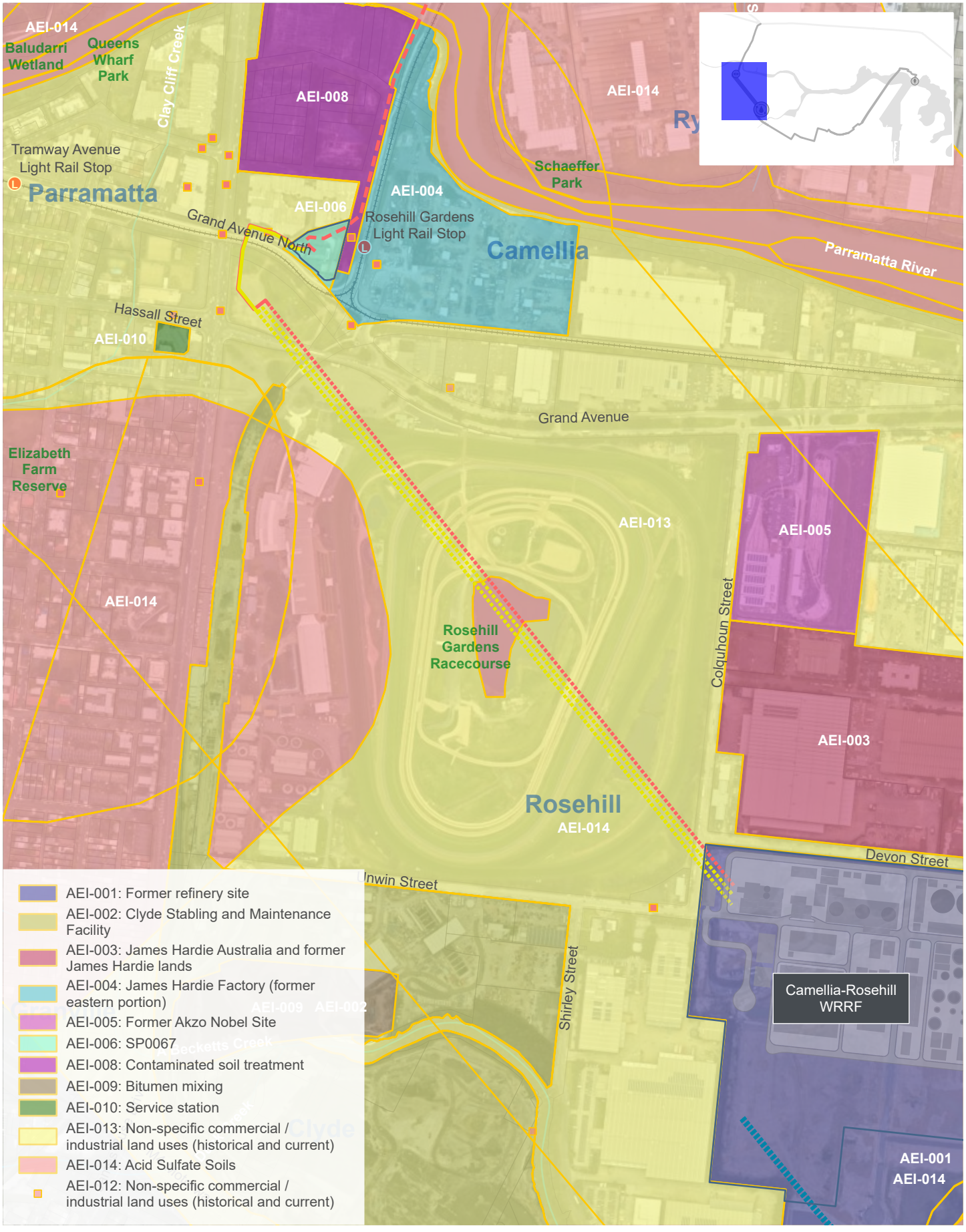
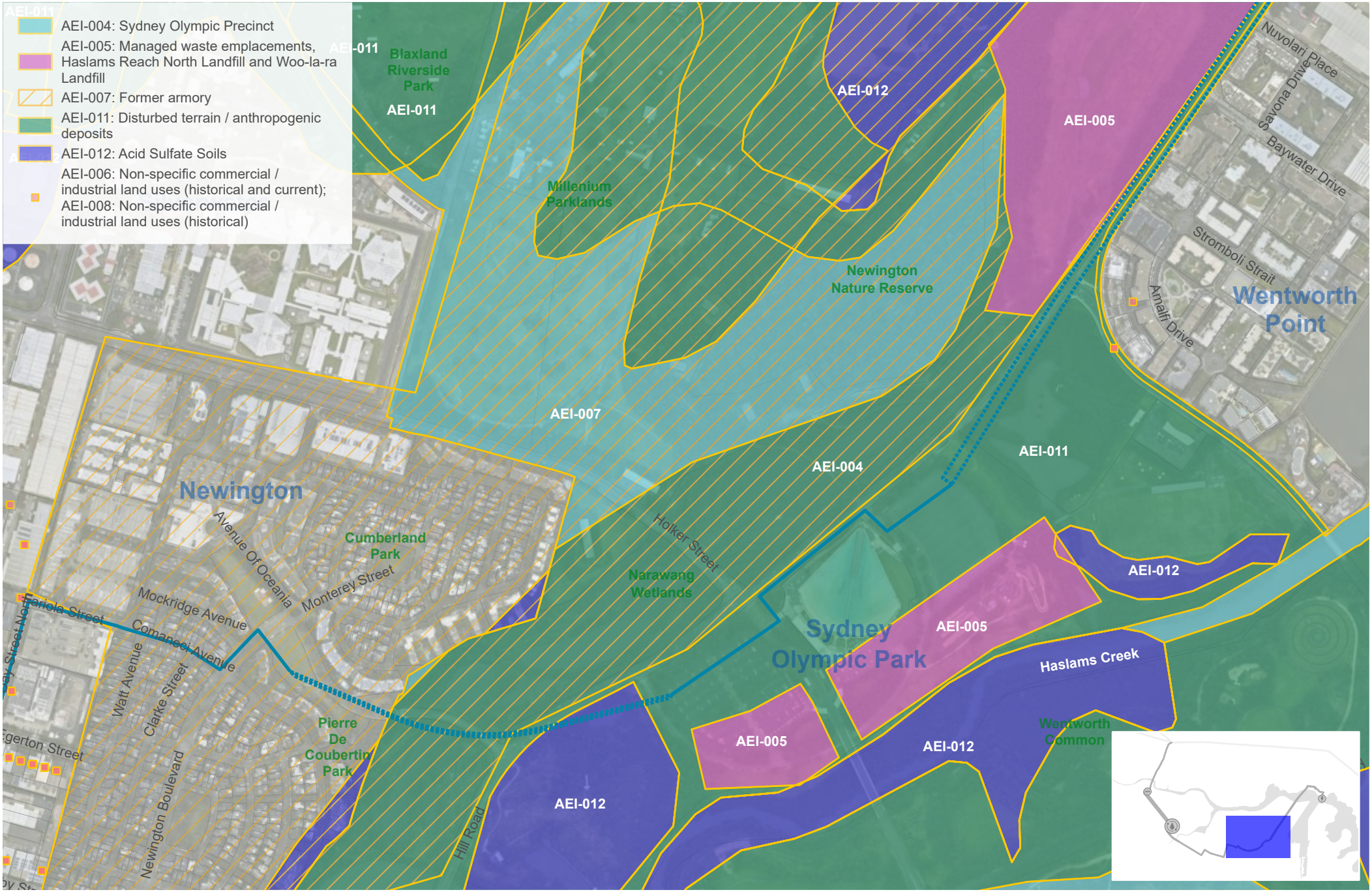


Figure 9-1 WRRF and brine transfer pipeline AEIs

Figure 9-2 WRRF and river release pipeline AEIs

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56



Proposed River Release Pipeline - Open trench
Proposed River Release Pipeline - Trenchless

Figure 9-3 River release pipeline AEIs

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

N

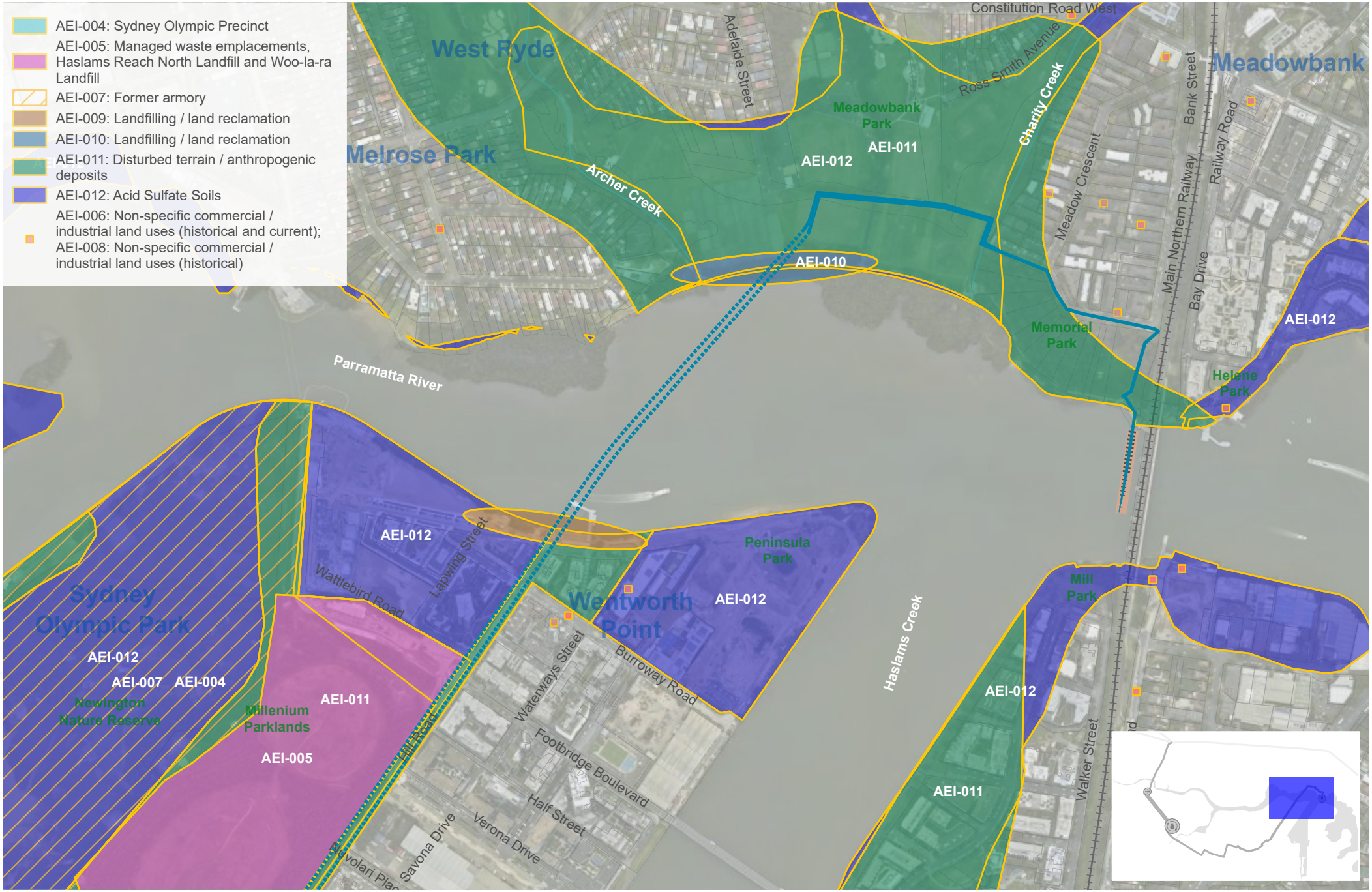


Figure 9-4 River release pipeline AEIs

9.4 Construction impacts

9.4.1 Potential impacts of contamination on the project

A contamination risk ranking has been undertaken for the AEIs identified as a project risk and can be found in Section 9.5.3. This assessment indicates there is a moderate to very high risk of contamination during the construction of the project if no mitigation measures are in place. These relate to impacts on the construction workforce due to potential contact with contaminated soil, soil vapour, groundwater gases and/or water. They also relate to the environment due to uncontrolled water release into the local waterways and the draining or exposure of ASS. These impacts would be managed through the implementation of management plans and common PPE practices to minimise the risk from direct contact and ingestion of contaminants. A high-level summary is provided below:

- **soil:** Results from the soil sampling along the 3 main sections show a presence of asbestos, hydrocarbons, heavy metals (nickel) and PAHs above the adopted site assessment criteria (SAC). Construction activities, including excavation and earthworks, vegetation clearing, stockpiling and vehicle movement, would involve soil disturbance, potentially creating an exposure pathway through direct or indirect contact and/or risk of inhalation with the construction workforce. The risks of soil contamination within the project footprint would be greatly reduced through the implementation of mitigation measures recommended in Section 9.6.
- **soil vapour:** There is a high chance of encountering soil vapour at the WRRF, and a potential along the alignment, based on findings from site investigations
- **ground gases:** There is a potential for gas accumulation (methane and carbon dioxide) in trench excavations and/or pits during construction, within service pits, which presents a risk for explosion and/or asphyxiation that would require management
- **ASS:** Acid sulfate soils are likely to be encountered during construction due to the project's elevation and surface geology. The brine and transfer alignment (specifically south of the Parramatta River) and the WRRF is situated within an area classified as 'Class 4', which indicates ASS may be present more than 2 m below ground level. Shallower ASS in fill and natural soils may be encountered at construction entries located within and/or between the WRRF, Rosehill Gardens Racecourse overflow carpark and Camellia pumping station.
- **soil salinity:** Excavation would be undertaken in areas with moderate salinity potential for the WRRF, river release pipeline and the brine and transfer pipelines alignment from south of the Parramatta River to the WRRF. The brine and transfer pipelines alignment on the northern side of the Parramatta River is an area with low salinity potential. High salinity soil can produce aggressive soil conditions, which may be detrimental to concrete and steel, and erosion can cause migration of saline sediments to the receiving environments. The potential for impacts due to the presence of saline soils is considered low. Any potential impacts would be temporary and managed by implementing erosion and sediment control measures.

- **sediments**: The sediments near the proposed river release structure within Parramatta River contain zinc and dioxins/furans at levels exceeding the adopted criteria. The investigation report into the sediments recommended obtaining engineering advice as the sediments should not be disturbed. Installation of a cofferdam at the Parramatta River and temporary removal of the seawall at Meadowbank would disturb sediments which may impact the environment. However, the construction impact of the river release structure on surface water at the Parramatta River has been assessed to be low (Soils and Contaminated Land Impact Assessment (Appendix J)).
- **groundwater**: The project would intersect with groundwater when undertaking construction activities at several locations across the project footprint. Groundwater sampling results reported the presence of PFAS, heavy metals and ammonia exceeding the adopted health and ecological SAC across the project footprint. Below ground structures could act as preferential migration pathways for contaminated groundwater and soil vapour to ingress into pipelines. If excavations are dewatered during construction, this may mobilise contaminants in groundwater and oxidise and acidify ASS if not appropriately managed. Groundwater quality would need to be determined to identify the appropriate management of dewatered groundwater.
- **unexpected contamination**: Unexpected contamination may be encountered due to soil contamination not previously identified, or where methods or design changes result in an increased risk of encountering contaminated soils or groundwater within the project footprint. Unexpected contamination would be managed in accordance with an Unexpected Finds Protocol during construction.

9.4.2 Potential impacts of the project on contamination

Storage and use of various hazardous and dangerous goods during construction may result in unintended leaks and spills which may contaminate the local environment, and impact on flora and fauna, surrounding soils, groundwater and watercourses.

Management of excavated spoil may impact local watercourses through soil and sediment mobilisation. All excavated spoil is being stored at the WRRF within the southern area and would be managed by a Waste and Resource Recovery Plan to allow segregation of spoil (including asbestos containing soil and ASS). These procedures would also reduce the risk of inadvertent transfer of contaminants to other parts of the project footprint. Mitigation procedures can reduce the risk of inadvertent transfer, as expanded upon in Section 9.6.

Groundwater intersected during excavations and drilling would need to be managed. Trenchless sections of alignment are not expected to significantly interact with groundwater, as pressure is maintained during drilling. Trenchless construction methods involve advancing the pipe as the machine is advanced, again preventing significant inflow from the formation.

Drilling muds/fluids and dewatered groundwater across the project would require management as per a CEMP. Approval to treat/release dewatered groundwater and drilling muds/fluids would need to be sought and managed via a dewatering protocol.

During the construction phase, wastewater would be generated by construction personnel at construction compounds. This wastewater would be contained within portable amenity facilities, with wastewater removed and disposed of frequently as required by a licensed contractor. No impacts to the environment from wastewater are anticipated.

The project would avoid intersecting the Woo-la-ra landfill and therefore would not impact the integrity of the landfill system.

9.5 Operational impacts

9.5.1 Potential impacts of contamination on the project

During the operation phase of the project, workers within the WRRF are not expected to be exposed to soil or groundwater contamination. A LTEMP at the WRRF is required to be implemented to manage any remaining contamination, which would include the management of contamination during future works and any ongoing monitoring requirements.

For areas of the project footprint outside of the WRRF, minimal soil disturbance associated with general maintenance activities is expected within operation. As such, the operation of the project is unlikely to result in exposure of human and environmental receptors to existing potentially contaminated soil or groundwater. Maintenance workers requiring access to any of the service pits along the alignment, may require management measures to ensure there is no accumulation of hazardous gases.

The sediments near the proposed river release structure within Parramatta River contain zinc and dioxins/furans at levels exceeding the adopted criteria. The investigation report into the sediments (Birch, G.F. & Batley, G.E., 2025) recommended obtaining engineering advice as the sediments should not be disturbed. The report noted that other projects in different areas of the Parramatta River have been undertaken with similar levels of contaminants in the sediment and have proceeded with mitigation techniques.

9.5.2 Potential impacts of the project on contamination

Operation of the project has the potential to contaminate soil and groundwater from leaks and spills of fuel, oils and other hazardous materials during maintenance activities. However, the potential is considered to be low, given the likely scale and duration of maintenance activities along the alignment.

At the WRRF the potential for impact is higher and this would be minimised by implementing procedures to handle dangerous goods and hazardous materials and manage spills as per Sydney Water procedures. This includes management of waste, soil erosion, spills and leaks and other associated operational aspects. All wastes generated from maintenance activities would be stored, handled, and disposed of in accordance with the Waste Classification Guidelines (NSW EPA, 2014).

The sediments near the proposed river release structure within Parramatta River contain zinc and dioxins/furans at levels exceeding the adopted criteria. The release of water may disturb these sediments, changing the water quality in the area. The operational impact of the river release structure on surface water at the Parramatta River has been assessed to be low with specific mitigation measures detailed in the Surface Water and Geomorphology Assessment (Appendix G).

9.5.3 Overview of contamination risk without mitigations

The AEIs that presented a risk to the project in Section 9.3.3.2 have been carried into the impact assessment. Construction and operational phase impacts have been summarised in Table 9-5, Table 9-6, and Table 9-7, and provide a risk ranking in accordance with the criteria in Section 9.2.2.1.

Table 9-5: Contamination risk ranking (without controls or remediation) - WRRF

AEI	Contamination	Impact Summary	Risk Ranking
AEI-001: Former Clyde Refinery	Contamination is present at concentrations exceeding the relevant assessment criteria across the area in soil (including asbestos in fill), soil vapour, ground gases and groundwater.	Proposed construction includes 2 foul water pumping stations to be excavated. Excavation is likely to intersect with contaminated soil and groundwater, ground gas and soil vapour. Sensitive Receptors include construction workers, future maintenance workers, commercial workers (current and future) and the Duck River.	Moderate

Table 9-6: Contamination risk ranking (without controls or remediation) - brine and transfer pipelines alignment (including Camellia pumping station)

AEI	Contamination	Impact Summary	Risk Ranking
Proposed pipeline access pits – BTP	There is the potential for fill material to include asbestos and other anthropogenic material. Excavation pits B8 to B6 are adjacent to a former contaminated site. There is the potential for ASS from pit B9 to the south where it joins Camellia pumping station.	Soil would be intersected in 21 locations along the existing pipeline during construction. Groundwater would be intersected at most of the pits, excluding B10 and B11. Potential sensitive receivers include construction workers and Parramatta River.	Moderate to high (human health)

AEI	Contamination	Impact Summary	Risk Ranking
AEI-001 – BTP: Former Clyde Refinery	Contamination is present at concentrations exceeding the relevant assessment criteria across the area for soil (including asbestos in fill) and ASS.	Pits associated with trenchless methods are proposed in areas within the raised level extent to a maximum depth of 2 metre below ground level (mbgl). Soil contamination is located throughout the profile starting at depths of 1.7 mbgl. Potential and actual ASS could be intersected. Potential sensitive receivers include construction workers, future maintenance workers, current and future commercial workers on-site and offsite, and Duck River.	Very high (human health, ecological)
AEI-006 – BTP: Camellia pumping station	Contamination is present in soil (asbestos) and potentially in groundwater, exceeding the relevant assessment criteria across the area. ASS and PASS are present in the area.	Soil contamination (asbestos), potential and actual ASS and groundwater may be intersected during the trenching for the transfer main and brine main. Groundwater is likely to be intersected for the brine main. Potential sensitive receivers include construction workers, future maintenance workers, current and future commercial workers both on and off site, and Parramatta River.	Very high (human health, ecological)

AEI	Contamination	Impact Summary	Risk Ranking
AEI-010 – BTP: Service Station	Contamination may be present in soil, soil vapour and groundwater exceeding the relevant assessment criteria across the area.	Groundwater may migrate from the site as it is likely to be intersected as part of the brine pipeline trench. Given the depth of trenchless excavations, contaminated soil or groundwater are unlikely to be intercepted. Sensitive receivers include construction workers.	Low (human health)
AEI-012 – BTP: Commercial / industrial land	Contamination may be present in soil, soil vapour and groundwater exceeding the relevant assessment criteria across the area.	Groundwater is likely to be intersected as part of the brine pipeline trench at Camellia pumping station and the area north-west of Rosehill Gardens racecourse to Camellia pumping station. Given the depth of trenchless excavations, contaminated groundwater or soil are unlikely to be intercepted. Potential sensitive receivers include construction workers.	Moderate (human health)
AEI-013 – BTP: Areas of disturbed terrain and anthropogenic deposits	Contamination may be present in soil, soil vapour and groundwater exceeding the relevant assessment criteria across the area.	Groundwater is likely to be intersected as part of the brine pipeline trench at Camellia pumping station and the area north-west of Rosehill Gardens racecourse to Camellia pumping station. Given the depth of trenchless excavations, contaminated groundwater or soil are unlikely to be intercepted. Sensitive receivers could include construction workers.	Moderate (human health)

AEI	Contamination	Impact Summary	Risk Ranking
AEI-014 – BTP: Acid sulfate soils	Potential and actual ASS could be intersected.	Excavation and oxidation of ASS and generation of acidity in soils and groundwater generating acidic run-off water and possible migration into nearby surface water bodies. Sensitive receivers include Duck Creek and Parramatta River.	Moderate (ecological)

Table 9-7: Contamination risk ranking (without controls or remediation) - river release pipeline alignment

AEI	Contamination	Impact Summary	Risk Ranking
AEI:001 – RRP: Former Clyde Refinery	Contamination may be present in soil, soil vapour and groundwater exceeding the relevant assessment criteria across the area.	Soil contamination throughout the profile. Soil vapour and ground gases are likely to be present during excavation. Groundwater would be intersected as part of the construction. Sensitive receivers include construction workers, future maintenance workers, and Duck Creek.	Very high (human health, ecological, surface water/groundwater)
AEI-002 – RRP: Former landfill, MET Recycling Facility (EPL 20948)	Contamination is present at concentrations exceeding the relevant assessment criteria soil, groundwater and ground gases. The EPL has requirements for ongoing monitoring gas associated with the former landfill.	Soil contamination throughout the profile during excavation of open trenches. Groundwater would be intersected as part of the construction. Ground gases are likely to be present during excavation. Sensitive receivers include construction workers, future maintenance workers and Duck River.	Moderate to high (human health, ecological, surface water/groundwater)

AEI	Contamination	Impact Summary	Risk Ranking
AEI-003 – RRP: Former commercial industrial sites	The site has had previous investigations where contamination has been identified (information was obtained in the PSI).	Soil contamination is known to be present. Groundwater would be intersected as part of the construction. Soil vapour is likely to be present during excavation. Potential sensitive receivers include construction workers and future maintenance workers.	Moderate to high (human health, ecological, surface water/groundwater)
AEI-004 – RRP: Sydney Olympic Precinct	Some of the historical land uses include brickworks, abattoirs, landfilling / land reclamation. Contamination has been identified.	Soil contamination is known to be present as well as ASS. Groundwater would be intersected as part of the construction. Ground gases are likely to be present during excavation. Sensitive receivers include construction workers, future maintenance workers, Narawang wetlands, and Haslams Creek.	Moderate (human health, ecological, surface water/groundwater)
AEI-005 – RRP: Haslams Reach north and Woo-la-ra Landfill	These areas are former landfills and areas of land reclamation.	Contaminated soil is unlikely to be intersected. Groundwater is unlikely due to the trenchless methodologies used. Ground gases are likely to be present during excavation. Given the depth of trenchless excavations, contaminated groundwater or soil are unlikely to be intercepted. Potential sensitive receivers include construction workers and future maintenance workers.	Moderate to high (human health - ground gases)

AEI	Contamination	Impact Summary	Risk Ranking
AEI-006 – RRP: Commercial / industrial land	These areas are within a large commercial / industrial area. As a result, there is the potential for localised contamination. There is a potential for asbestos and ASS in these areas as the investigations were limited.	Surface soil would contain fill and have the potential to be contaminated and contain asbestos and soil may contain ASS at Carnarvon Street and Silverwater Road. Contaminated groundwater could migrate into the trench at Silverwater Road to PDC Park. Sensitive receivers include construction workers and future maintenance workers.	Moderate (human health)
AEI-007 – RRP: Former armory	No contamination was reported in soil and groundwater where the 2 pits associated with trenchless methods are proposed.	It is unlikely that contaminated soil to be intersected. ASS may be present or acidic soils. Groundwater would be intersected, however all results were below the assessment criteria. Sensitive receivers include Narawang wetlands.	Low to moderate (ecological)
AEI-008 – RRP: Commercial / industrial	No soil contamination was reported. However, fill was noted. Groundwater contamination may be present.	Surface soil contamination (if present) from sources would unlikely migrate and be exposed during trenching at depth. Sufficient pressure to prevent groundwater ingress during the drilling. There are no sensitive receivers.	Negligible
AEI-009 – RRP: Landfilling and land reclamation	These areas are former landfills and areas of land reclamation.	Ground gases are likely to be present during excavation. Sensitive receivers include construction workers and future maintenance workers.	Moderate to high (human health - ground gases)

AEI	Contamination	Impact Summary	Risk Ranking
AEI-010 – RRP: Landfilling and land reclamation	These areas are former landfills and areas of land reclamation with soil, groundwater and ground gases contamination.	Surface soil would contain fill and have the potential to be contaminated and contain asbestos. Contaminated groundwater could migrate into the trench. Ground gases are likely to be present during excavation. Sensitive receivers could include construction workers, future maintenance workers, and Parramatta River.	Moderate to high (human health)
AEI-011 – RRP: Disturbed terrain / anthropogenic deposits	These areas are former landfills and areas of land reclamation.	Surface soils would contain fill and have the potential to be contaminated and contain asbestos. Potential and actual ASS could be intersected. Contaminated groundwater could migrate into the trench. Ground gases are likely to be present during excavation. Sensitive receivers include construction workers, future maintenance workers, and Parramatta River.	Moderate to high (human health)
AEI-012 – RRP: Acid sulfate soils	ASS has been detected in some areas along the alignment but a full investigation is yet to be completed.	Potential and actual ASS could be intersected at the WRRF, corner of Vore Street and Derby Street, and Silverwater Potential and actual ASS could be intersected near the surface. ASS and PASS where the trenching is at depth near SOPA and Wentworth Road Sensitive receivers include Duck River, Narawang Wetlands,	Moderate (ecological)

AEI	Contamination	Impact Summary	Risk Ranking
		Haslams Creek, and Parramatta River.	
Dioxins from Parramatta River and Homebush Bay	Contamination is present in the surficial sediments at the Bridge.	Potential for sediments to be disturbed by the construction of the release pipe and the release of the clean water at the bridge. Potential sensitive receivers include construction workers, future maintenance workers, and Parramatta River.	Moderate to high (human health and ecological)

9.6 Mitigation measures

Mitigation measures proposed to avoid or minimise contamination risks and potential impacts on the environment are listed in Table 9-8. These mitigation measures would be included in the Construction Soil and Water Management Sub-Plan and a Contamination Management Sub-Plan (CMSP) which would form a component of the CEMP.

Construction of the WRRF would be managed in accordance with the requirements of the 3 current LTEMPS (AA1, AA2, and AA3). The requirements of the 3 LTEMPs would be incorporated into the CEMP and associated sub-plans. The LTEMPs would be incorporated into one overarching LTEMP implemented throughout the operation of the WRRF.

Table 9-8: Soil and contamination risk mitigation measures

ID	Potential impact	Mitigation measure	Timing
CLS01	Ineffective controls pending additional investigations	Undertake the following investigations: • further characterisation of ASS and asbestos along the pipeline alignments • soil, groundwater and soil vapour investigation at 54-58 Derby Street, Silverwater and 103-105 Silverwater Road, Silverwater.	During detailed design
CLS02	Disturbance of asbestos	Prepare and implement an Asbestos Management Plan (AMP) which would detail asbestos locations on-site, management decisions including transport management, air monitoring requirements (if applicable) during construction, testing, disposal and encapsulation options, incident and emergency procedures.	Prior to and during construction

ID	Potential impact	Mitigation measure	Timing
CLS03	Soil contamination – compound sites	At the construction compound sites, consider the importation and placement of engineering fill, Excavated Natural Materials (ENM) or Virgin Excavated Natural Materials (VENM) as a construction base (or hardstand) underlain by geotextile fabric to avoid disturbance of potentially contaminated soils in these areas. If excavations are required, the contamination status of the surface soils would be assessed prior to importation of VENM or ENM, and management, if necessary, would be undertaken in accordance with procedures detailed in the CEMP.	During construction
CLS04	Unexpected contamination	Manage the discovery of any unexpected contamination during construction in accordance with an Unexpected Finds Protocol (UFP).	During construction
CLS05	Disturbance of saline soils	Generally, the potential for impacts due to the presence of saline soils is considered low. Any potential impacts would be temporary and managed by implementing standard best-practice erosion and sediment control measures.	During construction
CLS06	Potential impacts of contaminated sediment disturbance within and adjacent to Parramatta River	Minimise the disturbance and migration of contaminated sediments. Refer to **GE01** (Appendix E).	During construction
CLS07	Soil and groundwater contamination at the WRRF	An updated LTEMP would be required to manage the existing contamination at the WRRF. The LTEMP would need to consider and include relevant management requirements under the existing 3 LTEMPs associated with the WRRF (which would be superseded).	During operation
CLS08	Soil, soil vapour, ground gases and groundwater contamination	Implement a Soil and Water Management Plan including a Contamination sub-management plan with reference to an Asbestos Management Plan. Refer to **SW01** (Appendix E) and **CLS02.**	During construction
CLS09	Soil and groundwater contamination	Implement a Drilling Fluid Management Protocol. Refer to **SW04** (Appendix E).	During construction
CLS10	Groundwater contamination	Implement a Soil and Water Management Plan. Refer to **SW01** (Appendix E). Implement a Dewatering Protocol. Refer to **SW03** (Appendix E).	During construction

ID	Potential impact	Mitigation measure	Timing
CLS11	Spills resulting from improper storage and handling of hazardous substances	Implement a spill response procedure. Refer to **SW05**.	During construction
CLS12	Disturbance of acid sulfate soils	Implement an Acid Sulfate Soil Management Plan. Refer to **SW02** (Appendix E).	During construction

Groundwater

10 Groundwater

This chapter describes existing groundwater conditions and the project's potential impacts on groundwater levels, quality and groundwater-sensitive receivers during construction and operation. It provides an overview of the key findings of the Groundwater Impact Assessment (Jacobs, 2025c) included in Appendix K. During construction, temporary groundwater drawdown may occur from dewatering excavations. The impact from dewatering is expected to be minor and is not anticipated to harm groundwater dependent ecosystems, waterways or licensed bores. There is potential for some groundwater to be contaminated due to the industrial history in the area. Contaminated groundwater can be adequately managed through implementation of mitigation measures. Groundwater impacts during operation of the project are unlikely.

10.1 Secretary's Environmental Assessment Requirements

Table 10-1 lists the Secretary's Environmental Assessment Requirements (SEARs) relevant to groundwater and where they are addressed in the EIS.

Table 10-1: Project SEARs relating to groundwater

SEARs	EIS section where requirement addressed
Water - Quality	
1. Water Quality (surface and groundwater) impacts on waterways potentially impacted by the project, including but not limited to the Parramatta River, Homebush Bay and Haslams Creek, including:	
a) existing background levels b) details on the ambient NSW Water Quality Objectives (NSW WQO) and environmental values for the receiving waters relevant to the project, including the indicators and associated trigger values or criteria for the identified environmental values c) identification and estimation of the quality and quantity of pollutants that may be introduced into the water cycle by source and discharge point and describe the nature and degree of impact that any discharge(s) may have on the receiving environment, including consideration of all pollutants that pose a risk of non-trivial harm to human health and the environment d) results of water quality modelling and analysis including descriptions under the full range of operating scenarios, including average or typical through to worst case for any proposed discharge point, including but not limited to the full range of weather conditions, bypasses, and 'off-spec' effluent scenarios e) outline impacts from the proposal on existing sewage infrastructure including any potential impacts on dry weather and wet weather overflows from the existing reticulation network and any impacts on North Head Water Resource Recovery Facility concentrations and loads discharged and hydraulic and treatment capacity	Chapter 7

SEARs	EIS section where requirement addressed
f) details on the rainfall event that the water quality protection measures will be designed to cope with g) the significance of any identified impacts including consideration of the relevant ambient water quality outcomes h) details on how construction and operation of the project will, to the extent that the project can influence, ensure that: i. where the NSW WQOs for receiving waters are currently being met they will continue to be protected ii. where the NSW WQOs are not currently being met activities will work toward their achievement over time iii. the objectives of making the Paramatta River swimmable can be met iv. migration of contamination is considered and how it will be managed and minimised i) justification for, if required, why the WQOs cannot be maintained or achieved over time.	
j) demonstration that all practical measures to avoid or minimise water pollution and protect human health and the environment from harm are investigated and implemented. This also includes consideration and management of frac out from the temporary loss of drilling fluids and inappropriate storage of chemicals and fuels	Chapter 7 Section 10.5
k) identification of sensitive receiving environments (which may include estuarine and marine waters downstream) and develop a strategy to avoid or minimise impacts on these environments	Chapter 7 Section 10.3
l) proposed water quality monitoring programs, including monitoring locations, monitoring frequency and the parameters that will be monitored pre-construction, during construction and during operation, including justification for these.	Chapter 7 Section 10.7.1
Water - Hydrology	
1. Describe the existing hydrological regime for surface and groundwater resources (including reliance by users and for ecological purposes) likely to be impacted by the project, including stream orders, as per the Framework for Biodiversity Assessment. This must include a description of groundwater levels across the site under a range of wet and dry conditions.	Chapter 7 Section 10.3
2. Map the following features:	
a) rivers, streams, estuaries, and wetlands (as described in section 3.1.3 of the BAM)	Section 10.3
b) groundwater	Section 10.3
c) groundwater dependent ecosystems	Section 10.3.3

SEARs	EIS section where requirement addressed
d) proposed discharge locations.	Chapter 7
3. A description of works / activities that may intercept, interfere, extract, use divert or receive surface water and groundwater on a temporary or permanent basis during construction and operation	Section 10.5 Section 10.6
4. Identify any relevant Water Sharing Plans that may potentially be impacted by the project.	Section 10.2.1
5. Provide a detailed water balance for ground and surface water resources.	Chapter 7
6. Surface and groundwater hydrology impacts (both quality and source) of the construction and operation of the project and any ancillary facilities (both built elements and discharges) in accordance with the current guidelines, including:	
a) natural processes within rivers, wetlands, estuaries, marine waters and floodplains that affect the health of the fluvial, riparian, estuarine or marine system and landscape health (such as modified discharge volumes, durations and velocities), aquatic connectivity and access to habitat for spawning and refuge	Section 10.5 Section 10.6
b) effects to upstream and downstream rivers, wetlands, estuaries, marine waters, floodplain areas and water-dependent fauna and flora (including groundwater dependent ecosystems)	Section 10.5 Section 10.6
c) impacts from permanent and temporary interruption or interference of groundwater flow, including the extent of drawdown, barriers to flows, implications for groundwater dependent surface flows, ecosystems and species, groundwater users and the potential for geotechnical settlement associated with surface water bodies	Section 10.4 Section 10.6
d) changes to environmental water availability and flows, both regulated/licensed and unregulated/rules-based sources	Section 10.5 Section 10.5.6 Section 10.6
e) direct or indirect increases in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses	Chapter 7
f) methods for minimising the effects of proposed stormwater and wastewater management during construction and operation on natural hydrological attributes (such as volumes, flow rates, management methods and re-use options) and on the conveyance capacity of existing stormwater systems where discharges are proposed through such systems	Chapter 7
g) water take (direct or indirect) from all surface and groundwater sources with estimates of annual volumes during construction and operation.	Chapter 7 Section 10.5.6

SEARs	EIS section where requirement addressed
h) details of the proposed surface and groundwater monitoring to identify construction and operational hydrological impacts, including changes to groundwater levels.	Chapter 7 Section 10.7.1

10.2 Assessment methodology

10.2.1 Legislative and policy context

The assessment of groundwater impacts was undertaken in accordance with the project SEARs, as well as the following legislation, policies and guideline documents:

- *Water Act 1912* and *Water Management Act 2000* (WM Act)
- Rules of the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023
- Minimal harm criteria presented in the NSW Aquifer Interference Policy (DPI, 2012)
- NSW Water Strategy (DPIE, 2021a)
- Groundwater Assessment Toolbox for Major projects in NSW (DPE, 2022h)
- Guidelines for Groundwater Documentation for SSD/SSI Projects, Technical guideline (DPE, 2022i)
- Minimum Groundwater Modelling Requirements for SSD/SSI Projects (DPE, 2022j)
- Cumulative Groundwater Impact Assessment Approaches (DPE, 2022k)
- Guidelines for the Assessment and Management of Groundwater Contamination (DEC NSW, 2007)
- DUBA, BUDU, BARRA – Ten Steps to a Living River – The Parramatta River Masterplan (PRCG, 2018)
- Framework for Biodiversity Assessment (OEH, 2018)
- NSW Aquifer Interference Policy (DPI, 2012)
- National Environment Protection (Assessment of Site Contamination) Measure (2013).

The key legislation and guidelines that require approvals or include assessment criteria are outlined in more detail below.

Water sharing plans

The objects of the WM Act are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. Water sharing plans are the main tools in the Act for managing water sources. They define the rules for sharing water within a particular water source.

The project is located within the Sydney Basin Central Groundwater Source of the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023. The Sydney Basin Central Groundwater Source is categorised as a 'less productive' porous rock groundwater source (aquifer).

Certain activities that interact with or 'take' groundwater require additional approval or licenses. Section 5.23(1) of the EP&A Act states that the following approvals are not required for approved State significant infrastructure:

- water use approval under section 89 of the WM Act
- water management work approval under section 90 of the WM Act
- activity approval (other than an aquifer interference approval) under section 91 of the WM Act.

A Water Access Licence under section 56 of the WM Act is required if dewatering volumes are greater than 3 ML/year of groundwater. Dewatering volumes for the project were calculated and compared to the criteria of 3 ML/year. As of June 30, 2025, amendments to the WM Act allow public authorities constructing essential infrastructure to undertake the work without obtaining a water access license (WAL).

NSW Aquifer Interference Policy

Potential impacts of a project on groundwater are considered acceptable if they are less than the minimal impact considerations in the NSW Aquifer Interference Policy. As the Sydney Basin Central Groundwater Source is categorised as a 'less productive' porous rock groundwater source, the project has been assessed against the *Less Productive Minimal Impact Considerations* of the NSW Aquifer Interference Policy. Further details are included in Appendix K (Groundwater Impact Assessment).

10.2.2 Methodology

The groundwater impact assessment methodology included:

- a desktop review of publicly available information and data from recent site investigations to understand the existing geological and hydrogeological conditions across the study area, and identify groundwater-sensitive receivers, groundwater users and relevant Water Sharing Plans
- a review of design information to identify where excavations would have the potential to intercept existing groundwater
- development of a hydrogeological conceptual model and modelling to estimate the potential extent of groundwater drawdown and inflows to project excavations
- quantifying water supply arrangements
- assessing potential construction and operation impacts related to groundwater
- recommending mitigation measures to minimise potential impacts, including monitoring.

The study area for the assessment was defined as the project's impact assessment area plus a buffer of 500 m. A buffer of 500 m was determined to be sufficient to capture any potential groundwater impacts associated with the project infrastructure.

10.2.2.1 Management of design change

The Groundwater Impact Assessment (Appendix K) is based on a concept design, as well as current site investigation information. As the project progresses, changes to the design may be required which could change the magnitude of the identified groundwater impacts. The impact assessment has been carried out to provide some flexibility for these changes, for example a wider impact assessment area has been included so lateral alignment changes within this area have been accounted for. Assumptions have been adopted to facilitate a conservative assessment of groundwater for this EIS, including adoption of shallowest measured groundwater levels for locations where levels are not available. Similarly, monitoring results occurred during a period considered to be wetter than average. This is considered to provide a conservative approach as groundwater levels and flows may be less than estimated if constructed during a dry period. Where possible, a conservative approach has been adopted to assess 'worst-case' scenarios.

10.3 Existing environment

10.3.1 Groundwater sources

The Sydney 1:100,000 Geological Map (Geological Survey of NSW, 1983) indicates two geological profiles across the impact assessment area (refer Figure 10-1 and Figure 10-2). These profiles are generally separated by the Parramatta River and are defined by either Hawkesbury Sandstone (generally north of the Parramatta River) and Ashfield Shale as bedrock (generally south of the Parramatta River).

Hawkesbury Sandstone bedrock underlies the relined section of the brine pipeline and the river release pipeline between Sydney Olympic Park P5C carpark and Parramatta River. Ashfield Shale bedrock underlies the brine and transfer pipelines alignment, WRRF site and western portion of the river release pipeline between the WRRF and SOPA Pod C carpark. Ashfield Shale is mapped at the surface along the majority of the western section of river release pipeline, between the WRRF and PDC Park in Newington. Hawkesbury Sandstone is mapped at the surface along the section of river release pipeline within Meadowbank, and along the majority of the relined brine pipeline, north of Parramatta.

The surface soils in the study area are mostly made up of clay and sandy clay, which are low in permeability. In some locations where Ashfield shale is the bedrock, the topsoil is made up of clay formed from naturally broken down shale. These areas often do not have the usual alluvium (silty river or stream deposits) that might be otherwise expected. Overall, the soils in the study area tend to hold water, rather than let it drain away. Anthropogenic deposits are also noted on regional geological mapping in areas across Sydney Olympic Park and Wentworth Point, including the man-made Narawang wetlands.

Groundwater occurs within a shallow unconfined perched aquifer system across the study area. This type of groundwater system is not pressurised, but close to the surface, sitting in pockets within the soil and fill material. Groundwater is generally observed to occur within the fill/alluvium at the WRRF site, brine and transfer pipeline alignment and the river release pipeline between P5C carpark and Parramatta River. Groundwater is expected to occur within the residual soil for the river release pipeline between the WRRF and P5C carpark and the brine pipeline between Camellia pumping station and the NSOOS.

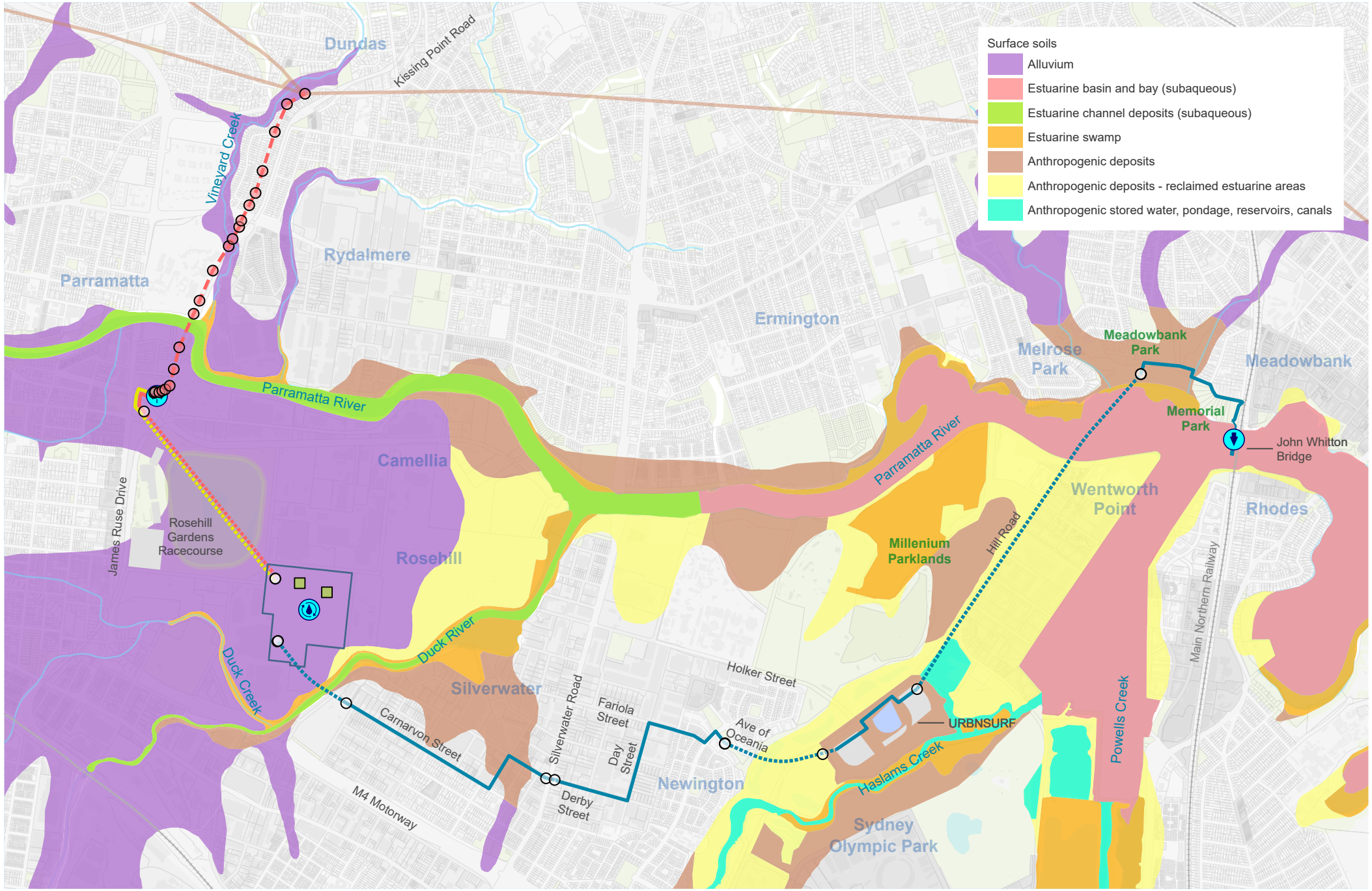


Figure 10-1 Regional geological mapping – surface soils

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

Figure 10-2 Regional geological mapping – bedrock units

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

Groundwater levels are typically 1 to 4 mbgl at the WRRF and in the wider Camellia-Rosehill area. Along the river release pipeline, groundwater levels are typically between 2 mbgl (within Silverwater and Newington) and 3.5 mbgl (within Wentworth Point and Meadowbank).

Groundwater flow across the study area is likely to be primarily influenced by topography and/or nearby surface water features. Groundwater flow at the WRRF site, along the southern section of the brine pipeline and transfer main, and along the section of the river release pipeline at Silverwater and Newington, is predicted to flow toward the Duck River. Groundwater flow along the northern section of the brine pipeline and transfer pipeline, along the section of the river release pipeline in Wentworth Point and Meadowbank and along the majority of the brine alignment between Camellia pumping station and the NSOOS is predicted to be primarily toward the Parramatta River.

Additional detail of groundwater conditions is included in Appendix K (Groundwater Impact Assessment).

10.3.2 Groundwater quality

10.3.2.1 Groundwater contamination

Groundwater quality across the study area is known to be contaminated. Investigations at the WRRF site found that groundwater contained concentrations of selected heavy metals, hydrocarbons, VOCs (BTEX), PAHs and PFAS compounds exceeding human health and/or ecological site assessment criteria. This is a result of the historical land use activities undertaken at the site. Sydney Water has undertaken a groundwater monitoring program at the site to measure quality and potential movement of groundwater. Investigations undertaken to date have shown that there is low risk of contaminants moving offsite. The site raising works undertaken have been designed to minimise interaction with existing soil and groundwater contamination during construction and operation of the WRRF.

Groundwater sampling conducted along the river release pipeline indicated exceedances of some metals (cadmium, copper, nickel, zinc), nutrients (ammonia as nitrogen (N)) and other substances (PFOS). Groundwater contamination is anticipated along the brine and transfer pipeline alignments and Camellia pumping station. However most groundwater results are either below the limit of reporting or below the site assessment criteria.

Groundwater quality along the brine pipeline north of Camellia pumping station has not been sampled. However it is considered a low risk for contamination, except in the immediate area to the north of Camellia pumping station.

More information on contamination is included in Appendix K (Groundwater Impact Assessment).

10.3.2.2 Groundwater salinity

Groundwater salinity is expected to vary across the desktop assessment area. Sampling of groundwater at the WRRF site and along the river release alignment indicate higher levels of salinity, with likely lower levels at the brine and transfer pipelines alignments and Camellia pumping station. More information on salinity is provided in Chapter 9 (Soils and contamination).

10.3.2.3 Acid sulfate soils

Acid sulfate soils are soils and sediments containing iron sulfides that, when exposed to oxygen, generate sulphuric acid and can release aluminium and other heavy metals. The Acid Sulfate Soils Risk Mapping (NSW DCCEEW, 1998), shows there is a high probability of acid sulfate soils occurrence in areas of undisturbed terrain surrounding the Parramatta River. More information on acid sulfate soils including results of investigations undertaken is provided in Chapter 9 (Soils and contamination).

10.3.3 Groundwater dependent ecosystem

GDEs are ecological communities that rely on groundwater, either entirely or in part, for their health or survival. GDEs can be characterised as terrestrial, aquatic or subterranean.

A review of the GDE Atlas (BoM, 2025) indicates that there are 17 terrestrial GDEs with high potential for groundwater dependence within 500 m of the impact assessment area, as shown on Figure 10-2.

There are no known subterranean GDEs in the project area. There are also no aquatic GDEs mapped within 500 m of the impact assessment area.

Potential GDEs were then crossed checked against the NSW HEVAE framework. The NSW HEVAE framework identified the presence of GDEs within 500m of the project impact assessment area, however these GDEs are mapped as being of low or medium ecological value. The nearest potential GDE to an access point is 20 m. There were no ecosystems considered as having high ecological value (defined by the NSW framework) mapped within the project impact assessment area. GDEs identified through the BoM GDE Atlas were classified based on the national assessment.

The GDEs present within 500 m of the impact assessment area are typically associated with:

- Estuarine Mangrove Forest ecosystem, which is present along sections of the Parramatta River and Duck River, as well as within the Sydney Olympic Park and Haslams Creek/Bicentennial Park.
- Forested/woodland areas to the north and east of the study area and include Cumberland River Flat Forest, Hinterland Sandstone Gully Forest, Sydney Hinterland Transition Woodland.

The project assessment area crosses the Narawang and Nuri wetlands, which are constructed wetland systems that support biodiversity and water management as part of the Sydney Olympic Park Biodiversity Management Plan. The Narawang and Nuri wetlands are lined and are not anticipated to interact with the regional groundwater system.

Figure 10-3 Existing groundwater-sensitive receivers

10.3.4 Groundwater dependent culturally significant sites

The Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023 does not list any groundwater dependent culturally significant sites in the vicinity of the project impact assessment area. Additional detail on cultural heritage values is included in Chapters 5 (Engagement) and 16 (Aboriginal heritage).

10.3.5 Regional groundwater users

One licenced groundwater bore is listed as functioning within 500 m of the impact assessment area, shown on Figure 10-2. The groundwater supply bore was listed as an irrigation bore and is likely used to irrigate L. H. Waud Sports Field in Meadowbank Park. No other licenced extraction bores were identified within the project impact assessment area. No basic landholder rights bores were identified within the project impact assessment area.

10.4 Avoid and minimise impacts

The project has used design and construction methods to avoid and minimise interaction with groundwater. Broadly, the use of trenchless technologies (i.e. HDD and microtunneling) to construct key pipeline sections significantly reduces interaction with groundwater. Construction techniques such as sheet piling, have been selected for tunnel openings (launch and retrieval pits) and some sections of trenched pipeline, to reduce groundwater interaction. Design and construction measures to avoid or minimise potential groundwater ingress and associated impacts are summarised below:

- HDD uses a special type of fluid (such as bentonite) to help guide and support the drill as it moves to create the tunnel underground. This fluid helps keep the pressure in the tunnel steady, which means groundwater from the surrounding area is prevented from entering the tunnel and groundwater ingress is unlikely . The tunnel openings are usually left unsealed at the surface preventing pressure build up. This reduces the chance of cracking the surrounding ground surface, a risk known as “frac out.” This process also prevents groundwater ingress, resulting in a negligible groundwater intake within tunnelled sections. HDD has been used for crossing waterways, including Duck River, Parramatta River and the Narawang wetlands, and for the brine and transfer pipelines below Rosehill Gardens Racecourse.
- microtunneling uses a concrete encased ‘pipe-jack’ which pushes a concrete encased pipe through the ground formation. The concrete encased ‘pipe-jack’ is impermeable to groundwater ingress. Microtunneling would be used beneath Silverwater Road.
- sheet piling reduces groundwater ingress through the walls of trenches, minimising groundwater inflow. Sheet piling would be used during trench excavation for the transfer and brine pipelines between Camellia pumping station and the HDD launch and receival pit. Sheet piling and a concrete floor would be installed in microtunnelling shafts at Silverwater Road and the HDD pits in P5C Carpark (URBNSRF) to minimise groundwater inflow during tunnelling works.
- as well as using trenchless methods, the tunnelled section beneath Narawang wetlands has been designed so that it is sufficiently deep to avoid interaction with the wetlands

- open trenching would be carried out progressively in lengths of up to 25 m per day. Open trenches are typically backfilled at the end of each day to minimise groundwater inflow to trenching excavations.

10.5 Construction impacts

During construction, groundwater impacts can occur where there is interaction with groundwater, and where the construction methodology does not prevent groundwater ingress. Impacts can occur due to:

- dewatering groundwater within excavations resulting in the potential for groundwater drawdown (lowering of the groundwater table)
- contaminated groundwater within the excavations requiring management, or migrating to other areas, or potentially contaminating surface water
- surface water from site runoff can infiltrate and impact groundwater surfaces during construction.

The estimated drawdown due to construction dewatering of excavations does not extend to any areas mapped as potential GDEs or HEVAEs. As a result, no impacts to ecosystems are anticipated due to dewatering.

Project elements with potential construction impacts include shaft and trench excavations. Potential impacts would be temporary in nature and highly localised to excavation locations. As such, the risk of cumulative impacts arising from project construction is low.

The presence of contaminated groundwater (as described in Section 10.3.2) during construction needs careful management (characterisation, appropriate treatment, disposal).

Mitigation measures to address the potential groundwater impacts are included in Section 10.7.

10.5.1 WRRF

Figure 10-3 illustrates the location of excavations anticipated to intercept ground water at the WRRF. The majority of excavation and other construction works for the WRRF would not intercept groundwater, as most of the infrastructure would be constructed in the area of the site that has been raised. However, there is potential for groundwater interaction during excavation of two foul water pumping stations and the two HDD pits required to construct the river release pipelines HDD. The HDD pits for the brine and transfer pipelines would be located within the raised area, so are unlikely to interact with groundwater.

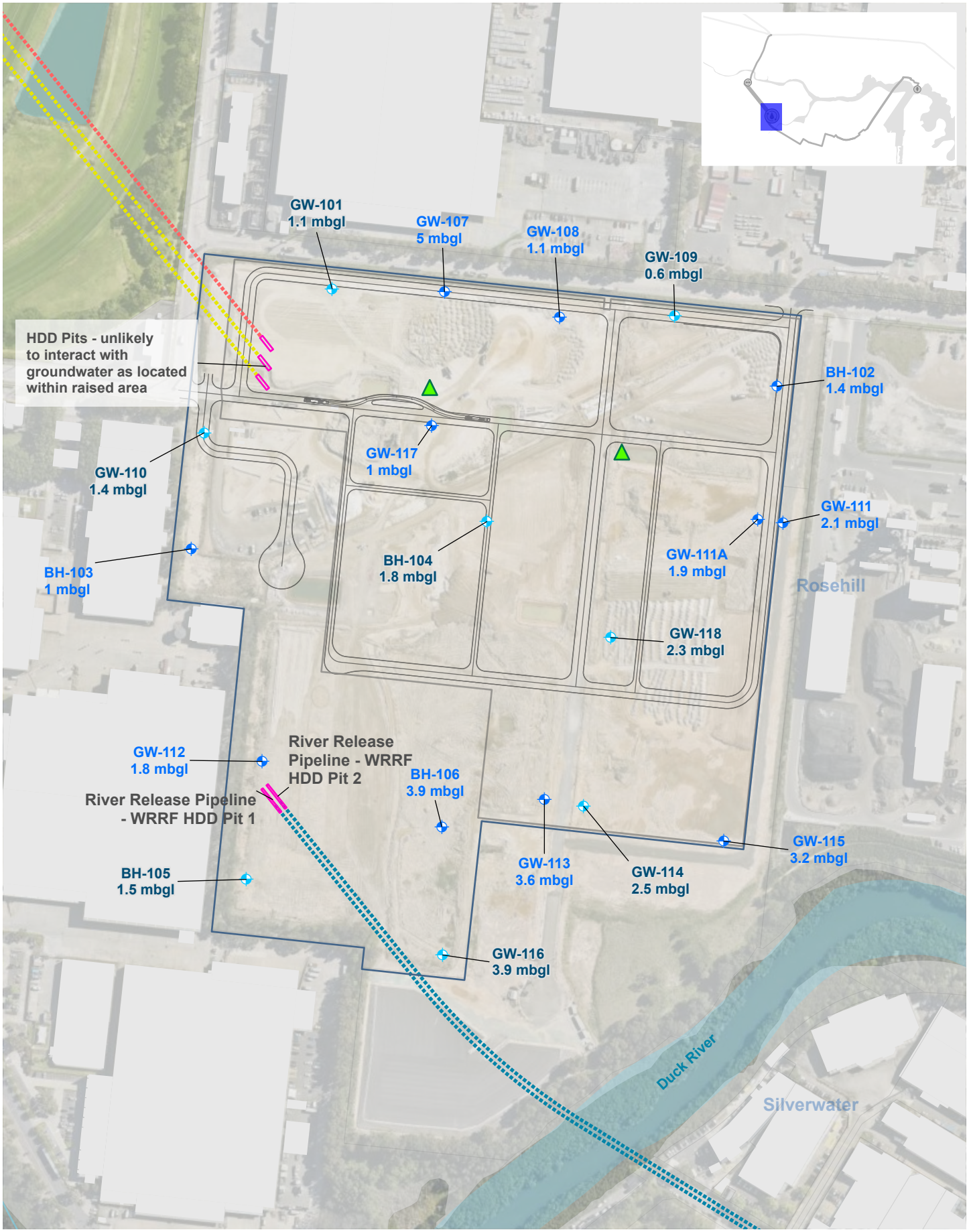
The predicted depths and inflows provided in Table 10-2 are not expected to result in any impact on GDEs, existing groundwater users or waterways.

Table 10-2 Predicted groundwater interactions at the WRRF site

Aspect	Foul water pumping stations (x2)	HDD pits for river release pipeline (x2)
Interception of groundwater (m)	4.4	0.2
Extent of drawdown from edge of excavation (m)	4	0.1
Rate of groundwater inflow (kilolitre (kL) per day) (per excavation)	0.3	0.02
Duration of excavation (days)	14	28
Total inflow (kL per excavation)	5	1
Distance to GDE (m)	> 20	> 20

There is evidence of existing groundwater contamination at the WRRF site. However, due to the low permeability of the clay fill/alluvium at the site (in the order of 0.0012 m/day) as well as the relatively short duration of dewatering, the risk of mobilising contaminants from areas outside the estimated drawdown extents is considered low. Disruption to existing regional groundwater quality or existing groundwater quality at the WRRF site is also not anticipated to be affected by dewatering.

There is the potential for 0.3 m of ASS to be desaturated during excavation of the HDD pits for the river release pipeline. However, likely impacts are limited and not anticipated to extend beyond the immediate vicinity of the pits, due to the low permeability of the clay material.



Camellia-Rosehill WRRF
Foul water pumping stations (FWPS)
WRRF layout base
Camellia-Rosehill WRRF raised extent
Indicative shaft locations

Proposed pipelines
Brine pipeline
Transfer pipeline
River release pipeline
Pipeline construction method
Trenchless

Groundwater well
Groundwater well with data logger

Figure 10-4 Excavations anticipated to intercept groundwater - WRRF

0 50 100 150 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:4,000 @ A4
GDA2020 MGA Zone 56

N

10.5.2 Camellia pumping station

During upgrade works at Camellia pumping station, including replacing the pumps within the pump station and the new electrical switchroom and transformer yard, there is little potential for interaction with groundwater.

There is potential for groundwater interaction during excavation for the connection of the transfer and brine pipelines to the connection point within the Camellia pumping station site. There is potential for acid sulfate soils to be present as well as contaminated groundwater.

However, the predicted depths and inflows provided in Table 10-3 are not expected to result in any impact on GDEs, existing groundwater users or waterways.

As trenched sections are assumed to be actively dewatered for only one day at a time, impacts to regional groundwater quality or flow regimes are unlikely. Sheet pile walls adopted along the walls of the connection trench would reduce groundwater inflow to near negligible volumes and associated impacts to existing groundwater quality are not anticipated.

Table 10-3 Predicted groundwater interactions at Camellia pumping station

Aspect	Transfer pipeline connection	Brine pipeline
Interception of groundwater (m)	5	4.5
Extent of drawdown from edge of excavation (m)	0.1	0.1
Rate of groundwater inflow (per excavation) (kL per day)	1	1
Duration of excavation (days)	90	90
Total inflow (kL)	121	114
Distance to GDE	> 20m	> 20m

10.5.3 River release pipeline

Along the river release pipeline, there is potential for groundwater interaction during excavation of:

- the two Silverwater Road microtunnel shafts
- the two HDD pits in PDC Park
- the HDD cofferdam pit in SOPA P5C carpark
- the two HDD pits in Meadowbank Park
- all sections of open trenching along the alignment
- construction of the coffer dam at the land/river interface.

Potential groundwater interactions are shown in Table 10-4. Anticipated groundwater head during excavation ranges from 0.3 m (at PDC Park) to 6.5 m (at Silverwater Road).

Groundwater drawdown estimates from shaft excavations (HDD pits or microtunnel shafts) range from 0.1 m to 25 m from the edge of each excavation. Inflow estimates to shafts range from 6 kL to 229 kL. Dewatering of trenches along the river release pipeline was estimated to draw water down from 0.5 m to 25 m from the edge of each trench subsection being actively dewatered. Groundwater inflow to trenches was estimated to range from 104 kL to 3,191 kL. Inflow rates ranged from 1 kL per day to 106 kL per day. Trenches were assumed to be excavated in 25 metre sections each, that is 25 m being actively dewatered each day. Dewatering of 25 metre trench sections for this short duration (about one day) is not anticipated to impact existing regional groundwater quality, gradients or flow patterns, nor considered likely to mobilise contaminants from beyond drawdown extents. Very short term dewatering (in the order of one day) would not cause significant impacts.

Drawdown associated with dewatering of shaft excavations along the river release pipeline is expected to be of small magnitude and localised. Deeper excavations including the Silverwater Road microtunnel shafts and SOPA Pod C carpark cofferdam pit are proposed to be constructed using sheet piles and a concrete floor lining. Construction of the coffer dam at the land/river interface to connect the land and water based pipelines would require dewatering. Due to the location within the river, most of this is anticipated to be river water rather than groundwater.

Therefore, these locations are unlikely to act as groundwater sinks and no impacts to groundwater quality surrounding these locations were anticipated.

The risk of acid sulfate soils mobilisation and impacts to groundwater quality is considered low given the:

- short duration of dewatering of trenched sections is not sufficient to desaturate acid sulfate soils
- limited magnitude and extent of drawdown at shaft excavations.

As a result, construction of the river release pipeline is not expected to result in any impact on GDEs, existing groundwater users or waterways.

Table 10-4 Predicted groundwater interaction along the river release pipeline alignment

	Trench 1 Carnarvon Street to Silverwater Road	Trench 2 Silverwater Road to PDC Park	Trench 3 SOPA P5A carpark to SOPA P5C carpark	Trench 4 Meadowbank Park to Parramatta River	Trench 5 River release outfall structure	Silverwater Road east shaft	Silverwater Road west shaft	PDC Park HDD pit 1	PDC Park HDD pit 2[9]	P5C Carpark HDD cofferdam pit	Meadowbank Park HDD pit 1
Interception of groundwater (m)	1.5	1.5	4.1	5.5	3	6.5	6.5	0.3	0.3	4.6	0.5
Extent of drawdown from edge of excavation (m)	0.5	7	13	17	25	0.1	0.1	1	1	0.1	1
Rate of groundwater inflow (per excavation) (kL per day)	2	6	13	18	106	1	1	0.2	0.2	2	2
Duration of excavation (days)	55	55	27	34	30 (3 x 20 m sections open for 10 days each	60	60	34	34	110	110
Total inflow (per excavation) (kL)	104	350	346	600	3,191	49	49	6	6	197	229
Distance to GDE (m)	>20	>20	>20	>80	>70	>20	>20	>20	>20	>20	>20

[9] There is no predicted groundwater interception at HDD pits at P5A car park

10.5.4 Transfer and brine pipelines

The transfer and brine pipelines share a similar alignment between the WRRF and Camellia pumping station such that the trenched section from construction compound C16 would be installed in a singular trench. Therefore, this groundwater assessment has considered the transfer and brine pipelines together.

The section of open trenching between C16 and Camellia pumping station has the potential to encounter up to 2 m of existing groundwater. Potential interactions are shown in Table 10-5 and Figure 10-5. However, potential drawdown would be minimal and localised and impacts to regional groundwater quality or flow regimes are unlikely.

Table 10-5 Potential groundwater interaction between the WRRF and Camellia pumping station

Aspect	Trench 1 C16 to Camellia pumping station	HDD Shaft 1	HDD Shaft 2	HDD Shaft 3
Interception of groundwater (m)	2	0.5	0.5	0.5
Extent of drawdown from edge of excavation (m)	17	1	1	1
Rate of groundwater inflow (per excavation) (m)	16	2	2	2
Duration of excavation (days)	13	49	49	49
Total inflow (kL)	203	102	102	102
Distance to GDE	> 20	> 20	> 20	> 20

There are not anticipated to be any acid sulfate soils related impacts to groundwater for the transfer and brine pipelines between the WRRF and the Camellia pumping station.

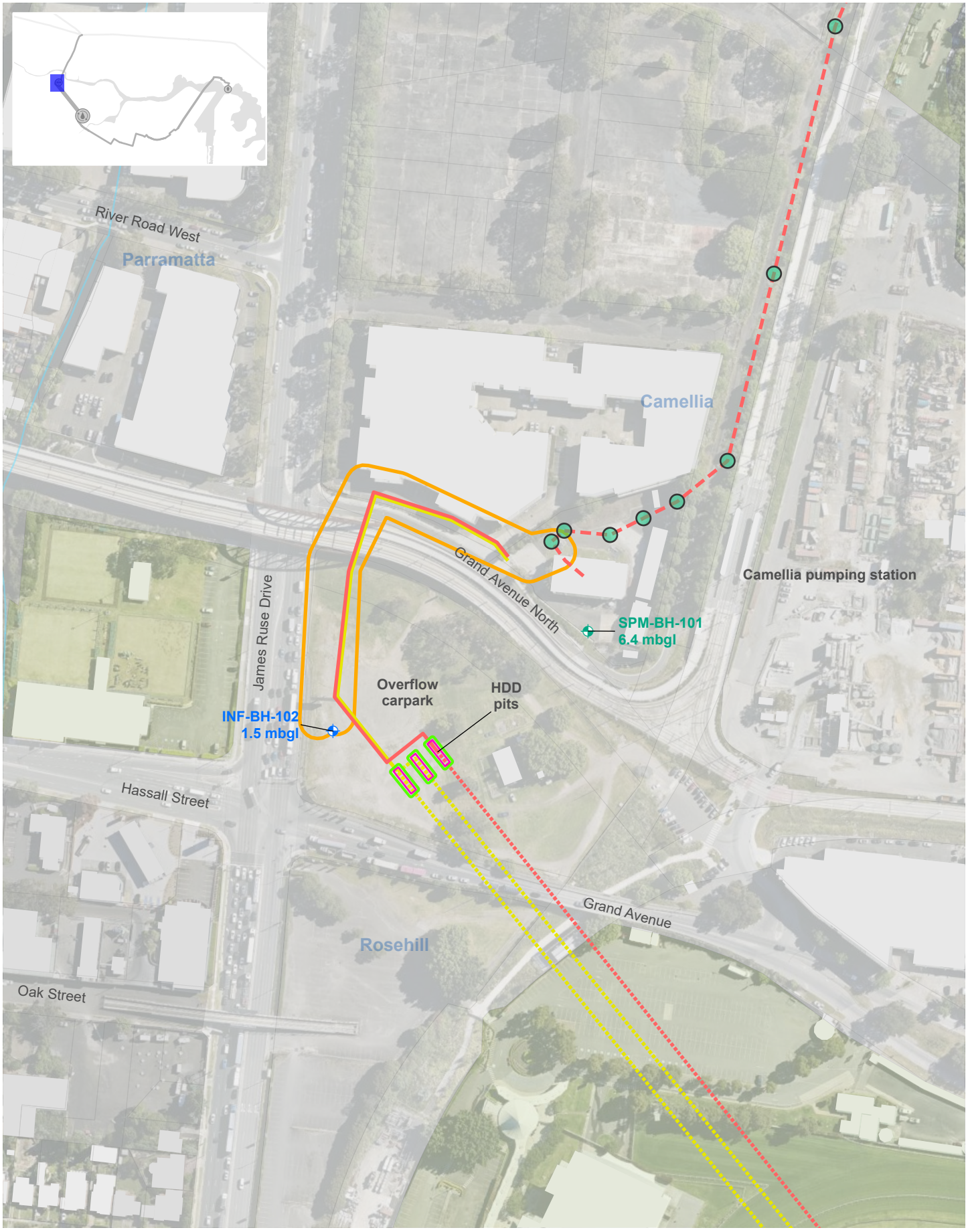


Figure 10-5 Estimated drawdown and potential impacts transfer and brine pipelines and Camellia pumping station

10.5.5 Brine pipeline (relining section)

The relining of the existing wastewater pipeline for the brine pipeline between Camellia pumping station and the NSOOS would require excavation of 21 access pits. These access pits would allow for access of relining equipment. The excavation depth of access pits was assumed to be 1 m below the existing pipe invert level. The footprint of access pit excavations was assumed to be 15 m by 4 m.

There is potential to encounter existing groundwater at all access pits except pit 9, this pit is where the pipeline is above ground. Figure 10-5 and Table 10-6 shows the location of the pits and estimated drawdown.

Anticipated groundwater head during excavation has been estimated to range from 1.2 m (at pit 17) to 5.7 m (at pit 11). Drawdown estimates from dewatering of access pits range from 1 m to 14 m. Inflow volumes were estimated to range from 0.3 kL up to 13 kL.

A review of Acid Sulfate Soils Risk Mapping indicated a high probability of ASS at/near ground surface along a portion of Vineyard Creek where it joins the Parramatta River. It is, therefore, considered that ASS may occur at these locations, and that excavation of brine access pits 7 and 8 may encounter ASS.

At pit 9, mapped GDE is present within the vicinity of the pipeline. As the pipeline in this location is above ground and does not require dewatering, no impacts to the GDE would occur.

Given the duration of excavation dewatering at these locations ranges between one to 7 days, mobilisation of acid sulfate soils compounds from soils to groundwater is considered unlikely. As such the risk to groundwater quality from potential acid sulfate soils desaturation along the brine alignment is considered low.

There was no groundwater quality available for this section of the alignment. Given the anticipated low permeability of material that may be encountered during excavation combined with the likely short duration of any dewatering, drawdown is interpreted to be highly localised to each pit excavation. The risk of potential regional scale groundwater quality impacts, or changes to existing regional flow regimes is, therefore, considered low.

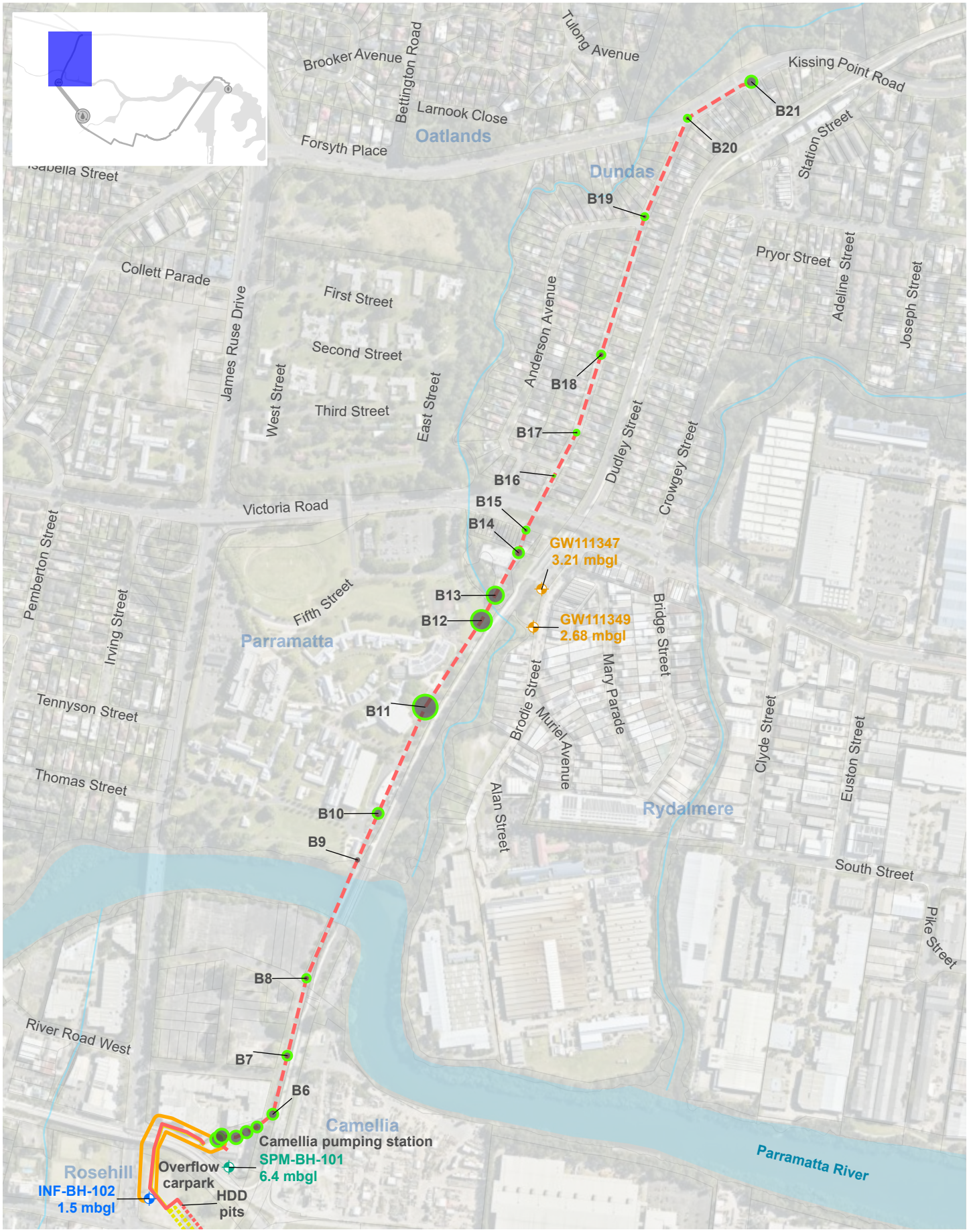


Figure 10-6 Estimated drawdown and potential impacts – relined section of the brine pipeline

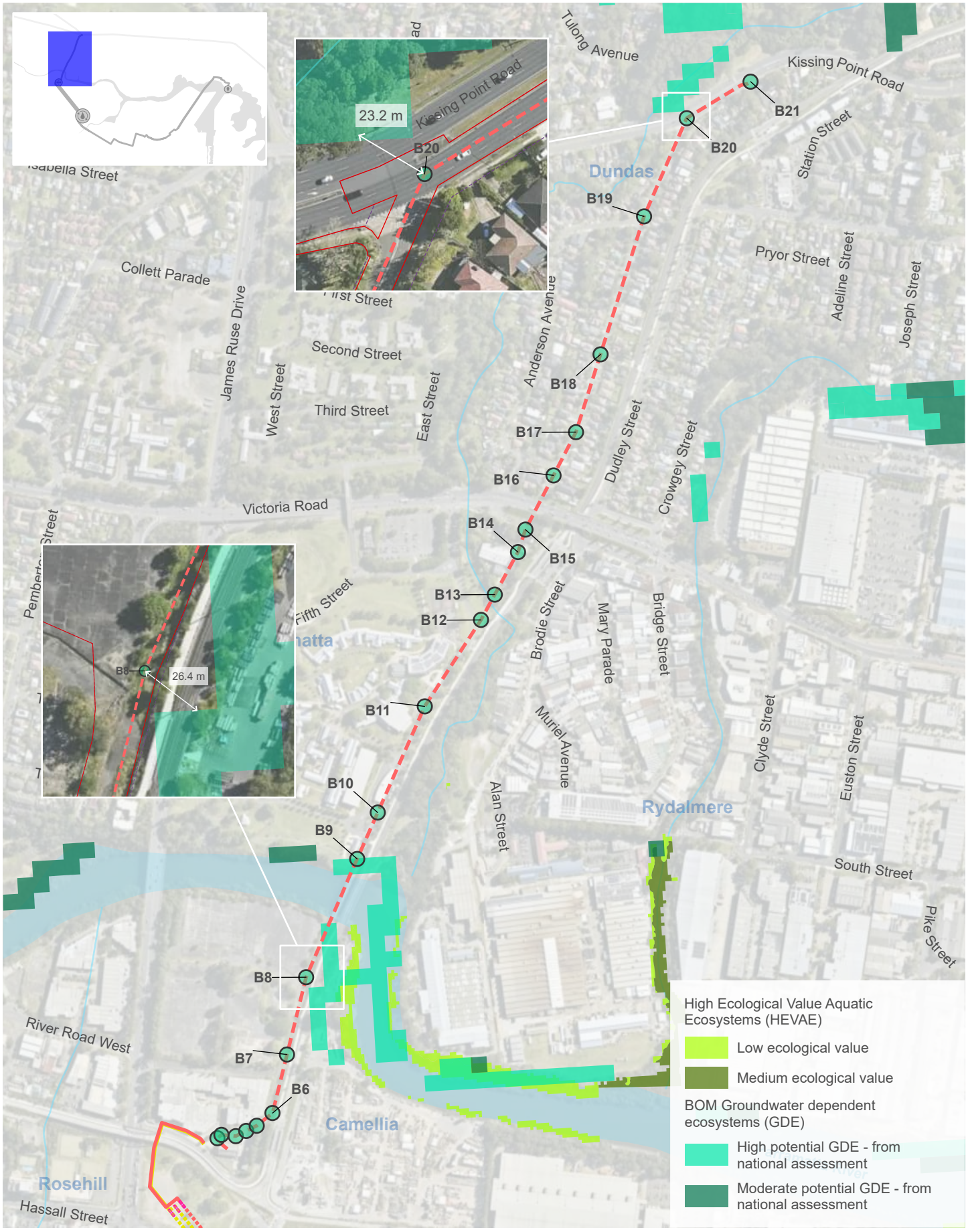
Table 10-6 Potential interaction of groundwater at access pits along brine pipeline (relining section)

Access pit	Interception of groundwater (m)	Extent of drawdown from edge of excavation (m)	Rate of groundwater inflow (kL/day per excavation)	Duration of excavation (days)	Total inflow (kL/day per excavation)	Distance to GDE (m)
1	3.4	7	6	1	6	> 20
2	3.4	7	6	1	6	> 20
3	3.1	6	5	1	5	> 20
4	2.8	5	4	1	4	> 20
5	2.6	4	4	1	4	> 20
6	2.4	3	4	1	4	> 20
7	2.2	3	3	1	3	> 20
8	1.9	2	3	7	19	> 20
9[10]	Not Applicable Above ground					
10	2.3	3	3	3	10	> 20
11	5.7	14	13	1	13	> 20
12	5.0	12	10	1	10	> 20
13	3.8	8	7	3	21	> 20
14	2.3	3	3	4	14	> 20
15	1.6	1	2	2	4	> 20
16	0.3	1	0.3	1	0.3	> 20
17	1.2	4	1	4	6	> 20
18	1.9	2	3	3	8	>20
19	1.5	1	2	8	16	>20
20	1.6	1	2	2	4	>20

[10] At pit 9, the pipeline is located above ground so there would be no interaction with groundwater.

Access pit	Interception of groundwater (m)	Extent of drawdown from edge of excavation (m)	Rate of groundwater inflow (kL/day per excavation)	Duration of excavation (days)	Total inflow (kL/day per excavation)	Distance to GDE (m)
21	2.7	4	4	1	4	>> 20

Figure 10-7 illustrates the distance to the closest GDE for the brine pipeline for pits B20 and B10. Concluding that pits are greater than 20m away from the nearest GDE.



Indicative shaft locations
Foul water pumping stations (FWPS)
Assumed access points for pipe relining

Impact area (IA)
Proposed pipeline
Proposed brine pipeline
Proposed transfer pipeline
Proposed river release pipeline

Impact assessment area (IAA)
Pipeline construction method
Open trench
Trenchless
Relining

Figure 10-7 Distance to closest GDEs – Brine pipeline

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

10.5.6 Groundwater inflows and management

Table 10-7 identifies a breakdown of the anticipated groundwater inflows during construction. The total volume of groundwater inflow to all excavations across the project is estimated to be up to 5.2 ML.

Table 10-7 Projected total groundwater inflows during construction

Project Site	Trenches		Shafts	
	Total inflow volume		Total inflow volume	
	kL	ML	kL	ML
WRRF	-	-	10	0.01
Camellia pumping station	234	0.2	-	-
Brine and transfer pipelines alignment	203	0.2	306	0.3
Brine pipeline (relined section)	-	-	162	0.2
River release pipeline	4,591[11]	4.6	766	0.8
Total	5,028	5	1,245	1.3
Project total	**5.2 ML**			

10.5.6.1 Groundwater management during construction

Given the presence of contaminants identified in the groundwater, extracted groundwater is not likely to be of suitable quality for discharge direct to the environment or via stormwater. However, where possible, groundwater would be reused for example for dust suppression or treated and discharged to stormwater. Where this is not feasible, dewatering disposal options would be either discharge to sewer under a trade waste agreement with Sydney Water or disposal via a third party commercial licenced waste facility. For discharge to trade waste, water quality acceptance standards would need to be met. Given the contaminants identified, it is likely that abstracted groundwater would require treatment on-site prior to trade waste disposal.

Dewatering discharge quality would need to be monitored on a site-by-site basis. Treatment may take place at each abstraction site, or dewatered groundwater may be transported to the WRRF site for treatment.

[11] Based on a conservative estimate of groundwater inflow due to limited information on groundwater and hydraulic properties for the pipelines near the river release structure

Primary treatment via sedimentation and settling tanks and pH balancing is likely to be required. There is also potential for treatment of benzene and toluene to be required in groundwater extracted from the river release pipeline HDD pits located at the WRRF site.

Drilling muds/fluids, as well as any dewatered groundwater across project sites would require management during construction, under the CEMP. A Dewatering Protocol would be prepared which would detail methods to treat/discharge or reuse dewatered groundwater and drilling muds/fluids.

10.6 Operational impacts

The risks associated with any potential operational groundwater impacts are considered low. Table 10-8 outlines a risk assessment for potential operational impacts.

Table 10-8 Risk assessment of potential operational impacts

Potential impact	Cause	Comment	Risk
Groundwater quality	Runoff or seepage of contaminated water from operation of vehicles, machinery or spills	Permeability of geological units across the impact assessment area is low. The project would not cause perceptible change to existing recharge mechanisms. Compacted VENM / ENM at the surface of the WRRF would likely be lower permeability than the existing underlying fill / alluvium. Recharge at the WRRF may actually be reduced.	Low
Groundwater flow	Underground structures acting as groundwater sinks	Permeability of geological units across the impact assessment area is low. The project would not cause perceptible change to existing regional groundwater flow regimes. Localised changes to groundwater flow may arise where groundwater seepage occurs through trench bedding. Mitigation measures for this scenario have been recommended (refer to Appendix K (Groundwater Impact Assessment). However, due to the low permeability of the surrounding formation, the effect of any seepage is unlikely to occur at the water table. All other permanent underground structures would be fully sealed and impermeable to groundwater flow and would, therefore, not act as sinks	Low

Potential impact	Cause	Comment	Risk
Groundwater flow	Impermeable underground structures acting as barriers to groundwater flow	There is potential for installed pipelines to behave as barriers impeding shallow groundwater flow. These effects would only impact shallow groundwater near the surface and are not expected to cause noticeable changes to deeper aquifers. As deeper microtunnelled or HDD installed sections would be installed in low permeability, high strength rock, any change to flow would be very minor and is unlikely to occur at the water table. The project would not cause perceptible change to existing regional groundwater flow regimes.	Low
Groundwater recharge	Increased stormwater irrigation at the WRRF	Compacted VENM / ENM at the surface of the WRRF would likely be lower permeability than the existing underlying fill / alluvium. Recharge at the WRRF may be reduced.	Low
Groundwater mounding	Water leakage from installed pipelines may cause localised increases to groundwater levels	Due to the low permeability of geological units, any mounding effect would be very minor and is unlikely to occur at the water table.	Low

The project has limited potential to impact groundwater levels and flow directions during operation, for the following reasons:

- there are no ongoing groundwater takes anticipated during operation of the project
- all permanent structures on the WRRF site are proposed to be fully concrete lined and sealed to groundwater inflow
- where groundwater seepage occurs through bedding to inclined sections of trenched pipeline, trench stoppers would be used to prevent migration of groundwater from the source
- any potential for installed pipelines to behave as barriers impeding shallow groundwater flow would be minor due to the sizes and depth of the pipelines
- for deeper microtunnelled or HDD installed sections, any mounding effect would be very minor and is unlikely to impact the water table
- as no groundwater take is anticipated during operation of the project, drawdown associated impacts to GDEs, waterways or nearby users are not anticipated. Project operation is unlikely to cause perceptible change to regional groundwater systems.

The management of minor spills, leaks, chemical storage and exposure to potential contamination (if present) during operation of the project would be managed in accordance with Sydney Water's standard operating procedures, including spills and incident response procedures, and as such are not likely to impact groundwater quality. No additional management measures other than the adoption of the recommended design and construction methods are considered needed for operation.

10.7 Mitigation measures

The project has been designed to avoid and minimise impacts to groundwater with the selection of construction methods, where feasible. Mitigation measures to manage potential groundwater impacts during construction are provided in Table 10-9. No impacts are precited for groundwater during operation of the project and no mitigation has been proposed.

Table 10-9 Groundwater mitigation measures

ID	Potential impact	Mitigation measure	Timing
GW01	Groundwater drawdown	Implement sheet piling and concrete encasement as per design to minimise groundwater flow.	During detailed design.
GW02	Contamination of groundwater from surface water runoff	Implement a SWMP. Refer to **SW01** (Appendix E).	Prior to and during construction
GW03	Potential for groundwater interaction with acid sulfate soils	Implement an ASSMP. Refer to **SW02** (Appendix E).	Prior to and during construction
GW04	Groundwater drawdown and quality impacts from dewatering activities	Implement a Dewatering protocol. Refer to **SW03** (Appendix E).	Prior to and during construction
GW05	Loss of drilling fluid (frac outs) and groundwater seepage during trenchless construction	Implement a Drilling Fluid Management Protocol. Refer to **SW04** (Appendix E).	Prior to and during construction
GW06	Groundwater seepage to trench bedding	Use trench stoppers to prevent migration of groundwater from the source.	During construction

10.7.1 Groundwater monitoring

Select groundwater level and quality monitoring is recommended for the project and development of a groundwater monitoring plan is proposed.

The monitoring plan would be established during detailed design and would be used to inform additional design aspects (as needed), as well as the development of relevant construction management plans. The locations and water quality indicators for groundwater monitoring would be confirmed. After detailed design, the groundwater monitoring plan would be used through construction, to guide recording of dewatering activities (volumes, quantity, disposal) and the proposed 3 monthly construction groundwater quality and level sampling at the WRRF. This 3 monthly monitoring at the WRRF would be in accordance with and would reference previous routine monitoring undertaken at the site.

As noted in this chapter, very minimal interaction with and impacts to groundwater are expected from the project. An extensive groundwater monitoring program has been undertaken at the WRRF site since Sydney Water acquired the site in 2024. This includes groundwater quantity (i.e levels and rates) and quality (contamination and other analytes) monitoring.

A single set of groundwater quality and level sampling at the WRRF is then proposed, to be undertaken within one year of operation commencing. This set of monitoring would be used to confirm the assessment findings and complete the extensive monitoring at the WRRF site that Sydney Water has undertaken since acquiring the site in 2024. The proposed approach to groundwater monitoring is provided in Table 10-10.

Table 10-10 Proposed groundwater monitoring

ID	Proposed project groundwater monitoring	Timing
GW07	Develop and implement a groundwater monitoring plan to inform detailed design and the SWMP (SW01). The plan would identify: • additional drilling and groundwater investigations to supplement existing groundwater information near the river release structure at the Parramatta River • drilling and groundwater investigations along the alignment for the brine pipeline (relining section) if structural relining methods are required. • groundwater monitoring locations and water quality indicators.	During detailed design
GW08	During construction monitor: • groundwater quality and levels every 3 months at the WRRF • dewatering in accordance with the dewatering protocol in **GW05** (and detailed in **SW03** (Appendix E)).	During construction
GW09	Undertake one round of groundwater contamination monitoring at the WRRF site within 12 months of operation commencing. No operational pipeline groundwater monitoring (quantity or quality) is proposed for the pipelines or Camellia pumping station.	During operation

Terrestrial biodiversity

11 Terrestrial biodiversity

This chapter provides an overview of the key findings of the detailed BDAR (Arcadis, 2025) (Appendix L). The assessment reviewed the project's potential impacts on terrestrial biodiversity. Most of the vegetation impacted by the project would be planted native vegetation (about 4.78 ha), with minimal impacts to threatened ecological communities (about 0.18 ha). Most of the impact assessment area represents marginal and disturbed habitat for threatened species.

Sydney Water would implement a range of management measures to minimise terrestrial biodiversity impacts and would offset impacts in accordance with the NSW Biodiversity Offset Scheme.

11.1 Secretary's Environmental Assessment Requirements

Table 11-1 lists the SEARs relevant to terrestrial biodiversity and where they have been addressed.

Table 11-1: Project SEARs relating to terrestrial biodiversity

SEARs	EIS section where requirement addressed
1. Prepare a Biodiversity Development Assessment Report (BDAR) that assess biodiversity impacts in accordance with section 7.9 of the *Biodiversity Conservation Act 2016* (BC Act) and the Biodiversity Assessment Method 2020 (BAM).	Appendix L
2. The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.	Section 11.4 Section 11.8 Section 11.5.1 Section 11.5.2 Section 11.5.3
3. The BDAR must include information in the form detailed in s6.12 of the BC Act, section 6.8 of the Biodiversity Conservation Regulation 2017 (BC Regulation) and the BAM including details of the measures proposed to address the offset obligation as follows:	Appendix L
a) the total number and classes of biodiversity credits required to be retired for the project	Section 11.8
b) the number of classes of like-for-like biodiversity credits proposed to be retired	Section 11.8
c) the number and classes of biodiversity credits proposed to be retired in accordance with the variation rules	Section 11.8
d) any proposal to fund a biodiversity conservation action	Section 11.8

SEARs	EIS section where requirement addressed
e) any proposal to make a payment to the Biodiversity Conservation Fund	Section 11.8
f) any staged retirement of credits based on when a development / activity that would impact on biodiversity values is carried out.	Section 11.8
4. The BDAR must be submitted with all digital spatial data associated with the survey and assessment	Appendix L
5. The BDAR must be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of Biodiversity Assessment Method Order 2017 under section 6.10 of the BC Act.	Section 11.2.2 Appendix L
6. The BDAR must include details of the measures proposed to address offset obligations.	Section 11.8
7. Identify whether the project, or any component of the project, would be classified as a Key Threatening Process (KTP) in accordance with the listings in the BC Act, FM Act and the EPBC Act.	Section 11.5.4

11.2 Assessment methodology

11.2.1 Legislative and policy context

Field surveys and the preparation of the BDAR (Appendix L) were undertaken in accordance with, or with reference to, the following legislation and guidelines:

- *Biodiversity Conservation Act 2016* (BC Act)
- *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Fisheries Management Act 1994* (FM Act)
- *Biosecurity Act 2015*
- State Environmental Planning Policy (Biodiversity and Conservation) 2021
- Biodiversity Assessment Method (BAM) (DPIE, 2020a)
- Biodiversity Assessment Methodology Calculator (BAM-C) (NSW DCCEEW, 2025c).

Further detail is provided in Section 1.6 of the BDAR (Appendix L).

11.2.2 Methodology

The SEARs require that the BDAR be prepared by a person accredited in accordance with the Accreditation Scheme for the Application of Biodiversity Assessment Method Order 2017 under section 6.10 of the BC Act. The BDAR (Appendix L) was prepared by Elijah Elias, an Accredited Person under the BC Act (BAAS 21012).

The terrestrial biodiversity impact assessment follows the requirements of the BAM. The key steps are summarised below:

- a desktop assessment was undertaken to characterise the biodiversity values of the impact assessment area including native vegetation, threatened species, populations, communities and GDE. The BDAR (Appendix L) details the databases and information sources accessed to inform the desktop assessment.
- field surveys, including:
  - random meanders, rapid assessment points, BAM survey plots and vegetation assessments. The results were used to validate desktop results, update mapping and assess habitat constraints and microhabitats for threatened species
  - vegetation integrity surveys to classify native vegetation into PCTs. Each PCT was then further separated into vegetation zones based on broad condition classes
  - targeted threatened flora and fauna surveys.
- results of the above steps were input to the BAM calculator to confirm which threatened species required assessment. Species were characterised as:
  - ecosystem credit species - species expected to occur in the impact assessment area. Impacts to these species requires assessment but targeted surveys are not required as they are assumed to be present
  - species credit species - species with potential to occur in the impact assessment area. These species require targeted surveys, or species expert reports, to confirm their presence and inform further impact assessment.
- determining impact avoidance and minimisation solutions, primarily by locating infrastructure away from sensitive areas
- impact assessment and mitigation - after impact avoidance, the remaining residual impacts were considered in the following key categories:
  - direct impacts
  - indirect impacts
  - prescribed impacts
  - impacts to MNES under the EPBC Act
  - assessment for Serious and Irreversible Impacts (SAII) on biodiversity values.
- impact summary and determination of offset requirements.

11.2.3 Assessment areas

The assessment of biodiversity impacts has been undertaken within the following defined areas:

Impact assessment area (referred to as subject land in the BDAR (Appendix L)): The BAM defines the subject land as ‘land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal’.

- impact area (referred to as development footprint in the BDAR (Appendix L)): The impact area represents the area of land directly impacted by the project.

- assessment area: The assessment area includes the impact assessment area and land within a 500 m buffer. For portions of the impact assessment area that are not linear in nature, including the WRRF and Camellia pumping station, a 1,500 m buffer was applied.
- study area: The area in which biodiversity surveys have been conducted. This includes the impact assessment area, as well as avoided land, including:
  - sections of the pipeline alignments that would be delivered by trenchless methods
  - areas considered for development during the project planning process and subsequently excluded from the impact assessment area (subject land).

The impact assessment area and impact area are equivalent to the definitions in Section 6.2. The assessment and study areas are specific to the BDAR (Appendix L).

There is some overlap with the Aquatic Biodiversity Impact Assessment (Section 7.7 and Appendix H), which focuses on aquatic and riparian habitats and species. As each assessment focus on different aspects (i.e. terrestrial or aquatic), some inconsistencies may be expected in the information presented.

11.2.4 Assumptions

Ecological surveys provide a sample of flora and fauna at a given time and season. Surveys were carried out in accordance with Chapters 4 and 5 of the BAM. Where minor adjustments to prescribed methods have been made, (e.g. by using 10 x 100 m BAM plots), they were documented in the BDAR (Appendix L). The level of field survey is considered adequate for the types and condition of native vegetation communities and threatened species habitats occurring within the impact assessment area.

A conservative approach of assuming the presence of certain species was applied where the project is located within Important Habitat Mapping (IHM) or where a large number of records exist within the assessment area. Database searches, and associated conclusions on the likelihood of species to occur within the study area, are reliant upon external data sources and information managed by third parties.

For the purpose of the impact assessment, it was assumed that all native vegetation classified as PCT vegetation would be cleared (0.18 hectares (ha) total). This is a conservative approach that likely overstates the impact. During construction, Sydney Water would minimise impacts to native vegetation wherever possible, for example, native vegetation would be trimmed rather than removed.

11.3 Existing environment

11.3.1 Site context and overview

The BDAR (Appendix L) includes a detailed description of the existing environment including landscape features, bioregions, soils and geology, waterways, wetlands and biodiversity connectivity features. This section focuses on providing existing environment context in relation to:

- terrestrial flora, including native vegetation communities and threatened flora

- terrestrial fauna, including threatened fauna
- GDEs.

11.3.2 Terrestrial flora

Native vegetation communities

Vegetation within the impact assessment area largely consists of exotic vegetation, planted native vegetation and small, highly fragmented patches of remnant or naturally revegetated native vegetation. Native vegetation conforming to a PCT type is limited to some patchy, low-condition revegetation south of URBNSURF in Sydney Olympic Park, and a mixture of remnant and planted native vegetation within Memorial Park in Meadowbank.

Two PCTs and 3 planted native vegetation zones were identified within the impact assessment area. Table 11-2 provides a summary of these PCTs and planted native vegetation zones and their conservation status. Figure 11-6 to Figure 11-13 show the location of these communities within the impact assessment area and impact area.

Table 11-2: Vegetation communities identified within the impact assessment area and study area

Plant community type	Vegetation zone(s)	BC Act listing	EPBC Act listing	Extent in the impact assessment area (ha)
PCT 4028: Swamp Oak Twig-rush Forest	Low – Sydney Olympic Park	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Coast Bioregions Endangered Ecological Community (EEC)	N/A	0.06
PCT 4058: Sydney Hinterland Red Gum Riverflat Forest	Moderate – Memorial Park	NSW River-Flat Eucalypt Forest on Coastal Floodplains EEC where it occurs within the stated elevation range	Commonwealth River-flat Eucalypt Forest on Coastal Floodplains Critically Endangered Ecological Community (CEEC) where it occurs at elevations below 250 m above sea level (asl) and condition thresholds are met	0.02

Plant community type	Vegetation zone(s)	BC Act listing	EPBC Act listing	Extent in the impact assessment area (ha)
PCT 4058: Sydney Hinterland Red Gum Riverflat Forest	Low – Meadow Crescent	NSW River-Flat Eucalypt Forest on Coastal Floodplains EEC where it occurs within the stated elevation range	N/A	0.10
Planted native vegetation	Street trees	N/A	N/A	2.20
Planted native vegetation	Suburban parks	N/A	N/A	1.34
Planted native vegetation	Sydney Olympic Park	N/A	N/A	1.23

PCT 4028 – Estuarine Swamp Oak Twig-Rush Forest (shown in Figure 11-1) occurs within the impact assessment area at a single location in the southern HDD pipe string in Sydney Olympic Park (Figure 11-11). It also occurs adjacent to the impact assessment area along the western boundary of the WRRF site, in land avoided by the project (Figure 11-8). PCT 4028 is in a highly disturbed state in both locations.

Figure 11-1 PCT 4028 (low – Sydney Olympic Park)

PCT 4058 – Sydney Hinterland Red Gum Riverflat Forest (shown in Figure 11-2) occurs within the impact assessment area and study area in Memorial Park, Meadowbank. PCT 4058 at this site is generally within a disturbed state, with an understorey dominated by exotic or disturbance-tolerant native species. Much of the vegetation community occurs within maintained suburban parkland, with a mown or mulched understorey.

PCT 4058 occurs in 2 vegetation zones within the subject land – moderate and low. PCT 4058 also occurs within avoided land along south-eastern boundary of Memorial Park.

PCT 4058 (moderate) occurs in the north-west corner of Memorial Park in an area that may be remnant vegetation (Figure 11-13). PCT 4058 is fully structured within this patch with canopy characteristic of the vegetation community, shrubs that include *B. oblongifolia* and *B. spinosa*, and a largely native groundcover dominated by *I. cylindrica* and *P. pandorana*.

PCT 4058 (low) occurs along Meadow Crescent (Figure 11-13). In this vegetation zone, native trees characteristic of PCT 4058 such as *E. tereticornis* occur in the verge adjacent to the street, but the understorey consists of mown, largely exotic grasses. Shrubs and smaller native trees have been removed, and the vegetation community in this vegetation zone consists solely of remnant trees.

Figure 11-2 PCT 4058 (left - moderate, right - low)

Planted native vegetation occurs throughout the impact assessment area in forms that cannot reasonably be assigned to a PCT. To capture the diversity of planted native vegetation across the project, 3 vegetation zones have been established and mapped:

- planted native vegetation (street trees)
- planted native vegetation (suburban parks)
- planted native vegetation (Sydney Olympic Park).

Planted native vegetation (street trees) refers to native trees planted along the verges of suburban streets, pathways and railway lines. Generally, trees are planted at widely spaced intervals, above exotic, maintained lawn and without any associated shrub layer or native groundcover. Trees tend to be moderate in size and recent plantings are common. Examples are shown in Figure 11-3.

Figure 11-3 Planted native vegetation (street trees) – Carnarvon St, Silverwater (left), Rippon Ave, Dundas (right)

Planted native vegetation (suburban parks) refers to native trees planted within suburban parks. Trees within suburban parks tend to be larger than street trees and encompass a wide variety of species, generally species native to western Sydney but also including some species from greater Sydney or areas outside the Sydney region altogether. Like street trees, planted native vegetation in suburban parks is usually above exotic, maintained lawn and without any shrub layer or native groundcover. Examples are shown in Figure 11-4.

Figure 11-4 Planted native vegetation (suburban parks) – Memorial Park, Meadowbank (left), Deakin Park, Silverwater (left)

Planted native vegetation in Sydney Olympic Park can be described as occurring within a mosaic of planted and remnant native vegetation. Sydney Olympic Park is planted with a wide variety of native vegetation, from wetlands vegetation to a broad range of eucalypt species. Within the impact assessment area, which includes carparks and access roads surrounding URBNSURF and street-side vegetation on the eastern side of Hill Road, planted native vegetation does not conform to any PCT. Examples are shown in Figure 11-5.

Figure 11-5 Planted native vegetation (Sydney Olympic Park) – Hill Road (left), Carpark P5A (right)

Threatened flora

Targeted threatened flora surveys were undertaken over 4 days in October and December 2024 and February and March 2025, using the methods described in Section 5.3.1 of the BDAR (Appendix L). These surveys were completed for all threatened flora species considered likely to occur in the impact assessment area. No threatened flora were recorded during targeted surveys. No other threatened flora species are considered likely to occur within the impact assessment area.

Figure 11-6 Existing vegetation communities

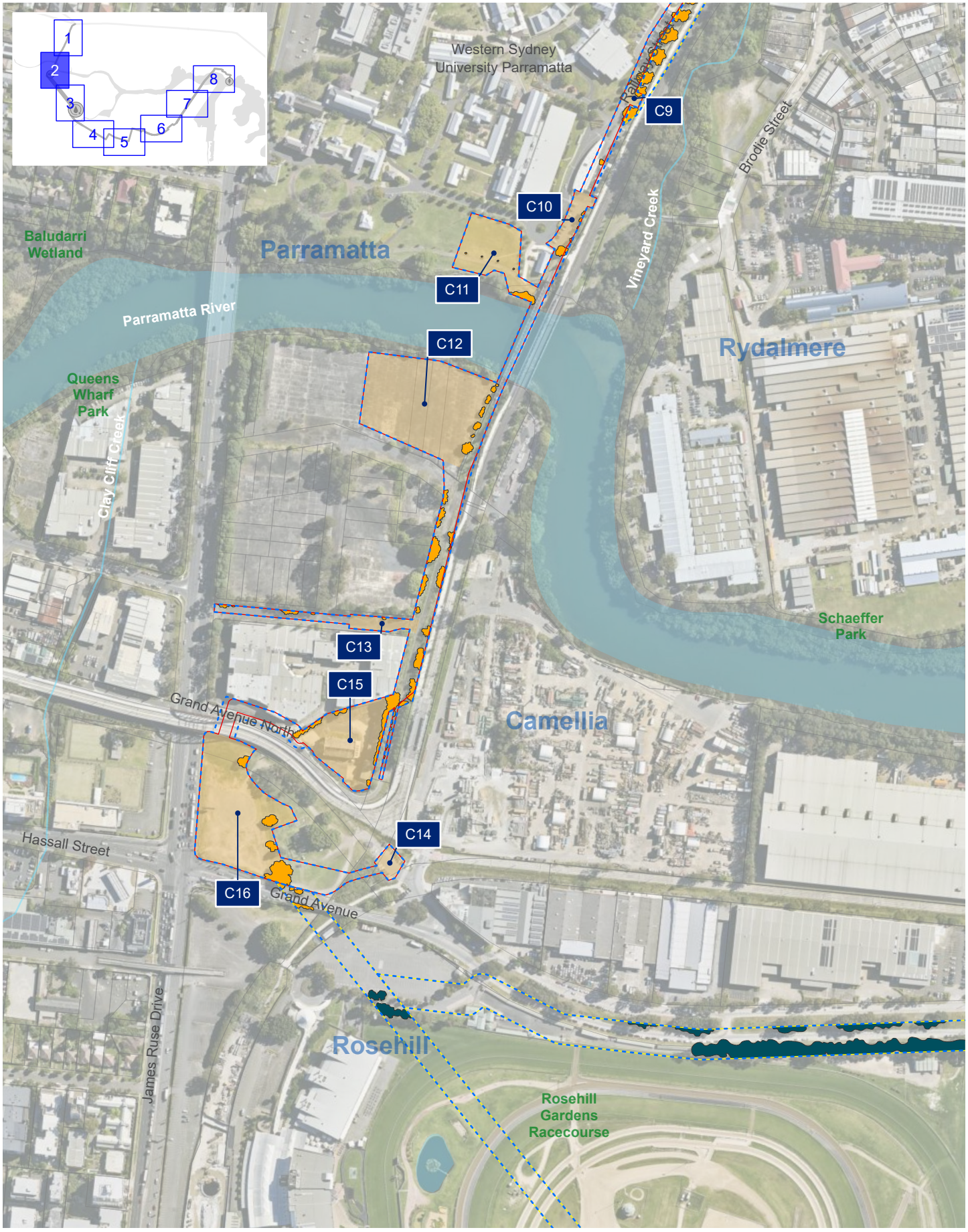
0 100 200 300 m

Page 1 of 8

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

N



Impact area (IA)
Indicative construction compounds
Avoided land
Study area
Planted Native Vegetation (Street trees) [Non-PCT]
Planted Native Vegetation (Suburban parks) [Non-PCT]

Figure 11-7 Existing vegetation communities

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

Impact area (IA)
Indicative construction compounds
Avoided land
Study area

PCT 4028: Estuarine Swamp Oak Twig-rush Forest (low-Camellia)
Planted Native Vegetation (Suburban parks) [Non-PCT]

Figure 11-8 Existing vegetation communities

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

N

Impact area (IA)
Indicative construction compounds
Avoided land
Study area

PCT 4028: Estuarine Swamp Oak Twig-rush Forest (low-Camellia)
PCT 4091: Grey Mangrove-River Mangrove Forest
Planted Native Vegetation (Street trees) [Non-PCT]
Planted Native Vegetation (Suburban parks) [Non-PCT]

Planted Native Vegetation (Sydney Olympic Park) [Non-PCT]

Figure 11-9 Existing vegetation communities

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

N

Impact area (IA)
Indicative construction compounds
Avoided land
Study area

Planted Native Vegetation (Street trees) [Non-PCT]
Planted Native Vegetation (Suburban parks) [Non-PCT]

Planted Native Vegetation (Sydney Olympic Park) [Non-PCT]

Figure 11-10 Existing vegetation communities

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,500 @ A4
GDA2020 MGA Zone 56

N

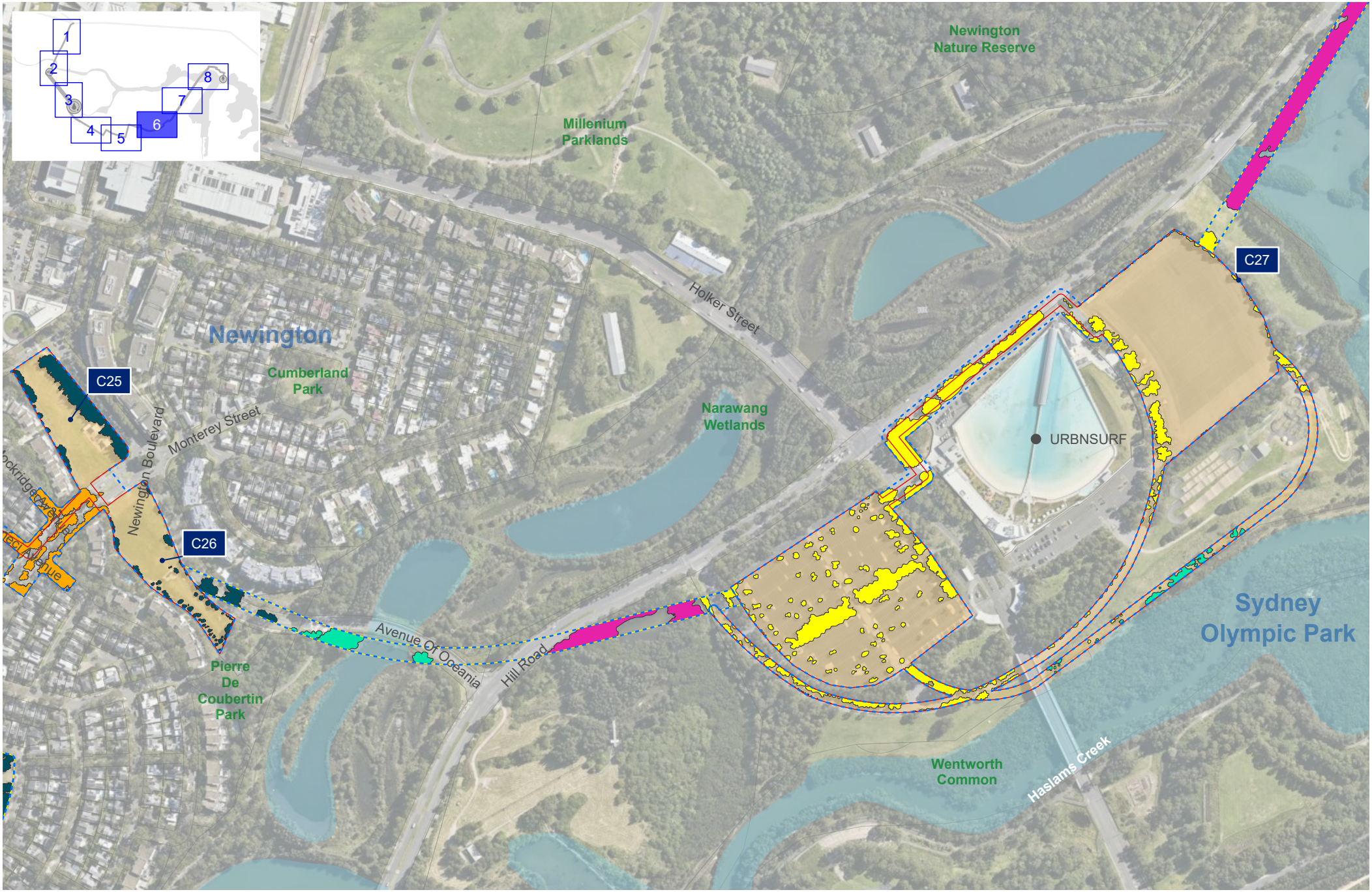


Figure 11-11 Existing vegetation communities

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

Avoided land
Study area
PCT 4091: Grey Mangrove-River Mangrove Forest
Planted Native Vegetation (Sydney Olympic Park) [Non-PCT]
Planted Native Vegetation (Sydney Olympic Park) [Non-PCT]

Figure 11-12 Existing vegetation communities

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

N

Impact area (IA)
Indicative construction compounds
Avoided land
Study area

PCT 4028: Estuarine Swamp Oak Twig-rush Forest (low-Sydney Olympic Park)
PCT 4058: Sydney Hinterland Red Gum Riverflat Forest (low)
PCT 4058: Sydney Hinterland Red Gum Riverflat Forest (moderate)
PCT 4091: Grey Mangrove-River Mangrove Forest
Planted Native Vegetation (Street trees) [Non-PCT]
Planted Native Vegetation (Suburban parks) [Non-PCT]

Planted Native Vegetation (Sydney Olympic Park) [Non-PCT]

Figure 11-13 Existing vegetation communities

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:5,000 @ A4
GDA2020 MGA Zone 56

N

11.3.3 Terrestrial fauna

The BDAR reported the following results relating to terrestrial threatened fauna:

- 35 ecosystem credit species were retained for assessment. These species are listed in Table 11-3. Four were recorded during targeted surveys, including:
  - *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
  - *Miniopterus australis* (Little Bent-winged Bat)
  - Miniopterus orianae oceanensis (Large Bent-winged Bat)
  - *Pteropus poliocephalus* (Grey-headed Flying Fox).
- 5 species credit species were retained for assessment, based on BAM-C results, habitat assessment and targeted surveys. A summary is provided in Table 11-4. Two were recorded during targeted surveys, including:
  - *Myotis macropus* (Southern Myotis)
  - *Ninox strenua* (Powerful Owl).
- the presence of the *Litorea aurea* (Green and Golden Bell Frog) was assumed within PCT 4028 (within Sydney Olympic Park), given the large number of records in the area. The river release structure is located in the IHM for the *Calidris ferruginea* (Curlew Sandpiper) and *Limosa lapponica* (Bar-tailed Godwit) (Figure 11-4), so presence has also been assumed for these species.
- 25 migratory species were also identified as known or likely to occur in the area.

Table 11-3: Ecosystem credit species for assessment

Scientific name	Common name	BC Act Status	EPBC Act Status
Anthochaera phrygia	Regent Honeyeater (Foraging)	Critically Endangered (CE)	CE
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable (V)	-
Botaurus poiciloptulus	Australasian Bittern	Endangered (E)	E
Calidris ferruginea	Curlew Sandpiper (Foraging)	CE	CE
Callocephalon fimbriatum	Gang-gang Cockatoo (Foraging)	V	E
Calyptorhynchus lathami lathami	Glossy Black-cockatoo (Foraging)	V	V
Chthonicola sagittata	Speckled Warbler	V	-

Scientific name	Common name	BC Act Status	EPBC Act Status
Circus assimilis	Spotted Harrier	V	-
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	-
Daphoenositta chrysoptera	Varied Sittella	V	-
Dasyurus maculatus	Spotted-tailed Quoll	V	E
Ephippiorhynchus asiaticus	Black-necked Stork	E	-
Epthianaura albifrons	White-fronted Chat	V	-
Falco subniger	Black Falcon	V	-
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-
Glossopsitta pusilla	Little Lorikeet	V	-
Haliaeetus leucogaster	White-bellied Sea-eagle (Foraging)	V	-
Hieraaetus morphnoides	Little Eagle (Foraging)	V	-
Hirundapus caudacutus	White-throated Needletail	-	V
Lathamus discolor	Swift Parrot (Foraging)	E	CE
Lophoictinia isura	Square-tailed Kite (Foraging)	V	-
Melanodryas cucullata cucullata	South-eastern Hooded Robin	E	E
Micronomus norfolkensis	Eastern Coastal Freed-tailed Bat	V	-
Miniopterus australis	Little Bent-winged Bat (Foraging)	V	-
Miniopterus orianae oceanensis	Large Bent-winged Bat (Foraging)	V	-
Neophema pulchella	Turquoise Parrot	V	-

Scientific name	Common name	BC Act Status	EPBC Act Status
Pandion cristatus	Eastern Osprey (Foraging)	V	-
Petaurus australis	Yellow-bellied Glider	V	V
Petroica boodang	Scarlet Robin	V	-
Pteropus poliocephalus	Grey-headed Flying-fox (Foraging)	V	V
Rostratula australis	Australian Painted Snipe	E	E
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-
Stagonopleura guttata	Diamond Firetail	V	-
Varanus rosenbergi	Rosenberg's Goanna	V	-

Table 11-4: Species credit species for assessment

Scientific name	Common name	BC Act status	EPBC Act status	Presence	Number / area
Calidris ferruginea	Curlew Sandpiper (Breeding)	CE	CE	N/A	Presence assumed within Important Habitat Map
Limosa lapponica baueri	Bar-tailed Godwit (Breeding)	E	V	N/A	Presence assumed within Important Habitat Map
Litoria aurea	Green and Golden Bell Frog	E	V	Presence assumed	Presence assumed within PCT 4028: Estuarine Swamp Oak Twig-rush Forest

Scientific name	Common name	BC Act status	EPBC Act status	Presence	Number / area
Myotis macropus	Southern Myotis	V	N/A	Recorded	Species recorded within PCT 4058: Sydney Hinterland Red Gum Riverflat Forest Presence assumed within PCT 4028: Estuarine Swamp Oak Twig-rush Forest
Ninox strenua	Powerful Owl	V	N/A	Recorded	One individual in PCT 4058: Sydney Hinterland Red Gum Riverflat Forest

Impact area (IA)
Impact assessment area (IAA)
Indicative construction compounds
Indicative Parramatta River construction area
Avoided land
Study area
Migratory shorebird important habitat mapping (IHM) (Bar-tailed Godwit, Curlew Sandpiper

Figure 11-14 Important habitat mapping in Parramatta River

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:4,000 @ A4
GDA2020 MGA Zone 56

N

11.3.4 Groundwater dependant ecosystems

There are low, medium and high value GDEs within and surrounding the assessment area. These areas are mapped in Figure 10-2 in Chapter 10 (Groundwater). The project avoids direct impacts on these areas of GDEs. Further assessment of impacts on GDEs associated with groundwater is provided in Section 10.5.

11.4 Avoid and minimise impacts

The BC Act establishes a hierarchy for addressing the potential impacts of development on biodiversity values. In the first instance, the proponent must take steps to avoid impacts to biodiversity values when planning the project. Measures to offset or compensate for residual impacts on biodiversity values may be undertaken only after the steps to avoid and minimise impacts are taken.

Section 7 of the BAM sets out specific principles to be considered in relation to avoiding and minimising impacts when locating and designing the project. Summaries of how the project has addressed each principal are provided in Table 11-5 and Table 11-6. Avoided areas are also mapped in Figure 11-6 to Figure 11-13.

Table 11-5: Avoidance and minimisation measures implemented during planning for project location

BAM Principles	How addressed
(a) Locating the project in areas lacking in biodiversity values	The project is located in an area comprising residential and industrial neighbourhoods. The landscape is dominated by built assets including buildings, roads, railways, bridges and other urban infrastructure. The WRRF location and pipeline alignments were selected to minimise impacts on key ecological constraints. Where ecological constraints could not be avoided along the pipeline alignments (e.g. the Narawang and Nuri wetlands in Sydney Olympic Park and waterway crossings) trenchless methods (HDD) are proposed. Adopting HDD has avoided: • 0.92 ha of PCT vegetation • 1.62 ha of planted native vegetation. Adjustments to the impact assessment area boundaries were also made to avoid biodiversity values identified during preparation of the BDAR (Appendix L). These boundary adjustments avoided: • 1.23 ha of PCT vegetation • 0.95 ha of planted native vegetation.
(b) Locating the project in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas that have a low vegetation integrity score)	Most of the native vegetation impacted by the project is non-PCT planted native vegetation (4.78 ha), compared to native PCT vegetation (0.18 ha). Avoiding and minimising impacts to PCT vegetation also has the effect of avoiding impacts to the higher quality threatened and non-threatened species habitat within the study area.

BAM Principles	How addressed
(c) Locating the project in areas that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or a highly cleared PCT.	The project avoids impacts to most of the native vegetation that is within the study area. It also avoids impacts to TECs and mapped threatened species habitat. Three patches of native vegetation, avoided through project boundary adjustments, are located within PCTs associated with TECs listed under the BC Act. These avoided patches include: • PCT 3176: Sydney Enriched Sandstone Moist Forest – 0.08 ha • PCT 3320: Cumberland Shale Plains Woodland – 0.27 ha • PCT 4091: Grey Mangrove-River Mangrove Forest – 0.78 ha.
(d) Locating the project outside of the buffer area around breeding habitat features such as nest trees or caves.	Hollow-bearing trees are located within the impact assessment area. It is not feasible to avoid all impacts to these trees. Alignments have been located away from these patches to the extent practical, but some minor trimming of branches to accommodate construction equipment may be required. It is not anticipated that removal of any hollow-bearing trees would be required.

Table 11-6: Avoidance and minimisation measures implemented during project design

BAM Principles	How addressed
(a) Reducing the clearing footprint of the project by minimising the number and type of facilities	At a strategic level, Sydney Water has reduced the clearing footprint through the selection of the preferred wastewater servicing strategy. The project avoids duplication of the NSOOS (a 28 km pipeline). The project has also reduced the clearing footprint, by: • employing trenchless methods to avoid surface impacts from pipeline alignments • reusing existing facilities for project purposes (Camellia pumping station and existing pipeline between the Camellia pumping station and NSOOS) • locating the project components requiring the most intensive development in areas of low biodiversity value • designing project facilities efficiently to minimise the space required. This has included adjusting the impact assessment area at the WRRF to avoid a TEC in the south-west corner.

BAM Principles	How addressed
(b) Locating ancillary facilities in areas where there are no biodiversity values (c) Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas with the lowest vegetation integrity scores) (d) Locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g. an EEC) or CEEC or is an entity at risk of a SAII.	Construction compounds and other ancillary facilities are generally located in 3 types of areas: • intersections or along side streets to the pipeline alignments where there is little to no vegetation • car parks or other large paved areas • suburban parks where there are extensive mown areas. These areas are existing open spaces where staff facilities, trenchless excavation pits and laydown areas can be located without permanent impacts to native vegetation.
(e) Actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.	The project includes 2 key elements that provide the basis for enhancement of biodiversity values within the study area: • avoiding native vegetation through trenchless methods and adjusting project boundaries • maintaining current vegetation within those parts of the impact assessment area that are not required to be cleared.

11.5 Construction impacts

The project has been assessed against impact types including direct, indirect and prescribed impacts and impacts to MNES. A SAII has also been undertaken for one species. This section summarises these impacts, with detailed results included in the BDAR (Appendix L).

11.5.1 Direct impacts

Table 11-7 identifies the PCTs, planted native vegetation and threatened species which would be directly impacted by the project. Table 11-7 also incorporates the conclusion of the relevant Assessments of Significance included in Appendix B of the BDAR (Appendix L).

Figure 11-6 to Figure 11-13 show the locations of impacted PCTs and planted native vegetation in the impact assessment area.

Table 11-7: Summary of direct impacts on terrestrial flora and fauna

Potential direct impact	Description of impact
Removal of native vegetation within PCTs	As explained above, Sydney Water has avoided impacts to native vegetation within PCTs as much as practical. However, minimal removal would still be required along the river release pipeline at Sydney Olympic Park, Memorial Park and Meadow Crescent, including: • PCT 4028: Estuarine Swamp Oak Twig-rush Forest – 0.06 ha (EEC under BC Act) • PCT 4058: Sydney Hinterland Red Gum Riverflat Forest:

Potential direct impact	Description of impact
	– 0.02 ha within the Moderate – Memorial Park vegetation zone (EEC under BC Act, CEEC under EPBC Act) – 0.10 ha within the Low – Meadow Crescent vegetation zone (EEC under BC Act). Sydney Water has adopted a conservative approach and calculated the above areas based on removal of all vegetation within the impact assessment area. However, Sydney Water would implement mitigation measures to minimise the amount of vegetation removed during construction, such that the final impact areas would be less. Impacts to these PCTs would be offset as outlined in Section 11.8.
Removal of planted native vegetation	The project would impact planted native vegetation, including street trees and planted native vegetation within suburban parks and Sydney Olympic Park. Up to 4.78 ha would be removed. Impacts to street trees would be minimised by limiting impacts to branch trimming where possible. Ancillary facilities within construction compounds in suburban parks would be sited to avoid impacts to native vegetation. Sydney Water would restore and rehabilitate these areas as outlined in the Section 11.7.
Removal of threatened species habitat within PCTs	The project would remove up to 0.18 ha of vegetation within PCTs. This would result in the removal of potential habitat for 35 threatened fauna species identified as ecosystem credit species (listed in Table 11 3). Habitat for 3 species credit species may also be impacted by the removal of vegetation within PCTs. The project would result in: • removal of 0.06 ha of habitat for the Green and Golden Bell Frog • removal of 0.18 ha of habitat for the Southern Myotis • removal of 0.12 ha of habitat for the Powerful Owl. Impacts to these species would be offset as outlined in Section 11.8
Removal of threatened species habitat within planted native vegetation	Planted native vegetation within the impact assessment area would serve as habitat for native species common to urban areas. However, it is less likely to serve as habitat for a substantial number of threatened species due to its fragmented nature and minimal shrub layer or native groundcover. Species such as Grey-headed Flying Fox, Powerful Owl, Green and Golden Bell Frog, Australasian Bittern, Australian Painted Snipe and microbats may occasionally traverse or forage planted native vegetation near PCTs. No threatened species were recorded making use of planted native vegetation during field survey, nor was there any direct evidence of such use. Sydney Water has taken extensive measures to avoid and minimise impacts to non-PCT planted native vegetation. All areas impacted by pipeline construction would be restored upon completion of works. Where possible, impacted areas would be restored to their pre-construction condition. Given these measures and the surrounding available habitat, impacts to threatened species that occasionally occupy these areas is expected to be minimal.

Potential direct impact	Description of impact
Threatened species within areas mapped as Important Habitat	Approximately 2.93 ha of IHM for the Bar-tailed Godwit and Curlew Sandpiper would be impacted during construction of the river release structure. The Bar-tailed Godwit and Curlew Sandpiper are 2 migratory shorebird species which may potentially use habitat within the Parramatta River, which is mapped as Important Habitat. These species forage in exposed shoreline areas at low to mid-tide. Potential foraging habitat exists on the eastern side of the John Whitton rail bridge, at a small beach and exposed rocky habitat, however this area would be avoided by the project. The western side of the rail bridge does not contain suitable foraging habitat for these species, as it consists of sandstone walls only. These species are unlikely to use the impact assessment area within Parramatta River as dispersal habitat due to the near constant ferry traffic along the river. Given the above, impacts to the Bar-tailed Godwit and Curlew Sandpiper are predicted to be minimal. Further information about the potential impact on the Curlew Sandpiper is provided in Section 11.5.5.

11.5.2 Indirect impacts

The BAM identifies 16 potential indirect impacts that must be considered as a part of a BDAR. Table 11-8 provides consideration of the indirect impacts of the project on native vegetation, TECs, threatened species and their habitat.

Table 11-8: Summary of indirect impacts to terrestrial flora and fauna

Potential indirect impact	Description of impact
Impacts on adjacent habitat or vegetation	As with any construction project, there is a risk of inadvertent impacts to adjacent habitat and vegetation through overstepping vegetation clearing boundaries. However, areas of native vegetation which interface with the construction area are limited because, for the most part, the pipeline alignments and associated facilities such as the WRRF are located within cleared areas in suburban and industrial neighbourhoods. The risk to the limited native vegetation that occurs adjacent to the impact assessment area can be mitigated through good environmental management and strict controls for identifying and adhering to clearing boundaries. These actions would reduce the risk of inadvertent impacts to an acceptable level.
Reduced viability of adjacent habitat due to edge effects	Edge effects occur when the perimeter of a patch of vegetation increases resulting in changes to the vegetation community composition and environmental conditions for biodiversity. There are only small areas of native vegetation within and adjacent to the impact assessment area. The small patches are already subject to high levels of edge effects. Sydney Water would minimise native vegetation clearing as much as possible and would restore areas following construction. Edge effects and a reduction in the viability of adjacent habitat is therefore unlikely.

Potential indirect impact	Description of impact
Reduced viability of adjacent habitat due to noise, dust or light spill	The project would result in minor increases to noise, dust and light spill due to construction and operational activities. Some construction activities, including trenchless methods and construction of the river release structure would require work at night. The project is located in suburban and industrial areas that are currently subject to high levels of noise, dust and light spill. Any increases to noise, dust and light spill are expected to be negligible and would not reduce the viability of adjacent habitat.
Transport of weeds and pathogens to/from the site to/from adjacent vegetation	The construction footprint and areas of adjacent vegetation are currently abundant in weeds. The increase in the movement of people, vehicles, machinery, vegetation, waste and soil during construction can introduce or spread weeds and pathogens that currently occur within the impact assessment area into adjacent vegetation. The spread of weeds and pathogens to adjacent vegetation can be adequately managed as a part of a Construction Flora and Fauna Management Plan.
Trampling of threatened flora species	All threatened flora species with potential to occur within the impact assessment area were surveyed for, and no threatened species were identified. Much of the adjacent native vegetation was also surveyed. It is unlikely that threatened flora occurs in adjacent areas. Clearing and access would be limited to the impact assessment area only, further minimising this risk.
Other indirect impacts identified for the project: • impacts to aquatic habitats • impacts to microbat habitat	The project has the potential to result in minor indirect impacts to the first-order watercourses in the impact assessment area and study area through sedimentation and run off from construction activities. However, these watercourses, namely Charity Creek and the drain adjacent to the WRRF, are concrete-lined channels within limited and degraded habitat. It is unlikely that construction activities would adversely affect habitat within these watercourses. Indirect impacts to first-order watercourses within the impact assessment area are anticipated to be minor and of low risk if managed under a Soil and Water Management Plan. Potential microbat habitat exists on structures crossing the Parramatta River, including the brine pipeline (relined section) that crosses the Parramatta River via a dedicated pipe bridge, and John Whitton Bridge near the proposed river release pipeline and structure. Field surveys conducted on the 5 June 2025 did not observe any signs of microbat use. Disruption to any potential microbat habitat at the brine pipeline crossing is limited to indirect noise and vibration impacts from the relining works and construction activities at adjacent maintenance holes (direct access to the pipe-bridge is unlikely to be needed). These impacts are temporary and unlikely to impact potential microbat habitat. Construction of the river release structure adjacent to potential habitat at John Whitton Bridge would include night works over several weekends. There is potential for indirect impacts from noise and light spill. Given that the inspections did not identify microbat use and that works are temporary only, indirect impacts to microbats are unlikely.

11.5.3 Prescribed impacts

Prescribed impacts listed in Table 11-9 are identified in clause 6.1 of the Biodiversity Conservation Regulation 2017. Table 11-9 provides a summary of the potential prescribed impacts from the project.

Table 11-9: Prescribed impacts

Potential prescribed impacts	Description of impact
Impacts on the habitat of threatened entities including: Karst, caves, crevices, cliffs and other geological features of significance	There are no karst, caves, crevices, cliffs or other geological features of significance within the impact assessment area.
Human-made structures	Structures within the impact assessment area include roads, carparks, recreational facilities within suburban parks and the buildings at the Camellia pumping station. These structures provide very limited habitat values and are unlikely to provide threatened species habitat. As noted above, potential microbat habitat exists on structures crossing the Parramatta River. Measures have been taken to avoid and minimise works to these structures, which could cause direct impacts if microbats were present. Indirect impacts from noise and vibration, including night works, and light spill are considered unlikely, as outlined in Table 11-8 above.
Non-native vegetation	There is non-native vegetation across the highly urbanised impact assessment area in the form of non-native trees and exotic lawn. Threatened fauna species that would potentially use non-native vegetation within the impact assessment area would also use native vegetation present, in most cases preferentially. Impacts to threatened fauna species have been assessed by consideration of direct and indirect impacts, outlined in Sections 11.5.1 and 11.5.2.
Impacts on areas connecting threatened species habitat, such as movement corridors	The impact assessment area is in a highly urbanised setting. The small fragments of native vegetation that exist in the impact assessment area currently have very poor connectivity to other patches of native vegetation. This connectivity would not be meaningfully affected by the project. The project could potentially have had connectivity impacts on riparian corridors where pipelines cross the Parramatta River, the Duck River and the Narawang and Nuri wetlands. However, pipelines in these areas would be constructed using trenchless and relining techniques and would avoid impacts on these areas.

Potential prescribed impacts	Description of impact
Impacts that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)	Project components that may impact water quality, water bodies and hydrological processes that sustain threatened entities, include: • pipeline construction adjacent to and across waterways and wetlands • construction of the river release structure within Parramatta River • release of advanced treated water to Parramatta River during operation. Pipeline construction would avoid impacts to waterways using trenchless technologies and repurposing existing pipelines (brine pipeline). As noted in Table 11-7, the river release structure within Parramatta River would impact on areas of IHM for migratory shorebirds, including the Bar-tailed Godwit and Curlew Sandpiper. Potential direct impacts on these species are outlined in Table 11-7 and the assessment for SAII to the Curlew Sandpiper is summarised in Section 11.5.6. The ongoing release of advanced treated water is expected to have a predominantly positive impact on the water quality of the Parramatta River (refer to Chapter 7 (Waterways assessment)). Potential impact to threatened aquatic species has been assessed in Section 7.6.
Impacts on threatened and protected animals from turbine strikes from a wind farm	Not applicable.
Impacts on threatened species or fauna that are part of a TEC from vehicle strikes	The project is within a highly urbanised area and is not likely to increase traffic in a way that would impact threatened species or fauna. There may be some potential for vehicle strikes from construction vehicles, as there is for any road vehicle.

11.5.4 Key threatening processes

Schedule 4 of the BC Act lists KTPs that may adversely impact native flora and fauna including threatened species and ecological communities.

The primary KTP associated with the project is ‘clearing of native vegetation’. Approximately 0.18 ha of native vegetation would be cleared for the project. The clearing of native vegetation associated with the project would impact on habitat for each of the 35 ecosystem credit species associated with identified PCTs and the 5 species credit species recorded or assumed to be present within the impact assessment area. However, impacts are anticipated to be low due to the small amount of clearing required and efforts to minimise impacts from that clearing.

Two KTPs related to clearing of native vegetation also have the potential to be associated with the project:

- loss of hollow-bearing trees
- removal of dead wood and dead trees.

Several hollow-bearing trees were identified within the impact assessment area. However, it is anticipated that impacts to these trees would largely be limited to branch trimming, and every effort would be made to avoid removal of hollow-bearing trees. Some dead trees and small amounts of dead wood would be impacted as part of native vegetation clearing. Dead and down wood would be relocated to adjacent native vegetation where possible, and efforts made to minimise removal of dead wood as part of minimising native vegetation clearing. Loss of hollow-bearing trees and removal of dead wood and dead trees would potentially impact on species dependent on those habitat features, such as the Powerful Owl and ecosystem credit bird species that may occasionally use these features. As mentioned, such impacts are anticipated to be low due to the small amount of native vegetation cleared and efforts to minimise impacts.

Additional KTPs are or may be currently impacting threatened species within the impact assessment area. For example, small woodland birds are likely to be impacted by the 'aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners, *Manorina melanocephala'*. The Green and Golden Bell Frog is likely to be impacted by 'infection of frogs by amphibian chytrid causing the disease chytridiomycosis'. Although such KTPs would continue to impact threatened species during construction and operation of the project, the project is not anticipated to increase the impact of these KTPs.

11.5.5 Impacts to Matters of National Environmental Significance

The project would remove habitat associated with TECs, threatened fauna and migratory species listed under the EPBC Act. Significant Impact Assessments using the EPBC Act Significant Impact Guidelines (DEWHA, 2013) were undertaken for:

- one TEC (Red Gum Riverflat Forest CEEC (PCT 4058))
- 8 listed threatened fauna species
- 25 listed migratory species.

The assessments, included in the BDAR (Appendix L), found that the project was not likely to have a significant impact on these species. Due to the low potential for impact to MNES, the project has not been referred to the Commonwealth Minister for the Environment.

11.5.6 Assessment for serious and irreversible impacts (SAII)

One threatened fauna species, Calidris ferruginea (Curlew Sandpiper), requires assessment for SAII as per Section 9.1 of the BAM (DPIE, 2020a). This species is considered at risk of SAII when important mapped habitat is impacted. The species is listed as SAII under Principal 1 – species under rapid decline. The construction of the river release structure within Parramatta River is within IHM.

The Curlew Sandpiper is a small migratory shorebird which predominately occurs along the Australian coastline. The species breeds in Siberia and migrates to Australia for the non-breeding season between August and April. It generally occupies littoral and estuarine habitats as well as intertidal mudflats of sheltered coasts. It forages at the edge of shallow water or on exposed algal mats and beach-cast seaweed banks. The Curlew Sandpiper roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores. The Curlew Sandpiper was not detected during surveys targeting threatened birds in the impact assessment area.

The full assessment is documented in Section 11 of the BDAR (Appendix L). Potential impacts are summarised below:

- A total of 2.93 ha of IHM would be impacted by the project during the construction period for the river release structure. This area represents about 0.001% of the extent of occurrence.
- The Parramatta River area provides potential dispersal habitat for these species. However, given heavy maritime traffic, the potential for these species to use this area of the river is unlikely.
- The potential shoreline habitat impacted consists of a sandstone wall and does not offer any foraging habitat. Potential foraging habitat to the eastern side of John Whitton Bridge would be avoided.
- Once construction is complete, the shoreline would be restored as close as possible to its previous condition. Mitigation measures have been included in Section 11.7.
- The ongoing river releases to Parramatta River are predicted to have a predominantly positive impact on Parramatta River and therefore potential ongoing impacts are considered negligible.

11.6 Operational impacts

The full extent of proposed ground disturbance works would occur during construction so direct impacts to terrestrial biodiversity would be limited to this phase. There is potential for indirect impacts to occur during the operational phase. These impacts have been addressed previously in Sections 11.5.2 and 11.5.3 and include:

- reduced viability of adjacent habitat at WRRF due to noise, dust or light spill
- impacts to aquatic ecology from release of advanced treated water to Parramatta River during operation.

Impacts to terrestrial biodiversity during operation are expected to be negligible.

11.7 Mitigation measures

Table 11-10 outlines mitigation measures Sydney Water proposes to manage terrestrial biodiversity impacts.

Table 11-10: Terrestrial biodiversity mitigation measures

ID	Potential impact	Mitigation measure	Timing
TB01	Biodiversity impacts	Prepare a Flora and Fauna Management Plan prior to clearing of native vegetation and threatened species habitat. The sub-plan is to include: • plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas • pre-clearing survey requirements, including triggers for engaging an ecologist • procedures for unexpected threatened species finds and fauna handling • protocols to manage weeds and pathogens.	Prior to and during construction
TB02	Residual impacts to biodiversity	Prepare a Biodiversity Offset Strategy in accordance with the NSW Biodiversity Offset Scheme to address the species and ecosystem credit requirements outlined in Chapter 11 (Terrestrial biodiversity).	Prior to construction
TB03	Impacts to native vegetation and native species habitat	Adjust methodology (e.g. avoid area) to protect sensitive areas where possible (such as mature trees, known threatened species, populations or ecological communities).	During detailed design and during construction
TB04	Impacts to significant vegetation and threatened species	Site inductions for construction staff would include: • details on the potential presence and location of threatened species and their habitat • locations and extents of no-go zones • an overview of sensitive areas, including the Nuri and Narawang wetlands adjacent to Sydney Olympic Park and the riparian areas of the Parramatta River and the Duck River.	Prior to construction
TB05	Prevent impacts from accidental clearing	Physically delineate vegetation to be cleared and/or protected on site and install appropriate signage prior to works commencing.	Prior to and during construction

ID	Potential impact	Mitigation measure	Timing
TB06	Fauna mortality and injury	Conduct pre-clearing surveys to identify any breeding or nesting activities by native fauna in hollow-bearing trees and native vegetation or where there is potential to minimise impacts to threatened species. No breeding sites or active nests should be disrupted, as far as practical.	Prior to construction
TB07	Fauna mortality and injury	Check for sheltering native fauna of all infrastructure, plant and equipment before works commence daily and during relocation of stored construction materials.	Prior to and during construction
TB08	Impacts to native vegetation and native species habitat	Minimise vegetation clearance and disturbance, including impacts to standing dead trees and riparian zones. Where possible, limit clearing to trimming rather than the removal of whole plants. Make particular effort to avoid impacts to PCT and TEC vegetation in Memorial Park and Sydney Olympic Park.	Prior to and during construction
TB09	Impacts to native vegetation and native species habitat at Sydney Olympic Park	Where possible, lay pipeline strings to avoid impacts to native trees and shrubs, in particular through PCT 4028 in construction compound C27.	During construction
TB10	Impacts to native vegetation and native species habitat	Locate material stockpiles away from native vegetation (including planted native vegetation) and physically delineate native vegetation to avoid unintentional trampling, accidental damage and other impacts.	During construction
TB11	Impacts to native vegetation and native species habitat	Protect trees in accordance with the requirements of Australian Standard 4970-2009 for the Protection of Trees on Development Sites where trees are not required to be removed. Engage a qualified arborist to assess whether significant native trees in Memorial Park (diameter at breast height over 15 cm) can be retained. Do this when the impact area overlaps the Tree Protection Zone and removal may not required. The assessment would consider the ongoing viability of the tree and safety risk.	During construction

ID	Potential impact	Mitigation measure	Timing
TB12	Impacts to native vegetation and native species habitat	Retain dead tree trunks, bush rock or logs in-situ unless they are in the impact area and moving is unavoidable. Maximise reuse of native vegetation and other habitat features that have been approved for removal. If reuse is not possible on site, consult with relevant stakeholders to determine if the following features could be used by others in habitat enhancement and rehabilitation activities : • hollows, tree trunks (greater than 25 - 30 cm in diameter and 2 - 3 m in length), mulch, bush rock and root balls salvaged from native vegetation impacted by the project • collected plant material, seeds and/or propagated plants from native vegetation impacted by the project.	During construction
TB13	Impacts to the Bar-tailed Godwit and Curlew Sandpiper	To the extent possible and consistent with construction requirements, minimise works and intensity of works within Important Habitat Map for the Bar-tailed Godwit and Curlew Sandpiper.	During construction
TB14	Prevent impacts from accidental clearing	If any damage occurs to vegetation outside of the impact area, notify the Sydney Water Project Manager and Environmental Representative in accordance with Sydney Water management specifications.	During construction
TB15	Fauna mortality and injury	Securely cover any pits/trenches that are to remain open overnight adjacent to native vegetation. Alternatively, install fauna ramps (logs or wooden planks) to provide an escape for trapped fauna.	During construction
TB16	Fauna mortality and injury	If fauna is encountered on site, stop work and allow the fauna to move away un-harassed. Engage Wildlife Information, Rescue and Education Service (WIRES) or a licenced ecologist if assistance is required to move fauna.	During construction
TB17	Fauna mortality and injury	The Flora and Fauna Management Plan will outline steps to follow should any threatened flora or fauna species be discovered during the works, including notification, assessment and management requirements.	During construction

ID	Potential impact	Mitigation measure	Timing
TB18	Fauna mortality and injury	Where fauna species are identified in vegetation to be cleared, remove and relocate to adjacent bushland prior to felling. If this is not possible, the tree would be sectionally dismantled or soft felled under the supervision of an ecologist or wildlife carer, before relocating the animal.	During construction
TB19	Fauna mortality and injury	Avoid removal of hollow-bearing trees if possible. If removal is necessary: • remove surrounding non-hollow-bearing trees at least 48 hours before habitat trees are removed. • knock hollow-bearing trees with an excavator bucket or other machinery to encourage fauna to evacuate the tree immediately prior to felling. • leave felled trees for a short period of time to give any fauna trapped in the trees an opportunity to escape before further processing. • Eengage an ecologist to inspect felled hollow-bearing trees as soon as possible (no longer than 2 hours after felling).	During construction
TB20	Prevent the spread of exotic species	The Flora and Fauna Management Plan will outline steps to manage and prevent the spread of weeds, including: • wrap straw bales in geofabric to prevent seed spread. • dispose of all plant parts and excavated topsoil that may be infested with weed propagules at a licensed waste disposal facility. • report high risk weed infestations or invasive pests, as required by the *Biosecurity Act 2015*. • record Pesticide and Herbicide use in accordance with Sydney Water procedure, SWEMS0017.	During construction

ID	Potential impact	Mitigation measure	Timing
TB21	Impacts to vegetation	Restore impact areas to pre-existing condition as much as practical. Replace removed trees with the same species (if possible), or species agreed to with relevant council/ landowners. Tree selection will consider potential impacts to Sydney Water assets. Where trees cannot be replanted at the same location, Sydney Water would work with stakeholders to agree to an alternative location, which could include the WRRF, if appropriate.	During post-construction

11.8 Terrestrial biodiversity offsets

11.8.1 Impacts on native vegetation

Impacts on native vegetation that require offsetting (in accordance with Section 9.2 of the BAM and as determined using the BAM-C) are outlined in Table 11-11. Impacts to planted native vegetation and threatened species habitat within planted native vegetation do not require offsetting.

According to Section 9.2.1 of the BAM, the assessor must determine an offset for all impacts of projects on PCTs that are associated with a vegetation zone that has a vegetation integrity score of:

- ≥15, where the PCT is representative of an EEC or a CEEC
- ≥17, where the PCT is associated with threatened species habitat (as represented by ecosystem credits) or represents a vulnerable ecological community
- ≥20, where the PCT does not represent a TEC and is not associated with threatened species habitat.

A total of 3 credits are required to offset impacts to PCT 4058 at Memorial Park and Meadow Cresent. Offsets are not required for impacts to PCT 4028. These areas are shown in Figure 11-15.

Table 11-11: Impacts that require an offset - ecosystem credits

PCT Name	Vegetation zone	Impact assessment area (ha)	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
PCT 4028: Estuarine Swamp Oak Twig-rush Forest	Low (Sydney Olympic Park)	0.06	-13.3	2	0

PCT Name	Vegetation zone	Impact assessment area (ha)	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
PCT 4058: Sydney Hinterland Red Gum Riverflat Forest	Moderate (Memorial Park)	0.02	-46.2	2	1
PCT 4058: Sydney Hinterland Red Gum Riverflat Forest	Low (Meadow Crescent)	0.10	-32.4	2	2
				Total credits	**3**

Figure 11-15 Native vegetation to be offset

11.8.2 Impacts on threatened species and their habitat (species credits)

Impacts to species credit species require offsetting in accordance with Section 10.1.1 of the BAM. The Threatened Biodiversity Data Collection (NSW DCCEEW, 2025d) identifies the assessment method for threatened species to be used when determining credit requirements. Each of the species that requires an offset is classified as an area species, meaning its offset is determined by the area of its species polygon.

The credit requirements for each species as a result of the project are listed in Table 11-12. A total of 8 species credits are required to offset impacts for the project.

11.8.3 Biodiversity offset strategy

Under the NSW Biodiversity Offset Scheme (BOS), there are 3 main avenues for securing biodiversity offsets for the project including:

- purchasing and retiring like-for-like credits from existing credit holders. Chapters 12 and 13 of the BDAR (Appendix L) include a summary of the credit requirements and like-for-like options available to Sydney Water. Amendments to the BC Act mean that from 7 March 2025, approval can no longer be granted for proponents to use the variation rules, including for standard biodiversity certification
- transferring their obligation to the Biodiversity Conservation Trust by paying into the Biodiversity Conservation Fund
- establishing a Biodiversity Stewardship Site to generate credits required by the project.

Sydney Water is committed to securing the required number and type of biodiversity credits to offset residual impacts of the project, most likely through retirement of like for like credits or via a combination of the first 2 listed options above. Sydney Water would prepare a detailed Biodiversity Offset Strategy outlining how offsetting requirements would be met.

Table 11-12: Impacts that require an offset - species credits

Scientific name	Common name	Vegetation zone	Area (ha)	Sensitivity to loss	Biodiversity risk weighting	Potential SAII	Number of species credits required
Litorea aurea	Green and Golden Bell Frog	PCT 4028 (low-Sydney Olympic Park)	0.06	High	2	No	1
Myotis macropus	Southern Myotis	PCT 4028 (low-Sydney Olympic Park)	0.06	Moderate	2	No	1
		PCT 4058 (moderate)	0.10	Moderate	2	No	2
		PCT 4058 (low)	0.02	Moderate	2	No	1
Ninox strenua	Powerful Owl	PCT 4058 (moderate)	0.10	Moderate	2	No	2
		PCT 4058 (low)	0.02	Moderate	2	No	1
						Total credits	**8**

Air quality

12 Air quality

This chapter provides an overview of the Air Quality Impact Assessment (AQIA) (WSP, 20250 (Appendix M). The AQIA provides a description of the existing air quality climate and meteorology near the project which formed the basis for modelling undertaken. The assessment found that construction would result in a negligible to medium risk of dust impacts on receivers, however implementation of mitigation measures would result in this residual risk being low. Modelling also showed that the operation of the Camellia-Rosehill WRRF would not result in any adverse air quality impacts and would comply with the EPA criteria and Clean Air Regulations.

12.1 Secretary's Environmental Assessment Requirements

Table 12-1 lists the SEARs relevant to air quality and where they have been addressed.

Table 12-1: Project SEARs relating to air quality impacts

SEARs	EIS section where requirement addressed
1. Undertake an air quality impact assessment (AQIA) for construction and operation of the project in accordance with the current guidelines.	Appendix M
2. The AQIA must include the following:	As per below
a) demonstrated ability to comply with the relevant regulatory framework, specifically *Protection of the Environment Operations Act 1997* and Protection of the Environment Operations (Clean Air) Regulation (2022).	Section 12.6
b) identification and assessment of construction air pollution sources and measures for preventing and/or minimising their generation, including nuisance dust, emissions from plant and equipment and potential odours from contaminated and acid sulfate soils.	Section 12.5
c) a description of operational odour control techniques proposed for the project and their effectiveness in reducing odour emissions	Section 12.6.1
d) assessment of operational odour impacts, including on any future redevelopment of the Camellia-Rosehill precinct.	Section 12.6.1
e) cumulative local and regional air quality impact assessment.	Section 12.6.2 Section 23.4.4

12.2 Assessment methodology

The assessment methodology was developed in accordance with relevant Commonwealth and State legislation and policy. The assessment comprised a risk based dust assessment for construction and air dispersion modelling for operation of the WRRF.

12.2.1 Legislation and guidelines

The POEO Act provides the legislative authority for the NSW EPA to regulate air emissions in NSW. The Protection of the Environment Operations (Clean Air) Regulation 2010 (Clean Air Regulation) also provides operational requirements including emission standards such as motor vehicle and industrial emissions.

Relevant guidelines included:

- Guidance on the assessment of dust from construction Version 2.2 (Institute of Air Quality Management) (IAQM, 2024) (IAQM guidance)
- Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (Approved Methods) (NSW EPA, 2022b)
- Technical framework: Assessment and management of odour from stationary sources in NSW (DEC NSW, 2006b).

12.2.2 Construction assessment methodology

The focus of the construction impact assessment is the potential for dust from construction activities. Odour impacts during construction are anticipated to be minimal. Bypass and diversion works are being undertaken at the Camellia pumping station as part of a separate Sydney Water project at the site and would remain in place for use for this project.

Construction of the project could lead to emissions to air from a variety of activities including earthworks, material handling, material transport and wind erosion of exposed areas. These construction-related emissions would mainly comprise particulate matter.

The IAQM guidance allows for a semi-quantitative assessment which considers the predicted increase (or decrease) of primarily particulate matter (dust) from construction works, and the sensitivity of the receptor.

The IAQM guidance provides steps to follow to determine of the level of significance of air quality impacts from construction works. Table 12-2 describes what is required in each of the four steps.

Table 12-2: IAQM construction assessment methodology

Requirement	Description
Step 1: Screen the requirement for a more detailed assessment	When sensitive receivers are within certain distances from construction works additional assessment is required. For human receivers the assessment radii are: • 250 m from the impact area

Requirement	Description
	• 50 m from construction vehicle routes, or 250 m from the site entrance. For ecological receivers the assessment radii are: • 50 m from the impact area • 50 m from the construction vehicle routes, or 250 m from the site entrance. For those receivers outside the nominated distances the risk of dust impacts is considered negligible.
Step 2: Assess the risk of dust impacts	This step comprises three parts: 1. rating the potential dust emission magnitude for each construction activity (demolition, earthworks, construction and track out). The size of works, materials used and number of heavy vehicles are considered. 2. rating the sensitivity of the receivers based on number and proximity. This step also allows for the consideration of existing air quality and the presence of any wind breaks (e.g. trees). 3. the overall potential risk of dust prior to the application of mitigation measures is determined based on the dust magnitude and the sensitivity of the area. The applicable matrices used in this step are provided in the AQIA (Appendix M).
Step 3: Determine site specific mitigations	Site specific mitigations are required when there are low, medium or high risks of an impact.
Step 4: Examine the residual risks	Reconsider the risks after the application of mitigation measures and determine if these are significant.

12.2.3 Operational assessment methodology

The operational impacts associated with the pipelines are from the air release valves only. These are located at various points along the alignment to intermittently release air build ups. Air valves are typical to any pipeline operation to maintain appropriate pressure. Impacts to air quality from the operation of these air valves is considered negligible and has not been considered further.

Upgrades to the Camellia pumping station involve connecting new pipelines, replacing existing pumps and upgrading the existing transformer. The project would not change the capacity of the pumping station. Therefore, it is not expected that there would be a change in the potential for odour emissions. As such, the pumping station upgrades have not been assessed further.

Operational emissions from the Camellia-Rosehill WRRF include:

- odour from the liquid and solid waste streams and the associated treatment process
- generation of oxides of nitrogen (NO_x), including nitrogen dioxide (NO_2) from energy recovery processes occurring in the WRRF (e.g. operation of the cogeneration units or flaring system).

The operational assessment has been undertaken in accordance with the EPA's Approved Methods. To assess the operational emissions of odour and NO_x, air dispersion modelling was completed using the CALPUFF

(version 6.5) modelling tool. Air quality predictions from the Camellia-Rosehill WRRF were modelled at nested receptors (equally spaced receptors arranged in a grid pattern across the study area) and 20 discrete receptors.

At each discrete receptor a 'flagpole' was applied where varying heights, starting at ground level were assessed. The increments increased by 5 m to a total of 50 m and then the increments increased by 10 m. The increments represented each building level up to the proposed building height, as guided by the Camellia-Rosehill Place Strategy (DPE, 2022b).

Meteorological monitoring data from three local stations (Sydney Olympic Park, Parramatta North and Chullora) were used to inform the meteorological models. The AQIA (Appendix M) includes the full details of the model settings used in the CALPUFF and associated models for the project.

Odour sources from the WRRF were modelled as either point or area sources. Area sources included the various bioreactors, and the point sources included the co-generation units and stack from the odour control unit. Surrounding buildings and structures that could influence the dispersion of odours from the WRRF were also included in the model.

Chapter 3 (Project Description) described the use of waste gas burners to combust biogas volumes in excess of what is required for the co-generation units. As the use of the burners is intermittent and more efficient than the use of the co-generation units, modelling considered the worst-case use operation of the co-generation units. this is also typical of the routine operation of the WRRF.

The modelling results were then compared to the criteria provided in the Technical Framework (DEC NSW, 2006b). Based on projected population growth, the Camellia-Rosehill area was classified as an urban area. Therefore, a project specific criterion of 2 odour units (OU) was applied to the operational assessment.

The assessment of NO_x followed the Ozone Limiting Method (OLM) procedure as outlined in the Approved Methods. The OLM is a two stage assessment where the level of assessment is determined by an exceedance of the standard criteria for NO_2.

The National Environment Protection (Ambient Air Quality) Measure 2021 (Air NEPM) provides criteria for key pollutants. The criteria for NO_2 presented in Table 12-3, was used in the operational assessment.

Table 12-3: Standard criteria for nitrogen dioxide per averaging period

Averaging period	Maximum NO_2 concentration criteria (ppm)	Maximum NO_2 concentration criteria ($\mu g/m^3$)
1 hour	0.08	164
Annual	0.015	31

12.3 Existing environment

12.3.1 Site Context

The Camellia-Rosehill WRRF is located in Sydney's west, within the City of Parramatta LGA. The WRRF site is generally flat with an elevation of about 5 m above sea level, which rises to 10 m in surrounding areas. Along the pipeline alignment elevation varies between 5 m to 20 m above sea level.

The WRRF site is currently surrounded by commercial and industrial land uses with the exception of Rosehill Gardens Racecourse to the north-west. An asphalt reclamation plant is considered the most significant industrial site which neighbours the WRRF site to the east. The closest residential areas to the Camellia-Rosehill WRRF are approximately 900 m to the west of the site in Harris Park. There are also residential receivers 900 m to the south-east of the site in Silverwater. Duck River is located 320 m from the southern site boundary while the northern boundary is 900 m away from the Parramatta River.

The Camellia-Rosehill Place Strategy (DPE, 2022b) proposes significant redevelopment of the area over the next 20 years. Land use would shift from the predominant 'services' category to include:

- entertainment (with building heights to 36 m)
- educational facilities (location under investigation and building heights not specified, maximum of 50 m applied)
- town centre (high, including residential buildings with heights up to 130 m)
- town centre (low, including residential buildings with heights up to 80 m).

Building heights could range from 36 m to 130 m.

12.3.2 Meteorological Conditions

Meteorological data from Sydney Olympic Park station (ID 066212) was used to describe the existing local meteorological conditions. Two other weather stations managed by the NSW DECCEW were also used to supplement local meteorological data (Parramatta North and Chullora). A summary of the average values for meteorological parameters is shown in Table 12-4, as well as a percentage of wind speed data completeness.

Table 12-4: Summary of average values of meteorological parameters for the Sydney Olympic Park Bureau of Meteorology Automatic Weather Station

Year	Average Temperature (°C)	Average relative humidity (%)	Average wind direction (degrees)	Average wind speed (m/s)	Wind speed data completeness
2017	18.2	71.8	170.2	2.3	100
2018	17.9	71.8	172.0	2.3	99.8
2019	18.2	72.4	175.9	2.2	99.9

Year	Average Temperature (°C)	Average relative humidity (%)	Average wind direction (degrees)	Average wind speed (m/s)	Wind speed data completeness
2020	17.8	75.9	174.9	2.2	100
2021	17.2	75.3	177.4	2.1	99.8
2022	17.3	76.5	178.5	2.2	99.9

The average wind speed for all the recorded years was 2.21 m/s. Consistent average wind speeds were observed across each season, with the highest speeds occurring in the summer and lowest during winter. Predominant wind direction is from the south to south-west during summer and north to north-west during winter. The AQIA (Appendix M) includes wind roses (diagrams showing strength, direction and frequency of wind) illustrating the data.

The consistency in the wind patterns, temperature and relative humidity indicate that the data collected from the Sydney Olympic Park station are representative of the study area.

12.3.3 Air quality conditions

DCCEEW has established a network of air quality monitoring stations (AQMS) across NSW with the closest to the WRRF site being Parramatta North. The station is located 5.5 km north-west to the site at Cumberland Hospital, Fleet Street.

Tabulated concentrations over a six year period is provided in the AQIA (Appendix M). Key points to consider include:

- PM2.5[12] and PM10[13] – the data shows that there have been numerous (39) exceedances over the 24-hour average criteria since 2017. Many of these exceedances occurred during 2019 and 2020
- O3[14] – numerous (101) exceedances of the 8-hour average criterion over the period. Again, a number of these occurred during 2019 and 2020
- NO2 – no exceedances recorded.

The exceedances of PM_{10}, $PM_{2.5}$ and O_3 during the summer of 2019 and 2020 correlated with 'Black Summer', where NSW was impacted by large bush fire events. Since the commencement of the Parramatta North AQMS in 2017 this station has recorded a good air quality rating.

[12] Airborne particles of 2.5 micrometres or smaller. Can originate from sources such as vehicle exhaust, industrial emmissions and bushfires.
[13] Airborne solid and liquid particles that are 10 micrometres or less in diameter. Can originate from sources like bushfires, construction work and vehicle exhaust.
[14] Refers to ozone gases.

12.3.4 Existing air emission sources

The National Pollutant Inventory (NPI) Database identified emission sources within 200 m of the WRRF site. Three facilities with relevant sources that generate odour or emit criteria pollutants (NO_2 or SO_2) were identified nearby:

- Rosehill Sustainable Road Resource Centre located to the east of the WRRF site, emits a mixture of hydrocarbons and volatile organic compounds that generate a distinctive odour
- IVE Group Bluestar Web Silverwater is a printing facility located to the south-east of the WRRF site which produces emissions of NO_2
- LGI Silverwater Flare located to the south of the WRRF site emits a range of compounds that generate odour and other criteria pollutants.

12.4 Avoid and minimise impacts

The project design and construction methodology has included the following measures to avoid or minimise potential air quality impacts:

- locating odour control facilities and chemical storage areas towards the centre of the site, away from the site boundary and neighbours
- covering odour sources (inlet works, primary treatment, biosolids handling area) to contain odour.

12.5 Construction impacts

As there are residential receptors within proximity of the project, an assessment of potential dust impacts associated with demolition, earthworks, construction and vehicles spreading dirt or mud was completed. The detailed assessment was undertaken for activities associated with pipeline construction (trenching, trenchless and relining activities), pumping station upgrade, and construction of the WRRF.

12.5.1 Proposed construction and proximity to sensitive receivers

12.5.1.1 WRRF

Human and ecological receivers are located near the WRRF site. Commercial offices and businesses are located within 250 m of the impact area. The closest ecological receiver, Duck River, is also located within 250 m of the site entrance. Therefore, the completion of IAQM assessment is required.

The Rosehill Gardens Racecourse, including the stables along Unwin Road are outside of the IAQM assessment area (250 m) and were not considered further.

While the WRRF site is large, the site has already undergone extensive shaping works, so construction would be limited to excavation of material to allow for the installation of some deep infrastructure. Equipment and material would generally remain on site.

12.5.1.2 Camellia pumping station

Receivers identified within the assessment radii from the pumping station included:

- various offices to the north (approximately 20 m)
- Rosehill Gardens light rail station (approximately 25 m)
- Explore and Develop Childcare Centre (approximately 150 m).

Works at the pumping station would require the demolition of two corrugated iron sheds and replacement with new transformer buildings, connection of the new pipelines to the pump station, as well as internal works to replace pumps. Much of the pumping station site is hardstand.

12.5.1.3 Pipelines

Construction of the transfer, brine and river release pipelines will use a combination of open trench and trenchless methods (HDD and microtunneling), as well as relining works for the section of brine pipeline between Camellia pumping station and the NSOOS.

Pipeline works would occur near a high number of residences (over 100) and places of employment. Relining works would occur within the WSU Rydalmere campus which is considered a high sensitivity receptor. The impact area associated with pipeline construction would also occur within 250 m of nature reserves located along the Parramatta River.

Earthworks and construction would occur progressively along the pipeline alignments. It is likely that more than one work front would be working concurrently on each pipeline alignment however these would be located some distance from each other. Generally, trenches would be 2 - 3 m wide and excavated at a rate of 10 - 25 m per day.

As the alignments are in roadways or developed areas much of the impact area is sealed. Material to be excavated would comprise road bedding materials with a larger grain size and lower dust potential.

12.5.2 Potential risk of dust impacts

Table 12-5 shows the potential risk of dust impacts (resulting from the combination of the dust emission magnitude and sensitivity of the area) during construction of the project without the application of mitigation measures.

Table 12-5: Risk level for potential dust impacts during construction of the WRRF

Activity	Indicator	Demolition	Earthworks	Construction	Track out
WRRF	Dust soiling	None	Medium risk	Medium risk	Low risk
	Human health	None	Medium risk	Medium risk	Low risk
	Ecological	None	Medium risk	Medium risk	Low risk

Activity	Indicator	Demolition	Earthworks	Construction	Track out
Camellia pumping station	Dust soiling	Low risk	Low risk	Low risk	Negligible risk
	Human health	Low risk	Low risk	Low risk	Negligible risk
	Ecological	Negligible risk	Negligible risk	Negligible risk	Negligible risk
Pipeline construction	Dust soiling	Low risk	Low risk	Medium risk	Low risk
	Human health	Negligible risk	Low risk	Medium risk	Low risk
	Ecological	Negligible risk	Negligible risk	Low risk	Negligible risk

Generally, construction associated with the project has a medium to low or negligible risk of potential dust. No mitigation measures are required by the IAQM when works have a negligible risk. Standard mitigation measures would be implemented on activities designated as low risk. In addition, the potential for the generation of dust containing asbestos would be managed under an Asbestos Management Plan. Refer to Chapter 9 (Soils and contamination).

Construction and earthworks associated with WRRF were considered to have a medium risk of potential dust impacts. Mitigation measures such as the treatment of stockpiles or the appropriate storage of aggregates to limit dry out are to be implemented. As the risks associated with the construction of the WRRF are manageable the residual impact is considered to be negligible.

Construction of the pipelines was also considered as a medium risk of potential dust. This is conservative as construction works were considered as a whole, rather than the temporary and progressive nature of works on each receiver. Mitigation measures would be implemented during construction to minimise potential dust lowering the risk level to low/negligible.

12.5.3 Contaminated and Acid Sulfate Soils

Construction works would encounter areas of contaminated material (e.g. asbestos) and/or ASS, as described in Chapter 9 (Soils and Contamination). Implementation of mitigation measures would mean that air quality impacts including odour associated with exposed acid sulfate soils are minimised.

12.6 Operational impacts

12.6.1 Odour

Odour sources from the project include the primary, secondary and tertiary treatment areas, digesters, biosolids treatment building and the co-generation engine. Components of the WRRF that were identified as significant sources of odour were designed to be enclosed with emissions extracted to an odour control unit (OCU) that would treat the air. The dispersion modelling quantified the potential odour impacts from the WRRF operating at 70 ML/d. Figure 12-1 shows the model predicted ground level odour contours from the WRRF.

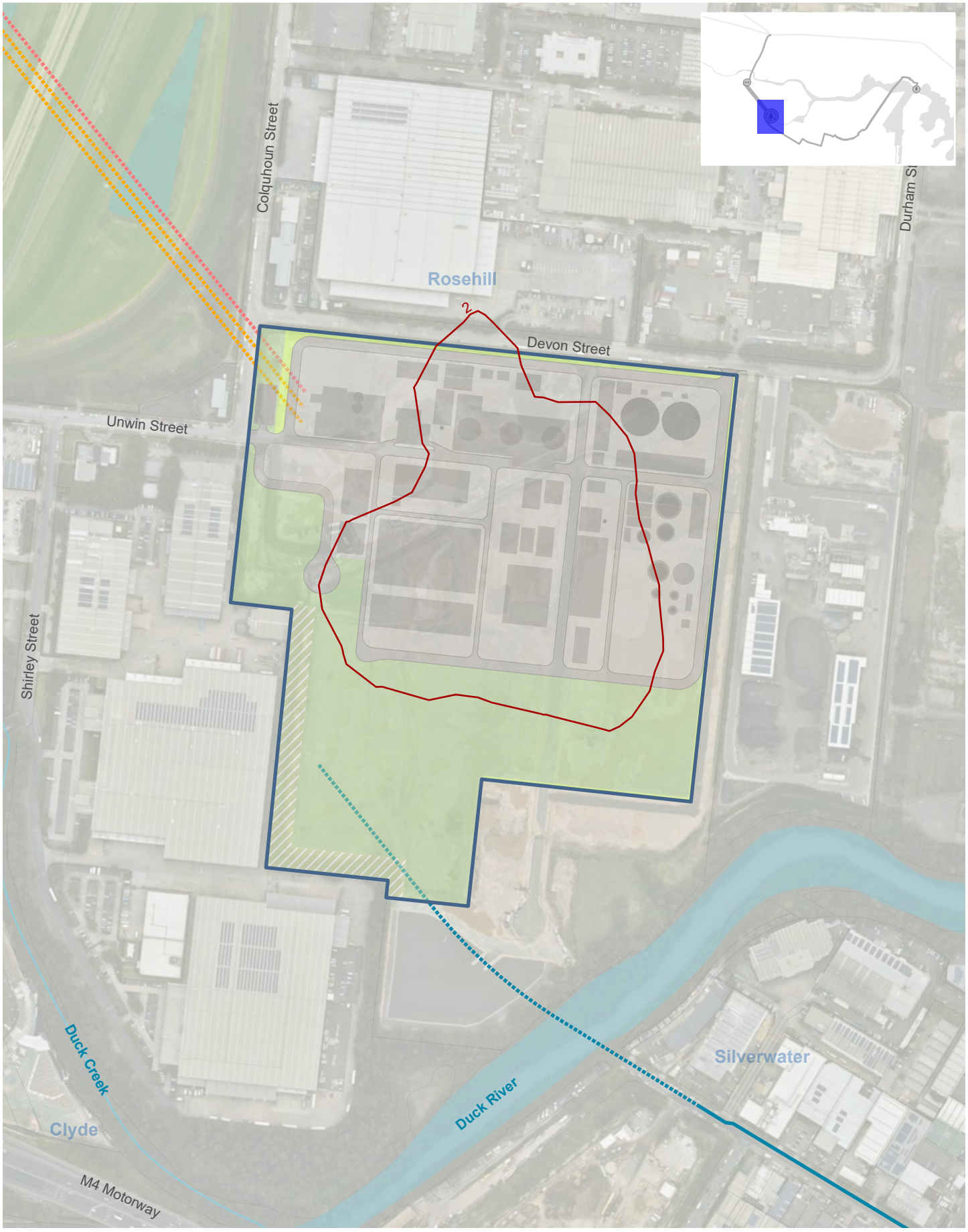


Figure 12-1 Odour contours at ground level at normal operation of the WRRF

The 2 OU contour is mostly contained within the Camellia-Rosehill WRRF boundary. A small portion of the contour extends beyond the WRRF boundary in the north by approximately 35 m. However, this does not reach any identified sensitive receivers. At ground level odour disperses rapidly and between 200 m to 500 m from the WRRF odour concentrations were predicted to be 0.5 OU.

The assessment also found that there would be no odour impacts for the flagpole receptors both at elevated or ground level, including those described within the Camellia-Rosehill Place Strategy (DPE, 2022b).

The assessment found that normal operation of the Camellia-Rosehill WRRF would comply with the EPA assessment criteria (in the Approved Methods) and are not predicted to have odour impacts on nearby receivers.

12.6.2 Nitrogen dioxide

Operation of the co-generation unit would result in the release of NO_x. Dispersion modelling was undertaken for one-hour average and annual average NO_2 impacts that could result from the project. Parameters used for the modelling are included in the AQIA (Appendix M).

12.6.2.1 One-hour average

The maximum one-hour average NO_2 concentrations for the initial level 1 assessment showed exceedances of the 1 hour air quality criteria. The exceedances are considered likely to be biased by the high concentrations of NO_2 recorded during the 2018 period, which were the highest values experienced at the Parramatta North AQWS.

A more detailed assessment (level 2) was then undertaken where contemporaneous background concentrations (the hourly measured values) are matched with the hourly modelled values at each receptor. The results of the Level 2 assessment showed that the NO_2 maximum modelled concentrations would be around 150 µg/m^3, below the 1-hour criteria of 164 µg/m^3, and that most NO_2 concentrations at each receptor would be below 60 µg/m^3.

12.6.2.2 Annual average

Figure 12-2 shows the predicted annual average NO_2 concentrations from the WRRF operating at 70 ML/day. The results show that NO_2 does not exceed the annual criteria of 31 µg/m3 beyond the site boundary.

Based on the model results, the WRRF would not result in any adverse air quality impacts with respect to NO_2. The assessment showed that during operation the Camellia-Rosehill WRRF would comply with the EPA criteria and Clean Air Regulations.

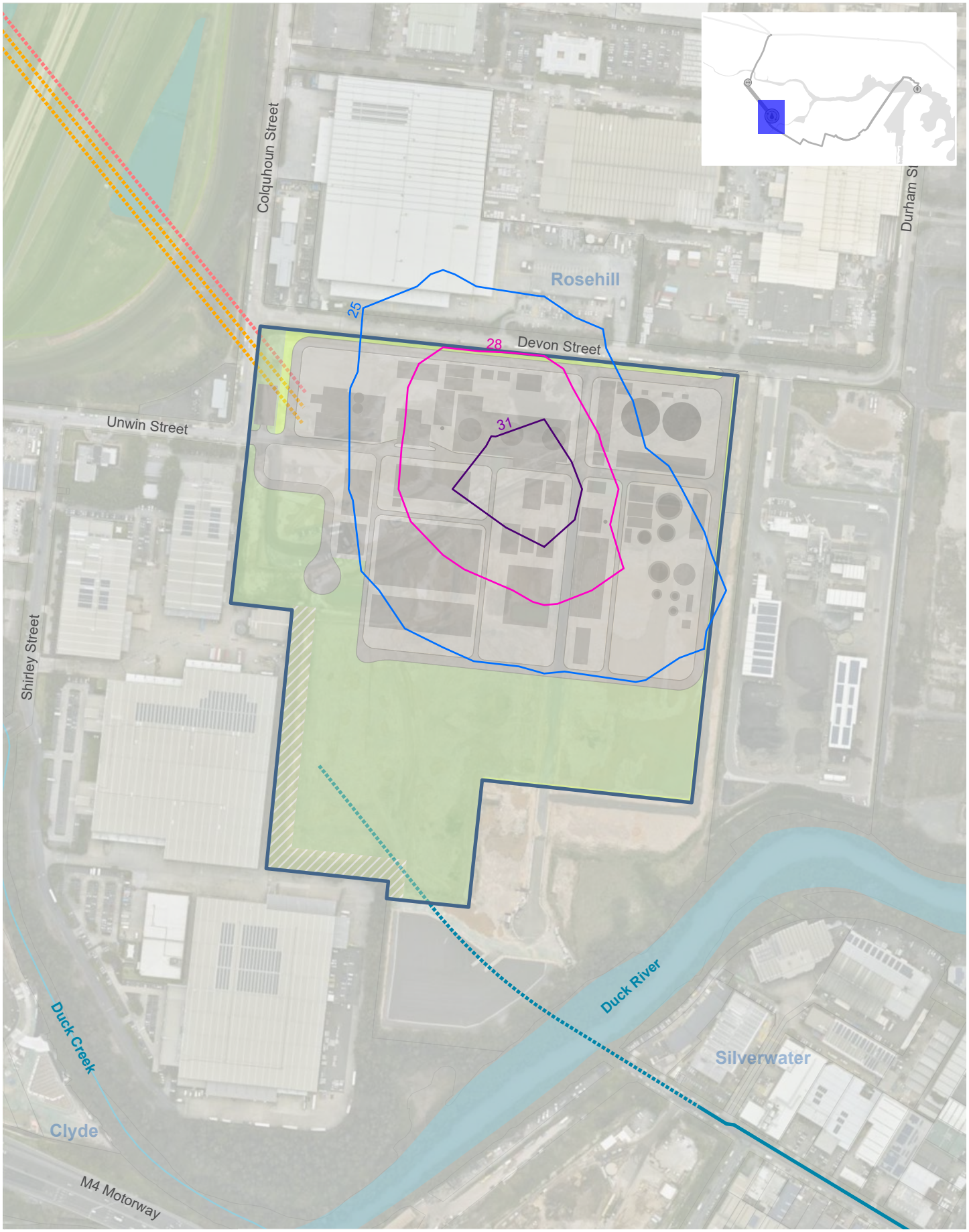


Figure 12-2 NO_2 concentration (annual, µg/m^3) at ground level at normal operation of the WRRF

12.6.2.3 Cumulative impacts

Cumulative air impacts associated with the proposed operation were considered within the operational assessment. The proposed developments that could contribute to odour impacts in the precinct included:

- Downer Rosehill Sustainable Resource Centre - Changes to Reconomy Facility and additional waste input
- SAMI - Camellia - Bitumen Plant Redevelopment.

As these odour sources were considered to have characteristics different to the WRRF, it is unlikely to contribute to cumulative odour impacts.

The Grand Avenue Data Centre Expansion (Rosehill) was also considered as it could lead to additional levels of NO_2. This would be during non-routine power failure where the data centre would rely on diesel generators which produce large volumes of NO_2. The operation of the data centres diesel generators could result in exceedances of the NO_2 criteria during times of power failure. Modelling has shown operation of the WRRF does not exceed the criteria.

12.7 Mitigation measures

Mitigation measures to be implemented to manage potential air quality impacts are provided in Table 12-6.

Table 12-6: Air quality mitigation measures

ID	Potential impact	Mitigation measure	Timing
AQ01	Operational NO2 emissions	Co-generation equipment (if selected) is to include consideration of engines with the lowest level of NO_2 generation per unit of energy production as far as practical.	During detailed design
AQ02	Operational odour emissions	Detailed design to confirm through odour modelling, that the final design achieves odour modelling performance requirements in this EIS.	During detailed design

ID	Potential impact	Mitigation measure	Timing
AQ03	Construction dust	Include the following measures in the project's CEMP: • maintain equipment in good working order to comply with the Clean Air Regulations of the POEO Act, having appropriate exhaust pollution controls, and meeting Australian Standards for exhaust emissions • carry out dust suppression on exposed areas and stockpiles using a non-drinking water source, where possible • cover exposed areas or stockpiles when high wind conditions are expected and if expected to be left exposed for more than 20 days (for example with tarpaulins or geotextile fabric) • modify or cease dust-generating work in windy conditions, where possible • maximise distance of dust-generating activities from sensitive receivers, where possible.	Prior to and during construction
AQ04	Operational odour emissions	Operate odour control unit on site. Manage odour complaints in accordance with Sydney Water's existing management system processes.	During operation

Noise and vibration

13 Noise and vibration

This chapter summarises the assessment of potential construction and operation noise and vibration impacts as provided in the Noise and Vibration Impact Assessment (AECOM, 2025) (Appendix N).

The assessment considered the existing noise of the areas surrounding the project and potential noise impacts associated with the project's construction and operation. Construction of the WRRF and upgrades to the Camellia pumping station are unlikely to exceed noise management levels (NML). However, works associated with the installation of pipelines (e.g. open trenching, HDD and compound operation) exceed NML at receivers around Silverwater and Newington during both standard and out of hours. Implementation of best practice mitigation measures would minimise noise impacts and disruption to affected residences. The operation of the Camellia-Rosehill WRRF and associated infrastructure would not exceed noise criteria for existing receivers.

13.1 Secretary's Environmental Assessment Requirements

Table 13-1 lists the SEARs relevant to noise and vibration and where they have been addressed.

Table 13-1: Project SEARs relating to noise and vibration impacts

SEARs	EIS section where requirement addressed
1. The assessment of construction noise and vibration must:	
a) identify and justify all noise monitoring locations used to determine the construction Noise Management Levels and construction Rating Background Levels	Section 13.2.4 Section 13.3
b) identify the relevant construction scenarios (both surface and below ground) for assessment considering, but not limited to, time of day, duration, annoying characteristics, and noise (both air and ground borne) and vibration levels	Section 13.4.1
c) identify noise (both air and ground borne) and vibration impacts resulting from work proposed to be undertaken outside of standard construction hours. The location, duration, type of activity and justification (consistent with ICNG requirements) must be provided	Section 13.4.1
d) identify predicted noise (both air and ground borne) and vibration levels, and provide noise and vibration contour maps for potentially affected receivers	Appendix N
e) assess and justify the potential noise (both air and ground borne) and vibration impacts	Section 13.4

SEARs		EIS section where requirement addressed
f)	identify and assess the potential vibration impacts on Aboriginal places and environmental heritage (including heritage items)	Section 13.3.1 Section 13.4.3
g)	assess noise generated by construction traffic on public roads and entering and exiting fixed facilities and construction works zones, including noise generated by idling heavy vehicles and consideration of road geometry	Section 13.4.2
h)	identify and justify potential mitigation to be applied, including but not limited to learning(s) from previous projects, case studies and identification of good practice to manage noise and vibration impacts relevant to the proposed construction activities	Section 13.4.1 Section 13.6
i)	identify and assess the predicted effectiveness of mitigation measures including the effect on noise (both air and ground borne) and vibrations levels, time of day and duration	Section 13.4.1
j)	identify potential residual noise and vibration impacts following application of mitigation measures	Section 13.4
k)	demonstrate how community consultation has informed the development of noise and vibration mitigation measures including how out-of-hours works has been socialised with the affected community	Section 13.4.1
l)	consider cumulative noise and vibration impacts from the project, including concurrent and consecutive construction activities within the project boundary and the construction of other projects in the vicinity of the project	Section 23.4.5
m)	consider construction fatigue and how this will be managed during construction of the project, taking into account cumulative impacts particularly with other SSI projects such Sydney Metro West and Parramatta Light Rail Stage 2.	Section 23.4.5 Section 23.4.9
2.	The assessment of Operational noise and vibration must:	
a)	define and justify all operational assessment scenarios and activities, including additional noise from new and upgraded pumping stations	Section 13.5
b)	demonstrate and validate the performance of the noise or vibration model used	Section 13.5
c)	include the selection criteria / methodology and justification for monitoring locations with specific reference to locations indicative of potential impacts	Section 13.2.4 Section 13.3
d)	identify all sensitive receivers that exceed the relevant operational triggers / criteria which may qualify for mitigation	Section 13.5

SEARs	EIS section where requirement addressed
e) present predicted noise levels, and noise contour maps for all potentially affected receivers	Figure 13-2 Figure 13-3
f) identify, assess and justify conceptual mitigation measures to be implemented	Section 13.6
g) identify all affected receivers with residual impacts after the implementation of the conceptual mitigation measures.	Section 13.5
3. The process for community engagement should be included or referenced in the noise and vibration assessment as part of the mitigation strategy and assessment.	Section 13.6

13.2 Assessment methodology

The scope of the assessment included:

- identifying the nearest sensitive receivers likely to be impacted by the construction and operation of the project and grouping similar land uses and receivers into noise catchment areas (NCAs)
- establishing existing background noise levels at each of the NCAs
- establishing construction noise management levels, operational noise trigger levels and vibration limits that would apply to the project
- predicting and assessing the projects construction noise and vibration impacts at nearby residential and other sensitive receivers. The assessment is in accordance with the NSW Interim Construction Noise Guideline (ICNG) (NSW EPA, 2009)
- predicting and assessing operational noise impacts of the project at nearby sensitive receivers, in accordance with the NSW Noise Policy for Industry (NPfI) (NSW EPA, 2017). The focus of the assessment is on the WRRF and Camellia pumping station as noise generation from the pipelines is expected to be minimal
- assessing the project's vibration impacts against the three main categories of vibration – human perception, effects on building contents and effects on structures
- assessing road traffic noise from the additional traffic movements associated with construction and operation of the project
- assessing cumulative noise impacts of the project and other nearby major projects
- recommending mitigation measures to minimise construction and operational noise.

The study area considered in this assessment was a buffer of 1000 m from the Camellia-Rosehill WRRF and the pipelines.

A quantitative assessment of the construction impacts has been undertaken for the project. To assess construction noise, noise emissions were modelled using an implementation of the Conservation of Clean Air and Water in Europe (CONCAWE) propagation algorithm with neutral meteorological conditions which is widely used and accepted to assess noise from industrial equipment.

Noise assessment criteria depend on duration, construction equipment and whether out of hours work is required and were developed in accordance with the ICNG. The ICNG sets out ways to manage impacts of construction noise on residences and other sensitive land uses. It provides assessment approaches based on the size of the construction project and identifies appropriate mitigations to minimise noise impacts.

Predicted 'worst case' construction noise levels at nearby sensitive receptors (e.g. residences, schools, hospitals, places of worship, and passive or active recreational areas) were compared to reasonable level criteria ascribed in the ICNG, or noise management levels.

Where predicted construction noise exceeds NML, the ICNG describes these receivers as 'noise affected' and all feasible and reasonable work practices should be applied to minimise the impact.

Where predicted noise levels reach or exceed 75 A weighted decibels (dB(A)), residential receivers are considered 'highly noise affected' and the proponent should, in consultation with the community, consider restrictions to the hours of construction to provide respite.

Predicted noise levels were identified for sensitive receivers and then compared against the NML, including the highly noise affected NML. These levels give an indication of the potential for the receiver to be impacted by noise. If predicted noise levels reach the NML, then management measures would be implemented to minimise the level of impact. This has formed the basis of determining the level of noise impact during construction and guides the development of management measures. The assessment used the current noise environment to develop construction noise criteria, as the future surrounding developments and projects would not be in operation during construction of the project.

To assess noise impacts from the operation of the Camellia-Rosehill WRRF noise modelling was completed using SoundPlan Version 8.2. This model was based on 1 m Digital Elevation Model (NSW Spatial Services, 2019) with a 0.75 ground absorption. Existing buildings beyond the site boundary were included in the model, as well as proposed buildings within the WRRF site. Noise emissions were predicted using an implementation of the CONCAWE propagation algorithm.

The Noise and Vibration Impact Assessment (Appendix N) includes a full description of the assessment methodology.

13.2.1 Legislative and policy context

The legislation, policies and guidelines listed in Table 13-2 were used to guide the noise and vibration impact assessment.

Table 13-2: Noise and vibration legislation, policies and guidelines

Legislation/ Policy/ Guideline	Relevance to project
NPfI (NSW EPA, 2017)	The NPfI provides guidelines for the assessment of noise impacts from the operation of an industrial development on nearby receivers. The NPfI is used to assess the project's operational noise impacts.
POEO Act POEO (Noise Control) Regulation 2017	The POEO Act is the key piece of environment legislation in NSW and administered by the Environment Protection Authority (EPA). The Act sets out provisions relating to pollution, including noise pollution which is supported by the POEO (Noise Control) Regulations.
NSW Road Noise Policy (RNP) (NSW EPA, 2011)	The RNP is used to assess operational traffic noise associated with the project.
ICNG (EPA, 2009)	The ICNG provides guidelines for the assessment and management of construction noise. The ICNG provides a range of work practices to minimise construction noise impacts.
Construction Noise and Vibration Guideline (Roads), (Transport for NSW, 2024)	This guideline is used to assess the level of impact from noise during construction of the project.
Australian Standard AS24360-2010 Guide to Noise Control on Construction, Maintenance and Demolition Sites 2010, (Standards Australia, 2010)	The guideline provides practical guidance on how to mitigate the impacts on construction noise and vibration through the application of all feasible and reasonable mitigation measures.
BS 5228-1-2009 Code of Practice for noise and vibration control on construction and open sites, (The British Standards, 2009)	The guideline is used to source sound power levels for construction equipment and assist in identifying management measures.
Assessing Vibration – a technical guideline (AVTG) (DEC NSW, 2006c)	This Australian Standard is used to source sound power levels for project construction equipment.
British Standard BS 6472: Part 1 -2008 Evaluation of human exposure to vibration in buildings (1-80Hz) (The British Standards, 2008)	The standard is used for assessing potential vibration disturbances to human occupants of buildings and building contents from project construction.
British Standard BS 7385: Part 2-1993 Evaluation and measurement of vibration in buildings Part 2 (The British Standards, 1993)	The standard is used for assessing potential structural or cosmetic damage to buildings/structures from vibration during project construction.
DIN 4150-3 (1999) Vibrations in buildings - Part 3: Effects on structures, English translation (German Standards, 1999)	The standard is used to set guideline values for vibration effects on buildings/structures (including buried pipework), including from trenchless pipeline construction.

13.2.2 Construction Activity Noise Criteria

13.2.2.1 Interim Construction Noise Guideline

The construction noise management levels for residential areas are included in Table 13-3 and for other receivers are shown in Table 13-4. The rating background level (RBL) and how this was measured for the project is described in Section 13.2.4.

Table 13-3: Interim Construction Noise Guideline residential NML

Time of day	NML	How to apply
Recommended Standard Hours: • Monday to Friday 7am to 6pm • Saturday 8am – 1pm • No work on Sundays or public holidays.	Noise Affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise.
Outside recommended standard hours	Noise Affected RBL + 5 dB	A strong justification would typically be required for works outside the recommended standard hours.

Table 13-4: Construction NML for other receivers

Land use	NML (when properties are in use) dB(A)
Education (classrooms at schools, other educational institutions and childcare centres)	External noise level, 55
Place of worship	External noise level, 55
Active recreation	65
Passive recreation (including stables)	60
Commercial	70
Industrial	75

13.2.2.2 Sleep Disturbance Criteria

When construction works are planned to extend over two consecutive nights, a sleep disturbance analysis is required. The ICNG and information from the Road Noise Policy (NSW EPA, 2011) can be used to determine the appropriate screening levels and awakening reaction levels to be applied within the assessment. Table 13-11 provides those applied to this project.

13.2.3 Operational Noise Criteria

13.2.3.1 Noise Policy for Industry

The NPfI provides guidance on the acceptable noise limits for industrial noise emissions separated into two components: intrusive noise impacts and protecting amenity.

The NPfI states that the noise from any single source should not be greatly above the prevailing background noise level. The background noise level or RBL is determined by methods provided in the policy. The NPfI considers noise sources acceptable if the sound (A-weighted equivalent continuous sound pressure measure over a 15 minute period, $L_{Aeq,\ 15\ min}$) does not exceed the RBL by more than 5 dB(A). This is the Intrusiveness Criterion.

To limit the continuing increase in noise levels in an area from increasing industrial activity the policy provides amenity noise levels that should not be exceeded. The recommended amenity levels are based on certain localities and predominant land use. Where there is existing industrial activity within a particular area the amenity level is usually set to the recommended amenity level minus 5 dB(A). This ensures that noise remains within the recommended noise level. Project noise trigger levels were considered for this assessment which is the lowest of the intrusive and amenity criteria.

As per the NPfI the operational assessment should include the potential for sleep disturbance. This considers the maximum noise likely to occur during the night. If certain screening levels as provided in the policy are exceeded a more detailed assessment is required. The detailed assessment should consider by how much the RBL is exceeded by the proposed operational noise and how many times this is likely to occur, this was determined as not required for this assessment.

13.2.4 Noise monitoring

To establish the existing ambient and background noise environment this assessment utilised noise survey results from other recent major projects in the area. Any gaps were then supplemented by long-term unattended and short term attended measurements. All monitoring equipment complied with the requirements of the Australian Standards and were within their current National Association of Testing Authorities Australia certified in calibration period.

Long-term unattended monitoring occurred at two locations (NL04 and NL05) between the 15 November and 28 November 2024. The selected monitoring locations were considered the best representation of each of the noise catchment areas (as described further in Section 13.3.1). As prescribed by the NPfI, noise levels over the sample period were analysed and adverse weather periods or extraneous noise events were excluded. Weather data from the BoM's Olympic Park weather station was used. The analysis provided a single assessment background level (ABL) for each day, evening and night period at each monitoring location. The median of all the ABLs over the monitoring period provided the background noise level or RBL for each day, evening and night period as considered in this assessment.

Attended monitoring was undertaken at all the long-term monitoring locations. This was completed during the daytime on 15 May 2024 and between 15 and28 November 2024. Each measurement was for a 15 minute period when weather conditions were fine and partly cloudy.

13.3 Existing environment

13.3.1 Sensitive receivers

Land uses adjacent to the Camellia-Rosehill WRRF are mainly industrial and commercial. The closest residential receivers to the WRRF are:

- 460 m to the south-east (Asquith Street, Silverwater)
- 875 m to the west and north-west (Jame Ruse Drive, Rosehill).

The closest non-residential receiver to the WRRF is the Rosehill Gardens Racecourse horse stables, located 620 m to the west.

Land uses adjacent to the Camellia pumping station are also industrial and commercial. The pipelines traverse through mainly urban/ suburban and industrial/commercial areas, as well as recreational spaces within these areas. In consideration of the existing land uses the study area was divided into 12 NCAs, as shown on Figure 13-1. The NCAs were developed by grouping noise sensitive receivers that were exposed to similar noise environments.

Table 13-5 lists non-residential receivers which were considered in this assessment due to their proximity to the pipelines and pumping station.

Table 13-5: Non-residential receivers in proximity of the pipelines and pumping station

Section	Non-residential receivers
Brine and transfer pipeline	• Explore and Develop Paramatta • Rosehill Bowling Club.
Brine (relined)	• WSU Early Learning Paramatta • WSU Whitlam Library • Sir Ian and Nancy Turbott Auditorium.
River release pipeline	• West Ryde Rovers Netball Club • Sydney Korean Catholic Church • RØDE • Sydney Baha'i Centre • Eastwood Ryde Netball Association • URBNSURF Sydney • Narawang Wetlands

Section	Non-residential receivers
	• Newington Nature Reserve Forest • Meadowbank Park.

The Camellia–Rosehill Place Strategy (DPE, 2022a) indicates that residential and educational developments are proposed within Camellia and Rosehill.

The closest heritage item to the WRRF is the Capral Aluminium Building located about 105 m to the north. There are 9 heritage structures and three environmental heritage items within 100 m of the pipeline alignments. These items are described in Chapter 15 (Non-Aboriginal Heritage). No registered Aboriginal Places have been identified in proximity to the project (see Chapter 16 (Aboriginal Heritage)).

13.3.2 Existing noise environment

The results of the noise monitoring indicate that the dominant noise source in the NCAs is road traffic noise. Table 13-6 provides a description of the existing noise environmental experienced by each of the NCAs.

Table 13-6: Existing noise environment

NCA	Logger location	Noise environment	Relevant project element
1	Kissing Point Road, Dundas	Residential receivers. Dominated by traffic noise on Kissing Point Road.	Brine pipeline (relining)
2	Rippon Ave, Dundas	Residential receivers. Distant road traffic noise is constant. Local traffic and natural sounds such as birds are also audible.	Brine pipeline (relining)
3	Hope Street, Rosehill	Residential receivers. Dominated by traffic noise on James Ruse Drive. Also, local traffic noise from Hope Street.	Pumping station Brine and transfer pipeline
4	Eleanor St, Rosehill	Residential receivers. Local traffic and bird noise audible.	Brine and transfer pipeline WRRF
5	Asquith Street, Silverwater	Mostly commercial and industrial receivers. Some residential receivers. Dominated by local traffic noise. Occasional aircraft noise.	WRRF River release pipeline
6	Carnarvon Street, Silverwater	Mostly commercial and industrial receivers. Dominated by road traffic noise on Carnarvon Street and Silverwater Road to the south. Industrial noise also contributes to the noise levels.	River release pipeline

NCA	Logger location	Noise environment	Relevant project element
7	Comaneci Avenue, Newington	Residential receivers. Very distant road traffic noise is audible. Local traffic and natural sounds such as birds are also audible.	River release pipeline
8	Hill Road, Wentworth Point	Residential and recreational receivers. Dominated by traffic noise on Hill Road.	River release pipeline
9	Hill Road, Wenworth Point	Residential receivers. Dominated by traffic noise on Hill Road. Noise from boat horns and wharf area also audible.	River release pipeline
10	Lancaster Avenue, Melrose Park	Residential and recreational receivers. Dominated by distant road traffic noise along with natural sounds such as birds and distant aircraft and marine craft noise.	River release pipeline
11 & 12	Meadow Crescent, Meadowbank	Residential and recreational receivers. Distant road traffic noise is audible. Occasional local traffic is also audible. Natural sounds such as birds are dominant.	River release structure

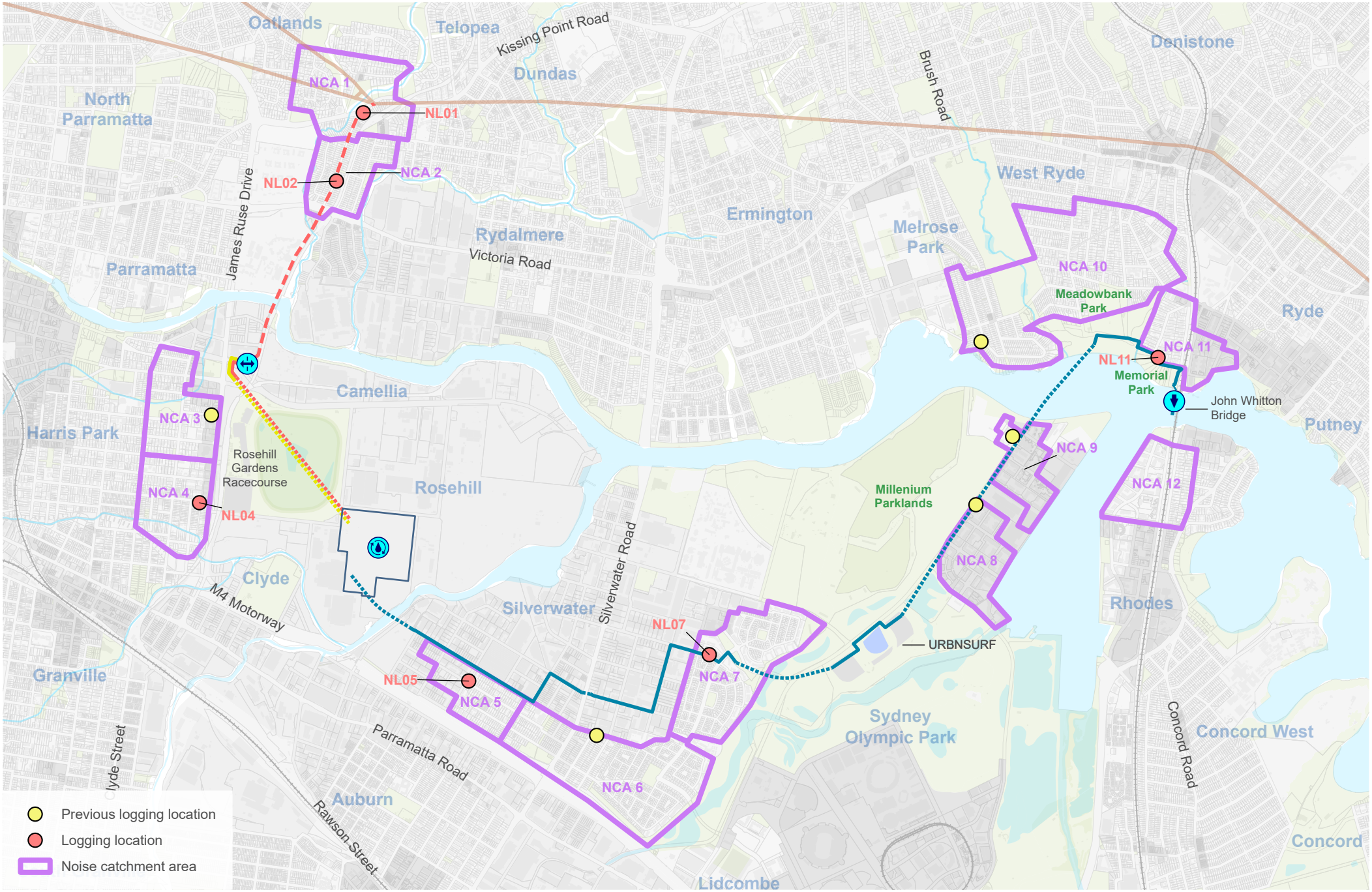


Figure 13-1 Noise catchment areas and logger locations

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:32,000 @ A4
GDA2020 MGA Zone 56

13.4 Construction impacts

13.4.1 Residential and other receivers

To assess the construction noise impacts, a noise model which included seven construction scenarios was created. Relevant plant and equipment as described in Chapter 3 (Project Description) were then assigned to each scenario with a corresponding sound power level (SPL). The SPL for each noise source was adopted from the following:

- Australian Standard AS:2436-2010 Guide to noise and vibration control on construction, demolition and maintenance sites (Standards Australia, 2010)
- British Standard 5228: Part 12009 Code of practice for noise and vibration control on construction and open sites, Part 1: Noise, 2009 (including Amendment 1, 2014) (The British Standard, 2009)
- Construction Noise and Vibration Guideline – Roads (Transport for NSW, 2024).

Feedback from potentially affected residences and businesses shaped the construction scenarios. This feedback included a general preference for nightworks along Carnarvon Street to limit access issues to business premises.

The scenarios also considered a reasonable worst case of how the works would be completed. This included where OOHW would be necessary to facilitate construction e.g. night time trenching works to minimise traffic and access issues along busy streets (as mentioned above), or continuous HDD for engineering purposes. The remaining construction activities were modelled during standard hours.

Generally, the scenarios were modelled using the noisiest piece of equipment/plant for that scenario. Scenario 4 (HDD construction) modelled each drilling site with various continuous point noise sources. This approach is considered more representative of the actual construction noise levels, compared to the more conservative approach of modelling all the equipment for each scenario. A summary of these construction scenarios and relevant information included in the model is provided in Table 13-7.

Table 13-7: Summary of modelled scenarios

Scenario ID	Scenario description	Modelled equipment	SPL	Construction Hours
1	Construction Compounds	Backhoe	111	Standard hours OOHW likely for compound 23
2	Construction of the WRRF	Piling rig – bored	112	Standard hours OOHW (for oversized deliveries and concrete pours)

Scenario ID	Scenario description	Modelled equipment	SPL	Construction Hours
3	Pipeline construction – open trenching	Concrete saw	112	Standard hours OOHW at: • Grand Avenue, Camellia • Carnarvon Street, Silverwater • Hill Road, Sydney Olympic Park
4	Pipeline construction - HDD	HDD machine Mud Mixer and pump Road Truck Generator	105 108 108 103	Standard hours and OOHW (24 hour operation)
5	Relining works	Generator	103	Standard hours OOHW required at: • Kissing Point Road, Dundas • Victoria Road, Rydalmere
6	Camellia pump station upgrades	Concrete saw	112	Standard hours
7	Construction of the river release structure	Truck and dog	102	Standard hours OOHW (two 24 hour weekends)

The results of the construction noise modelling are a worst case as it is unlikely that the noisiest plant/equipment selected would be operating for the entire duration as it has been modelled. Therefore, it is likely that the experienced noise levels during construction would be lower than those presented.

Table 13-8 and Table 13-9 provide the construction noise modelling results for residential receivers during standard hours and OOHW respectively.

Table 13-8: Number of noise affected residences during standard hours

NCA	NML	Predicted number of noise affected residences during standard hours			
		Level of exceedance			Highly affected
		1-10 dB(A)	10-20 dB(A)	>20 dB(A)	75 dB(A)
Scenario 1: Construction compounds					
NCA 1-2	49 - 63	No exceedances			
NCA 3	61	0	1	0	1
NCA 4-5	61-62	No exceedances			
NCA 6	56	71	41	10	18
NCA 7	49	125	122	55	24
NCA 8-9	63, 58	No exceedances			
NCA 10	47	174	10	0	0
NCA 11	51	27	16	8	6
NCA 12	51	6	0	0	0
Scenario 2: Construction of the WRRF					
NCA 1-12	47-63	No exceedances			
Scenario 3: Pipeline construction – open trenching					
NCA 1-2	49-63	No exceedances			
NCA 3	61	1	0	0	0
NCA 4	62	No exceedances			
NCA 5	61	3	0	0	0
NCA 6	56	5	3	0	0
NCA 7	49	121	46	39	22
NCA 8-9	63, 58	No exceedances			

NCA	NML	Predicted number of noise affected residences during standard hours			
		Level of exceedance			Highly affected
		1-10 dB(A)	10-20 dB(A)	>20 dB(A)	75 dB(A)
NCA 10	47	52	0	0	0
NCA 11	51	34	11	10	10
NCA 12	51	5	0	0	0
Scenario 4: Pipeline Construction - HDD					
NCA 1-2	49-63	No exceedances			
NCA 3	61	1	0	0	0
NCA 4-6	56-62	No exceedances			
NCA 7	49	18	6	1	0
NCA 8-9	58-63	No exceedances			
NCA 10	47	3	0	0	0
NCA 11 -12	51	No exceedances			
Scenario 5: Relining works					
NCA 1	63	17	0	0	0
NCA 2	49	20	44	21	2
NCA 3-12	47-63	No exceedances			
Scenario 6: Camellia pump station upgrades					
NCA 1-2	49-63	No exceedances			
NCA 3	61	1	0	0	0
NCA 4-12	47-62	No exceedances			
Scenario 7: Construction of the river release structure					
NCA 1-10	47-63	No exceedances			

NCA	NML	Predicted number of noise affected residences during standard hours			
		Level of exceedance			Highly affected
		1-10 dB(A)	10-20 dB(A)	>20 dB(A)	75 dB(A)
NCA 11	51	9	0	0	0
NCA 12	51	No exceedances			

Table 13-9: Number of noise affected residences during out of hours work

NCA	NML	Predicted number of noise affected residences during OOHW			
		Level of exceedance			
		1-5 dB(A)	6-15 dB(A)	16-25 dB(A)	>25 dB(A)
Scenario 1: Construction compounds (compound 23 only)					
NCA 1-4	39-47	No exceedances			
NCA 5	50	4	0	0	0
NCA 6	46	53	98	30	14
NCA 7	35	21	12	0	0
NCA 8-12	35-43	No exceedances			
Scenario 2: Construction of the WRRF					
NCA 1-12	47-63	No exceedances			
Scenario 3: Pipeline construction – open trenching					
NCA 1-2	39,41	No exceedances			
NCA 3	45	71	23	1	0
NCA 4	47	No exceedances			
NCA 5	50	42	48	9	21
NCA 6	46	27	16	6	2
NCA 7	35	109	103	0	0
NCA 8	41	9	1	0	0

NCA	NML	Predicted number of noise affected residences during OOHW Level of exceedance			
		1-5 dB(A)	6-15 dB(A)	16-25 dB(A)	>25 dB(A)
NCA 9 - 12	35-43	No exceedances			
Scenario 4: Pipeline Construction - HDD					
NCA 1-2	39,41	No exceedances			
NCA 3	45	24	0	1	0
NCA 5-6	58 -63	No exceedances			
NCA 7	35	66	47	19	5
NCA 8	41	7	0	0	0
NCA 9	43	4	0	0	0
NCA 10	37	93	47	0	0
NCA 11	35	14	22	0	0
NCA 12	35	9	11	0	0
Scenario 5: Relining works					
NCA 1	39	3	6	0	0
NCA 2	41	4	3	1	1
NCA 3-12	47-63	No exceedances			
Scenario 6: Camellia pump station upgrades					
NCA 1-12	47-63	No exceedances			
Scenario 7: Construction of the river release structure					
NCA 1-10	47-63	No exceedances			
NCA 11	35	7	16	12	1
NCA 12	35	19	22	0	0

Table 13-10 provides the construction noise modelling results for non-residential receivers for all scenarios when in use.

Table 13-10: Number of noise-affected non-residential properties

Scenario ID	Scenario description	Number of noise affected non-residential properties Level of exceedance when in use		
		1-10 dB(A)	10-20 dB(A)	>20 dB(A)
1	Construction Compounds	3	4	3
2	Construction of the WRRF	No exceedances		
3	Pipeline construction – open trenching	7	2	
4	Pipeline construction - HDD	No exceedances		
5	Relining works	1	2	1
6	Camellia pump station upgrades	No exceedances		
7	Construction of the river release structure	No exceedances		

The results show that construction noise levels would not exceed the NML during the construction of the WRRF (scenario 2). However, during the installation of the pipelines (open trenching, HDD, compounds and construction of the river release structure) associated construction noise is expected to exceed NML during standard and OOHW. Construction noise associated with the Camellia pumping station works is expected to exceed NML at one residence during standard hours.

'Highly noise affected' residential receivers are predicted as a result of trenching and relining activities and use of compounds. The largest number of 'highly noise affected' residential properties occur in NCA 7. As noted above, the results of the noise modelling are considered conservative. Modelling included noisy equipment as operating for sustained periods, which is unlikely to occur. However, this allows for the implementation of robust mitigations as provided in Table 13-16. In accordance with the ICNG, Sydney Water would continue to consult with these residences and consider additional mitigations including respite periods in this area.

Open trenching (particularly the use of the concrete saw) is expected to impact the most residences at night, with residences in NCAs 3, 5, 6 and 7 being the most impacted. HDD would also impact a number of residences mainly in NCA 7.

The results show that for non-residential properties, no exceedances are expected as a result of the construction of the WRRF or upgrades to the pumping station. Four non-residential properties are expected to experience NML exceedances greater than 20 dB(A) including West Ryde Rovers Netball Club, two buildings associated with the Sydney Korean Catholic Church (associated with compound operation) and WSU Early Learning Parramatta.

Other non-residential properties expected to be impacted by exceedances less than 20 dB(A) include Sydney Baha'i Centre, Explore and Develop Parramatta, Rosehill Bowling Club, Eastwood Ryde Netball Association, URBNSURF Sydney, Meadowbank Park, WSU Whitlam Library and Sir Ian and Nancy Turbott Auditorium.

These results are representative of the worst case 15-minute period of construction works. Due to modelling limitations, they are not reflective of the general operation of the work site. Modelling also does not consider the progressive nature of works and that the number of impacted properties shown are not going to be impacted all at the same time.

It is anticipated at its slowest progression open trenching would move at a rate of approximately 10 m per day. The results show during the project open trenching would impact 487 receivers outside standard hours and 329 impacted within standard hours, 32 being 'highly noise affected'. However, considering the rate of trenching, it is more likely that receivers would have a varied impact for a period of 10 weeks. For those 'highly noise affected' noise would increase as trenching approaches then remain above 75 dB(A) for three to five days while the work is in front of the receiver. It would then subside at the works move away. These durations could be reduced where works progress at a rate of 25 m per day.

Particularly noisy activities (e.g. use of the concrete saw) would only occur in short bursts, rather than the entire work shift as the model currently assumes. Considering the potential shielding from site sheds or other buildings, it is likely that the experienced noise level could be 5-10 dB(A) less than what has been predicted in this assessment. No noise barriers were applied to the noise model which could further reduce noise levels by 5-10 dB(A).

A Construction Noise and Vibration Management Plan would be prepared for the construction works. The CEMP would provide all feasible and reasonable mitigation measures to be implemented.

As the works are proposed to extend over two nights a sleep disturbance assessment was completed. Table 13-11 shows the number of residential properties where the predicted noise levels exceed the sleep disturbance criteria and the sleep awakening reaction criteria. Scenarios (2 and 6) and NCAs with no exceedances have been omitted.

Table 13-11: Sleep disturbance criteria, awakening reaction criteria and predicted exceedances

NCA	Sleep disturbance criteria, dB(A)	Awakening reaction criteria, dB(A)	Number of residential properties where the criteria are exceeded	
			Sleep disturbance	Awakening reaction
Scenario 1: Construction compounds (compound 23 only)				
NCA 6	56	65	175	65
NCA 7	45	65	23	0
Scenario 3: Pipeline construction – open trenching				
NCA 3	55	65	66	1
NCA 5	60	65	102	65
NCA 6	56	65	30	10
NCA 7	45	65	162	0
NCA 8	51	65	7	0
Scenario 4: Pipeline Construction - HDD				
NCA 3	55	65	6	1
NCA 7	45	65	99	14
NCA 8	51	65	1	0
NCA 10	47	65	109	0
NCA 11	45	65	32	0
NCA 12	45	65	15	0
Scenario 5: Relining works				
NCA 1	49	65	7	0
NCA 2	51	65	7	2
Scenario 7: Construction of the river release structure				
NCA 11	45	65	34	4

NCA	Sleep disturbance criteria, dB(A)	Awakening reaction criteria, dB(A)	Number of residential properties where the criteria are exceeded	
			Sleep disturbance	Awakening reaction
NCA 12	45	65	33	0

Several exceedances of both criteria have been predicted in NCA 3, 5, 6 and 7. This is due to the proximity of open trenching works. Chapter 5 (Engagement) provides a description of the consultation undertaken to date with potentially impacted residences and businesses. Given the number of exceedances effective communication would be continued throughout the duration of the project to minimise impacts on affected residences.

Sydney Water plans to implement best practice mitigation measures used on recent and similar large construction projects (e.g. Upper South Creek Advanced Water Recycling Centre Project and Sydney Metro West Stage 1) which were considered effective at minimising noise and vibration impacts by up to 15 dB. Mitigations include robust consultation with the community which would ensure works do not happen unexpectedly. Residents would be able to plan around proposed works to minimise disruptions and would understand the complaint management process.

Cumulative noise impacts are discussed in Chapter 23 (Cumulative Impacts).

13.4.2 Construction traffic noise

Increased traffic generated on the public road network is assessed in accordance with the NSW Road Noise Policy (NSW EPA, 2011). When assessing noise impact on the existing road network, an initial screening test evaluates whether noise levels are expected to increase by more than 2 dB(A) due to the additional traffic generated by the proposed development. Where expected noise level increase is 2dB(A) or less, then no further assessment is required. Should the expected noise levels be greater and exceeds the road category specific criterion, then noise mitigations should be implemented. The Road Noise Policy does not require assessment for commercial and/or industrial receivers.

The assessment of noise from construction traffic used information consistent with the Traffic and Transport Impact Assessment (Appendix O).

During standard hours 15 heavy vehicle movements per hour has been estimated for the construction of the WRRF and would only occasionally require movements outside standard hours. Vehicles would access the site via James Ruse Drive, Grand Avenue, Colquhoun Street and Unwin Street (or Devon) or Parramatta Road, Wentworth Street to Unwin Street. Traffic would also depart using these same routes as no other routes are available.

As detailed above the closest receivers to the WRRF are residences on James Ruse Drive and the Rosehill Gardens Racecourse (horse stables). Therefore, the focus of the construction traffic noise assessment was on James Ruse Drive and Unwin Street. The existing traffic flows along James Ruse Drive and Unwin Street are substantially greater than the proposed construction traffic numbers.

The predicted construction traffic noise values were assessed to be consistent with the existing noise levels and do not cause an increase of 2 dB(A) or more. Overall, noise from construction traffic from the WRRF is negligible.

For works along the pipeline routes estimates for the heavy vehicle movements are 20 per day. In the wider project area work sites would be accessed via a mix of arterial and quieter residential (local) roads. Construction traffic on arterial roads would have a negligible impact. Impacts on local roads would be higher due to lower background noise levels. The assessment concluded that the volume of construction traffic required for the whole project is unlikely to increase the noise level by more than 2 dB(A) and would therefore have a negligible impact. Impacts can be adequately managed through the implementation of the management measures in Section 13.6.

13.4.3 Construction vibration

As there are no current Australian Standards for the assessment of structural damage caused by vibration, this assessment refers to the German Standard (DIN 4150). The German Standard provides the recommended maximum levels of vibration to minimise the likelihood of structural damage. However, the standard notes that buildings exposed to higher levels than the recommended maximum would not necessarily result in damage.

The assessment of tactile vibration was in accordance with Assessing Vibration: A Technical Guideline (DEC NSW, 2006c). The guideline references vibration dose value, which is the accumulated vibration energy during the daytime and nighttime periods. The vibration dose value corresponds to the likelihood that a person would be annoyed by the level of vibration over the construction period.

Construction of the project would require vibration intensive activities associated with the use of vibratory rollers, hydraulic hammers or piling rigs. This has the potential to damage surrounding infrastructure as a result of vibration and low frequency noise. The Construction and Vibration Guideline (Roads) (Transport for NSW, 2024) provides recommended minimum working distances for such plant and machinery. If these distances are adhered to no adverse impacts to structural or cosmetic building damage and human response are predicted. The minimum working distances for various equipment likely to be used during construction are provided in Table 13-12.

Structural impacts from vibration of construction equipment would depend on the proximity of the work to buildings and structures, as well as the material, condition and dynamic characteristics of the structure. Vibration impacts to buildings and structures from construction of the project are unlikely, due to the type of machinery proposed and the distances from the works to sensitive receivers. Most construction within the vicinity of structures or receivers that could be affected by vibration is via open trenching which limits vibration generation. Pipelines are also generally located along roadways in urbanised areas, located at a distance from private properties.

Table 13-12: Minimum working distances for vibratory equipment

		Cosmetic Damage (m)		
Plant	**Rating/ description**	**Residential/ commercial**	**Heritage and other sensitive structures**	**Human Response (m)**
Vibratory Roller	< 50 kN (typically 1-2 t)	5	14	15
	< 100 kN (typically 2-4 t)	6	16	20
	< 200 kN (typically 4-6 t)	12	33	40
	< 300 kN (typically 7-13 t)	15	41	100
	< 300 kN (typically 13-18 t)	20	54	100
	< 300 kN (> 18t)	25	68	100
Small hydraulic hammer	300 kg – 5 to 12 t excavator	2	5	7
Pile boring	≤ 800m	2 (nominal)	40	4

Heritage items and their proximity to the impact area of the project is shown in Table 13-13. These items are mapped and discussed further in Chapter 15 (Non-Aboriginal Heritage).

Table 13-13: Proximity of heritage items and likelihood of vibration impacts

Heritage	Register (ID)	Distance to the impact area (m)	Likelihood of Impact
Dundas Railway Station Group	Parramatta LEP (I054) SHR (01133)	92	Unlikely to be impacted.
WSU Parramatta Campus (formerly Rydalmere Hospital Precinct)	Parramatta LEP (I6661) SHR (00749)	0	Unlikely to be impacted.
Clyde Carlingford Rail Bridge abutments	Parramatta LEP (I008 and I695)	15	Unlikely to be impacted if 1-2t rollers are used.
Grave of Eliner Magee and child	Parramatta LEP (I007)	50	Unlikely to be impacted if vibratory rollers sized 13t or lower are used.

Heritage	Register (ID)	Distance to the impact area (m)	Likelihood of Impact
Sewage Pumping Station 67 (Camellia pumping station, part of the project)	Parramatta LEP (I009) SHR (01643)	0	Part of the project. Vibration associated with works are unlikely to impact heritage brick superstructure.
Capral Aluminum	Parramatta LEP (I677)	105	Unlikely to be impacted. Outside area of vibration impact.
Lower Duck River Wetlands	Parramatta LEP (I702)	67	Unlikely to be impacted. Outside area of vibration impact.
Wetlands	Parramatta LEP (I011)	0	Part of the project. This section is to be trenchless and vibration is unlikely to impact the wetlands.
Ernest Fleming Pty Ltd, machinery merchants	Parramatta LEP (I703)	30	Unlikely to be impacted if vibratory rollers sized 4t or lower are used.
Explosives Store	Parramatta LEP (I291)	55	Unlikely to be impacted.
Newington Armament Depot and Nature Reserve	SHR (01850)	66	Unlikely to be impacted if vibratory rollers sized 18t or lower are used.
Memorial Park (including obelisk) and remnants of former Meadowbank baths	Parramatta LEP (I072)	0	May be impacted by works in this area. Undertake vibration monitoring.
Meadowbank rail bridge over Parramatta River	Ryde LEP (I056) SHR (01189)	5	May be impacted by works in this area. Undertake vibration monitoring.

It is recommended when construction is located within the minimum distances, smaller plant is selected to reduce the likelihood of vibration impacts. Where this is not reasonable or feasible, vibration monitoring to determine the site specific minimum distances should be undertaken. For any structures still remaining within the site specific minimum distances the following would occur:

- condition survey before and after vibration intensive works
- vibration monitoring during vibration intensive activities. The vibration monitor should notify the work supervisor when vibration levels reach or exceed the criteria.

13.5 Operational impacts

Operational noise impacts are assessed in accordance with the NPfI, which is primarily concerned with controlling short-term intrusive noise impacts for residences and maintaining long-term noise level amenity for residences and other land uses. Potential for sleep disturbance is also assessed for residential locations during the night period.

During operation, the pipelines are underground, and the only components with potential to generate noise are the valves along the pipelines. Noise from pipeline valves would only occur if there were a malfunction which is not part of their standard operation. Associated noise from operation of the pipelines is therefore considered negligible.

The assessment focused on the operation of the WRRF and the pumping station and considered that these would operate 24 hours per day. The following equipment and activities at the Camellia-Rosehill WRRF have the potential to generate noise during operation:

- pump stations
- biosolids outloading
- vehicles
- advanced water treatment
- odour control fans.

The noise sources, their location and associated SPL for the WRRF and upgraded pumping station are included in the Noise and Vibration Impact Assessment (Appendix N). Noise sources included pumps, blowers, centrifuges, fans and conveyors operating continuously (24/7) at both sites. The operational noise was predicted under neutral and adverse weather conditions during the night time. The night time scenario was selected for the modelling as this was considered representative of the worst case.

The predicted noise levels were then compared to the trigger levels and sleep disturbance screening levels provided in Table 13-14 and Table 13-15. NCA 3, 4 and 5 are the only catchments relevant to the operation of the WRRF and pumping station.

Table 13-14: Operational noise trigger levels

NCA	Time	Trigger Level dB(A)	Compliance
3	Day	56	Yes
	Evening	48	Yes
	Night	43	Yes
4	Day	57	Yes
	Evening	48	Yes

NCA	Time	Trigger Level dB(A)	Compliance
	Night	43	Yes
5	Day	56	Yes
	Evening	48	Yes
	Night	43	Yes
School	Nosiest 1 hr when in use	43	Yes
Place of Worship	When in use	48	Yes
Commercial premises	When in use	63	Yes
Active Recreation Area	When in use	53	Yes

Table 13-15: Sleep disturbance screening levels

NCA	RBL (night time)	Sleep disturbance screening levels		Compliance
		LAeq15min dB(A)	LAFmax dB(A)	
3	40	45	55	Yes
4	42	47	57	Yes
5	45	50	60	Yes

The results of the modelling are presented as contour plots in Figure 13-2 and Figure 13-3. For the operation of the WRRF the predicted noise levels did not exceed trigger levels. The operational noise levels also complied with the sleep disturbance criterion.

The predicted noise levels for the upgraded pumping station were found to be consistent with the current operational noise levels. The current operation of the pumping station does not impact on any local receivers. However, modelling included receivers proposed in the Camellia-Rosehill Place Strategy (DPE, 2022b) which showed that the current operation would exceed the noise criteria by 8 dB(A). Consequently, the upgraded pumping station would also exceed the noise criteria (8 dB(A)).

Future mitigation treatments to the pumping station may be required if the residential development proposed in the Strategy is adopted. Several options are available to reduce exceedances to zero. These include replacing the roller door on the western side of the pumping station with an acoustic roller door, and/or keeping the windows on the western and northern side of the pumping station closed. Sydney Water would continue to engage with DPHI regarding the plans for the precinct and would implement additional mitigation if needed.

That would be separate to this project and undertaken as part of Sydney Water's maintenance of the upgraded pumping station.

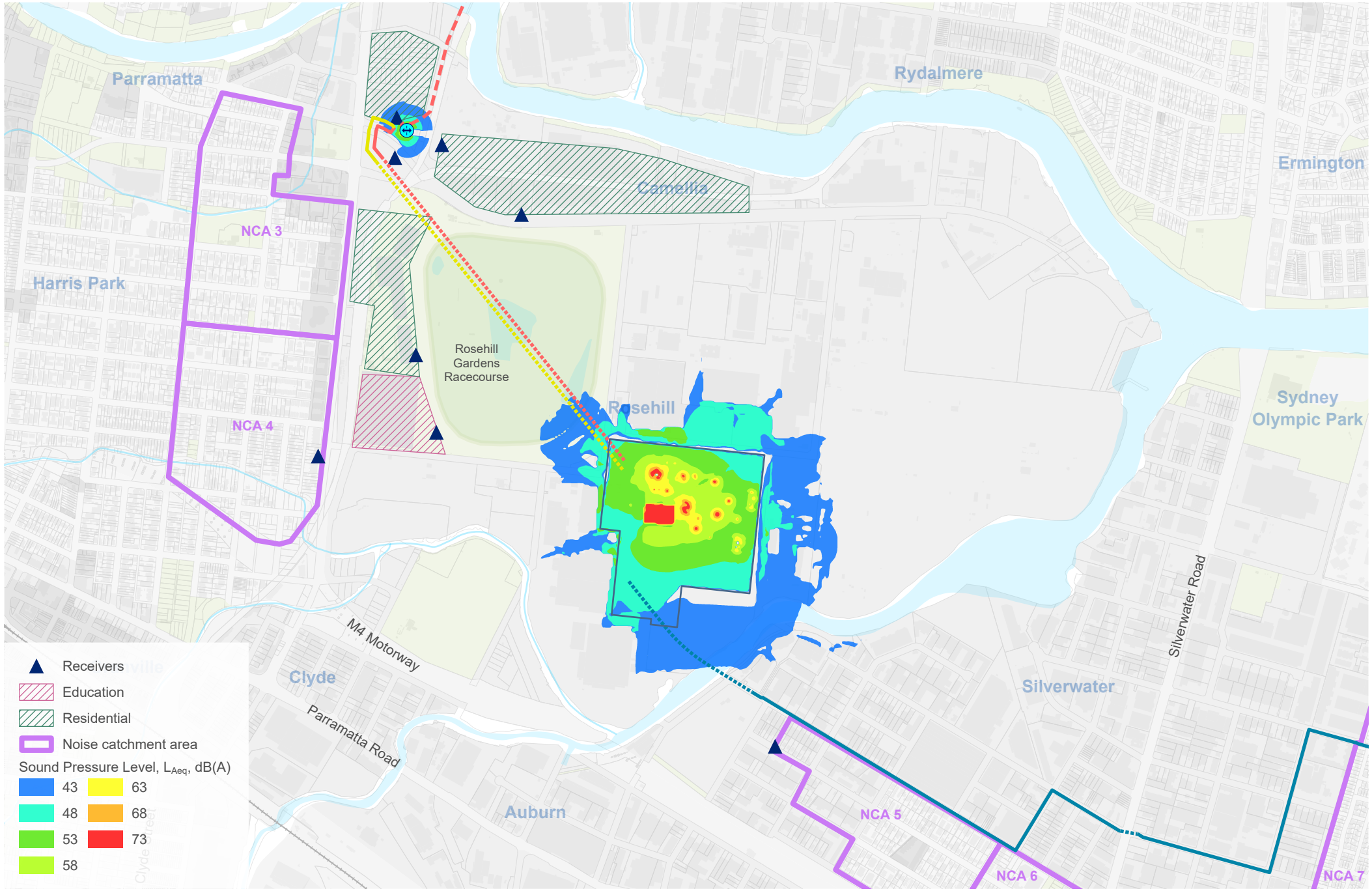


Figure 13-2 Night time noise contours (neutral weather)

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:15,000 @ A4
GDA2020 MGA Zone 56

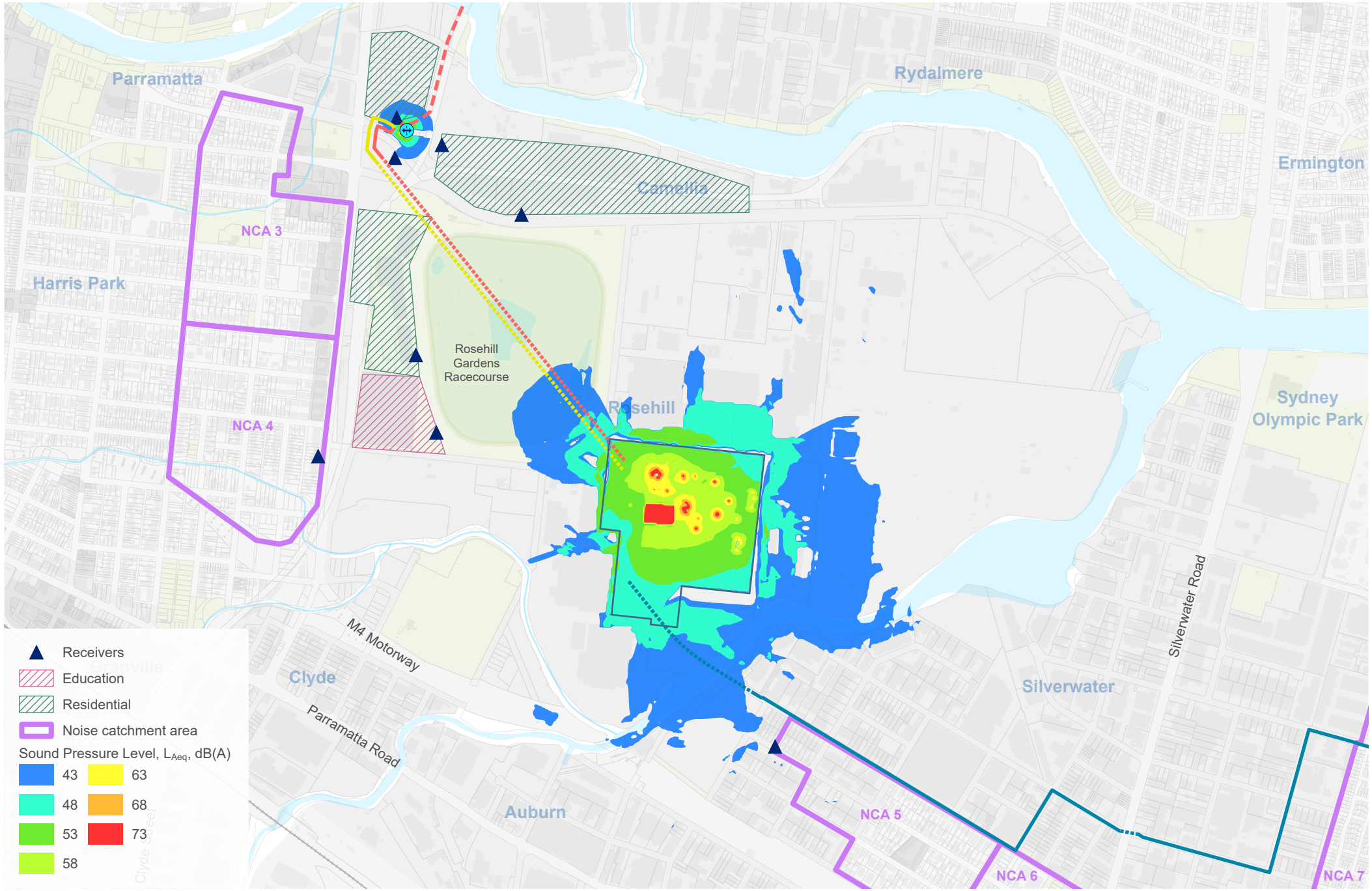


Figure 13-3 Night time noise contours (adverse weather)

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:15,000 @ A4
GDA2020 MGA Zone 56

13.5.1 Operational traffic

Traffic generated during operation of the WRRF would be minimal. The likely operational traffic required by the WRRF is expected to be around 14 light vehicles and 10 heavy vehicles per day. Most vehicle movements are expected to occur during standard hours, with the potential for some infrequent out of hours visits associated with emergency or unplanned maintenance. The existing traffic flows along Unwin Street and Colquhoun Street are substantially greater than the operational WRRF traffic, and therefore operational traffic noise is expected to have only a minor impact on existing traffic noise levels.

Traffic required during operation of the pumping station and pipelines are expected to be infrequent and minimal (one vehicle or less per day) and associated with inspections and maintenance. Impacts to noise would be negligible.

13.6 Mitigation measures

Sydney Water has focused on the following objectives when developing and designing management measures for noise and vibration impacts:

- undertaking works and associated activities in a manner that minimises noise and vibration impacts on sensitive receivers
- minimising unreasonable noise and vibration impacts on residences and businesses
- avoiding cosmetic and structural damage to buildings, structures and/or heritage items
- undertaking active community consultation
- maintaining positive, cooperative relationships with local residences, building owners and businesses including childcare centres.

Table 13-16 outlines the noise and vibration management measures Sydney Water would implement during construction and operation of the project. These measures were considered effective on similar Sydney Water projects and the implementation of these measures, including the use of barriers or quieter machinery could result in a reduction of noise levels by up to 10 dB(A).

Table 13-16: Noise and vibration mitigation measures

ID	Potential impact	Mitigation measure	Timing
NV01	Excessive noise generated during construction	Prepare a Construction Noise and Vibration Management Plan (CNVMP) as part of the project CEMP. This will include: • roles and responsibilities • noise sensitive receiver locations • standard working hours and OOHW processes • reasonable and feasible management measures (including respite consideration) • monitoring methodology • community engagement.	Prior to and during construction
NV02	Excessive noise generated during construction	Develop and implement a Community and Stakeholder Engagement Plan (CSEP) that will outline the following: • ongoing consultation with landowners, stakeholders, local councils, businesses and other relevant government agencies • notification of construction impacts to local areas and how these will be managed • project updates to nearby communities, including information on positive impacts and long-term project benefits • process for community complaints and response management system • a dedicated 1800 toll free number for enquiries • a dedicated email address and website for the project • resident notifications regarding: – start of construction – significant milestones – major detours, traffic disruptions and controls – after hours work • communication of key messages in a range of languages • vehicle management signs to communicate traffic changes to road users and communicate traffic management plans. For affected sensitive receivers (such as childcare centres, places of worship and businesses) specific community engagement should be	Prior to and during construction

ID	Potential impact	Mitigation measure	Timing
		undertaken to understand noise sensitive times to avoid high noise generating works during sensitive periods or inclusion of respite periods.	
NV03	Vibration from construction equipment results in impacts to structures	Complete dilapidation and condition surveys on infrastructure and structures at risk from being damaged by vibration during construction, including heritage items.	During detailed design Prior to and during construction
NV04	Equipment selection during construction generates excessive noise	Select equipment to minimise noise emissions. For example: • select equipment with lower noise emissions than alternative equipment • use electric/ hydraulic equipment where possible. Use the minimum size and power requirement to complete a task.	Prior to and during construction
NV05	Placement of construction equipment results in noise impacts	Arrange construction equipment to minimise noise to any nearby sensitive receivers. For example: • maximise the distance between noisy plant and any adjacent sensitive noisy receivers, including directing noise emitting plant away from sensitive receivers • throttle down or shut down equipment when not in use • where possible shield or enclose stationary noise sources whilst maintaining worker safety • where possible, place or orient structures or hoarding/noise curtains at particularly noisy compounds to shield residential receivers where possible (e.g. compounds where trenchless works will be undertaken for particularly long durations).	Prior to and during construction
NV06	Out of hours works (OOHW) results in sleep disturbance of sensitive receivers	Consult with residents that will be impacted by OOHW about measures to manage impacts in accordance with the ICNG.	Prior to and during construction
NV07	Vibration from construction equipment results in impacts to structures	Investigate opportunities for using alternatives to vibration generating equipment where vibration impacts have the potential to occur.	Prior to and during construction

ID	Potential impact	Mitigation measure	Timing
NV08	Inefficient operation and maintenance of equipment resulting in noise impacts	Regularly train workers and contractors (such as at toolbox talks) to use equipment and conduct works in ways to minimise noise, including: • site managers to periodically check the site and nearby residences for noise problems so that solutions can be quickly applied • avoid the overuse of radios or stereos outdoors. When in use outdoors, maintain at respectful volumes • avoid the overuse of public address systems • avoid shouting and minimise talking loudly and slamming vehicle doors • turn off all plant and equipment when not in use • maintain and monitor equipment to ensure proper and efficient operation. Aligning with Sydney Water's Noise Management Code of Behaviour (SWEMS0056.01).	During construction
NV09	Inefficient use of construction vehicle reverse beepers	Implement and use non-tonal reversing beepers (or an equivalent mechanism) on all construction vehicles and mobile plant, where possible. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.	During construction
NV10	Noise during OOHW	For works required outside of standard hours, undertake particularly noisy work at the start of the shift where possible. Provide appropriate respite to affected receivers in accordance with the Interim Construction Noise Guideline (ICNG).	During construction
NV11	Vibration from construction equipment results in impacts to structures	Undertake in-situ vibration monitoring to confirm vibration levels and assess potential impacts where minimum vibration impact distances cannot be achieved. Where the monitoring identifies exceedances in the relevant criteria, or where impacts are identified, additional management measures will be identified and implemented to appropriately manage impacts.	During construction

Traffic, transport and access

14 Traffic, transport and access

This chapter describes the project's potential impacts on traffic, transport and access. It provides an overview of the key findings of the Traffic and Transport Impact Assessment (TTIA) (Stantec, 2025b) (Appendix O).

The construction of the project is expected to slightly increase traffic congestion at the Grand Avenue/James Ruse Drive and Wentworth Street/ Parramatta Road intersections. Temporary disruptions to bus and ferry routes, active transport facilities and public spaces are expected from the construction of the pipelines. Access to some businesses and dwellings would be temporarily impacted due to road closures and use of construction compounds. Following the implementation of mitigation measures, these impacts are not expected to be substantial. The operation of the project is not expected to have adverse traffic, transport or access impacts.

14.1 Secretary's Environmental Assessment Requirements

Table 14-1 lists the SEARs relevant to transport and traffic and where in this section they are addressed.

Table 14-1: Project SEARs relating to transport, traffic and access

SEARs	EIS section where requirement is addressed
1. Construction transport and traffic (vehicle, pedestrian and cyclists) impacts, including, but not necessarily limited to:	
(a) a considered approach to route identification and scheduling of construction vehicle movements	Section 14.2 Section 14.5
(b) the indicative number, frequency and size of construction related vehicles (passenger, commercial and heavy vehicles, including spoil management movements) accessing each construction ancillary facility and travelling along construction traffic routes during both standard hours and out-of-hours	Section 14.5
(c) construction worker parking	Section 14.5
(d) the nature of existing traffic (types and number of movements) on construction access routes (including consideration of peak traffic times and sensitive road users and parking arrangements)	Section 14.3.1 Section 14.5
(e) access constraints and impacts on public transport (infrastructure and services), pedestrians and cyclists	Section 14.5
(f) the need to close, divert or otherwise reconfigure elements of the road, pedestrian and cycle network, duration of these changes, with a specific emphasis on impacts on the Duck River Nature Trails project and measures for retaining pedestrian and cyclists access	Section 14.5

SEARs	EIS section where requirement is addressed
(g) impacts to on-street parking, including to residents and businesses	Section 14.5
(h) a cumulative impact assessment taking into consideration the delivery of Parramatta Light Rail Stage 2 and Sydney Metro projects, including but not limited to road works, road closures, haulage routes, and construction worker parking.	Section 23.4.6
2. Operational traffic and transport arrangements and impacts of the project, including:	
(a) forecast traffic volumes for the project and the surrounding road	Section 14.6
(b) impacts on property and business access and on-street parking	Section 14.6
(c) impacts on the Duck River Nature Trails and any measures to maintain public access	Section 14.6
(d) details on the maximum size of vehicles that will be servicing the facility and demonstration that adequate access is provided	Section 14.6
(e) impacts on the delivery and operation of Parramatta Light Rail Stage 2 and Sydney Metro projects.	Section 14.4 Section 23.4.6

14.2 Assessment methodology

14.2.1 Legislative and policy context

The assessment was undertaken in accordance with, or with reference to, the following key legislation and guidelines:

- *Roads Act 1993*
- Road Rules 2014
- Guide to Transport Impact Assessment – Technical Guidance for Transport Practitioners (NSW Government, 2024)
- Guide to Traffic Management Part 12: Traffic Impacts of Developments (Austroads, 2009)
- Traffic Modelling Guidelines (Roads and Maritime Services, 2013)
- Camellia-Rosehill Place Strategy (DPE, 2022b)
- Walking Space Guide: Towards Pedestrian Comfort and Safety (Transport for NSW, 2020a)
- Cycleway Design Toolbox: Designing for Cycling and Micromobility (Transport for NSW, 2020b)

- Traffic Control at Work Sites: Technical Manual (Transport for NSW, 2022).

14.2.2 Methodology

The methodology for assessing traffic and transport impacts included:

- reviewing available data and documentation to understand traffic generated by the project in construction and operation
- using available traffic data to understand existing traffic conditions on the surrounding road network and establish a baseline for the assessment
- assessing the potential impacts of the project on the road network through the application of Signalised and Unsignalised Intersection Design and Research Aid (SIDRA) intersection modelling
- reviewing other infrastructure projects where construction is likely to overlap with project construction to assess cumulative impacts on the surrounding road network
- identifying management measures to minimise the impacts of the project on the traffic network.

The study area for the TTIA has been identified as the transport networks that may be impacted by traffic movements during construction and operation (staff and maintenance movements). This includes intersections near the WRRF and a catchment of up to 10 km from the pipelines.

As the construction workforce and the origin of materials and equipment are expected to be widely distributed across the wider Sydney region, the assessment focused on those roads and nearby transport facilities (parking, active transport, public transport) that provide access to the construction sites and back to the nearest major road. Beyond this point, the construction traffic is expected to diminish as it becomes distributed across the wider network to varied destinations and is considered to not have a measurable impact.

The following sections provide further detail about how baseline data was used and the approach used within the impact assessment. Measures adopted during design of the project to avoid and minimise impacts on traffic, transport and access are detailed in Section 14.4.

14.2.2.1 Traffic baseline data

The assessment used existing data 2025 (Transport for NSW, 2025) for key intersections in the study area. This data was supplemented with traffic counts (peak hour) undertaken on 8 May 2025, to calculate baseline traffic volumes across the study area.

Key intersections were selected for the traffic counts as they would experience the highest volume of traffic movements during the construction and operation of the project and are therefore representative of the worst-case baseline for impact prediction. These intersections included:

- Grand Avenue/James Ruse Drive
- Grand Avenue/Colquhoun Street
- Wentworth Street/Parramatta Road.

Furthermore, these intersections are the only roads available to access the Camellia-Rosehill precinct. As a result, all construction and operational traffic for the Camellia-Rosehill WRRF would be required to pass through these intersections when travelling to and from the site.

Traffic data indicated that the network peak hours were:

- AM Peak: 7am to 8am
- PM Peak: 5:15pm to 6:15pm.

14.2.2.2 Assessment scenarios

The TTIA considered 3 scenarios to address likely changes in baseline traffic volumes over the duration of the project. The scenarios included:

- **Scenario 1**: 2025 baseline – the existing traffic volumes in 2025, which includes construction traffic generated by Parramatta Light Rail Stage 1 and Sydney Metro West
- **Scenario 2**: 2028 baseline –the estimated traffic volumes in 2028 considering background traffic growth of 1.5% each year
- **Scenario 3**: 2028 with construction traffic – the 2028 baseline scenario plus construction traffic volumes generated from this project.

The year 2028 was selected for scenarios 2 and 3 as this was identified as likely the of peak construction for the project and a worst-case assessment for the TTIA.

14.2.2.3 Growth factors

The assessment applied a growth factor to the 2028 baseline. This value was determined by reviewing traffic data and determining the growth in traffic volumes from 2021 to 2025. These years were considered suitable as they were not impacted by COVID-19 and the associated working from home mandate. Growth was found to be approximately 1.1%. This assessment applied a conservative 1.5% growth factor to the baseline traffic numbers.

14.2.2.4 Construction impact assessment methodology

The construction impact assessment included:

- identifying traffic generated in the construction phase
- distributing the expected traffic volumes across the surrounding road network, assuming:
  - most movements to and from each construction compound would likely occur outside of the AM and PM peaks
  - a conservative approach, assuming 70% of daily light vehicle movements would occur during the peak hours. Heavy vehicle movements were assumed to be spread evenly across construction hours for the WRRF, Camellia pumping station and river release pipeline. 100% of daily heavy vehicle movements were assumed to occur during peak hours for the brine and transfer pipelines.

- undertaking SIDRA intersection modelling for the key intersections expected to be the most impacted during the construction of the Camellia-Rosehill WRRF
- undertaking qualitative assessment for the remaining intersections along the pipeline alignments
- identifying any impacts to the traffic network, including impacts to road users, public transport, walking and cycling infrastructure. The impacts were classified based on the following levels of impact:
  - low indicates minimal impact from low volumes of traffic movements, with management measures not likely to be required
  - medium indicates local impacts to road network, with the implementation of management measures required
  - high indicates impacts may cover a large area along the project corridor with implementation of management measures required.
- developing measures to manage identified impacts
- producing a draft Framework Construction Traffic Management Plan to outline appropriate traffic management controls for the construction phase of this project. This Framework Construction Traffic Management Plan would guide development of Site-specific Construction Traffic Management Plans (SSCTMPs) once the construction contractor(s) are engaged.

14.2.2.5 Construction vehicle route identification

Vehicle routes for the assessment were identified by prioritising State roads where possible, and minimising travel distances to and from motorways or the arterial road network. These roads are designed to support the movement of people and goods between cities and urban centres and are therefore more suitable for accommodating construction-related traffic.

The selection of local roads for construction traffic were restricted to those segments that are essential for accessing specific construction sites. This approach helps reduce the overall impact on the surrounding precinct, as regional and local roads serve more diverse functions, including pedestrian and cyclist movements, property access, kerbside parking, and local street activity. Local and regional roads are also generally more sensitive to disruption.

Whether overmass or oversize vehicles are required would be confirmed in detailed design. Approved heavy vehicle routes were considered and are shown in Section 14.3.1.

14.2.2.6 SIDRA modelling and assessment parameters

SIDRA intersection modelling is a traffic modelling infrastructure package which calculates intersection performance. SIDRA modelling determines the performance of an intersection through the following modelling parameters:

- Degree of Saturation (DoS): a ratio of demand to capacity of the traffic network. This parameter measures how ‘full’ the intersection is on a scale of zero to one. A DoS of one indicates that the intersection is operating at its capacity, and DoS of less than one indicates that the intersection can accommodate more vehicles.

- 95th percentile queues: the queue length that has a 5% probability of being exceeded during the analysis period. This parameter is used to calculate lane lengths but is not representative of a queue that a normal driver would experience.
- Level of Service (LoS): the average delay experienced by vehicles. There are 6 LoS, ranging from LoS A, which represents the best performance, to LoS F, which represents the worst performance (Table 14-2).

Table 14-2: SIDRA Intersection Level of Service Criteria

LoS	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but crash study required
D	43 to 56	Near capacity	Near capacity, crash study required
E	57 to 70	At capacity, at signals incidents would cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

SIDRA modelling was undertaken for the following key intersections:

- Grand Avenue/James Ruse Drive
- Grand Avenue/Colquhoun Street
- Wentworth Street/Parramatta Road.

The traffic volumes required for the construction of the Camellia pumping station upgrades, brine, transfer and river release pipelines are not expected to impact nearby intersections. Therefore, no other intersections across the study area were identified as requiring SIDRA modelling. Due to the progressive nature of trenching works low volumes of construction traffic are expected along pipeline alignments. The potential traffic impacts on the pipeline alignments were assessed qualitatively.

14.2.2.7 Operational assessment

During operation, it is anticipated that the pipelines and Camellia pumping station would generate infrequent and low volumes of traffic associated with periodic maintenance. Therefore, the operational assessment focused on the Camellia-Rosehill WRRF. The operational impact assessment involved the following steps:

- identifying proposed access routes to the WRRF considering the suitability of roads and any restrictions

- identifying the estimated traffic volumes generated during operation
- identifying potential impacts to the road, public transport, and active transport networks
- recommending transport provisions to be implemented during operation of the WRRF
- developing measures to manage identified impacts (if required).

The proposed Camellia-Rosehill WRRF would be operated similarly to other WRRFs across the Sydney Water network. As a result, Sydney Water anticipates the operational traffic movements required for the WRRF would be low, especially compared to the construction scenario. For this reason, an operation scenario was not modelled and was qualitatively assessed.

14.3 Existing environment

The project and its surrounds are urban and comprise a complex road network with arterial, sub-arterial and local roads. Several intersections already experience high levels of congestion and delay. Public transport services are present but vary in accessibility, while active transport infrastructure (such as footpaths and cycleways) is limited and fragmented.

The Camellia-Rosehill precinct is intended for a shift from a predominant industrial land use landscape to a mixed use urban centre as detailed within the Camellia-Rosehill Place Strategy (DPE, 2022b). The precinct also includes several major transport projects such as the PLR Stages 1 and 2, Sydney Metro West and the Duck River Nature Trail, each contributing to increased movement and accessibility.

14.3.1 Road network and traffic

Key roads within and close to the project are described in Table 14-3 and shown on Figure 14-1.

Table 14-3: Key roads near the project

Road type	Road name	Key road characteristics
Arterial road	• James Ruse Drive • Silverwater Road	• Two-way road with 3 lanes of traffic in each direction • 70 km/h speed limit
Arterial road	• Parramatta Road • Kissing Point Road	• Two-way road with 3 lanes of traffic in each direction • 60 km/h speed limit
Arterial road	• Victoria Road	• Two-way road with 2 lanes of traffic in each direction • 60 km/h speed limit.
Sub-arterial roads	• Hill Road • Holker Street	• Two-way road with 2 lanes of traffic in each direction • 60 km/h speed limit.

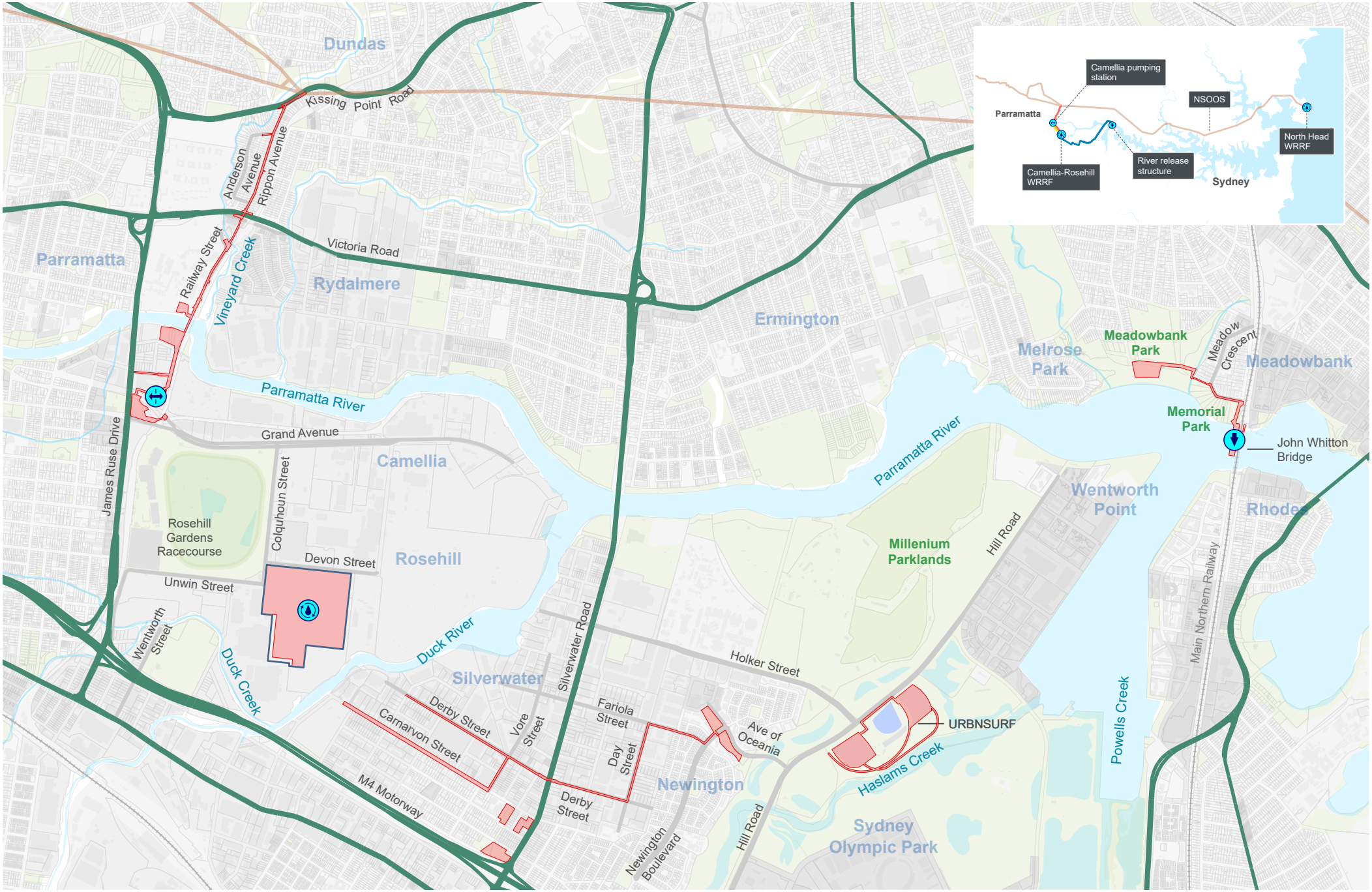
Road type	Road name	Key road characteristics
Local roads	• Colquhoun Street • Devon Street • Grand Avenue • Unwin Street • Wentworth Street	• Two-way road, with 2 lanes of traffic in each direction • 50 km/h speed limit.
Local roads	• Anderson Avenue • Avenue of Oceania • Carnarvon Street • Day Street North • Derby Street • Fariola Street • Meadow Crescent • Newington Boulevard • Railway Street • Vore Street	• Two-way road with one lane of traffic in each direction • 50 km/h speed limit
Local roads	• Grand Avenue • Rippon Avenue	• Two-way road with a shared lane of traffic in each direction. • 50 km/h speed limit
Local roads	• Comaneci Avenue	• Two-way road with a shared lane of traffic in each direction • 40 km/h speed limit

14.3.1.1 Heavy vehicle routes

Many of the roads near the project are also designated heavy vehicle routes. These roads can accommodate large vehicles, including B-doubles. Roads identified as B-double routes are shown on Figure 14-1.

14.3.1.2 School zones

The river release pipeline would be underbored within 200 m of Wentworth Point Public School and Wentworth Point High School. No active work zones would be located in this area, nor would workers be required to travel through this school zone. Therefore, no school zone restrictions have been identified that would be impacted by or have impact on the project.



Camellia-Rosehill WRRF
Camellia pumping station
River release structure

Impact area (IA)
Approved heavy vehicle route
Northern Suburbs Ocean Outfall Sewer (NSOOS)

Figure 14-1 Key roads near the project

0 500 1000 1500 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

N

14.3.1.3 Intersection performance and safety

Table 14-4 presents a summary of the existing operation of the key intersections:

Table 14-4: Existing intersection performance

Intersection	Peak	Average delay (sec)	LoS	DoS	95th Percentile Queue (m)
Grand Avenue/ James Ruse Drive	AM	68	E	0.945	496
	PM	123	F	1.067	624
Grand Avenue/ Colquhoun Street	AM	11	A	0.256	15
	PM	9	A	0.157	6
Wentworth Street/ Paramatta Road	AM	124	F	1.210	1121
	PM	94	F	1.131	910

The Grand Avenue/James Ruse Drive intersection operates near capacity, with a maximum average delay of 123 seconds and a LoS F during the PM Peak. In the AM Peak, it operates near capacity. The Grand Avenue/Colquhoun Street intersection performs well with minimal queuing, delays and a low DoS. The Wentworth Street/Parramatta Road intersection operates poorly with high average delays and a LoS F during both the AM and PM peaks.

At the Grand Avenue/James Ruse Drive intersection, 8 crashes were recorded between 2019 to 2023, with 6 injuries and no fatalities. The most common crash type was a 'right through' collision, which occurs when one vehicle turns right across the path of an oncoming vehicle traveling straight. No crashes were recorded at the Grand Avenue/Colquhoun Street intersection between 2019 and 2023. At the Wentworth Street/Parramatta Road intersection, 7 crashes were recorded between 2019 and 2023, with 5 injuries and no fatalities.

Crash occurrences near the Camellia pumping station, pipeline works and construction compounds are summarised in Table 14-5.

Table 14-5: Crash occurrences near the project

Project element	Compounds	Nearby crash occurrences
Camellia pumping station, brine and transfer pipelines	C14 to C16	10 crashes were recorded near C16 from 2019-2023. The incidents resulted in 8 injuries and one fatality. There were 2 occurrences of left-rear collisions.
Brine pipeline (relining)	C1 to C3	Three crashes were recorded near these compounds from 2019-2023. The incidents resulted in moderate injuries. No repeated patterns were found.
	C4 and C5	One crash was recorded near these compounds from 2019 - 2023. The incidents resulted in 2 injuries from a vehicle emerging from a driveway.
	C6 and C7	Five crashes were recorded near these compounds from 2019 - 2023. The incidents resulted in 6 injuries and no fatalities. 80% of collisions were rear-end collisions.
	C8 to C10	No crashes recorded near these compounds.
	C11 to C13	Two crashes were identified near these compounds from 2019 - 2023. The incidents were minor and resulted in 2 injuries. No repeated patterns were found.
River release pipeline	C17, C18, C22 to C24	Three crashes were recorded near these compounds from 2019 - 2023. The incidents resulted in 3 injuries. No repeated patterns were found.
	C19 and C20	No crashes recorded near these compounds.
	C21	Five crashes were recorded near this compound from 2019 - 2023. The incidents resulted in 4 injuries. Cross-traffic collisions at the Derby Street/Wetherill Street intersection were the most common type of collision.
	C25 and C26	No crashes recorded near these compounds.
	C27	One crash was recorded near this compound from 2019 - 2023. The incident was a rear-end collision which resulted in one injury.
	C28 to C31	No crashes were recorded near these compounds.

14.3.1.4 Parking

On-street parking opportunities for the project are described in Table 14-6.

Table 14-6: On-street parking opportunities near the project

Project feature	Road	Parking opportunities
WRRF	• Colquhoun Street • Grand Avenue	On-street parking opportunities are provided on both sides of the road, but are mostly used during the AM/PM peak periods
	• Devon Street • Grand Avenue North • Unwin Street	On-street parking opportunities are provided on both sides of the road, and are mostly available during AM/PM peak periods
Brine and transfer pipelines	• Victoria Road Service Road	On-street parking opportunities are provided on both sides of the road, but are mostly used during the AM/PM peak periods
	• Anderson Avenue • Rippon Avenue	On-street parking opportunities are provided on both sides of the road, and are mostly available during AM/PM peak periods
River release pipeline	• Carnarvon Street • Day Street North • Derby Street • Fariola Street • Meadow Crescent • Newington Boulevard • Vore Street	On-street parking opportunities are provided on both sides of the road, but are mostly used during the AM/PM peak periods
	• Comaneci Avenue	On-street parking opportunities are provided on alternate sides but are mostly used during AM/PM peak periods.

14.3.2 Public transport

The project area is well serviced by a range of public transport services. The location of these services is shown in Figure 14-2 and described in Table 14-7. Despite the various public transport services available around the study area, a relatively low proportion of people use public transport compared to private vehicles in this area (ABS, 2021a and ABS, 2021b).

Table 14-7: Public transport options near the project

Public transport mode	Description of services
Heavy rail	Stations operate at Clyde, Sydney Olympic Park and Meadowbank. The Sydney Olympic Park line (T7) operates services via Sydney Olympic Park Station. The line connects to the North Shore and Western Line (T1), Leppington and Inner West Line (T2), and Liverpool and Inner West Line (T3) at Lidcombe. The T1 and T2 services also run through Clyde Station and connect to Parramatta. Meadowbank station is serviced by the T9 Northern line which runs between Hornsby and Central Stations. Customers can travel on the T9 to Epping, Strathfield and Central to access Central Coast, Newcastle and Northern NSW rail services.
Metro	Metro services are the nearest available at Epping Station, which is about 10 minutes by heavy rail from Meadowbank Station. Sydney Metro West is expected to open for services in 2032. Once operational metro services would be available at Parramatta and Sydney Olympic Park.
Light rail	Three light rail stops are located near the project. They include: • Rosehill Gardens Light Rail Stop, located about 25 m east of the Camellia pumping station • Dundas Light Rail Stop, located about 60 m south-east of compound C7 • Yallamundi Light Rail Stop, located about 70 m south of compound C1.
Bus	• Parramatta - 500N, 501, 521, 523, 524, 525, N61, N81 • North Ryde - 545 • Eastwood Station, Macquarie Centre - 540, 544 • Parramatta, Rhodes Shopping Centre - 525, 526 • Chatswood – 533
Ferry	The F3 Parramatta River ferry operates between Parramatta and Circular Quay, with ferry wharves located near the river release pipeline at Wentworth Point (Sydney Olympic Park Wharf) and Meadowbank (Meadowbank Wharf). Ferry services generally operate every 15 minutes in each direction between 8am and 5pm daily. Tidal conditions prevent up to 10% of ferry services from operating to Parramatta Wharf. During such conditions, ferries terminate at Rydalmere Wharf and a shuttle bus replacement service operates between Rydalmere and Parramatta.

14.3.3 Active transport

Active transport refers to walking and cycling. Limited active transport options are available near the WRRF site, with footpaths located sporadically along Grand Avenue and on Unwin Street. Similarly, there are limited cycling facilities and routes near the WRRF site. Given the area is industrial, it creates a challenging and potentially unsafe environment for pedestrians and cyclists.

An active transport link was delivered as part of PLR Stage 1. Shared paths are now located near Camellia pumping station and the brine and transfer pipelines. As shown on Figure 14-3, a shared path is located on the southern side of Grand Avenue, which continues north on the Camellia Light Rail Bridge and along the eastern side of Railway Street until Victoria Road, Rydalmere. Shared paths are also located near Anna Maria King Park and Kissing Point Road.

Near the river release pipeline, there is a shared path located towards the south of Newington Boulevard and towards the south of Meadow Crescent. All active transport links are shown on Figure 14-3.

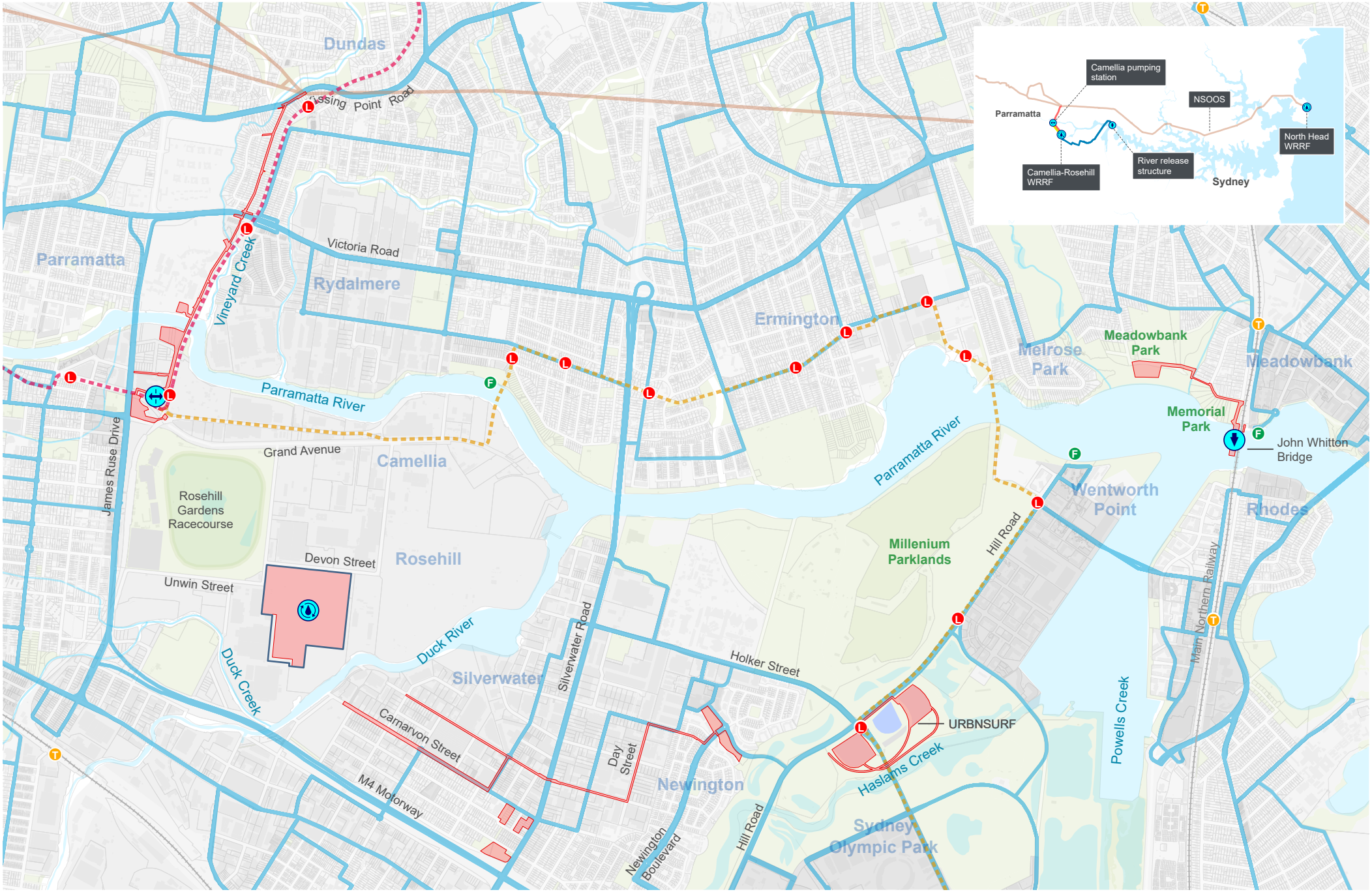
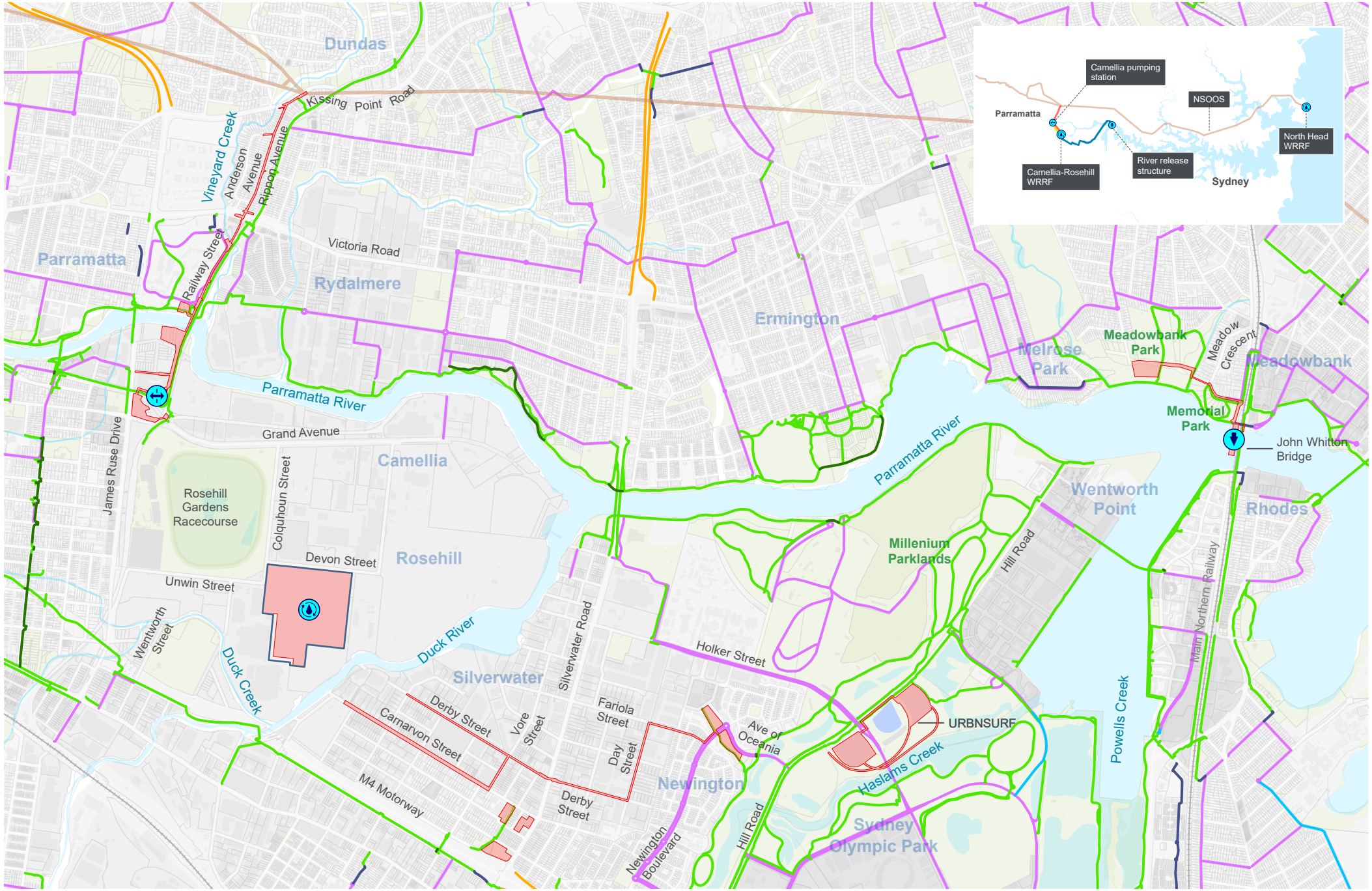


Figure 14-2 Public transport near the project

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56



Camellia-Rosehill WRRF
Camellia pumping station
River release structure
Impact area (IA)
Bicycle paths
Shared paths
Quiet streets
Bicycle lanes
General roads
Road shoulders

Figure 14-3 Active transport routes near the project

0 500 1000 1500 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

N

14.3.4 Special events

Additional transport services are available during special events at Rosehill Gardens Racecourse and Sydney Olympic Park (including Sydney Showground) to move large numbers of people to and from these venues.

14.3.4.1 Rosehill Gardens Racecourse

Events at Rosehill Gardens Racecourse occur throughout the year and are generally daytime events. Patrons at these events can travel to the racecourse via ferry to Rydalmere or by train to Parramatta Station, then transfer to bus services to the racecourse. This includes the M92 and 535 routes as well as supplementary bus shuttle services that may be provided by the Australian Turf Club. Alternatively, they can travel via light rail to Camellia Light Rail Stop.

14.3.4.2 Sydney Olympic Park

Events at Sydney Olympic Park occur throughout the year, including concerts, festivals, sporting events and cultural events. Notably, the Royal Easter Show, which is held in March and/or April, attracts about 828,000 attendees on average each year (Royal Agricultural Society of NSW, 2025).

Patrons travelling to Sydney Olympic Park currently use a variety of public transport services. Trains operating along the T7 Olympic Park Line provide a 'shuttle' service to and from Olympic Park Station for customers transferring at Lidcombe Station. There are also special event trains that travel directly to Olympic Park Station without the need for transfer at Lidcombe. Bus stops in Sydney Olympic Park are serviced by routes 525, 526 and 533.

Additional special event bus services operate which extend from Sydney Olympic Park to suburbs north and south of the Parramatta River. During major events, a special event transport management plan is implemented which includes some road closures, bus stop relocations, additional signage, and additional public transport services. There is generally no available on-street parking due to road closures for events. The P1 to P8 car parks provide around 7,100 parking spaces in total, which patrons have the option to pre-book. Notably, the P5 Sydney Olympic Park – Car Park is located adjacent to URBNSURF. This carpark would be used as a compound for the construction of the river release pipeline.

14.4 Avoid and minimise impacts

The project design and construction methodology has included the following measures to avoid or minimise potential traffic and transport impacts:

- utilising HDD methods for the construction of pipelines in order to avoid road closures on Victoria Road and Silverwater Road
- providing car parking spaces in some construction compounds where available to minimise impacts to on-street parking for local residents and businesses
- where construction is required to be carried out in roads, the project would avoid complete road closures where possible and would prioritise maintaining access

- designation and assessment of nightworks along Carnavon Road to minimise access impacts as directed by businesses during early consultation
- the impact area has been designed to avoid directly interacting with the Sydney Metro West tunnels and PLR tracks and services.

14.5 Construction impacts

This section outlines the potential impacts from construction vehicle movements on the traffic network and impacts to parking, public transport, access and pedestrians (where applicable). This section is divided into key components of the project including construction of the Camellia–Rosehill WRRF, upgrades to Camellia pumping station, installation of the new section of brine and transfer pipelines, relining of the existing brine pipeline and installation of the river release pipeline.

The likely traffic generating activities and types of vehicles anticipated include:

- light vehicles associated with work crews undertaking construction along the pipeline alignments (and associated compounds) and WRRF site
- light vehicles undertaking relining works along the existing section of brine pipeline
- heavy vehicles accessing site compounds for the delivery and removal of raw materials, equipment or infrastructure components, including the WRRF site.

Traffic volumes generated from the construction of the project were distributed onto the local road network until the closest major road, as discussed in Section 14.2.

14.5.1 WRRF

14.5.1.1 Construction vehicle movements

The indicative number and size of construction vehicles travelling to and from the WRRF are shown in Table 14-8.

Table 14-8: Indicative construction vehicle movements to and from the WRRF

Type of vehicle	Estimated daily movements	Estimated AM/PM peak hour movements (each peak hour)
Light vehicle	400	140
Heavy vehicle	300	38

Construction vehicles accessing the WRRF site from Unwin Street would travel via the Wentworth Street/Parramatta Road intersection. As shown in Figure 14-4, this would be the primary route for inbound and outbound vehicle movements to and from the WRRF. Due to height restrictions from the Western Motorway Bridge at the Wentworth Street/Parramatta Road intersection, a secondary route may be required. Vehicles

using the secondary route would access the WRRF site from Devon Street, travelling via the Grand Avenue/James Ruse Drive intersection and Grand Avenue/Colquhoun Street intersection.

14.5.1.2 Intersection performance

Modelling of the 2028 base case scenario indicates that the James Ruse Drive/Grand Avenue intersection and Wentworth Street/Parramatta Road intersection operate unsatisfactorily irrespective of the project. The impacts of the project on intersection performance are summarised below:

- James Ruse Drive/Grand Avenue intersection: construction traffic would increase the average delay by up to 14 seconds and queuing by up to 45 m during the AM peak. During the PM peak, average delay would increase by up to 7 seconds and queuing by up to 5 m.
- Wentworth Street/Parramatta Road intersection: construction traffic would increase the average delay by up to 13 seconds and queuing by up to 83 m during the AM peak. During the PM peak, average delay would increase by up to 1 second and queuing by up to 7 m.
- The Grand Avenue/Colquhoun Street intersection would continue to operate well during the AM and PM peaks, with minimal changes in delays and queuing lengths.

To minimise further impacts to the existing intersection performance, mitigation measures have been identified in Section 14.7.

14.5.1.3 Network closures, detours and property access

No elements of the road, pedestrian and cycle network would need to be closed, diverted or otherwise reconfigured during the construction of the WRRF. No impacts to access are expected on the Duck River Nature Trail project.

Construction of the WRRF would not impact surrounding property access.

14.5.1.4 Parking

Parking for construction workers would be provided on the WRRF site. If additional parking is required, on-street parking is available on Devon Street and Unwin Street as described in Section 14.3.1. Given the availability of on-street parking on these streets and provision for parking on the WRRF site, impacts on on-street parking are expected to be low. Workers would also be encouraged to carpool and use the public transport network.

Camellia-Rosehill WRRF
Camellia pumping station
Indicative compound access
Indicative construction compounds
Impact area (IA)

Construction arrival route
Construction departure route

Figure 14-4 Construction vehicle routes

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:9,000 @ A4
GDA2020 MGA Zone 56

N

14.5.2 Camellia pumping station

14.5.2.1 Construction vehicle movements

The indicative number, frequency and size of construction vehicles travelling to and from the Camellia pumping station are shown in Table 14-9.

Table 14-9: Indicative construction vehicle movements to and from the Camellia pumping station

Type of vehicle	Estimated daily movements	Estimated AM/PM peak hour movements (each peak hour)
Light vehicle	30	11
Heavy vehicle	30	4

Vehicle access and egress routes to the Camellia pumping station would be via James Ruse Drive.

14.5.2.2 Intersection performance

As workers exiting the pumping station onto James Ruse Drive may only make a left turn, works at the Camellia pumping station are not expected to impact intersection performance.

14.5.2.3 Network closures, detours and property access

No elements of the road, pedestrian and cycle network would need to be closed, diverted or otherwise reconfigured during the upgrade of Camellia pumping station. No impacts to active and public transport are expected from these works.

Works at the Camellia pumping station would not impact surrounding property access.

14.5.2.4 Parking

Car parking would be required for about 15 light vehicles. Parking may be provided within construction compounds where available. If additional parking is required, construction staff may use nearby on-street parking opportunities. Workers would also be encouraged to use other forms of transport, such as car-pooling, public and active transport. Impacts to parking availability is discussed further in Section 14.5.3.

14.5.3 Brine and transfer pipelines

14.5.3.1 Construction vehicle movements

The indicative number, frequency and size of construction vehicles travelling to and from the new sections of brine and transfer pipeline are shown in Table 14-10.

Table 14-10: Indicative construction vehicle movements to and from the brine and transfer pipelines

Type of vehicle	Estimated daily movements	Estimated AM/PM peak hour movements (each peak hour)
Light vehicle	30	11
Heavy vehicle	2	2

Vehicle access and egress to compounds C14 to C16 would be via James Ruse Drive. Light vehicles exiting C15 from Grand Avenue may only make a left turn at James Ruse Drive.

14.5.3.2 Intersection performance

The construction of the brine and transfer pipelines are not expected to impact surrounding intersection performance.

14.5.3.3 Network closures, detours and property access

Grand Avenue North would be partially closed (one lane) during this phase of the construction works.

No elements of the pedestrian and cycle network would need to be closed, diverted or otherwise reconfigured during the construction of the brine and transfer pipelines. No impacts to active and public transport are expected from these works.

14.5.3.4 Parking

Car parking would be required for about 15 light vehicles. Parking may be provided within construction compounds. If additional parking is required, construction staff may use nearby on-street parking opportunities nearby. Workers would also be encouraged to use other forms of transport, such as car-pooling, public and active transport.

Compound C14 would temporarily reduce off-street car parking availability. The compound would only be set up for a short duration to minimise the impact to nearby businesses and light rail customers that use these parking spaces. Given the availability of parking opportunities within other off-street car parks, impacts on on-street parking is not expected to be significant. Impacts would be managed in accordance with the mitigation measures outlined in Section 14.7.

14.5.3.5 Special events

The project would be designed and constructed to facilitate access for special events at Rosehill Gardens Racecourse. Special event mitigation measures have been outlined in Section 14.7.

14.5.4 Brine pipeline

14.5.4.1 Construction vehicle movements

The indicative number, frequency and size of construction vehicles travelling to and from brine pipeline relining works are shown in Table 14-11.

Table 14-11: Indicative construction vehicle movements to and from the brine pipeline

Type of vehicle	Estimated daily movements	Estimated AM/PM peak hour movements (each peak hour)
Light vehicle	400	140
Heavy vehicle	300	38

Construction vehicles would use the following roads to access the brine pipeline compounds:

- Anderson Avenue
- James Ruse Drive
- Grand Avenue North
- Kissing Point Road
- Railway Street
- Rippon Avenue
- Victoria Road
- Victoria Road Service Road

14.5.4.2 Intersection performance

The construction of the brine pipeline is not expected to impact surrounding intersection performance.

14.5.4.3 Network closures, detours and property access

Kissing Point Road, Railway Street, Rippon Avenue and Anderson Avenue would be partially closed (one lane) during this phase of the construction works.

A shared path in WSU Parramatta Campus, near compound C11, would be temporarily closed while the compound is being used by the project. Pedestrians and cyclists would be detoured around the compound using alternative routes within the campus. Detours would be agreed in consultation with WSU. Temporary disruptions may occur on footpaths along Victoria Road and Rippon Avenue. Pedestrians would be advised to detour as required.

Despite works near the Dundas and Yallumundi Light Rail Stops, access to these stops would be maintained. No impacts are expected to this access nor the Light Rail from these works.

Bus routes 500N, 501, 521, 523, 524 and 525 are located along the proposed brine pipeline alignment. These routes are not expected to be impacted by the project. However, the Kissing Point Road before Rippon Avenue bus stop, servicing bus route 545 may be impacted. The bus stops may be temporarily relocated to prevent disruptions to the network.

Compound C6 would be located within Rippon Avenue and access to various properties on Rippon Avenue may be impacted during relining works. Some properties on Kissing Point Road may also be impacted. These construction works would be temporary, about 8-10 weeks in any given area, and construction workers would be advised to maintain access to properties. Consultation with the potentially impacted residents would occur prior to construction and layout would be designed to minimise impacts to access. Given the temporary nature of construction works, impacts to property access are not expected to be significant. Impacts would be managed in accordance with the mitigation measures outlined in Section 14.7.

14.5.4.4 Parking

Car parking would be required for about 12 light vehicles. Parking may be provided within construction compounds. Construction staff would otherwise use nearby on-street and off-street car parking spaces.

Compound C10 would temporarily reduce car parking availability. Students at the WSU Parramatta Campus would need to seek other parking opportunities while compound C10 is being used. On-street parking opportunities near Wesley Employment Services David Morgan Centre, Rippon Avenue and Anderson Avenue may also be temporarily lost during relining works. Given the temporary nature of construction works, impacts on on-street parking is not expected to be significant. Impacts would be managed in accordance with the mitigation measures outlined in Section 14.7.

14.5.5 River release pipeline

14.5.5.1 Construction vehicle movements

The indicative number, frequency and size of construction vehicles travelling to and from the river release pipeline works are shown in Table 14-12.

Trenching pipeline construction along the river release pipeline would generally occur at a rate of approximately 10-25 m per day. This means that works would be experienced in one area over a period of 8-10 weeks. Given the progressive nature of works it is unlikely that all receivers identified in this section would be impacted at the same time.

Table 14-12: Indicative construction vehicle movements to and from the river release pipeline

Type of vehicle	Estimated daily movements	Estimated AM/PM peak hour movements (each peak hour)
Light vehicle	15	6
Heavy vehicle	20	3

Construction vehicles would use the following roads to access the river release pipeline compounds:

- Great Western Highway (including Parramatta Road)
- Western Motorway, Auburn
- Silverwater Road, Silverwater
- Bligh Street, Silverwater
- Carnarvon Street, Silverwater
- Beaconsfield Street, Silverwater
- Vore Street, Silverwater
- Derby Street, Silverwater

- Derby Street North, Silverwater
- Fariola Street, Silverwater
- John Ian Wing Parade, Newington
- Avenue of Oceania, Newington
- Newington Boulevard, Newington
- Comaneci Avenue, Newington
- Hill Road, Sydney Olympic Park
- Holker Busway, Sydney Olympic Park
- Belmore Street, Ryde
- Junction Street, Ryde
- Bank Street, Meadowbank
- Constitution Road, Meadowbank
- Meadow Crescent, Meadowbank.

14.5.5.2 Intersection performance

The construction of the river release pipeline is not expected to impact surrounding intersection performance.

14.5.5.3 Road closures

Carnarvon Street would be partially closed during trenching works. However, at least one lane would remain open. Trenching construction would progress at a rate of about 10 m to 25 m per day and have a duration of between eight to ten weeks in any given area. These works would be undertaken at night to limit access restrictions and traffic delays.

Vore Street and Derby Street would be partially closed during trenching works. However, at least one lane on both streets would remain open. During these works, commuters can detour towards Carnarvon Street, Stanley Street, Churchill Street and Suttor Street to access the impacted businesses.

Derby Street and Day Street North would be partially closed during trenching works. However, at least one lane on both streets would remain open. During these works, commuters can detour towards Egerton Street and Wetherill Street North to access the impacted businesses.

Fariola Street and Hill Road would be partially closed during trenching works. However, at least one lane would remain open. Comaneci Avenue and the northbound lanes on Newington Boulevard would be temporarily closed during construction works. Commuters would be advised to make detours at Newington Boulevard, Nurumi Avenue, Kosmala Close and Wenden Avenue to continue travelling northbound and southbound. Part of Holker Busway and the unnamed road connecting Hill Road to URBNSURF would be temporarily closed during

construction works. Commuters would be advised to make detours at Kevin Coombs Avenue and Pondage Link Road to continue onto Hill Road and Holker Street.

A section of Meadow Crescent would also be closed during trenching works. Certain residents would need to make detours at Meadow Crescent and Bank Street to park near their respective houses.

Given the temporary nature of construction works, impacts from road closures are not expected to be significant. Impacts would be managed in accordance with the mitigation measures outlined in Section 14.7.

14.5.5.4 Property access

A full list of properties with their access impacted by the construction of the river release pipeline is detailed in the TTIA (Appendix O). In summary, various properties along the following roads would be impacted:

- Carnarvon Street, Silverwater
- Vore Street, Silverwater
- Derby Street, Silverwater
- Suttor Street, Silverwater
- Fisher Street, Silverwater
- Day Street North, Silverwater
- Egerton Street, Silverwater
- Silverwater Road, Silverwater
- Comaneci Avenue, Newington
- Mockridge Avenue, Newington
- Bank Street, Meadowbank.

These construction works would be temporary, about 8 to 10 weeks in any given area, and construction workers would be advised to maintain access to properties. Works would occur progressively so that most of these properties would not be impacted at the same time. Property owners and occupiers would be consulted with before construction works occur near their properties. Given the temporary nature of construction works, impacts to property access are not expected to be significant. Impacts would be managed in accordance with the mitigation measures outlined in Section 14.7.

14.5.5.5 Public transport

The following bus stops would be impacted by the construction works:

- Carnarvon Street after Stubbs Street, Silverwater
- Carnarvon Street at Vore Street, Silverwater
- Pierre de Coubertin Park, Newington Boulevard.

The bus stops may be temporarily relocated to prevent disruptions to the network, subject to consultation with bus operators and TfNSW. The construction works can also be staged so that both bus stops on Carnarvon Street are not inaccessible at the same time.

Bus routes 533, 540 and 544 would also be impacted by trenching works. Temporary detours would be required, subject to consultation with bus operators and TfNSW. Given the temporary nature of construction works, impacts on public transport are not expected to be significant. Impacts would be managed in accordance with the mitigation measures outlined in Section 14.7.

14.5.5.6 Active transport

Pedestrians and cyclists using footpaths on either side of the following roads would be asked to detour as required by traffic controllers, signage and barriers:

- Carnarvon Street
- Vore Street
- Derby Street
- Day Street North.

Shared paths are located to the south of compounds C25 and C26. Pedestrians and cyclists would be detoured to other footpaths through signage and traffic controllers. To access Sydney Olympic Park, cyclists and pedestrians could use the footpaths on Avenue of Europe, Avenue of Oceania and Hill Road temporarily whilst construction works are completed.

Shared paths are located to the north of C27. During construction works, shared paths on the southern side of Hill Road would be cordoned off. Pedestrians and cyclists would be detoured to other footpaths such as those to the north of Hill Road through signage and traffic controllers.

Shared paths are located to the west and south of Meadow Crescent. Some parts of the construction works would encroach on the existing shared paths in the area. Pedestrians and cyclists would need to be detoured to other parts of the area whilst construction work is happening.

Pierre De Coubertin Park and part of Meadowbank Park would be occupied during construction works. Access to these public spaces would be temporarily disrupted during this time. Works at Pierre De Coubertin Park are expected to take about three to six months while works at Meadowbank Park are expected to take about 18 months. Sydney Water would continue to liaise with local councils and other relevant stakeholders to develop temporary solutions, including proactive notifications and signage.

14.5.5.7 Parking

Car parking would be required for about eight light vehicles. Parking may be provided in compounds. Construction staff would otherwise use nearby on-street and off-street car parking spaces. On-street parking opportunities would be temporarily lost during construction works at the following locations:

- Carnarvon Street, Silverwater

- Vore Street, Silverwater
- Derby Street, Silverwater
- Day Street North, Silverwater
- Fariola Street, Silverwater
- Comaneci Avenue, Newington
- Newington Boulevard, Newington
- Bowden Street, Meadowbank
- Meadow Crescent, Meadowbank.

The Sydney Olympic Park P5 carpark would be used during construction works. This is expected to impact parking for URBNSURF customers and staff, as well as for special events in Sydney Olympic Park. Consultation would be undertaken with URBNSURF to minimise impacts on their business.

Given the temporary nature of construction works, impacts on on-street parking are not expected to be significant. Impacts would be managed in accordance with the mitigation measures outlined in Section 14.7.

14.5.5.8 Maritime navigation and traffic

Ferries and other marine traffic would be impacted by works for the river release structure. Ferries and other marine traffic would be required to detour around compound C30. The use of barges to arrange pipes and concrete mattresses underwater would also require closure of Parramatta River to maritime traffic across two weekends for safety purposes. The timing of river closure and detour routes would be determined in consultation with TfNSW, NSW Maritime, the Harbour Master and Sydney Ferries, and would be provided through signage at John Whitton Bridge and posters at the Meadowbank Ferry Wharf.

14.5.5.9 Special events

The project would be designed and constructed to facilitate access for special events at Sydney Olympic Park (including Sydney Showground). Special event mitigation measures have been outlined in Section 14.7.

14.5.6 Summary of construction impacts

Table 14-13 summarises the potential key traffic impacts during construction. Impacts with a medium and high impact would be managed in line with the mitigation measures outlined in Section 14.7.

Table 14-13: Summary of project construction traffic impacts

Impact	Location	Impact significance
Traffic congestion at the Grand Avenue/James Ruse Drive and Wentworth Street/Parramatta Road intersections due to traffic volumes	• Grand Avenue/James Ruse Drive intersection • Wentworth Street/Parramatta Road intersection	Medium

Impact	Location	Impact significance
Temporary disruption to parking and traffic during special events	• Rosehill Gardens Racecourse • Sydney Olympic Park	High
Temporary disruption to bus stops and routes along the construction corridor	• Bus routes 533, 540 and 544 • Kissing Point Road before Rippon Avenue bus stop • Carnarvon Street after Stubbs Street • Carnarvon Street at Vore Street • Pierre de Coubertin Park	Medium
Temporary disruption to ferry routes along the construction corridor	• Parramatta River	Medium
Temporary disruption to footpaths, cycle routes and public spaces	• Shared paths near C11, C25, C26 and C27 • Shared paths located to the west and south of Meadow Crescent and near URBNSURF • Footpaths along Victoria Road, Rippon Avenue, Carnarvon Street, Vore Street, Derby Street and Day Street North • Pierre de Coubertin Park • Meadowbank Park	Medium

Impact	Location	Impact significance
Temporary impacts to dwellings and business access including from road closures and temporary removal of on-street parking	• Bank Street • Carnarvon Street • Comaneci Avenue • Day Street North • Derby Street • Egerton Street • Fariola Street • Fisher Street • Grand Avenue North • Holker Busway • Meadow Crescent • Mockridge Avenue • Newington Boulevard • Rippon Avenue • Silverwater Road • Suttor Street • Sydney Olympic Park P5 carpark • Unnamed road connecting Hill Road to URBNSURF • Vore Street • WSU Parramatta Campus near compound C10	Medium

14.6 Operational impacts

The section outlines impacts from operational vehicle movements on the traffic network and parking, public transport, access and pedestrians.

During operation most traffic generated by the project would be a result of day to day operation of the WRRF. The pipelines (including the release structure) would only require infrequent vehicle access to carry out routine inspections and maintenance. This would likely occur every six to 12 months in any one location, with impacts considered negligible. For the Camellia pumping station, no changes to current operational staffing levels and therefore vehicle movements are proposed.

On this basis the operational traffic assessment has only assessed the WRRF.

14.6.1 WRRF traffic generation

Both light vehicles and heavy vehicles would access the WRRF during operation. Other heavy vehicles including cranes and articulated vehicles up to 20 m, may also visit the site for maintenance purposes. These have been included in daily movements to and from the WRRF as a conservative approach.

The forecast traffic volumes for the project and surrounding road network during operation is summarised in Table 14-14. During the AM peak, 50% of light vehicle movements were assumed to occur and 50% were assumed to occur in the PM peak. Heavy vehicle movements were assumed to be distributed evenly across the day.

Table 14-14: Indicative operational vehicle trips to and from the WRRF

Activity	Type of vehicle	Daily trips	Peak hour trips
Staff journeys	Light vehicle	14	7
Residuals (biosolids, screenings, grit)	Heavy vehicle	10	2
Liquid chemical deliveries	Heavy vehicle	3	1
Other chemical deliveries	Heavy vehicle	1	1
Maintenance requirements	Heavy vehicle	2	1
Other trucks (spare parts, packages, cranes, etc)	Heavy vehicle	2	1
Total	**Light Vehicle**	**14**	**7**
	Heavy vehicle	**18**	**6**

The operational vehicle routes and traffic distributions for the WRRF are the same as those identified in Section 14.5.1.

Swept path assessments were undertaken and are available in the TTIA (Appendix O). The assessments indicate that the largest vehicles that would access the WRRF can access the driveways and enter and exit the site in a forward direction.

14.6.2 Intersection performance

Operational traffic volumes are not expected to have adverse impacts on the surrounding road network given the low numbers of vehicle movements. Similarly, operational traffic volumes are not anticipated to compromise the safety or function of the surrounding roads.

14.6.3 Network closures, detours and property access

The operational workforce would only enter and exit the WRRF site. Therefore, the operational traffic volumes would have no impacts to other businesses and properties. Impacts to public and active transport facilities, including the Duck River Nature Trail would be minimal.

To facilitate active transport, in line with the Camellia-Rosehill Place Strategy (DPE, 2022b), Sydney Water is providing bike parking spaces as well as end of trip facilities in the WRRF building that would enable staff to travel to and from the site by alternative travel modes.

14.6.4 Parking

The WRRF proposes to provide 20 car parking spaces including two spaces for people with disabilities. It is noted that City of Parramatta Council's Development Control Plan (City of Parramatta Council, 2023b) requires seven spaces. Parking for staff and visitors during the operation of the WRRF would be fully contained within the WRRF for both light vehicles and heavy vehicles. On-street parking opportunities would not be used by the operational workforce. Therefore, no parking impacts are expected during operation

14.6.5 Maritime navigation and traffic

There would be negligible impacts to ferries and other ships, including to navigation routes, during operation of the project.

14.7 Mitigation measures

The project has been designed to avoid and minimise traffic and transport impacts. Sydney Water would manage potential impacts during construction through implementation of the CEMP. Project specific mitigation measures that would be implemented to manage potential impacts relating to traffic, transport and access are listed in Table 14-15.

Table 14-15: Traffic, transport and access mitigation measures

ID	Potential impact	Mitigation measure	Timing
TT01	Traffic congestion including at the Grand Avenue/James Ruse Drive and Wentworth Street/Parramatta Road intersections due to traffic volumes	Prepare and implement a Construction Traffic Management Plan (CTMP) in accordance with the Framework Construction Traffic Management Plan. The CTMP would outline: • staging and timing of construction for each area of the project • any changes to traffic conditions, including road closures or diversions • identification of haulage routes, avoiding use of nominated local roads • safe alternative routes for pedestrians, cyclists and other active transport in accordance with relevant safety standards • parking arrangements for construction workers • construction access points • measures to minimise impacts on public transport network, including bus stops • opportunities to reduce road traffic noise, including restricting heavy vehicle movements to standard construction hours • measures to minimise impacts to businesses • measures to outline construction interface management with Stage 2 of PLR and Sydney Metro West • scheduling of deliveries outside of the AM/ PM peak hours where possible. Site-specific Construction Traffic Management Plans (SSCTMP) are also to be prepared for key intersections in consultation with relevant local councils, impacted residents and businesses, Transport for NSW and in accordance with relevant guidelines and the Framework CTMP.	During detailed design and construction
TT02	Impacts during special events	Where special events require specific traffic and pedestrian management, develop and implement measures in consultation with Sydney Olympic Park Authority (SOPA), the Australian Turf Club, and other relevant stakeholders.	During construction
TT03	Temporary disruption to bus stops and routes along the construction corridor	Liaise with relevant bus operators and State authorities to develop temporary solutions. Implement proactive notifications and signage in line with the Community and Stakeholder Engagement Plan where relevant.	During detailed design

ID	Potential impact	Mitigation measure	Timing
TT04	Temporary disruption to ferry routes along the construction corridor	Liaison with State authorities, local councils, stakeholders and operators to develop temporary solutions. Implement proactive notifications and signage in line with the Community and Stakeholder Engagement Plan where relevant.	During detailed design
TT05	Temporary disruption to footpaths and cycle routes and public spaces	Maintain access (wherever possible) or provide alternate safe access routes. Liaise with local councils and stakeholders to develop temporary solutions. Implement proactive notifications and signage in line with the Community and Stakeholder Engagement Plan where relevant.	During detailed design and construction
TT06	Temporary impacts to dwellings and business access including from road closures and temporary removal of on-street parking	Liaise with local councils and stakeholders, including affected residents and businesses to develop temporary solutions.	During detailed design
TT07	Cumulative traffic impacts from nearby construction including from Sydney Metro West and Stage 2 of PLR	Continue ongoing engagement with Sydney Metro and Parramatta Light Rail, other developers and relevant councils to understand specific transport and access needs with ongoing and planned developments.	During detailed design and construction

Non-Aboriginal heritage

15 Non-Aboriginal heritage

This chapter describes the non-Aboriginal heritage items and values within the study area, and the project's potential impacts during construction and operation. It provides an overview of the key findings in the Statement of Heritage Impacts (SoHI) (EMM, 2025a) (Appendix P). During construction, excavation and ground disturbance is required in the curtilage of the Rydalmere Hospital Precinct, Memorial Park and the Sewage Pumping Station 67. Little to no direct impacts are expected to the Rydalmere Hospital Precinct and Memorial Park. Direct impacts would occur to the façade and internal fabric of the Sewage Pumping Station 67 (Camellia pumping station) however these are considered minor. During operation at Memorial Park there would be a minor permanent indirect (visual) impact from the barometric loop. The Camellia-Rosehill WRRF would be visible from the curtilage of the Capral Aluminium site but would not change the setting and would not have an indirect (visual) impact.

15.1 Secretary's Environmental Assessment Requirements

Table 15-1 lists the SEARs relevant to non-Aboriginal heritage and where they have been addressed.

Table 15-1: Project SEARs relating to non-Aboriginal heritage

SEARs	EIS section where requirement addressed
1. Assess and manage direct and / or indirect impacts to the heritage significance of:	Appendix P
(a) environmental heritage, as defined under the *Heritage Act 1977*	Section 15.5 Section 15.6
(b) items/places/properties listed on the Local, State, Commonwealth, National World Heritage and State Agency Section 170 Heritage and Conservation Registers or lists	Section 15.5 Section 15.6
(c) heritage items and conservation areas identified in environmental planning instruments applicable to the project area.	Section 15.5 Section 15.6
2. Where impacts to State or locally significant heritage items are identified, the assessment must:	
(a) include a significance assessment, a statement of heritage impact (SOHI) for all heritage items and a historical archaeological assessment	Appendix P
(b) assess the consistency of the project against conservation policies of any relevant conservation management plan	Section 15.3.2 Section 15.5 Section 15.6

SEARs	EIS section where requirement addressed
(c) consider impacts to the item of significance caused by, but not limited to, vibration, demolition, archaeological disturbance, altered historical arrangements and access, visual amenity, landscape and vistas, curtilage, subsidence and architectural noise treatment, drainage infrastructure, contamination remediation and site compounds (as relevant)	Section 15.5 Section 15.6
(d) outline measures to avoid and minimise those impacts during construction and operation in accordance with the current guidelines	Section 15.7
(e) justify changes to the heritage fabric of items or landscape elements, including analysis of alternative options	Table 15-6
(f) identify opportunities for the project to reflect on the heritage character and significance of the site and surrounding area during construction and operation through heritage interpretation	Section 15.6
(g) outline the future management framework for the ongoing protection, management and conservation of Heritage objects and other heritage values	Section 15.7
The assessment must be undertaken by a suitably qualified heritage consultant(s) and / or historical archaeologist. Where archaeological excavations are proposed the relevant consultant must meet the NSW Heritage Council's Excavation Director criteria).	Appendix P

15.2 Assessment methodology

15.2.1 Legislative and policy context

The assessment has been carried out in line with the project SEARs, and with reference to the following key legislation and guidelines:

- *Heritage Act 1977*
- Australia ICOMOS Charter for the Conservation of Places of Significance (Burra Charter) 2013 (Australia ICOMOS, 2013)
- Assessing Heritage Significance – Guidelines for assessing places and objects against the Heritage Council of NSW criteria (NSW DCCEEW, 2025e)
- Guidelines for preparing a Statement of Heritage Impact (DPE, 2023c)
- Skeletal Remains: Guidelines for Management of Human Remains (Heritage Office, 1977)
- Assessing Significance for Historical Archaeological Sites and 'Relics' (Heritage Branch of the DPE, 2009)
- Altering Heritage Assets (Heritage Council, n.d)
- Investigating Heritage Significance (Heritage Council, 2022)

- Design Guide for Heritage (GANSW, 2018)
- Design in Context Guidelines for Infill Development in the Historic Environment (Heritage Office, 2005).

15.2.2 Methodology

The assessment methodology included:

- a desktop review of non-Aboriginal heritage items in the vicinity of the site, including a search of:
  - World Heritage List
  - National Heritage List
  - Commonwealth Heritage list
  - State Heritage Inventory, including the State Heritage Register (SHR), section 170 registers, and local heritage items
  - Schedule 5 of the Parramatta LEP 2023
  - Schedule 5 of the Ryde LEP 2014
  - Precincts - Central River City SEPP 2021
- a review of primary research sources which confirms historic extent of listed sites and potentially identifies other, currently unlisted items including potential subsurface remains (archaeological potential)
- targeted field surveys, carried out in January 2025 to record built heritage, known and potential archaeological sites with potential to be impacted by the project
- an assessment of significance for built heritage items and potential archaeological sites based on the Burra Charter (ICOMOS, 2013) and the criteria from Assessing Heritage Significance (NSW DCCEEW, 2025e)
- identification of mitigation measures to minimise impacts to the significance of heritage items
- preparation of impact assessments for items of built heritage significance and archaeological significance for construction and operation of the project.

15.2.3 Study area

The study area for the SoHI (Appendix P) was defined as the project's impact area, with a 200 m buffer applied. The assessment investigated the potential for direct and indirect impacts to significant items, places and archaeology both in the impact area, and in the 200 m buffer area.

15.2.4 Assessment of archaeological potential

The assessment of archaeological impact considers the potential for the impact area to contain historical archaeological items. To identify areas within the impact area that had the potential to contain archaeology, an analysis was carried out of relevant historical aerials, maps and plans specific to the impact area and respective heritage listings. A review was then carried out of associated aerial imagery to identify evidence of past land disturbance, structures, topographical features, or other indicators aligning with the historic maps.

Areas identified during this search as having the potential to contain archaeology were then targeted during the field assessment in February 2025. Following this process, sites within the impact area that were found to have archaeological potential were classified using the framework in Table 15-2.

Table 15-2: Levels of archaeological potential

Level of archaeological potential	Explanation
High	Known, intensive activity has occurred (during the historical phase) that is likely to result in an archaeological resource. The activity is geographically constrained and is not likely to have been subject to subsequent disturbance.
Moderate	Known activity likely to result in an archaeological resource has occurred (during the historical phase). The activity is geographically constrained but may have been subject to subsequent disturbance.
Low	Known activity that may have resulted in an archaeological resource has occurred (during the historical phase). The activity is not geographically constrained and/or is likely to have been subject to substantial subsequent disturbance.
Unlikely	No known historical activity has been identified within a geographically constrained area that is likely to result in an archaeological resource and/or an area where subsequent subsurface impacts have been extensive.

15.2.5 Assessment of heritage impact

Heritage items within the impact area have been assessed against the criteria outlined in the NSW Material Threshold Policy (Heritage NSW, 2022). Impacts to heritage items have been defined as:

- direct impacts, which involves the demolition or alteration of the fabric, remains, or heritage significance of an item, place, artefact or archaeological remains
- indirect impacts, which involves no physical impact to an item, place or artefact but:
  - may affect the views and setting of the cultural landscape and nearby built items
  - cause damage through vibration through associated construction activities
  - cause groundwater drawdown, resulting in changes to significant ecosystems
  - cause subsidence that reduces the integrity of an item.

Once an impact to an item is assessed, the overall level of impact to the heritage significance of the item is confirmed by evaluating both positive and adverse impacts. The potential scale of impacts to items of heritage significance is summarised in Table 15-3.

Table 15-3: Scale of impact to heritage significance

Impact	Definition[15]
Total loss of significance	Major adverse impacts to the extent where the place would no longer meet the criteria for listing on the SHR.
Major adverse impact	Major (that is, more than minor or moderate) adverse impacts to State heritage significance.
Moderate adverse impact	Moderate adverse impacts to State heritage significance.
Minor adverse impact	Minor adverse impacts to State heritage significance.
Little to no impact (negligible)	An alteration to State heritage significance that is so minor that it is considered negligible. * Little to no impact (as opposed to no impact) acknowledges that any change would result in some level of impact/alteration to State heritage significance.
Positive impact	Alterations that enhance the ability to demonstrate the State heritage significance of an SHR listed place.

15.3 Existing environment

15.3.1 Historic context

Prior to European occupation, the Parramatta area was occupied by several Aboriginal clans who had lived in the area for over 60,000 years (City of Parramatta Council, n.d.). Many Aboriginal people, including people who are descendants of these clans continue to live in the area. More information on Aboriginal cultural heritage is provided in Section 16.3.1 and the ACHAR (Appendix Q).

Shortly after British Settlement occurred in 1788, colonists set out to establish new agricultural lands to support the colony at Port Jackson. In April of 1788, Governor Phillip led an expedition west along the Parramatta River in search of land that would be suitable for farming. The area, now known as Parramatta, was determined to be suitable for this purpose, and was officially established on 2 November 1788 as the township of Rose Hill. Over the next few years, the township of Rose Hill progressively grew and was renamed to 'Parramatta', after the Burramattagal place name meaning "head of a river." (Kass et. al., 1996). Free settlers and soldiers from the colony begun to be granted land along the Parramatta River and its tributaries to establish farms. During this time, several large farms were established around Duck River to the south of Parramatta River, and Subiaco Creek, to the north of the River. Notably, this included the Elizabeth Farm and homestead, which was owned by John and Elizabeth Macarthur and included much of the area now known as Camellia and Rosehill.

[15] Definitions sourced from the NSW Material Threshold Policy (Heritage NSW, 2022)

Throughout the 19th century, agricultural land begun to be subdivided for other uses, as well as for smaller farmland. An orphanage for girls was established in 1801 on the verge of Parramatta River and Vineyard Creek. A convent and girls' school were later built between Vineyard Creek and Subiaco Creek. The Rosehill Racing Club was opened to the south of the Parramatta River in 1885 and in 1896, a railway to Carlingford, Castle Hill and Dural was constructed through the Female Orphan School site. Further east at Meadowbank, the Meadowbank Rail Bridge was built as part of the Main North Line, linking Sydney to Newcastle by rail.

Agriculture would remain a prominent industry in the area until the late 19th century. The early 1900's saw agricultural lands begin to be subdivided to support new industrial services and residential land for the growing population. These land uses remain prominent in the area today. Following the end of the Second World War in 1945 suburban development rapidly increased in the area, particularly in Rydalmere, Ermington and Meadowbank.

In 2025 the Parramatta region is a highly urbanised area, reflecting its role as a central hub within Greater Western Sydney. The city of Parramatta serves as a major commercial and business district, featuring a skyline of high-rise buildings and a vibrant urban environment. Surrounding suburbs include a mix of residential development, ranging between low density suburban areas in Dundas to developments with high density apartments and townhouses in Meadowbank and Wentworth Point. The Camellia-Rosehill precinct is a significant commercial and industrial zone which is characterised by large manufacturing plants, warehouses, and other industrial facilities. The Parramatta River continues to be a prominent feature of the area, supporting recreational walking and cycling routes, as well as regular commuter ferry services.

Figure 15-1: View of the Female Orphan School, Near Parramatta by Joseph Lycett, 1825 (Source: State Library of Victoria 30328102131561/13)

Figure 15-2: Meadowbank baths and dressing sheds before 1926 (Source: City of Ryde Libraries, Object Number 2938.)

15.3.2 Heritage listings

The SoHI (Appendix P) did not identify any heritage items that are listed in World, Commonwealth or National heritage registers within the impact area. State and local heritage Items that were found on statutory registers and are within the impact area are listed in Table 15-4. Listed items within the 200 m buffer area are listed in Table 15-5 and shown in Figure 15-3. An assessment of significance for items listed in both tables is provided in Section 7.2 of the SoHI (Appendix P).

No items of potential heritage value have been identified for the impact assessment area.

There are 2 items within the impact area are subject to Conservation Management Plans (CMP). A CMP is a document prepared by an asset owner to assist them in managing the heritage significance of the asset while allowing for its continued operation. The relevant CMPs include:

- Female Orphan School, Rydalmere CMP 2000 (Tanner & Associates Pty Ltd, 2000)
- Sewage Pumping Station SP0067, Camellia: Conservation Management Plan (Extent, 2025).

An assessment of potential construction impacts is included in Section 15.5 and has been prepared with consideration to the policies and obligations in the CMPs. Sydney Water would carry out construction in line with the policies and guidelines of both CMPs to prevent damage to significant structures and potential loss of cultural heritage.

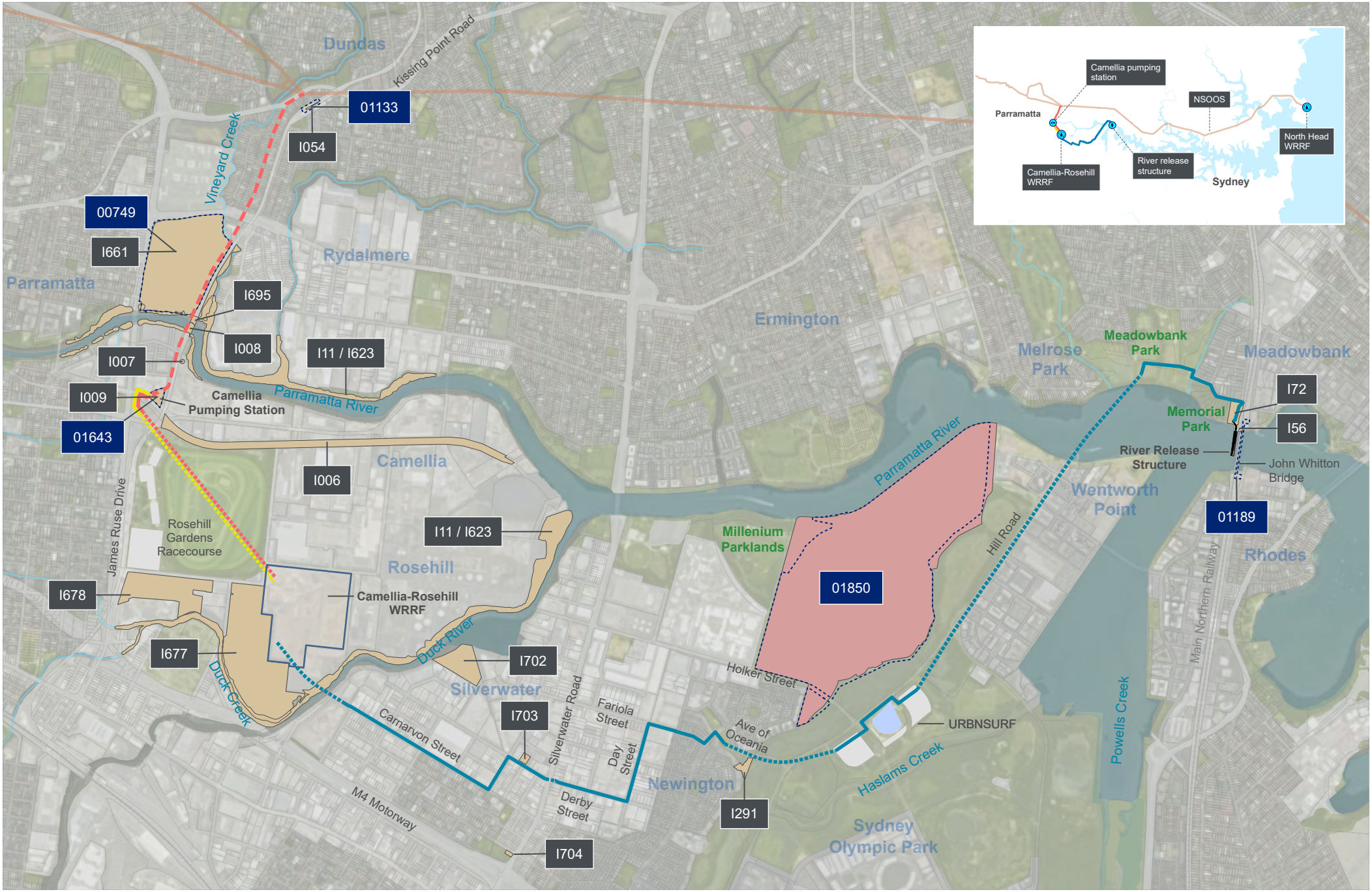
Table 15-4: Listed heritage items within impact area

Area	Item	Listing	Significance
Rydalmere	Rydalmere Hospital Precinct (former)	SHR (00749) Department of Health Heritage and Conservation section 170 Register (5000658)	State
	WSU Parramatta Campus (Former Rydalmere Hospital & Female Orphan School)	Parramatta LEP (I661)	Local
Camellia	Sewage Pumping Station 67	SHR (01643) Sydney Water section 170 Heritage and Conservation Register (4571724)	State
Meadowbank	Memorial Park (including obelisk) and remnants of former Meadowbank baths	Ryde LEP 2014 (I72)	Local

Table 15-5: Listed heritage items within 200 metres of impact area

Area	Item	Listing	Significance
Dundas	Dundas Railway Station / Dundas Railway Station Group	SHR (01133) TfNSW section 170 Heritage and Conservation Register (4801051)	State
Rydalmere	Camellia (Parramatta River) Underbridge Abutments	TfNSW section 170 Heritage and Conservation Register (4800212)	State
Camellia	Clyde Carlingford Rail Bridge abutments	Parramatta LEP 2023 (I8/I695)	Local
	Grave of Eliner Magee & Child	Parramatta LEP 2023 (I7)	Local

Area	Item	Listing	Significance
	Tram alignment	Parramatta LEP 2023 (I6)	Local
Parramatta	Wetlands	Parramatta LEP 2023 (I11/ I623)	Local
Rosehill	Capral Aluminium	Parramatta LEP 2023 (I677)	Local
Silverwater	Earnest Fleming Pty Ltd Machinery Merchants	Parramatta LEP 2023 (I703)	Local
	Dwelling	Parramatta LEP 2023 (I145)	Local
Newington	Explosives Store	SEPP (Precincts—Central River City) 2021 (Item 87) Parramatta LEP 2023 (I291) Sydney Olympic Park section 170 Heritage and Conservation Register (I42)	Local
	Newington Armament Depot and Nature Reserve	SHR (01850)	State
Sydney Olympic Park	Millennium Parklands Conservation Area	Precincts—Central River City SEPP 2021 (B)	State
Meadowbank	Meadowbank rail bridge over Parramatta River / Meadowbank (Parramatta River) Underbridge (John Whitton Bridge)	SHR (01189) Ryde LEP 2023 (I56) Canada Bay LEP 2013 (I542) TfNSW section 170 Heritage and Conservation Register (4805744)	State



State Heritage Register
Conservation Area - SEPP
Local Item - General

Proposed pipelines
Brine pipeline
Transfer pipeline
River release pipeline

Pipeline construction method
Open trench
Trenchless
Relining

Camellia-Rosehill WRRF

Figure 15-3 Overview of heritage items within study area

0 500 1000 1500 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

N

15.3.3 Archaeological potential

As described in Section 15.2.2, the SoHI (Appendix P) included identifying potential archaeological sites relevant to the project. The pipeline alignment primarily follows existing roadways where potential for archaeological findings would be low. Construction for the river release pipeline is proposed in the curtilage of the Memorial Park (including obelisk) and remnants of former Meadowbank baths (Ryde LEP #I72). The brine pipeline would be relined over the wetlands along the Parramatta River and the river release pipeline would be constructed underneath the Wetland along Duck River (Parramatta LEP) 2023 (I11/ I623). The pipelines are also within the curtilage of:

- Rydalmere Hospital Precinct (former) (SHR #00749, s170 #5000658 and Parramatta LEP #I661)
- Sewage Pumping Station 67 (SHR #01643, s170 #4571724 and Parramatta LEP #I9).

Within both sites, disturbance would be limited to areas with low archaeological potential.

At Meadowbank, Memorial Park was identified as having low potential to contain archaeological remains associated with the residence of F. Whitham. There is moderate potential for remains of the Meadowbank baths and land-side bath, and park related structures. Potential archaeological impacts are described and assessed in Section 15.5 and 15.6.

15.4 Avoid and minimise impacts

The project design and construction methodology has included the following measures to avoid or minimise potential impacts to non-Aboriginal heritage:

- locating pipelines in areas that have a history of disturbance (such as in roadways), to minimise the potential for archaeology and built heritage
- minimising excavation in the curtilage of the Rydalmere Hospital Precinct (former) by relining the existing wastewater pipeline
- improving the existing Camellia pumping station (Sewage Pumping Station 67 (Item no. 01643)) to maintain its continued use
- designing trenchless sections below the Wetlands to be deep enough to avoid interaction with root systems and to prevent groundwater drawdown
- designing the open trenching works in Memorial Park to:
  - avoid known original location of the Meadowbank baths to reduce the risk of encountering archaeology
  - minimise the need to remove vegetation to avoid impacting the aesthetic value of the park
- designing the river release pipeline in Memorial Park to:
  - avoid directly impacting built heritage features in the Park
  - avoid attaching the pipeline to significant features of the John Whitton Bridge.

15.5 Construction impacts

This section summarises the potential impacts to non-Aboriginal heritage items and archaeology. Table 15-6 summarises the project's potential impacts to listed non-Aboriginal heritage items and archaeology within the impact area.

All non-Aboriginal heritage items identified in the 200 m buffer area were found to have little-to-no impact from the project. As a result, these items have not been included in Table 15-6, however are considered further in Table 8.6 of the SoHI (Appendix P).

Table 15-6: Summary of potential impacts to non-Aboriginal heritage items within the impact area

Item	Summary of impacts during construction	Overall impact
Rydalmere Hospital Precinct (former) (SHR Item no. 00749, section 170 Department of Health Heritage and Conservation Registers (5000658)) / WSU Parramatta Campus (Former Rydalmere Hospital & Female Orphan School) (Parramatta LEP (I661))	**Direct impacts (built heritage)** The alignment of the existing pipeline to be relined for the brine pipeline travels through the far western curtilage of the Rydalmere Hospital Precinct (former). The alignment travels within 200 m of the Hospital Building which is a significant feature of the listing, and within 100 m of other structures associated with the site's former use as an asylum. This includes a sandstone and brick structure that is near the (current) early learning centre and is within 10 m of the impact area. While this structure is believed to have no heritage significance, it is thought that it represents the Precinct's boundary during the time it was the psychiatric hospital. The existing wastewater pipeline would be relined from a maintenance hole within WSU and from new access pits where required. Additional access points would be excavated along the alignment to facilitate the relining works. The project would not impact any significant features of the site and is consistent with the policies in Female Orphan School, Rydalmere CMP 2000 (Tanner & Associates Pty Ltd, 2000). Construction works would be restricted to the impact area assessed in the SoHI (Appendix P) which avoids significant built heritage features of the item. **Direct impact (archaeology)** Construction would occur in the far edge of the Precinct, located away from known development and significant structures. The site has been subject to moderate to high disturbance including that associated with the installation of the existing pipeline which is subject to proposed relining works. The area impacted by the project is expected to have low archaeological potential and therefore impacts to archaeology are unlikely. **Indirect temporary impact (views and vistas)** Around 4 construction compounds would be established within the curtilage of the item. These would be temporary for about a month and would be removed once relining works are complete. There is potential for compounds C10 and C11 to be partially visible from the Orphan School building. Despite this, the site has varying topography, several mature trees and modern buildings which are likely to obstruct views to significant buildings. During construction, it is not anticipated that there would be changes to the setting, views and vistas of the key heritage elements of the site. **Indirect temporary impact (settlement and vibration)** Relining works would require the use of equipment and machinery that generates vibration. No exceedances of the cosmetic damage screening criteria are expected. The potential for vibration to cause indirect impacts to significant	Little to no impact

Item	Summary of impacts during construction	Overall impact
	elements of the site is unlikely. More information on the cosmetic damage screening criteria is provided in Section 13.4.3.	
Sewage Pumping Station 67 (SHR Item no. 01643, Sydney Water section 170 Heritage and Conservation Register (4571724))	**Direct impacts (built heritage)** During construction, open trenching would be required within the heritage curtilage of the item to connect the new brine and transfer pipelines with the existing pump and valve infrastructure. This work would directly impact concrete and asphalt areas that have no significance to the building. The project would require the demolition of disused sheds behind the pumping station building, and removal of internal existing pumps and pipework. The CMP (Extent, 2025) outlines that much of the building's internal fabric is not original and is of low significance. The SoHI (Appendix P) concludes that the removal of the sheds and non-significant pumps and valves inside the Camellia pumping station building would not result in a direct impact to the heritage value of the site. New electrical connections into the building would be required. These connections would be made by drilling several small holes into the external brickwork, so that electrical wiring can be fed through into the services in the building. This would directly impact some brickwork which is identified in Sewage Pumping Station SP0067 CMP 2009 (Extent, 2025) as being of exceptional significance. Sydney Water would seek to minimise the extent of drilling into the fabric of the building wherever feasible. In line with the policies of the CMP, photographic and archival recordings of the building would be made prior to construction occurring to document the building. **Indirect temporary impact (views and vistas)** Sydney Water would establish a construction compound within the site boundary and curtilage for about 24 months. Machinery and equipment stored on the site would likely be visible in views of the Camellia pumping station building. Construction hoarding and fencing may temporarily obstruct views of the pumping station from Grand Avenue North. Views of the pumping station may be obstructed from the Rosehill Gardens light rail stop and active transport path, however, this view is currently mostly obstructed by trees, shrubs and site sheds. The site sheds would be removed to facilitate construction of a new electrical switch room and transmission yard. It is not expected that the removal of the site shed and construction of the electrical switch room and transmission yard would significantly impact views and vistas of the Camellia pump station from the Rosehill Gardens light rail stop and active transport path. Several Cypress Pine trees in the western area of the site may be required to be permanently removed for open trenching works. The trees make an aesthetic contribution to the site and contrast with the broader industrial setting. Despite this, the trees do not form part of the State Heritage listing for the site. The CMP (Extent, 2025) states that the trees have a low contribution to the heritage value of the site. If removed, the trees would not cause a significant indirect impact to the value of the site.	Minor adverse impact

Item	Summary of impacts during construction	Overall impact
	Indirect temporary impact (settlement and vibration) No exceedances of the cosmetic damage screening criteria are expected during construction at this item. The potential for vibration to cause indirect impacts to significant elements of the site is unlikely.	
Memorial Park (including obelisk) and remnants of former Meadowbank baths (Ryde LEP Item no. I72)	**Direct impacts (built heritage)** The river release pipeline is proposed within the curtilage of the item. Open trenching works for the river release pipeline would avoid and would not physically impact the Memorial Park obelisk. There is potential for construction to impact the 'Ryde Remembers' memorial. The memorial is not identified in the item's heritage listing as having heritage significance, however, it is acknowledged in the SoHI (Appendix P) as contributing to the war memorial motif of the Park. Sydney Water would work with City of Ryde Council on avoiding impacts to the Ryde Remembers memorial. This approach is outlined in Section 15.7. **Direct impact (archaeology)** There is moderate potential for remnants of the Meadowbank baths to be present at Meadowbank Park and in the Parramatta River. The river release pipeline would avoid the original location of the Meadowbank baths. Part of the river release pipeline would be located within the Bowen Street carpark, which is largely reclaimed land with low potential for archaeology. Sydney Water would construct a cofferdam (or other temporary work) on the edge of the Parramatta River at John Whitton Bridge. This area has experienced significant previous disturbance from the construction of the existing sandstone seawall. As a result, there is low potential to disturb remnant artefacts associated with the former Meadowbank Baths. Beyond the cofferdam, concrete blankets (or a similar performing structure) would be placed on the riverbed to minimise sediment disturbance, making it unlikely that associated artifacts would be uncovered or impacted. The impact area for the river release pipeline would travel through the known location of the original F. Whitham cottage. This location has undergone significant disturbance and is expected to have minimal remaining archaeology. Any archaeological remains found during construction would be unlikely to meet the criteria for heritage significance in Assessing Heritage Significance (DPHI, 2025). It is unlikely that construction would impact remnant archaeology. **Indirect temporary impact (views and vistas)** During construction there would be temporary indirect visual impacts associated with the presence of 3 construction compounds. These compounds would be present for between 6 to 8 months and would be visible from various areas of the park, including from the obelisk. Temporary fencing would be used during construction of the barometric loop and open trenching works for the river release pipeline. This would create a temporary visual barrier within the Park and may obstruct views of the obelisk and other memorial structures in the park from certain viewpoints.	Minor adverse

Item	Summary of impacts during construction	Overall impact
	Open trenching would require the removal of vegetation along the pipeline. Although these trees and bushes are not included in the heritage listing, their removal would impact on the Park's setting and views. **Indirect temporary impact (settlement and vibration)** Sydney Water would require the use of equipment and machinery that generates vibration when excavating for the river release pipeline and constructing the barometric loop. No exceedances of the cosmetic damage screening criteria are expected. The potential for vibration to cause indirect impacts to significant elements of the site is unlikely.	

15.6 Operational impacts

During operation, most infrastructure would be below ground or contained within buildings and would not be visible. There would be no direct impacts to heritage items within the impact area or impact assessment area.

As described in Table 15-6, the switchroom and transmission yard may obstruct views of the pumping station from the Rosehill Gardens light rail stop and active transport path. This view is currently mostly obstructed by trees, shrubs and site sheds. It is not expected that the switch room and transmission yard which are proposed for the same location as the existing site sheds would result in permanent significant impacts to views and vistas of the Camellia pumping station. The SoHI (Appendix P) concluded that despite the proposed drilling into the significant brickwork and removal of non-significant internal fabric, the proposed upgrades would improve the existing pumping station, and would maintain its continued use. This is considered an overall positive impact. At Rosehill, there would be permanent visual impacts to the sightlines from the curtilage of the Capral Aluminium site to the Camellia-Rosehill WRRF site. Despite this, the project would not change the setting of the area due to the WRRF site and surrounding area already having industrial land uses. The project would not have any permanent adverse impacts on the aesthetic significance of the structures (in particular the Moderne office building) within the curtilage of the item.

The Memorial Park would experience permanent indirect impacts to views and vistas from the barometric loop. The barometric loop would be visible from various areas within the park. While the barometric loop would be about 8 m tall and 3 m wide, it would be located in the north-eastern edge of the Park, away from the obelisk and significant features. This is expected to be a minor adverse impact to the setting, views and vistas of the Memorial Park during operation. The barometric loop may be incorporated into, or co-located with, or adjacent to, the existing toilet block. If required, a toilet block replacement or upgrade design would be developed through detailed design in consultation with City of Ryde Council. Sydney Water would consider reasonable opportunities to provide visual screening of the barometric loop for park users. This may include planting of vegetation, or heritage interpretation to include war memorial motifs or cultural heritage recognition in line with feedback received during Connecting with Country consultation.

No other non-Aboriginal heritage items, places or values are expected to experience impacts during operation.

15.7 Mitigation measures

As discussed in Section 15.4, the project has been designed to avoid impacts to non-Aboriginal heritage items, places and values. Sydney Water would manage potential impacts during construction through implementation of the CEMP (Section 6.4). Project specific mitigation measures that would be implemented to manage potential impacts to non-Aboriginal heritage are listed in Table 15-7.

Table 15-7: non-Aboriginal heritage management measures

ID	Potential impact	Mitigation measure	Timing
NAH01	Non-Aboriginal heritage impacts	Prepare a Heritage Management Plan as part of the CEMP. This would include:	Prior to and during construction

ID	Potential impact	Mitigation measure	Timing
		• a list of the identified heritage sites and their locations • Unexpected Heritage Finds Protocol • heritage awareness and management training for site induction processes including: – briefing on the heritage sensitivity of the impact area and moveable heritage within the Camellia pumping station – management measures – guidance on unexpected finds – obligations under the *Heritage Act 1977*.	
NAH02	Damage to items in the impact area due to vibration	Where vibration intensive construction is required within the minimum working distances of heritage items, the use of alternative equipment should be considered. For structures still within the site-specific minimum distances the following should occur to avoid exceeding the Cosmetic Damage Screening Criteria (AECOM, 2025): • condition survey before and after vibration intensive works. • vibration monitoring during vibration intensive activities. The vibration monitor should alert the supervisor when vibration levels reach or exceed the criteria.	Prior to and during construction
NAH03	Accidental direct impact to fabric of items, including: • the sandstone and brick feature at the Rydalmere Hospital Precinct (former) • Camellia pumping station (Sewage Pumping Station 67)	Install fencing to demarcate between work areas and heritage fabric in proximity of the works.	Prior to and during construction
NAH04	Unexpected damage to brickwork at Camellia pumping station (Sewage Pumping Station 67)	Utilise existing penetrations in brickwork where possible for new electrical connections. If not possible, prioritise drilling through mortar rather than brick to minimise damage to significant brickwork.	During operation

ID	Potential impact	Mitigation measure	Timing
NAH05	Unexpected heritage impact that does not comply with policies and guidelines of Conservation Management Plans for: • Female Orphan School • Camellia pumping station (Sewage Pumping Station 67)	Take photographic records to systematically survey the site before construction for archival purposes, in line with the relevant CMP policies. Should damage unexpectedly occur, the relevant CMP owners are to be notified and develop a plan to rectify impacts as reasonably possible.	Prior to and during construction
NAH06	Loss of vegetation in Memorial Park resulting in impacts to the aesthetic setting	Minimise removal of vegetation in the curtilage where possible. Replant removed vegetation. Refer to **TB10** (Appendix E).	Prior to and during construction
NAH07	Damage to or destruction of the Ryde Remembers memorial	During detailed design, prioritise protecting and retaining the plaque in its original location. If this is not possible, consult with City of Ryde Council to temporarily store and reinstate the plaque on the completion of works, or relocate the plaque permanently.	During detailed design Prior to and during construction

Aboriginal heritage

16 Aboriginal heritage

This chapter describes the Aboriginal sites and values that are relevant to the project. It also provides an overview of the likely impacts assessed during construction and operation of the project in the ACHAR (Kelleher Nightingale Consulting, 2025) (Appendix Q). The ACHAR establishes the archaeological, ethnohistorical, landscape and Aboriginal cultural values of the impact assessment area. The project has been designed to avoid known Aboriginal sites and as a result, no impacts to registered Aboriginal sites are expected during construction and operation. The project would have a positive impact on the health of the Parramatta River and surrounding waterways which are recognised as having cultural value.

16.1 Secretary's Environmental Assessment Requirements

Table 16-1 lists the SEARs relevant to Aboriginal cultural heritage and where they have been addressed.

Table 16-1: Project SEARs relating to Aboriginal heritage

SEARs	EIS section where requirement addressed
1. Assess and manage all impacts to the heritage significance of:	
(a) Aboriginal places, objects and cultural heritage values as defined under *the National Parks and Wildlife Act 1974* (NPW Act) and in accordance with the principles and methods of assessment identified in the current guidelines; and	Section 16.5 Section 16.6
(b) Aboriginal places of heritage significance, as defined in the Standard Instrument – Principal Local Environmental Plan.	Section 16.5 Section 16.6
2. Where impacts to Aboriginal places, and/or objects are identified, the assessment must:	
(a) be documented in an Aboriginal Cultural Heritage Assessment Report (ACHAR). This may include the need for survey and test excavation	Appendix Q
(b) assess impacts on Aboriginal Cultural Heritage values (tangible and intangible)	Section 16.3.6 Section 16.5 Section 16.6 Section 16.7
(c) outline measures to avoid and minimise those impacts during construction and operation in accordance with the current guidelines	Section 16.7
(d) outline procedures to be followed if Aboriginal objects, Aboriginal burials or skeletal material are found during construction or operation, which formulate appropriate measures to manage unforeseen impacts	Section 16.7

SEARs	EIS section where requirement addressed
(e) outline the long-term management framework for the ongoing protection, management and conservation of Aboriginal objects and other heritage values.	Section 16.7
3. Where archaeological investigations of Aboriginal objects are proposed these must be conducted by a suitably qualified and experienced archaeologist, in accordance with Section 1.6 of the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010).	Not applicable – no test excavations proposed.
4. Where impacts to Aboriginal objects and/or places is likely, consultation must be undertaken with Aboriginal people and stakeholders in accordance with the National Parks and Wildlife Regulation 2019 and current guidelines, including Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010.	Section 16.2.5 Section 16.5 Section 16.6

16.2 Assessment methodology

16.2.1 Legislative and policy context

The ACHAR (Appendix Q) was carried out in line with the following key legislation and guidelines:

- *National Parks and Wildlife Act 1974* (NPW Act)
- National Parks and Wildlife Regulation 2019
- Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW (OEH, 2010a)
- Guide to investigation, assessing and reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011)
- Aboriginal cultural heritage consultation requirements for proponents 2010 (OEH, 2010b).

16.2.2 Methodology

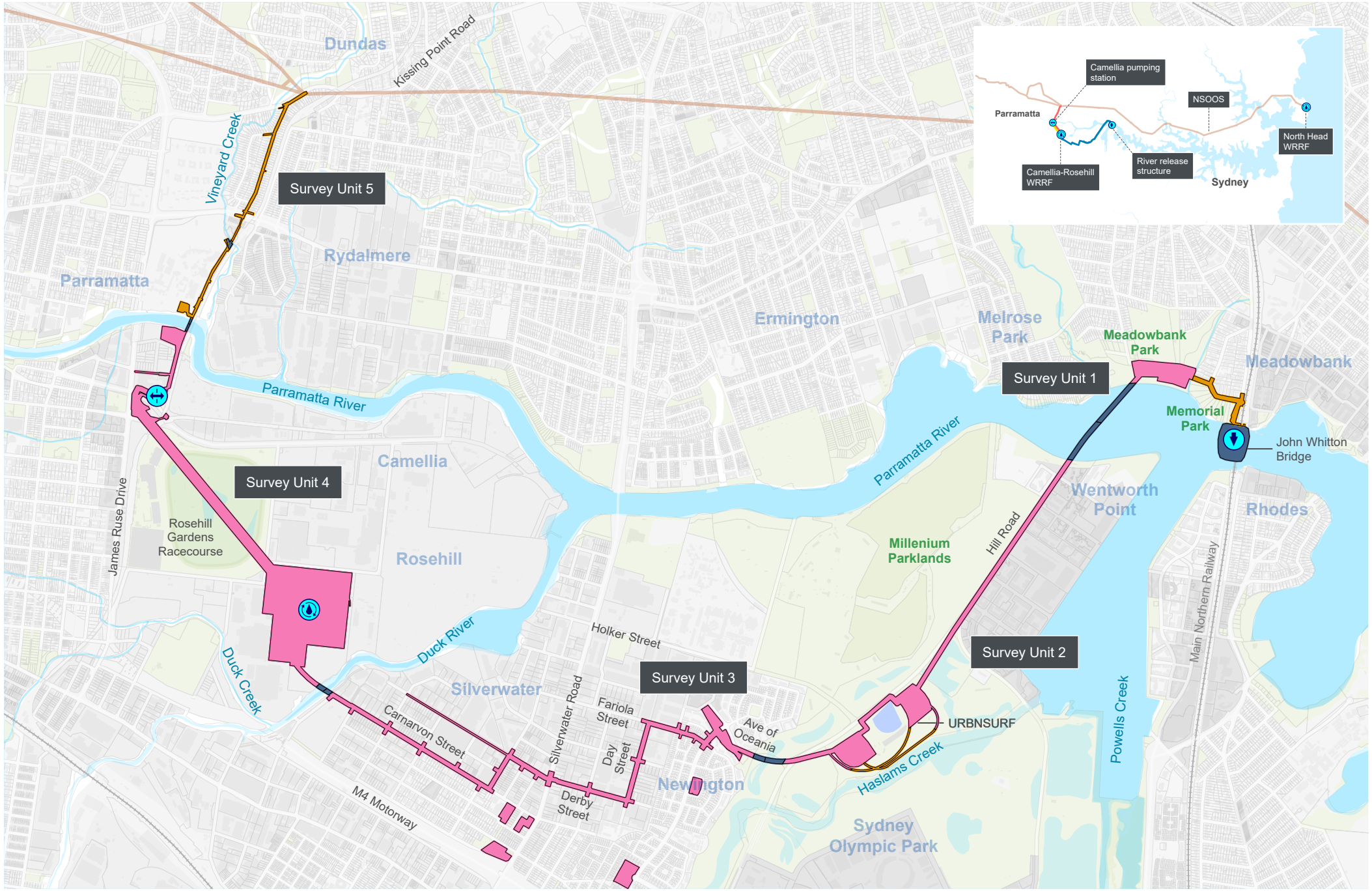
The assessment involved the following key activities:

- a desktop review of relevant literature and reports, including those prepared by other projects in the study area
- a search of statutory and non-statutory heritage registers, including:
  - Parramatta LEP 2023 and the Ryde LEP 2014
  - Section 170 Heritage and Conservation registers
  - State Heritage Register and State Heritage Inventory
  - Commonwealth Heritage List
  - National Heritage list
  - Australian Heritage Database (Register of the National Estate – Non-statutory archive)
  - Australian Heritage Places Inventory (Register of the National Estate – Non-statutory archive)

- a review of the Aboriginal Heritage Information Management System (AHIMS) database
- a review of the project area to identify any Aboriginal archaeological sites and potential archaeological deposits (PADs)
- archaeological field surveys of the impact area, which were carried out over 2 days in April 2025
- consultation with the Aboriginal community, which is described further in Chapter 5 (Engagement) and Section 17.7.2
- assessment of direct, indirect and cumulative impacts on Aboriginal heritage
- recommendation of appropriate mitigation measures.

16.2.3 Study area

The study area for the ACHAR (Appendix Q) was defined as the project's impact area. A buffer area of about [redacted] was applied to the impact area to identify registered AHIMS sites that are relevant to the project. The study area was divided into 5 survey units which are shown in Figure 16-1.



Camellia-Rosehill WRRF
Camellia pumping station
River release structure

Survey landform
Flat
Open Depression
Slope

Figure 16-1 Study area

0 500 1000 1500 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:27,500 @ A4
GDA2020 MGA Zone 56

N

16.2.4 Significance assessment criteria

The Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (OEH, 2010a) requires an assessment of significance assessment according to criteria established in the Australia ICOMOS Burra Charter (Australia ICOMOS, 2013). The Burra Charter and its accompanying guidelines are considered best practice standard for cultural heritage management, specifically conservation, in Australia. The Burra Charter sets out 4 criteria for the assessment of cultural significance:

- aesthetic value – the sense of the beauty of a place, object, site or item
- historic value – the association of a place, object, site or item with historical events, people, activities or periods
- scientific value – the importance of the data available for a place, object, site or item, based on its rarity, quality or representativeness, as well as the degree to which the place (object, site or item) may contribute further substantial information
- social value – the aspects of a place, object, site or item has become a focus of spiritual, political, national or other cultural sentiment to a group of people.

The impact area in the ACHAR (Appendix Q) does not display any aesthetic, historic, scientific or social value under the Burra Charter as it does not contain any identified Aboriginal archaeological sites or areas of potential.

16.2.5 Aboriginal stakeholder consultation

16.2.5.1 Aboriginal Cultural Heritage Assessment Report consultation

The ACHAR has been prepared in consultation with the Aboriginal community in accordance with the Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010 (DECCW, 2010b) and Clause 60 of the National Parks and Wildlife Regulation 2019. Members of the community were invited to register their interest in the project and share information around cultural significance and values. Those who registered were given the opportunity to review the draft ACHAR and provide feedback. The list of RAPs who registered their interest in the project is provided in Table 16-2.

Table 16-2: Registered Aboriginal Parties

Registered Aboriginal Parties		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Registered Aboriginal Parties		
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]		

16.2.5.2 Connecting with Country engagement

Sydney Water has also carried out consultation with the Aboriginal community in line with the GANSW's Connecting with Country Framework (2023). This engagement prioritised connections with Aboriginal elders, organisations and communities to share cultural knowledge, sacred stories and visions for cultural healing. The summarised outcomes of this engagement and how they have been considered in the design of the project is included in Section 17.7.2.

During the consultation process for the project, some stakeholders identified Aboriginal cultural values in relation to the wider impact assessment area. These are discussed in Section 16.3.6.

Table 16-3 summarises the engagement activities that have been carried out and are planned for the project.

Table 16-3: Summary of engagement with Aboriginal and First Nations community

Activity	Details
Constultation with RAPs	
Notification letters	Notification letters were sent to RAPs, and relevant local and State Government agencies to invite them to register their interest in the project. Recipients were also notified of the closing date of registration.
Advertising	Advertisements were placed in several newspapers to promote the opportunity to register for the project.
Provision of project information and proposed ACHAR methodology	Project information and a draft methodology were provided to registered parties to review for 43 days. Feedback was received from 3 parties and was considered in finalising the methodology for the ACHAR.
Provision of draft ACHAR for review	The draft ACHAR was issued to RAPs to review for 28 days. Feedback was received by 19 parties.

Activity	Details
Connecting with Country engagement	
Engagement for the project	Engagement with the Aboriginal Community was carried out for the project in line with the Connecting with Country Framework (GANSW, 2023). This engagement aimed to share cultural knowledge, stories and values, and identify opportunities to recognise cultural heritage through the design of the project.
Ongoing consultation with the Aboriginal community	Sydney Water maintains ongoing dialogue with the Aboriginal community outside of this project. For this project, engagement with the process and targets for engagement with the Aboriginal community would be documented in the CSEP.

16.2.6 Assumptions

Existing information sources provide an indication of the Aboriginal archaeology of an area but do not represent the entire potential archaeology of that area. Involvement of the RAPs provides a comprehensive consultation process but does not include input from Aboriginal stakeholders who did not register to be involved in the project.

16.3 Existing environment

16.3.1 Cultural context

Aboriginal people have a long history of inhabiting the Greater Sydney region from the coastal areas in the east, to the Blue Mountains in the west. The original inhabitants and traditional owners of the GPOP area are the Wangal, who occupied land on the southern side of the Parramatta River, and the Wallumedegal clan, who lived north of the Parramatta River. The area comprising present day Parramatta has been occupied by the Burramattagal people, a clan of the Dharug, for over 60,000 years. The name ‘Burramattagal’ is thought to be derived from the Aboriginal word for 'place where the eels lie down' to breed (within the Parramatta River) (City of Parramatta Council n.d.).

Many Aboriginal people lived in ‘clans’ with complex social and cultural practices that included laws, customs and cultural obligations. Caring for Country was, and continues to be, a fundamental component of Aboriginal culture. It involves a reciprocal relationship where Country (land, waterways and oceans) is recognised as a living entity which people should respect, listen to its needs and give back to ensure its balance and biodiversity is maintained.

The Parramatta River and surrounding waterways were a resource rich area which supported a variety of marine and land animals. Fish and shellfish were an important food source for local inhabitants, who used the flat, marshy areas of the river to fish, and collect other marine animals. Shell materials were also used for tools, including spear barbs and scarpers to sharpen tools. The Parramatta River also served as an important meeting

place to trade food, hold events such as corroborees, initiations, marriage exchanges, funerals and combat rituals (PRCG, 2018).

On land, grasslands provided habitat to a range of land-based animals including kangaroos, birds and small mammals. These formed an important part of the local diet. Plants and vegetation provided additional sources of food and were also utilised as medicine, and to create tools, canoes and shelters.

Some of the most common types of archaeology that continues to be found within the region in present day includes stone artefacts, shell midden deposits and shelter sites with art.

16.3.2 Historical context

Early colonial records suggest that despite differences in specific language, customs and material culture, the Wangal, Wallamedegal, and other neighbouring 'clans' would have interacted for ceremonies, intermarriage, dispute resolution and trade.

Soon after arrival of the First Fleet in 1788, Parramatta was identified as a suitable location to support a new farming settlement to feed the new English colony. This resulted in the rapid displacement of Aboriginal clans and groups from their traditional lands. Many local Aboriginal groups led resistance efforts against colonists.

In mid-1789, a large outbreak of smallpox, believed to have been introduced by colonist ships, caused widespread fatalities throughout the Aboriginal population of the greater Sydney region. Governor Phillip estimated that the outbreak led to the deaths of half of the known Aboriginal population. The full scale of the outbreak is not known. This epidemic dramatically altered the size and structure of the Aboriginal population living in the Cumberland Plain. Many children were orphaned and some went to live in the colony.

In a contemporary context, the cultural and historical significance of the Parramatta and Greater Sydney region is complex. As European colonisation expanded, many Aboriginal people were brought to Sydney and Parramatta as an underpaid workforce in domestic service and building infrastructure. Many historical policies and initiatives, including the Assimilation Policy, which have caused humanitarian and cultural harm began outside of the Parramatta Town Hall (City of Parramatta Council n.d.). Of relevance to the project, the Female Orphan School (Parramatta LEP (I661)) at Rydalmere housed a number of young girls including some Aboriginal children between the years 1801 and 1829 (City of Parramatta Council n.d.). Many Aboriginal and First Nations people continue to live, work and practice culture in Parramatta and Greater Western Sydney.

16.3.3 Archaeological context

The current scientific understanding of the human occupation of the Australian continent is that Aboriginal people have lived in Australia for at least the last 40,000 - 60,000 years. Archaeological evidence shows that the Sydney Region has been occupied since at least 18,000 years ago. Archaeological investigation is reliant on the artefacts or physical evidence of human activities which have survived anywhere from centuries to thousands of years. The oldest of these artefacts are likely to represent a small fraction of the objects that were used by Aboriginal people with even the most robust organic materials unlikely to survive in contexts older than 6,500 years. As a result, and in addition to the highly disturbed urban context of the study area, the likelihood of intact

subsurface archaeological deposit is considered very low to nil. The majority of the study area was found to comprise human-made fill and disturbed terrain as a result of urban development with no archaeological potential and no requirement for test excavation under the Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (OEH, 2010a).

16.3.4 Desktop assessment

A search of the AHIMS database was carried out on 14 October 2025 to identify registered (known) Aboriginal sites or declared Aboriginal places within or adjacent to the study area. No sites were found within the impact area. The search results found 30 registered Aboriginal sites in the impact assessment area. Artefact scatters were the most prevalent in the study area, making up 40 per cent of the search results. Other features include art remnants (pigments or engravings), shell midden artefacts, and grinding grooves. There were 3 sites classified as having PADs.

Out of all the identified AHIMS sites, 6 would fall within [redacted] of the project (Table 16-4 and Figure 16-2). This would include [redacted] that are near the [redacted], as well as [redacted]. [redacted] would travel in the vicinity of [redacted] sites at [redacted], and [redacted] at [redacted].

Table 16-4: Registered AHIMS sites within [redacted] of the project impact area

Site name	AHIMS ID	Site type/ site feature	Status	Distance to impact area
[redacted]	[redacted]	Low density scatter (3 silcrete flakes)	Destroyed	[redacted] to brine pipeline and compound C8
[redacted]	[redacted]	Artefact – open camp site	Valid	[redacted] to Camellia pumping station and compound C16
[redacted]	[redacted]	PAD	Valid	[redacted] to river release pipeline and compound C27
[redacted]	[redacted]	Grinding groove	Valid	[redacted] to river release pipeline and compound C28
[redacted]	[redacted]	Artefact – shell	Valid	[redacted] to river release pipeline and compound C29
[redacted]	[redacted]	Artefact	Valid	[redacted] to river release pipeline and compound C29

16.3.5 Archaeological field survey

An archaeological field survey was carried out from 3 to 4 April 2025 to record any Aboriginal archaeological sites or areas with potential to contain Aboriginal objects. The survey concluded that land across the corridor had been significantly disturbed and modified due to urban development. No Aboriginal objects, archaeological sites or areas of archaeological potential were identified. Due to this, no test excavations were carried out for the project.

16.3.6 Aboriginal cultural values

The following Aboriginal cultural heritage values were identified by RAPs during consultation for the project:

- ancestral association with the land
- responsibility to look after the land, including the heritage sites, plants and animals, creeks, rivers and the land itself
- artefact sites and landscape features
- connectivity of sites throughout the landscape
- creek lines, particularly larger landscape features and waterways such as Parramatta River
- native plants and animals
- general concern for burials, as their locations are not always known.

Sydney Water recognises that Aboriginal cultural knowledge was traditionally passed on through oral traditions and that the long-lasting effects of colonisation have disrupted many practices where important cultural knowledge was shared. As described in Section 16.2.5, Sydney Water has carried out targeted engagement with the Aboriginal community in accordance with the Connecting with Country Framework (GANSW, 2023). This engagement has prioritised sharing and understanding valuable cultural knowledge, stories and aspirations to shape the design of the project. Section 17.7.2 summarises how Sydney Water is responding to cultural knowledge shared during the Connecting with Country engagement.

16.4 Avoid and minimise impacts

The approach to design development for the project has involved proactively identifying areas and items of cultural, environmental and social significance. Various options for the location of the WRRF, Camellia pumping station, and pipelines considered avoiding these areas (Section 2.4). As outlined in Section 16.3.4, there are [redacted] AHIMS sites are within [redacted] of the project. These sites were identified early in the Concept design development process and as a result, were able to be avoided. As a result, no Aboriginal sites or PADs would be harmed by the project.

16.5 Construction impacts

16.5.1 WRRF

Construction at the WRRF would occur adjacent to Duck River. Chapter 7 (Waterways assessment) and Appendix F (Hydrodynamics and Water Quality Impact Assessment) identify that Duck River has generally poor water quality due to historic industrial land uses in the area. The WRRF site contains residual contamination from previous industrial land uses (Chapter 9 (Soils and Contamination)). Sydney Water has carried out site management works to manage contamination on the site under a separate planning approval. During construction of the WRRF, Sydney Water would implement soil, sediment and erosion controls. This would limit the potential for contaminated and uncontaminated soil from entering Duck River and Parramatta River. With the implementation of adequate mitigation measures there would be an overall low risk for construction at the WRRF site to result in environmental harm to the surrounding waterways.

The WRRF site contains limited vegetation and no permanent structures so there is low potential for animals to live at the site. Some animals including birds, amphibians and other marine animals use the mangroves along Duck River as habitat. Some threatened ecological community plants are present along the western boundary of the WRRF site. No vegetation is proposed to be removed within the WRRF site and as a result, it is not anticipated that any animals, amphibians or marine animals would be vulnerable to habitat loss.

The WRRF site has been used for various industrial purposes since around 1940. Field surveys carried out for the ACHAR (Appendix Q) identified the WRRF site as being highly disturbed due to previous industrial development. Part of the site would also be capped by about 1.7 m under a separate planning approval. As a result, the archaeological potential of the WRRF site is low. There are no known Aboriginal objects, archaeological sites, or areas of archaeological potential within the site. Construction of the WRRF would not directly or indirectly impact Aboriginal objects, sites or areas of archaeological potential.

16.5.2 Camellia pumping station

Camellia pumping station is within [redacted] of [redacted] (AHIMS 45-6-2559). Construction works for the upgrade would occur entirely within the existing Camellia pumping station site, which has been subject to significant previous disturbance. This AHIMS site is not within the impact area, and as a result would not be impacted.

16.5.3 Pipelines

The construction of the brine and transfer pipelines, and river release pipeline would occur within [redacted] of 4 AHIMS sites (Table 16-4). All 4 AHIMS sites are considered to be a suitable distance from the impact area. No impacts are anticipated.

Pipelines would be constructed using HDD methods beneath the Parramatta and Duck Rivers. The proposed construction methodology would avoid the removal of mangrove vegetation along both waterways. Locating

pipelines below the waterways would also assist in preserving the natural landscape of both waterways. Chapter 11 (Terrestrial biodiversity) identifies that the removal of vegetation including trees would be required in some areas along the pipeline alignments. Across the impact area there is a range of remnant and planted vegetation. Sydney Water would seek to avoid the removal of remnant vegetation and would minimise the amount of vegetation removed during detailed design for the project. Where removal of vegetation cannot be avoided, Sydney Water would seek to provide replacement trees in the same location. Where this is not feasible Sydney Water would consider replacement vegetation in the WRRF site to contribute to a net increase in tree canopy on the site.

16.5.3.1 Brine and transfer pipeline

Relining of the existing rising main in Dundas and Rydalmere would occur within [redacted] of [redacted] (AHIMS 45-6-3151). This artefact scatter was of low cultural and archaeological significance and is believed to have been destroyed by past landscaping works unrelated to the project.

In Rosehill, the brine and transfer pipeline would travel within [redacted] of the [redacted] (AHIMS 45-6-2559). This AHIMS site has experienced significant disturbance and is of low archaeological significance.

16.5.3.2 River release pipeline

There are 4 AHIMS sites within [redacted] of the river release pipeline (Table 16-4).

At Sydney Olympic Park, works would occur within [redacted] of a PAD ([redacted] (AHIMS 45-6-2785)). Construction compounds would be established in the hardstand carparking areas of the URBNSURF facility. These compounds would be used for launch and retrieval pits for trenchless pipeline sections and would include laydown and storage. Open trenching and horizontal direction drilling for installation of the new pipeline would also occur within the compound area and along Hill Road. These works would all occur within the impact area and would not impact AHIMS 45-6-2785.

At Meadowbank Park, the open trenching works for the river release pipeline would travel within [redacted] of [redacted] (AHIMS 45-6-3039).Open trenching works and construction of the barometric loop would occur within [redacted] of [redacted] (AHIMS 45-6-0534) and [redacted] (AHIMS 45-6-3050). All 3 sites within Meadowbank are located on separate properties that do not form part of the impact area. Impacts to these sites would not occur.

16.6 Operational impacts

As no Aboriginal heritage constraints have been identified for the project, no negative impacts are anticipated during operation of the project.

Engagement carried out with RAPs for the ACHAR (Appendix Q) and under the Connecting with Country Framework has highlighted that the water quality in the Parramatta River and surrounding waterways is a cultural concern. Chapter 7 (Waterways assessment) outlines that during operation of the project, the water quality in the Parramatta River is expected to improve as a result of the release of treated water. This project benefit aligns with and promotes the cultural values of caring for the land and waterways.

16.6.1 WRRF

As described in Section 17.7.2 and in the Place and Design Framework (Appendix R), Sydney Water would consider opportunities to integrate Aboriginal cultural heritage into the final design of the WRRF. This may include but not be limited to the use of interpretive signage along Devon Street within the public interface zone to provide community education on historical context of the site and surrounding waterways. Sydney Water would also plant new vegetation in the WRRF site, particularly around the administration building. Sydney Water would prioritise planting native plant species that would not adversely impact waterways. These aspirations for the WRRF would align with the identified cultural heritage values around native plants, and a responsibility to look after the land.

16.6.2 Pipelines

During operation, most of the pipeline infrastructure would be below ground and would not be visible. Exceptions include the aerial pipeline crossings at Charity Creek and the Unnamed Creek in Meadowbank Park, along with the barometric loop in Memorial Park. The existing rising main crossing Parramatta River between Camellia and WSU is also above ground, however this is existing infrastructure. Visual impacts for the aerial crossings would be minimal due to the crossings being co-located with an existing bridge or across an existing concrete stormwater channel. It is expected that locating infrastructure below ground and inside or adjacent to existing infrastructure would reduce the visual impacts to the Parramatta River and surrounding waterways. Minimising the visual impact of pipeline infrastructure assists in preserving views of natural landscape, which is of increasing importance as the surrounding area undergoes significant urbanisation.

The barometric loop would be visible from multiple areas within Memorial Park at Meadowbank. Sydney Water would continue to engage with the Aboriginal community throughout the detailed design process for the barometric loop to investigate opportunities for cultural heritage interpretation at Memorial Park, specifically regarding design of the barometric loop facade.

16.7 Mitigation measures

Table 16-5 outlines the mitigation measures Sydney Water proposes to manage Aboriginal heritage impacts. As discussed in Section 16.4, the project has been designed to avoid impacts to known Aboriginal items and places. There are no site-specific mitigation measures proposed as no aboriginal constraints were identified for the project.

Table 16-5 Aboriginal heritage management measures

ID	Potential impact	Mitigation measure	Timing
AH01	Impacts to Aboriginal heritage, including unexpected finds	Develop and implement a Heritage Management Plan as part of the CEMP. This would include: • roles and responsibilities • map of approved work areas and access points to avoid known AHIMS sites • inducting all construction site staff (before they start work) on known heritage items nearby and measures to be implemented during construction to avoid impacts. Inductions will include: – briefing on approved working areas and access points – management measures (including no-go zones) – Unexpected Finds Protocol – obligations under the *National Parks and Wildlife Act 1974*.	Prior to and during construction
AH02	Unexpected finds – Human skeletal remains	In the event that construction activity reveals possible human skeletal material (remains) an unexpected finds human skeletal remains procedure will be implemented in accordance with the Skeletal Remains – Guidelines for the Management of Human Skeletal Remains under the *Heritage Act 1977* (Heritage Office, 1977) and the Aboriginal Cultural Heritage Standards and Guidelines Kit (NPWS, 1997).	During construction

Visual, landscape and place making

17 Visual, landscape and placemaking

This chapter assesses the landscape and visual amenity impacts for the project during construction and operation. It also provides a summary of the WRRF Place and Design Framework (GHD, 2025b) (Appendix R) which outlines Sydney Water's approach to placemaking and urban design at the Camellia-Rosehill WRRF site.

Visual and landscape character impacts during construction are associated with visible construction compounds, machinery and equipment, stockpiles and at some locations, vegetation removal. As expected, impacts during construction have been assessed for most locations to range from moderate to high. However these visual impacts would be temporary and mitigations are recommended to further reduce impacts. During operation, most infrastructure would be below-ground or in buildings and would not be visible. The exceptions are Devon Street and Unwin Street where the new WRRF would be built and where low to moderate visual impacts are expected. The installation of a permanent barometric loop at Memorial Park is expected to have low residual visual impacts once installed, given measures to visually integrate this structure into the landscape.

17.1 Secretary's Environmental Assessment Requirements

Table 17-1 lists the SEARs relevant to landscape and visual amenity impacts, and placemaking and where they have been addressed.

Table 17-1: Project SEARs relating to landscape and visual amenity, and placemaking

SEARs	EIS section where requirement addressed
1. A design led process that is informed, collaborative and iterative, which	
(a) utilises good design processes (such as Design Excellence and Design Review)	Section 17.7
(b) utilises design experts and multidisciplinary teams	Section 17.7
(c) is designed with and connected with Country	Section 17.7.2
(d) involves the Department of Planning, Housing and Infrastructure (State-led Rezoning team) and other stakeholders	Section 17.7.1
2. Identify place principles that are reflective of the design objectives in Better Placed, including a focus on: (a) fit – contextually, culturally, local and of its place (including future development state of the surrounding environment (b) performance – sustainable, adaptable and durable working – functional, efficient and fit for purpose	Section 17.8 Appendix R

SEARs	EIS section where requirement addressed
(c) working- functional, efficient and fit for purpose (d) value – creating and adding value to the community (e) look and feel – engaging, inviting and attractive.	
3. Include and illustrate place designs, outcomes and actions for the project that protect and facilitate improvements to the built environment and place, including in relation to:	Appendix R
(a) built form (including key project elements and amenity impacts on the surrounding environment)	Section 17.8.1 Appendix R
(b) Aboriginal Cultural Heritage and Environmental heritage (including maritime) having regard to the results of any consultation and archaeological investigations	Section 17.7.2 Appendix R
(c) views and vistas: (i) an assessment of visual impact and visual representations of the project from key locations to illustrate the project where visual impacts are deemed greater than medium (ii) consideration of views from the proposed future redevelopment of the Camellia-Rosehill precinct (iii) methods for screening the facility from publicly accessible areas and future redevelopment within the Camellia-Rosehill precinct	Section 17.5 Section 17.5.9 Section 17.6 Section 17.8 Appendix R
(d) provision of adequate bicycle parking and high-quality end-of trip facilities.	Appendix R
4. Identify green infrastructure design principles that are reflective of the principles in Greener Places and The Sydney Green Grid.	Section 17.6.1 Section 17.8.1 Appendix R
5. Include and illustrate green infrastructure designs, actions and outcomes for the project including in relation to: (a) green infrastructure that supports recreation, biodiversity and waterway health (b) how the project will achieve a net increase in tree numbers and canopy within proximity of the impacted area (c) mitigating urban heat island effects and provide appropriate comfort levels on-site how the design of the facility and its interface will integrate into the landscape. (d) how the design of the facility and its interface will integrate into the landscape.	Section 17.8.1 Appendix R

17.2 Assessment methodology

17.2.1 Legislative and policy context

The assessment of landscape and visual impacts (GHD, 2025e) has been carried out in line with the project SEARs, as well as the following guidance documents:

- Guideline for landscape character and visual impact assessment - Environmental impact assessment practice note EIA-N04 - Version 2.3 (Transport for NSW, 2020c)
- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (Landscape Institute and Institute of Environmental Management & Assessment, 2013)
- Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2022k).

17.2.2 Methodology

The assessment for landscape and visual amenity impacts methodology included:

- a desktop review of the study area to identify likely viewpoints from publicly accessible areas and to identify potential sensitive visual receiver locations
- site visits, which were carried out in November 2024 between the hours of 9 am and 3 pm on a clear day. Various locations within the study area were visited to understand the landscape character, confirm publicly accessible viewpoints and sensitive visual receivers identified in the desktop review, and to take photographs from viewpoints and other locations identified in the desktop review
- assessment of potential landscape and visual impacts during construction and operation of the project
- identification and recommendation of appropriate mitigation measures.

Potential landscape and visual amenity impacts are typically measured with consideration to the sensitivity of a landscape or view, and the magnitude of a project. A criteria was developed in line with the Guideline for landscape character and visual impact assessment - Environmental impact assessment practice note EIA-N04 - Version 2.3 (Transport for NSW, 2020c) to measure the sensitivity and magnitude criteria for landscape character and visual amenity. Impacts were then rated as high, moderate, low or negligible.

This process for measuring the sensitivity and magnitude is shown in Figure 17-1 and the impact rating matrix in Table 17-2.

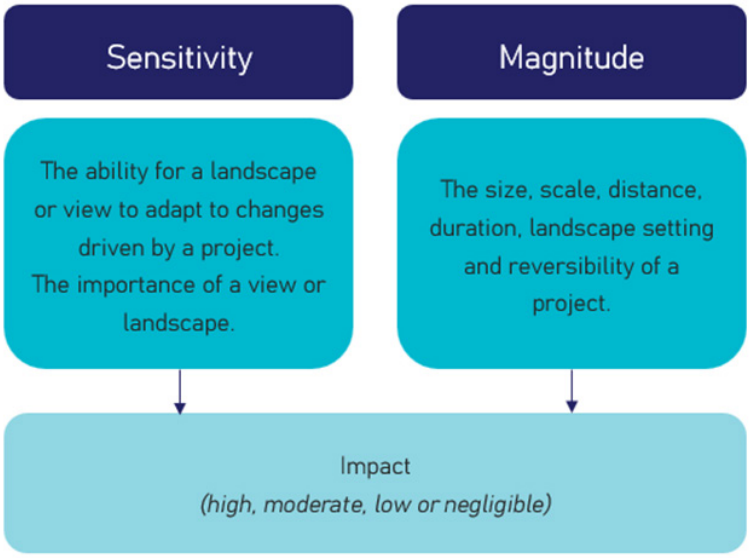


Figure 17-1: Process for assessing sensitivity and magnitude of impacts

Table 17-2: Landscape character and visual impact rating matrix

		Magnitude			
		High	**Moderate**	**Low**	**Negligible**
Senstivity	High	High	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
	Low	Moderate	Moderate-Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

17.2.3 Study area

The study area considered in this assessment included the impact area, as well as a 1000 m buffer. This approach was used for both the assessment of landscape character and sensitivity and visual impacts. The study area was selected by considering the current and future land uses of the area, as well as the topography and significant features and views. The study area is shown in Figure 17-2 and Figure 17-3.

17.2.4 Landscape character and sensitivity

In order to understand the landscape impacts of the project, Landscape Character Units (LCUs) have been assigned to land within the study area. An LCU is identified using an assessment of the natural and human-made features of an area, with consideration given to the topography, vegetation, water features, land use and cultural elements, such as historic sites or buildings. The study are was categorised into 5 distinct LCUs, which are shown in Figure 17-2 and described in Section 17.3.1.

17.2.5 Visual amenity

A visual impact is experienced when a development is visible from multiple viewpoints and impacts the amenity of people experiencing a landscape from a particular viewpoint. Fifteen viewpoints were identified within the study area which have potential views of the project. Viewpoints were selected to represent private and public receivers with potential views during either construction and or operation and considered the following key factors:

- residential areas, noting that residents are often highly sensitive to changes in their visual environment
- parks, recreational areas, and other public spaces, where people spend time and enjoy the landscape are deemed important
- major roads, railways, and footpaths are included to assess the views of travellers and commuters
- future land uses as outlined in strategic planning documents, including the Camellia-Rosehill Place Strategy (DPE, 2022b).

To assist with determining visibility, a zone of theoretical visibility (ZTV) map was generated for the project. This was based on the likely highest point of infrastructure located within the WRRF (25 m) and a viewing height of 1.7 m.

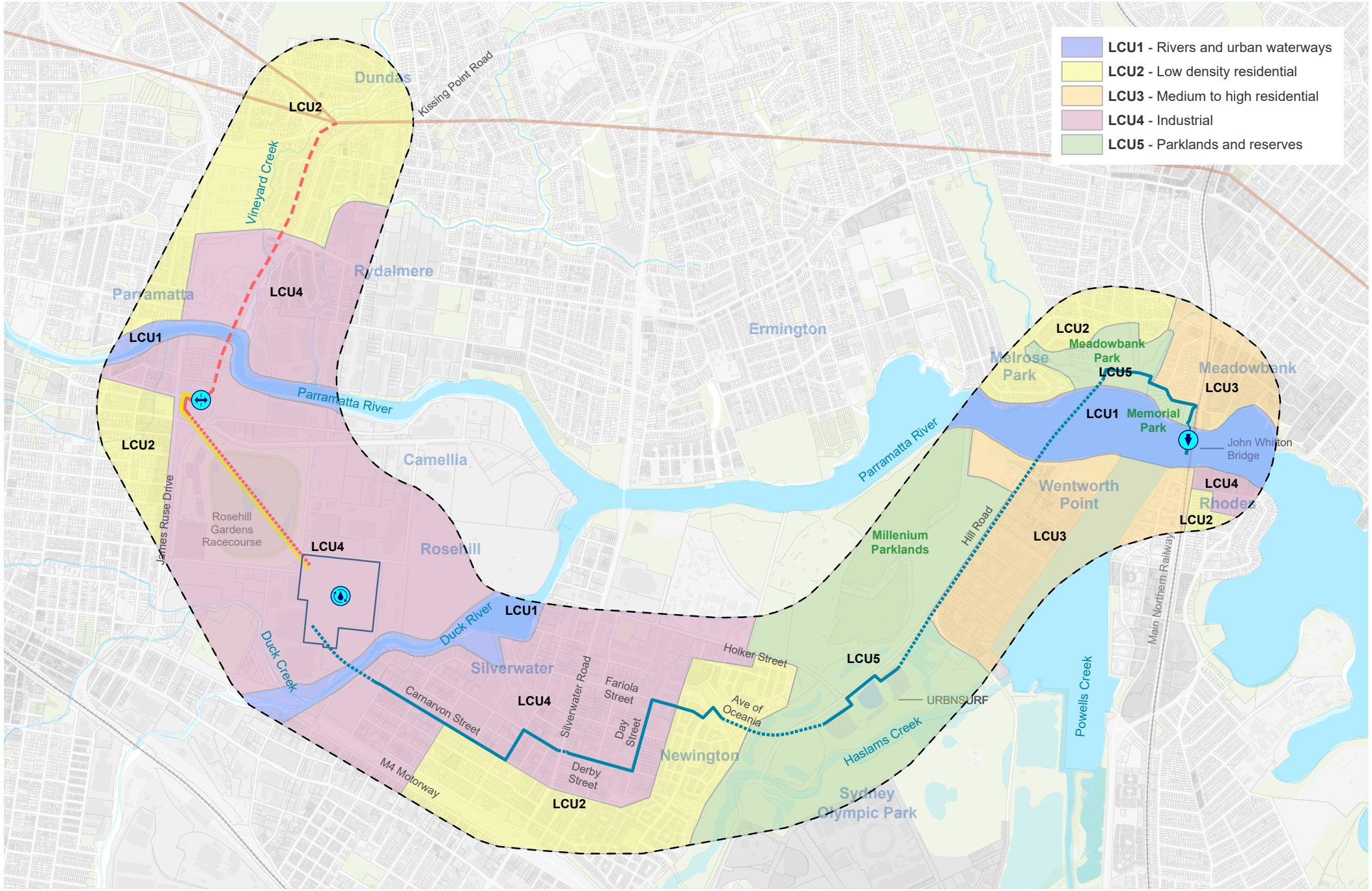
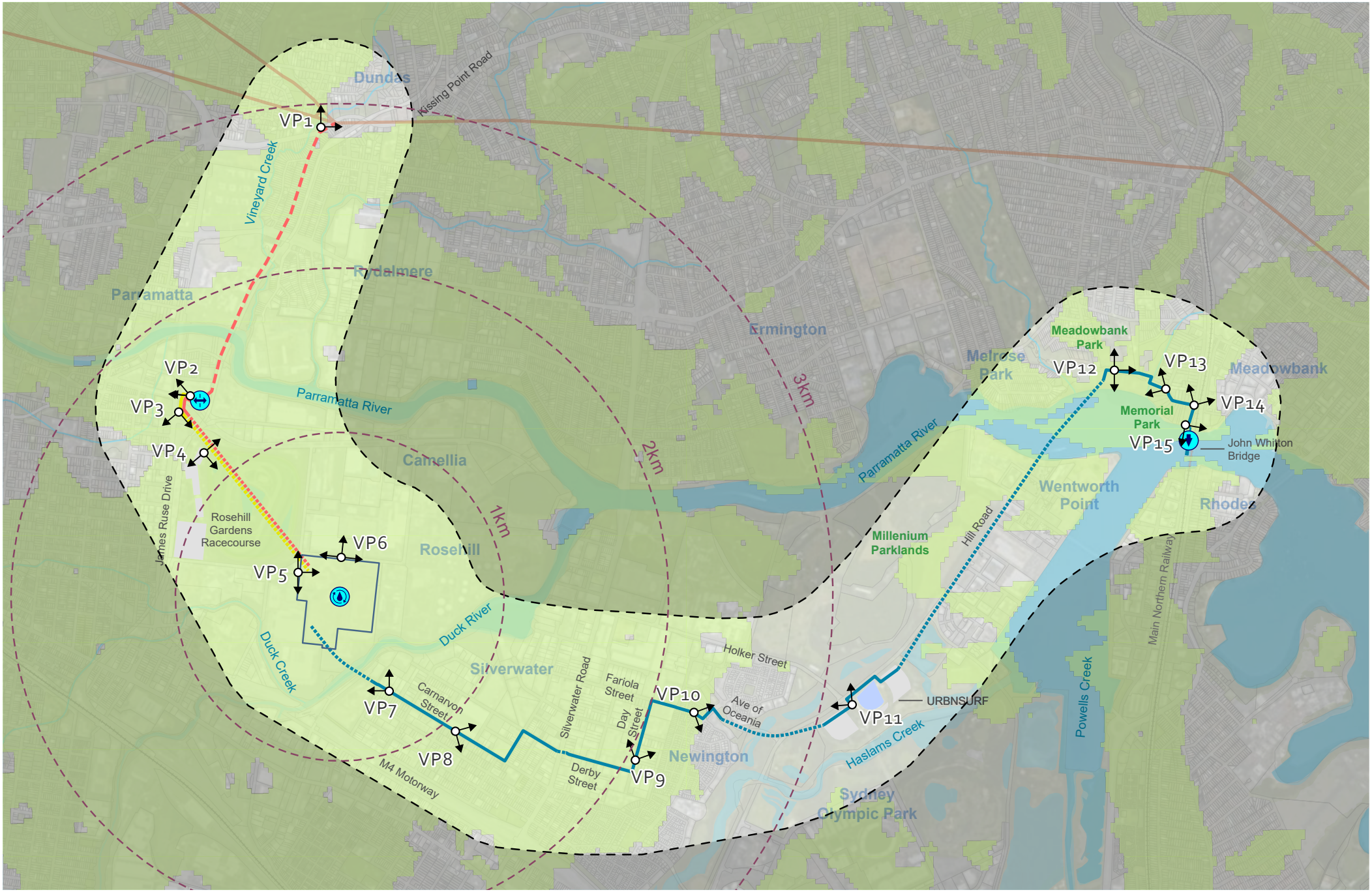


Figure 17-1 Landscape character zones

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:30,000 @ A4
GDA2020 MGA Zone 56



Camellia-Rosehill WRRF
Camellia pumping station
River release structure

Proposed pipelines
Brine pipeline
Transfer pipeline
River release pipeline

Pipeline construction method
Open trench
Trenchless
Relining

Northern Suburbs Ocean Outfall Sewer (NSOOS)
Study area
Viewpoints
Zone of theoretical visibility

Figure 17-2 Representative viewpoints

0 500 1000 1500 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:30,000 @ A4
GDA2020 MGA Zone 56

N

17.3 Existing environment

17.3.1 Landscape context

The project crosses several suburbs within the Greater Western Sydney region including, from east to west, Meadowbank, Wentworth Point, Sydney Olympic Park, Newington, Silverwater, Rosehill, Camellia, Rydalmere and Dundas. Land within the study area has generally experienced previous disturbance associated with urban development, industrial or commercial land uses, or recreational development. Currently the predominant land uses within the study area include commercial and industrial lands at Camellia, Rosehill and Silverwater, and residential uses at Meadowbank, Wentworth Point and Rydalmere. Sydney Olympic Park includes a mix of both open recreational space, commercial and residential land.

The area is largely characterised by the Parramatta River, which connects the Parramatta area with Sydney Harbour, as well as Duck River, which passes along the southern edge of the WRRF. There are no registered Aboriginal sites or places within the impact area for the project. As described in Section 16.3.4., there are 6 registered AHIMS sites in the impact assessment area. These sites would not be impacted by the project. The ACHAR (Appendix Q) identifies that creek lines, including waterways such as the Parramatta River and Duck River have Aboriginal cultural heritage value. The Parramatta River also has non-Aboriginal heritage significance due to its importance in the development of modern Sydney (City of Parramatta Council, n.d.).

These are further described in Table 17-3.

Table 17-3: Landscape character units

LCU	Description	Imact
LCU 1 – Rivers and urban waterways	Includes the Parramatta River and Duck River. This LCU is relatively flat and includes mostly low-lying waterways and riverbanks. Aquatic and riparian habitats are found in Duck River and aquatic habitat in Parramatta River. Vegetation in the LCU includes a mix of mangroves, wetlands and other riverine vegetation. The area supports some recreational water-based activities including rowing and sailing, and there are walking and cycling on waterside paths. A ferry service operates regularly along the Parramatta River between Parramatta and the Sydney CBD. Heritage items within the LCU include: • Meadowbank Railway Bridge over Parramatta River (Ryde LEP No. I56) • Memorial Park (including obelisk) and remnants of former Meadowbank baths (Ryde LEP No. I72) • Wetlands (Parramatta LEP No. I011). A new nature trail is proposed by City of Parramatta Council, adjacent to Duck River, south of the proposed WRRF site. This would expand the existing walking and cycling network in LCU 1.	 **Figure 17-4: Meadowbank Park looking south towards Wentworth Point**

LCU	Description	Imact
LCU2 – Low density urban residential	Includes low density, suburban residential development around Harris Park and Parramatta, to the west of the study area, and in Newington and Silverwater. The LCU is characterised by low to medium density residential developments including single-detached dwellings and low-rise apartments. The topography is generally flat with small hills with drainage systems that feed into the Parramatta River system. A number of parklands and public and private greenspaces are present in the area. These spaces include a mix of native and exotic plant species. A number of schools are found within the LCU, including Newington Public School. Some areas of the LCU are serviced by PLR, however generally the built environment supports an extensive road network.	 **Figure 17-5: Low rise residential development in Newington**
LCU3 – Medium to high density urban residential	Includes medium to high density residential areas around Wentworth Point, Rhodes and Meadowbank. The LCU is characterised by multistorey mixed-use buildings which are predominantly residential. The topography varies between the north and south of the Parramatta River. At Meadowbank, land is typically hilly, whereas at Wentworth Point and Rhodes, land is generally flat and low-lying. The urban landscape typically includes paved streets with some turfed areas and street plantings. Open greenspace areas and active transport links are found along the banks of the Parramatta River, and in local parks such as Pierre de Coubertin Park at Newington. The LCU is serviced by the PLR, ferry services at the Meadowbank Wharf, and an established road network. Other key infrastructure includes Wentworth Point Public School and Wentworth Point High School.	 **Figure 17-6: High density residential development at Wentworth Point**

LCU	Description	Imact
LCU4 – Industrial	This LCU covers industrial and commercial lands predominantly in the Camellia-Rosehill area. This area is characterised by large warehouse buildings, security fencing and carparking. The land is typically flat in topography and is low-lying to the Parramatta River and Duck River. Some vegetation is present within public areas of the precinct, however tree coverage is generally low and the landscape is mainly hardscaped surfaces. Heritage items within the LCU include: • WSU Parramatta Campus (former Rydalmere Hospital & Female Orphan School) (Parramatta LEP No. I661) • Clyde Carlingford Rail Bridge abutments (Parramatta LEP No. I695) • Clyde Carlingford Rail Bridge abutments (Parramatta LEP No. I008) • Grave of Eliner Magee & child (Parramatta LEP No. I007) • Sewage Pumping Station SP0067 (State Heritage Register No. 01643) • Tram alignment (Parramatta LEP No. I006) • RTA Depot (Parramatta LEP No. I678) • Capral Aluminium (Parramatta LEP No. I677) • Lower Duck River Wetlands (Parramatta LEP No. I702) • Ernest Fleming Pty Ltd, machinery merchants (Parramatta LEP No. I703).	 **Figure 17-7: Industrial land at Camellia**

LCU	Description	Imact
LCU5 – Parklands and reserves	This LCU is comprised mostly of open parklands including Rosehill Gardens Racecourse, Sydney Olympic Park and associated parklands, and Meadowbank Park. Topography is generally flat with gentle slopes, except for some areas within Sydney Olympic Park where historical landfills are present. Some vegetation plantings are present around the perimeter of Rosehill Gardens Racecourse. Sydney Olympic Park and Meadowbank Park include mangroves and wetlands, as well as other native and exotic plantings. Heritage items within the area include: • Explosives Store (Parramatta LEP No. I291) • Memorial Park (including obelisk) and remnants of former Meadowbank baths (Parramatta LEP No. I72).	 **Figure 17-8: Rosehill Gardens Racecourse**

17.4 Landscape character impacts

The assessment of landscape character impacts has considered the construction and operation of the project. Table 17-4 includes an assessment of the sensitivity of each LCU, as well as the anticipated landscape character impacts during construction and operation.

Table 17-4: Landscape character assessment

LCU	LCU sensitivity rating	Impact	Landscape character impact rating (Unmitigated)
LCU 1 – Rivers and urban waterways	This LCU has **moderate** landscape sensitivity.	Isolated construction works within the LCU would be required for the relining of the brine pipeline and construction of the river release pipeline and structure. Stockpiling from excavation, site boundary hoarding and machinery would be present including near the John Whitton Bridge where access to an adjacent carpark may be reduced. Construction barges and equipment would be used for works within the Parramatta River at Meadowbank. Closures of the Parramatta River to maritime traffic would be required, likely across several weekends for safety purposes. The exact timing would be planned in consultation with TfNSW, the Harbour Master and Sydney Ferries. The exact duration of these works would be confirmed during detailed construction planning. Works are currently expected to occur for several months. At the completion of construction the barge and other construction equipment would be removed.	Low -Moderate construction impact.
		The river release pipeline would be below-ground in LCU 1 during operation and would not be visible. The brine pipeline across Parramatta River involves repurposing an existing pipeline and there would be no visible change to the pipeline during operation. Areas disturbed by construction would be returned to the same or comparable condition. Vegetation removed around John Whitton Bridge during construction would result in minimal changes to landscape character for the project.	Negligible operational impact.
LCU2 – Low density urban residential	This LCU has **moderate** landscape sensitivity.	Several excavation pits would be visible in public areas within Dundas during relining works for the brine pipeline. These pits would be visible predominantly in roadways. Construction compounds would also be visible at various points along the alignment. These impacts would be temporary and progressive in each location lasting from about 4 weeks for the brine pipeline excavation pits, to about 6 - 12 months for the river release pipeline and compounds.	Moderate construction impact.

LCU	LCU sensitivity rating	Impact	Landscape character impact rating (Unmitigated)
		Construction work would be visible during works for the river release pipeline. Works would involve open trenching excavation, soil stockpiling, fencing and machinery for the river release pipeline. Parking access at Pierre De Coubertin Park may also be restricted to accommodate for construction compounds and the HDD launch site. This would be confirmed during detailed design. There are 3 construction compounds (C18, C22 and C23) proposed on Carnarvon Street, Silverwater. Another compound (C24) is proposed on Beaconsfield Street. These compounds would be used for material, spoil, plant and equipment storage while construction of the river release pipeline is occurring. Construction compounds C25 and C26 are expected to be located in Pierre De Coubertin Park for up to 18 months. There would be a temporary reduction in the landscape character of this area while the compounds are in use. Sydney Water does not anticipate that vegetation in Pierre De Coubertin Park would be required to be removed.	
		The river release pipeline would be below-ground in LCU 2 during operation and would not be visible. Areas disturbed by construction would be returned to the same or comparable condition.	Low – Moderate operational impact.
LCU3 – Medium to high density urban residential	This LCU has **low** landscape sensitivity.	During construction of the river release pipeline at Meadowbank there would be minor changes to the LCU where open trenching would be carried out in the roadway of Meadowbank Crescent. Construction compound C29 would be established for around 7.5 months. Overall, impacts to the LCU would occur for around 7.5 months during construction of the river release pipeline. At Wentworth Point, construction of the river release pipeline would be carried out using trenchless methods (HDD). This would occur belowground and would not be visible aboveground.	Low construction impact.
		The river release pipeline would be belowground in this LCU during operation and would not be visible. Areas disturbed by construction would be returned to the same or comparable condition.	Negligible operational impact.

LCU	LCU sensitivity rating	Impact	Landscape character impact rating (Unmitigated)
LCU4 – Industrial	This LCU has **low** landscape sensitivity.	Construction of the river release pipeline at Silverwater would involve open trenching at Carnarvon Street, Vore Street, Derby Street and Day Street North. Construction of the river release pipeline would occur progressively along these roads. Partial road or lane closures would be required progressively along all 3 roads to enable excavation and installation of the pipelines. Construction fencing, signage for traffic and access changes, stockpiling, excavators and machinery would be visible in the street when works are underway. Construction compounds C19, C20 and C21 are proposed on Derby Street. Compound C19 is proposed to be in use for around 18 months. Compounds C20 and C21 are proposed to be used for around 4 months. Construction Compounds C20 and C21 would be used for launch and retrieval of drilling rigs where HDD is proposed under Silverwater Road. The brine and transfer pipeline construction within Camellia and Rosehill would be constructed using mainly trenchless methods (HDD) and would therefore be below-ground and not visible. There would be temporary visual impacts to the Camellia pumping station during the installation of replacement pumps, pipework and electrical infrastructure. This would last for about 24 months. Most of the pipelines would be installed below-ground however there would be some above-ground ancillary infrastructure associated with the buried pipeline such as scour valves and maintenance holes. Construction would involve excavation, heavy machinery, soil stockpiling, fencing and pipeline storage and the potential disturbance of existing vegetation. There would also be the removal of existing site sheds which would be replaced with an electrical switchroom and transformer yard, and potential to remove several mature pine trees. Construction of the WRRF facility would involve the use of heavy machinery and cranes and would occur for up to 36 months. These elements would be visible within the LCU throughout the construction period. During the early construction phases there would be frequent heavy and light vehicles associated with workers, and deliveries of material and plant equipment.	Low - Moderate construction impact.

LCU	LCU sensitivity rating	Impact	Landscape character impact rating (Unmitigated)
		The completed WRRF would be large in scale, however, would be in keeping with the urban industrial character of the area. The WRRF would be designed in line with the Place and Design principles in the Place and Design Framework (Appendix R) and would contribute positively to the LCU. Details of permanent operational lighting design would be subject to detailed design development however given the existing adjacent industrial uses to the north, east and west of the WRRF, adverse impacts are not anticipated. The brine, transfer and river release pipelines within this LCU would be mostly below-ground during operation and would not be visible. Areas disturbed by construction would be returned to the same or comparable condition. At the Camellia pumping station, infrastructure would be below-ground and contained within the building, or would replace existing buildings on site, and would not be noticeable.	Low operational impact.
LCU5 – Parklands and reserves	This LCU has **moderate** landscape sensitivity.	Temporary open trenching would be used for the river release pipeline construction west of the URBNSURF facility, in Meadowbank Park, and within Memorial Park. Construction compound C27 would be established in both carparks at URBNSURF for around 6 to 8 months. Sydney Water would work with SOPA to allow for some carpark areas to remain open during standard construction hours. Launch and retrieval of drilling rigs would occur from this compound. Open trenching works for the river release pipeline would be required within compound C27 and along a portion of Hill Road, near the URBNSURF facility. The pipeline would use trenchless methods (HDD) to construct the pipeline below Parramatta River between C27 and C28 within Meadowbank Park. Some vegetation would be removed along Hill Road to allow for the open trenching works. The open trenching works and the use of compound C29 would occur concurrently. As discussed above, construction compound C28 would be established at Meadowbank Park. This would require the use of at least one playing field. From this compound, the pipeline would be constructed by open trenching in the eastern area of Meadowbank Park. This would require the disturbance of open grassed areas and playing fields. During this work, Sydney Water would install an aerial crossing over Charity Creek and an unnamed Creek (existing drainage culverts) which run north-south through the park. Work in the park would occur for around 8 months. Open trenching would then travel to Memorial Park at Meadowbank. At this location, construction would occur in the roadway of Meadow Crescent which is adjacent to Memorial Park. Sydney Water would establish	Moderate construction impact.

LCU	LCU sensitivity rating	Impact	Landscape character impact rating (Unmitigated)
		construction compound C29 in Memorial Park for about 7.5 months. This compound would be in place during open trenching works. Construction works would involve the use of heavy machinery for excavation, soil stockpiling, fencing and pipeline storage. Machinery, stockpiling and fencing would also be required for construction of the barometric loop, and would be visible within Memorial Park.	
		The river release pipeline would be below-ground during operation and would not be visible. Areas disturbed by construction would be returned to the same or comparable condition. The barometric loop at Memorial Park would be visible during operation. It's location near an existing toilet block and John Whitton Bridge, which is an operational rail corridor, would soften the permanent visual impact.	Low - Moderate operational impact.

17.5 Visual impact assessment

This chapter summarises the impacts expected at viewpoints which would experience a moderate or higher impact during construction, operation, or both. Out of the 15 viewpoints assessed, 8 would experience a moderate or higher impact during construction.

17.5.1 VP02 – Camellia pumping station

This viewpoint is of moderate sensitivity due to the historic and aesthetic significance of the Camellia Pumping Station. The pumping station is listed on the State Heritage Register (no. 01643) and Sydney Water Section 170 Heritage and Conservation Register (4571724). The pumping station is visible to users of PLR, cyclists and pedestrians, and users of the neighbouring commercial facilities, however, is partially screened by vegetation. During construction there would be temporary changes to the view during upgrade works to the pumping station, as well as for connection of the brine and transfer pipelines, demolition of an existing shed and construction of replacement electrical infrastructure, and some vegetation removal. Construction machinery, equipment and stockpiles would also be visible within the viewpoint. This would last for around 24 months. The construction footprint in the Camellia pumping station boundary would be around 20 m wide.

During operation, above-ground changes such as the new electrical switchroom and transformer yard replacing the existing shed may be visible within the viewpoint. The site would be reinstated upon the completion of construction and no visual impacts are expected during operation.

Table 17-5: VP02 - Summary of impacts

Sensitivity	Overall construction impact	Overall operational impact
Moderate	Moderate	Negligible

Figure 17-9: View of the indicative impact area from Grand Avenue North

Figure 17-10: VP02 - View of the indicative impact area at the Camellia pumping station

17.5.2 VP05 – Unwin Street and VP06 – Devon Street, WRRF site

This viewpoint is of low sensitivity due to being located in a highly modified industrial area that experiences large volumes of passing road traffic. Construction machinery including excavators and cranes would be used on site to construct the WRRF and would require access to the site from adjacent roads including Unwin Street. Temporary construction fencing and signage would be installed around the perimeter of the site and would be visible from Unwin Street. Grasses along the verge would likely be removed for construction. The completed WRRF facility, would be visible with new industrial structures such as tanks, buildings and stacks, and the administration building. The project would present as a large, industrial facility to the street however implementation of urban design measures would assist in its integration with the street and local area. Sydney Water is proposing urban design and landscaping improvements at the WRRF site for operation. These would improve the existing street condition on Devon Street and Colquhoun Street. Once mature, vegetation along the site boundary would screen some of the WRRF buildings.

Table 17-6: VP05 and VP06 - Summary of impacts

Sensitivity	Overall construction impact	Overall operational impact
Low	Low-Moderate	Low-Moderate

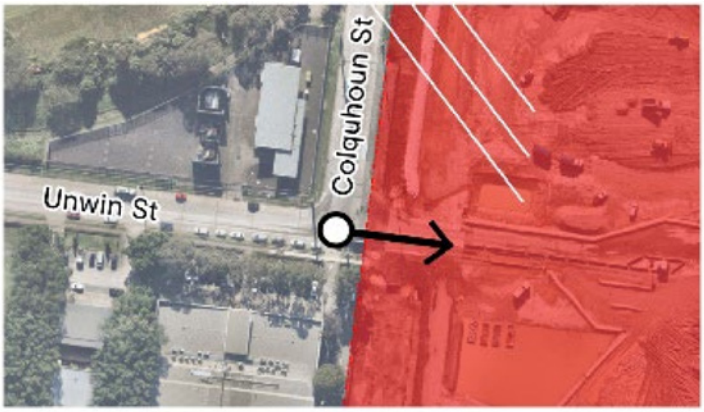


Figure 17-11: VP05 - Location and view direction

Figure 17-12: VP06 - Location and view direction

Figure 17-13: VP05 - Existing view east from the intersection of Unwin Street and Colquhoun Street

Figure 17-14: VP05 - Proposed view (artist's impression, subject to change)

Figure 17-15: VP06 - Existing view south towards the WRRF site from Devon Street

Figure 17-16: VP06 - Proposed view (artist's impression, subject to change)

17.5.3 VP08 – Carnarvon Street (east), river release pipeline

This viewpoint is of high sensitivity due to the presence of residential visual receivers who would have visibility of construction works for extended periods of time. At VP08, visual impacts would only occur during construction where open trenching would be required to construct the river release pipeline. Construction would likely occupy the width of the street and some verge areas. Construction fencing, machinery, stockpiling and pipeline materials would be prominent during construction. No impacts would be experienced during operation given that the pipeline would be below-ground and would not be visible.

Table 17-7: VP-08 - Summary of impacts

Sensitivity	Overall construction impact	Overall operational impact
High	High-moderate	Negligible

Figure 17-17: VP08 view west from Carnarvon and Sutton showing extent of construction area

17.5.4 VP10 – Comaneci Avenue, river release pipeline

This viewpoint is of high sensitivity due to the presence of residential visual receivers who would have visibility of construction works for extended periods of time. During construction, VP10 would see high visual impacts where open trenching is required for the river release pipeline. During operation, removed vegetation along Comaneci Avenue would be reinstated and Sydney Water would seek to replace any street trees that have been removed in the same location or in an alternative location in collaboration with City of Parramatta Council. This would result in a moderate-high visual impact during operation.

Table 17-8: VP10 - Summary of impacts

Sensitivity	Overall construction impact	Overall operational impact (post restoration/ revegetation)
High	High	Low

Figure 17-18: VP10 - View east on Comaneci Avenue showing extent of construction area

17.5.5 VP11 – URBNSURF, river release pipeline

This viewpoint is of moderate visual sensitivity due to the high volume of visual receivers associated with the URBNSURF facility and other recreational users of Sydney Olympic Park. This viewpoint would be impacted by construction of the river release pipeline. Open trenching would occur within Holker Busway and Hill Road. Construction machinery, stockpiling and storage of drainage infrastructure would be visible during these works. Sydney Water would also occupy carparking space within and around the URBNSURF facility to carry out pipe stringing. Construction compounds would be established in the carparks to the north and south of the facility and would also include excavation for trenches for the river release pipeline as well as a HDD pit in each car park. Temporary construction fencing and signage would be installed around the area of works. During construction there would be a high-moderate construction impact.

Removal of several trees would be required at the intersection of Holker Street and Hill Road. At the URBNSURF facility, the area impacted by construction would be reinstated. This would result in a moderate visual impact during operation.

Table 17-9: VP11 - Summary of impacts

Sensitivity	Overall construction impact	Overall operational impact
Moderate	High-moderate	Low

Figure 17-19: VP11 - views south-east from the intersection of Holker Street and Hill Road showing extent of construction area

17.5.6 VP12 – Meadowbank Park, river release pipeline

This viewpoint is of moderate viewpoint sensitivity due to Meadowbank Park being a place of public recreation where visual receivers would have short term views of the project.

VP12 would experience changes to the view associated with construction of the river release pipeline. Temporary visual impacts within the park would occur while the pipeline is being installed. The sports field in the south of the park would be occupied for around 8 months to support the HDD (launch or retrieval pit) and open trenching works. These works would be visible from within the park. The river release pipeline alignment would also cross Charity Creek and an unnamed Creek (concrete lined channels, with a small bridge over Charity Creek) that intersect Meadowbank Park. About 9 paperbark trees in Meadowbank Park are within the impact area for the river release pipeline. These trees may be required to be removed. Where tree removal is required Sydney Water would seek to replace trees in the same location. Where this is not possible Sydney Water would collaborate with City of Ryde Council to identify suitable areas for tree replacement to be provided. During operation, Meadowbank Park would be largely reinstated, except for the aerial crossings which would be visible, but would be co-located with the existing concrete channel infrastructure once in operation.

Table 17-10: VP12 - Summary of impacts

Sensitivity	Overall construction impact	Overall operational impact
Moderate	High-moderate	Low

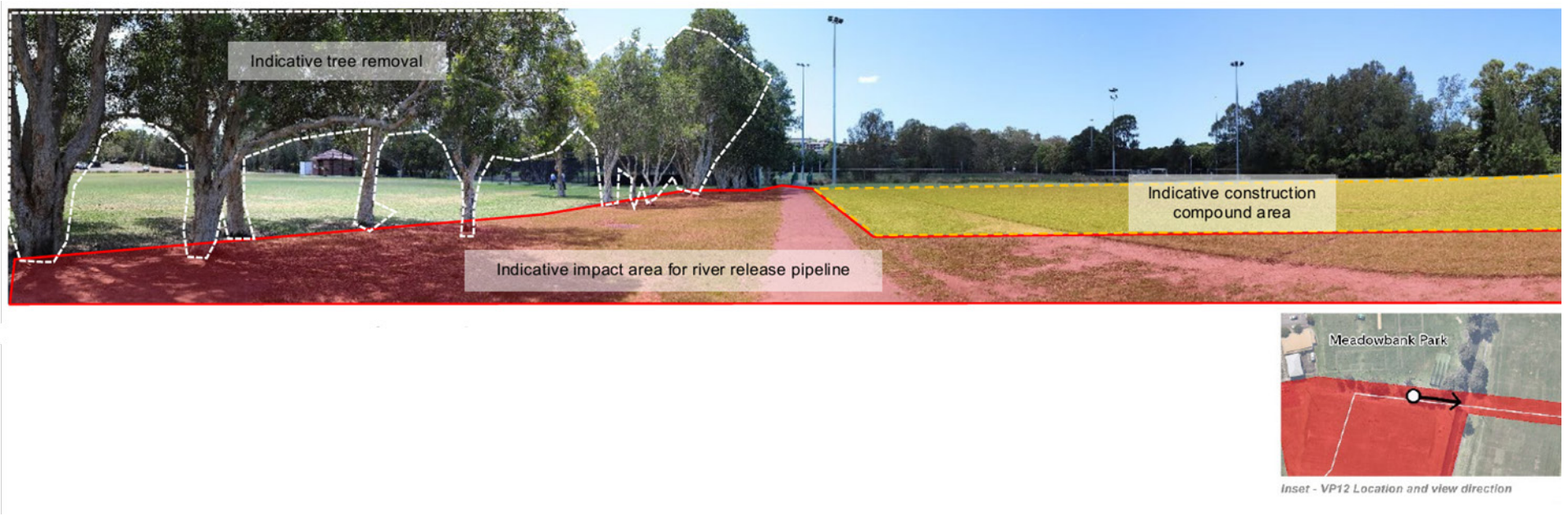


Figure 17-20: VP12 - View east from footpath south of L.H. Waud sports field showing extent of construction area

17.5.7 VP13 – Meadow Crescent, river release pipeline

This viewpoint is of high sensitivity due to the presence of residential visual receivers who would have visibility of construction works for extended periods of time. At VP13, open trenching works through Meadow Crescent would be visible by residential receivers located on the street, along the alignment corridor resulting in a high visual impact. Construction work would require the removal of several trees which would not be replaced at this location for operation. Whilst the street would be generally reinstated for operation, the permanent tree removal would result in a high-moderate visual impact for operation.

Table 17-11: VP13 - Summary of impacts

Sensitivity	Overall construction impact	Overall operational impact
High	High	Low

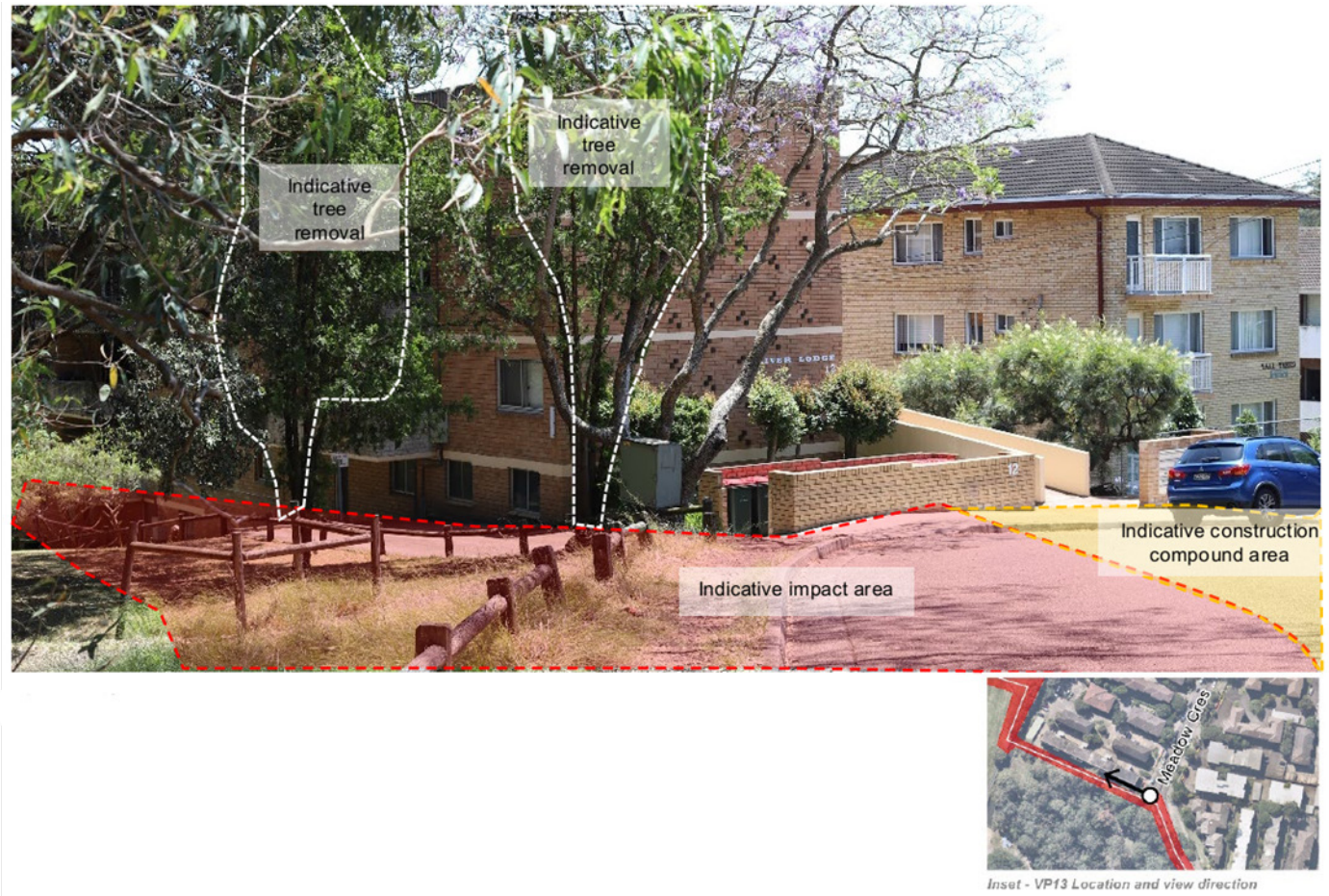


Figure 17-21: VP13 - View north-west from Meadow Crescent showing extent of construction area

17.5.8 VP14 – Barometric Loop

At Memorial Park, the barometric loop and river release pipeline would result in temporary and permanent visual impacts at VP14. The area has high sensitivity due to the high number of park users, vehicles and pedestrians who access Memorial Park, as well as neighbouring residential buildings who overlook the Park. During construction, changes to the view would occur for construction of the river release pipeline. The construction footprint for the barometric loop is anticipated to be up to about 20 m wide and would require the removal of trees, vegetation and grass near the existing toilet block and along Meadow Crescent. Construction activities include trenching, excavation machinery, soil stockpiling and storage of pipeline infrastructure prior to installation. Temporary construction fencing and signage would also be required around the site. This would result in a high-moderate visual impact for construction. The barometric loop would be a permanent, aboveground feature of the project during operation and would be visible within Memorial Park. Impacted areas within the park would be reinstated for operation, except for the location of the barometric loop. Trees that were removed for the barometric loop would not be replaced in the same location. As a result, there would be a high-moderate visual impact during operation. However, Sydney Water would continue to work with City of Ryde Council to reinstate trees and to replace the existing toilet block should it be removed. Sydney Water would consider opportunities to include potential historical or cultural interpretation and treatment of the barometric loop façade. The overall impact is expected to be reduced.

Table 17-12: VP14 - Summary of impacts

Sensitivity	Overall construction impact	Overall operational impact
High	High-moderate	Low-moderate

Inset - VP14 Location and view direction

Figure 17-22: VP14 - View north from near the amenities building showing impact area

17.5.9 Impacts of the project to the future Camellia-Rosehill precinct

As discussed in Chapter 2 (Strategic context), the Camellia-Rosehill Place Strategy (DPE, 2022b) would drive urban renewal throughout the Camellia-Rosehill precinct over the next 20 years. Significant change is expected in the north of the precinct with major rezoning proposed to support the delivery of new residential land. Land in the south of the precinct, including Devon Street and Colquhoun Street are expected to support commercial and industrial land uses. Sydney Water is anticipating operation of the WRRF to commence in 2031.

At the time of exhibition for this EIS, no rezoning of land in the Camellia-Rosehill precinct has occurred. Sydney Water expects that construction of the WRRF would be complete before land use changes from the proposed rezoning are complete.

In the Camellia-Rosehill precinct, 5 viewpoints have been further assessed to understand potential operational impacts. These are summarised in Table 17-13.

Table 17-13: Summary of viewpoints and impacts relevant to the Camellia-Rosehill Place Strategy (DPE, 2022b)

Viewpoint	Summary
VP02 – Camellia pumping station	The Camellia-Rosehill Place Strategy (DPE, 2022b) shows that the Camellia pumping station would be incorporated into the future Camellia-Rosehill town centre. The upgrades to the pumping station proposed as part of this project would start in 2028 and continue for about 24 months. These upgrades are expected to be completed before construction for the town centre begins. Once complete, most operational infrastructure would remain within the existing building and out of public view. Developments adjacent to the pumping station site would have some visibility of the asset. The landscape sensitivity of the area is currently Moderate but is anticipated to rise to High once the town centre is delivered.
VP03 – James Ruse Drive	Under the Camellia-Rosehill Place Strategy (DPE, 2022b), land in this viewpoint would remain open greenspace. The brine and transfer pipelines would be underground and not visible. In this viewpoint, the visual impact of the project on the Camellia-Rosehill precinct is expected to be negligible.
VP04 – Rosehill Gardens Racecourse	The Camellia-Rosehill Place Strategy (DPE, 2022b) outlines that the Rosehill Gardens Racecourse is expected to remain a feature of the precinct. There would be no change to this viewpoint following delivery of the Master Plan. The WRRF is not anticipated to be visible from this viewpoint due to it being located about 1 km from the viewpoint. All other pipeline infrastructure would be below-ground in this view. From this viewpoint, the visual impact of the project on the Camellia-Rosehill precinct is expected to be negligible.
VP05 – Unwin Street	This viewpoint looks east toward the WRRF from the south-east corner of Rosehill Gardens Racecourse. Urban services are proposed south of the Rosehill Gardens Racecourse which would likely include commercial buildings. These buildings may have potential views of the WRRF. New developments are expected to experience low to moderate visual impacts.

Viewpoint	Summary
VP06 – Devon Street	This viewpoint is located in an area identified for future urban services to the north and high productivity (industrial) to the south and east (Camellia-Rosehill Place Strategy (DPE, 2022b)). Should new residential development be delivered in the northern area of the precinct, the urban services zone would potentially mitigate visual impacts and reduce views of the WRRF. New developments are expected to experience low visual impacts.

Overall the project is expected to have low visual impacts on the future Camellia-Rosehill precinct. Despite this, opportunities to contribute to improved visual amenity and placemaking outcomes in the Camellia-Rosehill precinct are outlined in the following sections, as well as the Place and Design Framework (Appendix R).

17.6 Placemaking

Sydney Water recognises the value and contribution of good design on improving amenity and sense of place. During operation, the new WRRF would be visible from multiple viewpoints, while the majority of the pipeline infrastructure would be underground or contained within existing buildings and would not be visible to the public. To support the project's contribution to improved place and amenity at Camellia-Rosehill, a Place and Design Framework (Appendix R) has been prepared for the WRRF. The Place and Design Framework outlines the process for the development of design priorities for the WRRF as the project progresses.

The Place and Design Framework develops these priorities based on the vision shared in the Camellia-Rosehill Place Strategy (DPE, 2022b) and Integrated Master Plan, in particular within the industrial sub-precinct where the WRRF would be located. The Framework focuses on site-specific Design Principles and Objectives to inform the design response.

17.6.1 Integration with strategic planning priorities

The Place and Design Framework has been developed to align with broader strategic planning priorities. Throughout the concept design development process for the project, Sydney Water has considered the future vision and objectives of the GPOP area, the Camellia-Rosehill precinct, and the WRRF site as set out in the following documents:

- A Metropolis of Three Cities (Greater Sydney Commission, 2018a)
- Central City District Plan (Greater Sydney Commission, 2018b)
- Camellia-Rosehill Place Strategy (DPE, 2022b).

In the future, the Camellia-Rosehill precinct is planned to undergo significant urban renewal. The precinct would be characterised by a new town centre to the north, between the Parramatta River and Grand Avenue, with land to the south-east including a mix of commercial and industrial services. New transport connections, including walking and cycling routes, PLR Stage 2 and potential new bus routes would support access to and movement throughout the precinct. These aspirations are shown in Figure 17-23 and described further in Section 2.1.2.8.

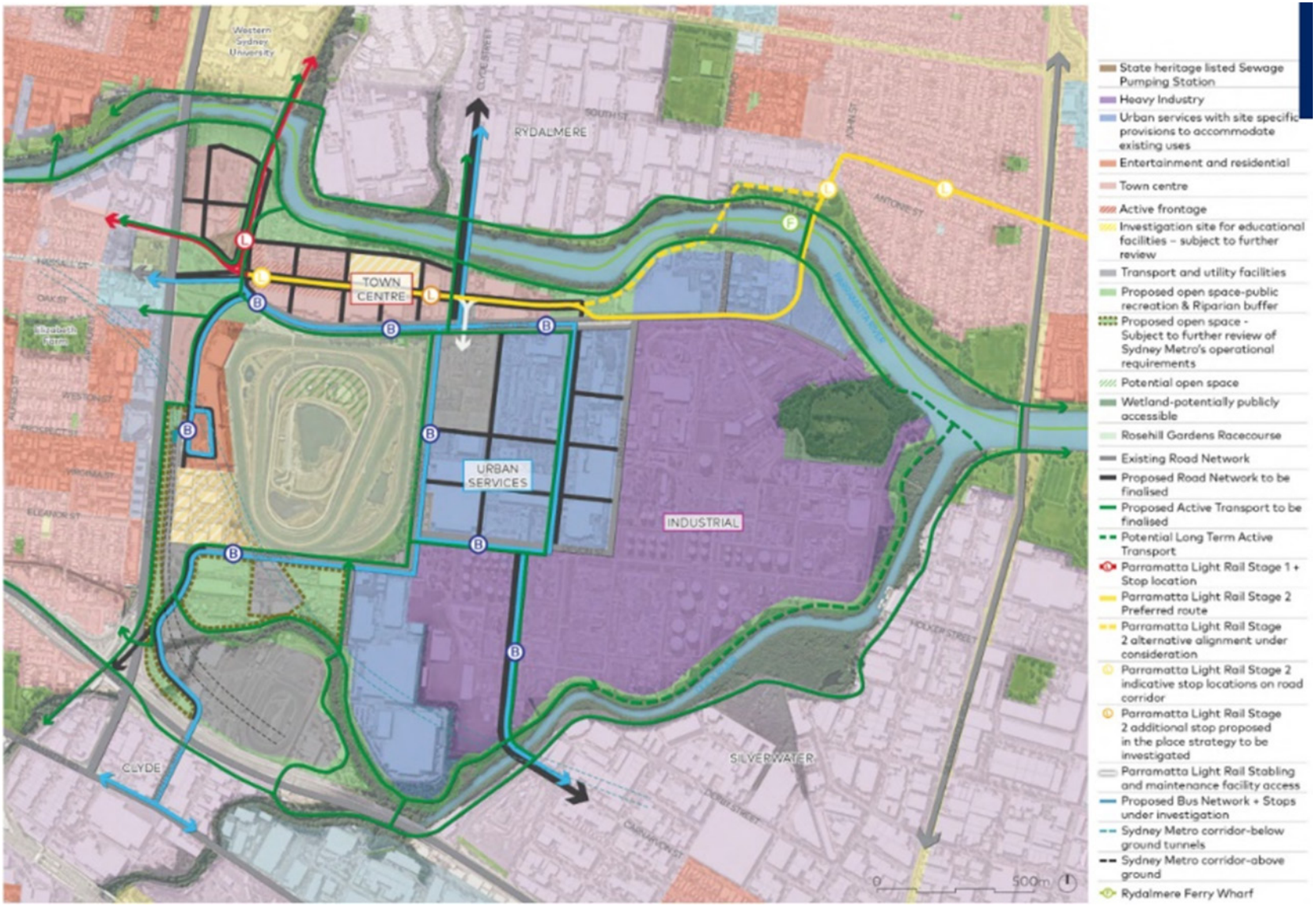


Figure 17-23: Camellia-Rosehill Place Strategy (Source: DPE, 2022b)

Several key Government policies and frameworks are in place to guide the delivery of good place outcomes for NSW and are summarised in Table 17-14. These documents have been used in the development of the Place and Design Framework in Appendix R.

Table 17-14: Guidance for Place and Design Framework

Policy	Discussion
Better Placed – an integrated design policy for the built environment of New South Wales (GANSW, 2017a)	This document outlines design approaches and principles to achieve the delivery of well-designed projects in line with NSW Government priorities. Priorities outlined in the policy include: • enhancing public health through design • improving climate resilience • adapting to a growing population and changing demographics • delivery of improved infrastructure and urban renewal. Better Placed outlines 7 overarching objectives to be considered in the design of the built environment in NSW. They are: • Objective 1 - Better fit – contextual, local and of its place • Objective 2 - Better performance – sustainable, adaptable and durable • Objective 3 - Better for community – inclusive, connected and diverse • Objective 4 - Better for people – safe, comfortable and liveable • Objective 5 - Better working – functional, efficient and fit for purpose • Objective 6 - Better value – creating and adding value • Objective 7 - Better look and feel – engaging, inviting and attractive.
Greener Places – An urban green infrastructure design framework for New South Wales (GANSW, 2020)	The Greener Places Design Guide aims to improve the quality of urban areas and communities by improving access to walking and cycling connections, supporting and maintaining Aboriginal cultural heritage, and climate resilient infrastructure. The Design Guide includes information relating to recreational open space, tree canopies, habitat and ecological health.
Connecting with Country Framework (GANSW, 2023)	The Connecting with Country Framework provides guidance on the protection of Country and aims to guide planning, design, and infrastructure projects, ensuring they support the health and wellbeing of Country. The Framework emphasises the importance of including Aboriginal perspectives and the input of knowledge holders in the design of projects to value and respect cultural knowledge, ensure that Country is cared for, and minimise further impacts to Country and culture.
Biodiversity in Place - A framework to improve urban biodiversity in NSW (GANSW, 2024)	This document aims to address biodiversity loss in urban areas by outlining how Government and the community can support the delivery of nature-positive urban environments.

Policy	Discussion
Green Grid West Central District (GANSW, 2017b)	The 2017 Sydney Green Grid Central West report by the Government Architect NSW outlines a vision to enhance green infrastructure across the region, including the Camellia-Rosehill Precinct. The report emphasises the transformation of this precinct into a vibrant, sustainable area by improving connectivity, increasing green spaces, and revitalising the Parramatta River foreshore.

17.7 Design process

The design for the WRRF has been developed with input from a multi-disciplinary team with a broad range of skills in engineering, environmental science, architecture, landscape and urban design.

From an initial reference design of key infrastructure needs, the development of the WRRF at Camellia-Rosehill progressed using a design led process. This process prioritises the inputs of key stakeholders to positively influence the design, and to drive good built environment outcomes. Stakeholders are able to identify issues or needs that can be resolved through design, for example, for amenity impacts such as odour or noise, or design factors such as materials and finishes. The design solutions that were developed through this process were tested for their feasibility. Where solutions were found to both appropriately respond to issues or needs raised by stakeholders and are feasible, those solutions were:

- adopted into the concept design, and
- carried through to the Place and Design Framework (Appendix R) to inform the development of Place and Design principles and identify design opportunities. More information place and design principles and design opportunities are provided in Section 17.8.

This process is proposed to continue as the project progresses to the design development phase, as outlined in Figure 17-24. The Place and Design Principles reflect the opportunities and constraints of the site and prioritise alignment with the strategic planning priorities (outlined in Section 17.6.1).

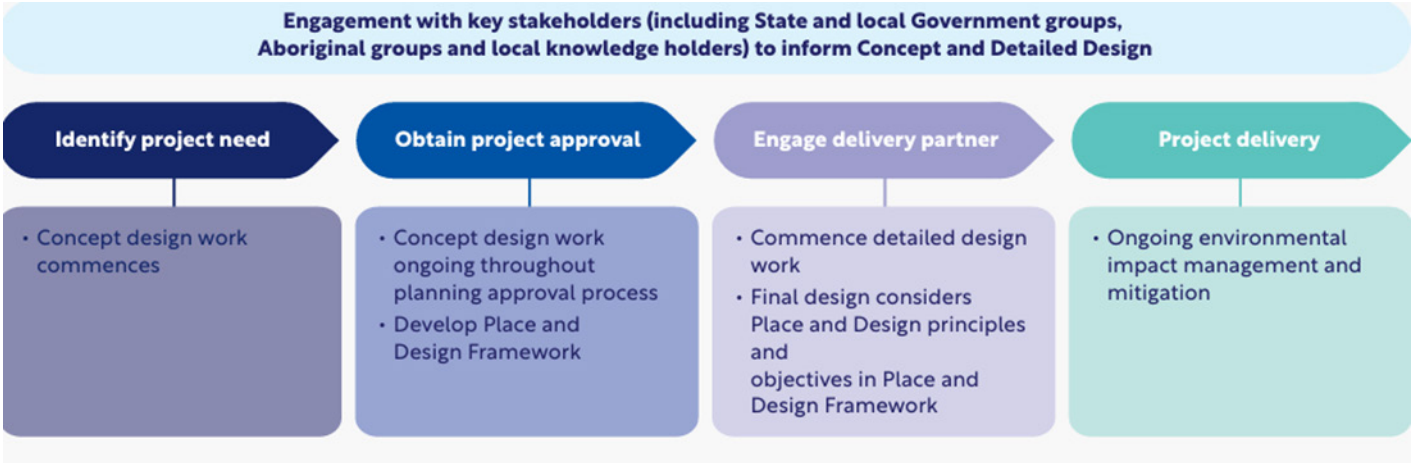


Figure 17-24: Summary of iterative design led-process for the project

17.7.1 State Government engagement

In early 2025, Sydney Water carried out targeted engagement with DPHI and GANSW to seek feedback on the Concept Design. The feedback provided by both agencies and Sydney Water's response is summarised in Table 17-15.

Table 17-15: Summary of preliminary State Government engagement on the WRRF Concept Design

Feedback	Response
Impacts of the facility on views and vistas from potential future residential development on the site of Rosehill Gardens Racecourse and Camellia-Rosehill precinct	Following initial engagement it was confirmed that Rosehill Gardens Racecourse would not be rezoned for residential development. The assessment of landscape and visual impacts has therefore assumed Rosehill Gardens Racecourse to remain as a private recreational space, and for the surrounding land uses on Devon Street and Colquhoun Street to remain as industrial and commercial.
The design of the WRRF should consider the level of amenity, and potential odour and acoustic impacts	The WRRF has been designed with noise and odour generating activities located within the centre of the site, away from sensitive receivers. Noise and vibration impacts are assessed in the NVIA (Appendix N) and odour impacts in the Air Quality Impact Assessment (Appendix M).
The site should provide active transport routes along the Parramatta River and should provide a through-site connection for vehicles travelling between Camellia and Silverwater.	The project would work with City of Parramatta Council to provide new footpaths along Devon Street to support an east-west connection through the precinct. The WRRF site does not include waterfront areas of Parramatta River and as such, no riverside active transport connections would be provided as part of the WRRF site. Due to the operational security requirements of the site, it would not be possible to provide a north-south connection through the site and over Duck River to Silverwater.
Opportunities to provide a green canopy within the site should be prioritised and should consider potential mangrove restoration (where feasible)	Sydney Water would retain the existing vegetation along the western boundary of the site and provide new landscape plantings along the frontage of Devon Street, and within the north-western corner of the WRRF site. These plantings would result in a net increase of vegetation within the site. The mangroves at Duck River are outside of the WRRF site area and would not be impacted by the project. Planting of new mangroves within Duck River is outside the scope of this project.
The design process should identify best-practice international examples of similar facilities to influence the design of the WRRF.	The Concept Design development has considered international examples of similar facilities. This is documented in the Place and Design Framework (Appendix R). The proposed design for the WRRF site has been developed appropriately for the site with consideration to visual treatments used by other facilities in similar commercial and industrial landscapes.

17.7.2 Connecting with Country

Sydney Water has developed a Connecting with Country Engagement Strategy for the project to identify Aboriginal stakeholders who have valuable cultural knowledge, stories and aspirations that can shape the design of the project. The project involves the construction of pipelines below the Parramatta River, Duck River and wetlands. These natural features are important to the Dharug people, who are the traditional custodians of the area. Pipeline construction would impact to varying degrees riverbanks, floodplains and vegetation within the project area. Dharug Organisations and Elders, local Knowledge Holders, community members and relevant Local Aboriginal Land Councils (LALCs) were invited to participate in engagement for the project. Engagement was carried out with the primary purpose of achieving the following:

- to centre Dharug perspectives in the planning of water infrastructure along their traditional lands
- to highlight cultural values and stories
- to identify concerns, opportunities and aspirations that can shape the physical and interpretive elements of the project
- to build respectful long-term partnerships between Sydney Water and Aboriginal stakeholders.

Key engagement activities included:

- listening Sessions
- walks on Country
- stakeholder workshops
- one-on-one cultural consultations.

This process highlighted both risks and opportunities that required consideration during the design process.

These risks and opportunities are summarised in Table 17-16, along with other cultural considerations that were raised during engagement.

Table 17-16: Summarised outcomes of Connecting with Country engagement

Category	Summary	Response
Risk	Concern was raised around the potential loss of cultural sites through development and erosion. The design should respect the flow of water and land memory.	Sydney Water would prioritise collaboration throughout the detailed design process to deliver a design that is reflective of Aboriginal Cultural Heritage. This may include but not be limited to the use of interpretive signage along Devon Street within the public interface zone to provide community education on historical context of the site and surrounding waterways.

Category	Summary	Response
Opportunity	Provide co-designed public spaces with cultural signage and interpretive landscape design reflective of cultural values. The design should consider multi-generational education tools to share Aboriginal cultural knowledge with the community. The design should recognise the cultural significance of the Parramatta River as an important place of trade, meeting, ceremony and migration, and should highlight the sacred value of the longfin eel.	As above.
Cultural consideration	Duck River and Duck Creek are ecologically fragile and experience high levels of sedimentation and water pollution. Both waterways require urgent restoration and cultural recognition.	Vegetation plantings within the WRRF site would prioritise planting native species that are appropriate for the site and would not adversely impact waterways. Construction and operation of the site would be carefully managed to avoid impacts to these waterways.
Cultural consideration	The design should include cultural infrastructure. Meadowbank Park was identified as having potential to support cultural spaces such as yarning circles, memorialisation and other visual markers such as tree rings or ceremonial circles.	While the Place and Design Framework (Appendix R) applies specifically to the WRRF, Sydney Water acknowledges the feedback provided on Meadowbank Park. Sydney Water would continue to engage with the Aboriginal Community throughout the detailed design process for the barometric loop to develop cultural infrastructure at Memorial Park.

17.8 Place and design principles and objectives

The overarching objectives from the GANSW's Better Placed (2017) have been considered throughout the development of Place and Design principles and objectives for the project. The overarching Place and Design Principles for the WRRF are outlined in the Place and Design Framework (Appendix R). The Place and Design Framework categorises the site as 3 zones which include the facility grounds and operational zone, the public interface zone, and the environmental buffer zone. Design objectives and desired built environment outcomes have been prepared for each zone based on the overarching design principles for the site and are listed in Section 5 of the Place and Design Framework (Appendix R) and Table 17-17.

Table 17-17: Place and design principles for the WRRF

Principle	Summary
1. focus on integration	Integrate and connect the site with the wider precinct context by focusing on interfaces, providing diverse landscaped frontages and streets for people that are high amenity buffers.

Principle	Summary
2. establish a legacy	Incorporate Design Excellence processes and outcomes to demonstrate Sydney Water's commitment to sustainability, place and community.
3. founded on respect	Collaborate with the Dharug people to develop a design that Connects with Country and daylights their stories and connection to the place.
4. people focused	Design with people at the heart, ensuring employee, visitor and community focused streetscapes and interfaces.
5. celebrate water	Incorporate water themes and features in public interfaces to provide interest and meaning whilst maintaining the site's industrial character.
6. drive operational efficiency and safely	Deliver best practice water treatment and safety measures with built in flexibility to evolve and innovate over time, future proofing and ensuring longevity of this essential infrastructure into the future.
7. regenerative	Respect and work with the lay of the land by keeping water at the surface where possible and restoring the estuarine landscape character and natural processes.
8. preserve and connect	Preserve and expand the ecological values on the western boundary of the site into the site to strengthen habitat connectivity
9. healthy natural systems	Strengthen and connect green networks throughout the site to create multifunctional spaces that support both human and non-human use, while simultaneously delivering ecosystem, environmental benefits.
10. adaptive	Give space and buffers that are flexible so that the landscape can evolve and change over time to withstand climate change and other environmental challenges.

17.8.1 Place and design recommendations for consideration in detailed design

Table 8 of the Place and Design Framework (Appendix R) includes a series of recommendations for the design of the WRRF site. These recommendations were developed with consideration of the engagement outcomes in Table 17-15 and Table 17-16. In summary, recommendations for the WRRF site include:

1. apply green and blue infrastructure interventions by improving habitat connectivity
2. respect and integrate Aboriginal cultural heritage
3. design the site to align with the relevant landscape character unit context
4. implement mitigation strategies for viewpoints 05 and 06 to reduce visual impacts of the WRRF
5. improve streetscape and tree canopy coverage along Devon Street and Colquhoun Street by planting native plants and trees. An example of potential landscape improvements along Devon Street is included in Figure 17-26

6. expand active transport infrastructure by providing clear wayfinding and an improved verge on Devon Street (in consultation with City of Parramatta Council). Bike parking and end of trip facilities would also be provided in the Administration Building to encourage staff to use the expanding active transport network in the Camellia-Rosehill precinct
7. deliver water sensitive urban design by using sustainable drainage systems
8. design the WRRF to have an attractive façade that contributes to the public domain and encourages an active street frontage.

Sydney Water would continue to explore opportunities to apply these recommendations into the final design of the WRRF. The Place and Design Framework (Appendix R) highlighted opportunities and desired outcomes for the following elements, in line with the project SEARs:

- green and blue infrastructure
- active street frontages and integration into surrounding landscapes
- cultural heritage interpretation.

The following sections provide an overview of potential opportunities for each of these elements. More detail on these elements is provided in the Place and Design Framework (Appendix R).

Green and blue infrastructure

The WRRF site would include landscaping and water sensitive design treatments to support biodiversity and waterway health (Figure 17-25). Native vegetation and tree planting within and along the perimeter of the site would be provided. This would contribute towards increasing vegetation coverage on the site and mitigating urban heat.

Figure 17-25: Example of a water sensitive urban design treatment - Solrødgård Water Treatment Plant: Henning Larsen, 2017

Active street frontages

Sydney Water would work with City of Parramatta Council to deliver an improved public domain on Devon Street, along the frontage of the WRRF site. Improvements may include new footpaths and pedestrian access to the site, vegetation planting in the kerb, and localised signage and wayfinding. An example of potential landscape improvements along Devon Street is included in Figure 17-26.

While the site is an operational facility and is not for recreational purposes, the site would include a landscaped outdoor space for staff to use. This space is subject to design development however is expected to be at the front of the WRRF site, on the corner of Devon Street and Colquhoun Street. Bike parking and end of trip facilities would also be provided in the Administration Building to encourage staff to use the expanding active transport network in the Camellia-Rosehill precinct.

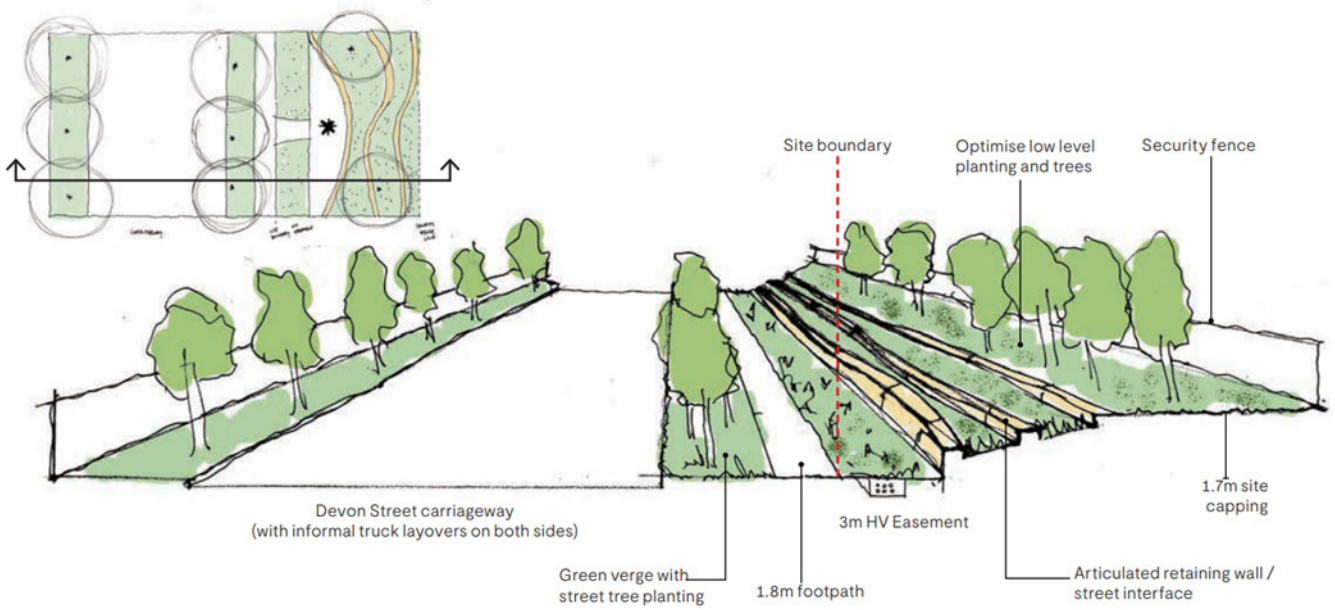


Figure 17-26: Artist impression of landscape design along Devon Street (Indicative - subject to design development)

Sydney Water would consider opportunities to reflect Aboriginal cultural heritage and local heritage in the final design of the WRRF site. This may include the use of signage and artwork in the publicly visible landscaped area along Devon Street. An example of how cultural heritage interpretation has been incorporated into landscaped areas as part of the Takina Wellington Convention and Exhibition Centre project is shown in Figure 17-27.

Figure 17-27: Takina Wellington Convention and Exhibition Centre, Wellington: GHD, 2025b

17.9 Mitigation measures

Sydney Water would manage potential impacts during construction through implementation of the CEMP (Section 6.4). Project specific mitigation measures that would be implemented to manage potential impacts to landscape and visual impacts are listed in Table 17-18.

Table 17-18: Landscape and visual impact mitigation measures

ID	Potential impact	Mitigation measure	Timing
LCV01	Visual impact of construction compounds	Consider a range of solutions such as: • installing temporary screens/hoarding around construction sites and compounds to minimise the visual impacts where higher sensitivity ratings are identified • storing equipment and machinery away from sensitive receivers • phasing works to limit the extent of visible disruption at any one time • keeping the site tidy and removing waste promptly.	During construction

ID	Potential impact	Mitigation measure	Timing
LCV02	Visual impacts of the WRRF – public domain (Viewpoint 05 and viewpoint 06)	Integrate the perimeter design with the surrounding areas through: • integrated level changes (stepping) • planting to help reduce scale of substantial level changes and provide targeted screening • visual appealing street facing buildings with respect to the future Camellia-Rosehill precinct (refer to LCV03).	During detailed design and construction
LCV03	Visual impacts to existing and future visual receivers of the WRRF buildings and structures	Implement the following design measures: • adopt materials and finishes for façade treatments on buildings and structures which face the street to improve their visual quality • use colours that will reduce reflectivity and glare • deliver an administration building with a façade that is visually appealing to the public • consider potential for art/Connecting with Country integrated into the building façades of fence.	During detailed design and construction
LCV04	Visual impacts of barometric loop (Viewpoint14)	Visually integrate the barometric loop into Memorial Park.	During detailed design and construction
LCV05	Visual impacts at the Camellia pumping station	Consider screening and fencing around the Camellia pumping station to mitigate potential visual impacts.	During construction
LCV06	Lighting disturbances	Direct artificial light away from sensitive receivers (i.e. receivers in dwellings where lighting may be required as part of any night works such as in the Meadowbank area during construction of the river release pipeline). Note, requirements also under AB06 (Appendix E).	During construction
LCV07	Vegetation removal	Avoid removal where possible and excessive pruning of vegetation. Refer to TB02 and TB10 (Appendix E).	During construction

Social and economic impacts

18 Social and economic impacts

This chapter provides an overview of the key findings of the Social Impact Assessment (SIA) (EMM, 2025b) (Appendix S). This assessment provided a review of the social context of the area surrounding the project and the potential impacts to the social environment as a result of the nature and scale of project activities. The SIA confirmed that there are several long-term benefits associated with the project as well as predominantly short-term social impacts relating to construction amenity. Management measures would be implemented to enhance the identified benefits and reduce the level of impact experience by the community.

18.1 Secretary's Environmental Assessment Requirements

Table 18-1 lists the SEARs relevant to social and economic impacts and where they have been addressed.

Table 18-1: Project SEARs relating to social and economic impacts

SEARs	EIS section where requirement addressed
Social	
1. Potential social impacts of the project, both during construction and operation, from the points of view of the affected community and other relevant stakeholders (i.e. how they expect to experience the project), including disruptions to recreational land uses at outfall locations, and how any social impacts would be mitigated or offset.	Section 18.4.1 Section 18.5.1 Appendix S
2. How project activities and environmental changes and impacts arising from the construction and operation of the project may affect: (a) way of life (b) community (c) accessibility, including impacts on the Duck River Nature Trail (d) culture (e) health and well being (f) surroundings (g) livelihoods (h) decision making systems	Section 18.4.1 Section 18.5.1 Appendix S
3. Impact of the project on the use of Parramatta River for recreational purposes including swimming	Section 18.4.1 Section 18.5.1 Appendix S

SEARs	EIS section where requirement addressed
Economic	
1. Economic impacts on potentially affected properties, businesses, recreational users and land and water users (for example, recreational and commercial fishers, oyster farmers), including property acquisitions/adjustments, access, amenity and relevant statutory rights.	Section 18.4.2 Section 18.5.2

18.2 Assessment methodology

18.2.1 Legislative and policy context

The SIA was carried out in accordance with the following key guidelines:

- Social Impact Assessment Guideline for State Significant Projects (SIA Guideline (2023)) (DPIE, 2023a)
- Technical Supplement: Social Impact Assessment Guideline for State Significant Projects (SIA Technical Supplement 2023) (DPIE, 2023b)
- Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2022k).

The SIA was prepared prior to the release of the updated SIA Technical Supplement 2025 (DPHI, 2025b). As such, the SIA significance evaluation has been updated to reflect the terminology and definitions provided within the updated guidance where practicable, but follows the requirements set by the SIA Guideline (DPIE, 2023a) and SIA Technical Supplement (DPIE, 2023b).

18.2.2 Methodology

The assessment involved the following key activities:

- scoping of SIA:
  - defining the project's social locality and baseline social conditions
  - review of available qualitative and quantitative data to develop baseline social conditions
  - carrying out community engagement to understand values, concerns and behaviours
- impact assessment:
  - review of findings from other technical disciplines that contributed to the EIS
  - identification of potential social impacts from the project in line with the categories in the SIA Guideline (DPIE, 2023a)
  - preparation of a social risk assessment of each social impact and benefit to understand the magnitude of impacts before the application of mitigation measures
- development of mitigation and enhancement measures.

18.2.3 Study area

Figure 18-1 provides an overview of the study area used to inform the SIA. While the impact area for the project would only include the City of Parramatta and City of Ryde LGAs, part of the City of Canada Bay Council area (at Rhodes Peninsula) has been included as there is potential for stakeholders in this area to experience indirect impacts. As such, the study area covers stakeholders who have the potential to be both directly and indirectly impacted by the project. Potentially impacted stakeholders include landowners, nearby neighbours, community members, businesses, service providers and Aboriginal groups who may have an interest in the project or could be directly or indirectly impacted.

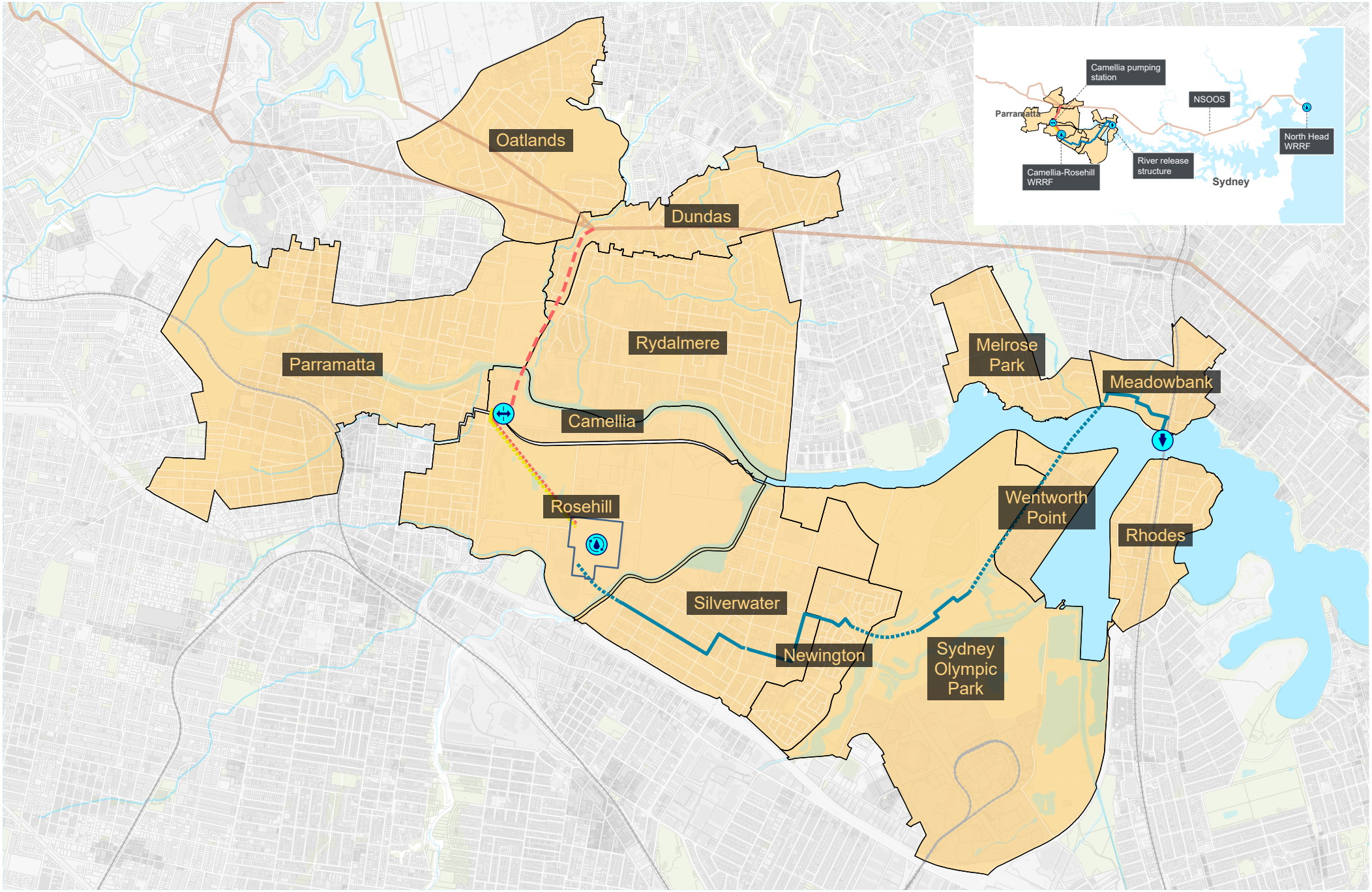


Figure 18-1 Social locality - local area

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:45,000 @ A4
GDA2020 MGA Zone 56

18.2.4 Social impact categories

The SIA Guideline (DPIE, 2023a) outlines 8 categories of social impacts (Table 18-2 (Source: SIA Guideline (DPIE, 2023a))). Social impacts may be positive or negative and may be temporary or permanent. People can also experience more than one social impact at a time. In some cases, people may experience multiple social impacts as a result of various projects occurring in an area. This is referred to as a cumulative impact. Cumulative impacts from the project are assessed in Chapter 23 (Cumulative impacts).

Table 18-2: Social impact categories (Source: SIA Guideline (DPIE, 2023a))

Impact	Summary
Way of life	Including how people live, how they get around, how they work, how they play, and how they interact each day.
Community	Including composition, cohesion, character, how the community functions, resilience, and people's sense of place.
Accessibility	Including how people access and use infrastructure, services and facilities, whether provided by a public, private, or not-for- profit organisation.
Culture	Both Aboriginal and non-Aboriginal, including shared beliefs, customs, practices, obligations, values and stories, and connections to country, land, waterways, places and buildings.
Health and wellbeing	Including physical and mental health especially for people vulnerable to social exclusion or substantial change, psychological stress resulting from financial or other pressures, access to open space and effects on public health.
Surroundings	Including ecosystem services such as shade, pollution control, erosion control, public safety and security, access to and use of the natural and built environment, and aesthetic value and amenity.
Livelihoods	Including people's capacity to sustain themselves through employment or business.
Decision making systems	Including the extent to which people can have a say in decisions that affect their lives, and have access to complaint, remedy and grievance mechanisms.

18.2.5 Risk assessment criteria

The social risk assessment stage evaluates each identified potential social impact and benefit across each phase of the project. Each impact or benefit is provided a likelihood and magnitude rating. The definitions for these ratings, as provided by the SIA Guideline Technical Supplement 2023 (DPIE, 2023b), are outlined in Table 18-3 and Table 18-4.

Table 18-3: Likelihood of impacts definitions

Likelihood of impacts	Description
Rare	May occur only in exceptional circumstances - can be assumed not to occur during period of the project (probability < 10%)
Unlikely	Event is unlikely to occur, but it is possible during period of the project (probability 10 - 30%)
Possible	Event could occur during period of the project (probability 30 - 70%)
Likely	Event likely to occur once or more during period of the project (probability 70 - 90%)
Almost certain	Very likely to occur as a result of the construction and/or operation of the project; could occur multiple times during relevant impacting period (probability > 90%)

Table 18-4: Magnitude of impacts definitions

Magnitude	Description
Transformational	Substantial change experienced in community wellbeing, livelihood, infrastructure, services, health, and/or heritage values; permanent displacement or addition of at least 20% of a community.
Major	Substantial deterioration/improvement to something that people value highly, either lasting for an indefinite time, or affecting many people in a widespread area.
Moderate	Noticeable deterioration/improvement to something that people value highly, either lasting for an extensive time, or affecting a group of people.
Minor	Mild deterioration/improvement, for a reasonably short time, for a small number of people who are generally adaptable and not vulnerable.
Minimal	Little noticeable change experienced by people in the locality.

A risk matrix was used to determine the potential impact in accordance with the SIA Guideline Technical Supplement 2023 (DPIE, 2023b). This matrix is provided in Table 18-5.

Table 18-5: Social impact significance matrix

Likelihood	Magnitude				
	Minimal	**Minor**	**Moderate**	**Major**	**Transformational**
Almost certain	Low	Medium	High	Very high	Very high
Likely	Low	Medium	High	High	Very high

Likelihood	Magnitude				
Possible	Low	Low	Medium	High	High
Unlikely	Negligible	Low	Low	Medium	High
Very unlikely	Negligible	Negligible	Low	Medium	Medium

18.2.6 Limitations

18.2.6.1 Primary data

A number of stakeholders, including members of the community, were invited to participate in engagement for the project. Not all stakeholders and community members that were invited to participate were able to. As a result, primary data collected through SIA engagement may not be representative of all values and perspectives amongst the community.

18.2.6.2 Secondary data

The 2021 ABS Census of Population and Housing was a key source of data for the SIA. This Census occurred during the height of COVID-19 pandemic restrictions which may have influenced socio-economic trends and characteristics.

Social infrastructure in the baseline predominantly considers infrastructure located within the suburbs that contain components of the project. Given the interconnectivity of the urban context, it is highly likely residents of the area and workers travelling to the area access services outside of the project's immediate area of impact. This has been considered in determining the risk associated with impacts to transport network in Chapter 14 (Traffic, transport and access).

18.2.6.3 Other limitations

The SIA is based on the current project design. It has been noted that while project components are generally fixed, some refinements to the physical layout or design of the project may be required following further investigation and design development. These changes would be subject to additional assessment by Sydney Water where required.

18.3 Existing environment

This section describes the existing social environment within the SIA study area.

18.3.1 Community profiles

Community profiles provide an overview of the socioeconomic characteristics and trends of an area. The study area is within the easternmost point of the City of Parramatta LGA, the southern part of the City of Ryde LGA, and the western part of the City of Canada Bay LGA, along the Parramatta River. Within these geographical social areas, community profiles for relevant suburbs were created to inform the baseline assessment.

Table 18-6: Population across the study area[16]

Suburb	Population
Rosehill	4,047
Rydalmere	7,274
Dundas	4,959
Silverwater	3,600
Newington	5,648
Sydney Olympic Park	4,848
Wentworth Point	12,703
Melrose Park	2,059
Meadowbank	5,089
Rhodes	11,453
Parramatta	30,211
Oatlands	5,833
Total	97,724

18.3.1.1 Age

The median age of residents across the study area is 34 years. Comparatively, the median age in NSW in 2021 was 39 years. This suggests that the study area is represented by a higher number of young people when compared to other areas across NSW. Within the study area the median age in Oatlands is 42 years which is the highest across the study area. The lowest median age was 31 years and was recorded in Sydney Olympic Park.

18.3.1.2 Housing

The volume and types of housing across the study area significantly vary. In the suburbs of Oatlands, Rydalmere, Dundas and Melrose Park, at least 50% of residents live in houses. This differs from areas such as Newington, Sydney Olympic Park, Wentworth Point, Meadowbank and Rhodes where more residents occupy units and apartments compared to houses. Typically older, traditionally suburban residential suburbs have

[16] Data presented in this table is reflective of the Suburbs and Localities (SAL) data collected by the Australian Bureau of Statistics for the 2021 Census.

higher numbers of residents living in single detached dwellings. Newer suburbs, and suburbs which are undergoing urban renewal have higher numbers of residents living in units or apartments.

Sydney Olympic Park, along with Parramatta, Rhodes, Meadowbank and Wentworth Point, is characterised by a predominance of flats and apartments, with over 85% of private dwellings in these suburbs falling into this category. Sydney Olympic Park and Wentworth Point have the highest proportion of population in flats and apartments with more than 98% of homes being units or apartments. Notably, 21.6% of dwellings in Sydney Olympic Park are unoccupied.

In contrast, Dundas, Oatlands and Rydalmere present a very different housing profile, with less than 15% of their dwellings comprised of flats or apartments. These suburbs tend to maintain more traditional residential housing, such as detached houses. Rydalmere also has the highest proportion of social housing at 31.6%, closely followed by Oatlands with 21%. This highlights the diversity in housing types and social infrastructure across the study area, emphasising the marked differences between suburbs undergoing urban renewal and those retaining established suburban characteristics.

Sydney Olympic Park and Wentworth Point had the highest proportion of rented dwellings and Melrose Park had the lowest. Rhodes and Newington had the highest median weekly rent, followed by Oatlands and Sydney Olympic Park.

18.3.1.3 Employment and unemployment

Table 18-7 outlines the different rates of employment and unemployment across the LGAs containing and within proximity to the project.

Table 18-7: Unemployment and workforce participation[17]

Area	Labour force participant count	Labour force participation rate	Unemployment rate (including youth unemployment)
Canterbury Bankstown LGA	143,939	48.4%	19.9%
Cumberland LGA	93,846	49.8%	22.2%
Parramatta LGA	130,510	62.1%	16.1%
Georges River LGA	74,332	58.1%	14.6%
The Hills LGA	100,595	66.5%	13.1%
Blacktown LGA	185,750	60.6%	18.5%
Ryde LGA	69,053	63.8%	15.2%

[17] Data sourced from Australia Bureau of Statistics Census, 2021

Area	Labour force participant count	Labour force participation rate	Unemployment rate (including youth unemployment)
Canada Bay LGA	48,280	64.3%	12.0%
Total	341,689	58.7%	17.3%
Sydney	2,310,052	60.3%	15.5%
NSW	3,874,012	58.7	14.7%

The study area has a higher rate of unemployment when compared to the Sydney and broader NSW rates. The most common types of employment across the study area were:

- health care and social assistance
- professional, scientific and technical services
- retail trade.

Employment trends may have been influenced by the COVID-19 pandemic.

18.3.1.4 Local business and industry

The highest concentration of registered businesses is in the City of Parramatta LGA. The most prevalent business type is construction. Most businesses in the study area were small businesses that employ less than 20 people.

The industries which employ the most people in the study area were professional, scientific and technical services, healthcare and social assistance, retail trade, financial and insurance services and education and training. The registered business types which employ the most people were rental, hiring and real estate services, transport, postal and warehousing, professional, scientific and technical services, wholesale trade and construction.

18.3.1.5 Community infrastructure

Community infrastructure refers to community facilities, services, and networks that help individuals, families, groups, and communities meet their social needs, maximise their potential for development and enhance community wellbeing. The areas surrounding the project offer diverse and accessible community facilities including healthcare providers, childcare and aged care, schools, emergency services, and accessible open spaces.

The social and community infrastructure in the nearby communities as of October 2025 is shown on Figure 18-2 to Figure 18-6. A full list of the community infrastructure is included in the SIA (Appendix S).

18.3.1.6 Access and connectivity

Community strategic plans for the study area ((City of Parramatta Council, 2025a), (City of Ryde Council, 2025) and (City of Canada Bay Council, 2025)) identified priorities derived from community feedback. The plans outline the need for accessibility of transport infrastructure, parking improvements, reducing car use and increasing pedestrian and cycling access.

Communities in the study area have access to a range of public transport options including rail networks, bus routes, and ferries. Existing public transport options service the study area and provide connection throughout the region and Greater Sydney. The proposed Parramatta and Sydney Olympic Park Metro station would increase accessibility and connection to Sydney by relieving pressure on the rail network and offering an alternate mode of travel. The recently opened PLR connects suburbs of Parramatta throughout the LGA.

Modes of travel differs between suburbs in the local area due to varying levels of access to public transport options. Rhodes and Meadowbank had the highest proportion of residents travelling to work via train. Oatlands had the lowest proportion of residents travelling to work via train with 17.5 % of the working population travelling via private vehicle due to the lack of train station in Oatlands and infrequent and limited bus services. It is noted the 2021 commute data is skewed due to the effects of the COVID-19 pandemic. Comparison of 2016 and 2021 journey to work data revealed that in 2021, a significantly lower proportion of residents travelled via train, which can be attributed to COVID-19 limiting travel.

Train stations in the region are accessible via connecting bike paths, reducing the need for private vehicle travel. Some areas are restrained by geography such as Wentworth Point, which is one way in and out through Hill Road. Silverwater has the highest proportion of residents who only travelled by car with 45.1% relying on private vehicle usage. This is then followed by Rhodes with 22.9% of residents only travelling by car. However, the study area had higher proportion of people commuting via public transport compared to Sydney and the wider State.

18.3.1.7 Cultural and linguistic diversity

The study area is home to a diverse community with between 30% and 60% of the population speaking languages other than English at home. Korean, Chinese, and Indo Aryan languages are the primary languages other than English that are spoken in the suburbs surrounding the project.

About 0.8% of the population within the study area identify as being Aboriginal and/or Torres Strait Islander. This is lower when compared to broader NSW where about 3.4% of the population identifies as being Aboriginal and/or Torres Strait Islander.

18.3.1.8 Health and wellbeing

The baseline health and wellbeing data for the population within the study area is discussed in Section 19.3 of Chapter 19 (Human health).

18.3.1.9 Community values

A review of community strategic plans was undertaken to inform an understand the community values for the local area. Key themes identified across the City of Parramatta (City of Parramatta Council, 2025a), City of Ryde (City of Ryde Council, 2025), and City of Canada Bay (City of Canada Bay Council, 2025) include:

- desire to have access to green and open spaces for recreation such as the Parramatta River and the Canada Bay foreshore
- enhancement of infrastructure sustainability including energy and resource efficiency
- balancing development of infrastructure between maintaining existing assets and building new ones
- reducing impact on the environment and strengthening the health of natural corridors
- strengthening community life, identity, connectedness, and wellbeing.

Figure 18-2 Nearby community facilities and infrastructure

Sheet 1 of 5 0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

N

Figure 18-3 Nearby community facilities and infrastructure

Sheet 2 of 5 0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

N

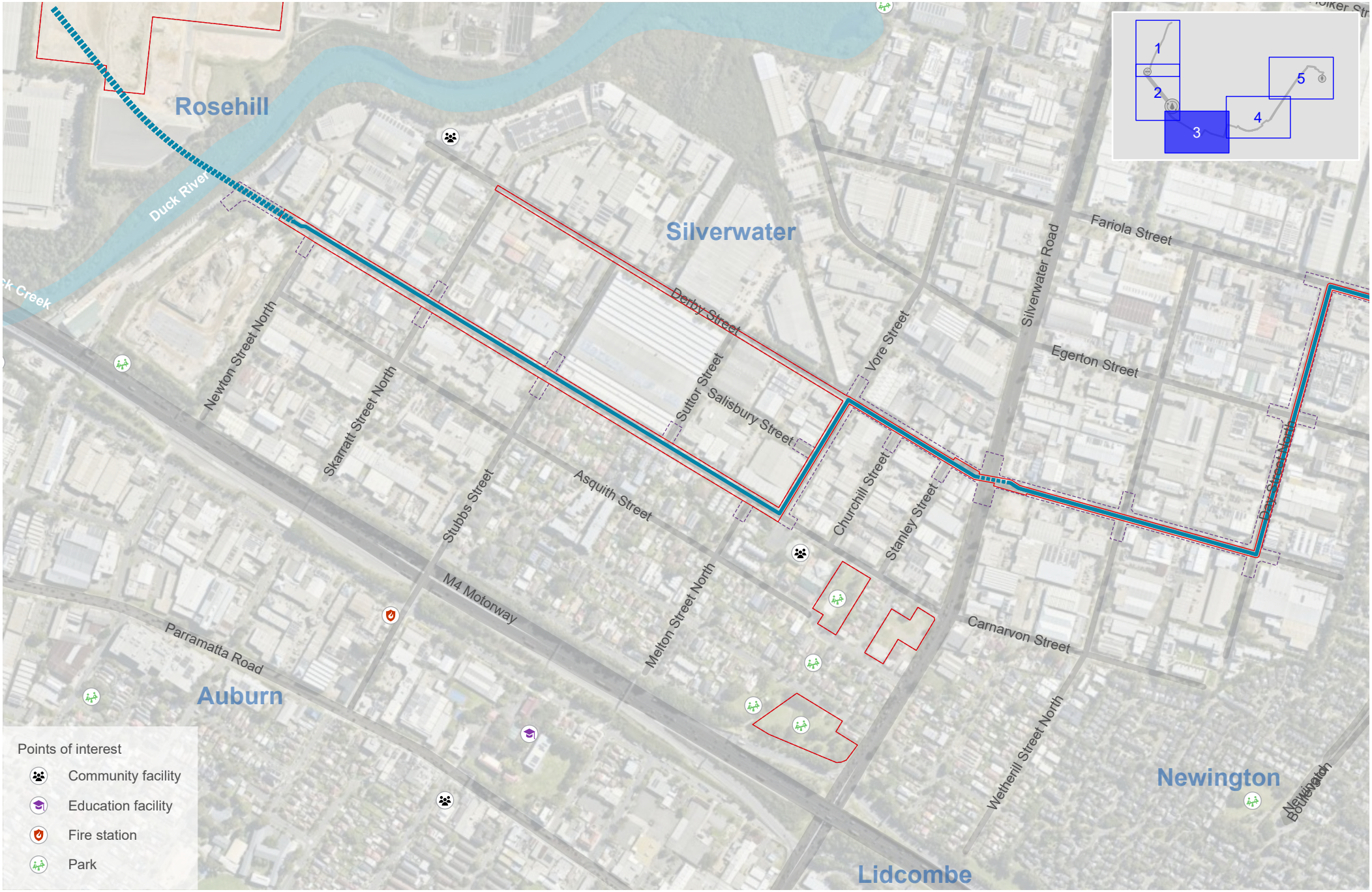


Figure 18-4 Nearby community facilities and infrastructure

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025
Scale: 1:8,000 @ A4
GDA2020 MGA Zone 56

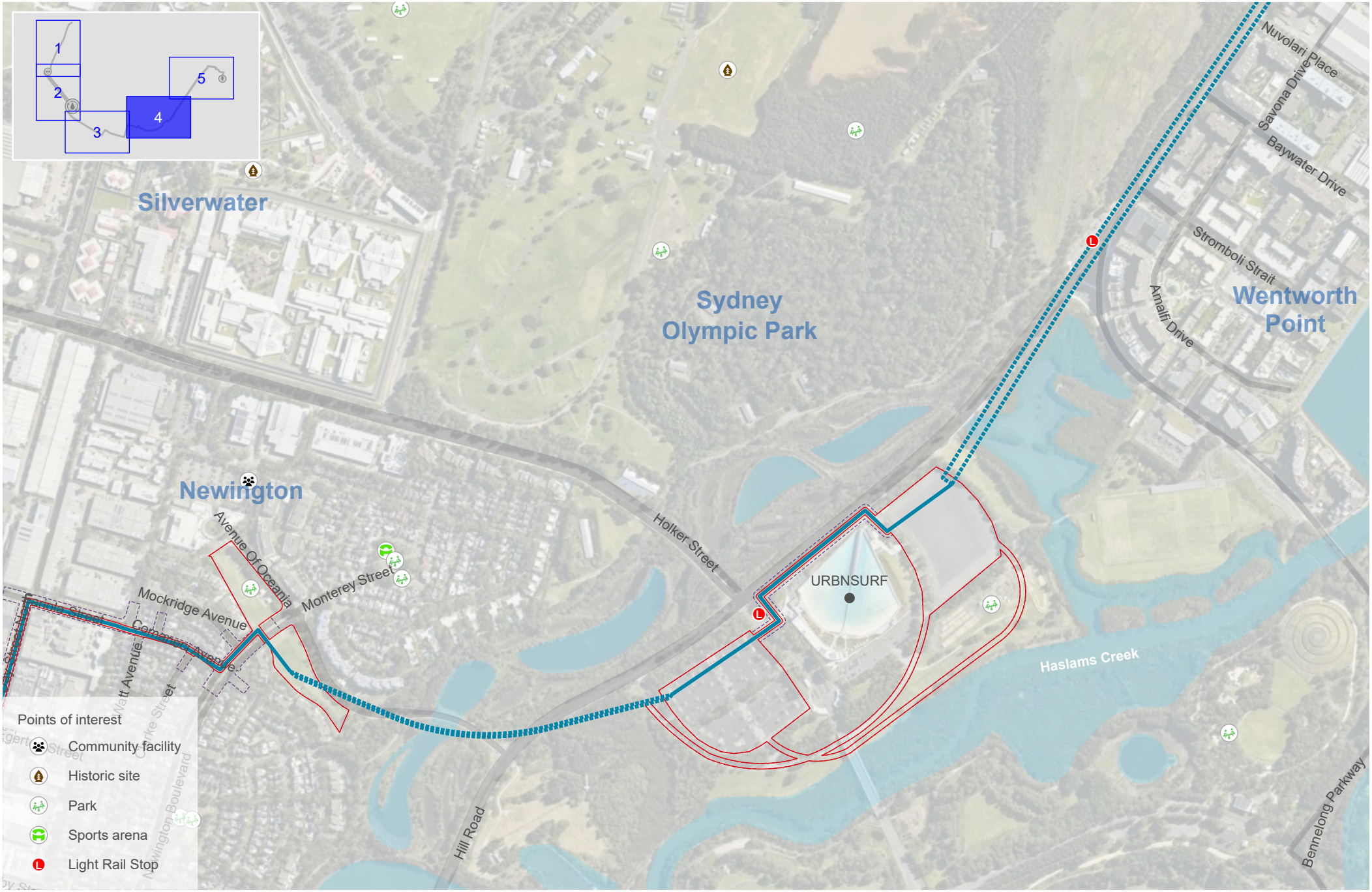


Figure 18-5 Nearby community facilities and infrastructure

Figure 18-6 Nearby community facilities and infrastructure

18.4 Construction impacts

18.4.1 Social

Table 18-8 provides a summary of the social impacts that may occur during construction and the significance of these impacts after mitigation measures or enhancements have been applied. The mitigation measures recommended for social and economic impacts are provided in Section 18.6. Mitigation measures directly applied for other environmental factors are provided in the relevant impact assessment chapter of this EIS. A detailed description of potential impacts is provided in the SIA (Appendix S).

Table 18-8: Social impacts expected during construction

Social impact category	Summary of unmitigated social impact	Relevant mitigation measures	Location	Significance	Impacted receivers
Surroundings	During construction, temporary visual impacts may arise from the presence of construction machinery, fencing, signage, and the removal of vegetation. In addition, the construction of large WRRF structures would alter the existing views, particularly those from Unwin Street and Devon Street. The facility would be partially visible from the Rosehill Gardens Racecourse and grandstands. All identified landscape character units would experience changes to their visual outlook, with more noticeable impacts resulting from activities such as horizontal directional drilling (HDD) pits, the installation of the barometric loop, as well as trenching and excavation machinery used for pipeline works. Visual impacts to recreational spaces can have broad social impacts as public spaces play important roles in public wellbeing in high density suburbs, supporting mental health and	• LCV01 to LCV07 (inclusive). Mitigation measures would not substantially reduce the degree of visual impact but would assist in managing community sentiment associated with the change.	Camellia-Rosehill Precinct (including Unwin Street, Devon Street and Rosehill Gardens Racecourse) Medium to high density residential areas; rivers and urban waterways; industrial Low density urban residential areas; parklands and reserves Carnarvon Street east, Comaneci Avenue, URBNSURF, Meadowbank Park,	High (unmitigated) Medium (mitigated)	• nearby residents • community • recreational users (Meadowbank and Memorial Parks).

Social impact category	Summary of unmitigated social impact	Relevant mitigation measures	Location	Significance	Impacted receivers
	peaceful enjoyment as well as influencing property values.		Meadow Crescent and Memorial Park.		
Health and wellbeing	During construction of the pipelines and use of the associated compounds dust emissions may be generated. This presents a potential concern for air quality if adequate mitigation measures are not implemented. There is potential for some contaminated material to be excavated along the river release pipeline alignment and transported to and from the Camellia-Rosehill WRRF. Within the vicinity of the WRRF, there are fewer than 100 receptors with a medium sensitivity to air quality impacts.	• AQ01 • AQ02. Mitigation measures provided in the AQIA make these impacts unlikely to occur with a minor magnitude when they do occur.	WRRF site and surrounds Pipeline construction and compound use	Medium (unmitigated) Low (mitigated)	• nearby residents.
Community	Consultation has highlighted the importance of the Parramatta River to the local community. Residents and stakeholders have expressed concerns regarding the potential impact of pipeline construction works in this area. The planned pipeline activities may disturb sections of aquatic and riparian habitats along the river. Such disturbances could lead to sediment being mobilised, which may increase turbidity and introduce contaminants into the water. These changes have the potential to negatively affect water quality and the health of the river ecosystem, which is highly valued by the community.	• WQ02 • SW06 • GE01 • GE02 • AB08 • CLS06 • TB08. Mitigation measures, including targeted monitoring and site-specific management plans, reduce the likelihood of the impact and reduce the	Parramatta River Duck River	High (unmitigated) Medium (mitigated)	• nearby residents • recreational users (Parramatta River) • conservation and bushcare groups.

Social impact category	Summary of unmitigated social impact	Relevant mitigation measures	Location	Significance	Impacted receivers
		magnitude of the impact to minor.			
Culture	No direct impacts to significant Aboriginal places or sites are expected. The project is proposed in an area which is recognised as having important Aboriginal cultural heritage value. Specific values are listed in Chapter 15 (Aboriginal Heritage) and include creek lines and larger waterways, as well as native plants and animals. The project would require removal of some native vegetation during construction which would have a minor negative impact to native plants during construction. Sydney Water would seek to avoid and minimise the extent of vegetation to be removed during detailed design. The Parramatta River and Duck River catchments have been exposed to sustained contamination due to historic heavy industries. The water quality in these waterways is generally poor, with elevated levels of nutrients and pollutants entering the waterways. Unmitigated construction of the project is not expected to result in a significant impact to the overall water quality and contamination in the waterways. Despite this, Sydney Water would implement appropriate mitigation measures as described in Chapter 7 (Waterways) to prevent contaminated water and sediment entering the waterways.	• LCV03. Mitigation measures identify opportunities to enhance cultural heritage.	Parramatta River Duck River	Medium (unmitigated) Low (mitigated)	• Aboriginal community • landowners.

Social impact category	Summary of unmitigated social impact	Relevant mitigation measures	Location	Significance	Impacted receivers
Accessibility	Increased traffic delays and longer queues are expected at intersections in Camellia-Rosehill that are already operating at or above capacity. This would be particularly noticeable during peak travel periods, which could make it more difficult for emergency services, businesses, and residents to navigate the affected areas. Additionally, construction compounds located in Newington and Silverwater may result in a reduction of available on-street parking. These changes could inconvenience those who rely on street parking in these neighborhoods as well as businesses whose customers utilise these areas. Access to more than 90 non-residential properties, including facilities that provide community and social services, would be temporarily restricted due to construction activities. This may disrupt service delivery and daily operation for both providers and the people who depend on these services.	• TT01 to TT07 (inclusive) Mitigation measures would assist in managing the magnitude of traffic and transport impacts.	Access routes to WRRF Parramatta Road/Wentworth Road intersection James Ruse Drive/Grand Avenue intersection Construction compounds	High (unmitigated) Medium (mitigated)	• road users • emergency services • local businesses • nearby residents • users of social services.
Health and wellbeing	Noise levels are expected to exceed allowable limits at most NCAs along the pipelines and adjacent infrastructure routes, with the potential for 24-hour disturbances. These noise exceedances may particularly affect vulnerable individuals, leading to sleep disruption for some residents. The noise exceedances could also impact non-residential properties. However, the findings do not represent the expected day to day noise impacts and these impacts are not likely to occur for long periods of	• NV01 to NV11 (inclusive). Mitigation measures would likely reduce the magnitude and likelihood of significant noise and vibration impacts. Sydney Water would consult with the Australian Turf Club	Pipeline routes and adjacent areas ATC house adjacent to C16 and C14	High (unmitigated) Medium (mitigated)	• nearby residents • noise-sensitive individuals • schools • churches • recreational clubs.

Social impact category	Summary of unmitigated social impact	Relevant mitigation measures	Location	Significance	Impacted receivers
	time. It is noted that the noise assessment adopted a worst-case scenario approach. There is an existing house at 2b Grand Avenue, Rosehill, that is owned by the Australian Turf Club. The house is directly adjacent to construction compound C16 and within 100 m of C14.	and any tenants during detailed design and construction to identify any reasonable and feasible measures for respite while compounds are in use.			
Accessibility / way of life	The location of the pipelines and associated construction compounds would temporarily restrict access to public spaces such as parks and recreation areas. This may reduce opportunities for sporting and recreational activities, and increase demand on alternative venues. This may create difficulties for people with accessibility needs who may not be able to travel to these alternate spaces. People living in high density housing, particularly around Meadowbank may be more likely to experience way of life impacts due to a temporary loss of recreational open space and parks.	• SIA01 to SIA03 (inclusive). Sydney Water would work with stakeholders to determine options for construction that have the least impact on public space accessibility. This would reduce the impact magnitude to minor.	Pierre De Coubertin Park, Meadowbank Park, Memorial Park, Parramatta River	High (unmitigated) Medium (mitigated)	• sporting associations • schools • nearby residents • community • recreational users (Parramatta River, Meadowbank and Memorial Parks).

Social impact category	Summary of unmitigated social impact	Relevant mitigation measures	Location	Significance	Impacted receivers
Way of life	Use of the Parramatta River at Memorial Park would be temporarily restricted due to the construction of pipeline infrastructure. This would temporarily limit river access for the community, recreational fishers, and sporting groups who use the river for leisure.	• SIA02 • SIA03. This mitigation measure would facilitate prompt notification of construction timing and potential safety risks, reduce the magnitude of these impacts to minimal.	Parramatta River at Memorial Park	Medium (unmitigated) Low (mitigated)	• recreational users (Parramatta River and Memorial Park) – canoers – boat users – fishers – recreational clubs.
Accessibility	The installation of the river release pipeline would require relocation and disruption to bus stops and ferry services along the corridor, resulting in reduced access and convenience for public transport users and the broader community.	• SIA02 • SIA03 • TT03 • TT04 • TT05. Mitigation measures keeping stakeholders and the community informed on construction timing and alternate access arrangements. Implementation of mitigation measures would reduce the magnitude of these impacts to minor.	Bus stops and ferry routes along pipeline corridor	Medium (unmitigated) Low (mitigated)	• nearby residents • public transport users • workers.

Social impact category	Summary of unmitigated social impact	Relevant mitigation measures	Location	Significance	Impacted receivers
Way of life	Access to walking and cycling paths in Meadowbank, Newington, and Sydney Olympic Park would be limited due to the installation of pipeline infrastructure, affecting routes commonly used for reaching public transport options. Detours would be in place which may be an inconvenience or annoyance to some people.	• SIA03 • TT03 • TT04 • TT05. Mitigation measures keeping stakeholders and the community informed on construction timing and alternate access arrangements. Implementation of mitigation measures would reduce the magnitude of these impacts to minor.	Meadowbank, Newington, Olympic Park	Medium (unmitigated) Low (mitigated)	• nearby residents • public transport users.
Livelihoods	The installation of pipeline infrastructure in Rosehill would require the temporary displacement of Stardust Circus for up to one season. This has the potential to result in a loss of income for the circus. It may also temporarily reduce tourism and economic activity in the immediate area. This disruption could have a minor negative impact on local businesses that experience event related patronage. However, the Stardust Circus holds several events elsewhere in the area throughout the year, indicating several suitable alternative locations nearby.	• SIA04. Mitigation measures, including ongoing engagement with businesses and advance notice for the circus, reduce the magnitude of these impacts to minimal.	Rosehill	Medium (unmitigated) Low (mitigated)	• Stardust Circus customers • local businesses • community.

Social impact category	Summary of unmitigated social impact	Relevant mitigation measures	Location	Significance	Impacted receivers
Health and wellbeing	Changes in road conditions, closures, and detours would be required for construction compounds. These adjustments may increase road safety risks for local residents, business owners, and visitors, while also making it harder for emergency services to reach people quickly and reliably, potentially putting community wellbeing at risk.	• TT01 • TT05. Mitigation measures and the CSEP would require that affected stakeholders, and emergency service providers to be notified of road changes to allow forward planning. This reduces the likelihood for safety risks from roads changes to unlikely.	Local road network near construction compounds	Medium (unmitigated) Low (mitigated)	• nearby residents (along pipeline routes) • landowners • community • local businesses • emergency services.
Accessibility / Community / Way of life	Temporary changes to road conditions, including closures and detours may disrupt regular access for residents, businesses, WSU, recreation facilities, and community services. These disruptions can make it more difficult for people to reach essential services such as emergency response, healthcare, and local amenities, impacting daily routines and potentially compromising community wellbeing by hindering access to important destinations.	• TT06 Mitigation measures and the CSEP would require that affected stakeholders, including businesses are notified of road changes to allow for forward planning. .	Along the release pipeline and brine pipeline alignment	Medium (unmitigated) Low (mitigated)	• landowners • community • emergency services • healthcare providers • other service users in affected areas.

Social impact category	Summary of unmitigated social impact	Relevant mitigation measures	Location	Significance	Impacted receivers
Livelihoods	The project is expected to create some employment and training opportunities, with the peak construction phase requiring around 200 full-time equivalent workers. This demand for skilled labor can provide local and regional residents with valuable job prospects and professional development, positively impacting individuals and their families by supporting livelihoods and contributing to the overall economic wellbeing of the community.	No specific mitigation measures are required for this project benefit. As a result, there is no change to the significance of the social impact. Employment benefits and opportunities would be considered further and would occur in line with Sydney Water's Procurement Policy.	City of Parramatta LGA City of Ryde LGA City of Canada Bay LGA	Low (unmitigated and mitigated)	• regional workforce.
Livelihoods	The procurement of goods and services needed throughout the construction period is expected to create business opportunities for local suppliers, while also generating indirect benefits for service industries such as cafés and restaurants frequently used by the construction workforce. These impacts can help support local businesses, boost economic activity, and enhance financial security for business owners and employees in the affected communities by increasing demand for their products and services.	No specific mitigation measures are required for this project benefit. As a result, there is no change to the significance of the social impact.	City of Parramatta LGA City of Ryde LGA City of Canada Bay LGA	Low (unmitigated and mitigated)	• regional businesses.

Social impact category	Summary of unmitigated social impact	Relevant mitigation measures	Location	Significance	Impacted receivers
Community	Significant changes to areas that hold value to communities and individuals can have negative community impacts. Impacts can include: • diminishing people's sense of belonging • reducing community cohesion • disrupting familiar spaces and relationships that facilitate community interaction. The installation of pipeline infrastructure at the Camellia pumping station, which is heritage listed, is expected to pose a low risk to the site's heritage value due to the works helping to preserve the future of the pumping station. There may be negative effects to the amenity of Meadowbank and Memorial Parks, which have strong community ties. This could temporarily impact the enjoyment and sense of connection for local residents and visitors who use these spaces.	• SIA01 • TT05 • LCV01 • LCV04 • LCV05 • LCV07 • NAH04 • NAH05 • NAH06 • NAH07. Implementation of mitigation measures would reduce the magnitude of impacts to identity and connection to place to minor.	Project wide Camellia pumping station Memorial Park	Medium (unmitigated) Low (mitigated)	• community • visitors to the region.

18.4.2 Economic

18.4.2.1 Stardust Circus

Stardust Circus has used the Australia Turf Club car parking site at the north-east corner of the James Ruse Drive / Grand Avenue intersection for many years. For the construction of the brine and transfer pipelines between Camellia pumping station and the WRRF, an HDD launch site and open trenching works would be undertaken at this location for about 4 months. During this time and if construction overlaps with the circus season, the circus would not be able to operate at this location. As a result, the circus would be required to identify an alternative location or postpone shows for one season until construction in this area is complete.

Each year, the circus generally performs several shows for a month around the July school holidays. The temporary displacement of Stardust Circus from its usual Rosehill site for one season is likely to result in lost income for the circus due to the cancellation of its annual shows. However, the Stardust Circus holds shows in a number of places across the Western Sydney throughout the year. In 2025, Stardust Circus held events at Castle Hill, Bass Hill, Penrith, St Marys, Camden, Earlwood, and Miranda. This indicates that there is a range of suitable alternative locations in the Greater Sydney area which could reduce economic impacts to the business.

18.4.2.2 Rosehill Gardens Racecourse

There would be no impacts to special events including race days in the Rosehill Gardens Racecourse and local businesses are expected to continue to experience no changes to patronage during these events.

18.4.2.3 Other businesses

A sensitive business is located within proximity to the construction boundary for part of the pipeline in Silverwater. The operation of this business may be sensitive to noise and vibration resulting from construction activities.

18.4.2.4 Oyster farmers and commercial fishing

There are no licences, aquaculture or oyster leases upstream or downstream from the Parramatta River and in Sydney Harbour.

- Commercial fishing in the Parramatta River and Sydney Harbour was banned in 2006. Recreational fishing is permitted. However, the DPIRD currently advises that due to elevated levels of dioxins in the waterways fish and other crustaceans caught west of Sydney Harbour Bridge should not be eaten
- Construction of the river release pipeline and structure would temporarily disrupt access to recreational fishing. This social impact to way of life is considered in Table 18-8.

18.4.2.5 Property and land use

Impacts to private properties have been minimised through the design of the project. Wherever possible, the design has prioritised locating infrastructure in land currently owned and operated by Sydney Water. Sydney Water acquired the Camellia-Rosehill WRRF site in 2024. The Camellia pumping station and surrounding property is currently owned and maintained by Sydney Water.

Where it has not been feasible to use land owned by Sydney Water, the design has been adapted to prioritise locating infrastructure and construction within public roads and public parks as well as private and public car parking areas. Sydney Water's use of these areas would be temporary for the duration of construction work and would be subject to lease agreements with the relevant landowners and authorities. At the completion of construction leased areas would be generally reinstated to their previous condition except where agreed with landowners. This would not include an area of Memorial Park at Meadowbank where the barometric loop is proposed to be permanently located. Sydney Water would continue to work with City of Ryde Council on the operational outcomes for Memorial Park.

Where new pipeline infrastructure is proposed greater than 9 m below-ground, Sydney Water would carry out acquisition of easements. Private residential properties are not expected to be subject to easement acquisition. The easement acquisition process is governed by the *Land Acquisition (Just Terms Compensation) Act 1991*, which mandates fair compensation for landholders and seeks to minimise adverse impacts during compulsory acquisition to ensure that compensation considers market value, disturbance, and other relevant losses, aiming to provide equitable outcomes for all parties involved.

From a socioeconomic perspective, property acquisition for construction works can lead to temporary or permanent displacement of residents or businesses, potentially disrupting local livelihoods and affecting property values in the area. Additionally, such acquisitions may alter community dynamics and access to amenities, with broader implications for social cohesion and local economic stability. These impacts are not expected as a result of the project due to the avoidance of acquiring privately owned residential properties and businesses.

Partial acquisition of council or public land can have mixed impacts on the local economy. Compensation received for the acquired land may be reinvested by the council into community infrastructure, public amenities, or maintenance projects, which can benefit the broader community. This reinvestment has the potential to stimulate local economic activity by funding improvement works, creating temporary jobs, or enhancing services accessible to residents and businesses alike.

18.5 Operational impacts

18.5.1 Social

Table 18-9 provides a summary of the social impacts that may occur during operation. A detailed description of potential impacts is provided in the SIA (Appendix S).

Table 18-9: Social impacts expected during operation

Social impact category	Summary of social impact	Relevant mitigation measures	Location	Significance of impact	Impacted receivers
Surroundings	The WRRF is expected to have minimal visual impact on the local community, as there are no sensitive visual receptors in the vicinity. During operation there would be moderate or lower visual impacts. This indicates that people living or working nearby are unlikely to experience noticeable changes to the appearance of their surroundings. During normal operation, the WRRF is not expected to cause any noticeable deterioration in air quality for people living or working nearby, meaning local residents and businesses should not experience adverse effects from air emissions associated with the facility. Noise from Camellia pumping station may exceed noise management levels at the proposed Camellia town centre, identified to be developed under the Camellia-Rosehill Place Strategy (DPE, 2022b). Noise levels may be exceeded by about 8 dB (consistent with current noise exceedance). Building design controls would mitigate impacts if required.	• LCV03 • LCV04 During design development, mitigation measures that promote good design outcomes would be implemented. During operation, the Sydney Water's Complaints Management Policy would be implemented to manage complaints, including those related to amenity. The application of the measures reduces the likelihood of these impacts occurring to unlikely.	WRRF Proposed Camellia town centre	Low (unmitigated and mitigated)	• nearby residents • community • local businesses • future businesses in the Camellia-Rosehill precinct.

Social impact category	Summary of social impact	Relevant mitigation measures	Location	Significance of impact	Impacted receivers
Way of life / accessibility	The Camellia-Rosehill WRRF and its associated infrastructure are designed to advance sustainable water and wastewater solutions throughout the Central City. By moving beyond current wastewater release practices, the WRRF would treat water to a high standard, release advanced treated water locally and enable adaptation for recycled water solutions in the future. This addresses the challenges posed by projected population growth, reducing the pressure on existing systems and lessening the need for major new infrastructure upgrades.	No specific mitigation measures are required for this project benefit. As a result, there is no change to the significance of the social impact.	Greater Sydney	High (positive)	• Greater Sydney community
Health and wellbeing / Culture / Community	The project would reduce wet weather overflows and release advanced quality water to Parramatta River. This is predicted to contribute to improvements in the water quality of the Parramatta River. This would reduce public health and environmental risks for local residents and community groups and support safer recreational and cultural activities along the river, enhancing overall wellbeing and community connection. By improving the health of the Parramatta River, the local community would benefit from a cleaner and safer waterway. This enhance social interaction and overall wellbeing by encouraging recreational and cultural activities along the river.	• WQ01 • WQ02 Implementation of mitigation measures would increase the likelihood of social benefits to likely and magnitude to moderate.	Parramatta River Western Sydney regional area	Medium (positive - unenhanced) High (positive - enhanced)	• nearby residents • community • recreational users (Parramatta River) – canoers – boat users – fishers – recreational clubs.

18.5.2 Economic

18.5.2.1 Stardust Circus

The Stardust Circus would be able to resume operating at the site following construction of the project. As such, no economic impacts to the Stardust Circus are expected during operation of the project.

18.5.2.2 Oyster farmers and commercial fishing

There are no licences, aquaculture or oyster leases upstream or downstream from the Parramatta River and Sydney Harbour. As such, no operational impacts are expected as a result of the project.

18.5.2.3 Property and land use

Sydney Water requires easements to provide access to property for maintenance of project infrastructure, including the river release, brine, and transfer pipelines.

Private residential properties are not expected to be subject to easement acquisition for this project.

The project has been carefully designed to locate infrastructure within roadways, Council reserves or government land, to minimise impacts to private owners. One private entity (the Australian Turf Club) would be affected by an operational easement for Lot 10 DP1285283 at the corner of James Ruse Drive and Grand Avenue, Camellia. This site is used as an overflow car park, with a caretaker's cottage and occasional use by the Stardust Circus. Current zoning of the site is E3 Productivity Support and is proposed to be RE1 Public Recreation under the Camellia-Rosehill Place Strategy (DPE, 2022b) for use as public open space and recreation. The proposed brine and transfer pipeline infrastructure at this site would be below-ground but would require an easement due to the depth of the pipelines and associated infrastructure here (air values). Current and proposed land uses at the site could continue during operation of the project. The brine and transfer pipelines also pass under the Australian Turf Club's Rosehill Gardens Racecourse. However, they have been designed to be of a depth that would not prohibit future development of that site.

The acquisition process and compensation would be undertaken to reflect the permanent loss of land for affected property owners, in line with regulatory requirements and best practice.

18.6 Mitigation measures

Table 18-10 outlines the mitigation measures Sydney Water proposes to manage social impacts during construction of the project. The SIA includes mitigation measures relevant to the social impacts associated with traffic and transport, environmental and human health, air quality, landscape and visual amenity, and noise and vibration associated with the project. These measures are detailed in the SIA (Appendix S) and the complete list of mitigation measures provided in Appendix E (Mitigation Measures). The measures below are in addition to those covered elsewhere in the EIS.

Table 18-10 Social impact management measures

ID	Potential impact	Mitigation measure	Timing
SIA01	Temporary interruption of access to public spaces	Continue collaboration with local councils. Refer to **TT05** (Appendix E). Restore parks affected by construction activities. At Meadowbank Park, where playing fields are impacted, re-grade the impacted fields and reinstate with quality turf suitable for sports and recreation use, to be selected in consultation with Council. Install two water bubblers in the park. Continue collaboration with Ryde City Council on how Sydney Water can support the Meadowbank Park Masterplan.	Prior to and during construction
SIA02	Impact of the project on use of the Parramatta River for recreational purposes	Provide advance notice to community and recreational users of construction timing including: • install clear temporary signage at affected foreshore areas • maintain safe access where practicable.	Prior to and during construction
SIA03	Potential disruption to active and public transport due to construction activities	Develop and effectively implement the project Community and Stakeholder Engagement Plan including measures to proactively address planned and unplanned access interruptions. Refer to **TT03, TT04, TT05** and **TT07** (Appendix E).	During construction
SIA04	Temporary disruptions to Stardust Circus during construction	Continue engagement with the Australian Turf Club and the Stardust Circus. Minimise impacts through detailed project programming, where feasible.	Prior to and during construction

Human health

19 Human health

This chapter provides an overview of the key findings of the detailed Health Impact Assessment (HIA, EnRisks, 2025) included in Appendix T. The assessment concluded that human health risks, as a result of potential project impacts to water quality, air quality, noise and vibration, soil and groundwater contamination, safety and traffic and transport, would be negligible, provided that appropriate mitigation measures are implemented.

19.1 Secretary's Environmental Assessment Requirements

Table 19-1 lists the SEARs relevant to human health and where they have been addressed.

Table 19-1: Project SEARs relating to human health

SEARs	EIS section where requirement addressed
1. The health impacts of the project, in accordance with the current guidelines.	Section 19.4 Section 19.5 Appendix T
2. The assessment must:	
(a) describe the current known health status of the affected population	Section 19.3
(b) assess health risks associated with exposure to environmental hazards	Section 19.4 Section 19.5
(c) assess the effect of the project on other relevant determinants of health such as the level of physical activity and access to social infrastructure	Section 19.4.7 Section 19.5.7
(d) assess opportunities for health improvement	Section 19.6
(e) assess the distribution of the health risks and benefits	Section 19.4 Section 19.5 Section 19.6
(f) discuss how, in the broader social and economic context of the project, the project will minimise negative health impacts while maximising the health benefits	Section 19.6
(g) assess the impact of project discharge(s) to Parramatta River on making the Parramatta River swimmable by 2025, and the potential health impacts to recreational uses of Parramatta River.	Section 19.5.1

SEARs	EIS section where requirement addressed
3. The likely risks of the project to public safety, paying particular attention to pedestrian safety, subsidence risks, bushfire risks and the handling and use of dangerous goods.	Sections 19.4.5 Section 19.4.6 Section 19.5.5 Section 19.5.6

19.2 Assessment methodology

19.2.1 Legislative and policy context

The HIA (Appendix T) has been completed in accordance with the following guidelines that are endorsed and accepted by NSW and Australian health and environmental authorities:

- Health Impact Assessment Guidelines, Environmental Health Committee (enHealth, 2017)
- Health Impact Assessment Guidelines, Environmental Health Committee (enHealth, 2001)
- Harris, P., Harris-Roxas, B., Harris, E. & Kemp, L., 2007, Health Impact Assessment: A Practical Guide, Centre for Health Equity Training, Research and Evaluation (CHETRE). Part of the University of NSW Research Centre for Primary Health Care and Equity. University of NSW, Sydney (Harris et al, 2007)
- Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards, 2012 (enHealth, 2012)
- Schedule B8 Guideline on Community Engagement and Risk Communication, National Environment Protection (Assessment of Site Contamination) Measure, 1999 (National Environment Protection Council (NEPC, 2013))
- Australian Drinking Water Guidelines published by National Health and Medical Research Council (NHMRC, 2011 updated 2024)
- Guidelines for Managing Risks in Recreational Water published by National Health and Medical Research Council (NHMRC, 2008)
- Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance or Inhalation Risk Assessment), EPA-540-R-070-002, January 2009 (United States Environment Protection Agency (USEPA, 2009)).

Relevant legislation considered as part of the assessment is listed in Table 1.2 of the HIA (Appendix T).

19.2.2 Methodology

The methodology for the HIA included:

- reviewing project design and technical assessments where impacts have potential to result in impacts to human health, including impacts related to:
  - water quality
  - air quality
  - noise and vibration
  - soil and groundwater contamination
  - safety, including chemical use and flooding
  - traffic and transport
  - access to physical activity and social infrastructure
- identifying the populations in the study area which may be exposed to impacts from the project
- completing a hazard assessment to identify the adverse health effects associated with the environmental hazards
- characterising the risk of hazards
- identifying mitigation measures to avoid or minimise the potential impact to human health from construction and operation of the project.

19.3 Existing environment

The project is located in the LGAs of the City of Parramatta and City of Ryde. The population considered in the assessment includes those living, playing and working in the areas where the project would be constructed and operated.

The City of Parramatta LGA is located in the centre of Sydney, about 25 km from the Sydney CBD. Parramatta CBD serves as an economic hub for the region, providing employment, education and economic opportunity. A key landmark of the region is the Parramatta River. The Parramatta River's environmental health, recreational uses, indigenous and non-indigenous history, transport options, economic opportunities and amenity are highly important to the community. A key focus of the DUBA, BUDU, BARRA: Ten Steps to a Living River – the Parramatta River Masterplan (PRCG, 2018) is to make the river swimmable again by 2025. Six swimming sites have already opened including Putney Beach at Putney Park, Bayview Park at Concord, Cabarita Park and Bedlam Bay at Gladesville. New site is being planned at Callan Park at Lilyfield.

The City of Ryde LGA makes up part of the area where this project would be located. The City of Ryde LGA is connected to the Canada Bay LGA via the Ryde Bridge. These LGAs are also connected via rail, with the John Whitton Bridge connecting the Meadowbank and Rhodes train stations. The John Whitton Bridge is heritage listed and multi-purpose, including a pedestrian walkway and cycle path. The City of Ryde LGA is home to the developing Macquarie Park Innovation District, which is considered to be a leading hub for employment and residential amenities. Both the City of Ryde and City of Parramatta LGAs have a culturally and linguistically diverse mix of residents.

The HIA (Appendix T) provides further information on the population and health profile of existing communities near the project. Key content summarised here includes:

- population statistics of the study area based on 2021 Australian Bureau of Statistics Census Data Table 19-2
- key health indicators for the Western Sydney and Northern Sydney Local Health District (LHD) compared with Sydney LHD and wider NSW statistics based on data obtained from NSW HealthStats (Table 19-3).

Table 19-2: Summary of population statistics in the study area

Location	Total population	Population by age group %			
		0 - 4	5 - 19	20 - 64	65 years and over
City of Parramatta	256,729	6.3	16.4	64.7	12.5
City of Ryde	129,123	5.6	15.2	64.2	15
Greater Sydney	5,231,147	6	18	61	15
NSW	8,072,161	5.8	18.1	58.5	17.7
Australia	25,422,789	5.8	18.1	58.8	17.2

Table 19-3: Summary of key health indicators

Parameter/measure	Sydney LHD	Western Sydney LHD	Northern Sydney LHD	NSW
Health behaviours (%)				
Met vegetable consumption guidelines – adults	5.8	2.1	6.6	4.6
Met fruit consumption guidelines – adults	39.6	31.6	46.6	38
Met vegetable consumption guidelines – children	5.3	1.6	6.5	4.2
Met fruit consumption guidelines – children	65.5	54	67.6	59
Increased risk of alcohol-related harm – adult	34.2	22.2	32	31
Adult population defined as overweight but not obese	35	34.9	31.6	34.9

Parameter/measure	Sydney LHD	Western Sydney LHD	Northern Sydney LHD	NSW
Adult population defined as obese	18.8	30.1	16.4	26.5
Adults – smoking rates (daily or occasional)	9	13	5	10.5
Adults – vaping rates (daily or occasional)	10.4	8.4	6.9	6.7
Sufficient levels of physical activity – adults	77.7	57	76	64.8
Sufficient levels of physical activity – children	16.5	13.5	14.7	19.8
Age standardised rates per 100,000 people				
Mortality – all causes	504.4	530.6	424.3	538.1
Mortality – cardiovascular	106.2	119.7	98.4	120.9
Mortality – asthma	1.1	1.5	1	1.3
Mortality – COPD	17	18.2	9.8	21.9
Hospitalisations – cardiovascular	1295.6	1425	1454.3	1522.7
Hospitalisations – gastrointestinal infection	194.9	232.2	221.9	238.7
Hospitalisations – respiratory disease	1263	1486.3	1349.2	1505.6

Review of the data presented in Table 19-3 indicates that the population relevant for this project is mixed in relation to their potential vulnerabilities. Overall, they are generally similar to the larger NSW population. The data indicate:

- Sydney LHD has similar characteristics to NSW overall or has characteristics that make them potentially less vulnerable to changes in environmental stressors apart from vaping rates.
- Western Sydney LHD has similar characteristics to NSW overall in relation to mortality and hospitalisations but has some statistics for behaviours that could make the population generally more vulnerable to changes in environmental stressors – issues around physical activity levels and rates of fruit and vegetable consumption.

- Northern Sydney LHD generally has characteristics that make them potentially less vulnerable to changes in environmental stressors than NSW overall.

Therefore, the communities relevant for this project are generally similar to the characteristics for NSW overall – i.e. they are not more sensitive to changes in their environment due to a project like this one than for NSW.

19.4 Construction impacts

The project's potential impacts on human health during construction are assessed below. Relevant environmental hazards include water quality, air quality, noise and vibration, soil and groundwater contamination, safety and traffic and transport. The environmental hazards have the potential to result in health risks to waterway users (for recreational use and ferry traffic), road users, pedestrians, and residents and sensitive receivers close to the impact area. Impacts associated with restricting access to recreational areas is also assessed in Chapter 18 (Social and economic). Overall, human health impacts during construction have been assessed as negligible, provide mitigation measures are in place.

19.4.1 Water quality

Runoff from construction areas has the potential to cause on and offsite erosion and sedimentation, particularly where earthworks are being undertaken. Accidental spills of fuels or chemicals used during construction also has the potential to enter receiving water which may then lead to exposure of these fuels or chemicals to humans who are in contact with that water. These impacts are common with all types of construction. A range of mitigation measures are recommended in other sections of the EIS for the management and release of stormwater from construction areas and for the appropriate storage and handling of any fuels or chemicals. This includes minimising disturbance as much as possible and implementing sediment and erosion controls. Disturbed areas would be rehabilitated as soon as practical following construction works to limit the potential movement of soils offsite.

Construction of the river release structure has the potential to disturb contaminated sediments on the Parramatta River riverbed. The design of the project and construction methodologies proposed have been developed to avoid disturbance of the contaminated sediments. Mitigation measures would also be implemented to minimise disturbance of contaminated sediments and to ensure the materials being placed in the river do not have impacts on water quality. Detailed planning for this part of the works would include consideration of tidal cycles, communication with river users, careful placement of materials and infrastructure to minimise disturbance, use of sediment controls to minimise sediment movement and monitoring.

Access to this section of the river would be impacted during construction of the river release structure and has the potential to impact river users (including recreational users and ferry traffic). Given that construction is short term only (anticipated to be limited to several weekends), any impacts to river users is minimal.

The assessment of potential human health impacts concluded that with mitigation measures in place, risks to community health due to changes in water quality during construction are expected to be negligible.

Sections 7.4.7 and Section 7.5.5 includes mitigation measures to minimise water quality impacts during construction.

19.4.2 Air quality

Sources of air emissions during construction relate primarily to dust during earthworks. Dust particles are always present in the air and construction activities would add to existing background levels. Dust particles at excessive levels have the potential to cause respiratory issues in humans. The air quality impact assessment (WSP, 2025) rated the risk of dust generation at the WRRF site, pumping station and pipelines. The risk levels were rated as medium, negligible to low and negligible to medium respectively. However, the assessment noted that these risks can be managed by the implementation of standard construction mitigation measures.

The assessment of potential human health impacts concluded that with mitigation measures in place, risks to community health due to dust generation during construction are expected to be negligible.

Section 12.7 includes mitigation measures to minimise air quality impacts during construction.

19.4.3 Noise and vibration

Noise and vibration impacts have the potential to impact human health, including in relation to:

- sleep disturbance
- annoyance, including from vibration
- hearing impairment
- interference with speech and other daily activities
- impacts on children's school performance (through effects on memory and concentration)
- impacts on cardiovascular health.

The project would produce noise and vibration as a result of construction activities at the WRRF, upgrades at Camellia pumping station and along the pipeline alignments.

Construction works would be completed both within and outside standard construction hours. In general, works outside standard construction hours would be required for trenchless methods and construction of the river release structure. Out of hours work would also be required in some areas to minimise significant disruptions to the traffic network.

During construction, noise would not exceed noise management levels during the construction of the Camellia-Rosehill WRRF or during Camellia pumping station upgrades. However, during construction of the pipelines construction noise would exceed both standard and out of hours noise management levels. Exceedances would occur predominately in the areas of Rosehill, Silverwater and Newington.

The results are representative of a worst case of construction works, where all noisy works are occurring at the same time, and are not reflective of the general operation of the construction works. In practice, the progressive nature of the work site and the intermittent nature of particularly noisy activities means that not all receivers would be impacted at the same time and there is the potential that the actual noise levels would be less than those predicted.

Given the potential exceedances, the assessment identified a range of noise mitigation measures for relevant locations and for relevant activities and noted that these would reduce noise impacts.

The assessment of potential human health impacts concluded that with standard mitigation measures in place, predicted noise impacts during construction are not sufficient to increase the risk to community health.

Section 13.6 includes mitigation measures to minimise noise and vibration impacts during construction.

19.4.4 Soil and groundwater

The Camellia Peninsula is an area where a wide range of industrial activities have occurred in the past. The proposed WRRF site formed part of the Clyde Refinery which ceased operation in 2012. The site is contaminated with petroleum hydrocarbons and asbestos. Remediation works have been carried out by the previous land owner. Sydney Water has carried out further environmental management works under a separate planning approval to manage residual contamination.

Contaminated fill remains present in parts of the WRRF site. Such material is being addressed by the application of clean fill across part of the site to a depth of 1.7 m above the historical level. This means that any contaminants in existing soil would be covered and generally not accessible to people during construction or operation of the facility (GHD, 2025a). Construction would include excavation of some contaminated fill, however this would be managed in accordance with mitigation measures included in Section 9.6. Residual contamination would be managed through a long-term environmental management plan for the site.

Risks to community health from contamination at the WRRF site are expected to be negligible. The community would not be able to come into contact with any soil or groundwater at the site, as they would not be able to access the site during construction or operation. The groundwater impact assessment identified mitigation measures that would minimise and manage groundwater interaction such that offsite migration of groundwater is unlikely. In locations where asbestos containing materials may be found, risks would be managed in accordance with government guidance and include measures to protect workers.

As noted in Section 9.4.1, there is a high chance of encountering soil vapour at the WRRF and a potential along the alignment. The HIA (Appendix T) includes the results of vapour modelling. The assessment concluded that the risk to health is negligible, provided mitigation measures are in place.

The brine, transfer and river release pipelines also traverse areas with history of industrial land use. Contamination has been identified during soil and groundwater sampling. Asbestos was identified and there is potential for more to be found during construction. Metals, PFAS and petroleum hydrocarbons were also identified in groundwater at levels above relevant guidelines. Potential for dust containing contamination was identified but considered to be low risk and able to be managed through standard mitigation measures.

Risks to community health from contamination along the pipelines are expected to be negligible. The community would not be able to come into contact with any soil or groundwater during construction due to the controls required to be in place for safety reasons related to construction methods.

The assessment of potential human health impacts concluded that with mitigation measures in place, risks to community health due to the management of contaminated soils and groundwater during construction are expected to be negligible.

Sections 9.6 and 10.7 include mitigation measures to manage contaminated soils and groundwater during construction.

19.4.5 Safety

Chemical use, flooding, bushfires and subsidence can impact public safety and human health. The project is not located in a bushfire prone or mine subsidence area. No further assessment is required in relation to these risks. Further assessment on chemical use and flooding is provided below.

19.4.5.1 Chemical use

The HIA relied on outcomes from the PHA for an assessment of potential health impacts during construction of the project. The PHA (GHD, 2025c) did not identify any construction materials or chemicals in the risk screening assessment. No further assessment is required.

19.4.5.2 Flooding

Construction activities can potentially change flooding conditions by inhibiting flood flows or displacing flood waters if located in flood-prone land. Potential construction flood impacts are summarised in Table 8-2. Due to the location and nature of the construction activities for the project, construction flooding risk mainly relates to the potential for movement of sediment and soils or potential for erosion from flooding at construction work areas. Overall impacts of construction on flood behaviour range from negligible to low risk.

The assessment of potential human health impacts concluded that with mitigation measures in place, risks to community health in relation to flooding during construction are expected to be negligible.

Section 8.7 includes mitigation measures to manage flooding risk during construction.

19.4.6 Traffic and transport

The project would generate traffic during the construction phase. This has the potential to impact the road network, as well as public transport, pedestrian footpaths and cycling.

The health and safety of road users is unlikely to be impacted given the temporary and minor nature of impacts. For most roads, the additional construction traffic volumes from the project are within their capacity. However, construction traffic would result in a minor increase average delay and queuing at the James Ruse Drive/Grand Avenue and Wentworth Street/Parramatta Road intersections. Road users and nearby residents would also be temporarily impacted during construction of the pipelines by several road closures and impacts to property

access. Car parking availability, including on-street parking opportunities, would also reduce for short periods in some areas. Impacts to the traffic network would be communicated with emergency services.

Ferries and other watercraft would be impacted by works for the river release structure and be required to detour around the construction area. These impacts would be limited to several weekends only.

Temporary closure of several shared paths near the project would have a minor impact on pedestrians and cyclists. Pedestrians and cyclists would be detoured to other paths through signage and traffic controllers.

The assessment of potential human health impacts concluded that with mitigation measures in place, risks to community health as a result of traffic changes during construction are expected to be negligible. Consultation with impacted groups is essential managing and minimising impacts. Section 14.7 includes mitigation measures to manage impacts to traffic and transportation during construction.

19.4.7 Access to physical activity and social infrastructure

Physical activity and access to social infrastructure is an important determinant of health.

During construction, the project would impact access to areas used socially and for physical and recreational activity. This includes suburban parks during pipeline construction and the Parramatta River during construction of the river release structure. Alternative routes would be provided for shared pathways to minimise impacts on physical activity. Impacts to suburban parks would be minimised as much as possible, in terms of space occupied and the duration of construction works. Impacts to ferry services during construction would be limited, likely to several weekend periods.

Given the temporary nature of construction, impacts to physical activity and access to social infrastructure is unlikely to increase the risk to community health. Mitigation measures in relation to social impacts, outlined in Section 18.6, would help to minimise the potential impacts.

19.5 Operational impacts

The project's potential impacts on human health during operation are assessed below. Relevant environmental hazards include water quality, air quality, noise and vibration, soils and groundwater contamination, safety and traffic and transport. The environmental hazards have the potential to result in health risks to recreational waterway users, road users, pedestrians, and residents and sensitive receivers close to the impact area. Overall, human health impacts during operation have been assessed as negligible, provide mitigation measures are in place.

19.5.1 Water quality

The project includes the release of treated water to Parramatta River. Most of the time, this would be advanced treated water.

People may come into contact with the water in Parramatta River in the following ways:

- incidentally ingesting water while swimming, boating, wading, rowing

- skin contact with water while swimming, boating, wading, rowing.

The water in Parramatta River is too salty to be considered a potential source for drinking water. It is also too salty to use as source water for agricultural uses (irrigation or stock watering) or for irrigation of parks or sports fields. The human health assessment compared estimated concentrations of contaminants in the releases with the relevant recreational water guidelines (NHMRC, 2008). The risk of health effects is considered negligible, provided that the concentration of a contaminant is below the relevant recreational water guideline.

The existing condition of the Parramatta River has been described in Chapter 7 (Waterways assessment). The estuary and its catchment have been exposed to persistent stress over the last 2 centuries due to historical and current impacts from human activities. Consequently, water quality in sections of the river has been degraded and segments of the river's embankments and sediments are contaminated with a range of heavy metals and other chemicals.

Contaminated sediments in the river resulted in the following fishing restrictions:

- complete commercial and recreational fishing ban in Duck River and Homebush Bay (including Haslams and Powells Creeks) since 1989 (due to contamination by dioxin-like compounds)
- recreation fishing advisory for Parramatta River and Port Jackson since 2006 (fishing can occur, but fish caught west of the Sydney Harbour Bridge should not be eaten). Parramatta River and Port Jackson are also closed to the taking of any species of shellfish
- commercial fishing ban throughout the rest of Sydney Harbour and its tributaries, including the Parramatta River also since 2006.

The river is used for a wide range of boating activities including rowing and sailing. Other recreational activities were not common in the river until the last decade when controls on water quality have been improved and information about water quality has become available via Beachwatch and RiverWatch. A number of swim sites are now open, with the closest one to the release located at Putney Park, about 2 km downstream of the river release.

The releases have the potential to impact water quality directly, as well as indirectly through the disturbance of contaminated sediments. These impacts are addressed separately below.

19.5.1.1 Potential impacts to water quality in Parramatta River from releases

Potential impacts to water quality were assessed using hydrodynamic and water quality modelling. The model and potential impacts are summarised in Section 7.4. Impacts in relation to human health are summarised in Table 19-4.

Table 19-4: Key human health findings from water quality modelling

Parameter	Key findings
Enterococci	Enterococci are a group of bacteria commonly found in the intestines of humans and other warm-blooded animals. Enterococci are considered the preferred indicator organisms for assessing the microbial quality of recreational waters in Australia. Enterococci is present in raw wastewater. The treated water releases would have zero/negligible concentrations of enterococci. The modelling predicted that enterococci levels in Parramatta River would reduce in the vicinity of the release, including at swim sites. During wet weather events, high concentration spikes may occur within the river. However, these spikes are a result of stormwater and wastewater overflows entering the river rather than the project releases. More broadly, the project would divert flows from the wastewater system to the new WRRF, resulting in a net reduction in flows in the NSOOS. This would result in a reduction in the frequency and volumes of wastewater overflows during wet weather, and therefore improvements to the water quality of downstream waterways, including a reduction in enterococci concentrations.
Nutrients	Modelling identified potential reductions in nutrient concentrations, such as nitrogen and phosphorus. This is due to the high level of treatment at the Camellia-Rosehill WRRF and the increase in capacity of the existing wastewater system, which would reduce overflows of untreated wastewater. The chlorophyll a concentrations and risk of algal blooms was also predicted to generally improve due to reduced nutrient concentrations.
Salinity	The advanced treated water would have a very low level of salinity due to the reverse osmosis treatment process. This is predicted to reduce the salinity in the river at the release location. As salinity in this estuarine area already varies significantly with each tidal cycle, the expected changes are unlikely to cause any meaningful impact on the river or pose health risks to river users.
Other chemicals	A wide range of chemicals are present in untreated wastewater. The treatment processes proposed for this WRRF would treat and remove many of these contaminants. A toxicant review, using data from other similar treatments plants was undertaken, with data reviewed against relevant guidelines. This comparison identified the following chemicals as potentially being above aquatic ecology guideline values: • advanced treated water: total chlorine and copper • tertiary treated water: total chlorine, nitrate, aluminium, copper, mercury and zinc. In addition to the above, iron has also been identified as potential above the recreational water quality guidelines. For advanced treated water, none of the flagged contaminants would be present at concentrations above guidelines relevant for recreational water quality so risks to community health would be low/negligible. For tertiary treated water, all contaminants except aluminium and iron would be at concentrations well below recreational water quality guidelines so risks to community health would be low/negligible. Further consideration of aluminium and iron, concluded:

Parameter	Key findings
	• guidelines for aluminium and iron are based on aesthetic considerations – i.e. changes in odour or taste for drinking water or impacts on infrastructure • aluminium guideline is based on preventing issues with the drinking water treatment process which is not relevant for Parramatta River as this water is not used for drinking • iron guideline is based on precipitation of iron salts which can cause brown spots on clothes after washing or taste issues in drinking water. Importantly, none of these issues are relevant for Parramatta River.

19.5.1.2 Potential disturbance of sediments in Parramatta River

Treated water releases have the potential to result in ongoing disturbance of contaminated sediments in Parramatta River. The design of the release structure has prioritised minimising turbulence and shear stresses at the riverbed. Sediment sampling and analysis indicated that flows less than 0.1 m/s in the river near the riverbed would be unlikely to disturb sediments (Jacobs, 2025a).

Jacobs has undertaken detailed CFD modelling of the potential for sediment disturbance for various configurations and a range of high, average and low flow scenarios (Jacobs, 2025a). A detailed description of the modelling and results is included in Section 7.6.

The CFD modelling was undertaken with and without the releases to determine the difference in velocities at the riverbed due to the releases. In most cases and at most locations, the velocity of the flows near the riverbed with the release were 0.1 m/s or less. There were some locations where flows at the riverbed were between 0.1 and 0.2 m/s which may result in some very minor sediment disturbance just adjacent to a nozzle particularly during extremely low flow conditions at the turn of the tide when the tidal flows in the river slow (Jacobs, 2025a). The addition of a geosynthetic concrete mattress (or similar performing structure) beneath the pipes and nozzles and an overlying concrete mattress (or similar performing structure) to anchor the structure in place was then considered to ensure sediment disturbance would be minimised to the maximum extent possible (Jacobs, 2025a).

Further modelling was undertaken to check if the change in flows due to the release could make any difference to boats and other recreational activities on the river surface. The focus of this work was on a paddleboard during low flow conditions close to the river release structure. The modelling showed that the change in flows due to the release would not be noticeable at the river surface even under these worst case conditions (Jacobs, 2025a).

Therefore, appropriate modelling has been undertaken to inform the design of the river release structure with the goals to minimise potential for sediment disturbance to the maximum extent practicable along with ensuring no impacts on recreational activities in the river.

19.5.1.3 Summary of water quality impacts in relation to human health

The assessment of potential health impacts concluded that with mitigation measures in place, operation of the WRRF and changes in water quality from releases to Parramatta River pose negligible risk to community health. Given that the releases are predicted to have a predominantly positive impact on water quality, the project would have a positive contribution to the goal of making Parramatta River swimmable and reduce potential health risks to recreational users of Parramatta River.

Sections 7.4.7, Section 7.5.5 and Section 7.6.5 outlines these measures to minimise impacts during operation.

19.5.2 Air quality

Operation of the project has the potential to generate air quality emissions including:

- odour
- oxides of nitrogen, measured as nitrogen dioxide from the cogeneration unit.

Quantitative air quality modelling of potential odour and nitrogen dioxide emissions from the project was undertaken using CALPUFF. The modelling found that the operation of the project would meet the EPA's criteria for:

- OU experienced at the nearest receivers. There is a small area to the north of the site where the 2 OU contour extends past the site boundary but it is contained to the roadway (Devon Street)
- nitrogen dioxide for both the annual average and one hour averaging times.

The assessment of potential human health impacts of these emissions concluded a negligible impact to community health during operation.

Section 12.7 includes management measures to minimise air quality impacts.

19.5.3 Noise and vibration

During operation the predicted noise levels of the WRRF did not exceed trigger levels or sleep disturbance screening levels at sensitive receivers.

As outlined in Section 13.5, the predicted noise levels for the upgraded pumping station were found to be consistent with the current operational noise levels. The current operation of the pumping station does not impact on any local receivers. However, modelling included proposed receivers as per the Camellia-Rosehill Place Strategy (DPE, 2022b) which showed that the current operation exceeds the noise criteria by 8 dB(A). Consequently, the upgraded pumping station would also exceed the noise criteria (8 dB(A)). Mitigation measures have been identified which could be implemented if the precinct is developed as proposed in the Place Strategy. This would be undertaken by Sydney Water separate to this project, as discussed in Section 13.6, to address this potential risk.

The assessment of potential human health impacts concluded that with mitigation measures in place, predicted noise impacts during operation are not sufficient to increase the risk to community health.

Section 13.6 includes mitigation measures to minimise noise and vibration impacts during operation of the project.

19.5.4 Soil and groundwater

Once construction is completed, contaminated soils and groundwater would not be subject to further disturbance. Residual contamination would be managed under a Long Term Environmental Management Plan during operation. There is therefore negligible risk to human health once construction is complete.

19.5.5 Safety

The use of chemicals during operation, flooding, bushfires and subsidence can impact public safety and human health. The project is not located in a bushfire prone or mine subsidence area. No further assessment is required in relation to these risks. Further assessment on chemical use and flooding is provided below.

19.5.5.1 Chemical use

The HIA (Appendix T) relied on the outcomes of the PHA for the assessment of potential health impacts during operation. More detail on this is provided in Chapter 22 (Dangerous goods and hazardous development). Potential risks to human health, due to handling and use of dangerous goods at the WRRF, have been assessed as negligible when managed in accordance with government requirements. Section 1.1 includes mitigation measures relating to the use of dangerous goods during operation.

19.5.5.2 Flooding

A detailed flood impact assessment was undertaken for the project and its findings are discussed in detail in Chapter 8 (Flooding). Impacts to flood levels, depths, extent, velocity, flood hazard and duration of inundation resulting from the project operation phase are generally predicted to be minor in all flood events up to and including the PMF.

As the development would not impact on the local flooding behaviour, or impede access to existing road networks, it is not expected to have any impacts on the existing community emergency management arrangements for flooding.

The assessment of potential human health impacts concluded that with mitigation measures in place, risks to community health in relation to flooding during operation are expected to be negligible.

Section 8.7 includes mitigation measures to manage flooding risk during construction.

19.5.6 Traffic and transport

During operation of the WRRF, fewer vehicle movements would be required compared to construction. The number of vehicle movements would be around 14 per day for light vehicles and 18 per day for heavy vehicles. Given the industrial nature of the area and the existing traffic environment, this additional traffic would result in negligible changes to the existing situation and needs no further assessment. In addition, sufficient on-site parking would be provided for people working at the facility to ensure staff do not need to park on the street.

Impacts to active transport (walking and cycling), pedestrian safety and public transport are also expected to be negligible, given the location of the facility and the limited number of people and vehicles accessing the site (Stantec, 2025b).

Given the negligible changes to traffic and transport during operation of the project, associated risks to community health are also expected to be negligible.

Section 14.7 includes mitigation measures to minimise traffic and transport impacts during operation.

19.5.7 Access to physical activity and social infrastructure

During operation, impacts to physical activity and access to social infrastructure at the release location are unlikely. The area would be reinstated and there would be no change in access to the area for water vessels (ferries, kayaks) or for recreational fishing.

As outlined in Section 19.5.1, impacts to water quality are predominantly positive and are not expected to impact general recreational use of Parramatta River. The river release structure has been designed to ensure that the change in flows due to the releases would not be noticeable by recreational uses at the river surface. Operational impacts to ferry services are not expected. Consequently, these changes are unlikely to increase the risk to human health.

19.6 Health benefits and opportunities

EnRisks concluded that human health risks, as a result of potential project impacts to water quality, air quality, noise and vibration, soil and groundwater contamination, safety and traffic and transport, would be negligible, provided that appropriate mitigation measures are implemented (EnRisks, 2025).

There are limited opportunities for health improvement during construction. Mitigation measures would be implemented during construction to minimise environmental hazards and health impacts.

In the broader strategic context, once operational, the project would maximise health benefits by increasing the capacity of the northern suburbs wastewater system. Compliance with the northern suburbs EPL would improve and wet weather overflows of untreated wastewater would reduce. This would result in improvements in water quality, indirectly reducing the risk of health impacts from wet weather overflows. This benefit would apply to a broad range of the northern suburbs community, particularly to recreational water users. Alternatives to the project, including the do-nothing option, would result in greater environmental impacts and potentially impacts to human health.

19.7 Mitigation measures

Mitigation measures have been proposed within each technical study to minimise negative environmental impacts. These measures would also minimise the potential negative health impacts. The HIA (Appendix T) has not recommended any mitigation measures in addition to the technical reports for water quality, air quality, noise and vibration, soil and groundwater contamination, PHA and traffic and transport.

Sustainability and climate change

20 Sustainability and climate change

This chapter describes the project's approach to achieving sustainable outcomes. It also assesses the project's resilience to climate change risks, and estimates greenhouse gas emissions during construction and operation. The project would contribute to sustainable outcomes by reducing the frequency of wastewater overflows and improving waterway health through the release of high quality advanced treated water to Parramatta River. The advanced treated water could also be used for non-drinking recycled water purposes further contributing to sustainable outcomes. Following the implementation of mitigation measures, 18 medium risks and 36 low risks were identified for the short-term (2030), and one high risk, 19 medium risks and 27 low risks were identified for the long-term (2070). The project is expected to release about 14,012 tonnes of carbon equivalent per year during operation, in line with the NSW Guide for Large Emitters (NSW EPA, 2025). During detailed design, Sydney Water would seek to minimise impacts further, for example through carbon reductions of at least 20%, solar panels at the WRRF and 100% beneficial reuse of biosolids.

20.1 Secretary's Environmental Assessment Requirements

Table 20-1 lists the SEARs relevant to sustainability and climate change and where they are addressed in the EIS.

Table 20-1: Project SEARs relating to sustainability and climate change

SEARs	EIS section where requirement addressed
Sustainability	
1. The sustainability of the project in accordance with an accredited rating tool and recommend an appropriate target rating for the project.	Section 20.4
2. Consider and assess the project against current guidelines including targets and strategies to improve Government efficiency in use of water, energy and transport.	Section 20.3 Section 20.7
3. Evaluate the potential for the beneficial reuse of treated water during project operation.	Section 20.7.1
Climate Change Risk	
1. The risk and vulnerability of the project to climate change in accordance with the current guidelines. This must include discussion of any proposed adaptation to climate change during the project's life cycle.	Section 20.5
2. Climate change risks must be quantified with reference to the NSW Government's climate projections at 10 km resolution (or lesser resolution if 10 km projections are not available) or equivalent projection tool (such as the	Section 20.5

SEARs	EIS section where requirement addressed
Climate Futures Tool from CSIRO and Bureau of Meteorology (attenuated for project region)) and specific adaptation actions incorporated in the design.	

20.2 Approach to sustainability

Sydney Water is committed to contributing to a sustainable and resilient future, through both the type of infrastructure projects and the way they are constructed and operated. For this project, the approach to sustainability encompasses:

- identification of opportunities that optimise the environmental, social and economic outcomes of the project (Section 20.4 to Section 20.6)
- setting a target sustainability Infrastructure Sustainability Council (ISC) rating (Section 20.4)
- understanding climate change risks and impacts on the project and how the project can build resilience into the design (Section 20.5)
- reviewing the project's impact on greenhouse gas emissions and identifying opportunities to reduce carbon and energy use (Section 20.6).

The project inherently contributes to sustainable outcomes by:

- reducing the frequency of wastewater overflows by providing capacity in the NSOOS
- improving waterway health over time with the introduction of high quality advanced treated water to Parramatta River.

The project also contributes to a sustainable wastewater servicing solution by:

- avoiding the need to duplicate the existing NSOOS pipeline, and associated environmental impacts
- avoiding the need to expand the North Head WRRF, and associated environmental impacts
- repurposing an existing pipeline section (about 3 km long) for the conveyance of brine
- constructing some of the pipelines to manage future treated water flow volumes. This reduces the need for future construction to accommodate the future flows and thereby avoids the associated carbon impacts.

20.2.1 Ecologically Sustainable Development

The project was assessed against the principals of ESD as provided in 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. Refer to Chapter 24 (Justification of the Project) for how this project aligns to those principals.

20.3 Legislative and policy context

Several key government policies and frameworks are in place to support the delivery of key sustainability outcomes. The sustainability related legislation, policies and guidelines that are relevant to the project and have been considered in the assessment of sustainability are:

- The Paris Agreement (United Nations, 2015a)
- United Nations Sustainable Development Goals (United Nations, 2015b)
- The Climate Change (Net Zero Future) Act 2023
- Decarbonising Infrastructure Delivery Policy (Infrastructure NSW, 2024)
- Infrastructure Sustainability Rating Tool v2.1 (Infrastructure Sustainability Council, 2021)
- NSW Government Resource Efficiency Policy (OEH, 2019)
- Climate Risk Ready NSW Guide (DPIE, 2020b)
- Australian Standard AS5334:2013 Climate change adaptation for settlements and infrastructure: A risk-based approach (Standards Australia, 2013)
- NSW Guide for Large Emitters (NSW EPA, 2025).

Sydney Water has several internal strategies and polices that have contributed to how sustainable outcomes have been considered for the project. Sustainability requirements were developed by Sydney Water's internal stakeholders and tailored specifically for the project, which would undergo further review during detailed design, procurement and construction to meet or exceed outcomes of initiatives captured within this EIS. As the project is undertaking an Infrastructure Sustainability (IS) Rating Scheme certification, themes and sustainability 'categories' are aligned to the certification framework as industry best practice (refer to Table 20-8).

20.4 Sustainability strategy and opportunities

A sustainability strategy for the project was developed to align with the Sydney Water sustainability policy and guidelines, the project SEARs, and the ISC IS rating framework. The sustainability strategy is an internal Sydney Water document used to identify key opportunities and outline recommendations and next steps for project integration.

To inform development of the sustainability strategy, a Climate Change Risk Assessment (CCRA) and Greenhouse Gas (GHG) emissions assessment were carried out as described in Section 20.5 and 20.6, respectively. The relationship between all 3 documents, the Sydney Water policy and guidelines, and the project SEARs is shown in Figure 20-1.

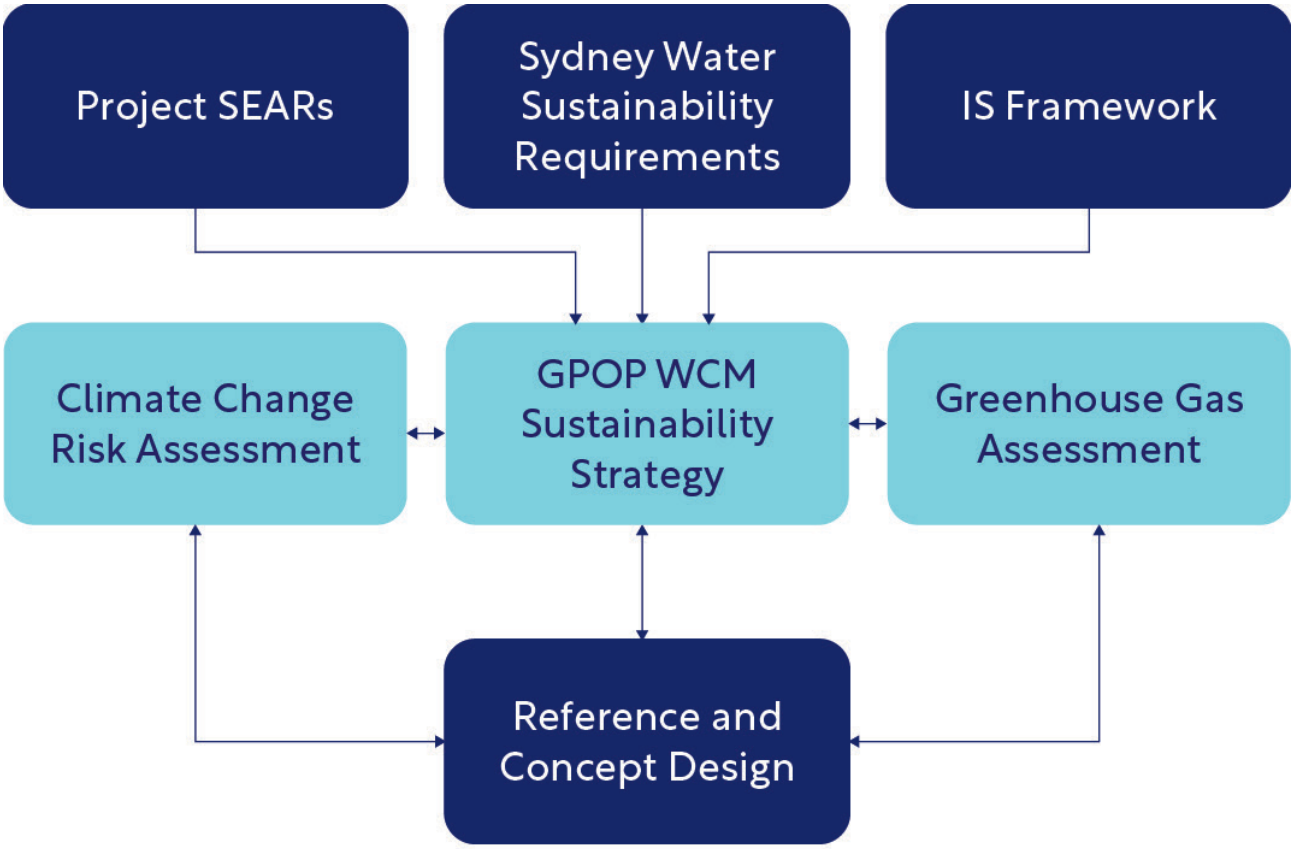


Figure 20-1: Relationship between key project sustainability documents and requirements

20.4.1 Assessment methodology

Key activities in the consideration of sustainability included:

- identifying sustainability priority areas, objectives and requirements for the project
- reviewing the project sustainability requirements to align with the IS Rating process (v2.1)
- reviewing design information and conducting a workshop with the design team and internal Sydney Water stakeholders to understand and identify potential sustainability opportunities for the project
- documenting, refining, investigating and tracking of potential sustainability opportunities through a Sustainability Opportunities Register (SOR) that includes:
  - sustainability opportunities for various elements of the project
  - anticipated impact and benefits for the opportunity
  - barriers to implementing the opportunity
  - opportunities that are not feasible for this project but may be feasible for future expansions or related development.
- preparing a preliminary materiality assessment to review the initial sustainability performance of the design against the ISC rating tool (IS v2.1 scorecard)

- defining a potential ISC rating target and credit pathway
- providing recommendations and next steps for future design stages.

The SOR would evolve throughout the project lifecycle, along with the overarching sustainability strategy. The current sustainability opportunities and commitments identified for the project are outlined in Section 20.7. These opportunities would be further tested and refined based on their feasibility as the project progresses into the detailed design phase.

20.4.2 Infrastructure Sustainability target rating

The IS Design and As Built Rating certification, is a rating scheme by the ISC to evaluate the sustainability performance of infrastructure projects across the design and construction phases of the project.

The project's sustainability performance was assessed using the IS 'Design and As Built v2.1' rating tool across fifteen categories (covering governance, economic, environmental and social aspects of sustainability). The categories are made up of 44 credits, each assessing an aspect of performance within the category. The credits may address mitigation or improvement and processes that support realisation of sustainable outcomes. Weighted points are allocated (as determined by the materiality assessment) to each credit, and performance of the project measured against credit levels to achieve points under each credit and a resultant overall score awarded. The IS rating award level achieved is determined by the score set against a total possible 110-point scale.

Based on other recent project achievements, Sydney Water is nominating a target score of 55 points (achieving a 'Silver Rating') and stretch target of 70 points (which would achieve a 'Gold Rating'). An IS scorecard identifying specific credit pathways to meet these targets would be developed during the next phase of the project.

20.5 Climate change risk assessment and project resilience

20.5.1 Assessment methodology

The CCRA determined the potential risks future climate change would have on the project. It was carried out in line with the project SEARs, and the following guidance documents:

- Climate Risk Ready NSW Guide (DPIE, 2020b)
- The Climate Change (Net Zero Future) Act 2023
- Australian Standard AS5334:2013 Climate change adaptation for settlements and infra-structure: A risk-based approach (Standards Australia, 2013).

Climate change projections were sourced from the NSW and Australian Regional Climate Modelling (NARCLiM 1.5) initiative. This is the best available data at the time of the assessment in line with Sydney Water Climate Change Position Statement which requires consideration for 2 RCPs, RCP 4.5 and RCP 8.5. NARCLiM 1.5

provides data based on the Coupled Model Intercomparison Projects Global Climate Models (CIMP5) and was chosen for the assessment as data are available at 5 km resolution.

Two time periods (2030 and 2070) were used to represent the opening year and the long-term design life of the project. For each time period, 2 emissions scenarios, described in the Special Report on Emission Scenarios A2 (Intergovernmental Panel of Climate Change, 2000) as RCPs, were considered in line with ISC requirements. The emission scenarios used were:

- RCP 4.5 – assumes global annual GHG emissions peak around 2040, and then decline
- RCP 8.5 – describes the high-emissions scenario that assumes global annual GHG emissions continue to rise throughout the 21st century.

The process used for the risk assessment is summarised in Table 20-2.

Table 20-2: Climate change risk assessment process

Assessment stage	Description of activities
Scope definition	• Identification of project boundary and scope of works. • Development of preliminary risk assessment.
Preliminary criticality and exposure assessment	• Review of the reference design and assessing the exposure of the project to climate hazards. • Identification of potential project risks to be further assessed and evaluated.
Risk identification	• Risk workshop held with design team to identify climate change risks and potential impacts to the project.
Risk assessment and evaluation	• Follow up assessment of climate risks identified in the risk workshop. • Worst-case consequences of the climate hazards were identified including for public health, environment, infrastructure performance. • Discussions held with stakeholders to confirm acceptability of risks.
Integration into design	• Follow up discussions with design team on climate risks. • Confirm acceptable level of risks, design response and mitigation measures to be implemented into the design.

20.5.2 Climate change projections

Projected changes for the climate variables relevant to the project are shown in Table 20-3. Overall, the locality of the project is projected to experience:

- hotter and more frequent extreme temperatures
- heavier rainfall during extreme events
- increased drought conditions

- more hazardous fire weather
- sea level rise.

There is no change expected for the frequency of extreme winds. Projected increases in sea levels may impact the flood risk for the Camellia-Rosehill WRRF and surrounding area, and this was assessed in Chapter 8 (Flooding).

Table 20-3: Historic and projected climate conditions

Climate variable	Historical (baseline)	2030 RCP 4.5	2030 RCP 8.5	2070 RCP 4.5	2070 RCP 8.5	Confidence
Average annual maximum temperature (°C)[1]	23.4	24.4 (+1.0°C)	24.5 (+1.1°C)	25.1 (+1.7°C)	26.1 (+2.7°C)	High
Number of days per year above 35°C[2]	11	17 (+6)	18 (+11)	22 (+11)	31 (+20)	Medium
Average annual rainfall[3] (mm)	977	952 (-2.6%)	933 (-4.5%)	937 (-4.1%)	897 (-8.2%)	Low
Maximum daily rainfall (mm)[4]	266	292 (+9.7%)	294 (+10.5%)	320 (+20.3%)	365 (+37.2%)	Medium
Increase in water demand during hot and dry periods (%)[5]	-	2.14	Data not available	4.42	Data not available	Low for RCP 4.5 High for RCP 8.5
Increase in annual average days with 'severe 'fire danger rating across NSW[6]	-	+ 2 days	Data not available	+ 5 days	Data not available	Medium
Extreme wind speed (km/hr)[7]	Currently there is no certainty or range that can be attributed to the likelihood or intensity of storm effects. High level assumptions should expect an increase in current exposure to intense storms. These have been projected to increase roughly by 30% per year for the Greater Sydney Area by the year 2100.					Low
Mean sea level rise (m)[8]	-	0.14	0.14	0.35	0.45	

Sources: 1. NARCliM 1.5; 2. Richmond, NSW; East Coast Cluster; CSIRO & BoM 2021; 3. East Coast Cluster; CSIRO & BoM 2019; 4. AR&R 2024; 5. NARCliM 1.5; 6. Climate Council of Australia, 2016; 7. AdaptNSW – Climate Change Snapshot 2014; 8. CoastAdapt (Sydney) with data sourced from CSIRO (NCCARF 2022)

20.5.3 Risk assessment

A risk assessment qualitatively rated and assessed risks as low, medium, high or extreme based on a consequence and likelihood matrix. The number of relevant unmitigated risks and the hazard type are shown in Table 20-4. The CCRA identified a total of 54 individual unmitigated risks for the project for the short-term horizon (2030), and 47 for the long-term horizon (2070). In summary, potential climate change related unmitigated risks for the project included:

- 27 medium and 27 low risks (short-term for the year 2030)
- 24 medium and 21 low risks (long-term for the year 2070)
- 2 high risk (long-term for the year 2070)
- no very high risks.

The most prevalent hazard types included drought, extreme rainfall and flooding, and extreme heat. Some risks were found to be relevant for both timeframes. Fifteen risks may be reduced through the implementation of mitigation measures. Nine of the 26 medium (short-term) risks and 5 of the 24 medium (long-term) risks would likely be reduced to low risk with the implementation of appropriate mitigation measures. Table 20-5 provides examples of adaptive measures that have been identified for key medium or high risks, and their influence on the residual risk ratings. These measures would be further investigated and developed throughout the detailed design process.

The highest worst-case risk was an increased risk of flooding non-submersible assets leading to damaged assets at the Camellia pumping station. However, the implementation of flood proofing measures at the pumping station would reduce the risk from 'high' to 'medium'. The specific types of mitigation measures to be implemented at Camellia pumping station would be confirmed during detailed design.

It is noted that an additional high risk was initially identified being a risk of flooding on Sydney Metro West facilities. A flood impact assessment was completed for this EIS and independently reviewed (Chapter 8 (Flooding). This assessment indicated no cumulative impacts are expected on the Sydney Metro West works because of this project and that flood impacts do not extend to the Metro site. This risk is therefore no longer considered to be a high-risk requiring mitigation.

Table 20-4: Summary of climate risks and risk rating

Hazard type	Year 2030					Year 2070				
	Very high	High	Medium	Low	Total	Very high	High	Medium	Low	Total
Extreme heat	0	0	7	3	**10**	0	0	8	0	**8**
Extreme rainfall and flooding	0	0	7	7	**14**	0	2	4	5	**10**

Hazard type	Year 2030					Year 2070				
	Very high	High	Medium	Low	Total	Very high	High	Medium	Low	Total
Storms and wind	0	0	3	2	**5**	0	0	1	2	**3**
Bushfire	0	0	0	7	**7**	0	0	0	7	**7**
Drought	0	0	10	5	**15**	0	0	10	5	**15**
Sea level rise	0	0	0	3	**3**	0	0	1	2	**3**
Initial (unmitigated) risks	**0**	**0**	**27**	**27**	**54**	**0**	**1**	**24**	**21**	**47**
Residual risks (post mitigation measures)	**0**	**0**	**18**	**36**	**54**	**0**	**1**	**19**	**27**	**47**

Table 20-5: Adaption measures for key climate change risks (medium and high risks)

Risk description	Initial risk rating (Year 2030)	Initial risk rating (Year 2070)	Adaption(s)	Residual risk (Year 2030)	Residual risk (Year 2070)
Increase in physical damage due to increase in storm events resulting in disruption of operation	Medium	Medium	• hail resistant material selection • protective covers • ongoing monitoring of asset condition during operation.	Medium	Medium
Increase in power outages due to increased storm events	Medium	Not assessed	• dual power supply (including emergency generators) integrated into the design.	Medium	Not assessed
Higher peak demands creating strain on pumping station assets, increasing risk of damage or failure.	Low	Medium	• dual power supply (including emergency generators) integrated into the design.	Low	Medium
Increased rainfall resulting in process disruptions and spills	Medium	Medium	• flexibility to stop taking flow from Camellia pumping station in wet weather • WRRF has been designed to allow for future expansion.	Low	Medium
Increased risk of disruption due to power outage as a result of extreme weather events (e.g. heatwaves, bushfires)	Medium	Not assessed	• permanently installed power back up provisions (including local standby generator for the inlet works).	Low	Not assessed
Increased temperatures resulting in additional management of infrastructure, reduced quality of treatment	Medium	Medium	• treatment plant design to reduce heat accumulation (e.g. light-coloured finishes)	Low	Low

Risk description	Initial risk rating (Year 2030)	Initial risk rating (Year 2070)	Adaption(s)	Residual risk (Year 2030)	Residual risk (Year 2070)
			• use materials with design conditions to allow for heat degradation • space proof for additional air conditioning units to be fitted in the future.		
Increased risk of odour and corrosion due to increase in H2S associated with increased temperatures	Medium	Medium	• protocol to communicate and engage with community on potential odour impacts, and increase odour treatment as a result • WRRF has been designed to allow space for additional odour treatment facilities if required • chemical dosing of raw wastewater if necessary.	Low	Low
Decrease in efficiency of equipment (blowers) associated with increased temperatures	Medium	Medium	• potential for provision of evaporative air-cooling system.	Low	Medium
Increased risk of fire at biosolids handling area associated with increased temperatures	Medium	Medium	• additional fire prevention / mitigation measures to be determined through detailed design.	Medium	Medium
Increased concentration of wastewater due to drought, resulting in increased corrosion, odour, and potential to not meet quality standards	Medium	Medium	• WRRF has been designed to manage concentrated wastewater • use of corrosion-resistant materials • protocol to communicate and engage with community on potential odour	Medium	Medium

Risk description	Initial risk rating (Year 2030)	Initial risk rating (Year 2070)	Adaption(s)	Residual risk (Year 2030)	Residual risk (Year 2070)
			impacts, and increase odour treatment as a result • WRRF has been designed to allow space for additional odour treatment facilities if required.		
Increased risk of flooding of Camellia pumping station, or damage to assets as a result of soil instability due to increased rainfall. There is also a lower risk of increased flooding due to combination of sea-level rise and increased rainfall.	Medium	High	• consider extending flood proofing (gate and protection walls) around the pumping station site and access ways to the building.	Low	Medium
Increased risk of spills and flooding due to structural failure of pipelines during larger peak flows as a result of increased rainfall	Medium	Medium	• concrete encasement of pipelines to increase safety and prevent breakages/spills. • pipeline design has been sized to accommodate potential future expansions of the WRRF • condition assessment to be carried out for the existing rising main that would be relined to form part of the brine pipeline, allowing appropriate design controls to be included in detailed design phase.	Medium	Medium

Risk description	Initial risk rating (Year 2030)	Initial risk rating (Year 2070)	Adaption(s)	Residual risk (Year 2030)	Residual risk (Year 2070)
Increase in sewer gas space humidity during times of drought, resulting in increased corrosion risk to pipeline	Medium	Medium	• resilient pipeline material selection • appropriate venting and air release of pipelines • sizing of pipeline for appropriate flow rate.	Medium	Medium

20.6 Greenhouse gas impact assessment

20.6.1 Assessment methodology

The assessment of GHG emissions follows the principles set out in the Greenhouse Gas Protocol (World Business Council for Sustainable Development and the World Resources Institute, 2003). According to the GHG Protocol, GHG emissions are split into 3 categories:

- Scope 1: direct emissions that occur within the site boundary from owned or controlled sources, for example, emissions from site plant and equipment. For the project, this includes fuel consumption, fugitive methane and nitrous oxide emissions from the wastewater treatment process and vegetation clearance.
- Scope 2: indirect emissions that occur outside the site boundary from the generation of purchased energy.
- Scope 3: all indirect emissions (not included in scope 2) that occur in the value chain. For the project, this includes embodied construction material emission, transport and waste.

The activities and emission sources identified for each scope of emissions and included in the assessment are provided in Table 20-6.

Table 20-6: Emission boundary for the assessment

Emissions source	Scope 1	Scope 2	Scope 3
Construction			
Construction fuel	✓		✓
Construction electricity		✓	✓
Embodied emissions (construction materials)			✓
Transport of construction materials			✓
Transport of construction spoil			✓
Transport of construction waste (excluding spoil)			✓
Land clearing	✓		
Operation			
Fugitive methane emissions	✓		
Fugitive nitrous oxide emissions	✓		
Operational fuel	✓		

Emissions source	Scope 1	Scope 2	Scope 3
Operational electricity		✓	✓
Chemicals (inc. transport)			✓
Biosolids transport			✓

The quantity of each relevant emission source was estimated in its relevant units using project specific data and information. Where project estimates were not available, data from existing comparable projects was used as a substitute baseline to support reasonable assumptions.

Once the emissions sources and levels were estimated in their relevant units, these were converted to carbon dioxide equivalent units using known emission factors and industry-recognised calculation methods. Using this approach the GHG emissions were estimated from the identified sources and the maximum average annual emissions was derived. This allowed a review against the emission threshold of 25,000 tonnes of carbon equivalent (tCO2e) in any financial year during operation for which the NSW Guide for Large Emitters (NSW EPA, 2025) would apply.

20.6.2 Estimated greenhouse gas emissions

Table 20-7 summarises the total emissions of each scope across construction and operation of the project. This assessment is based on the Camellia-Rosehill WRRF operating at 70 ML/day. Construction estimates are estimated total emissions from the start of construction to 2032 when the Camellia-Rosehill WRRF is assumed to be operating at full capacity. The operation estimates are based on a design life of 50 years as it is expected future expansions or changes in technology would be required by this time.

For scope 1 emissions, the largest contribution is sourced from the release of nitrous oxide and methane during the wastewater treatment process. This accounts for 28% of the total project emissions. The assessment assumes that all biogas would be transferred for use in co-generation, with leakage allowance of 0.01%.

Scope 2 emissions include electricity imported during construction and operation. During construction, electricity consumption would be very low, accounting for 0.01 % of the total construction emissions. During operation, the main electricity consumer is the Camellia-Rosehill WRRF site. This is due to wastewater treatment technologies, especially advanced level treatment, being energy-intensive. This accounts for about 4% of the total project emissions. Based on current design layout and inclusion of PV on building roofs and ground mount array, operational energy GHG emissions would be reduced by 6,821 tCO_2e. Further, current reference design treatment technology generates and captures biogas for use within a cogeneration system, offsetting a further 2,529 tCO_2e through reduced grid electricity demand.

For scope 3 emissions, materials are the largest contributor, including concrete and structural steel used in construction, and embodied emissions in chemicals used during Camellia-Rosehill WRRF operation. Scope 3 emissions in total account for 68% of the total emissions.

Of the construction and operation phases, the operational phase accounts for 89% of the whole-of-life emissions. The average annual GHG emissions during operation of the project are estimated to be around 14,012 tCO_2e (Table 20-7). Therefore, annual emissions for the project are not expected to exceed the NSW Guide for Large Emitters (NSW EPA, 2025) threshold of 25,000 tCO_2e for scope 1 and scope 2 emissions. The scope 2 emissions from purchased electricity would reduce annually due to grid decarbonisation and therefore would result in total lower combined scope 1 and scope 2 emissions over time.

Mitigation measures in Table 20-8 and Table 20-9 seek to minimise the predicted GHG emissions for the project.

Table 20-7: Estimated greenhouse gas emissions (over a 50 year design life)

Emissions source	Total emissions during construction (tCO_2e)	Total emissions during operation (tCO_2e)	Total emissions (tCO_2e)	Average emissions during operation (tCO_2e/year)
Scope 1	4,589	194,505	199,094	3,982
Scope 2*	8	29,023	29,031	581
Scope 3	72,457	400,005	472,462	9,449
Total	**77,053**	**623,532**	**700,586**	**14,012**

**Scope 2 figures provided, account for reduced grid electricity demand due to use of on-site generated renewable energy (PV and cogeneration).*

The GHG emissions estimates would be updated and a Base Case GHG model developed during detailed design in line with the IS Rating Scheme framework. The Base Case would be used to measure reductions achieved by final project design and construction. Further emission and energy reduction would be promoted through initiatives with the detailed design team and in collaboration with procurement and contractors.

20.7 Sustainability initiatives

Table 20-8 outlines the project's key sustainability initiatives. These initiatives demonstrate commitment to sustainable outcomes based on current design and would be confirmed during detailed design upon final selection of treatment technologies implemented. The themes of the initiatives cover a range of areas, with the major focus areas being energy, carbon, circular economy and project resilience to climate change. Table 20-8 also shows the alignment between these initiatives and the ISC ISv2.1 categories.

Other potential opportunities to be explored for further improvement to sustainability performance include:

- use carbon pricing mechanisms during market engagement and future options assessment to drive overall lowest cost solution in line with Treasury pricing and Sydney Water customer willingness to pay. The largest opportunities exist within scope 1 and 3 emissions during operation, and scope 3 emissions during construction
- use recycled and recovered materials in construction, and aiming to minimise waste to landfill

- implement circular economy principles in maintaining 100% beneficial reuse of biosolids at their highest value form. Continue to consider carbon in decision making, optimising production, handling and transport of biosolids
- optimise biogas extraction and use from wastewater treatment process, if produced in selected treatment technology
- consider opportunities to co-design project components (in particular public facing assets) with community and stakeholders where appropriate, including First Nations communities.
- investigate opportunities for treated water offtakes to support new industries, such as data centres, that will require reliable access to water resources.

More detail on the potential of sustainability opportunities in water reuse and carbon savings are below.

20.7.1 Water reuse

While not part of the current reference design solution, Sydney Water would continue to explore opportunities to further improve beneficial reuse of recycled water that could be produced. The project provides the flexibility needed to transition to recycled water options, creating a pathway for resiliency in water use. The project includes design features that allow for future expansion and to be adaptable to a circular economy future, by:

- proposing recycled water offtakes along the river release pipeline in consultation with local Councils and other recycled water users along the alignment
- the Camellia-Rosehill WRRF has been designed to allow additional space for recycled water treatment technologies.

The project has been designed with flexibility to provide treated water for a variety of uses, including for data centres.

20.7.2 Carbon and energy

During detailed design and market engagement, Sydney Water would drive innovation with the goal to achieve the lowest whole of life carbon and total expenditure (TOTEX) solution (within the capital expenditure budget). To achieve this, Sydney Water would continue to use a cost benefit framework that includes carbon pricing. This approach would align with Sydney Water's Net-Zero Carbon Directional Statement, where pricing is based on Customer Willingness to Pay and NSW Treasury figures.

The project is predicted to consume 83,830 MWh/yr of energy per year. Based on the reference design, a total renewables energy generation of 11,765 MWh/yr would be achieved through a combination of solar and co-generation systems. This energy generation capacity would be carried through as a project benchmark. Final confirmation of the renewable generation capacity would consider the proposed final design solution using the carbon cost inclusive assessment framework.

The current whole of life carbon assessment has predicted 700,586 tCO_2e. The assessment assumed a 50-year design life, which aligns to when future upgrades of the project are expected. Carbon reductions of at least 20%

are considered achievable for this project. This would be carried through as a project benchmark, with final targets established during procurement and design phases.

Table 20-8: Summary of key project sustainability initiatives

IS Theme	Key sustainability initiatives	IS Rating Scheme Credit Category
Governance	**IS Certification** – Achieve a Silver IS Rating 'Design and As Built' certification (minimum score of 40 points) with a stretch target of Gold under v2.1. **Urban design** – The project would protect urban greening and cooling values by: • re-vegetating areas in the project impact area • enhancing habitat at the seawall intersecting with the river release pipeline during rehabilitation – refer to Chapter 7 (Waterways assessment) • retaining the flood path along the western boundary until future expansions (assists with climate risk resilience for the site and surrounding streets) • vegetating the future expansion areas with native grasses. **Climate Risk and Resilience Planning** – The Camellia-Rosehill WRRF would implement adaptation measures following a detailed risk assessment to mitigate climate change risks. These adaptation measures include: • adopting durable and light-coloured materials for roofs and pavements – considering hail-resilient material selection (i.e. Colourbond) to prevent damage to assets from heavy wind, hail and/or lightning strikes – adopting materials with design conditions for heat degradation • designing buildings, flood sensitive equipment and stormwater systems based on future flood levels (Chapter 8 (Flooding)) • space allowance for additional air conditioning units and additional odour treatment facilities – considering potential for evaporative air-cooling system. **Independent rainfall supply** – The project would be designed to allow future adaptability to recycled water process technologies that support independent rainfall water supply, thereby increasing drought resilience.	• Leadership and Management • Place • Options Assessment • Benefits • Sustainable Procurement • Resilience • Innovation.

IS Theme	Key sustainability initiatives	IS Rating Scheme Credit Category
Economic	**Options Assessment** – Embed carbon pricing into financial criteria for decision making in project delivery procurement. **Benefits** - tracking through implementing Benefits Realisation Plan.	• Options Assessment • Benefits.
Environment	**EIS outcomes** - Implementing mitigations and monitoring to ensure impacts identified in the EIS are avoided or minimised. **Carbon** - Ambition to achieve 20% or more reduction in whole of life carbon driven by a commercial framework. The largest decarbonisation achievements may be seen in scope 1 and scope 3 emissions during operation and would be implemented in line with the Sydney Water Net Zero Carbon Directional Statement. **Renewable energy** - Combined renewable generation system capacity of about 5 MW through: • biogas extraction to co-generation engines, generating electricity and heating • installation of solar PV panels on administration buildings and workshops and ground mounted solar. **Energy efficiency** - Implementing efficiency measures to align with 'Sydney Water's Best Practice Energy Efficiency Design Guidelines' **Biosolids** - 100% beneficial reuse **Resource recovery** - Maximise the recovery of resources in place of landfilling **Water efficiency** - Implement best practice water efficiency during construction and operation. **Recycled water** - The Camellia-Rosehill WRRF would be built to allow for future expansion and adaptability for recycled water production.	• Energy and Carbon • Environmental impacts • Resource Efficiency and Management • Water • Ecology.

IS Theme	Key sustainability initiatives	IS Rating Scheme Credit Category
Social	**Engagement** – Maintain proactive engagement with local community members, governments, local Councils, First Nations Peoples and other key stakeholders during design, construction and operation. **Legacy** – Further investigation to fish habitat enhancement (refer to Chapter 7 Waterways assessment).	• Stakeholder Engagement • Workforce Sustainability • Legacy.

20.8 Mitigation measures

Project specific mitigation measures that would be implemented to manage potential sustainability and climate change impacts are listed in Table 20-9.

Table 20-9: Sustainability, climate change risk and greenhouse gas mitigation measures

ID	Potential impact	Mitigation measure	Timing
SUS01	Project not achieving sustainable outcomes	Develop and implement a Sustainability Management Plan that outlines how the project will embed and continually improve sustainability throughout delivery of the project. The Sustainability Management Plan will outline: • roles, responsibilities and deliverables relating to sustainability • how sustainability objectives will be embedded into the detailed design, construction and operation of the project • management of the SOR as a live document throughout detailed design and construction, detailing regular reviews, decision making framework and implementation through design mechanisms/deliverables • monitoring and reporting processes to measure success and apply corrections where necessary • the IS rating process, including timeframes for achieving a minimum Silver IS rating • how sustainable outcomes beyond Sydney Water's sustainability requirements can be accommodated and implemented in the project • plan for handover of sustainability initiatives at completion of delivery to operation.	During detailed design, construction and operation
SUS02	Project not achieving carbon and energy reductions in operation (through design)	Implement sustainability initiatives including adopting a commercial framework to drive decarbonisation, with greatest gains likely through operational scope 3 emissions.	During detailed design, construction and operation
SUS03	Project ineffective in lowering climate change risk levels	Adopt design appropriate climate adaptation measures to lower risk levels at detailed design milestones through revised climate risk assessment.	During detailed design

ID	Potential impact	Mitigation measure	Timing
SUS04	Scope 1 and 3 GHG emissions during construction	Where possible, fuel and energy efficient equipment and vehicles will be selected. All equipment and vehicles will be regularly serviced and maintained to optimise efficiency. Aim to prioritise/ incentivise low embodied carbon materials for use during construction.	During construction

Waste management

21 Waste management

This chapter describes the project's potential waste impacts and the measures that would be implemented to minimise and manage waste. It provides an overview of the key findings of the Waste Management Impact Assessment report (GHD, 2025d) included in Appendix U. During construction of the project, the primary waste streams are expected to be generated from site preparation, use of the construction site offices, and construction works, such as building and installation of equipment. Key waste streams expected to be generated during operation include brine, biosolids, dewatered screenings, dewatered grits, and general waste from operation and maintenance. Approaches embedded in the 'avoid, minimise, reuse' waste management hierarchy would be implemented to reduce the waste generated, and recycle wherever possible. Following the implementation of mitigation measures, the project would have low waste impacts.

21.1 Secretary's Environmental Assessment Requirements

Table 21-1 lists the SEARs relevant to waste management and where they have been addressed.

Table 21-1: Project SEARs relating to waste management

SEARs	EIS section where requirement addressed
1. Predicted waste generated from the project during construction and operation, including: (a) classification of the waste in accordance with the current guidelines	Section 21.4.1 Section 21.5.1
(b) estimates / details of the quantity of each classification of waste to be generated during the construction of the project, including bulk earthworks and spoil balance	Section 21.4.1 Section 21.4.2
(c) methods for handling of waste including measures to facilitate segregation and prevent cross contamination	Section 21.7
(d) management of waste including estimated location and volume of stockpiles	Sections 21.2.2 Section 21.4.2 Section 21.7
(e) measures for waste minimisation and reuse	Section 21.2.2 Section 21.7
(f) lawful disposal or recycling locations for each type of waste	Section 21.3.2
(g) contingencies for the above, including managing unexpected waste volumes.	Section 21.4.2

SEARs	EIS section where requirement addressed
2. Potential environmental impacts from the excavation, handling, storage on site and transport of waste particularly with relation to sediment/leachate control, noise and dust.	Section 21.4.4 Section 21.5.4 Further detail on impacts with relation to sediment/leachate control, noise and dust are contained in Chapters 9, 12 and 13.

21.2 Assessment methodology

21.2.1 Legislative and policy context

The assessment was undertaken in accordance with, or with reference to, the following key legislation and guidelines:

- *Waste Avoidance and Resource Recovery Act 2001* (WARR Act)
- POEO Act
- Protection of the Environment Operations (Waste) Regulation 2014 (Waste Regulation)
- NSW Waste and Sustainable Materials Strategy 2041 Stage 1: 2021-2027 (DPIE, 2021b)
- NSW Circular Economy Policy Statement: Too Good to Waste (NSW Government, 2019)
- Waste Classification Guidelines: Part 1 Classifying Waste (NSW EPA, 2014) and Addendum to the Waste Classification Guidelines (2014) – Part 1 Classifying Waste (NSW EPA, 2016) (Waste Classification Guidelines)
- National Environment Protection (Assessment of Site Contamination) Measure 1999
- Environmental Guidelines – Use and Disposal of Biosolids Products (NSW EPA, 1997) (the regulatory review for biosolids is ongoing) (NSW EPA, 2023).

21.2.2 Methodology

21.2.2.1 Approach

The key steps in completing this assessment were:

- collecting information about the potential waste types and quantities to be generated by the project
- classifying those waste types
- conducting an impact assessment to determine the impact of the waste
- identifying the management measures required to reduce any substantial impacts.

21.2.2.2 Materials for reuse

While this chapter focuses on the waste impacts of the project, various materials that could be reused and recycled would also be generated. Circular economy principles and the waste hierarchy outlined in the WARR Act have been considered at all stages of design development and construction planning. The waste hierarchy is shown in Figure 21-1. Where feasible, reusing and recycling materials would be prioritised in line with Sydney Water's goal of 85% recovery of waste materials from construction, office and operations (excluding biosolids). The reuse of spoil generated from the project has been discussed in Section 21.4.2. Spoil may be certified for beneficial reuse as per the categories defined in Table 21-2.

Table 21-2: Classification of spoils for beneficial reuse

Spoil classification	Definition
Virgin excavated natural material	• Natural material (such as clay, gravel, sand, soil or rock fines) that: – has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities – does not contain sulfidic ores or soils, or any other waste.
Excavated Natural Material	• Naturally occurring rock and soil that: – has been excavated from the ground – contains at least 98% (by weight) natural material – does not meet the definition of virgin excavated natural material.
Treated drilling mud (resource recover order)	• Treated drilling mud that has been dewatered so that the resultant solid either: – does not have an angle of repose of less than 5 degrees above horizontal – does not become free-flowing at or below 60 degrees Celsius or when it is transported – is generally capable of being picked up by a spade or shovel.
Contaminant threshold 1 (CT1) Recyclable	• General solid waste with a specific contaminant concentration below the relevant contaminant threshold as per the Waste Classification Guidelines.

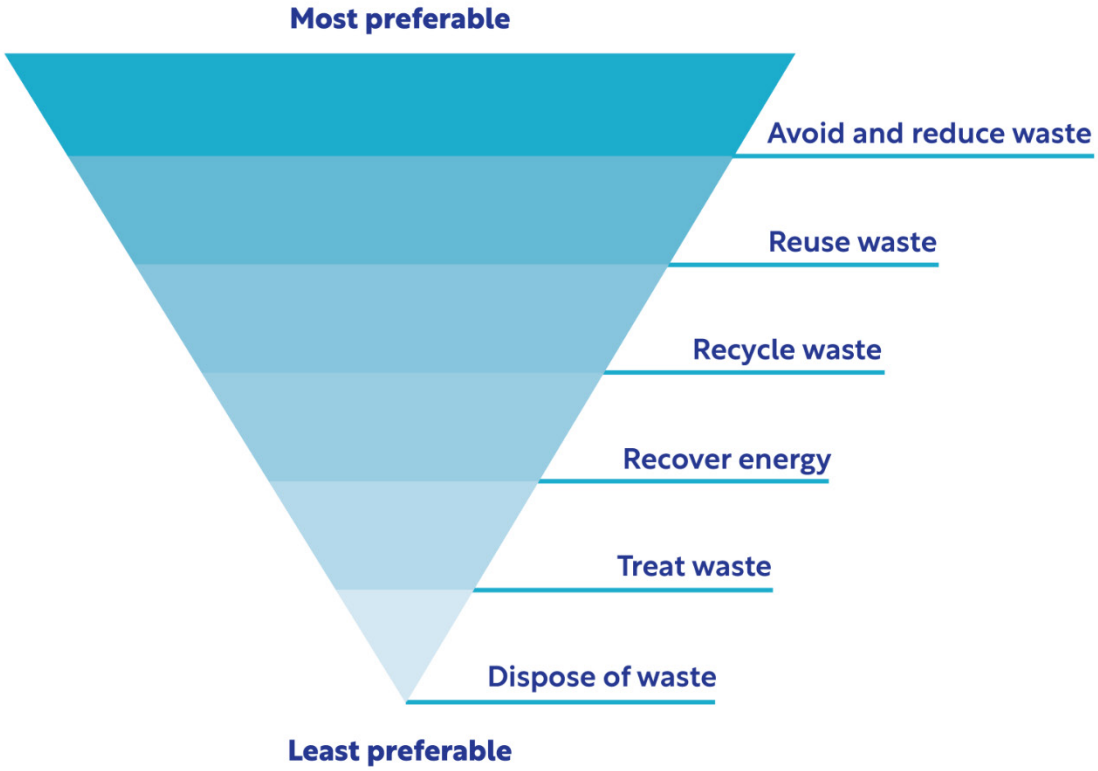


Figure 21-1: Waste hierarchy (Source: based on NSW EPA, 2014)

21.2.2.3 Waste generation and classification

Construction and operational waste generation rates were informed by preliminary design information and waste generation rates from similar projects. The types and quantities of waste were classified in accordance with the Waste Classification Guidelines, which are summarised in Table 21-3.

Table 21-3: Summary of waste classification

Waste classification	Examples
General solid waste (non-putrescible)	• glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal, paper or cardboard • household waste excluding food waste • grit, sediment, litter and gross pollutants from stormwater systems • garden waste • synthetic fibre waste (from materials such as fibreglass, polyesters and other plastics) • it excludes asbestos waste, virgin excavated natural material, building and demolition waste, asphalt waste, certain biosolids and cured concrete waste from a batch plant.

Waste classification	Examples
General solid waste (putrescible)	• household waste that contains putrescible organics • waste from litter bins collected by or on behalf of local councils • manure and night soil • disposable nappies, incontinence pads or sanitary napkins • food waste • animal waste • grit or screenings from sewage treatment systems that have been dewatered so that the grit or screenings do not contain free liquids.
Liquid waste	• waste that meets specific criteria such as becoming free-flowing in certain circumstances or not capable of being picked up by a spade or shovel • anything classified as liquid waste under a NSW EPA gazettal notice.
Special waste	• clinical and related waste • asbestos waste • waste tyres • anything classified as special waste under a NSW EPA gazettal notice.
Hazardous waste	• containers, having previously contained a substance of Class 1, 3, 4, 5 or 8 within the meaning of the Transport of Dangerous Goods Code • lead-acid or nickel-cadmium batteries • lead paint waste arising otherwise than from residential premises or educational or childcare institutions.
Restricted solid waste	• wastes assessed and classified as restricted solid waste in accordance with step five of the Waste Classification Guidelines.

21.2.2.4 Assessment of impacts

A qualitative risk assessment was carried out to determine potential environmental impacts associated with the generation and management of wastes, including storage, handling and transportation. The risk of each potential impact was assessed based on the consequences and likelihood of it occurring. Table 21-4 shows the risk categories used for this assessment. These risk categories were used to assess the level of impacts identified in Table 21-6 and Table 21-8.

Table 21-4: Risk categories

Consequences of impact	Likelihood of impact				
	Rare	Unlikely	Possible	Likely	Almost certain
Severe	Low	Low to moderate	Moderate to high	Major	Major

Consequences of impact	Likelihood of impact				
	Rare	Unlikely	Possible	Likely	Almost certain
Moderate	Negligible to low	Low	Moderate	Moderate to high	High
Mild	Negligible	Low	Low	Low to moderate	Moderate
Negligible	Negligible	Negligible	Negligible to low	Low	Low

Risk ratings are defined as follows:

- Negligible - The presence of the identified impact does not give rise to the potential to cause major harm.
- Low - It is possible that harm could arise from an identified impact, though this is likely to be mild.
- Moderate – It is possible that harm could arise, but it is unlikely that such harm would be major.
- High – Major harm is likely to be experienced from an identified impact without mitigation measures in place.
- Major – There is a high probability that severe harm could arise from an identified impact without appropriate mitigation measures.

21.3 Existing environment

21.3.1 Contamination and preliminary waste classification

Preliminary waste classification and leachability testing results classified most of the fill soil samples across the project as general solid waste or special waste (asbestos). Soil samples along the northern boundary, central-southern portion and southern boundary of the WRRF site showed concentrations of hydrocarbons, benzene and select metals which classified these materials as restricted or hazardous wastes. Similarly, testing along the river release pipeline classified some soil samples as restricted solid waste or hazardous waste due to concentrations of heavy metals, total recoverable hydrocarbons and polycyclic aromatic hydrocarbons. The natural material identified beneath the fill profile of the brine and transfer pipelines may be certified as virgin excavated natural material or meet excavated natural material requirements if acid sulfate soils are not identified. Where acid sulfate soils are identified, the natural material would be classified as general solid waste.

Since April 2025, a portion of the WRRF site has been raised by about 1.7 m using imported virgin excavated natural material, excavated natural material and material approved under resource recovery orders and exemptions. Before this portion of the site was raised, potential asbestos containing materials were observed as randomly scattered fragments across the surface of the site. Asbestos containing materials were also

present in fill material at the WRRF site up to 1 mbgl. Potential asbestos containing materials were observed as randomly scattered fragments across the surface of the site, particularly in the south-western portion. Asbestos containing materials were also present in fill material at the WRRF site up to 1 mbgl.

Asbestos containing material has been identified along pipeline alignments, as well as in previous investigations of the Camellia pumping station, which is subject to an existing contaminated land management plan. Therefore, asbestos is expected to be encountered during excavations along the pipeline alignments and at the Camellia pumping station.

Acid sulfate soils are expected to be present in soil materials at the WRRF site at depths of 1.5 to 12.95 m below the original fill layer. Shallower acid sulfate soils in fill and natural soils may be encountered at construction entries located within and/or between the WRRF, Rosehill Gardens Racecourse overflow carpark and Camellia pumping station. Acid sulfate soils may also be encountered along the brine and transfer pipeline alignments, which pass through Class 4 acid sulfate soil risk areas. Potential acid sulfate soils are likely to be encountered within Camellia, Sydney Olympic Park and Meadowbank.

Further detail on the extent of existing contamination across the impact assessment area is available in Chapter 9 (Soils and contamination) and the Soil and Contaminated Land Impact Assessment (Appendix J). Reuse of excess material on the WRRF site as general fill was considered acceptable provided that relevant management plans are followed. Thus, spoil material would be brought to the WRRF site where possible to avoid disposal.

21.3.2 Recycling and waste management facilities

There are several waste recycling and disposal facilities located within the Camellia-Rosehill precinct. These include resource recovery facilities, landfills, a liquid treatment plant and an anaerobic digestion facility. A list of nearby waste recycling and disposal facilities, including their distance from the WRRF, is provided in the Waste Management Impact Assessment (Appendix U).

The project is also well serviced by main and ancillary roads which facilitate the movement of waste collection vehicles. Key transport routes are identified in Chapter 14 (Traffic and Transport), which would be used for the transport of waste to licenced facilities. Any excess clean spoil material would be transported for reuse at the WRRF.

21.4 Construction impacts

21.4.1 Waste generation

During construction, waste is expected to be generated from various activities. The volume and type of waste that would be generated from each activity for each element of the project has been summarised in Table 21-5. The volumes shown indicate the excess material that cannot be reused immediately on-site. Where recycling or reuse opportunities may be available, they have been identified in the table. Otherwise, the material would be disposed of off-site.

Table 21-5: Key waste streams generated during construction of the project

Waste streams that may be produced	Likely classification of waste streams	Estimated quantity over construction period		
		WRRF	Camellia pumping station	Pipelines
Operation of construction site amenities				
Site office waste including paper and cardboard	Recycled, otherwise classified as general solid waste (non-putrescible)	27 t	5 t	8 t
Food waste from site offices and lunch rooms	Recycled, otherwise classified as general solid waste (putrescible)	53 t	9 t	17 t
Wastewater (sewage from restroom facilities)	Liquid waste	Up to 30 kL/day at peak construction	Up to 8 kL/day at peak construction	Up to 5 kL/day at peak construction
Site preparation including vegetation clearing, earthworks, establishment of compounds				
Acid sulfate soils	General solid waste (non-putrescible)	Unknown (subject to testing)	Unknown (subject to testing)	Unknown (subject to testing)
Asbestos waste (at surface, in shed at Camellia pumping station)	Special waste	N/A	Unknown (subject to testing)	N/A
Treated drilling muds (dewatered to create a solid – drilling fluid has been removed)	Reused, disposed in accordance with the Treated Drilling Mud Order 2014, or otherwise classified as general solid waste (non-putrescible)	N/A	N/A	1,359 m^3
Untreated drilling muds	Liquid waste	N/A	N/A	759 m^3

Waste streams that may be produced	Likely classification of waste streams	Estimated quantity over construction period		
		WRRF	Camellia pumping station	Pipelines
Excess spoil (contaminated soils, soils containing asbestos)	Reused, otherwise classified as special waste (for soils containing asbestos), restricted solid waste or hazardous waste	N/A	Minimal	Minimal[18]
Construction of the project including building works, installation of equipment, paved areas, driveways, office and utilities				
Wastewater including: • greywater from construction activities such as equipment washdown including concrete washout • contaminated groundwater • surface water collected in retention and detention basins, and erosion and sediment control systems.	Recycled, otherwise classified as liquid waste	25,200 m^3	Minimal	14,118 m^3
Spoil (excess from HDD)	Reused or recycled, otherwise classified as general solid waste (non-putrescible)	N/A	N/A	26,500 m^3
Waste pumps and pipework (cast iron)	Recycled, otherwise classified as general solid waste (non-putrescible)	N/A	27 t	N/A
Shed demolition waste	Recycled, otherwise classified as general solid waste (non-putrescible)	N/A	70 m3	N/A

[18] The intention is for excess spoil to be used at the WRRF site. Excess spoil for disposal off-site would comprise restricted waste

Waste streams that may be produced	Likely classification of waste streams	Estimated quantity over construction period		
		WRRF	Camellia pumping station	Pipelines
Garden waste	Reused or recycled, otherwise classified as general solid waste (non-putrescible)	N/A	0.08 ha	4.97 ha
Wood waste	Recycled, otherwise classified as general solid waste (non-putrescible)	109 t	N/A	36 t
Electrical infrastructure waste	Recycled, otherwise classified as general solid waste (non-putrescible)	1,008 kg	N/A	N/A
Piping materials	Recycled, otherwise classified as general solid waste (non-putrescible)	672 t	Minimal	750 t
Metal wastes including steel and aluminium	Recycled, otherwise classified as general solid waste (non-putrescible)	2,590 t	N/A	N/A
E-waste	Recycled, otherwise classified as general solid waste (non-putrescible)	Minimal	N/A	N/A
Synthetic fibres and membranes	Recycled, otherwise classified as general solid waste (non-putrescible)	7 t	N/A	4 t
Dewatered grit, sediment, litter and gross pollutants	General solid waste (non-putrescible)	252 m^3	N/A	141 m^3
Other construction waste including concrete waste from pipe off cuts or pouring remnants and waste packaging	Recycled, otherwise classified as general solid waste (non-putrescible)	9,142 m^3	70 m^3	2,259 m^3

Waste streams that may be produced	Likely classification of waste streams	Estimated quantity over construction period		
		WRRF	Camellia pumping station	Pipelines
Plant and equipment waste				
Tyres	Recycled, otherwise classified as special waste	9 t	N/A	49 t
Waste oils	Recycled, otherwise classified as liquid waste	1,470 L	N/A	8,550 L
Unwashed containers that previously held Class 1, 3, 4, 5 or 8	Hazardous waste	504 m^3	N/A	282 m^3
Used batteries	Recycled, otherwise classified as hazardous waste	91 kg	N/A	335 kg
Construction plant waste	Recycled, otherwise classified as general solid waste (non-putrescible)	126 m^3	N/A	71 m^3
Commissioning				
Partially treated water	Liquid waste	5,425 ML	N/A	7 ML
Screenings (combined coarse and fine)	General solid waste (putrescible)	49,445 m^3	N/A	N/A
Grit	General solid waste (putrescible)	10,695 m^3	N/A	N/A
Dewatered cake	General solid waste (putrescible)	6,000 t	N/A	N/A

Waste streams that may be produced	Likely classification of waste streams	Estimated quantity over construction period		
		WRRF	Camellia pumping station	Pipelines
Commissioning test water	Reused, otherwise classified as liquid waste	N/A	N/A	6,454 m^3
River release pipeline disinfection flushing water	Liquid waste	N/A	N/A	3 ML

21.4.2 Excess spoil and generation and disposal

21.4.2.1 Temporary storage

Construction of the project would generate a substantial amount of spoil. Spoil may be stored temporarily within the construction compounds while waiting for reuse on-site, or collection for off-site reuse, recycling, disposal or treatment. During this time, the suitability of spoil for reuse would be tested and its waste classification would be determined if necessary. Efforts would be made to reuse or dispose of spoil as soon as possible in order to limit storage time in construction compounds. Temporary stockpiles would be segregated by waste type to ensure no cross-contamination occurs and maximise reuse and recycling opportunities.

21.4.2.2 Spoil reuse at the WRRF

Excess spoil generated from the trenching of the brine, transfer and river release pipelines would be brought to the WRRF site and placed in the south-eastern portion. The excess spoil would be used to raise the height of this portion of the site, consistent with the rest of the WRRF where site environmental management works are currently occurring. The area has capacity to accommodate at least 64,000 m^3 of material. Spoil used to raise the height of this area may contain contaminated material, including potential asbestos containing material. Asbestos containing material would be covered and segregated from other spoil and would be managed in accordance with an asbestos management plan. Further detail on the management of contaminated material is available in Chapter 9 (Soils and contamination). Excess spoil may also be recycled onto other Sydney Water facilities.

21.4.2.3 Unexpected finds

Actual or suspected contaminated soils that cannot be reused or retained on-site would be classified in accordance with the Waste Classification Guidelines. Once classified, the soil would be managed, transported and disposed of in accordance with the requirements for the relevant classification. This includes transport by an authorised contractor and disposal at an appropriately licensed facility that is lawfully able to receive the waste. An unexpected finds protocol would be developed during detailed design to manage any unexpected contamination finds.

21.4.3 Commissioning waste

Water would be required for hydrostatic testing of the pipelines and at the WRRF. Where possible, this water would be reused. Where reuse is not possible, it would be disposed to appropriate locations, based on disposal protocols that would be established as part of the Waste and Resources Recovery Plan and the Soil and Water Management Plan.

During the commissioning phase, partially treated water may be released from the WRRF through the brine pipeline to the NSOOS for treatment at the North Head WRRF.

21.4.4 Potential impacts if waste not managed appropriately

The potential impacts of waste generated from the project during construction and commissioning, if not managed appropriately, are summarised in Table 21-6. Mitigation measures are identified in Section 21.7. Once implemented, all aspects of waste management listed below are expected to have a low impact.

Table 21-6: Construction waste impacts if not managed appropriately

Aspect of waste management	Potential impacts	Unmitigated risk	Mitigated risk
Generation of waste, including excavation and handling	• dust from excavation, handling and movement of waste • erosion and sedimentation due to runoff from exposed surfaces, generating increased water turbidity • mobilisation of acid sulfate soils: – at the WRRF site (soils between depths of 1.5 mbgl and 12.5 mbgl) – in fill at the Camellia pumping station – likely present in locations within Camellia, Sydney Olympic Park and Meadowbank • mobilisation of contaminated sediments at John Whitton Bridge • sediment laden or contaminated runoff, uncontrolled release of commissioning wastes and leachate generation, resulting in uncontrolled release to Duck River or Parramatta River impacting water quality and aquatic ecosystems • human health risks due to handling of excavated contaminated soils and hazardous materials • air quality impacts from excavation and movement of spoil containing asbestos • encountering unexpected finds at 54-58 Derby Street, Silverwater and 103-105 Silverwater Road, Silverwater where further investigation is required.	Moderate to high	Low
Storage of and segregation of waste (including stockpiles)	• odours and dust from stockpiling and storage of wastes • human health risks due to storage of contaminated soils and hazardous materials, such as asbestos, contaminated fill and acid sulfate soil • sediment laden or contaminated runoff and leachate generation, which if located close	Moderate to high	Low

Aspect of waste management	Potential impacts	Unmitigated risk	Mitigated risk
	to receiving waterbodies could impact nearby water quality and aquatic ecosystems • waste build-up from irregular or disrupted collections • cross contamination of soils due to improper segregation and storage, resulting in larger quantities of spoil requiring disposal, and therefore additional waste transport, emissions and costs • attracting pests and disease vectors.		
Waste transportation	• dust from loading waste onto vehicles and movement of waste on haul roads • traffic generated by haulage of waste to disposal or recycling facilities • odours from loading waste onto vehicles and movement of waste collection vehicles to disposal or recycling facilities • mud tracking on road from waste collection vehicles • unlawful transport and disposal • incorrect classification of waste materials.	Low	Low
Non-classified or incorrectly classified waste transport and disposal	• contamination of receiving facility, incurring increased costs to recover or remediate • contamination of soils, groundwater and/or surface water.	Moderate	Low
Unlicensed waste contractors transporting waste	• potential illegal dumping of waste resulting in disciplinary action from the NSW EPA • potential for disposal at unlawful, unlicensed receival sites.	Low to moderate	Low

21.5 Operational impacts

During operation, most waste would be generated from the WRRF. Waste generated from Camellia pumping station and pipeline operations would be limited. The volume and type of waste that would be generated from each activity, and potential impacts if not managed appropriately is summarised below.

21.5.1 Waste generation

Key waste streams expected to be generated during operation of the project are identified in Table 21-7.

Table 21-7: Key waste streams generated during operation of the project

Activity	Waste streams that may be produced	Likely classification of waste streams	Estimated quantity per year
Process	Brine	Liquid waste	5,183 ML
	Biosolids	Reused as per Section 21.5.3	4,680 t
	4,680 t	General solid waste (putrescible)	294 t
	Dewatered screenings	General solid waste (putrescible)	154 t
	Dewatered grits	Reused as per Section 21.5.3	1,679,000 m^3
General operation and maintenance (including offices and amenities)	Tyres	Recycled, otherwise special waste	42 kg
	Waste oils	Recycled, otherwise liquid waste	7 L
	Electrical transformer oils	Liquid waste	140 L
	Workshop liquid wastes	Liquid waste	616 L
	Wastewater	Liquid waste	>280 m^3
	Unwashed containers that previously held Class 1, 3, 4, 5 or 8	Hazardous waste	7 m^3
	Water treatment chemicals	Hazardous waste – unused or spilt chemicals: sodium bisulfate, sodium hypochlorite, ferric chloride, sodium hydroxide, methanol, sulphuric acid, anti-scalant	12,264 L
		General solid waste (non-putrescible) – unused or spilt chemicals: sodium	4,914 L

Activity	Waste streams that may be produced	Likely classification of waste streams	Estimated quantity per year
		hydroxide, alum, ammonia sulfate	
	Office waste	Recycled, otherwise general solid waste (non-putrescible)	1 t
	Maintenance waste	Recycled, otherwise general solid waste (non-putrescible)	42 m^3
	Wood waste	Recycled, otherwise general solid waste (non-putrescible)	168 kg
	E-waste	Recycled, otherwise general solid waste (non-putrescible)	28 kg
	Odour control chemicals	General solid waste (non-putrescible)	42 kg
	Scrap metals	Recycled, otherwise general solid waste (non-putrescible)	3 t
	Spent filters	General solid waste (non-putrescible)	14 m^3
	Food waste	General solid waste (non-putrescible)	2 t

21.5.2 Waste storage

Waste from WRRF processes would be stored near the areas where it is produced. Food and office waste generated by operational staff would be stored outside of the administration building where it would be accessible to waste collection vehicles.

21.5.3 Beneficial reuse of biosolids and biogas

Digested solids from the anaerobic digesters would be dewatered before being taken off-site for beneficial reuse. The ultimate destination and use of biosolids generated at the WRRF is not part of the scope of the EIS. However, biosolids are generally used for land application in agriculture, forestry or further processed into compost.

The reuse of biosolids is managed in line with the Sydney Water Bioresources Master Plan (Sydney Water, 2018) and the NSW EPA's Environmental Guidelines – Use and Disposal of Biosolids Products (NSW EPA, 1997), noting that the NSW EPA is currently reviewing the biosolids guidelines. Sydney Water would comply with the environmental obligations set by NSW EPA. NSW Health and NSW EPA have confirmed biosolids are safe if they are made and used following the NSW EPA's biosolids guidelines.

Biogas produced in the anaerobic digesters would be delivered to co-generation engines to generate electricity and provide digester heating. Biogas is therefore reused through the WRRF operations to produce electricity, reducing energy consumption from the grid by the WRRF.

21.5.4 Potential impacts if waste not managed appropriately

The potential impacts of waste generated from the operation of the project, if not managed appropriately, are summarised in Table 21-8. Mitigation measures are captured in Section 21.7. Once implemented, the below aspects of waste management are expected to have a low impact.

Table 21-8: Operational waste impacts if not managed appropriately

Aspect of waste management	Potential impacts	Unmitigated risk	Mitigated risk
Storage and segregation of waste	• odours from storage of wastes • waste build up from irregular or disrupted collections • cross contamination of waste due to improper segregation and storage • attracting pests and disease vectors.	Moderate	Low
Waste transportation	• traffic generated by haulage of waste to disposal and recycling facilities • odours from loading waste onto vehicles and movement of waste collection vehicles to disposal or recycling facilities • unlawful transport and disposal • incorrect classification of waste materials.	Moderate	Low
Non-classified or incorrectly classified waste transport and disposal	• contamination of receiving facility • contamination of soils, groundwater and/or surface water • unlicensed waste contractors transporting waste.	Moderate	Low

Aspect of waste management	Potential impacts	Unmitigated risk	Mitigated risk
Unlicensed waste contractors transporting waste	• potential illegal dumping of waste • potential for disposal at unlawful unlicensed receival sites.	Moderate	Low

21.6 Decommissioning waste

The project would be maintained, repaired and upgraded throughout its life to maintain its operation. As Sydney Water has no plans for decommissioning, this assessment does not identify any decommissioning waste. However, if decommissioning ever occurs, Sydney Water would dispose of any decommissioning waste responsibly, and with minimal impact on the environment.

21.7 Mitigation measures

The project has been designed to avoid and minimise waste impacts, such as through the reuse of material as described in Sections 21.4.2.2 and 21.5.3. Sydney Water would manage potential impacts during construction through implementation of the CEMP. Project specific mitigation measures that would be implemented to manage potential impacts relating to waste are listed in Table 21-9.

Table 21-9: Waste management measures

ID	Potential impact	Mitigation measure	Timing
W01	Co-mingling and contamination of waste and resource types, unnecessary disposal, offsite impacts from poor waste management	Develop and implement a Waste and Resource Recovery Plan (WRRP) as part of the project's CEMP to appropriately manage and classify any materials including soils, construction and demolition wastes and associated stockpiles. The WRRP would include: • opportunities to avoid and minimise the generation of spoil in line with the waste hierarchy • expected waste types and their location, including stockpile locations and reuse locations • classification of all waste generated by the project in line with the POEO Act and associated regulations • delineation of waste or resource types including identification of likely vertical and lateral extents (where applicable) • visual monitoring of materials during excavation and measures to be undertaken	During detailed design and construction

ID	Potential impact	Mitigation measure	Timing
		• material tracking register for on-site and off-site movements • ex-situ waste and resource recovery classification program, including proposed hold points • site specific measures for waste segregation, storage, handling, collection and transport according to their waste classification • roles and responsibilities in relation to the management and monitoring of stockpiles and materials • legislative compliance requirements • instructions on clear signage to be provided at construction compounds to encourage correct recycling and segregation and reduce contamination.	
W02	Human health risks from storage and handling of asbestos contaminated soils	Develop and implement a procedure for managing asbestos. Refer to CLS05 (Appendix E).	During construction
W03	Inadequate waste storage space resulting in safety and environmental impacts	Consider measures to minimise excess waste generation during detailed design. Optimise design to minimise excess spoil volumes and maximise the reuse of material on-site in line with the waste hierarchy outlined in the WARR Act.	During detailed design
W04	Waste-related odour, runoff and contamination during operation	Ensure dewatered biosolids, screening and grit is stored properly in covered areas. Ensure process units are appropriately connected to the odour control unit. Follow Sydney Water's standard operating protocols for WRRFs.	During operation

Dangerous goods and hazardous development

22 Dangerous goods and hazardous development

This chapter provides an overview of the key findings of the Preliminary Hazard Analysis (Appendix V) (GHD, 2025c). The assessment reviewed the dangerous goods associated with the project, possible hazardous scenarios and the likelihood of occurrence. The assessment confirmed that the project is not a hazardous industry. The individual risk is deemed low. The societal risk is negligible. Management measures would be implemented to maintain the low risk of hazards for this project.

22.1 Secretary's Environmental Assessment Requirements

Table 22-1 lists the SEARs relevant to dangerous goods and hazardous development, and where they have been addressed.

Table 22-1: Project SEARs relating to dangerous gods and hazardous development

SEARs	EIS section where requirement is addressed
1. Undertake a preliminary risk screening in accordance with Chapter 3 of SEPP (Resilience and Hazards) 2021 and Applying SEPP 33 (DoP, 2011). If the screening indicates that the development is 'potentially hazardous', a Quantitative Risk Assessment (QRA) must be prepared in accordance with the Department's Hazardous Industry Planning Advisory Paper No. 6, 'Hazard Analysis'. The QRA must include and not be limited to the following: (a) Identification of the quantity of dangerous goods to be stored, handled and transported to site and the associated locations	Sections 22.2.2.1 Section 22.5
(b) Justification for the appropriate choice of dangerous goods/chemicals selected for the process to reduce the potential risk exposure to surrounding receivers	Section 22.4
(c) an explanation of the processes/technologies proposed for the facility and any critical safeguards	Chapter 3 Section 22.8
(d) demonstration of compliance with relevant quantitative and qualitative risk criteria as set out in Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning	Section 22.7
(e) demonstration that the cumulative individual and societal risk from hazard sources (i.e. proposed facility, Dangerous Goods pipelines, and major hazards facility within Rosehill/Camellia precinct) would comply with all relevant land use safety risk criteria as set out in Hazardous Industry Planning Advisory Paper No. 4, with consideration of the population limits set out for Rosehill Camellia Precinct	Section 22.7

SEARs	EIS section where requirement is addressed
(f) demonstration that appropriate spill containment will be provided for storage, filling and loading of all fuels and other chemicals to be used on site	Section 22.5
(g) demonstrated compliance with Part 9.3E of the POEO Act for the use of industrial chemicals, including details of activities involving Schedule 6 or Schedule 7 chemicals listed on the Industrial Chemicals Environmental Management Standard (IChEMS) register.	Section 22.5

22.2 Assessment methodology

22.2.1 Legislative and policy context

The assessment was undertaken in accordance with reference to the project SEARs, and the following legislation and guidelines:

- the POEO Act (including Part 9.3E)
- Resilience and Hazards SEPP (Chapter 3)
- Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (Applying SEPP 33) (Department of Planning, 2011a)
- Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning (HIPAP 4) (Department of Planning, 2011b)
- Hazardous Industry Planning Advisory Paper No. 6 – Guidelines of Hazard Analysis (HIPAP 6) (Department of Planning, 2011c)
- Storing and Handling of Liquids: Environment Protection – Participants Manual (DECC, 2007b)
- Australian Dangerous Goods Code (National Transport Commission, 2024)
- Development proposed under the Camellia-Rosehill Place Strategy (DPE, 2022b).

22.2.2 Methodology

22.2.2.1 Preliminary risk screening

Dangerous goods (DGs) are materials that can harm people, animals, property, or the environment. Their physical or chemical properties can present a risk of poisoning, explosion, corrosion and burns or fire. Common types of dangerous goods include petrol, cleaning chemicals, and certain gases. The Australian Dangerous Goods Code (National Transport Commission, 2024) sets out rules for how these substances should be handled and transported. Many dangerous goods are also classed as hazardous substances under the Work Health and Safety Regulation 2017.

A preliminary risk screening study has been undertaken in line with the Resilience and Hazards SEPP and Applying SEPP 33 (Department of Planning, 2011a). The purpose of the preliminary risk screening study was to identify if the project had the potential to classify as either a potentially offensive industry or potentially hazardous industry as defined in Clause 3.2 of the Resilience and Hazards SEPP (2021). The definitions for both industries, as well as the methodology to determine if a project meets the definition is included in Table 22-2.

Table 22-2: Definitions and approach to identifying Potentially Hazardous and Potentially Offensive Industries

Issue	Summary of definition	Methodology to determine applicability	Follow up assessment (if required)
Potentially hazardous industry	A development that without any measures to reduce its impact, has the ability to pose a significant risk to human health, life, property or the environment.	Undertake the Applying SEPP 33 risk screening process	PHA required
Potentially offensive industry	A development that without any measures to reduce its impact, would release pollution (such as noise) that significantly harms the surrounding area, nearby developments and future developments.	Review of potential impacts to the amenity of the site or discharges, such as emissions e.g. noise, air.	No assessment required. Property owner/ facility operator to comply with licencing requirements issued by relevant authorities (e.g. NSW EPA).

The risk screening process and review of potentially offensive impacts identified that:

- some dangerous goods required for the project would exceed the threshold quantities in Applying SEPP 33 and as a result, had the potential for off-site impacts if unmitigated
- the project would release emissions including odour, noise and vibration.

As a result, the project was identified as both a potentially hazardous industry and potentially offensive industry, which warranted further consideration as described below.

22.2.2.2 Preliminary hazard analysis

Level of risk assessment

As the project was identified as a potentially hazardous industry a PHA was prepared. Three levels of PHA are identified in Applying SEPP 33 (Department of Planning, 2011a):

- level one – if low potential for harm is identified, a qualitative PHA is completed
- level 2 – if medium potential for harm is identified, a semi-quantitative PHA is completed
- level 3 – if high potential for harm is identified, a quantitative PHA is completed.

Hazard identification

To identify potential hazards that may occur from the project, a screening assessment was carried out. This process involves documenting possible events that could lead to an off-site incident. The assessment then lists the potential causes of the incident and identifies safeguards to prevent the incidents from occurring or lessen their impact. Any scenarios that are identified in the screening assessment process as having the potential to cause harm are carried through to the PHA for additional assessment.

The screening assessment for the project identified several worst-case hazard scenarios that had the potential to lead to a 'medium' potential for harm during operation of the project.

Risk assessment

The outcomes of the screening assessment confirmed that a level 2 PHA would be most appropriate level of assessment for the project given the 'medium' potential for harm and in consideration of the surrounding industrial land use. A semi-quantitative risk assessment was prepared for the project in accordance with the Hazardous Industry Planning Advisory Paper No. 6 (Department of Planning, 2011c). The risk assessment is included in the PHA (Appendix V) and includes review of the hazards following implementation of mitigation measures.

The PHA:

- identified all potential hazards and incident scenarios
- analysed the consequences of the incidents on people
- analysed the likelihood (frequency) of such events occurring
- quantified risk levels (individual risk and societal risk) in line with the qualitative risk criteria in HIPAP 4 (DoP, 2011b)
- compared the risk levels with established risk criteria and identified opportunities for risk reduction
- reviewed the mitigated risks of the project and subsequently considered whether the project remains either a hazardous or offensive industry with mitigation (as defined in Clause 3.2 of the Resilience and Hazards SEPP).

The PHA for the project focused on operation at the WRRF. This is because operation of the pipelines and Camellia pumping station do not pose a hazard. Similarly, during construction, only low levels of chemicals classified as dangerous goods would be required and the Resilience and Hazards SEPP thresholds would not likely be exceeded. Should chemicals used during construction be present in substantially larger quantities, the CEMP would capture additional relevant chemical handling protocols. The impact of other hazards, namely the handling and transport of contaminated spoil, have been addressed in Chapter 9 (Soils and contamination) and Chapter 21 (Waste management).

The PHA provides further detail about the methodology used for modelling different impact scenarios. The outcomes of the assessment were reviewed with consideration to the future land uses proposed for the Camellia-Rosehill precinct and are described in Section 22.7.

22.2.2.3 Potentially offensive industry

A potentially offensive industry is one which emits pollution that would cause a significant level of offence if safeguards were not implemented. The PHA reviewed air and noise emissions from the project and found that it would not be offensive provided that standard mitigation measures are implemented, and environmental licences are complied with. Therefore, this has not been discussed further in this chapter. Air quality impacts are assessed in Chapter 12 (Air quality) and in detail in the Air Quality Impact Assessment (Appendix M). Noise impacts are assessed in Chapter 13 (Noise and vibration) and in detail in the Noise and Vibration Impact Assessment (Appendix N).

22.3 Existing environment

The WRRF site is in a primarily industrial and commercial area. Nearby commercial receivers include a range of office and warehouse spaces, including one premise adjacent to the WRRF on Unwin Street. There is a broad range of industrial operations in the area. The Vivia Energy Australia Clyde Terminal is listed as a major hazard facility under the *Work Health and Safety Act 2011*. The PLR stabling and maintenance facility and future Sydney Metro West stabling and maintenance facility are both nearby. These sites currently and will in future experience frequent movements of light rail and metro vehicles as they enter the sites for maintenance.

The Rosehill Gardens Racecourse is located about 50 m from the WRRF site. This venue hosts a high number of entertainment events annually that can run concurrent to the operations of the industrial businesses in the precinct. Residential housing is present in Rosehill and Harris Park, west of the Camellia-Rosehill Precinct, and to the south of the WRRF within Silverwater. James Ruse Drive, Rosehill Gardens Racecourse and Duck River separate the residential areas from the industrial and commercial areas of the Camellia-Rosehill precinct.

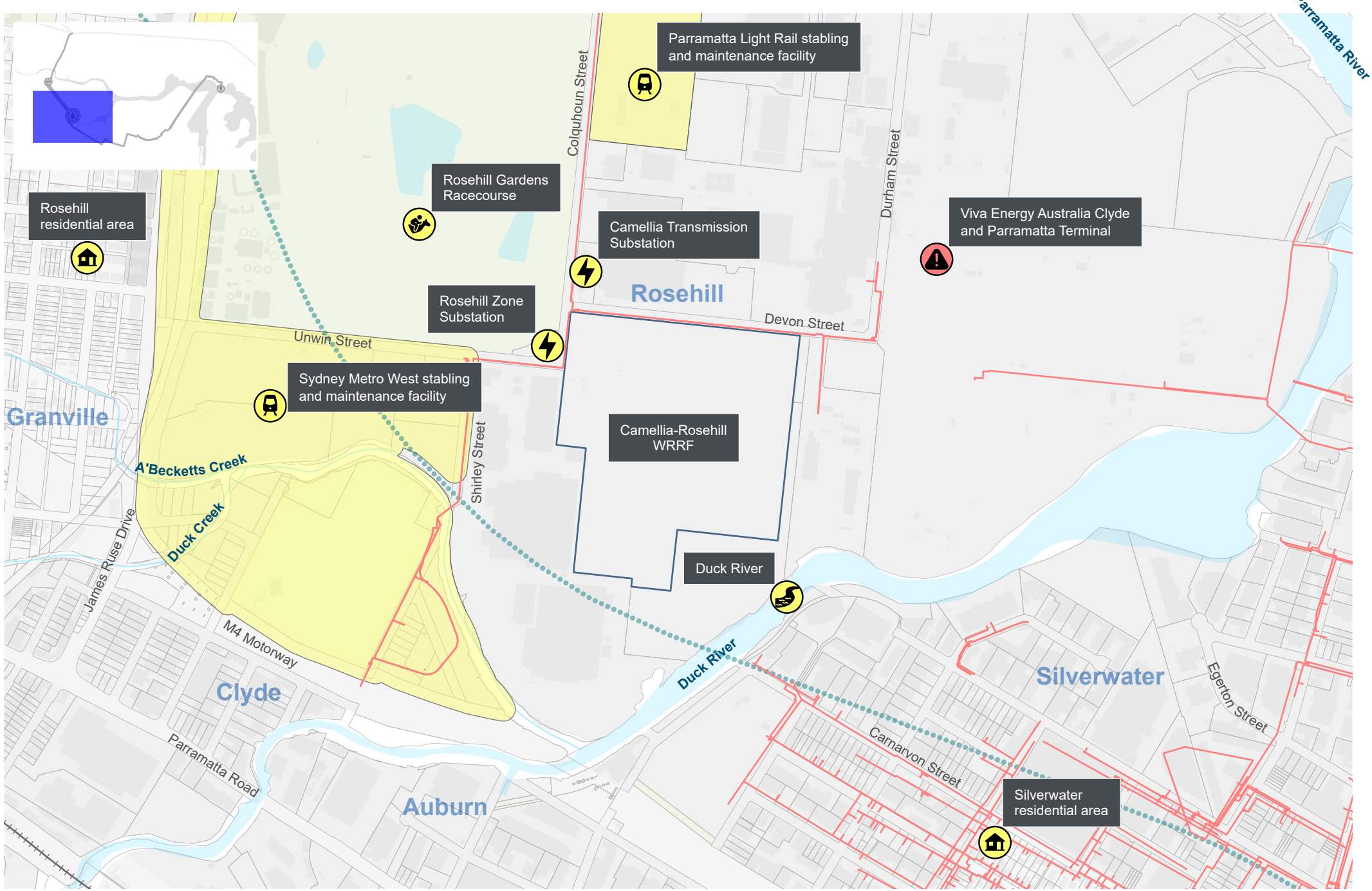
Key receptors located nearby are shown in Figure 22-1.

22.4 Avoid and minimise impacts

The design of the project has aimed to avoid and minimise potential hazards. For operation, this has included:

- locating the WRRF in an industrial area with similar neighbouring land uses and minimal sensitive receivers. This is consistent with the Camellia-Rosehill Place Strategy (DPE, 2022b) which prioritises retaining industrial land uses on Devon Street and Unwin Street and proposing residential development in the north of the Precinct
- locating odour control facilities and chemical storage areas towards the centre of the site, away from the site boundary and neighbours
- covering odour sources (inlet works, primary treatment, biosolids handling area) to contain odour before treatment
- proposing cogeneration engines and a waste gas burner to flare excess biogas produced at the WRRF

- selection of chemicals with lower potential to cause incidents or environmental harm. Sodium hypochlorite has been selected as the default form of chlorination on the basis of volumes required, uniformity of dosing technology across water resource recovery and cost.



Camellia-Rosehill WRRF

Receptor

Major hazard facility

Fuel and gas pipelines

Sydney Metro West

Figure 22-1 Nearby receptors

0 100 200 300 m

Data sources: DCDB/DTDB - NSW DCS 2025
Basemap: MetroMap 2025

Scale: 1:10,000 @ A4
GDA2020 MGA Zone 56

N

22.5 Handling and storage of chemicals

During operation, chemicals used by the WRRF would need to be transported to and stored at the site. The chemicals and what they are used for in the treatment process are listed in Table 22-3 (refer to Section 3.4.3 for information about the treatment process). Schedule 6 and 7 of the IChEMS register (DCCEEW, 2022) identifies chemicals that that are likely to cause serious or irreversible harm to the environment. No chemicals that would be stored as part of the project are listed under these Schedules. Therefore, the project is compliant with Part 9.3E of the POEO Act.

However, 3 substances used at the WRRF would exceed the general storage volume thresholds for dangerous goods within the Resilience and Hazards SEPP and Applying SEPP 33.

As described in Section 3.4.5.3, various chemicals would be required at the WRRF to dose wastewater at different stages of the treatment process. Chemical storage tanks would be installed in dedicated concrete bunds to contain any spills. The storage tanks would be covered in protective coating to prevent concrete corrosion. The chemical storage areas would typically have steel and colourbond roof structures. All chemical storage facilities would meet the relevant codes for safe storage and handling.

The indicative location of the chemical storage area is shown in Figure 3-7. Chemicals would be delivered to the site by trucks on a regular basis and would be stored on-site in accordance with relevant standards and codes. The exact size, location and number of tanks and pumps required for chemical storage and dosing would be detailed during the next design phase.

Table 22-3: Chemicals stored on the WRRF site

Chemical product	Required use	DG Class/ Packing Group (PG)	Expected storage quantity	Transport movements (annual)	Combined storage quantity per DG and PG	Exceedance of general screening threshold (Resilience and Hazards SEPP)	Exceedance of transport screening threshold (Resilience and Hazards SEPP)
Adjacent to main chemical building							
Carbon Dioxide	Advanced treatment	2.2/ N/A	24t	73	24t	N/A	N/A
Lime	Advanced treatment	N/A	120kL	N/A	120kL	N/A	N/A
Main chemical building							
Ferric Chloride[19]	Primary and solids treatment	8/III	135kL/ 194t	52	321kL/ 412t	Exceeds threshold	No exceedance
Sodium Hypochlorite	Tertiary and advanced treatment	8/III	160kL/ 189t	52			No exceedance
Ammonium hydroxide	Tertiary and advanced treatment	8/III	13.5kL/ 12t	17			No exceedance

[19] Alum may also be used interchangeably with ferric chloride. Ferric chloride is considered to be more hazardous and has therefore been used for this assessment as a conservative approach.

Chemical product	Required use	DG Class/ Packing Group (PG)	Expected storage quantity	Transport movements (annual)	Combined storage quantity per DG and PG	Exceedance of general screening threshold (Resilience and Hazards SEPP)	Exceedance of transport screening threshold (Resilience and Hazards SEPP)
Sodium Bisulphite	Tertiary and advanced treatment	8/III	12.5kL/ 17t	17			No exceedance
Sodium Hydroxide	Secondary and advanced treatment	8/II	135kL/ 204t	52	157kL/ 247t	Exceeds threshold	No exceedance
Sulphuric acid	Advanced treatment	8/II	10kL/ 18t	13			No exceedance
Hydrogen peroxide	Advanced treatment	8/II	22kL/ 25t	13			No exceedance
Citric acid	Tertiary and advanced treatment	N/A	13.5kL	N/A	13.5 kL	No exceedance	No exceedance
Sucrose	Solids treatment	N/A	135kL	N/A	180 kL	No exceedance	No exceedance
Anti-scalant	Advanced treatment	N/A	6kL	N/A	6 kL	No exceedance	No exceedance
Digesters, cogeneration and waste gas burners							
Biogas (methane)	Solids treatment	2.1/ N/A	12t/ 6000kL	N/A	12t/ 6000 kL	Exceeds threshold	No exceedance

Chemical product	Required use	DG Class/ Packing Group (PG)	Expected storage quantity	Transport movements (annual)	Combined storage quantity per DG and PG	Exceedance of general screening threshold (Resilience and Hazards SEPP)	Exceedance of transport screening threshold (Resilience and Hazards SEPP)
Reverse osmosis chemical area							
Biomate MBC781 (Biocide)	Advanced treatment	8/II	1 kL/ 1.03t	N/A	1 kL/ 1.03 t	No exceedance	No exceedance
Thickening and dewatering facilities							
Liquid polymer emulsion	Solids treatment	N/A	10m³	N/A	10 m³	No exceedance	No exceedance
Powder polymer	Solids treatment	N/A	6m³	N/A	6 m³	No exceedance	No exceedance

22.6 Hazard scenarios

Table 22-4 lists the worst-case hazard scenarios that could occur during operation of the project. Without mitigation all scenarios have potential for off-site impacts. However, with the implementation of the mitigation measures identified in Section 22.8, the risk is expected to be negligible.

Table 22-4: Worst case hazard scenarios

Scenario	Cause	Possible consequence	Mitigated individual[20] and societal risk[21]
Scenario 1 - Loss of containment from biogas system	• catastrophic rupture of gas holder (Scenario 1A) • tank, pipework or flange leak due to a hole or broken valve (Scenario 1B)	• explosion in digester tank or gas holder • fire	Negligible
Scenario 2 - Interaction between incompatible chemicals (Corrosive substances can react with other chemicals if incorrectly stored)	• inadequate storage • corrosion and leaks from the storage tanks	• fire • toxic gas production and potential environmental harm from release	Negligible
Scenario 3 - Leakage of brine into the environment	• pipework or flange leak	• environmental harm from release	Negligible
Scenario 4 - Leakage of treated water into the environment	• pipework or flange leak	• environmental harm from release	Negligible

Biogas is produced in the digester and would be stored for use in co-generation engines. Biogas is mostly methane and could explode if it were to leak from the storage vessel and find an ignition source.

Scenario 1 was investigated further given its potential for off-site impacts. There are 2 scenarios that could lead to the loss of containment from the biogas system:

- Scenario 1A - catastrophic rupture of the biogas holder (digester) resulting in an explosion or fire.
- Scenario 1B - tank, pipework or flange leak due to a hole or broken valve, resulting in a fire.

[20] Individual risk criteria considers the acceptable level of death for a single person from a hazardous incident. This criteria has been calculated in accordance with HIPAP 4. The individual fatality risk was determined to be 9×10^{-7} per year, compared to the relevant criteria of 5×10^{-6} per year. This constitutes a low risk.

[21] Social risk criteria considers the risk of an event to an exposed population. HIPAP 4 includes 3 indicative categories for societal risk: negligible, as low as reasonably possible and intolerable.

The worst-case consequence of Scenario 1A is a vapour cloud explosion. In this event, people located within 120 m of the digester could be injured from explosion overpressure. Heat radiation could also extend off-site onto Devon Street. The street would have a transient population, and it is not expected that people would be exposed to this level of heat radiation for the 30 seconds it would take to result in injury. Off-site building damage, structural damage, and fatalities are not expected to occur as explosion overpressure levels of this scale would not extend beyond the WRRF site. The consequences of Scenario 1B (a fire) would be contained on-site. The likelihood of these scenarios occurring is low (less than twice in every 100,000 years).

The PHA concluded that following implementation of appropriate mitigation measures (Section 22.8), all scenarios would carry a negligible off-site risk to current and future land uses and would have a low probability of occurring. Therefore, the project is unlikely to have any impact on off-site receivers, including on nearby dangerous goods pipelines and a nearby major hazards facility.

The PHA also concluded that the project is unlikely to impact on the proposed development under the Camellia-Rosehill Place Strategy (DPE, 2022b). Therefore, there would be no cumulative hazardous or offensive risks from this project.

22.7 Findings of the Preliminary Hazard Analysis

The PHA concluded that the project would not be classified as either a hazardous industry or offensive industry as defined in Clause 3.2 of the Resilience and Hazards SEPP.

The screening thresholds for corrosive substances (Class 8-II and 8-III) are expected to be exceeded during operation at the WRRF site. Despite this, the likelihood assessment and risk evaluation in the PHA demonstrated that off-site individual and societal risks are low, and compliant with the HIPAP 4 criteria. Through the implementation of appropriate mitigation measures such as storing non-compatible chemicals separately, and in stable containers, this risk can be further reduced. As a result, the project does not classify as a hazardous industry.

22.8 Mitigation measures

The project has been designed to avoid and minimise impacts from dangerous goods and hazards. Sydney Water would manage potentially offensive impacts related to contaminated spoil, air quality (dust) and noise during construction through implementation of the CEMP, and in accordance with relevant management measures identified in those chapters of the EIS. While the PHA has concluded that the project is not an offensive or hazardous industry, Sydney Water would continue to consider options to minimising risk of hazards during detailed design. Project specific mitigation measures that would be implemented to manage potential impacts relating to dangerous goods and hazardous development in addition to these are listed in Table 22-5.

Table 22-5: Dangerous goods and hazardous development management measures

ID	Potential Impact	Mitigation measure	Timing
DG1	Explosion or fire from loss of containment from the biogas system	• design for excess biogas in the waste gas burner to be flared as needed • design for pressure and vacuum relief valves to prevent ruptures of the gas holder (digester) • implement leak detection measures • ensure all electrical equipment in the gasholder is suitably specified for the hazardous area in which it would be installed in accordance with AS/NZ 3000:2007 Electrical Installations (Standards Australia, 2007) and AS/NZ 60079.10.1:2009 | Explosive Gas Atmospheres (Standards Australia, 2009) • hold safety data sheets for all chemicals stored on-site for reference by site personnel and emergency services • undertake routine maintenance • provide operator training • update safety management systems including as a minimum: – fire prevention and protection (including gas detection) – emergency planning and response – site security – traffic planning – hazardous area classification – maintenance.	During detailed design and operation
DG2	Impact to human health - interaction between incompatible chemicals resulting in a fire	In accordance with the NSW Work Health and Safety Regulations 2011: • store chemicals and dangerous goods in accordance with AS 3780-2008 (Standards Australia, 2008) and Australian Dangerous Goods Code (National Transport Commission, 2024) • prepare a manifest of the hazardous chemicals exceeding manifest quantities • prepare an emergency plan that would be provided to NSW Fire and Rescue • display warning placards regarding quantities of hazardous chemicals at any entrance where emergency services may enter the workplace.	During operation

Cumulative impacts

23 Cumulative impacts

The GPOP area is experiencing substantial residential and employment growth. As a result of this growth, there are many residential, commercial and transport infrastructure projects that are expected to be under construction around the same time as the project. Sydney Water recognises that the environment, stakeholders and members of the nearby community may be impacted by multiple projects at the same time. This is known as a 'cumulative impact'. Cumulative impacts may be positive or negative and may be experienced for short or long periods of time.

Repeated and sustained exposure to impacts such as traffic and transport disruptions, or construction noise and vibration can significantly impact people's wellbeing. People may experience construction fatigue because of reduced amenity or disruptions to routines and way of life.

Cumulative impacts may also impact the natural environment. Waterways can experience reduced water quality through the accumulation of surface water run-off from multiple concurrent construction sites. Removal of vegetation may be piecemeal and minor for each project, but vegetation removal by various construction projects may collectively cause a loss of habitat for animals.

Chapters 7 to 22 of this EIS includes an incremental assessment of the project. An incremental assessment involves assessing the impacts of a project against the existing environment (or baseline condition) to understand the impacts of the individual project.

This section assesses the cumulative (combined) impacts of the project with the known likely impacts of other projects occurring in the area. The assessment of potential cumulative impacts has been carried out in accordance with the Cumulative Impact Assessment Guidelines for State Significant Projects (DPE, 2022k).

23.1 Secretary's Environmental Assessment Requirements

Table 23-1 lists the SEARs relevant to cumulative impacts and where in this section they are addressed.

Table 23-1: Project SEARs relating to cumulative impacts

SEARs	EIS section where requirement addressed
Environmental Impact Statement	
The project is described in sufficient detail to enable clear understanding that the project has been developed through an iterative process of impact identification and assessment and project refinement to avoid, minimise or offset impacts so that the project, on balance, has the least adverse environmental, social and economic impact, including its cumulative impacts.	Chapter 3 Chapter 23

SEARs	EIS section where requirement addressed
Assessment and Mitigation of Key Issues and Impacts	
2. For each key issue, the EIS must include a detailed summary of the results of the assessment of the potential impacts of the project undertaken in detailed studies, including: (a) ... (b) ... (c) description of the scale and nature of the predicted impacts, including any cumulative impacts, and whether these impacts will comply with the relevant statutory requirements, standards, performance measures, and goals and criteria set out in relevant guidelines and policies (d) ... (e) ... (f) ... (g) highlight any key linkages between the assessment of different matters or likely cumulative impacts of the project.	Section 23.4

23.2 Assessment methodology

The methodology for assessing cumulative impacts has included:

- preliminary identification of projects planned near the project. Relevant projects were identified through:
  - a review of NSW Major Projects Portal, NSW Planning Portal Application Tracker and local Council websites
  - engagement with key stakeholders
- review of available public information to understand the scope and likely scale of relevant projects
- identification of projects with potential for cumulative impacts
- assessment of cumulative impacts associated with specific technical matters (such as heritage and noise and vibration)
- identification of suitable mitigation measures.

As outlined above, the first step of the cumulative impact assessment involved preparing a preliminary list of relevant projects occurring in impact assessment area. Sydney Water prepared this list with consideration to the criteria in Table 23-2. The preliminary list of relevant projects is included in Table 23-4.

Table 23-2: Criteria for identifying projects with potential for cumulative impacts

Criteria	Summary
Proximity to the impact area	Projects that are proposed or likely to occur within 1 km of the impact area.
Scope	Projects that: 1. are classified as SSD 2. are classified as SSI 3. are classified as designated development under Schedule 3 of the EP&A Regulation (2021) 4. requires assessment under Division 5.1 of the EP&A Act 5. requires an environmental impact statement due to being likely to significantly impact the environment 6. is declared as a controlled action under the EPBC Act 1999.
Status	The stage that a project is in, at the date of preparation of this EIS. This includes: • pre-planning and early scoping • detailed design development • project delivery and construction • operation.
Timing	Projects that are expected to: • carry out construction at the same time as the project, or • commence operation at the same time as the project.

23.3 Review of relevant projects

Several sites across the GPOP area are in the process of being re-zoned, with master planning processes underway. These sites are identified in Table 23-3. These sites currently have little or no public information available on the likely scope, impacts and timing and would involve future development applications for individual projects should the master planning and rezoning processes be successful. Therefore, these sites have not been assessed in Section 23.4 as it is not possible to accurately identify potential cumulative impacts.

Sydney Water would continue to monitor the progress of these projects as the GPOP WCM project progresses and would seek to implement appropriate mitigation measures wherever feasible and reasonable. The locations of the relevant projects are shown in Figure 23-1.

The full preliminary list of projects with potential to have cumulative impacts is included in Greenhouse gas impact assessment. Further assessment of the relevant cumulative impacts is included in Section 23.4.

Table 23-3: Sites undergoing master planning process

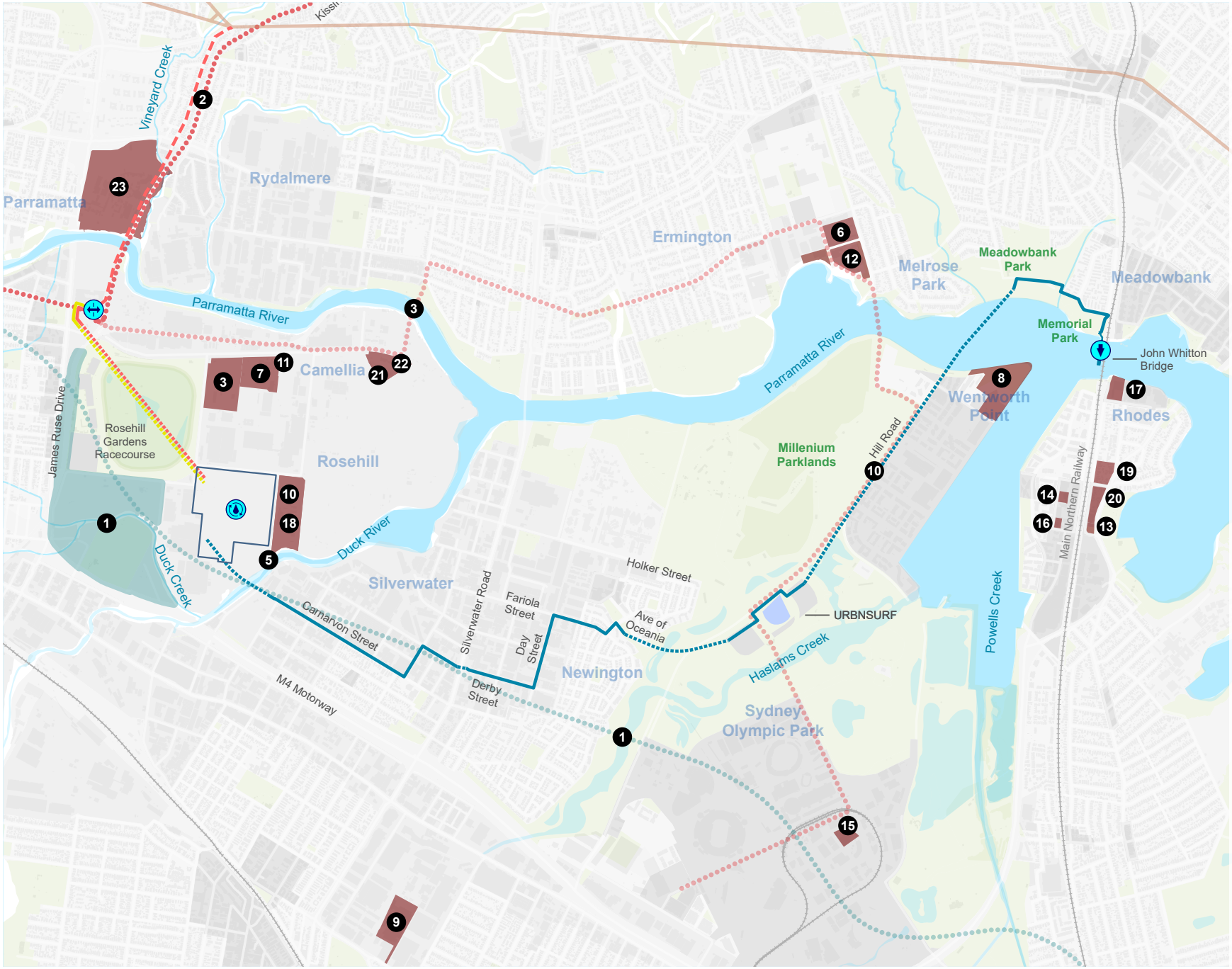
Site	Summary of potential cumulative impacts
Camellia-Rosehill Place Strategy (DPE, 2022b)	• flooding.
Sydney Olympic Park Masterplan 2030 (SOPA, 2018)	• non-Aboriginal heritage • landscape and visual amenity.
Draft Sydney Olympic Park Masterplan 2050 (SOPA, 2024)	• non-Aboriginal heritage • landscape and visual amenity.
Meadowbank Park and Memorial Park Masterplan (City of Ryde Council, 2019)	• social.

Table 23-4: Summary of relevant projects

Reference	Project	Summary of potential cumulative impacts
	State significant infrastructure	
1.	Sydney Metro West - Rail infrastructure, stations, precincts and operations (SSI-22765520) (referred to as SMW Stage 3)	• traffic and transport • noise and vibration • landscape and visual amenity • air quality • non-Aboriginal heritage (visual) • waste • contamination.
2.	Parramatta Light Rail Stage 1 (SSI-8285)	• no cumulative impacts.
3.	Parramatta Light Rail Stage 2 (SSI-10035) (referred to as PLR Stage 2)	• traffic and transport • noise and vibration • air quality • non-Aboriginal heritage (visual) • landscape and visual amenity • waste • biodiversity.

Reference	Project	Summary of potential cumulative impacts
	Other infrastructure works	
4.	Hill Road Project (Transport for NSW, 2025a)	• traffic and transport.
5.	Duck River Nature Trail (City of Parramatta Council, 2025b)	• aquatic biodiversity • air quality • non-Aboriginal heritage (visual).
6.	Melrose Park Public School redevelopment and new public preschool	• social.
	State Significant Developments	
7.	6 Grand Avenue Multi-Level Warehouse Rosehill (SSD-55522478)	• no cumulative impacts.
8.	9 Burroway Road, Wentworth Point - Mixed Use Development (SSD-72816207)	• biodiversity.
9.	Boorea Street Warehouse & Distribution Centre (SSD-36464788)	• no cumulative impacts.
10.	Central Sydney Industrial Estate (SSD 10459 Mod 5)	• no cumulative impacts.
11.	Grand Avenue Data Centre Expansion, Rosehill (SSD-53338465)	• air quality.
12.	Mixed Use Development with In-fill Affordable Housing - Melrose Park South – East (SSD-71558962)	• non-Aboriginal heritage (visual) • biodiversity • contamination.
13.	Mixed-use development including in-fill affordable housing - 9 Blaxland Road, Rhodes (SSD-67424709)	• non-Aboriginal heritage (visual).
14.	Mixed-use development with affordable housing – 23-29 Marquet Street, Rhodes (SSD-67636458)	• contamination.
15.	Sydney Olympic Park Sites 2A and 2B - Serviced apartment tower and commercial (SSD-21356591)	• no cumulative impacts.
16.	Mixed-use development with affordable housing - Marquet and Mary Street, Rhodes (SSD-71999463)	• no cumulative impacts.
17.	Mixed-use development with in-fill affordable housing - Leeds Street, Rhodes (SSD-67419241)	• no cumulative impacts.

Reference	Project	Summary of potential cumulative impacts
18.	Downer Rosehill Sustainable Resource Centre Mod 3 - Changes to Reconomy Facility and additional waste input (SSD-10459-Mod-3) and Downer Rosehill Sustainable Resource Centre Mod 4 – DSRRC throughput increase (SSD-10459-Mod-4)	• air quality • traffic and transport.
19.	Residential development with affordable housing – Llewellyn Street, Rhodes (SSD-67508739)	• visual • contamination.
20.	Rhodes East Mixed Use Seniors Housing Development (SSD-68363729)	• no cumulative impacts.
21.	Rosehill Resource Recovery Facility (SSD-77870968)	• air quality • visual • contamination.
22.	SAMI - Camellia - Bitumen Plant Redevelopment (SSD-65654458)	• air quality • visual • contamination.
23.	WSU Indigenous Centre of Excellence (SSD-64916225)	• biodiversity (planted native veg only) • non-Aboriginal heritage (temporary indirect).



1 Sydney Metro West
2 Parramatta Light Rail Stage 1
3 Parramatta Light Rail Stage 2
4 Hill Road Project
5 Duck River Nature Trail
6 Melrose Park Public School redevelopment and new public preschool
7 6 Grand Avenue Multi-Level Warehouse Rosehill
8 9 Burroway Road, Wentworth Point - Mixed Use Development
9 Boorea Street Warehouse & Distribution Centre
10 Central Sydney Industrial Estate SSD 10459 Mod 5
11 Grand Avenue Data Centre Expansion, Rosehill
12 Mixed Use Development with In-fill Affordable Housing - Melrose Park South - East
13 Mixed-use development including in-fill affordable housing - 9 Blaxland Road, Rhodes
14 Mixed-use development with affordable housing – 23-29 Marquet Street, Rhodes
15 Sydney Olympic Park Sites 2A and 2B - Serviced apartment tower and commercial
16 Mixed-use development with affordable housing - Marquet and Mary Street, Rhodes
17 Mixed-use development with in-fill affordable housing - Leeds Street, Rhodes
18 Mod 3 - Changes to Reconomy Facility and additional waste input, Mod 4 - DSRRC throughput increase
19 Residential development with affordable housing – Llewellyn Street, Rhodes
20 Rhodes East Mixed Use Seniors Housing Development
21 Rosehill Resource Recovery Facility
22 SAMI - Camellia - Bitumen Plant Redevelopment
23 WSU Indigenous Centre of Excellence

Camellia-Rosehill WRRF
Camellia pumping station
River release structure

Proposed pipelines
Brine pipeline
Transfer pipeline
River release pipeline

Pipeline construction method
Open trench
Trenchless
Relining

Nearby project
Parramatta Light Rail Stage 1
Parramatta Light Rail Stage 2
Sydney Metro West
Sydney Metro West compound

Northern Suburbs Ocean Outfall Sewer (NSOOS)
Railway

Figure 25-1 Cumulative impacts

0 500 1000 1500 m

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2025
Scale: 1:32,000 @ A4
GDA2020 MGA Zone 56

N

23.4 Cumulative impact assessment

This section provides an assessment of potential cumulative impacts that may be experienced during construction and operation of the project with the exception of those aspects for which no cumulative impacts are expected. This includes Aboriginal heritage, groundwater, hazards and dangerous goods, human health and climate change.

23.4.1 Surface water and flooding

There is potential for cumulative surface water and cumulative flooding impacts in the Camellia-Rosehill precinct.

Projects identified as being constructed around the same time are expected to implement appropriate mitigation measures to minimise surface water runoff from construction sites which may impact local waterways. Provided these projects implement effective measures, impacts are anticipated to minor.

Flooding impacts as a result of the Camellia-Rosehill Place Strategy (DPE, 2022b) are currently being assessed by DPHI. It is expected that the GPOP WCM project would have a minor contribution to cumulative flooding impacts in the precinct. Sydney Water would continue to work with DPHI to manage flooding in the Camellia-Rosehill Precinct.

23.4.2 Soils and contamination

There is potential for cumulative impacts around contamination due to the number of projects carrying out ground disturbing construction in the vicinity of the project. The impact assessment area is known to contain contaminated land where acid sulfate soils, asbestos material, lead, and hydrocarbons are present. A number of projects are identified as being constructed on contaminated land during or around the same time as the project. They are:

- Rosehill Resource Recovery Facility
- Mixed Use Development with In-fill Affordable Housing - Melrose Park South – East
- SAMI - Camellia - Bitumen Plant Redevelopment
- Residential development with affordable housing – Llewellyn Street, Rhodes
- Mixed-use development with affordable housing – 23-29 Marquet Street, Rhodes
- PLR Stage 2
- SMW Stage 3
- Duck River Nature Trail
- Hill Road Project.

It is expected that if the above projects implement appropriate mitigation measures for the handling and disposal of contaminated material that cumulative impacts from contamination would be negligible to minor.

23.4.3 Biodiversity

The main potential for cumulative terrestrial biodiversity impacts relate to the combined impacts of the project with current and future development projects in the study area. The various projects that are underway and proposed would result in the removal of mainly planted vegetation within existing disturbed and developed areas. Cumulatively, these projects would result in a loss of biodiversity values. However, the biodiversity values in this area are associated with an already modified environment with limited natural biodiversity values.

There were 3 projects identified with the potential to result in cumulative impacts to PCTs, TECs and threatened fauna also impacted by this project. These projects include:

- PLR Stage 2
- Hill Road Project
- Mixed Use Development with In-fill Affordable Housing - Melrose Park South – East

Impacts are summarised in Table 23-5. These projects together with this project would seek to maintain biodiversity values through retention and restoration where possible. There is also potential for cumulative impacts from the Duck River Nature Trail (Stage 2 and 3), however no information about potential impacts was available at the time of EIS preparation.

Table 23-5: Summary of cumulative terrestrial biodiversity impacts

Plant Community Type	Parramatta Light Rail Stage 2 (SSI-10035) (ha)	Hill Road Project (TfNSW) (ha)	Mixed Use Development with In-fill Affordable Housing - Melrose Park South – East (SSD-71558962) (ha)	This project (ha)	Cumulative impact (ha)
PCT 4028 Estuarine Swamp Oak Twig-rush Forest	-	-	0.04	0.06	0.10
Threatened ecological community (BC Act)					
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South-east Coast Bioregions EEC	0.47	-	0.04	0.06	0.57
Threatened fauna (species credit species)[22]					

[22] The Curlew Sandpiper and Bar-tailed Godwit are migratory shorebird species that forage on exposed shoreline areas in Parramatta River. Whilst habitat for these species is mapped at the impact assessment area, the impact assessment area in Parramatta River consists of a sandstone wall and does not actually contain suitable foraging habitat for these species. As these species are unlikely to use the impact assessment area within Parramatta River, impacts to these species are unlikely (refer to Chapter 11 (Terrestrial biodiversity)).

	Parramatta Light Rail Stage 2 (SSI-10035) (ha)	Hill Road Project (TfNSW) (ha)	Mixed Use Development with In-fill Affordable Housing - Melrose Park South – East (SSD-71558962) (ha)	This project (ha)	Cumulative impact (ha)
Calidris ferruginea Curlew Sandpiper (Breeding)	0.58	-	-	2.93	3.51
Limosa lapponica Bar-tailed Godwit	0.58	-	-	2.93	3.51
Litoria aurea Green and Golden Bell Frog	1.49	-	-	0.06	1.55
Myotis macropus Southern Myotis	2.27	0.67	-	0.18	3.12

23.4.4 Air quality and odour

There is the potential for cumulative air impacts during construction of the following projects located near the GPOP WCM project impact area:

- SMW Stage 3
- PLR Stage 2
- Duck River Nature Trail
- Rosehill Resource Recovery Facility
- SAMI - Camellia - Bitumen Plant Redevelopment.

Simultaneous construction activity could lead to higher levels of dust in the local area. Due to the proximity and large scale of works, the SMW Stage 3 or PLR Stage 2 projects would have the highest likelihood for cumulative impacts. For example, dust from vehicles tracking onto Unwin Road from both the WRRF worksite and SMW Clyde site. It is expected that with the implementation of mitigation measures identified in Chapter 12 (Air Quality), cumulative air impacts would be minimised.

The cumulative air impacts associated with surrounding projects are considered in Table 23-6 for operation. Table 23-6 orders the proposed projects based on their proximity to the WRRF.

Table 23-6: Operational cumulative air impacts

Project	Potential cumulative impacts
Camellia – Rosehill Place Strategy	Existing air quality and odour sources within the precinct were considered. Due to the different characteristics of the existing odour sources modelling of the WRRF was undertaken in isolation due to uncertainty of cumulative impacts. The project was found to be compliant and below criteria at all sensitive receptors, including potential future receptors as indicated in the Strategy.
Downer Rosehill Sustainable Resource Centre - Changes to Reconomy Facility and additional waste input	The Downer Centre comprises an asphalt plant, reclaimed asphalt pavement facility and a road sweepings recycling facility. Changes to the facility would allow an increase in the processing capacity. During the heating or mixing of bitumen odours can be emitted due to the volatilisation of organic compounds. This could contribute to cumulative odour impacts. The characteristics of the odour sources from the WRRF would be considerably different to those from the Downer Centre and would not contribute to cumulative odour impacts.

Project	Potential cumulative impacts
Grand Avenue Data Centre Expansion, Rosehill	The operation of the Centre could contribute to NO_2 levels in the area. While unlikely, during a power failure the Centre would rely on diesel generators which are known to produce large volumes of NO_2, potentially exceeding the criteria. NO_2 modelling of the cogeneration units within the Camellia – Rosehill WRRF show that the WRRF does not exceed the criteria. If the worst-case power failure does occur any exceedance of the NO_2 criteria would be from the operation of the diesel generators and the contribution of the WRRF operation is considered negligible.
SAMI - Camellia - Bitumen Plant Redevelopment	As above, bitumen plants generate volatile organic compounds that can be odorous, which could have cumulative odour impacts with the Camellia – Rosehill WRRF. Consideration of the odour characteristics of each odour source determined that the characteristics were different and unlikely to contribute to cumulative impacts.

23.4.5 Noise and vibration

The projects likely to contribute to cumulative construction noise are:

- SMW Stage 3
- PLR Stage 2.

The footprint of these projects partially aligns with the GPOP WCM project's impact area at the WRRF site and along the brine (relining section) and river release pipeline alignments. At these locations impacts from construction noise associated with the GPOP WCM project are lower than other aspects of the project. Noise from the concurrent projects is unlikely to increase noise levels on those receivers most impacted by the GPOP WCM project, particularly those located in NCAs 5 to 7.

There is the potential for cumulative construction traffic noise near Unwin Street as both the WRRF site and works associated with SMW Stage 3 are both located on Unwin Street. It is anticipated that earthworks and tunnelling at the SMW Clyde site would be complete prior to works at the WRRF commencing. While construction of SMW would be ongoing it is expected that traffic noise would reduce during the next stage of construction.

The construction of this project alongside construction works associated with SMW Stage 3 and PLR Stage 2 are unlikely to contribute to construction fatigue on nearby receivers. It is noted that the period of construction of both the Camellia-Rosehill WRRF and SMW Stage 3 are the same, so the additional construction associated with the WRRF would not increase duration of construction works in the precinct. At Meadowbank Park, receivers may be impacted by this project and bridge piling works associated with PLR Stage 2. However, bridge piling was scheduled to commence in 2025 and last a period of 19 weeks. It is likely that these works would be complete prior to the commencement of the GPOP WCM project and would allow residences to experience a period of respite.

Other projects in the proximity of the GPOP WCM impact area may contribute to cumulative construction noise impacts. The NVIA (Appendix N) describes that particularly noisy activities from 2 concurrent projects could raise noise levels by 3 dB(A). However, when a receiver is impacted by 2 projects at the same time, only one source would be dominant and noise levels would only raise slightly if at all.

The implementation of mitigation measures identified in Chapter 13 (Noise and vibration) would help to ensure that the potential for cumulative construction noise is minimised.

Cumulative operational noise was assessed in accordance with the NPfI, which require consideration of existing amenity levels to ensure that new industrial activities remain within the recommended noise levels of an area. The predicted operational noise of the Camellia-Rosehill WRRF did not exceed trigger values (see Chapter 13 (Noise and vibration)).

23.4.6 Traffic, transport and access

The projects likely to contribute to cumulative traffic, transport and access impacts are:

- SMW Stage 3
- PLR Stage 2

Both projects would have active construction sites in the Camellia-Rosehill precinct and in Sydney Olympic Park.

In Camellia-Rosehill, peak construction at the Sydney Metro site is expected to occur between Q3 2025 and Q2 2028. The main construction works for Stage 2 of PLR would also occur between Q2 2025 and Q2 2029. The precinct is geographically constrained with access only available via Wentworth Street to the south, and Grand Avenue to the west. Wentworth Street is a construction vehicle haulage route for SMW and Grand Avenue is a construction vehicle haulage route for PLR Stage 2.

The assessment of construction traffic impacts included the peak construction vehicle movements outlined in Parramatta Light Rail Stage 2 – Technical Paper 2 (Transport for NSW, 2023) and Sydney Metro West (Rail infrastructure, stations, precincts and operations) – Technical Paper 2 (Sydney Metro, 2022a). As of October 2025, at the date of preparation of this assessment, the intersection of James Ruse Drive and Grand Avenue is operating at a LoS E in the AM peak and F in the PM peak. The intersection of Wentworth Street and Parramatta Road are currently operating at a LoS F during the AM and PM peak periods. As shown in Table 23-7, by 2028, both intersections are expected to perform at a LoS F both with and without the project.

Cumulative traffic impacts are expected at Camellia-Rosehill. These impacts are expected to be minor and temporary for the duration of construction.

Table 23-7: Summary of SIDRA modelling results (LoS)[23]

		Existing conditions (2025)	Future conditions (2028 – without project)	Future conditions (2028 – with project)
Hassall Street/ James Ruse Drive/ Grand Avenue	AM Peak	E	F	F
	PM Peak	F	F	F
Wentworth Street/ Parramatta Road	AM Peak	F	F	F
	PM Peak	F	F	F

23.4.7 Non-Aboriginal heritage

23.4.7.1 Wetlands (Parramatta LEP Item No. I011)

The Wetlands are a locally listed heritage item that covers a large area along the Parramatta River between Parramatta and Ermington. The item's listing also covers some surrounding waterways including Duck River which travels into Rosehill. Primarily the item includes mangrove plant species along with saltmarsh complex.

The timing of the Mixed Use Development at Melrose Park is not currently known. Should construction of the project occur concurrent to construction of the GPOP WCM project, there is potential for temporary cumulative visual impacts. Given that the brine and transfer pipeline and river release pipeline would be mostly below-ground and Meadowbank Park would be reinstated upon completion of construction, there would be no permanent cumulative visual impacts to the Wetlands.

Stage 3 of the Duck River Nature Trail project would also have a permanent visual impact and permanent direct (physical) impact to the Wetlands. Construction is expected to occur between 2026 and 2028 and would likely require the removal of some vegetation within the heritage listed area. The GPOP WCM project is not expected to have any impacts on Duck River or the Wetlands. However, should construction of the Duck River Nature Trail project overlap with construction of the WRRF in 2028, there may be temporary cumulative visual impacts from both construction activities.

The Wetlands intersect and are adjacent to the SMW Clyde site. The Sydney Metro West (Rail infrastructure, stations, precincts and operations) – Environmental Impact Statement (Sydney Metro, 2022b) identified a neutral impact to the wetlands as a result of construction and operation of SMW.

[23] The level of service (LoS) of an intersection is measured by the average delay per vehicle (seconds/ vehicle). A LoS measurement of 'E' equates to a 57 to 70 second delay to a vehicle travelling through an intersection. A measurement of 'F' represents a delay of greater than 70 seconds. Acceptable intersection performance is considered to be between a LoS 'A' (delay of less than 14 seconds), and a LoS 'C' (delay of 29 to 42 seconds).

23.4.7.2 Rydalmere Hospital Precinct (SHR #00749)

No cumulative impacts to the heritage significance of the Rydalmere Hospital Precinct are expected. The WSU Centre for Indigenous Excellence is due to be completed in 2027, prior to construction of the GPOP WCM project. The Centre would be located to the north of the precinct on an existing carpark and adjacent to Victoria Road. The development has been designed to minimise impacts to significant buildings, archaeological features, view corridors and heritage landscapes.

23.4.7.3 Sewage pumping station 67 (Camellia pumping station) (SHR #01643)

There would be minor temporary visual cumulative impacts from PLR Stage 2. The construction program for PLR Stage 2 and the GPOP WCM project would overlap. There would be potential for temporary disruptions to views of the pumping station from both projects at multiple viewpoints. This cumulative impact would be temporary for the duration of construction and is not expected to reduce the overall significance of the item. No cumulative impacts to the heritage significance of the item are expected during operation of both projects.

23.4.8 Visual and landscape

During construction of the project in Camellia-Rosehill there would be some cumulative landscape and visual amenity impacts. These impacts would primarily be associated with construction of:

- SMW Stage 3
- PLR Stage 2
- Rosehill Resource Recovery Facility.

Cumulative visual impacts are expected to be minor given the highly industrial landscape of the area. Temporary cumulative landscape and visual amenity impacts are expected at the Camellia pumping station. This would occur when construction for PLR Stage 2 is occurring concurrently to work at the pumping station.

There is potential for cumulative night-time visual impacts to be experienced during operation of the project due to the use of artificial lighting. This is due to the site being located in the vicinity of James Ruse Drive and the M4 motorway which have high volumes of lighting. The site is also close to the SMW Clyde site which is expected to operate 24 hours a day, 7 days a week. The operational lighting requirements would be confirmed for the Camellia-Rosehill WRRF during detailed design. They are typically designed to be low impact and contained within the site for safety and security purposes.

23.4.9 Social and economic

The project has the potential to result in cumulative social impacts. This is mainly due to a high number of construction projects, many of which would drive land use change.

23.4.9.1 Way of life and livelihoods

During SIA engagement a range of stakeholders commented on concerns relating to cumulative traffic and access impacts. As part of PLR Stage 2 there would be permanent changes to local traffic networks. These changes would be occurring at the same time as construction of the GPOP WCM project. There is potential that road, footpath and carpark closures for the GPOP WCM project may contribute to cumulative traffic, transport and access impacts experienced by businesses and the community. Sydney Water would continue to engage with TfNSW, PLR and the impacted community to avoid and minimise these impacts wherever possible. The community and businesses in Camellia-Rosehill and Sydney Olympic Park may also experience cumulative impacts from construction traffic (particularly heavy vehicles) travelling to and from construction sites. This may increase travel times, alter travel patterns and discourage people from taking certain travel routes.

The Meadowbank Park and Memorial Park Masterplan (City of Ryde Council, 2019) indicates that both Memorial Park and Meadowbank Park would receive significant upgrades over the next 20 years. Upgrades to the netball courts and amenities building in Meadowbank Park are planned for late 2025. Should these upgrades run late, or additional improvement works be carried out concurrent to the GPOP WCM project, there would be potential for cumulative social impacts resulting in the loss of recreational space. Melrose Park Public School is expected to undergo significant upgrades, with completion expected in 2027. During consultation undertaken for the SIA, a school representative indicated concern that if projects overlap, the school may not be able to access their own sporting facilities or Meadowbank Park, creating a lack of open space for school sport. If construction work is likely to overlap, Sydney Water would liaise with City of Ryde Council and Meadowbank Park Public School to understand specific stakeholder needs and ensure access to some recreational space is maintained during construction.

23.4.9.2 Amenity and sense of place

While there would be some cumulative visual impacts experienced in the Camellia-Rosehill precinct there is expected to be minimal long-term changes to the amenity and sense of place of the area. This is due to the area's current and future industrial and commercial land uses.

Around Meadowbank, there is potential that residents and the community would be vulnerable to experiencing cumulative social impacts due to reduced amenity and sense of place. This is largely attributed to the large amount of urban development occurring in the area. Engagement carried out for the SIA indicated that some residents around Wentworth Point and Meadowbank are currently experiencing construction fatigue. Cumulative social impacts may occur as a result of the GPOP WCM project, PLR Stage 2, SMW and various high density mixed use and residential developments. The measures in Appendix E (Mitigation Measures) to mitigate specific issues (such as noise, traffic and dust) would also help reduce cumulative impacts to amenity and sense of place.

23.4.10 Waste

The capacity of nearby waste facilities may be impacted given the number of other projects near the GPOP WCM project. Waste facilities have not yet been selected for many of these projects since they are mostly in early stages of design development. Given the uncertainty around which waste facilities would be used and the potential for cumulative impacts, the Waste Management Impact Assessment (Appendix U) has identified a number of waste recycling and disposal facilities within about 35 km of the project. Therefore, alternative waste facilities could be used to minimise capacity concerns of nearby waste facilities. The project is also employing various recycling and reuse strategies, as outlined in Chapter 21 (Waste Management) to ensure cumulative waste impacts are limited.

23.5 Mitigation measures

Sydney Water would manage potential cumulative impacts from the project in accordance with the mitigation measures in Appendix E (Mitigation measures).

In line with the process outlined in Chapter 5 (Engagement), Sydney Water would continue to develop the project CSEP throughout detailed design. The CSEP allows Sydney Water to ensure detailed construction methodologies and management are designed with input from those directly affected.

As the project progresses through detailed design and construction, Sydney Water would continue to monitor the progress of the projects in the Greenhouse gas impact assessment. Where reasonable and feasible, Sydney Water would consider options to adapt construction methodologies to minimise cumulative impacts in response to community and stakeholder feedback.

Justification of the project

24 Justification of the project

24.1 Project need

Currently, 1.7 million people in Sydney are serviced by the northern suburbs wastewater system. This system consists of the NSOOS (built in the 1930s) and North Head WRRF. Forecasted population growth, including in the GPOP will see this system reach capacity by 2031. This project is needed to:

- support population growth in Sydney by providing a wastewater service that meets this new demand, and
- maintain operational compliance of the existing northern suburbs wastewater system by diverting flows from this system.

In addressing this need, this project provides the opportunity to deliver a more sustainable solution, moving from ocean discharges to keeping water within the local environment. It also provides the opportunity to build resilience and adapatability for the future as needs and demands change for water supply.

24.2 Actions in design to avoid or minimise project impacts

While it is not possible to avoid all impacts to the environment and community, the scope of work described in this EIS reflects the actions taken to avoid and minimise these impacts. This was completed without compromising the project objectives (Section 1.7) including keeping in mind that Sydney Water needs to deliver a cost effective service to the community.

From the outset, project alternatives considered balanced cost and non-cost criteria including environmental constraints, community impacts. Next, the location of the WRRF was chosen not only for operational and strategic alignment, but also to avoid sites with key ecological habitat constraints and locating the WRRF away from residential areas. The current preferred pipeline alignments were also chosen with consideration to avoiding and minmising impacts to the environment and community. Section 2.4 provides more detail on this.

Once the preferred options were decided, impacts were further reduced by refining the impact area to avoid environmentally sensitive areas (e.g. mangrove and saltmarsh communities), avoiding areas of environmental risks during construction (e.g. contaminated lands) and minimising impacts to the community (e.g. design adjustments to avoid cumulative construction impacts). Specific examples are provided in Table 24-1 below.

Table 24-1: Key actions taken in design to avoid or minimise impacts

Location	Action	Environmental aspect with avoided or minimised impacts
WRRF	Locating the OCU away from the site boundary and covering odour sources	• air quality.
	Design retains overland flow path along western boundary	• flooding.

Location	Action	Environmental aspect with avoided or minimised impacts
	Drainage to be installed along northern boundary to improve existing localised flooding	• flooding.
	Renewable energy generation to supplement WRRF operations	• sustainability.
	Locating noisy equipment inside buildings where feasible	• noise and vibration.
	Selection of chemicals with lower potential to cause incidents or environmental harm	• dangerous goods and hazardous development.
	Advanced water treatment, minimising risks related to releases.	• water quality.
Pipelines (all)	Sizing some pipelines/ pipeline sections to accommodate future flows	• all environmental aspects.
	Trenchless construction under waterways and ecologically sensitive sites (Narawang and Nuri wetlands)	• water quality • aquatic ecology • biodviersity.
	Trenchless construction under major roads, Victoria Road and Silverwater road, avoiding road closures	• traffic, transport and access.
	Trenchless methods and sheet piling for selected locations, reducing groundwater interaction	• groundwater.
	Moving project boundaries for pipeline sections around native vegetation including TECs, designing to follow roads where possible, compounds in open space areas	• biodiversity.
	Avoiding known and actively managed contaminated lands	• water quality • soils • waste.
	Designing to avoid 6 identified AHIMS sites within 200 m of the project	• heritage.
	Designing to avoid interacting with Sydney Metro West tunnels and PLR tracks	• cumulative impacts • traffic, transport and access.
Pipeline – brine and transfer	Moving the alignment (and associated compound site) to avoid non-Aboriginal and Aboriginal heritage items	• heritage.

Location	Action	Environmental aspect with avoided or minimised impacts
	Trenchless construction to avoid impacts on Rosehill Racecourse	• social • traffic, transport and access.
	Use of existing pipeline for relining section of brine pipeline	• biodiversity • transport and traffic • social • air quality • water quality.
Pipeline – river release	Location of the barometric loop near an existing toilet block in consulation with Council	• visual • social.
	Trenchless construction under Hill Road, minimising construction fatigue for local residents	• social • traffic, transport and access • noise.
	Re-locating compound site in Meadowbank Park following consulation with City of Ryde Council	• social.
	Designing to avoid built heritage features in Memorial Park	• heritage.
	Diffuser design angle adopting 30° orientation based on iterative design and model trials	• water quality • water- geomorphology • social.
	Sufficient depth of trenchless underbore to avoid Narawang and Nuri constructed wetlands	• groundwater • biodiversity.
	Use of a geosynthetic fabric (or similar performing device)	• water quality • water- geomorphology.
	Aerial crossings over concrete lined channels	• water quality • aquatic ecology.
	Adopting night works along Carnarvon Street to avoid impacts to business	• traffic, transport and access • noise and vibration.

Location	Action	Environmental aspect with avoided or minimised impacts
	Trenchless construction under Duck River, Parramatta River, Narawang wetlands and Nuri wetlands	• biodviersity • aquatic ecology • water quality.

In addition to the above actions taken, the mitigation measures in Appendix E (Mitgation measures) would further reduce impacts that cannot be avoided or minimised.

It is noted that the impacts assessed in this EIS are based on the scope of work within the impact assessment area which provides location flexibility during the detailed design and construction phases. This means a conservative assessment of direct impacts has been undertaken, however practically, direct impacts (such as to biodiversity and traffic) may be further minimised within the impact assessment area where compatible with construction requirements.

24.3 Strategic alignment

The project is supported by key government plans and policies as listed below. Additional information is provided in Section 2.1.

The Commonwealth Infrastructure Priority List (Infrastructure Australia, 2025)

Infrastructure Australia identifies '*GPOP growth area enabling infrastructure'* on this priority list. The list acknowledges that water security and supply will be challenged by climate variability, population growth and ageing assets. It also acknowledges that there are growing community expectations for waterway health improvements and water demands for greening and cooling. The project is infrastructure that will enable population growth in the GPOP. The project would benefit local waterway health and is adaptable in the future for other water uses.

Staying Ahead: State Infrastructure Strategy 2022 – 2042 ((Infrastructure NSW, 2022)

This strategy sets out infrastructure priorities for the State. These includes servicing growing communities and integrated water cycle management approaches for increased water resilience. The project will enable housing and commercial development in the GPOP and surrounding transport orientated development precincts. The project supports the need for increased resilience by providing a solution that is adaptable for other future water uses, including the growing water demands from digital infrastructure needs.

Greater Sydney Water Strategy 2022 (DPE, 2022c)

This strategy charges the direction fo sustainable and resilient water services to service growing Sydney.

The project aligns with this strategy by providing an adaptable solution for future water needs while meeting infrastructure needs in the immediate term for the growing city.

Greater Sydney Region Plan – A Metropolis of Three Cities (Greater Sydney Commission, 2018a)

GPOP is identified in this plan as integral to achieving the vision for the Central River City. To enable a better connected and more competitive city, investment in infrastructure to develop GPOP is necessary. The project supports the directions set out in the Greater Sydney Region Plan by providing wastewater infrastructure to service the future housing and commercial development in GPOP, contributing to productivity and economic objectives in this plan.

Our Greater Sydney 2056 – Central City District Plan (Greater Sydney Commission, 2018b)

This plan sets the planning priorities and actions to support development and productivity in the GPOP. Planning Priority C19 identifies the opportunity that GPOP presents a precinct-scale approach to change the way water resources are managed. The project is supported by this plan as the project shifts from coastal treatment and ocean discharge of wastewater as identified in the plan.

The Sydney Plan (Draft) (DPHI, 2025a)

This plan (once finalised) will replace the Greater Sydney Region Plan – A Metropolis of Three Cities (Greater Sydney Commission, 2018a) and associated district plans. The plan outlines a need for sustainable and resilience integrated water cycle management solutions. The project's key objectives are supported by this plan.

A City Supported by Infrastructure – Place Based Infrastructure Compact Pilot (Greater Sydney Commission, 2019)

The project is supported by this strategic planing model which recognises the need for a new WRRF with the ability to provide recycled water to support the GPOP precincts.

Camellia-Rosehill Place Strategy (DPE, 2022b)

This strategy guides renewal of the Camellia-Rosehill precinct. It plans for a thriving own centre and new homes supported by infrastructure, while retaining industrial land uses. The siting of the WRRF within the industry and employment hub of the precinct aligns with the strategy and enables efficient servicing of housing and commercial development in the GPOP along with the potential for integrated water management solutions.

DUBA, BUDU, BARRA – Ten Steps to a Living River – The Parramatta River Masterplan (Parramatta River Catchment Group, 2018)

This Mastplan establishes the actions required to achieve a swimmable Parramatta River by 2025. Sydney Water is a long-standing member of the Parramatta River Catchment Group. The project builds on an existing pipeline of investment contributed by Sydney Water to improve the water way health and recreational outcomes for the Parramatta River.

24.4 Statutory compliance

Chapter 4 and Appendix C (Statutory compliance) discuss all relevant Commonwealth, State, and local statutory requirements for which the project complies.

The project is SSI in accordance with Division 5.2 of the EP&A Act and an application was submitted to the Minister for Planning and Public spaces to declare the project to be critical SSI. This EIS addresses the SEARs issed on 24 September 2024.

The project is permitted without consent in accordance with Division 18 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP). See Chapter 4 (Statutory compliance) for details.

The project will not have a significant impact on MNES listed under the EPBC Act. Due to the low potential for impact to MNES, the project has not been referred to the Commonwealth Minister for the Environment.

24.5 How the project addresses community views

Sydney Water has carried out community and stakeholder engagement specific to the project. The EIS addresses the feedback and questions raised to date. There would be ongoing opportunities to respond to additional community feedback and questions as the project progresses. Regular engagement activities may influence detailed design or how mitigation measures are delivered – for example, specific feedback on how regularly a footpath is used may influence when and for how long it is closed during construction.

Some impacts have been avoided or minimised through project design. In addition, a range of mitigation measures are proposed to manage residual impacts, including for issues raised in community engagement. Appendix E (Mitigation measures) summarises these mitigation measures.

More information is provided in Chapter 5 (Engagement) and Appendix D (Community engagement table).

Table 24-2: How the project addresses community views

View	Stakeholder	How this view was addressed
Cumulative impacts to the community, given multiple construction projects in the area	PLR, SOPA, Sydney Metro, City of Parramatta Council, TfNSW	Trenchless drilling has been adopted in the design to avoid cumulative impacts with PLR construction and Council upgrades planned for Hill Road. At Rosehill, the pipeline alignment is designed to avoid interaction with Sydney Metro West tunnels. Sydney Water would to engage further with key stakeholders as the design progresses.

View	Stakeholder	How this view was addressed
Impact of river releases on public health and support for solutions that improve water quality.	PRCG, PRaWN, City of Parramatta Council, City of Ryde Council, Melrose Park Football Club, Melrose Park Primary School, Concord Sailing Club, Yaralla Sea Scouts, Epping Scouts Club, EPA	The project has selected a deeper release point to reduce potential impacts. The project has also prepared river release FAQs on the project webage to build community awareness.
Property impacts in relation to flooding	Sydney Metro, City of Parramatta Council, Downer Rosehill Sustainable Resource Centre, Goodman, NSW DCCEEW, SES, DPHI	The project has been designed to avoid causing adverse flood impacts to neighbouring properties. Sydney Water would continue to liaise with key stakeholders throughout the detailed design phase of the project.
Reduced access to parks, disruption to sporting and recreational activities including at Meadowbank Park and in the Parramatta River, public safety during construction.	City of Parramatta Council, City of Ryde Council, Primary School Sports Association – Ryde Zone, Meadowbank Park User Group committee, local residents.	Original proposed site compound location has been changed to reflect feedback from City of Ryde Council. Construction methods adjustments in response to feedback also include limiting the compound size, co-locating the pipeline with existing waterway crossings to reduce impacts, using open trenching methods to construct faster (than trenchless methods). Consultation will continue to understand peak park usage periods, as well as public amenity enhancements.
Access impacts ot business due to loss fo parking or construction traffic.	URBNSURF, local businesses along Carnarvon Street, James Ruse Drive and near the future Camellia- Rosehill WRRF.	Along Carnavon Street, nightworks are proposed to minimise impacts to businesses. Trenchless construction under Rosehill Gardens Racecourse will avoid impacts to events at this location.

24.6 Scale and nature of impacts

The key environmental, social and economic impacts are summarised below. Refinements in the design have reduced the scale of the project's impacts. The implementation of mitigation measures will manage the project's impacts to an acceptable level. Overall, the positive outcomes of the project are considered to outweigh the negative impacts, most of which would be experienced as temporary impacts during construction.

24.6.1 Environmental impacts

24.6.1.1 Construction impacts

During construction, the key environmental impacts relate to biodiversity, waterways, noise and traffic.

Biodiversity

During construction, the project would remove up to 4.97 ha of native vegetation. Most of this is planted native vegetation (about 4.78 ha), with minimal impacts to threatened ecological communities (about 0.18 ha). Most of the impact area represents marginal and disturbed habitat for threatened species. These impacts would be offset in accordance with the NSW Biodiversity Offset Scheme.

Waterways

There is the potential for temporary water quality impacts associated with sediment disturbance in the Parramatta River which would be managed to limit this disturbance with construction environmental controls. The net impact on aquatic ecology is considered minor and accounts for the absence of impacts on aquatic vegetation and the absence of threated aquatic ecology in the construction area. Habitat complexity would be improved with the restoration of the sandstone seawall and riparian planting at Meadowbank.

Noise

Construction of the WRRF would not exceed noise management levels. However, under worst-case scenarios, construction of the pipeline is expected to exceed these levels including at night. As the pipeline installation works are progressive along the pipeline, not all receivers would be impacted at the same time and there is the potential that the actual noise levels would be less than those predicted. The worst-case assessment also assumes that the noisiest pieces of equipment are being used continuously through the day or night. In reality, it is not likely that noisy equipment would be used continuously.

Traffic

Construction traffic would increase average delay and queuing at the James Ruse Drive/Grand Avenue and Wentworth Street/Parramatta Road intersections during the AM and PM peaks. Mitigation measures have been identified to minimise these impacts.

As to be expected with major project construction work, various roads and some shared paths for cyclists and pedestrians may be partially closed and detoured at different stages. Bus routes may also be be temporarily impacted. Specific management measures would be developed during detailed design and would be subject to consultation with bus operators and TfNSW.

Other impacts

Other temporary impacts include flooding, groundwater, soils and contamination, air quality, visual, waste and resource use. These impacts during construction are considered minor with the implementation of proposed mitigation measures.

24.6.1.2 Operational impacts

During operation, the key environmental impacts relate to waterways and visual impacts.

Waterways

On balance, the treated water releases to Parramatta River are expected to maintain and protect the waterway objectives. Predicted improvements are reflected in a reduction of nutrients and suspended solids. Short-term deterioration of water quality is predicted during unplanned events where releases of tertiary treated water may be needed. However, the effects of these infrequent short-term releases are expected to be assimilated relatively rapidly within the river.

Visual impacts

During operation, there would be permanent changes to views at the WRRF site due to the new facility. New landscaping would be delivered associated with the WRRF to enhance the street frontage at Unwin Street and Devon Street. Permanent visual impacts would also occur with the a new barometric loop in Memorial Park with impacts reduced where possible to visually integrate the structure with the park.

Other impacts

Other environmental impacts during operation are predicted to be minor and include but are not limited to flooding, groundwater, soils and contamination, air quality, noise and vibration, traffic, waste and resource use.

24.6.2 Economic impacts

The GPOP area is an important priority growth area for Sydney. A number of government strategies require the investment of infrastructure to support housing and commercial development in this area. With substantial housing and economic opportunities for this area, this GPOP WCM project will ensure the needs of population and employment growth in the area can be met. The project has been designed to be a cost-effective and resilient solution that is adaptable to future economic and social needs for the region. This includes the flexibilty for the future provision of recycled water for use in the community and for growing industries including digital infrastructure services, subject to separate approvals.

Some businesses may be impacted temporarily during construction. Sydney Water will work with impacted owners to minimise construction impacts where feasible. Sydney Water owns the land where the WRRF will be located as well as Camellia pumping station. For pipelines more than 9 m below the ground, easements will be reuqired. The project avoids the need to aquire privately owned residential properties and businesses.

24.6.3 Social impacts

During construction, temporary social impacts are expected and include impacts to visual amenity, noise, air quality, and traffic. With the implementation of appropriate mitigation measures, no potential construction impacts would have a high risk. Pipeline construction works would impact access to public recreational spaces including Pierre de Coubertin Park, Meadowbank and Memorial Parks. Detailed design will seek to further minimise these impacts where possible.

In operation, the project is expected to contribute to the improvement of the health of Parramatta River, with long term benefits for recreational access and amenity. The project would also strengthen the longevity and resilience of Sydney's wastewater network.

24.6.4 Cumulatve impacts

Review of construction work in proximity to this project was reviewed and the following potential cumulative impacts identified.

- contribution to surface water run off and cumulative flooding impacts in the precinct
- exposure to contamination, however, it is expected that if projects in the area implement appropriate mitigation measures for the handling and disposal, cumulative impacts from contamination would be negligible to low.
- removal of vegetation where replacements can not exactly reflect the value of the PCT or TEC in that location.
- increased dust and noise due to the proximity of Sydney Metro West and PLR Stage 2 projects which propose noise generating and ground disturbing works
- minor increases to travel times in the Camellia-Rosehill precinct due to an increase in construction vehicles from various projects
- minor temporary cumulative heritage (visual) impacts may occur to the Camellia pumping station during construction of the project and PLR Stage 2
- there is potential for cumulative visual impacts during operations of the WRRF due to artificial lighting in the night time.

It is expected that with the implementation of mitigation measures, cumulative impacts would be minimised.

24.6.5 Ecologically sustainable development

The project aligns with ESD principles as defined in section 193 of the Environmental Planning and Assessment Regulation 2021. Table 24-3 summarises how the project incorporates these principles.

Table 24-3: Project alignment with ESD principles

ESD Principle	Project alignment
Precautionary principle The precautionary principle relates to the scientific uncertainty about environmental impacts during decision-making processes. It states that where there is potential for irreversible environment	The project would not result in serious or irreversible environmental damage and mitigation measures have been designed to reduce scientific uncertainty relating to the project. The project has been informed by a range of specialist environmental investigations including desktop investigations, field investigations and modelling. This means there is a high level of certainty about the project's potential impacts. This principle was considered throughout the options assessment and reference design processes in deciding the preferred location for the WRRF and pipeline alignments and the approach to construction and design. Multi-criteria analysis and

ESD Principle	Project alignment
impact and degradation, the absence of complete scientific certainty should not be a reason to postpone management measures to prevent the potential impact.	risk assessments have been completed throughout the project to ensure serious and adverse damage to the environment is avoided. Throughout development of the EIS, Sydney Water has collaborated with the community and relevant government departments and agencies which has further informed the design and impact assessment process. The EIS communicates and assesses the potential environmental impacts associated with the construction and operation of the project. The EIS has assessed worst-case impacts and has completed detailed technical environmental assessments to minimise environmental risks and identify appropriate environmental management measures. Where avoidance of a potential environmental impact is not possible, mitigation measures have been identified and proposed within Appendix E (Mitigation measures) to minimise the severity of any adverse impacts.
Intergenerational equity Inter-generational equity relates to the equal distribution of economic, social and environmental costs and benefits for current and future generations	The objectives for the project are well aligned with the principle of intergenerational equity. The long-term needs of stakeholders and the community were a fundamental consideration in the strategy and options development for the project as well as the design. The EIS has considered the ultimate future capacity of the system and future sensitive receivers. The components of the project have a specific design life. However, operation of the project would be required well into the future continuing to support the needs of the current and future populations in the servicing area. Sydney Water has designed the project to avoid and minimise environmental impacts. The construction of the project would result in minor and manageable impacts with minimal environmental damage as a result. As such, the environmental cost to future generations is minimised. The impact to biodiversity, community values and heritage would not be diminished for future generations as a result of the project. Over time, the project would contribute to environmental improvements, including reduced wet weather overflows and improved water quality in Parramatta River. Construction and operation of the project would result in the consumption of fossil fuels, including diesel, which may negatively impact future generations. However, the project design has incorporated energy efficiency and a reduced carbon footprint by incorporating technologies such as solar and co-generation to minimise these impacts. Sydney Water would aim to reduce its consumption of resources and materials during construction and operation. This would be achieved by applying the rigorous standards prescribed by in the ISC rating tool. Waste and resource recovery planning would ensure waste is minimised and diversion from landfill is prioritised. The project's resilience to future changes in climate has been assessed, with specific adaptation measures incorporated into the design and operation. The project would produce treated water suitable for a range of uses. This can contribute to water resilience for future generations, should the availability of water reduce under future climate change scenarios.

ESD Principle	Project alignment
Conservation of biological diversity and ecological integrity	Minimising and avoiding impacts to biodiversity and maintaining ecological integrity is a fundamental consideration for the project. Impacts to biodiversity were considered throughout the development of the reference design, including the options selection process. Sydney Water has designed the project to avoid and minimise impacts to biodiversity where possible, including the use of trenchless construction methods for some sections of pipelines. Up to 4.97 ha of native vegetation is proposed to be cleared for the project. Over 96% of this is planted native vegetation. Substantial efforts have been made throughout the project to reduce and minimise impact to native vegetation habitats. The EIS outlines the mitigation measures to further minimise impacts to biodiversity, and how the impacts would be offset. The project also seeks to improve biodiversity through enhancing habitat complexity with restoration of the sandstone seawall at Meadowbank and retaining tree trunks and logs on-site where possible. Project impacts on aquatic ecology are expected to be minor, given the high quality of treated water released and minor expected changes to river geomorphology and flows.
Improved valuation, pricing and incentive mechanisms	The project has applied the INSW business case gateway process that specifically addresses the social, economic and environmental sustainability requirements of the project. This would ensure ESD is appropriately considered, valued and priced at each stage of the project lifecycle. This approach allows for identification of more sustainable and resilient infrastructure, and recognises the long-term value for the community and the environment. Sydney Water would also provide biodiversity offsets for the project in accordance with the Biodiversity Assessment Method, which essentially places a price on biodiversity impacts.

24.7 Monitoring and communicating compliance

This section summarises Sydney Water's approach to environmental monitoring and compliance during construction and operation of the project.

24.7.1 Construction environmental management

Sydney Water's construction contractor(s) would develop a Construction Environmental Management Plan (CEMP) for the project to manage environmental impacts during construction. This is a standard part of Sydney Water's contractual specifications, which specify minimum content for a CEMP and the need to capture any obligations from the EIS and conditions of approval. The CEMP would be consistent with the environmental management plan guideline for infrastructure projects (DPIE, 2020). This outlines the recommended content of a CEMP, including a framework for continuing management, mitigation, monitoring and auditing. The CEMP would link to requirements under the Community and Social Engagement Plan as well as the Sustainability Management Plan.

The CEMP would include the following sub-plans to address specific environmental risks:

- Flood Management Plan

- Soil and Water Management Plan (covering contamination, acid sulfate soils and with reference to an Asbestos Management Plan)
- Flora and Fauna Management Plan
- Noise and Vibration Management Plan
- Traffic and Transport Management Plan
- Heritage Management Plan
- Waste Recovery and Resource Plan (covering spoils and materials).

Aspect or area specific environmental work method statements would also be implemented to manage environmental impacts. These construction protocols would manage works associated with the construction of the river release structure or out of hours work.

24.7.2 Operational environmental management

Table 24-4 identifies Sydney Water's existing management systems that would be applied during project operation. These systems are based on international standards and apply across Sydney Water's asset operation. They capture accountabilities, processes, policies and procedures to manage quality, safety, environment and asset-related risks. They also provide a platform for continual improvement of Sydney Water's management processes. Sydney Water expects these systems to evolve over time. For example, Sydney Water is planning to integrate them into a single management system. If Sydney Water engages another party to operate the WRRF, they would also be required to have equivalent management systems.

In 2017, Sydney Water developed an operational environmental management roadmap which demonstrated to DPIE (now DPHI) how its management systems fulfil the requirements of a project-specific Operational Environmental Management Plan (OEMP). As a result, DPIE (now DPHI) approved modifications to existing conditions of approval for Sydney Water's State significant projects. Sydney Water proposes to continue this established approach for the project. By managing operations in accordance with Sydney Water's existing management systems (or contractor management systems) there is no need for a project OEMP. Sydney Water would incorporate operational mitigation measures summarised in Appendix E (Mitigation measures) and any operational phase conditions of approval into the relevant component of its existing management systems.

Table 24-4: Current Sydney Water management systems

Management system	Standard	Scope of system
Asset management system	Certified to ISO 55001:2014 (Asset management)	This system covers all activities associated with Sydney Water's asset value chain such as creation, reuse/disposal, renewals, maintenance, condition and performance.

Management system	Standard	Scope of system
Environmental management system	Certified to ISO 14001:2015 (Environmental management systems)	This system provides a framework to develop, implement, monitor and review Sydney Water's environmental objectives, actions and targets. It includes environmental criteria, standards and mechanisms to monitor performance and regulatory compliance.
Quality management system	Certified to ISO 9001:2015 (Quality management systems)	This system outlines Sydney Water's way of working, including in relation to risk management, document and records management, strategy and planning, business processes, assurance and audit, people capability and business performance and improvement.
Work health and safety management system	Certified to AS/NZS 4801:2001 (Occupational health and safety management systems)	This system manages Sydney Water's approach to work health and safety, including in relation to responsibilities and accountabilities, planning and improvement, risk management, consultation and communication, contractor and supplier management, training and competency, incident and emergency management, performance and reporting, and health, wellbeing and occupational hygiene.

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