4 Project description

This chapter describes the proposed scope of work for the project, including the concept proposal. It provides a description of the construction, operation, commissioning and maintenance phases, including where flexibility is required.

4.1 Relevant Project Secretary's Environmental Assessment Requirements

Table 4-1 lists the SEARs relevant to the description of the project and where they are addressed in this chapter.

Table 4-1 SEARs addressed in the project description chapter

SEARs	EIS section where requirement addressed
General Requirements (b) a full description of the Upper South Creek Advanced Water Recycling Centre (the project), including: i. the design for the project that is proposed to be constructed and operated.	Section 4.4 outlines the design of the project.
ii. all components, disturbance areas, materials, activities, site preparation and construction infrastructure (e.g. storage compounds, dirty water areas, roads, concrete batch plants) required to construct the project (including any ancillary development that may require separate approvals).	Section 4.8, Section 4.9, Section 4.10, Section 4.10.2, Section and Section 4.10.3 outline the construction of all project components.
iii. the operation of the project, and associated water infrastructure that is proposed to be constructed.	Section 4.5 and Section 4.6, outline all operational components of the project.
iv. likely staging or sequencing of the project, including construction, operation, maintenance, decommissioning and rehabilitation.	Sections 4.3 and 4.12 outline the likely staging and timing of different stages of the project.
v. site plans, maps, drawings and diagrams at an adequate scale with dimensions in an electronic format that enables integration with mapping and other technical software, showing: i) the location and dimensions of all project components. ii) existing infrastructure, land use, and environmental features. iii) the development corridor that has been assessed and consideration of design options.	Section 4.8.2 and Figure 4-17 show all project components, including the areas that were assessed.

SEARs	EIS section where requirement addressed
vi. the likely interactions between the project and any other existing, approved, proposed, reasonably foreseeable development in the vicinity of the site, including an assessment of the cumulative impacts on the environment.	Section 2.13 outlines interactions with other major projects.
1. Describe background conditions for any water resource likely to be affected by the development including: (b) hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations	Section 4.5 outlines volume, frequency and quality of treated water releases
1. Provide a detailed analysis of discharges into Warragamba River including e-flow needs going back 20 years. This analysis needs to consider: f) impacts to the proposal's outlet infrastructure if WaterNSW may, at any time, be required to spill water from the dam and outline what assumptions have been made on flood inundation levels and water velocity at this location	Section 4.4.2. This would only apply to the release location at Warragamba River. The outlet infrastructure would be appropriately designed during detailed design to account for flood inundation and water velocity from Warragamba Dam spillway. This level of detail is not available from the current reference design.
17. Description of the type and extent of any dredging or reclamation activities within 'water land' as defined under the FM Act. This assessment must be prepared in consultation with, and have regard to the requirements of DPI Fisheries.	Section 4.9.3 describes the activities of the project within 'water land'. Consultation with DPI Fisheries is outlined in Chapter 6.
Attachment 1 - General Requirements 6. The precise location and description of all works to be undertaken (including associated offsite works and infrastructure), structures to be built or elements of the action that may have impacts on MNES.	Section 4.4 describes the design and location of all project components. Section 4.8, 4.9, and 4.10, outline the construction of all project components.
7. How the action relates to any other actions that have been, or are being taken in the region affected by the action.	Section 2.13 describes the project alignment with other major projects and Chapters 8-13 describe cumulative impacts with these projects. Section 4.14 outlines elements that are outside the project scope

SEARs	EIS section where requirement addressed
8. How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts on MNES.	Sections 4.8 to 4.10.5 outline the construction methodology and phases of how the works will be undertaken. Section 4.4 outlines the design parameters of all structures.

4.2 Project overview

Sydney Water is proposing to build and operate a project to provide wastewater services to the Western Sydney Aerotropolis Growth Area (WSAGA) and South West Growth Area (SWGA). The project will comprise:

- a new Advanced Water Recycling Centre (AWRC) to collect wastewater from businesses and homes and treat it, producing high-quality treated water, renewable energy and biosolids for beneficial reuse
- a new green space area around the AWRC, adjacent to South Creek and Kemps Creek, to support the ongoing development of a green spine through Western Sydney
- new infrastructure from the AWRC to South Creek, to release excess treated water during significant wet weather events, estimated to occur about 3 – 14 days each year
- a new treated water pipeline from the AWRC to Nepean River at Wallacia Weir, to release high-quality treated water to the river during normal weather conditions
- a new environmental flows pipeline from Wallacia to Warragamba River, to release high-quality treated water to the river just below the Warragamba Dam
- a new brine pipeline from the AWRC connecting into Sydney Water's existing wastewater system to transport brine to the Malabar Wastewater Treatment Plant
- a range of ancillary infrastructure

The following sections provide more detail about each of these components.

4.3 Project staging

Sydney Water is seeking a staged approval for the project. The AWRC will likely be delivered in several stages as a response to growth in the servicing area. The timing of future upgrades at the AWRC will align with population growth forecasts and changes in the servicing area. The staging, to the extent it can be foreseen, is described below.

4.3.1 Stage 1

Stage 1 of the project includes:

- building and operating the AWRC to treat an average dry weather flow of up to 50 million litres per day (megalitres per day or ML/day)
- building all pipelines to cater for up to 100 ML/day flow at the AWRC (but only operating them to transport and release volumes produced by the Stage 1).

4.3.2 Future stages

Given the pipelines will be built to their ultimate capacity in Stage 1, future stages will only require expansion of the AWRC. Current growth projections suggest the ultimate capacity of the AWRC could be up to 100 ML/day. The timing and size of these stages will be established over time to align with growth in the servicing area. Sydney Water is seeking approval to build and operate Stage 1 and approval for the overall concept of the AWRC operating at up to 100 ML/day as part of the staged approval. Future stages will align with the overall concept presented in this EIS and will require further assessment and approval once development plans for future stages can be provided.

4.3.3 Maintaining flexibility

This EIS seeks approval to build and operate Stage 1 of the project. Although this is predicted to have an initial operating capacity of 50 ML/day, Sydney Water may elect to build the AWRC smaller given more recent growth projections suggest population growth has slowed, partly because of COVID-19. On this basis, by considering the AWRC sized to 50 ML/day, the EIS assesses a worst-case impact.

It is also likely that some elements of Stage 1 at the AWRC will be progressively installed after the initial construction phase where the main civil works occur in the initial construction phase but some processes, mechanical and electrical equipment are progressively installed over time to align with growth in the Upper South Creek Servicing Area. For example, if the AWRC is operating at 21.3 ML/day in 2026 as outlined in the growth projections in section 2.3, Sydney Water may install only the number of reverse osmosis membranes needed to treat that volume and install more membranes as flows to the AWRC increase. The impact assessment in this EIS assumes a worst-case impact scenario that all infrastructure is installed in the initial construction phase.

The detail will develop as detailed design progresses, including the exact location, layout and infrastructure for Stage 1 of the AWRC, within the impact area assessed in the EIS.

4.4 Project design

4.4.1 AWRC site

The AWRC site is about 78 ha and is shown in Figure 4-1. It is located on Lot 211 DP1272676, Part of Lot 21 DP 258414 and Part of Lot 104 DP1271336. Project infrastructure proposed on this site is located either in the operational area or green space area as described below. It is important these two areas of the site are managed and developed together to ensure water sensitive urban design, biodiversity and visual impacts are effectively managed across the whole site. The urban design approach for the whole AWRC site is also described below. Lot boundaries and numbers have recently changed around the AWRC site as a result of land acquisition by Sydney Water and Transport for NSW, and further changes may occur. Sydney Water is working closely with the relevant adjoining landowners, particularly Transport for NSW and University of Sydney, and will clarify any further changes in the project's amendment report.

Operational area

The operational area is about 40 ha and will contain the wastewater and advanced treatment infrastructure and a range of ancillary infrastructure including inlet works, tanks and process chambers, advanced treatment buildings, interconnecting pipelines, digesters, pumping stations, odour treatment units, and biosolids treatment units. The operational area also includes a range of ancillary infrastructure such as roads, carparking, an administration building, security fencing and visual screening. Other features ancillary to the main treatment process include chemical handling facilities and photovoltaic cells for solar energy production.

The operational area is above the 1% Annual Exceedance Probability (AEP) flood level and within the RU2 (Rural Landscape) land use zone under Penrith Local Environmental Plan 2010. A small section is zoned E2 (Environmental Conservation), as shown in Chapter 5.

Table 4-2 outlines the main treatment infrastructure of the AWRC and Table 4-3 outlines the main ancillary infrastructure. These tables provide an indication of the key project components which may change if different treatment technologies or processes are adopted in detailed design. These are not intended to be a comprehensive list as there is a complex suite of pipes, pumps, valves, screens and other treatment equipment that form part of the project. Most of the infrastructure will be above ground, with some below-ground components across the area including footings, pipelines, cables, utilities and the detention and retention basins.

The remainder of this section discusses project components for Stage 1. However, future AWRC stages will also be built in this operational area.

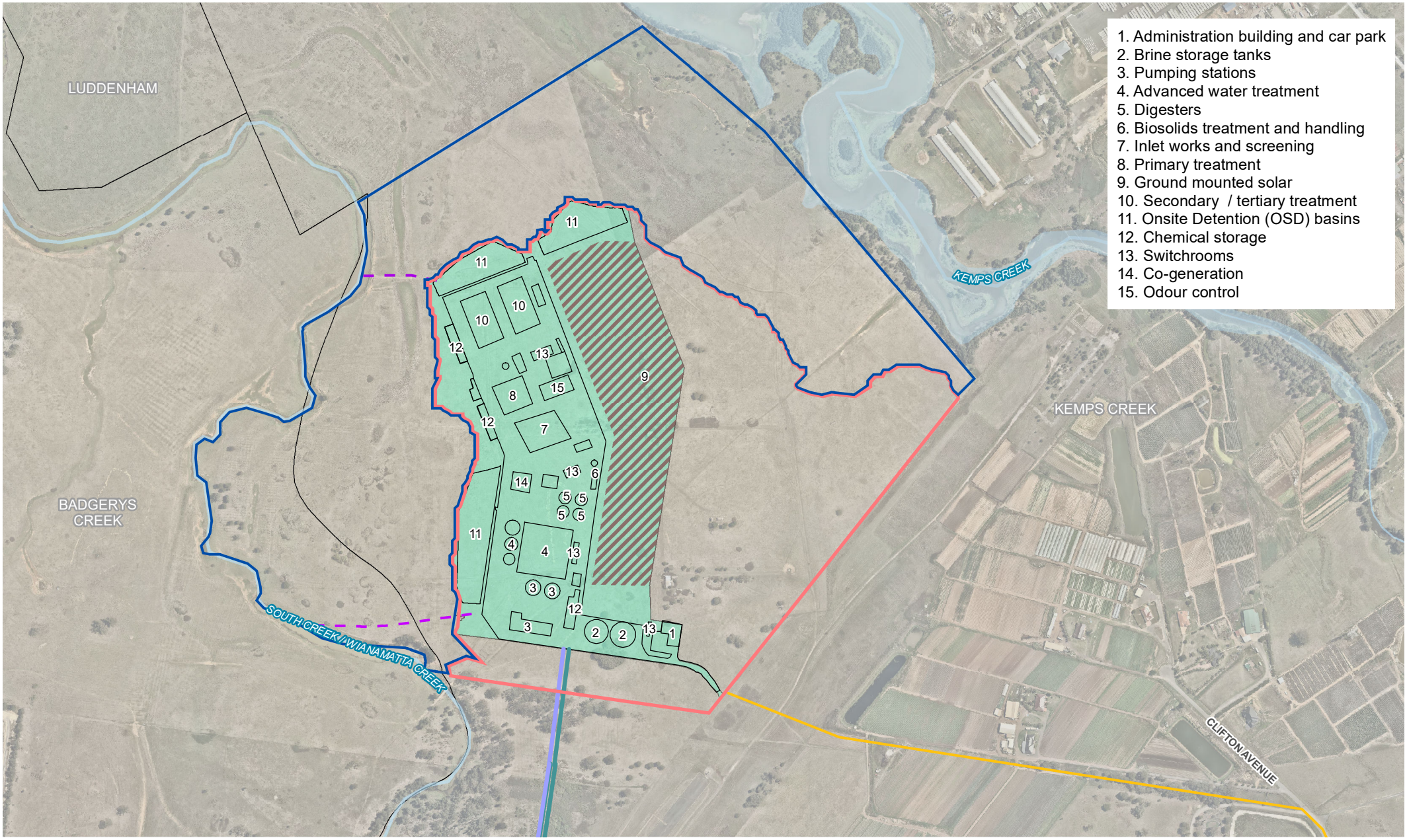

Figure 4-1 Operational area and indicative Stage 1 layout of the AWRC

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

Table 4-2 Indicative wastewater infrastructure at the AWRC

Wastewater infrastructure	Key design details	Figure 4-1 reference
Inlet work and screening	The inlet works consists of a combination of concrete structures and mechanical equipment. The main chamber of the inlet works is typically long and narrow, about 70 m x 10 m and 3 m deep to provide a series of channels to enable the wastewater to pass through mechanical screens. The inlet works may be constructed at ground level or elevated several metres to provide the wastewater with gravity head to convey it to the next process.	7
Primary treatment	The primary treatment unit is likely to consist of a single large concrete tank with internal walls to provide separate chambers. The tank is likely to be constructed at ground level and measure about 50 m x 50 m and 5 m in height. The tank will have access walkways around the edges of the chambers and it may be covered with removable covers.	8
Secondary treatment	The secondary treatment unit is likely to consist of two large open concrete tanks with internal walls to provide separate chambers. The tanks may be constructed at ground level, or partially buried and measure about 50 m x 60 m and 8 m in height. The tank may have access walkways around the edges of the chambers.	10
Tertiary treatment	The tertiary unit is likely to consist of two large open concrete tanks with internal walls to provide separate chambers. The tanks may be constructed at ground level, or partially buried and measure about 50 m x 20 m and 5 m in height. The tank may have access walkways around the edges of the chambers.	10
Advanced treatment	The advanced water treatment building will consist of a large equipment slab and a building. The slab will house pipework and pumping equipment while the building will be concrete, masonry or Colorbond construction and measure about 70 m x 30 m and 10 m in height.	4
Pumping stations	The pumping station will consist of concrete, masonry or Colorbond building(s) measuring about 10 m in height and about 60 m x 25 m total floor area. The pumping stations are likely to be located on the boundary of the AWRC site with their own dedicated access to support after hours maintenance.	3
Digesters	The digesters will be round concrete or steel tanks constructed at ground level and measure about 25 m in diameter and 20 m in height with a domed top which is the biogas holder.	5

Wastewater infrastructure	Key design details	Figure 4-1 reference
Biosolids treatment	Biosolids treatment and handling includes an outloading building that will likely be a steel and concrete building measuring about 50 m x 15 m and 30 m in height. The building will house mechanical equipment in the upper level and have access doors at each end to enable trucks at ground level to pass through it for top loading with biosolids.	6
Odour control unit (OCU)	The OCU will consist of a concrete slab at ground level, will house fans, large fibreglass ductwork, and an array of fibreglass tanks. The tanks will be about 10 m high and there will be stacks about 15 m high.	15
Brine storage tanks	The tanks will be about 40 m in diameter and about 15 m in height. They will have a capacity of about 30 ML in volume.	2
South Creek release infrastructure	The South Creek release infrastructure is likely to be a vegetated swale consisting of an earth embankment construction, rip rap (energy dissipation) and scour structure within the creek. It also includes a discharge chamber, headwall, swale and a bridge across the swale in the form of box culverts.	
Disinfection	Both tertiary and advanced treatment provide barrier disinfection for water that will be released to waterways or used for recycled water. Primary treated water will be disinfected with chlorine and dechlorinated with sodium bisulfite prior to release to South Creek.	
Other buildings and tanks	The AWRC site will also have a range of other steel and concrete tanks, mechanical equipment mounted on concrete slabs, and minor buildings for storage. All process units will be comprehensively fitted with pipework, supports, mechanical equipment and instrumentation, pumping equipment and electrical cabling. It also includes disinfection facilities to be used for future recycled water schemes.	

Table 4-3 Key operational ancillary infrastructure at the AWRC

Ancillary infrastructure	Key details	Figure 4-1 reference number
Administration building	The administration building will house the control room, laboratory, lunchroom, meeting rooms and amenities. It is likely to be located close to the entrance of the AWRC for security, convenience, and managing deliveries and visitors. The building may be two storeys.	1
Carpark	A car park will be provided at the administration building to provide parking for operational staff, visitors and contractors. The car park will include about 30 car spaces.	1

Ancillary infrastructure	Key details	Figure 4-1 reference number
Road network	Internal roads will divide the AWRC to provide operational and maintenance access to the process units for delivery vehicles and cranes. While the plant will be arranged to support access and functionality, consideration will 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 site and using grasses, trees and vegetation. Surface treatments for hardstand surfaces may include blue metal loose rock areas surrounding structures rather than concrete or compacted earth. A fire access road around the operational area of the AWRC will also be required to provide firefighting access in the event of a bushfire. This access road may be partially located within the green space area to ensure the road meets NSW Rural Fire Service (RFS) requirements.	
Renewable energy generation - solar	Solar panels up to about 4MW capacity, likely to be a combination of ground and roof mounted. The solar panels on the ground will be installed on poles to elevate them about two metres above ground and enable orientation for maximum efficiency. Spacing between the panels and a perimeter road will be provided for installation, inspection, and maintenance purposes.	9
Onsite Detention Basins (OSD)	The OSDs are designed to capture stormwater and runoff from the site and provide both treatment and storage. These basins are likely to be earthen construction with a polyethylene liner and measure about 250 m x 50 m and 1 m in depth. They also include release points to South Creek.	11
Chemical storage	The chemical storage consists of concrete bunds housing permanently installed fibreglass or plastic storage tanks and an adjacent a truck unloading bay. The concrete bunds will be open structures with a large concrete slab that provides spill containment, along with steel and Colorbond roof structure and fencing. Typical measurements for chemical bunds are about 60 m x 15 m and about 8 m in height. There is likely to be more than one chemical storage location at the AWRC site.	12
Switch rooms	There are likely to be several electrical switchrooms at the AWRC site to supply the various process units. Switchrooms will typically be concrete, masonry or prefabricated sandwich panel and measure about 40 m x 15 m and 10 m in height.	13
Renewable energy generation - Co-generation	The co-generation engines may be housed in a concrete building or container measuring about 10 m x 15 m and about 5 m in height. The building or containerised unit will also house ancillary infrastructure such as pipework and electrical equipment.	14

Ancillary infrastructure	Key details	Figure 4-1 reference number
Other ancillary infrastructure	A range of other ancillary infrastructure will be required across the site, including but not limited to perimeter fencing, security, lighting, visual screening, architectural cladding, first flush system, cabling and a workshop.	

Figure 4-2 to Figure 4-6 provide example images of AWRC components at other existing Sydney Water facilities. These give an indication of their size and appearance. Reference images have not been provided for all components due to difficulties in accurately capturing entire components.

Figure 4-2 Example chemical storage area from an existing Sydney Water facility

Figure 4-3 Example switchroom from an existing Sydney Water facility

Figure 4-4 Example odour control unit from an existing Sydney Water facility

Figure 4-5 Example primary treatment area from an existing Sydney Water facility

Figure 4-6 Example secondary treatment area from an existing Sydney Water facility

Green space area

This area of the site is about 38 ha and is within the 1% AEP flood level. As part of the project, it will be landscaped to develop a green space that enhances biodiversity, uses best practice water sensitive urban design and provides visual screening of the AWRC.

There is an additional opportunity for this green space to be developed into a publicly accessible recreation area to form part of the Wianamatta-South Creek parkland proposed in the Western Sydney Aerotropolis Plan. Sydney Water is working with Department of Planning, Industry and Environment (DPIE) to understand whether this is a realistic future opportunity, given the State Environmental Planning Policy (Western Sydney Aerotropolis) 2020 currently prohibits use of this land for a recreation area. Chapter 5 discusses the permissibility of this recreation area in more detail.

The green space area will also include infrastructure to release water to South Creek. This includes treated wastewater during wet weather and water from retention and detention basins. Sydney Water expects up to two release locations as shown indicatively on Figure 4-1. The infrastructure crossing the green space area will be either a pipeline or a swale, with energy dissipation structures at release points to South Creek. The type of infrastructure is influenced by the low grade of the AWRC site and the hydraulics of operating the AWRC and the detention and retention basins. The decision about type of infrastructure will be made during detailed design based on more detailed hydraulic calculations.

Urban design

Sydney Water has developed an urban design approach for the AWRC site. Considering both the operational and green space area, the design will include architectural treatments for visual screening and potential to adopt a landscape-led approach by integrating aspects of the heritage and natural assets around infrastructure requirements. The Western Parkland City landscape vision has been a fundamental input to Sydney Water's urban design approach.

Sydney Water has developed urban design principles for the AWRC site and an indicative concept of how these could be achieved, as described in this section. Table 4-4 summarises the urban design themes, principles and opportunities for the AWRC site. Figure 4-7, Figure 4-8 and Figure 4-9 show a concept for how these principles and opportunities could be implemented. Sydney Water will use these concepts to develop a more detailed design for the operational area and green space area that aligns with technical design and document it in an Urban Design and Landscaping Plan.

These figures include potential components such as walking tracks, seating, shading and signage that could be incorporated if the future recreational opportunity proceeds. Public access could be provided through an extension of the AWRC access road so visitors would not need to enter the AWRC site. Appropriate visitor parking and toilets would also be required.

If the recreational opportunity in the green space area does not proceed, these components will be substantially scaled back to focus on biodiversity and water sensitive design elements and any infrastructure needed to maintain these areas.

Sydney Water will continue to work closely with DPIE teams responsible for place management and green spaces about its urban design approach as design of these elements progresses to ensure the project aligns with the NSW Government's vision for the green spine along South Creek.

Figure 4-7 Indicative visualisation of AWRC site

Figure 4-8 Indicative Master Plan for AWRC site

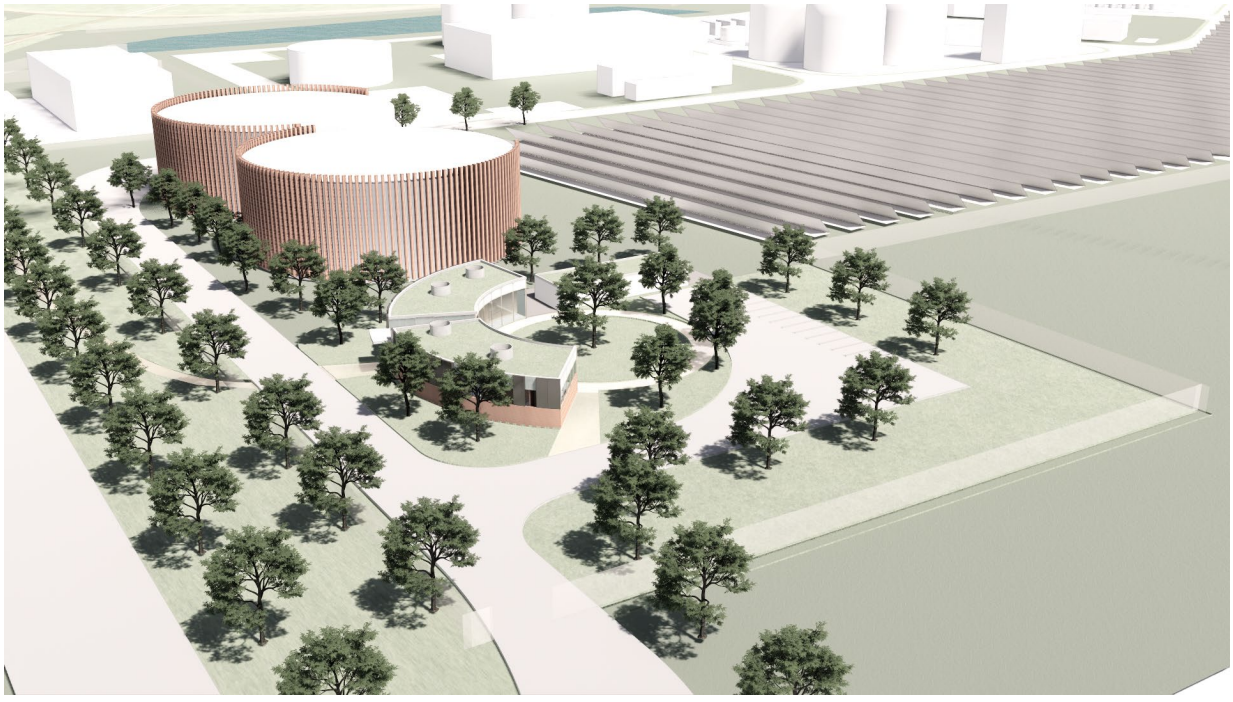

Figure 4-9 Indicative impression of administration building and architectural treatments for tanks

Table 4-4 Summary of the urban design themes, principles, and opportunities for the AWRC site

Urban design theme	Urban design principles	Opportunities to be considered in detailed design
Water treatment Safe and sustainable water treatment that addresses the ever-increasing issue of water security and drive awareness and education in water management.	Future proof expansion and the introduction of advanced technologies in water treatment and recycling with a flexible design.	Use natural topography of the site where possible to maximise use of gravity treatment processes.
Resource recovery Generation of: • clean water for recycling • biosolids for beneficial reuse • renewable energy through solar and co-generation.	Maximise opportunities in implementing circular economy approaches. Optimise nutrient recovery through biosolids processing. Maximise ecosystem services opportunities. Minimise waste and maximise reuse. Minimise energy use and maximise energy recovery. Maximise opportunities for stormwater harvesting stormwater runoff.	To be considered as part of design of operational components of AWRC.
Sustainability Showcase innovation and leadership in sustainable water management, energy capture, waste reduction and environmental management.	Minimise off-site impacts of treated water release. Restore and protect waterway health and amenity values; the natural landscape; and biodiversity. Minimise impact of built form and hard surfaces. Demonstrate an integrated functional design and landscape-led design across the site, aligning to the WSAP and Western Parkland vision. Ensure high-quality landscaping that is sympathetic to Western Sydney climate and native environs Maximise integration of water in the landscape to mitigate urban heating and create green and vibrant places.	A range of landscape zones such as riparian corridors, wetlands and grasslands in the parkland area and streetscaping in the operational area. Use landscaping, earthworks, material selection and architectural screening to mitigate visual impact from key viewpoints Landscape design supporting passive or interactive education opportunities (if recreation area progresses). Capture resource recovery and sustainability principles in architectural design.

Urban design theme	Urban design principles	Opportunities to be considered in detailed design
Community Continue to contribute to the site's rich cultural and environmental context, playing an important role in the future of Western Sydney.	Maximise opportunities for partnership with local community and businesses, including Aboriginal communities. If recreation area proceeds, provide quality public amenity by connecting into existing and future recreational and social infrastructure and networks.	Celebrate Aboriginal and non-Aboriginal heritage on the site. Consider opportunities to co-design features or architectural treatment with community and stakeholders where appropriate. Retain select existing heritage features such as parabolic antennas associated with Fleur's Radio Telescope for use in the landscape. Align layout to celebrate the cross formation of the former radio-telescope array.
Built environment approach A unique opportunity to positively integrate with the natural environment and urban fabric of the Western Parkland City.	Built form responds to the contextual landscape and future urban character. Design accommodates the functional properties of the AWRC. Address aerial views experienced by passengers departing and arriving at the new airport. Minimise negative environmental impacts. Embody the urban design principles of surrounding district and precinct plans.	Quality and sustainable architecture for the administration building. Set the administration building within its landscape and incorporate open spaces, natural lighting and ventilation. Unified architectural language across the site, for example in cladding and screening.

As urban design of the site progresses it will also factor in the following key constraints:

- Bushfire protection.
- Flooding.
- Airport safeguarding approaches, including in relation to wildlife attraction.

Sydney Water is also working with the Western Sydney Planning Partnership on a riparian revegetation strategy for the WSAGA. Once this strategy is finalised, Sydney Water will consider it in developing detailed design for the green space area.

4.4.2 Pipelines

The project includes pipelines to take treated water and the brine waste stream away from the AWRC and release and dispose of them responsibly. Pipelines required include the treated water pipeline to Nepean River at Wallacia Weir, the environmental flows pipeline from Wallacia to Warragamba River and the brine pipeline from the AWRC to the existing Sydney Water wastewater network at Lansdowne. All pipelines will be built to their full capacity (that is, for a 100 ML/day AWRC capacity) in Stage 1.

Treated water pipeline

The treated water pipeline is planned to be about 16.7 km long and up to 1.2 m in diameter. The treated water pipeline will transfer treated water from the transfer pumping station at the AWRC, to the release point at Nepean River, upstream of Wallacia Weir. Figure 4-10 shows the treated water pipeline location.

From the AWRC, the pipeline crosses South Creek then runs along the north side of Elizabeth Drive. This is outside the current road verge in an area that will become a utilities corridor next to the upgraded Elizabeth Drive. Along Elizabeth Drive it crosses several waterways including Badgerys Creek, Oaky Creek and Cosgroves Creek. The pipeline then crosses the Northern Road and runs along the southern side of Park Road, partly in the road verge and partly beneath the road surface.

At Wallacia, the pipeline runs through back streets to Fowler Reserve and crosses beneath Nepean River. It then runs along Bents Basin Road and Silverdale Road before crossing private property to connect to Nepean River at Wallacia.

The treated water pipeline does not have any provisions for recycled water offtakes. Any future recycled water schemes would require additional pipelines connecting to the AWRC, which is out of scope for this project.

The treated water pipeline has a range of ancillary infrastructure as described Table 4-5. The pipeline itself will be below-ground but some of the ancillary infrastructure will be above ground, such as pit covers and scour valves.

Environmental flows pipeline

The environmental flows pipeline is about 4.5 km in length and up to one metre in diameter. It will transfer high-quality treated water from the treated water pipeline to Warragamba River, downstream of Warragamba Dam. Figure 4-11 shows the environmental flows pipeline location.

The environmental flows pipeline diverts from the treated water pipeline at Bents Basin Road, near the intersection with Silverdale Road, Wallacia, via the flow splitter structure. The environmental flows pipeline continues south following Bents Basin Road for about 1.4 km before it runs west and is tunnelled for about 2.5 km to end at the release structure at Warragamba River.

The flow splitter enables remote operation for diverting the treated water between the Nepean River and Warragamba River release locations. It is mainly a below ground structure, with some above-ground structures such as a concrete slab, electrical equipment and fencing. The electrical equipment will be housed in a structure measuring about 0.6 m by 0.6 m and about 1.5 m in height. The entire flow splitter measures about 33 m x 30 m and will be located on the western side of Nepean River, and will be accessed off Bents Basin Road.

As noted in section 3.5.1, Sydney Water is also exploring with DPIE if the project can contribute to waterway health benefits of the new environmental flows regime by releasing treated water to Nepean River at Wallacia Weir and avoiding the significant cost of building the environmental flows pipeline. The EIS assesses the construction and operation impacts of this pipeline but depending on the outcome of these conversations, it (and its associated infrastructure) may not be built.

Brine pipeline

The brine pipeline will be about 24 km in length and about 0.6 m in diameter. The advanced treatment process at the AWRC will produce a brine waste product, which will be transferred from the AWRC to the existing Malabar wastewater system at Lansdowne. Figure 4-12 shows the location of the brine pipeline.

From the AWRC, the brine pipeline heads south to Elizabeth Drive, sharing a corridor with the treated water pipeline for half of this length. It then crosses Elizabeth Drive and heads south along Western Road and east along Cross Street in Kemps Creek, through the Western Sydney Parklands, under the M7 Motorway and then generally follows existing roads through Abbotsbury, Cecil Park, Bonnyrigg, Cabramatta and Lansdowne. It will also pass through several public parks including Lansvale Park.

The brine pipeline will connect to the existing wastewater network via a new maintenance hole into the Northern Georges River Submain (NGRS). The NGRS is part of the existing Malabar wastewater network, which transfers wastewater to the Malabar wastewater treatment plant (WWTP) for treatment and release via the deep ocean outfall.

During the design of the brine pipeline, Sydney Water modelled the capacity of the NGRS and Malabar wastewater network to ensure the system could accommodate brine from the AWRC. The aim was to develop an operational regime for brine transfer to the NGRS without triggering any additional wet weather overflows into Georges River. The modelling identified the need for a brine storage and pumping regime that can manage brine flows into the NGRS during significant wet weather events or other times when the NGRS does not have capacity.

The brine pipeline has a range of ancillary infrastructure as described in Table 4-5. The pipeline itself will be below ground but some of the ancillary infrastructure will be above ground, such as air valves to assist operation.

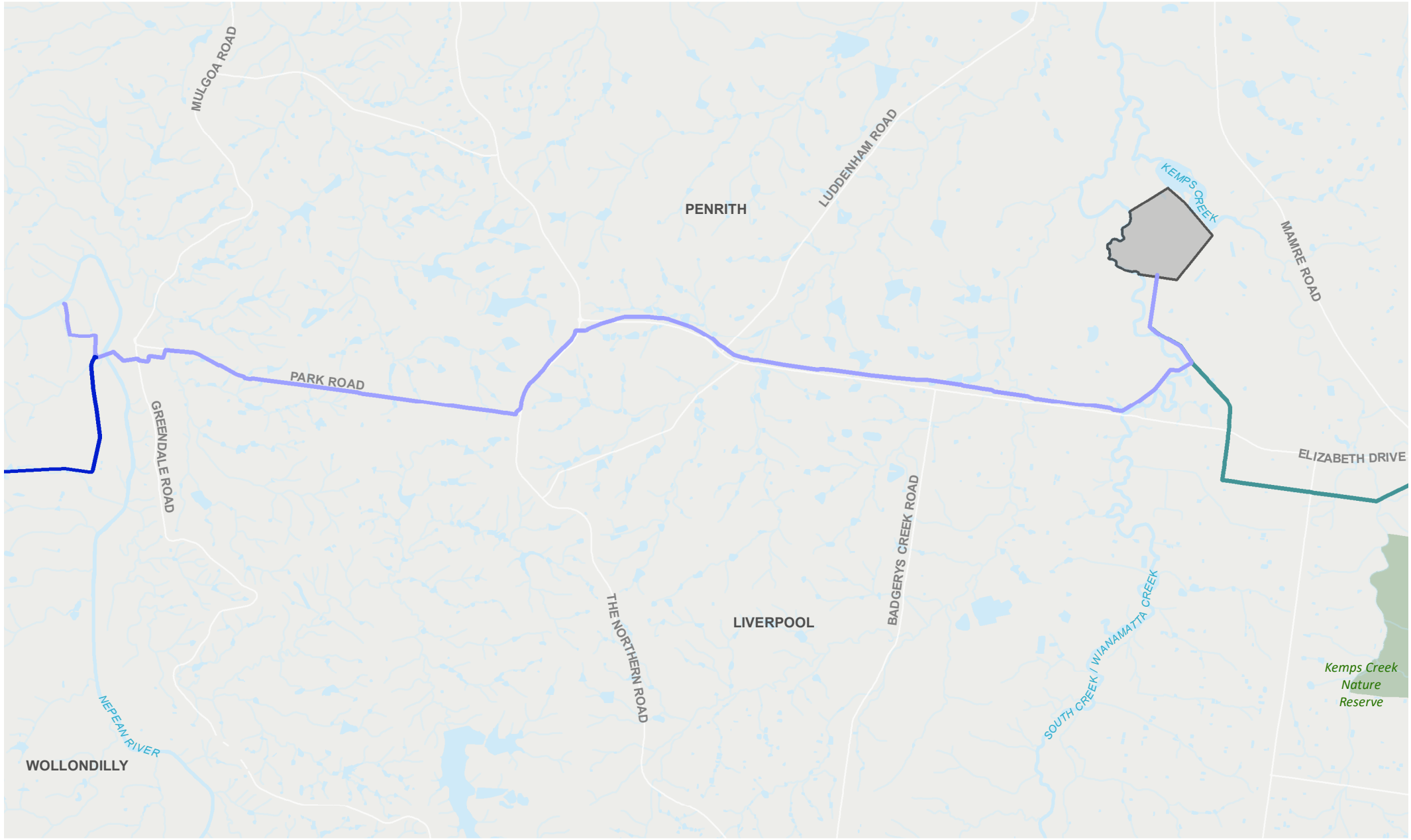

Figure 4-10 Treated water pipeline alignment

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

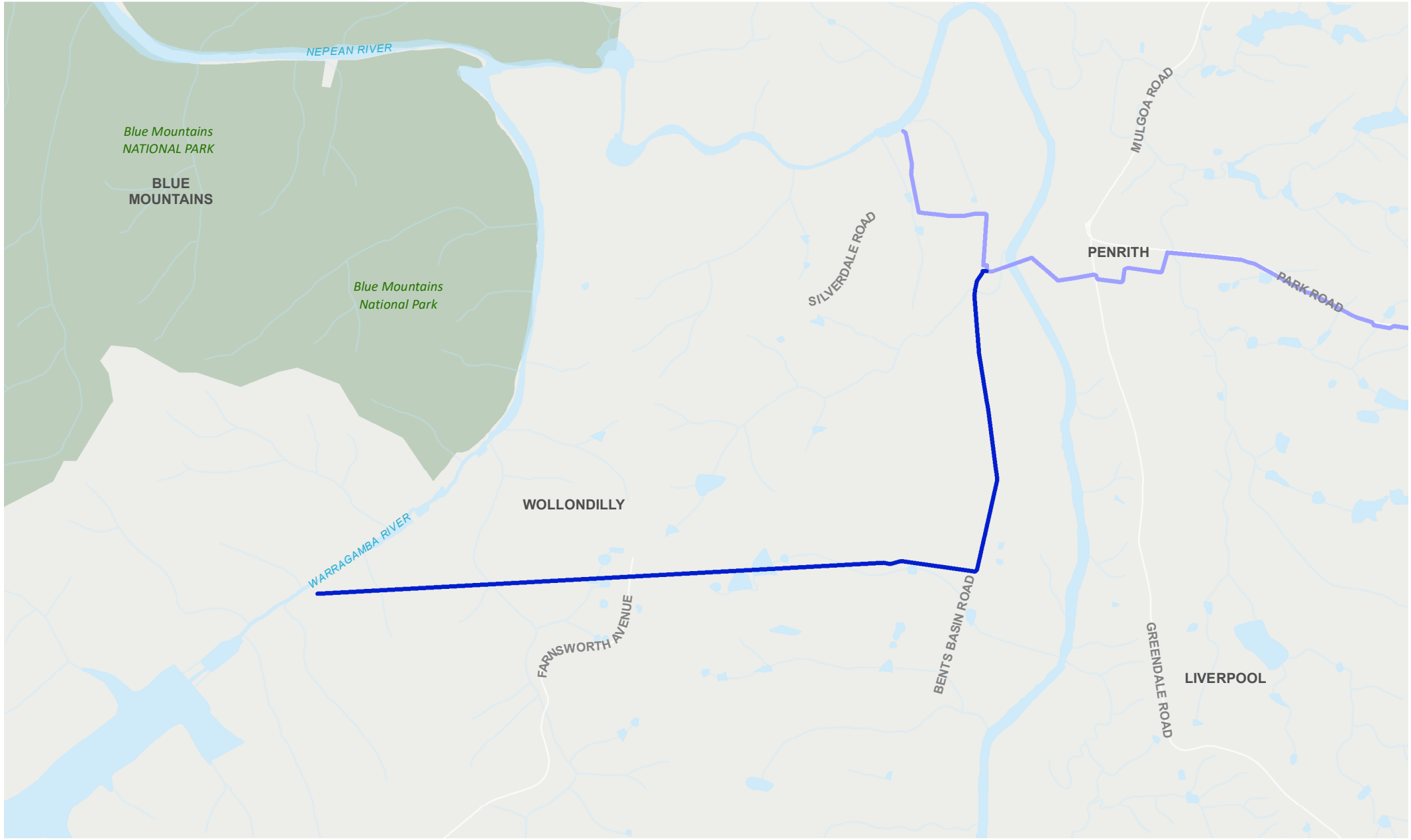

Figure 4-11 Environmental flows pipeline alignment

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

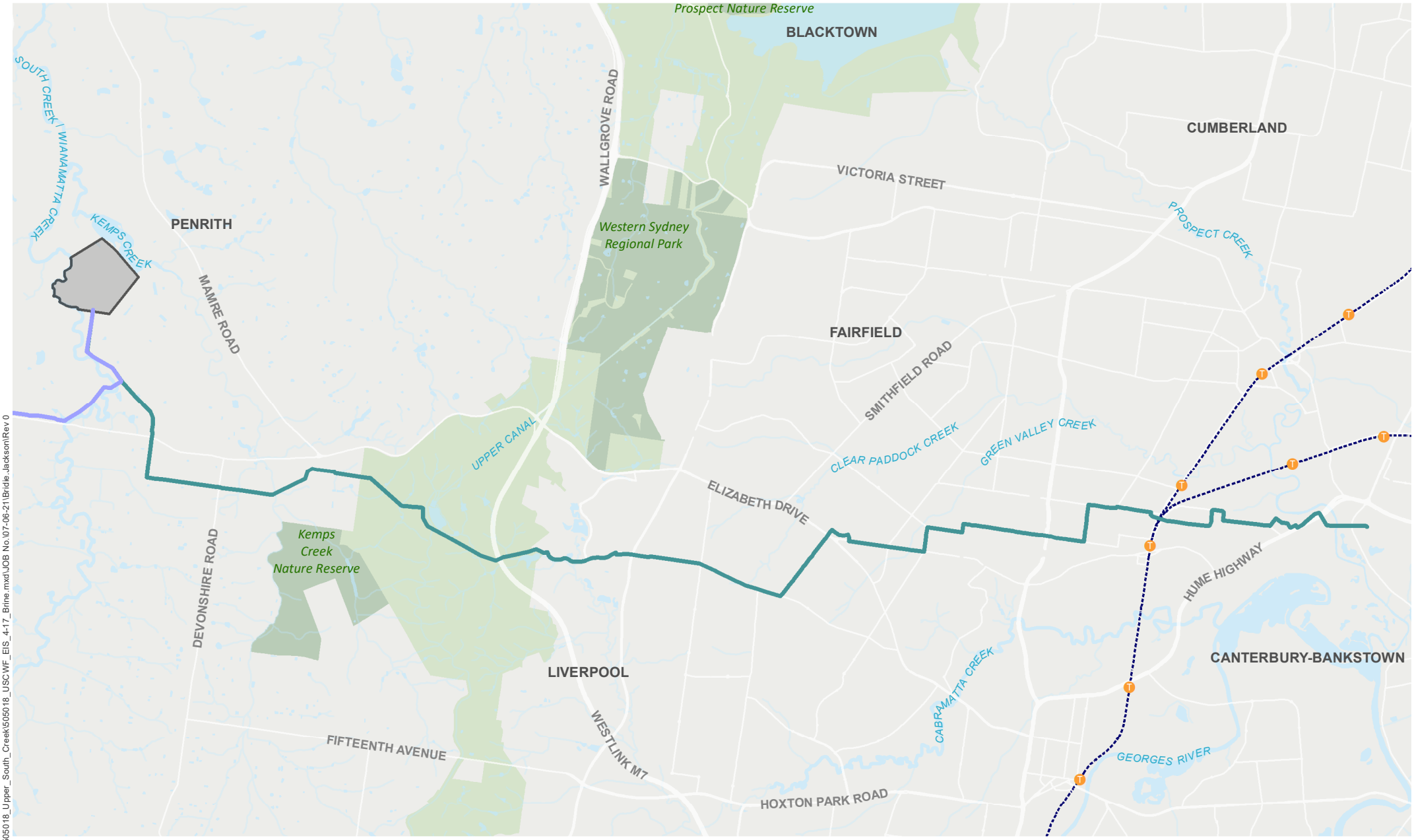

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Figure 4-12 Brine pipeline alignment

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

Pipeline ancillary infrastructure

The pipelines will be supported by ancillary infrastructure to enable assets to be easily monitored, accessed and operated. Table 4-5 provides a description of the main types of ancillary infrastructure required for the pipelines, and where they will be located.

Table 4-5 Description and location of the main ancillary infrastructure required for pipelines.

Ancillary infrastructure	Description	Location
Air valve	A valve used to expel air on filling the pipeline that also prevents a vacuum being formed when emptying the pipeline for maintenance. These valves are inside the pipe, however a small cover that extends about 30 cm above the ground level may be required.	These will be located at high points of the pipelines. Numbers below are current estimates and exact number and location will be identified in detailed design. Treated water ≈ 44 Environmental flows ≈ seven Brine ≈ 60
Scour valves and scour chambers	Scour valves are located at the low point of 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 dechlorinated if needed or pumped to a tanker for disposal at a suitable facility. Releases from the treated water and environmental flows pipeline will be directed to the nearest waterway by overland flow. Releases from the brine pipeline will be pumped to a tanker and disposed of at a liquid waste facility or into a nearby Sydney Water wastewater network. No above-ground infrastructure is proposed for these structures.	These will be located at low points of the pipelines. Numbers below are current estimates and exact number and location will be identified in detailed design. Treated water ≈ 27 Environmental flows ≈ three Brine ≈ 47
Other valves including isolation valves and actuated control valves	These 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. These are located below ground.	About every one kilometre along all pipelines (except the tunnelled section of environmental flows pipe). Also located at flow splitter. Exact number and location will be identified in detailed design.

Ancillary infrastructure	Description	Location
Flowmeter	Inground instrument along a pipeline that measures fluid flow rate. These are located below ground.	Flowmeter instruments located at flow splitter structure and pipeline release locations
Electrical control panel	Above-ground stainless steel panel to house electrical, instrument and control hardware to facilitate operation and monitoring of actuated control valves, flowmeters and other pipeline components. Electrical kiosks will measure about 0.6 m by 0.6 m and about 1.5 m in height.	Control panels are located at flow splitter structure at Bents Basin Road, Wallacia, and at the NGRS connection in Lansdowne Reserve for the brine pipeline.
Maintenance hole	Point of access into the pipeline system for inspections and maintenance. This is a circular access point at ground level.	Upstream of the treated water release structure in Wallacia.
Scour protection	Energy dissipation structures, such as rock and concrete, to reduce the energy of the released wastewater and minimise erosion to the surrounding environment.	Associated with release structures.

Treated water and environmental flows release structures

The treated water and environmental flows release structures will control the release of treated water into the receiving waterways. The release structures will include:

- a concrete chamber structure set back from the waterway
- measures to dissipate the energy of the treated water flows, for example baffle blocks, concrete rip rap (concrete slab with rocks/boulders)
- measures to prevent unauthorised access into the chamber and pipeline, for example grated covers and fencing
- scour protection along the nearby banks of Nepean and Warragamba Rivers to minimise erosion
- measures to protect the structure from flood impacts, for example gabion wall structure.

The environmental flows release structure is located downstream of the Warragamba Dam and spillway. There is potential for the structure to be inundated when the dam releases water during a major spill event which may damage the structure. WaterNSW have indicated that flows will be turbulent with highly variable water levels during these events (WaterNSW 2020a). The detailed design phase of the project will include the structural detailing of the release structure and what flow velocities and flood inundation levels it can withstand.

Figure 4-13 and Figure 4-14 show the indicative designs of the treated water and environmental flows release structures. Some infrastructure shown in the figures is located below ground, including the incoming pipeline, maintenance hole and concrete chamber. Above-ground infrastructure includes the concrete outlet structure, handrails and concrete rip rap.

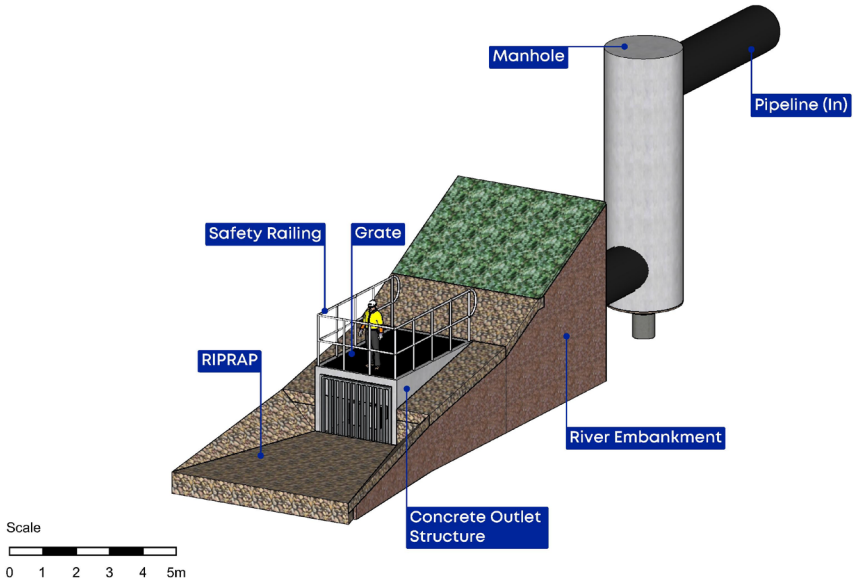


Figure 4-13 Indicative design of the treated water release structure

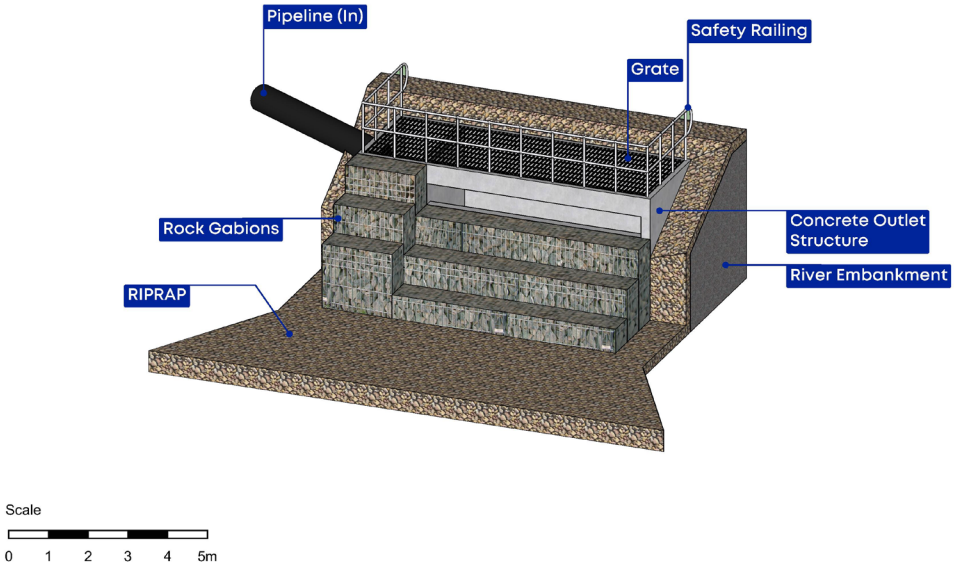


Figure 4-14 Indicative design of the environmental flows release structure

4.4.3 Design standards

Sydney Water follows industry design, construction and operation standards and codes to ensure the quality of installations. This is supplemented by Sydney Water's own deemed to comply drawings and technical specifications. Post construction monitoring and testing regimes are designed to ensure the quality of assets delivered. Those monitoring requirements are usually embedded to the technical specifications.

All structural elements of the project, especially the AWRC treatment processes will be designed with suitable materials or will be provided with suitable corrosion protection to ensure the specified design life. Redundancy via a duty and standby infrastructure arrangement will be factored into the AWRC design so that components can be taken offline for maintenance without disrupting plant operation.

Sydney Water has standards for the design life of infrastructure to ensure it will operate reliably. Generally, pipelines are designed for a minimum 50-year life. The design life of other components of the project include:

- structures and civil (excluding buildings): about 100 years
- buildings: about 50 years
- pumps and motors: about 30 years
- electrical assets: about 30 years
- general mechanical assets: about 20 years
- control assets: about 15 years
- general mechanical assets: about 20 years
- structures and civil (excluding buildings): about 100 years.

Sydney Water does not have any plans for decommissioning particular components of the project. The AWRC and pipelines will receive ongoing maintenance and upgrades to ensure they operate as intended and designed. Sydney Water designs its infrastructure to minimise maintenance, protect public health and the environment, and reduce service interruptions during operation and maintenance.

4.4.4 Design measures to minimise impacts

Measures have been incorporated into the reference design to minimise impacts to the environment and community, including:

- Suitable pipe material has been selected that will not be damaged by the contents being transported. For the brine pipeline, polyethylene (PE) is proposed that can transport the brine material under the required pressures without the risk of leaks and failure.
- The treated water and brine pipelines will operate under pressure which eliminates the need for uncontrolled overflow points that would release treated water into the environment.

- Pump out scours will be located along the brine pipeline, so that if a section of the pipeline requires maintenance or repair, the pipeline contents can be pumped into a truck for disposal, and not released into the environment.
- Tanks for temporary brine storage will be located at the AWRC in weather when the NGRS that receives the brine is at full capacity. This will minimise the potential for the brine to displace wastewater in the NGRS, resulting in wastewater overflows into the environment.
- Odour control units will be located at the AWRC to treat and minimise odour to avoid foul air being released into the environment.
- Renewable energy will be generated at the AWRC site in the form of solar and co-generation to offset a portion of the power required to be purchased from the grid to operate the AWRC.
- The layout of the treatment processes at the AWRC will use gravity to move wastewater through the site and reduce the need to pump and use electricity.
- The AWRC will be located outside the 1% AEP flood level to minimise flooding and damage to the plant that may result in release of wastewater into the environment.

4.5 Operation of the AWRC

The AWRC will service the SWGA and WSAGA, with potential to service other areas in the future. It will receive wastewater from industry, businesses and residences and process it 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.

The sections below provide more details on treated water and brine volume and quality and AWRC treatment processes. Figure 4-15 shows the flow of wastewater through the different AWRC treatment processes. The detail is based on Stage 1 and also applies to future stages.

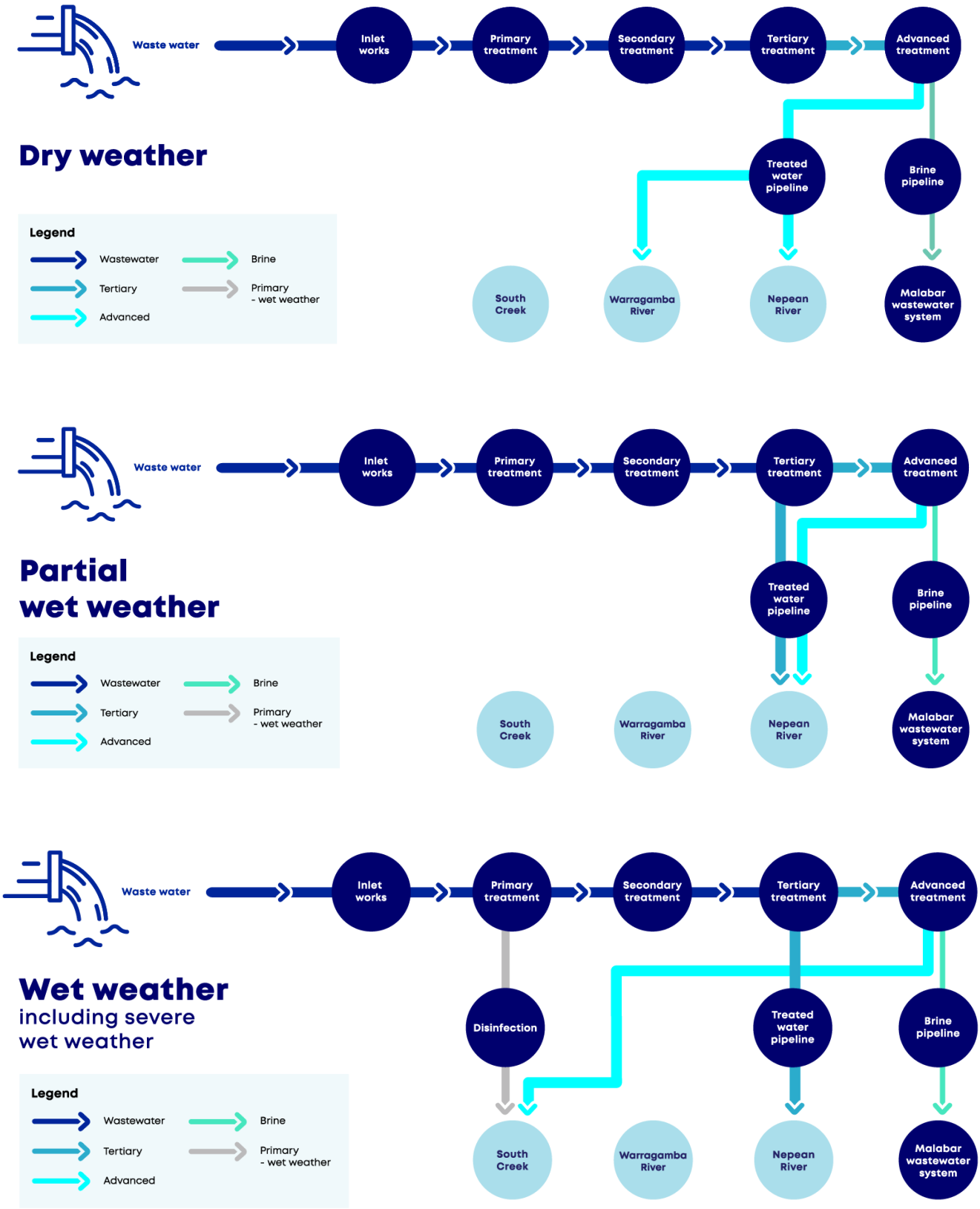


Figure 4-15 Flow of wastewater through the AWRC

4.5.1 Treated water

Treated water quality

The AWRC will produce treated water at three different quality levels including:

1. advanced (very high-quality) treated water
2. tertiary (high-quality) treated water
3. wet weather quality (lowest level of treatment – primary treatment).

Wastewater that receives higher levels of treatment will have lower concentrations of total nitrogen, total phosphorus and ammonia, and lower conductivity and enterococci. Table 4-6 provides indicative concentrations and measurements of different water quality parameters for the different levels of treatment.

Table 4-6 Indicative concentration of water quality under different treatment levels

Parameter	Units	Median concentrations		
		Advanced treated water	Tertiary treated water	Wet weather treated water
Total nitrogen (TN)	mg/L	0.35	2.5	18
Total phosphorus (TP)	mg/L	0.009	1	1
Oxides of nitrogen (NO_x)	mg/L	0.12	1.8	0
Ammonia (NH_3)	mg/L	0.03	0.2	15
Filterable reactive phosphorus (FRP)	mg/L	0.006	0.66	0.66
Chlorophyll *a* (Chl *a*)	µg/L	0	0	0
Dissolved oxygen (DO)	mg/L	9.2	5.9	0
TSS	mg/L	0	1	35
TDS	mg/L	20	540	240
pH	pH units	7	7	7
Conductivity	µS/cm^2	150	1500	1500
Enterococci	CFU/100mL	0	0	7400

In addition to the parameters considered in the above table, 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 8.

Treated water volume and release location

Sydney Water designs treatment processes based on average dry weather flow (ADWF), which is the average volume of incoming wastewater the AWRC is expected to receive from the servicing area each day. For this project, Sydney Water calculated expected ADWF based on population forecasts and typical wastewater generation for households, business and industry.

While these calculations are useful for design purposes, the actual incoming wastewater volume may be lower or higher than the average, depending on how much wastewater is generated and how much rainfall there has been. To account for these fluctuations, the advanced treatment process is designed to treat up to 1.3 times the ADWF, which Sydney Water considers as dry weather flows.

Sydney Water must design for additional volumes of wastewater entering the AWRC during wet weather which can occur from illegal stormwater connections to the wastewater system or stormwater entering the system through damaged wastewater pipes. Given these larger volumes are infrequent, and highly diluted, they receive lower levels of treatment.

Where flows that are greater than 1.3 times ADWF are referenced, this refers to flows during wet weather. This approach to treatment is typical for wastewater treatment plant design.

During normal dry weather operating conditions, all advanced treated water up to 1.3 times ADWF will be released to Warragamba River or Nepean River. Beyond 1.3 times AWDF, the AWRC will be operating under wet weather flows scenarios which include:

- During flows up to 1.7 times AWDF, treated water will be released to Nepean River via the treated water pipeline. This treated water will be a combination of advanced and tertiary treated water, with a minimum quality of tertiary treated water shown in Table 4-7.
- Once flows exceed 1.7 times ADWF, advanced treated water will also be released to South Creek via the South Creek release infrastructure. Once flows exceed three times ADWF, wet weather quality water will also be released to South Creek. Based on historical climate and Sydney Water treatment plant data, releases to South Creek are expected between 3-14 days per year.

Table 4-7 shows the different treatment levels for these incoming wastewater volume scenarios and the proposed release locations.

Table 4-7 Flow scenarios for Stage 1 of the AWRC and the respective release locations

Flow Scenario	Releases to Nepean River and Warragamba River		Releases to South Creek	
	Treatment level	Indicative volume (ML/day)	Treatment level	Indicative volume (ML/day)
Dry weather Flows up to 1.0 x ADWF	Advanced (≤1.0 x ADWF) to Warragamba River or to Nepean River if the environmental flows pipeline is not built.	0 – 45	-	-
Partial wet weather Flows from >1.0 x to 1.7x ADWF	Advanced (1.0 - 1.3 x ADWF) to Nepean River	45 – 59	-	-
	Tertiary (≤0.4 x ADWF) to Nepean River	0 - 20	-	-
Wet weather Flows from 1.7 x to 3x ADWF	Advanced (≤1.3 x ADWF) to Nepean River	59 - 0	-	-
	Tertiary (0.4 - 1.7 x ADWF) to Nepean River	20 - 85	Advanced (≤1.3 x ADWF)	0 – 59
Severe wet weather Flows ≥3 x ADWF	Tertiary (≤1.7 x ADWF) to Nepean River	85	Advanced (1.3 x ADWF)	45 – 59
			Wet weather (>3 x ADWF)	See note below

Notes on table:

- ADWF (ML/day) – average dry weather flow in megalitres per day. This is the average wastewater flow into the AWRC in typical conditions.
- Volumes of advanced treated water released to waterways are less than incoming flows as about 10% of incoming wastewater becomes brine and is not released as treated water. The release volumes in Table 4-7 account for this.
- Indicative volumes for each flow scenario represent a transition in treatment level and release location. For example, under the wet weather flow scenario, the preference is to minimise releases to South Creek. However, once incoming flows increase above 1.7 x ADWF and the treated water pipeline is at capacity, advanced treated releases will be incrementally diverted to South Creek which is reflected in the range of volume of 0 – 59 ML/day up until the incoming flows reach 3.0 x ADWF. As the incoming flows to the AWRC increase, the advanced treated releases to Nepean River will reduce, being replaced by tertiary treated water.

- This table assumes there are no alternative recycled water customers, which could be supplied from the AWRC but are not specifically included in this project scope. Such supply would typically be taken from ADWF.
- Incoming flows >3.0 x ADWF will receive primary treatment, including disinfection, and be released to South Creek.

Brine volume and quality

The advanced treatment process produces brine as a by-product which will be transferred to Sydney Water's Malabar wastewater system.

Table 4-8 gives an indicative breakdown of the concentration of different analytes likely to make up the brine stream. These numbers are indicative only and may change depending on the type of advanced treatment selected. However, any changes are likely to be minimal and are unlikely to have an impact on the operation of the AWRC or brine pipeline. At full operation at 50 ML/day ADWF, Stage 1 of the AWRC will transfer between 5 ML - 8 ML of brine from the AWRC to the NGRS each day.

Table 4-8 Indicative concentration and chemical composition of the brine stream

Analyte Name		Units	10%ile	50%ile	90%ile
Ammonia	NH4+ + NH3	mg/L	0.28	0.40	0.81
Potassium	K	mg/L	75	75	89
Sodium	Na	mg/L	537	537	634
Magnesium	Mg	mg/L	61	61	64
Calcium	Ca	mg/L	90	90	96
Strontium	Sr	mg/L	0.32	0.34	0.37
Carbonate (part of alkalinity measure)	CO3	mg/L	1.7	2.3	3.8
Bi-carbonate (part of alkalinity measure)	HCO3	mg/L	331	361	452
Nitrate	NO3	mg/L	4.9	6.7	18.7
Chlorine	Cl	mg/L	804	823	854
Fluoride	F	mg/L	2.8	2.8	2.9
Sulfate	SO4	mg/L	283	283	377
Silicon dioxide	SiO2	mg/L	24	24	27
Boron	Boron	mg/L	0.13	0.13	0.13
Carbon dioxide	CO2	mg/L	9.6	10.2	12.1
Total dissolved solids	TDS	mg/L	2235	2248	2622
pH	pH	pH units	7.5	7.6	7.7

Brine storage is also a factor in wet weather. If the capacity of the brine storage tanks is exceeded during prolonged wet weather because there is insufficient availability in downstream networks to allow for brine discharge, then the advanced treatment process will switch off temporarily so that the brine does not overflow. In this rare case, only wet weather quality water will be released to South Creek. The brine storage tanks have about three days of storage capacity.

4.5.2 Treatment process

Screening and screening handling

The screening process will remove materials such as rags, plastics, papers and large objects (screenings) from incoming wastewater, to avoid damage to downstream equipment and allow efficient operation of the AWRC. This will be located at the inlet works where all incoming wastewater enters the plant.

The wastewater will pass through mechanical screens with small openings. The screenings will be transferred to screening presses to wash off organic materials and remove excess water, before being stored in fully enclosed screenings bins. Screenings bins will be emptied and the waste material disposed at a solid waste landfill. Section 4.6.6 provides further details on operational waste.

A range of equipment is required, including penstocks and manual stopboards upstream and downstream of the screens to control water flow, and trafficable covers across the screening channels. Figure 4-1 shows the indicative location of the inlet works and screening process.

Grit removal

The grit removal process will treat screened wastewater and capture materials such as sand and gravel so they do not adversely impact downstream treatment processes.

Screened wastewater will enter the grit vortex chambers where the grit is removed from the wastewater. The grit accumulates in the grit vortex where it is pumped into the grit bins for offsite disposal as solid landfill waste, or for beneficial reuse if opportunities are available. The screened wastewater then continues into further primary treatment processes.

Primary treatment

Primary treatment will remove some organic solids from the wastewater. This typically occurs in sedimentation tanks where solids settle at the bottom. The solids are pumped to the thickening process for further treatment, and the liquid portion continues on to secondary treatment. Several technologies including primary sedimentation tanks are available for primary treatment and may be adopted during detailed design. Figure 4-1 shows the indicative location of the primary treatment process.

Secondary treatment

Secondary treatment involves the biological removal of nutrients, particularly organics, nitrates, ammonia and phosphorus from the wastewater. Secondary treatment will use a combination of anoxic and aerobic treatment. Anoxic relates to molecular oxygen not being present, and aerobic relates to the presence of molecular oxygen. Secondary treatment uses biological processes to remove organics and nutrients such as nitrogen and phosphorus. Figure 4-1 shows the indicative location of the secondary treatment process.

Tertiary treatment

Tertiary treatment removes further organic and inorganic solid components and can be designed to remove nutrients such as nitrogen and phosphorus. Some bacteria, virus and parasites which are harmful to public health are also removed at this stage. The AWRC will likely use membrane technology for tertiary treatment. This involves the wastewater from secondary treatment being pushed through a semi-permeable filtration barrier which acts to retain impurities. The retained impurities are returned to prior treatment phases. The tertiary treated wastewater continues to the advanced treatment process. Figure 4-1 shows the indicative location of the tertiary treatment process.

Advanced treatment

Advanced treatment removes any remaining impurities in the wastewater following the primary, secondary and tertiary treatment processes. This includes smaller-sized particles of biological, organic and inorganic material that may have passed through the previous stages due to their small size. The AWRC is likely to use Reverse Osmosis (RO) which achieves a high quality of treatment by forcing the wastewater through a membrane under high pressure.

The outputs of the advanced treatment process are the treated water stream and the brine stream. The brine stream consists of the waste products from the advanced treatment process. Figure 4-1 shows the indicative location of the advanced treatment process.

The advanced treated water will also be treated to remineralise the water and adjust the pH. This prevents concrete corrosion in the treated water and environmental flows pipelines and returns salinity and pH to levels similar to receiving waterways.

Disinfection

During the treatment process, the wastewater is disinfected to remove bacteria, viruses and other pathogens. This ensures that they are not released into the environment where they can impact on health and safety. Disinfection can be achieved using chlorine or ultraviolet radiation, as well as through the membrane barriers used during tertiary and advanced treatment processes.

Both tertiary and advanced treatment provide barrier disinfection for water that will be released to waterways or used for recycled water. Primary effluent is disinfected (chlorine) and dechlorinated (sodium bisulfite) prior to release to South Creek.

4.5.3 Supporting processes and infrastructure

Thickening and Digestion

Solids which are drawn from the both the primary and secondary processes have the water content reduced in the thickening process. This is typically carried out in drum thickeners, with the removed liquid (centrate) pumped back to earlier processes for treatment, and the thickened solids transferred to the digesters.

The digesters perform biological digestion to break down and stabilise the thickened solids in accordance with the biosolids targets. This process reduces the total mass of the solids, reducing pathogens and odour. This process also produces biogas that will be used for renewable energy generation.

Solids dewatering and reuse

Solids from the anaerobic digesters will be dewatered to reduce the volume required for offsite beneficial reuse. This uses a centrifuge to separate the solids from liquid. The remaining liquid (centrate) will be pumped back to the inlet works, with the remaining biosolids transferred to storage bays in an out-loading building, enabling a truck to drive through for loading and off-site beneficial reuse. The out-loading building will allow several days' storage. Figure 4-1 shows the indicative location of the biosolids outloading building and digesters.

Transfer pump stations

Two pump stations (one for treated water and one for brine) will be located at the AWRC site in standalone building(s). The treated water pump station will pump advanced and tertiary treated water for release at Nepean and Warragamba Rivers via the treated water pipeline. The brine pump station will pump the brine to the NGRS at Lansdowne via the brine pipeline.

Both pump stations will be automatically controlled via an Integrated Instrumentation Control Automation and Telemetry System (IICATS). Figure 4-1 shows the indicative location of the transfer pump stations.

Renewable energy

Biogas produced in the anaerobic digesters can be delivered to co-generation engines to generate electricity and provide digester heating. Biogas is produced in the digesters and mainly comprises methane and carbon dioxide. Biogas is temporarily stored in the top portion of the digesters prior to transport to the co-generation engines or waste gas burners. It is estimated that the AWRC will produce up to three million cubic metres of biogas each year once Stage 1 is fully operational.

Biogas volumes above the maximum amount the co-generation engines can consume will be combusted in the waste gas burners. This is only required if generation of biogas exceeds co-generation and storage capacity and is estimated at about 8% of the total biogas produced. The AWRC is proposed to have up to 1.2 MW co-generation capacity that will convert the biogas to electricity.

In addition to co-generation, Stage 1 of the AWRC will also include rooftop and ground mounted solar panels.

The combined renewable energy generation capacity is expected to be about 5 MW (based on the available technology and expected design outcomes at time of writing the EIS) to allow for standard protection and connection schemes. When the AWRC is operating at full Stage 1 capacity of 50 ML/day, the peak power demand is estimated to be about 6 MVA. This number will be lower in the earlier years of operation when incoming flows are lower as the energy requirements to operate the plant will be lower. As such, the amount of renewable energy generation will fluctuate over time. When renewable energy generated cannot be used for the AWRC, Sydney Water may export excess self-generated electricity to the grid.

Antiglare treatment will be provided to solar panels as required to reduce risk to aircraft in accordance with the National Airports Safeguarding Framework (NASF) requirements.

Odour control

Odour is generated by wastewater at different stages of treatment. It is mainly generated in the form of hydrogen sulfide. Sources of odour from the AWRC will include inlet works, primary treatment and the biosolids handling area. Each of these processes will be covered during operation, with the air extracted and sent to an odour control facility for treatment.

The AWRC will have an odour control facility that is likely to be centralised and use biotrickling filters (BTF), activated carbon filters (ACFs), or similar, to treat odour prior to release to the atmosphere. Figure 4-1 shows the indicative location of the central odour control facility.

Chemical storage

Various chemicals will be required to dose the wastewater at different stages of the treatment process. These are 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 requires a storage tank and dosing pump. Chemical storage tanks will be installed in dedicated concrete bunds to contain any spills and covered with protective coatings to prevent concrete corrosion. All chemical storage facilities will meet the relevant codes for safe storage and handling.

Each chemical storage area will ideally be located close to the dosing point to minimise transport and pumping around the site. Chemicals will 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. Table 4-9 provides an indicative list of the chemicals that will be stored on site that are required for operation of the AWRC. The indicative location of chemical storage areas is shown in Figure 4-1.

Table 4-9 Chemicals that will be stored and used at the AWRC

Chemical	Required use
Ferric chloride	Primary and solids treatment
Alum	Secondary and advanced treatment
Methanol	Secondary treatment
Sodium hydroxide	Secondary and advanced treatment
Citric acid	Tertiary treatment
Sodium hypochlorite	Tertiary and advanced treatment
Sodium bisulfite	Tertiary and advanced treatment
Sulfuric acid	Advanced treatment
Detergent	Advanced treatment
Ammonium sulfate	Advanced treatment
Phosphonic acid	Advanced treatment
Lime	Advanced treatment
Carbon dioxide	Advanced treatment
Liquid polymer	Solids treatment
Powder polymer	Solids treatment

South Creek release

The AWRC will release treated wastewater to South Creek during wet weather events via infrastructure including swales, pipelines, headwalls and scour protection.

Resource recovery

Digested solids from the anaerobic digesters will be dewatered before being taken off-site for beneficial reuse as an agricultural biosolid. Biosolids are currently handled in accordance with the Sydney Water Bioresources Master Plan (Sydney Water, 2018a) and 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. Stage 1 of the AWRC will produce about 15 tonnes of dewatered biosolids per day at its ultimate capacity. The ultimate destination and use of biosolids generated at the AWRC is not part of the scope of the EIS as Sydney Water has arrangements in place to manage reuse of biosolids across its whole wastewater network. Biosolids are primarily used for land application in agriculture or further processed into compost.

Power supply

The AWRC will receive power by two separate high voltage (HV) supply feeds from one distribution zone substation. Under normal operation each feed will supply about half of the power supply to the AWRC. This provides reliability and contingency in the event of power outage, as the AWRC is not relying on a single source of power to operate.

In the event of one incoming power supply failing, auto-changeover will occur to transfer the load of the full AWRC to the single active supply feed, and the AWRC can continue to operate normally. During the changeover the AWRC still has the capacity to continue to operate, but is limited to treating 1.5 x ADWF. Any flow above this level will receive wet weather treatment, including disinfection, and be released into South Creek.

In the event both incoming supply feeds fail, the AWRC will lose power. In this scenario, flows up to 3 x ADWF will bypass into South Creek after being disinfected. The collection network will also limit the amount of incoming flow into the AWRC by using emergency storage at pump stations and in the network. It is highly unlikely that both incoming power supply feeds to the AWRC will fail. Despite multiple layers of redundancy, a complete power failure event is possible, however the risk is considered low.

4.5.4 Maintenance activities

The AWRC, pump stations and pipelines will 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 AWRC and pumping stations. Maintenance work is usually carried out by a small number of staff using light vehicles, often by operational staff already working at the AWRC.

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

4.5.5 Operational workforce and hours

Operational staff requirements are still to be determined but Sydney Water expects the AWRC may require up to 10 operational staff for Stage 1.

Typically, the AWRC will operate in automatic mode, and the role of operational workers includes:

- 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 SCADA system
- sampling and testing wastewater
- assisting contractors and maintenance workers
- maintaining management systems
- intervening in extreme weather and power outages.

The AWRC and pipelines will operate 24 hours a day, seven days a week. Operational staff will likely only be present during standard hours unless emergency work or maintenance is required. The AWRC will be designed to operate autonomously and will be linked to Supervisory Control and Data Acquisition (SCADA) and IICATS systems for remote operation.

4.5.6 Operational transport and access

Vehicle movements during operation of the AWRC will be related to:

- staff journeys (up to 10 two-way trips each day)
- biosolids removal (about two trucks per day at peak biosolids production)
- screening removal (about one truck per week)
- grit removal (about one truck per fortnight)
- other deliveries (typically between three and seven vehicles each day for chemical deliveries) and
- maintenance requirements (ranging from daily to every six months).

4.5.7 Operational waste

The AWRC will produce a range of operational waste which includes special, liquid, hazardous and general solid waste. Most of the waste produced by the AWRC will be the screenings separated from the incoming wastewater at the inlet works and the dewatered grit, including sand. This has been estimated at about 91 and 110 tonnes per year, respectively. Other waste generated by the AWRC relates to the maintenance of equipment, such as oil, batteries, chemical containers, and waste generated by the operational staff such as food waste and electronic waste.

4.6 Operation of pipelines

This section describes how each of the pipelines will operate once they have been built. This includes how the treated water and brine are transported to their release locations, the release regime and how Sydney Water will maintain this level of operation.

4.6.1 Treated water pipeline and environmental flows pipeline

The default operating regime for the treated water pipeline is for the transfer pump station at the AWRC to pump very high-quality treated water to Warragamba River via the treated water and environmental flows pipelines.

If the volume is less than 1.3 x ADWF the flow splitter diverts the flow to Warragamba River via the environmental flows pipeline. If the volume of treated water from the AWRC is greater than 1.3 x ADWF (or the environmental flows pipeline is not built) the flow will only be to Nepean River via the treated water pipeline. Sydney Water is seeking flexibility in the operating releases if the environmental flows pipeline is built, to establish an approach that aligns with the NSW Government's future environmental flow regime and ensures efficient operation of the pipelines.

Releases from these pipelines are expected to be at velocities between about 1.5 to two metres per second, and temperature will vary between 15°C – 26°C but is likely to average about 20°C.

4.6.2 Brine pipeline

When brine is produced via the advanced treatment process, it will first be stored in tanks before release into the NGRS via the brine pipeline. These tanks will have a storage volume of about 30 ML. This equates to a storage duration of about six days in 2026 and three days when the AWRC is operating at 50 ML/day. This will ensure that the brine does not displace wastewater in the NGRS and the supporting Malabar wastewater network when this system experiences capacity issues, typically during wet weather. Once the system has capacity, the brine that is stored in the brine tanks can be released into the NGRS via the brine pipeline.

During wet weather events, the advanced treatment process will be switched off if the brine storage tanks reach capacity and are unable to release brine into the NGRS via the brine pipeline. Modelling of the wastewater system suggests this is likely to be happen about six times in 10 years in 2026, and up to 15 times in 10 years when the AWRC is operating at 50 ML/day. Sydney Water expects that by 2036, upgrades to the Malabar wastewater system will increase its capacity so brine storage at the AWRC is unlikely to be required.

Pipeline leaks and failures

Unless an overflow point has been included in the design of a wastewater pipeline, modelling leaks and failures is not feasible. The only way the brine pipeline can fail is if it gets damaged by ground disturbance. This cannot be predicted, so it cannot be modelled.

Sydney Water considers standard design elements during the design process of all wastewater pipelines, to minimise the potential for leaks and failures, including:

- appropriate pipeline materials
- appropriate pipeline sizing
- adequate system capacity
- alignments and locations
- operational access
- contingency capacity to temporarily store or divert wastewater.

The brine pipeline has been designed as a fully enclosed system with air entry and exit via air valves. The valves are designed to release air, not brine. There are no discharge points along the pipeline except at the connection to the Malabar wastewater system at Lansdowne. Sydney Water has completed a steady state and water hammer assessment on the pipeline and incorporated measures into the design to ensure no discharge to the environment from the pipeline will occur even during extreme failure scenarios. Design measures to minimise the potential for leaks and failures include:

- sealed system which will be tested during commissioning of the pipeline to ensure no leaks occur
- pressurised system to avoid the need for overflow structures as with a gravity system
- pipe material that can withstand the pressure and force of the flow
- scour valves (which allow emptying brine from the pipeline for maintenance) located outside of sensitive environments, including Western Sydney Parklands)
- maintenance work requiring emptying of sections of brine pipeline will involve tankering of the contents offsite via pump out scour valves with no releases into the local environment.

Sydney Water has processes and procedures in place to respond to the unlikely event of system failures, including leaks, of pressurised wastewater systems such as the treated water and brine systems. This includes isolating damaged areas for repair and rehabilitating any impacted areas.

As detailed design progresses Sydney Water will undertake a more detailed risk assessment of pipeline failures. If any further mitigation measures are identified, these will be incorporated into the design and the standard operating procedure for the brine pipeline.

4.6.3 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 will be required during early stages of operation with an increased focus on inspection and testing. This is particularly important for the release structures at Nepean and Warragamba Rivers to monitor flow and erosion.

Several trenchless sections of pipeline have been designed to be maintenance free due to the difficulties in accessing them for future maintenance. These sections include the environmental flows pipelines between Bents Basin Road and Warragamba River, railway crossing at Cabramatta, and crossing of Prospect Creek at Lansdowne. As noted in the project scoping report and in section 4.5.4, maintenance activities are outside the scope of the project.

4.6.4 Operational workforce and hours

The pipelines will not require any permanent staff, but there will be regular routine inspections and maintenance of the pipelines and release structures during operation. These inspections will be completed as needed and typically by a small number of workers about every six months in any particular location. Water quality sampling at the release structures will occur about once a quarter. The pipelines will operate 24 hours a day, seven days a week.

4.6.5 Operational transport and access

A small number of operational vehicle movements will be required for operation and maintenance of pipelines. Activities will include condition assessments, wastewater sampling and monitoring of flow conditions. Vehicle movements will be infrequent and scattered across all pipeline alignments and are expected to have negligible impact on the local traffic network. A sealed access track to the environmental flows release structure will be required off Core Park Road for vehicle operational access. A footpath and staircase will also be provided at this location. No other permanent sealed access tracks for operational use will be required.

4.6.6 Operational waste

Any maintenance activities required once the pipelines are operational will be done by Sydney Water operations teams or contractors. Operational waste is expected to be minimal.

4.7 Early construction work and site investigations

Some site investigations and early works will 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 will be managed with separate environmental management plans or work method statements prior to preparation of the Construction Environmental Management Plan for the overall project.

Site investigations and early works may include:

- archaeological investigations and salvage work
- survey work and geotechnical investigations
- relocation, adjustments and protection of existing services
- site establishment activities:
  - removal of waste and any site contamination for site
  - preparation 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 will have minimal impact on the environment.

4.8 Construction of the AWRC

Figure 4-16 shows the construction impact area for the AWRC site with one area designated for the AWRC and ancillary components and another for the green space area and release infrastructure to South Creek. Environmental impact assessment for the AWRC is based on these impact areas.

The following sections describe the different construction phases of the AWRC, including indicative timing, activities and required equipment and machinery.

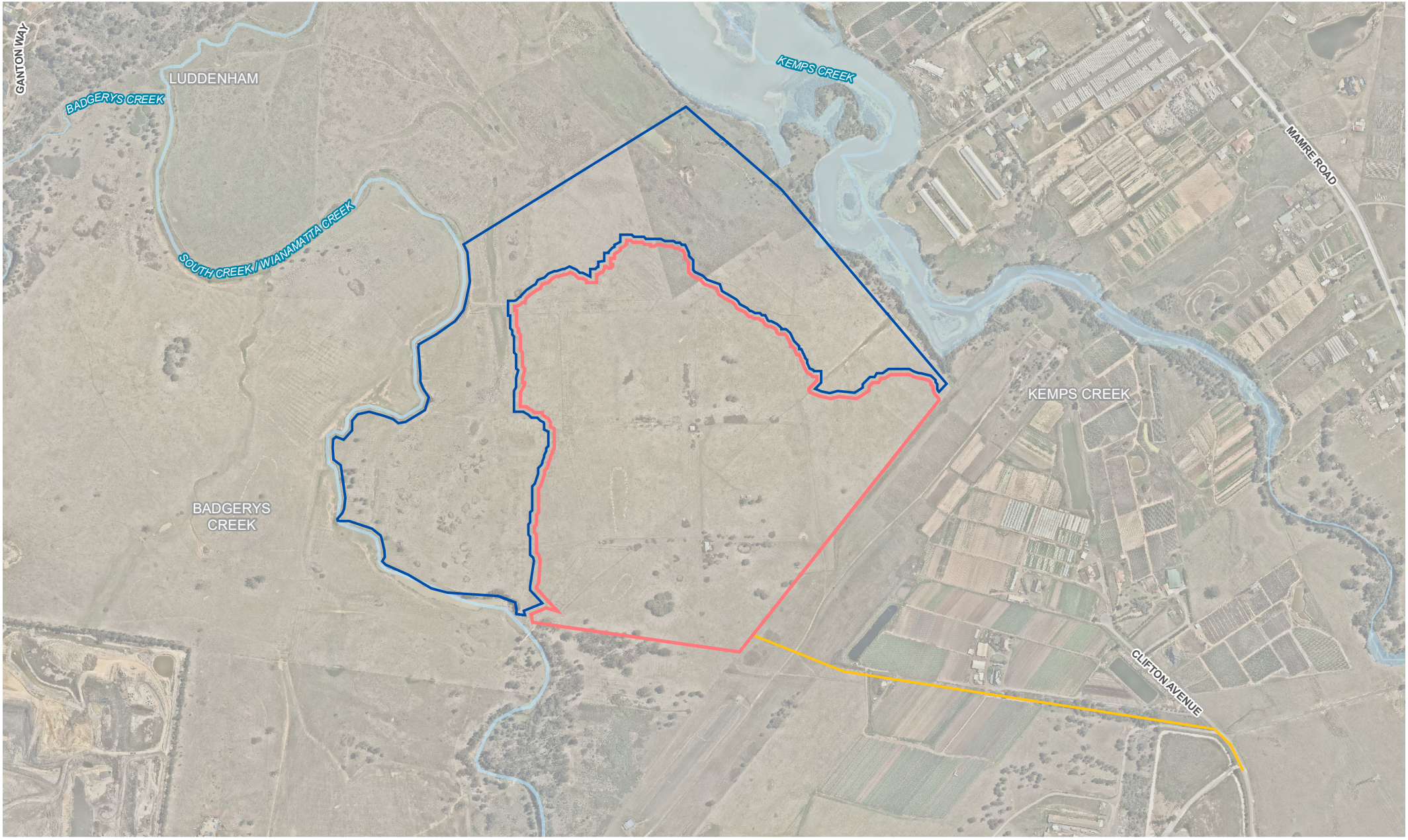


Figure 4-16 Construction area of the AWRC

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

4.8.1 Construction phases

There are seven main phases of construction for the AWRC:

- Phase 1 – site establishment and mobilisation.
- Phase 2 – site earthworks, stockpiling, storage and removal of materials.
- Phase 3 – civil works.
- Phase 4 – AWRC structure construction.
- Phase 5 – mechanical and electrical installation.
- Phase 6 – landscaping works and rehabilitation.
- Phase 7 – commissioning.

Although these phases represent the general progression of construction activities, these phases are expected to overlap. The overall duration of construction at the AWRC site is expected to be about 36 months, starting in mid-2022.

Table 4-10 provides more details about the construction phases, including indicative duration, typical activities and typical equipment required. These will be developed in more detail by the construction contractor during detailed design and construction planning.

Table 4-10 AWRC construction phases, timing, activities and required equipment

Phase	Duration	Typical construction activities	Typical equipment	
Phase 1: Site establishment and mobilisation	About two 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. • Remove surface vegetation. • Demolish existing buildings. • Contamination management.	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 to prepare site, including stockpiling top soil, removing spoil and importing fill. • Establish temporary site drainage and soil and water management controls. • Excavate for detention basins, underground infrastructure etc. • Excavation dewatering. • Waste disposal.	Backhoe loaders Chainsaws Compactors Concrete saws Cranes Dozers Dump trucks Excavators Excavators hammer	Front end loaders Grader Hand tools Pumps Roller Paver Profiler Trucks Water trucks

Phase	Duration	Typical construction activities	Typical equipment	
Phase 3: Civil works	About 12 months	• Construct roads and stormwater infrastructure. • Construct permanent internal roads and utility connections. • Construct permanent storage basins.	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: AWRC structure construction	About 18 months	• Construct buildings, treatment infrastructure, erect storage tanks and other treatment process units. • Install treatment equipment. • Build pipelines to South Creek.	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. • Operations equipment installation and testing.	Hand tools Light vehicles Trucks	Cranes Delivery trucks
Phase 6: Landscaping and rehabilitation	About three months	• Native planting and landscaping works on AWRC operational area. • Remove environmental controls. • Develop green space area (this is likely to continue into subsequent phases).	Hand tools Light vehicles	

Phase	Duration	Typical construction activities	Typical equipment
Phase 7: Commissioning	About six months	• Equipment testing and commissioning. • Operational testing. • Process proving. • Discharge commissioning wastewater.	Light vehicles Trucks Pumps Cranes

4.8.2 Construction workforce

The number of construction staff will depend on the schedule of works and construction program which will be developed during the detailed design and construction planning phase of the project. The AWRC site will have up to about 200 construction staff at any given time during construction. This number will fluctuate across the construction program and represents the peak construction of the program.

4.8.3 Landscape and restoration

Section 4.4.1 describes the landscaping and urban design approach for the AWRC site. This will include landscaping in the operational area and the green space area.

4.9 Construction of pipelines

4.9.1 Construction phases and timing

There are five main phases of pipeline construction:

- Phase 1 – site establishment and mobilisation, installation of environmental controls, such as erosion and sediment control.
- Phase 2 – site earthworks, including excavation for trenches and launch and receival pits for trenchless pipe sections.
- Phase 3 – installation of pipe bedding material and pipeline, as well as backfilling of trench. Civil works such as pipeline and ancillary infrastructure will also be installed during this stage.
- Phase 4 – commissioning.
- Phase 5 – landscaping works and rehabilitation.

Construction of the pipelines will 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 will be established by the construction contractor during detailed design and construction planning.

Construction of pipelines is likely to occur over the entire 36-month construction phase, starting mid-2022. Open trench construction will progress at a rate of about 12 m – 24 m per day and have a duration of between eight to 10 weeks in any given area. Tunnelling construction will have a duration of between one to six months depending on the location and depth of bore.

Table 4-11 provides an indicative staging and construction approach to pipeline construction. This includes the typical equipment and machinery that is required at different stages of construction.

Table 4-11 Pipeline construction phases, timing, activities and required equipment

Phase	Typical construction activities methodology	Typical equipment
Phase 1: Site Establishment	• Install environmental controls and delineate site. • Traffic control. • Ancillary construction works such as roads, site compounds and fencing. • Plant and equipment delivery. • Clearing.	Backhoe loaders Chainsaws Concrete saws Cranes Dozers Dump trucks Excavators Excavators hammer Front end loaders Hand tools Trucks Water trucks
Phase 2: Excavation	• Excavate trenches, drilling pits (trenchless construction) and install shoring. • Dewater excavation. • Waste disposal.	Concrete trucks Concrete pumps Dozers Loaders Excavators Drilling rig Excavators breaker Rock breakers Rock screens Delivery trucks Pumps and other dewatering equipment Trenching machines Waste trucks

Phase	Typical construction activities methodology	Typical equipment
Phase 3: Pipe installation	• Pipe delivery and placement of the section of the pipes near the trench in a line (pipe stringing). • Field bending of pipe. • Welding of each section of pipe together into one continuous length. • Pipe lowering into trench (trenchless construction). • Pulling pipe through bore (trenchless construction). • Backfilling. • Inspection and test of pipes.	Bending machines Compactors Cranes Delivery trucks Excavators Drilling rig Light vehicles Side booms or pipe layers Powered hand tools Semi-trailers Truck and dog Shoring equipment Welding equipment
Phase 4: Commissioning	• Pipe pressure testing and disinfection. • Discharging commissioning wastewater.	Light vehicles Trucks
Phase 5: Landscaping and restoration	• Topsoil placement and restoration.	Compactors Excavators Graders Road paving machinery Rollers Skidsteers Hand tools

4.9.2 Construction corridors

Figure 4-17 shows the impact area for the project. This is the area required to install the pipelines and ancillary facilities such as compounds and access routes. Environmental impact assessment for the project is based on this area.

Figure 4-17 also shows an impact assessment area where relevant specialist studies have identified environmental constraints.

Sydney Water is seeking flexibility in the planning approval to locate the project anywhere in the impact assessment area, provided changing the location has no additional net environmental impact. This is to allow flexibility for any small alignment changes resulting from detailed design investigations, progress of development plans in growth areas or other constraints.

The following sections describe the different construction methods and their associated impact area.

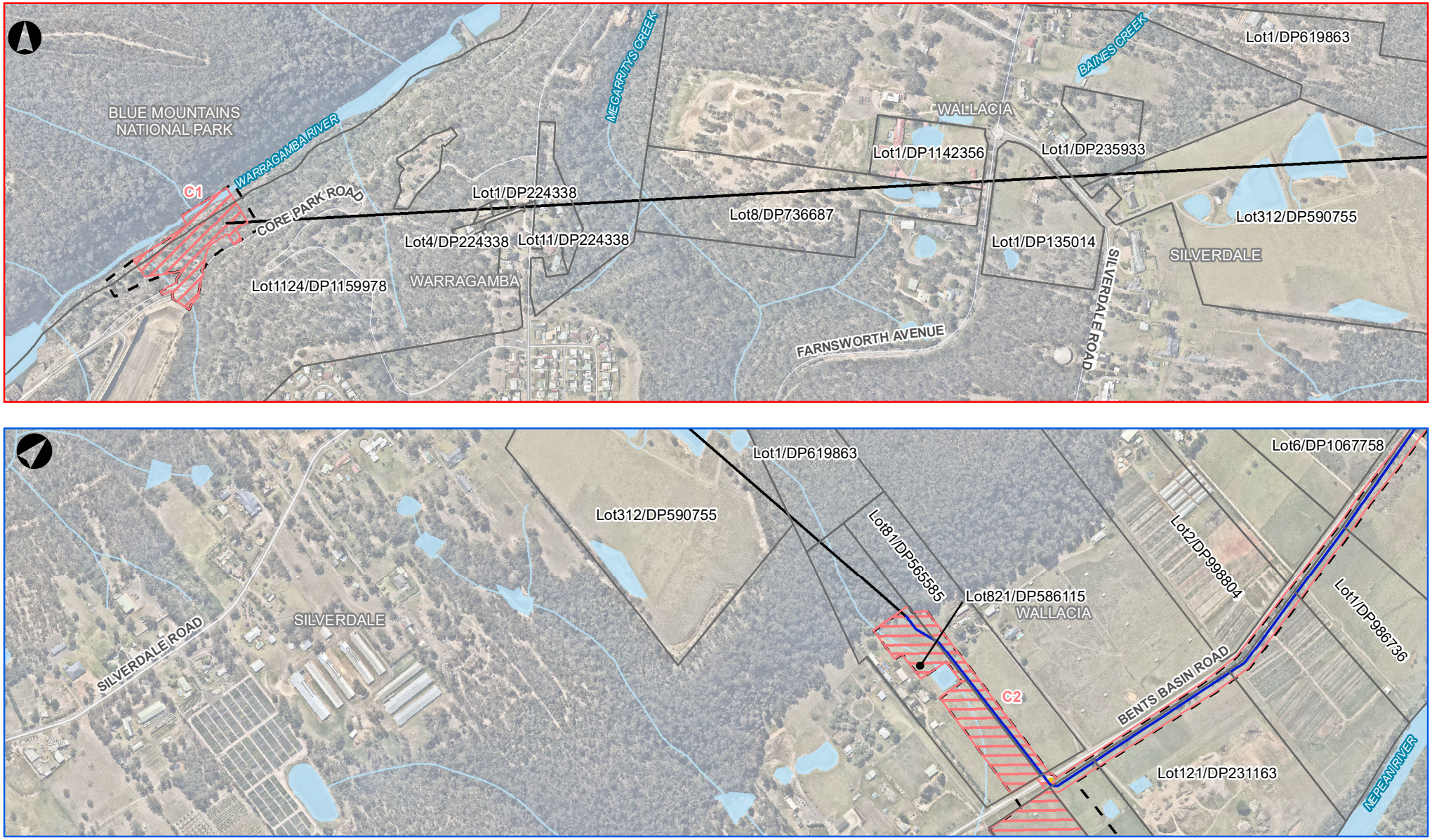


Figure 4-17a Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

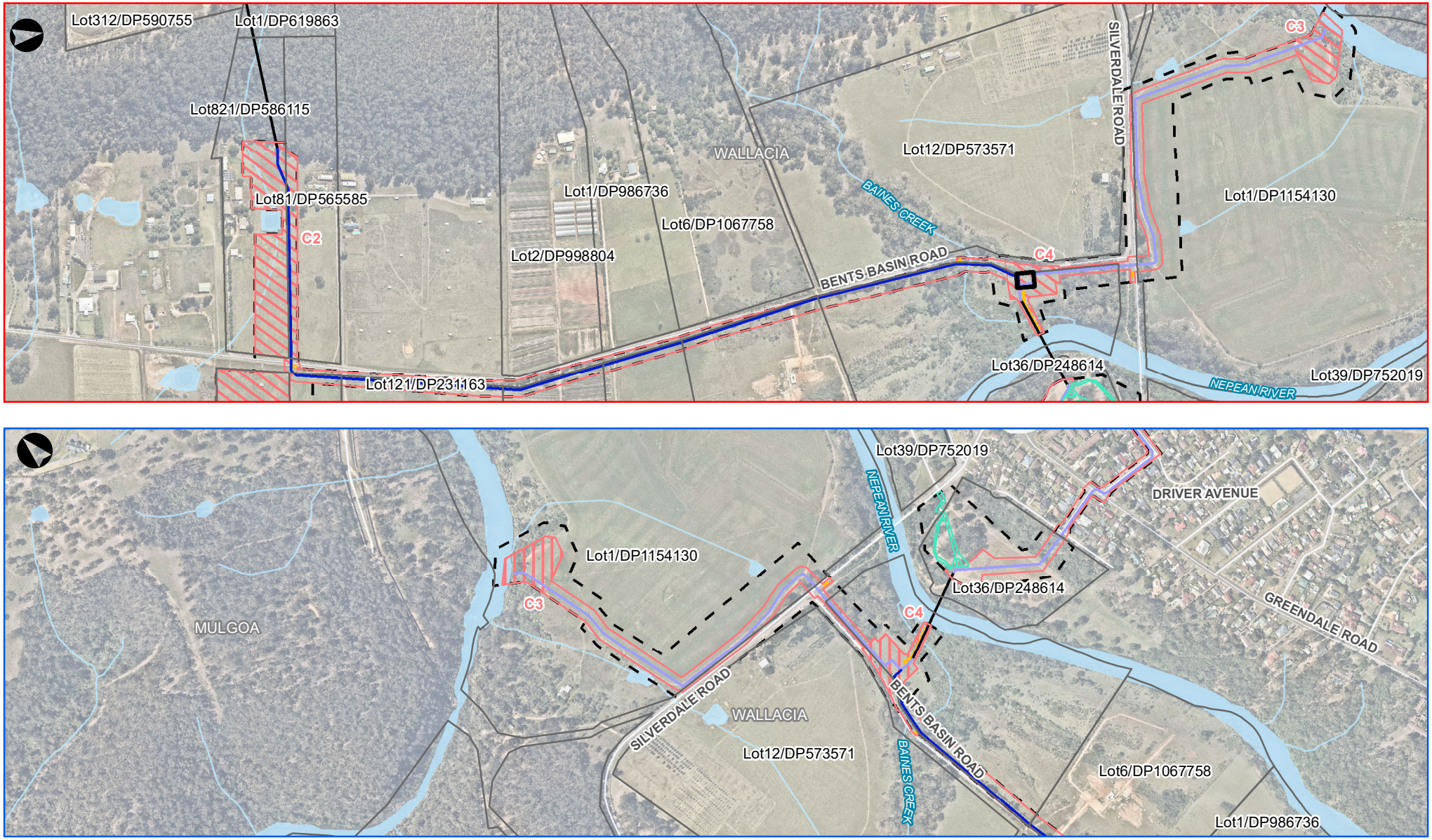


Figure 4-17b Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

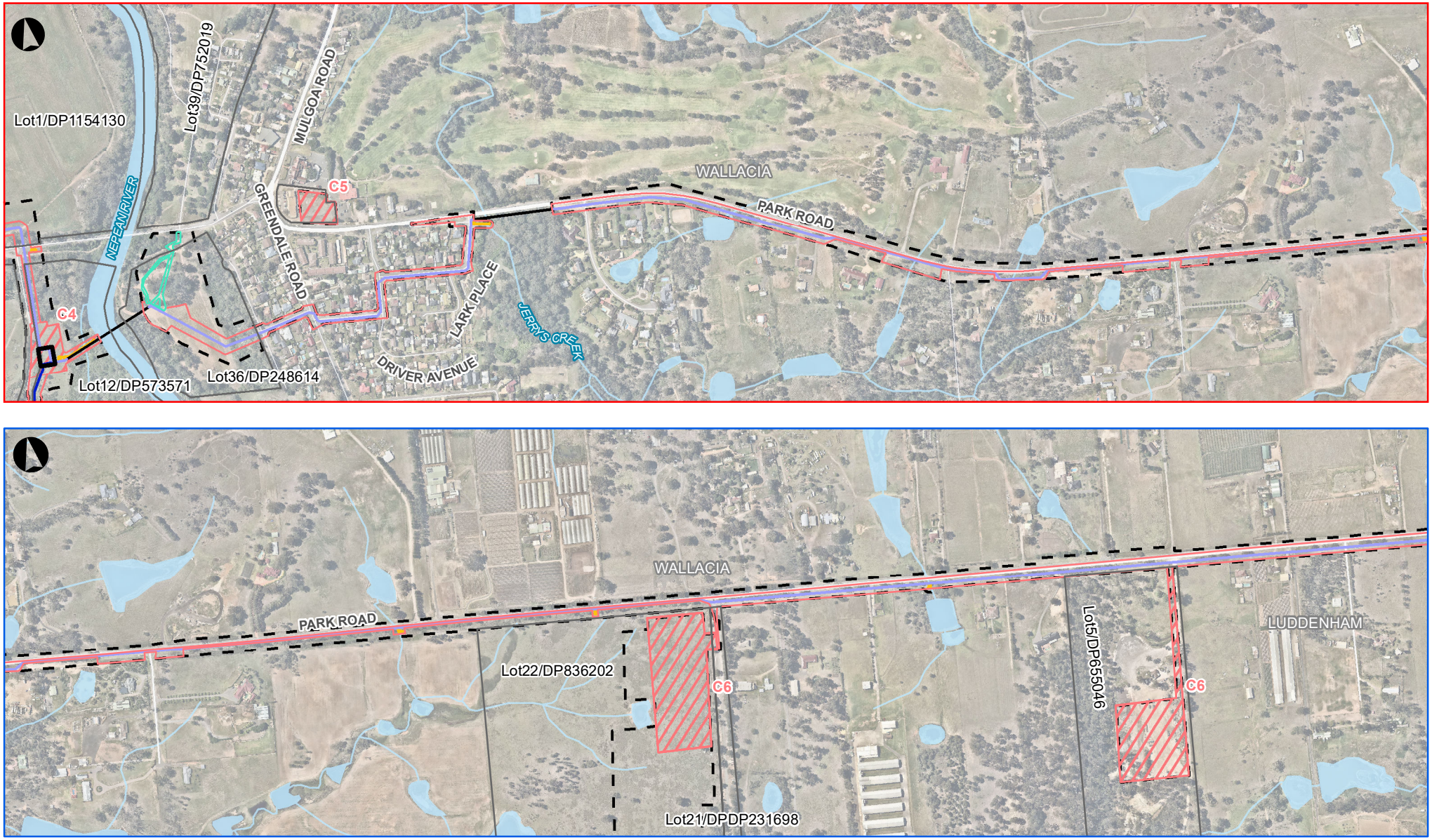


Figure 4-17c Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

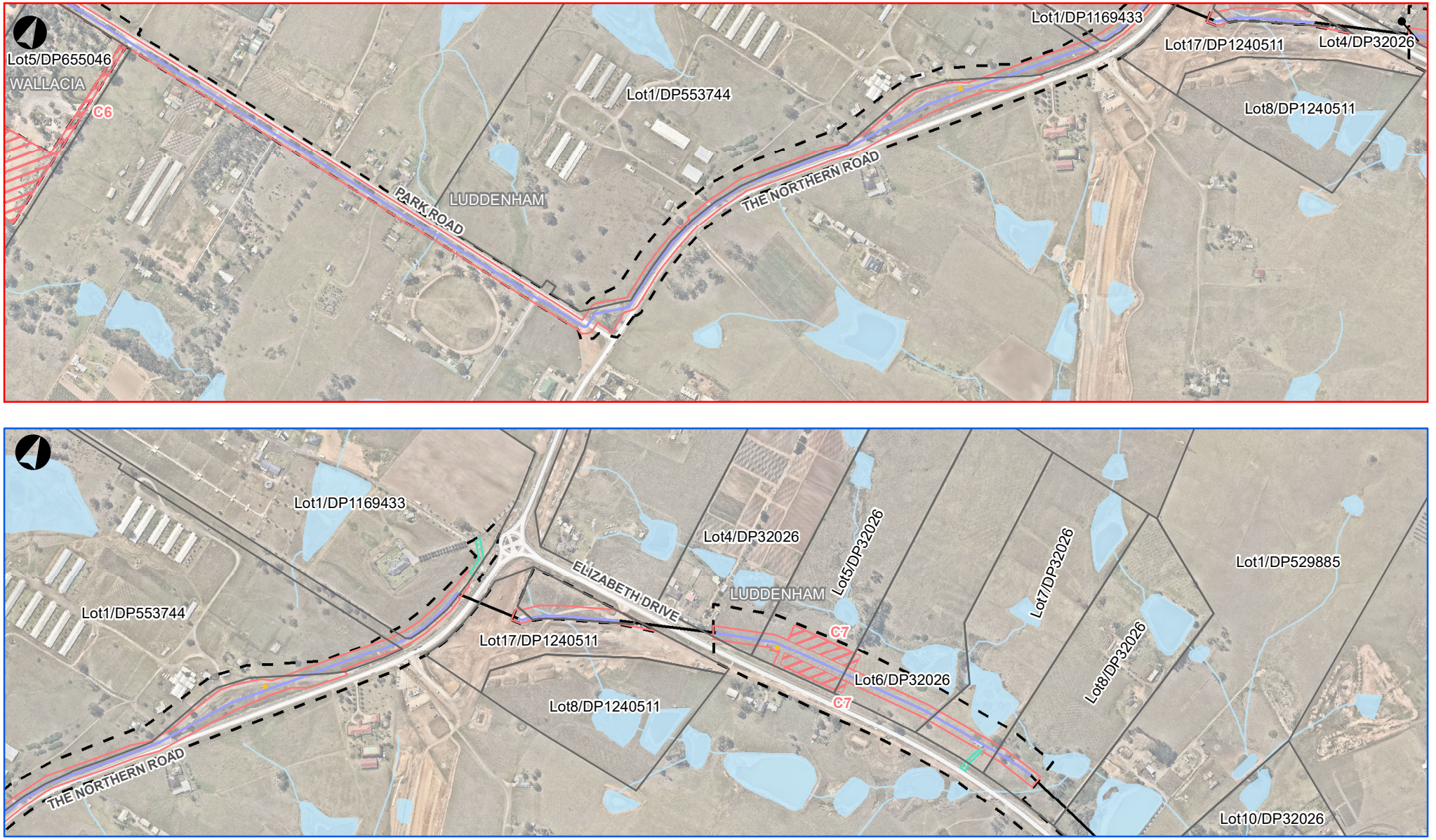


Figure 4-17d Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

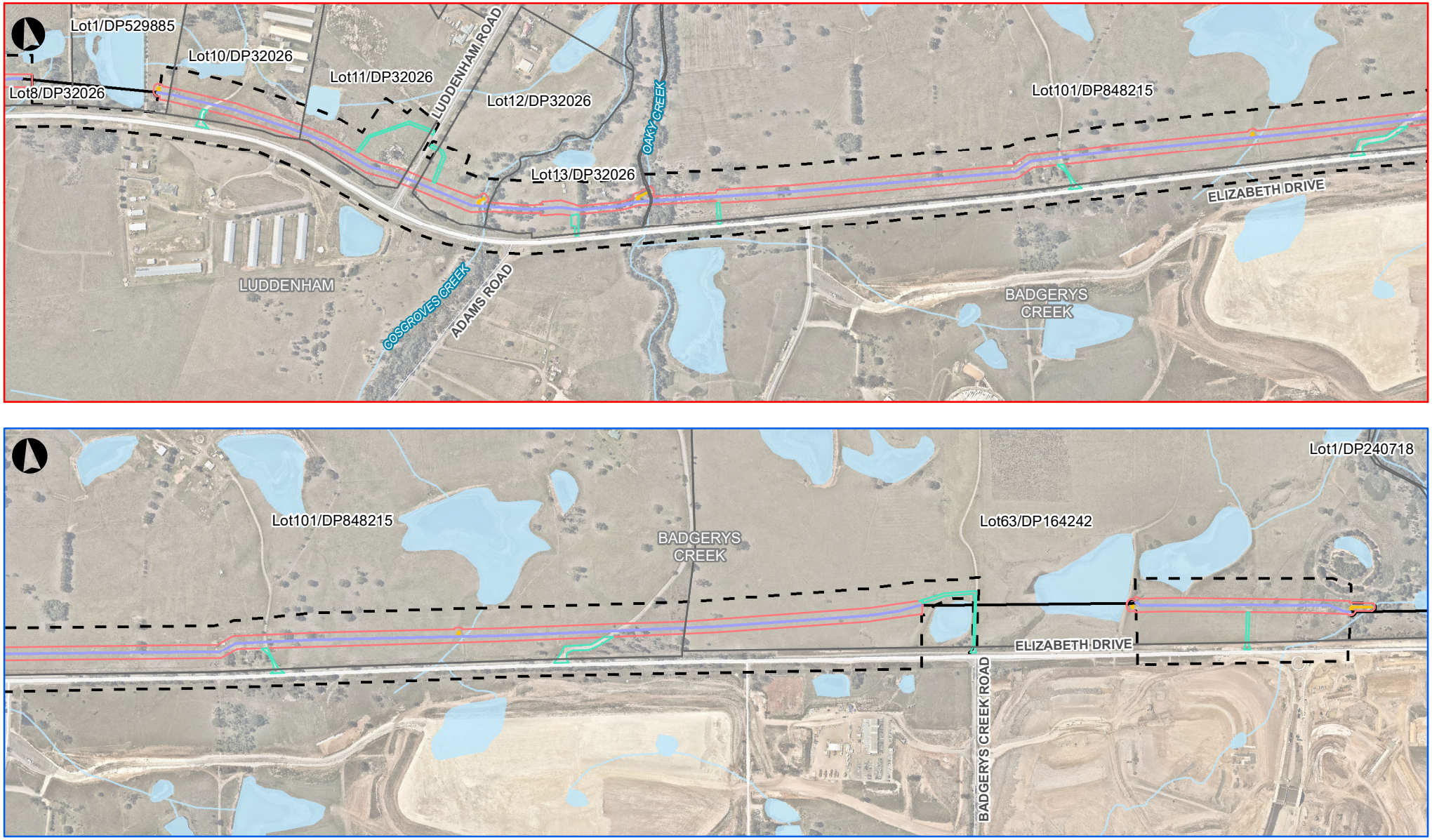


Figure 4-17e Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

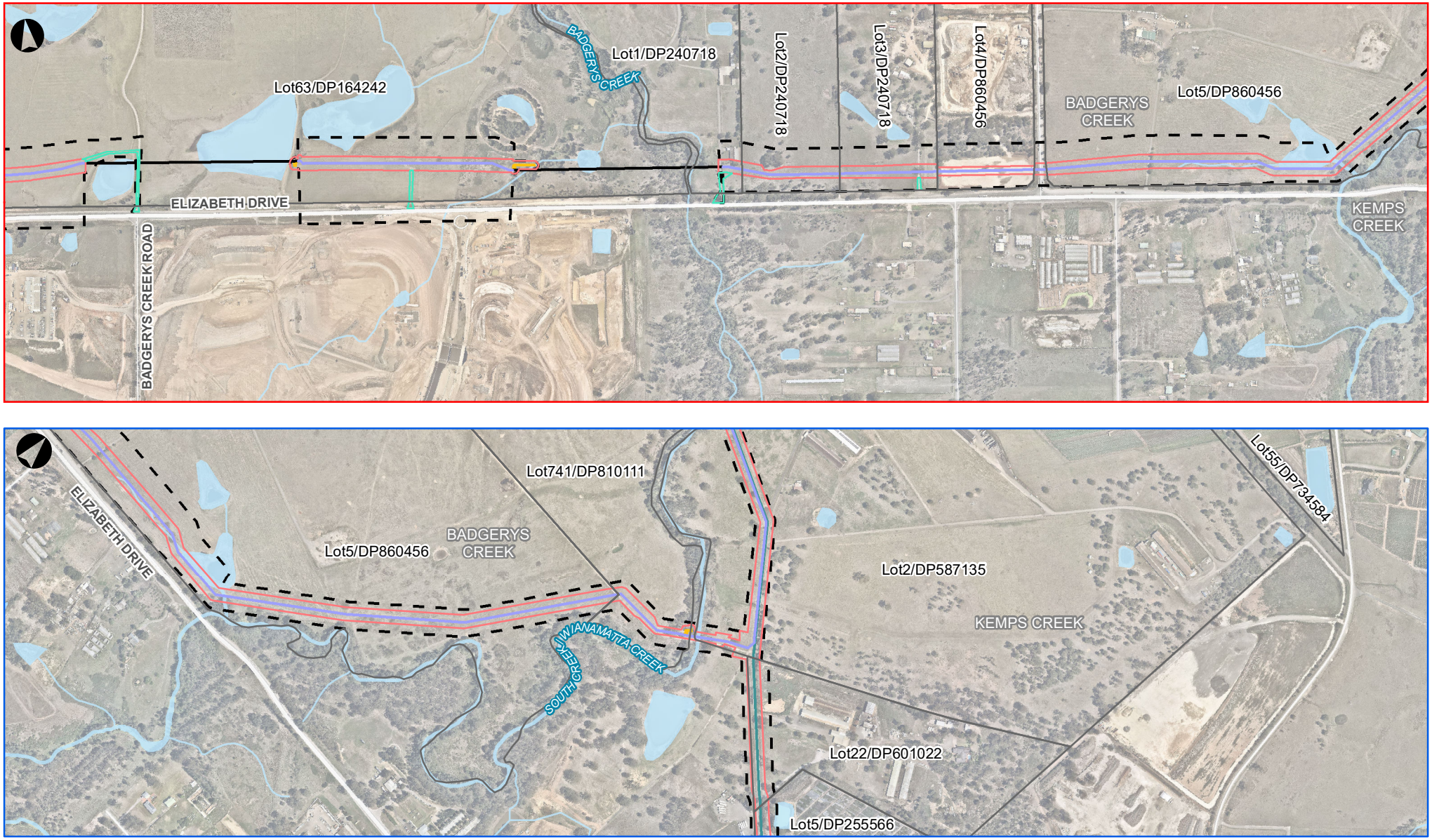
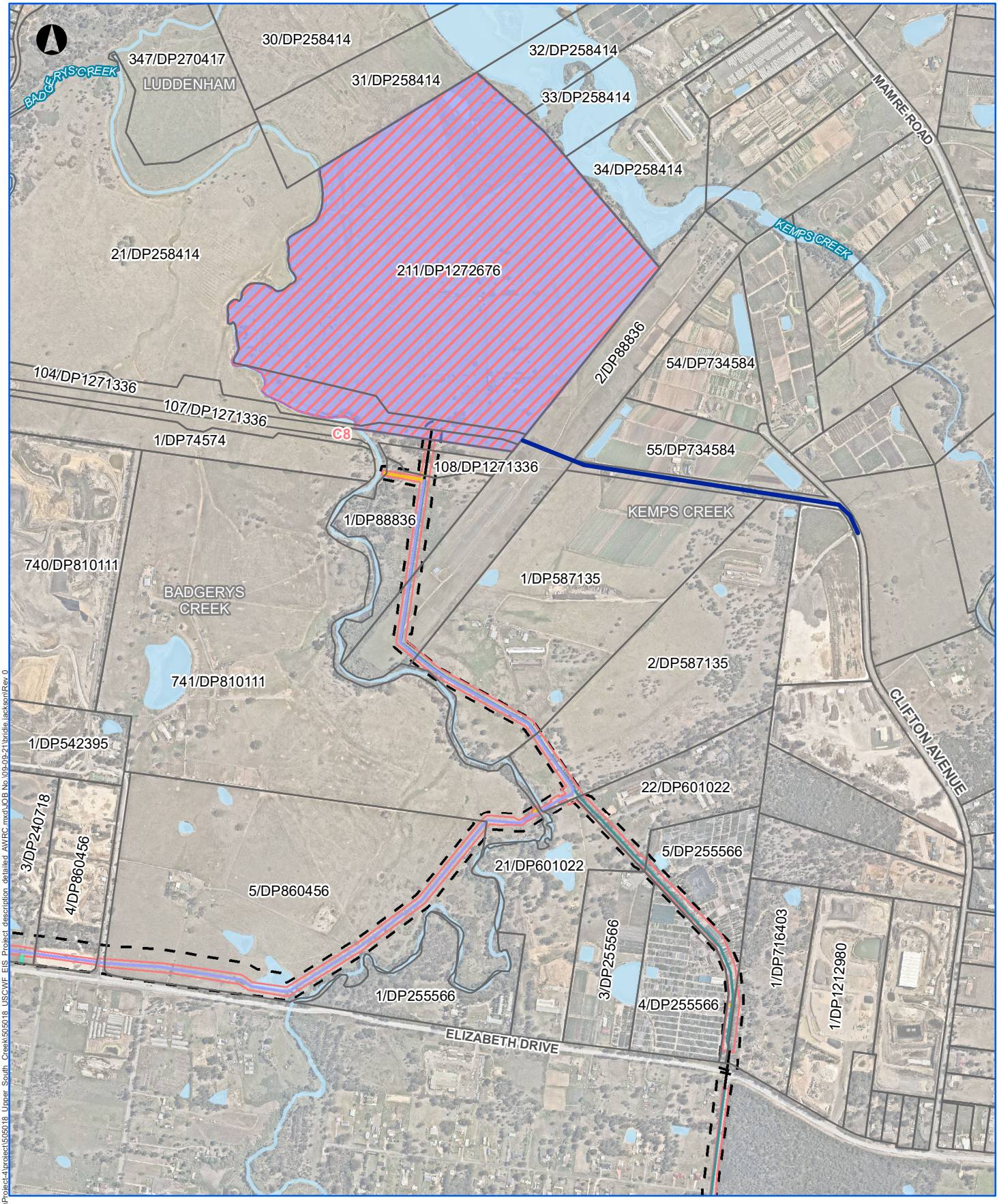


Figure 4-17f Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56



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Advanced Water Recycling Centre
Treated water pipeline
Brine pipeline
Scour valves
Tunnelled pipeline
Indicative compound
AWRC access road
Impact assessment area
Impact area
Impact area - access track
Lot boundary
Waterbody
Watercourse

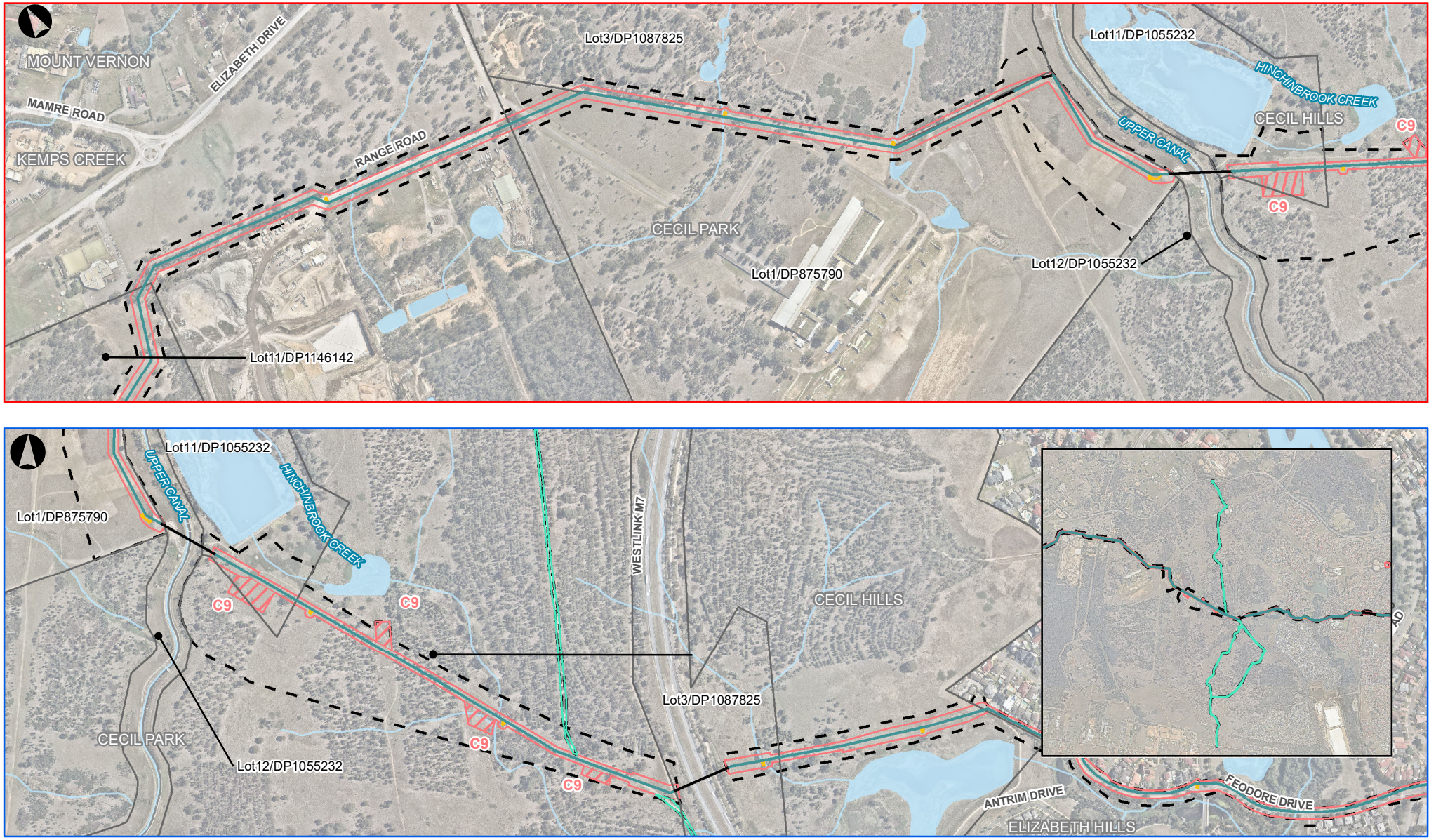
1:15,000
0 100 200m

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

Figure 4-17g Construction area of pipelines

Figure 4-17h Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA 1994 MGA Zone 56

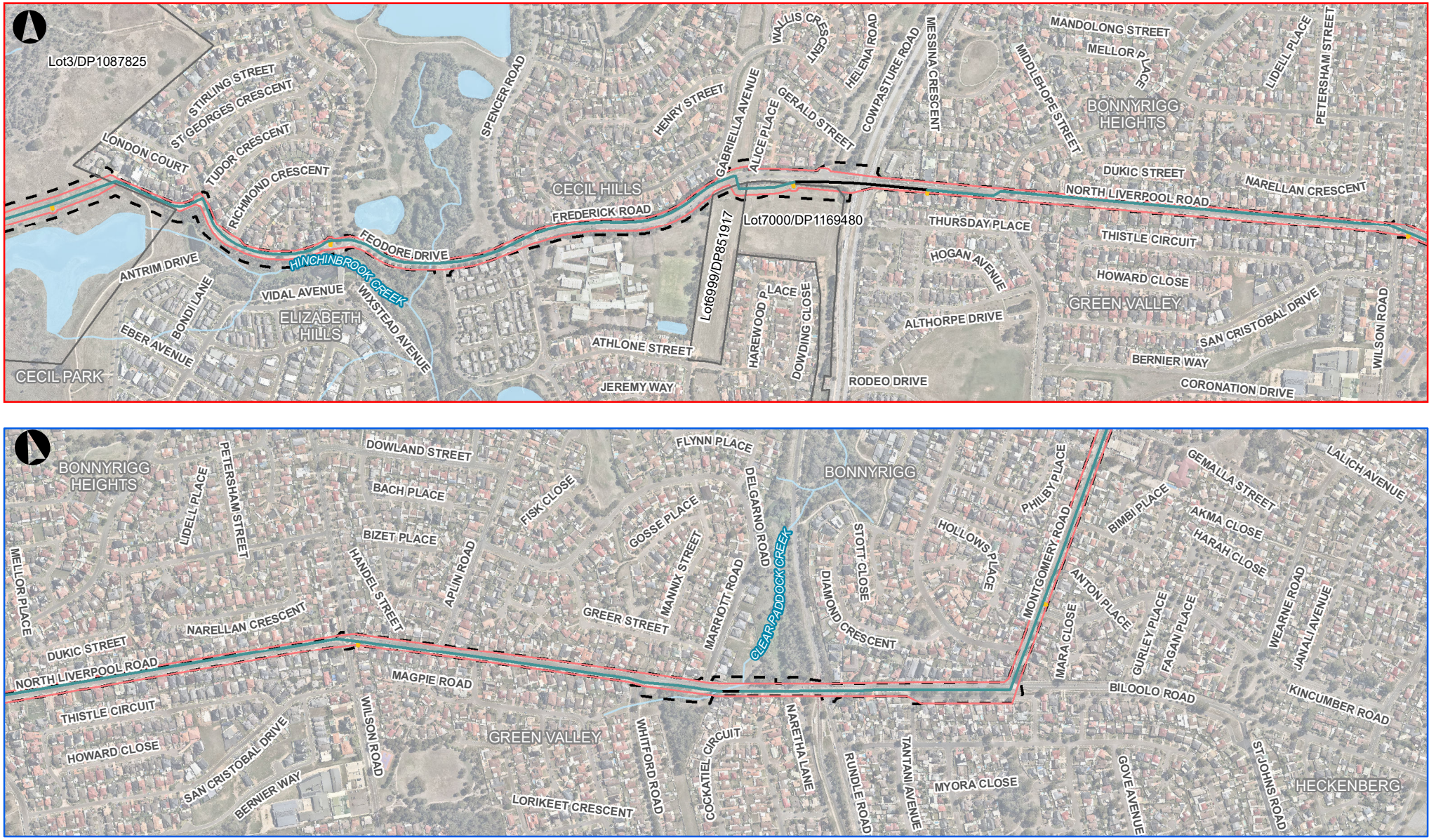


Brine pipeline
Scour valves
Tunnelled pipeline
Impact area
Impact area - access track
Impact assessment area
Lot boundary
Watercourse

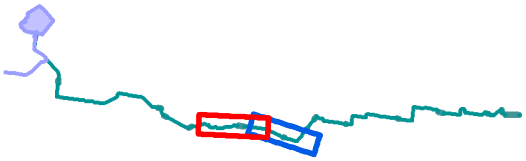
1:10,000
0 100 200m

Figure 4-17i Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56



Brine pipeline
Scour valves
Tunnelled pipeline
Impact area
Impact area - access track
Impact assessment area
Lot boundary
Watercourse



1:10,000
0 100 200m

Figure 4-17j Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA 1994 MGA Zone 56

Brine pipeline
Scour valves
Tunnelled pipeline
Impact area
Impact area - access track
Indicative compound
Impact assessment area
Lot boundary
Watercourse

1:10,000
0 100 200m

Figure 4-17k Construction area of pipelines

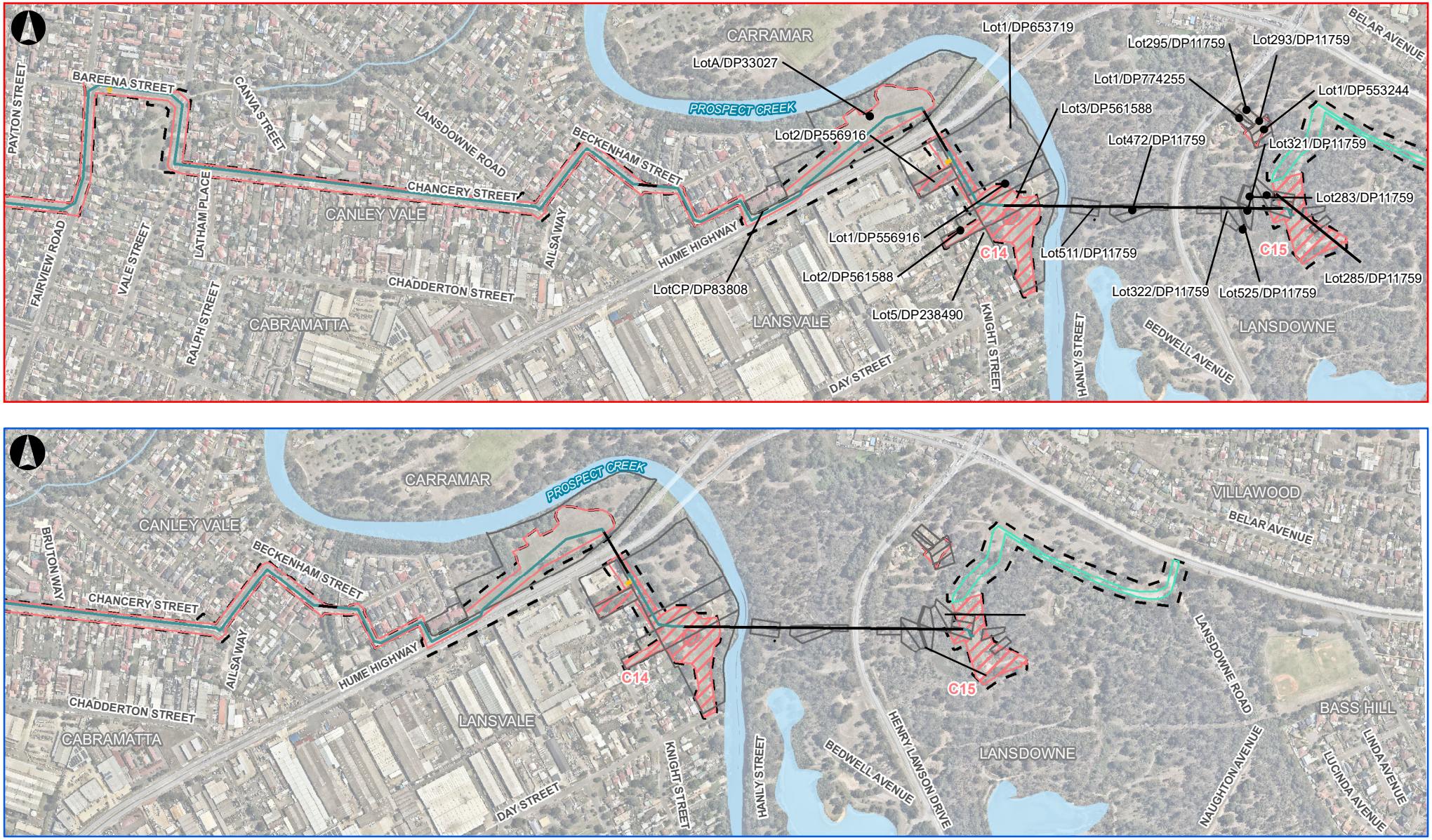
Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA 1994 MGA Zone 56

Brine pipeline
Scour valves
Tunnelled pipeline
Impact area
Impact area - access track
Indicative compound
Impact assessment area
Lot boundary
Railway

1:10,000
0 100 200m

Figure 4-17l Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA 1994 MGA Zone 56



1:10,000
0 100 200m

Figure 4-17m Construction area of pipelines

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA 1994 MGA Zone 56

4.9.3 Construction methodology

All pipelines will be constructed using a combination of open trench and tunnelling construction methods. Most of the pipelines will be constructed by open trenching, follow existing road alignments, either in the road or road verge. Tunnelling is planned beneath some existing and proposed infrastructure, waterways and environmental constraints. Tunnelling may be used in additional locations provided it does not result in any additional environmental impact.

Open trench construction

Open trenching involves digging a long linear trench in which the pipeline is placed. This requires excavation of the ground surface along the entire length of the pipeline. 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. Figure 4-18 and Figure 4-19 show a typical set up open trench excavation for pipeline construction. Figure 4-18 shows the use of shore boxes which are used for deep excavation and narrow construction corridors such as in a roadway. Figure 4-19 shows open trenching with a benched trench when a wider construction corridor is required. The project will use a range of open trenching methods for pipeline installation.

Figure 4-18 Trenched pipeline construction with shoring

Figure 4-19 Trenched pipeline construction with benching

Depending on the depth of the pipeline, the construction area and size of the trench can range in size. If deep excavation is required, the trench needs to be benched, stepped or reinforced with shoring to prevent collapsing. The typical construction corridor width for open trench construction is 15 m – 30 m.

Generally, a narrower corridor is adopted when constraints like vegetation or water bodies are present. Where there are no constraints, a wider corridor is adopted, allowing room for movement of machinery, people and construction materials. Figure 4-20 shows a typical construction layout for different construction corridor widths.

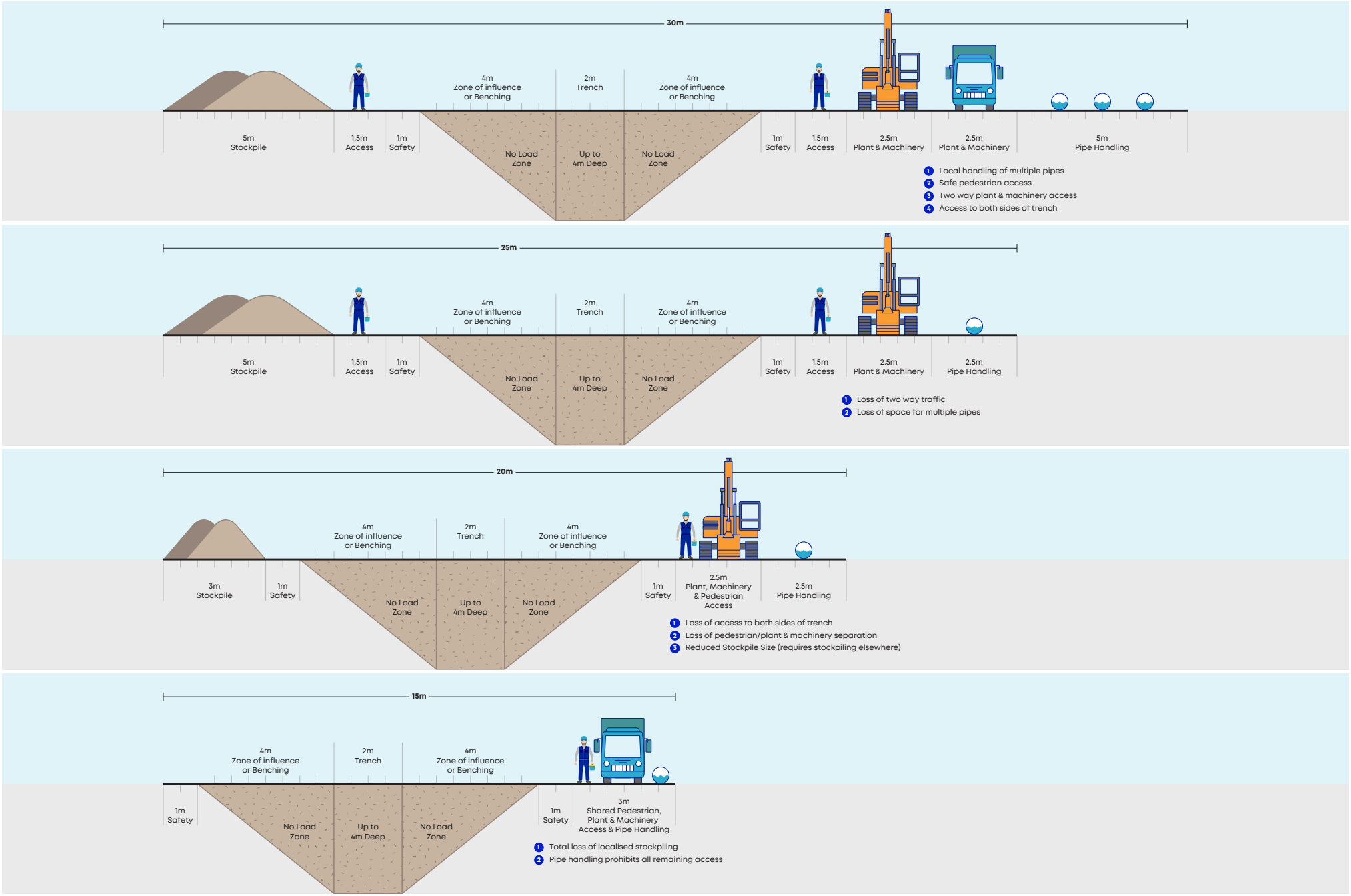


Figure 4-20 Pipeline construction corridor widths and layouts

Many pipeline crossings of waterways will avoid impacts on 'water land' by tunnelling. However, some crossings will be constructed by open trenching across the waterway. As such, the project will involve activities within 'water land' and be classified as dredging under the *Fisheries Management Act 1994*. Determining the construction methodology across waterways includes balancing considerations such as environmental constraints, waterway size and flow, geotechnical conditions and cost.

Construction of the release structures at South Creek, Nepean River and Warragamba River will also involve excavation within 'water land'. Chapter 8 provides an assessment on the potential impacts of the project to ‘water land’.

The following construction methodologies will also be implemented where trenched creek crossings are required. A typical construction area is also shown in Figure 4-21.

- Survey and delineate pipeline alignment and working corridor.
- Install fencing and security measures.
- Clear site to form access track and construction corridor.
- Establish land and waterway environmental controls, including any required coffer dams, portadams or turbidity curtains.
- Set up bypass pump system.
- Create temporary seal or dam by installation of a cofferdam, portadam, soil filled sandbags upstream to segregate wet section and provide a dry section of works.
- Excavate from bank to bank of the waterway to the required depth of the pipeline, up to 8 m in depth.
  - Length of excavation depends on the width of the waterway and will be up to 50 m in length.
  - Width of construction through waterways will be about 15 m to enable a safe working environment.
- Install pipes.
- Backfill and compaction works.
- Reinstate banks and creek bed to original profile. May require further measures to stabilise the banks and prevent erosion. Geotextiles may be used in conjunction with seeding of an appropriate grass mix.
- Remove temporary seal of creek eg cofferdam and bypass pump.
- Restoration and rehabilitation.
- Remove security and environmental controls.

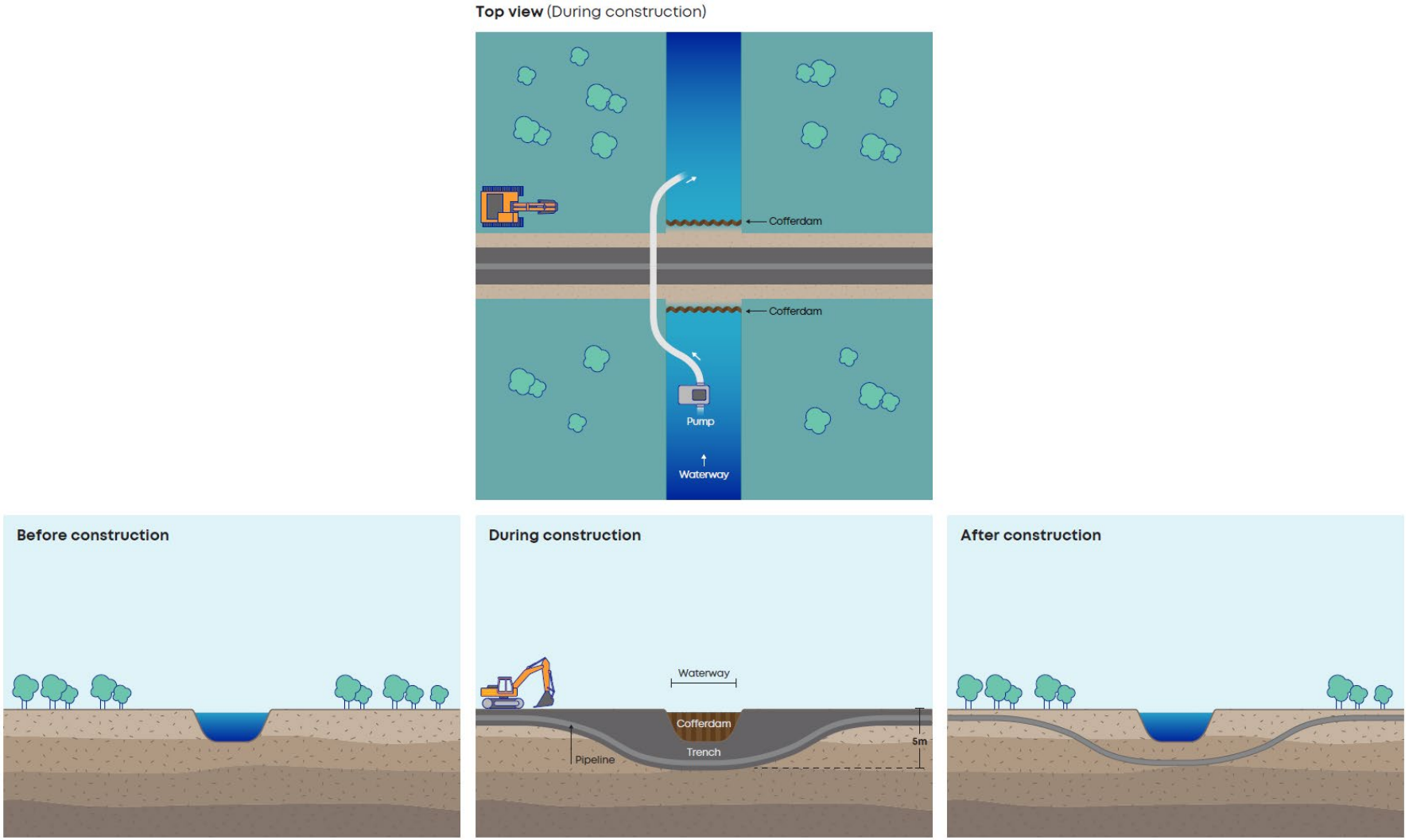


Figure 4-21 Illustration of trenched pipeline construction through a waterway

Tunnelling

Building a pipeline by tunnelling 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. Ground disturbance is not required along the entire length of the pipeline alignment as in open trench construction, and usually only at launch and receiving pits at each end. Figure 4-22 and Figure 4-23 show a typical tunnelling set-up for pipeline construction, 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. Two construction methodologies are shown - horizontal directional drilling (HDD) and pipe jacking.

For horizontal directional drilling, the pipeline cannot be installed in small sections. The entire length of pipeline is joined together above ground and pressure tested prior to it being installed in the bore. This requires the pipeline to be strung out on the ground surface prior to installation.

Tunnelling is proposed at several locations including crossing major roads (including Transport for NSW roads), railways, waterways, and farm dams. The construction methodologies likely to be used include pipe jacking and HDD, but these will be determined during detailed design. In general, pipe jacking is used for shorter distances, and HDD for longer distances. Table 4-11 provides details on the construction steps and equipment required for tunnelling.

General construction activities and methodology for tunnelled creek crossings include:

- survey, delineation of pipeline alignment and working corridor
- site set up, including installation of environmental controls
- excavation of launch and receival pits for drilling rigs (about 12 m x 4 m)
- drilling of pilot hole and pipe bore
- installation of pipe
- commissioning
- site remediation and restoration.

Tunnelled crossings that are proposed include:

- environmental flows pipeline from Bents Basin Road to Warragamba River
- Nepean River at Wallacia
- Jerrys Creek at Wallacia
- Elizabeth Drive and Northern Road
- Badgerys Creek and existing farm dams on northern side of Elizabeth Drive
- WaterNSW Upper Canal
- M7 Motorway
- Clear Paddock Creek at Green Valley

- Joseph Street at Cabramatta West
- Cowpasture Road
- railway at Cabramatta, including the T2, T3 and T5 lines
- Hume Highway, Prospect Creek and Henry Lawson Drive at Lansdowne.

Environmental flows pipeline

The environmental flows pipeline will be constructed using open trenching and tunnelling. The trenched section will extend south from Silverdale Road, down Bents Basin Road, and the tunnelled section will be from private property near Bents Basin Road to Warragamba River. The tunnelled section will be about 2.5 km long and up to 115 m deep. The exact construction methodology will be determined during detailed design once a construction contractor(s) has been engaged.

The construction of the environmental flows pipeline will include:

- drilling rig at both ends of the alignment, near Warragamba River and at Bents Basin Road
- removal of spoil via truck from both ends of the alignment
- 24 hour a day works for 3-6 months
- placement of ground level GPS devices at regular intervals along the alignment to monitor the drill position
- management of drilling fluid and groundwater
- temporary construction access tracks to both ends of the pipeline
- water, via the drinking water network or from Nepean River, for drilling operations.

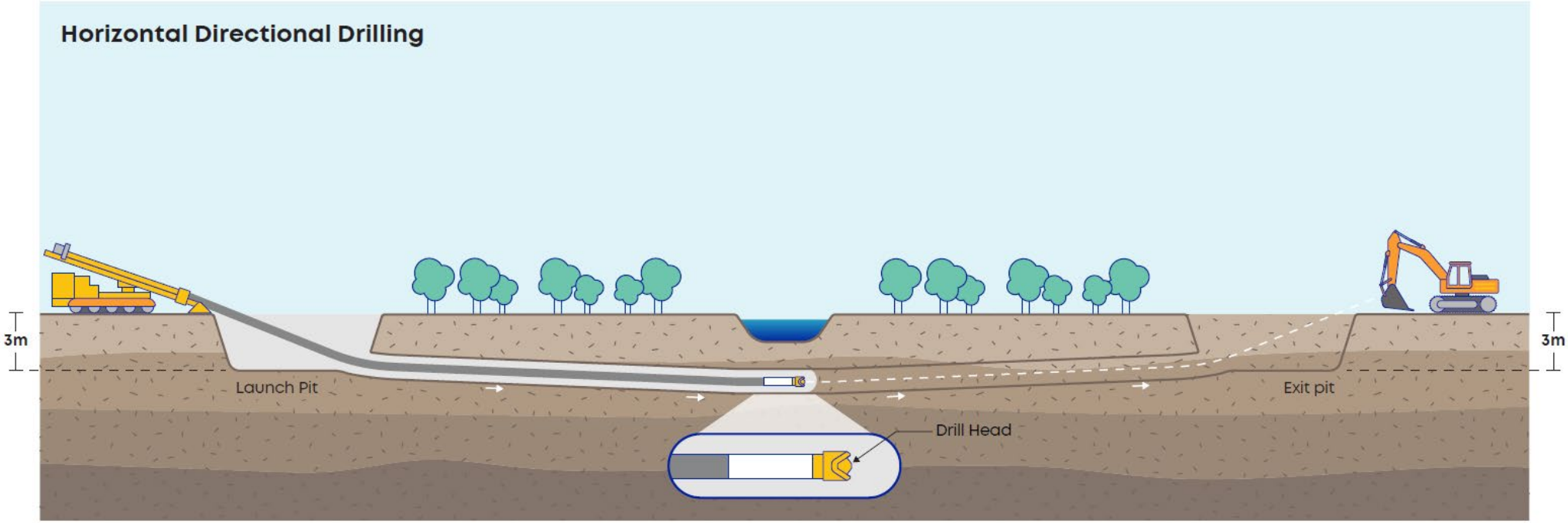


Figure 4-22 Illustration of HDD tunnelling construction

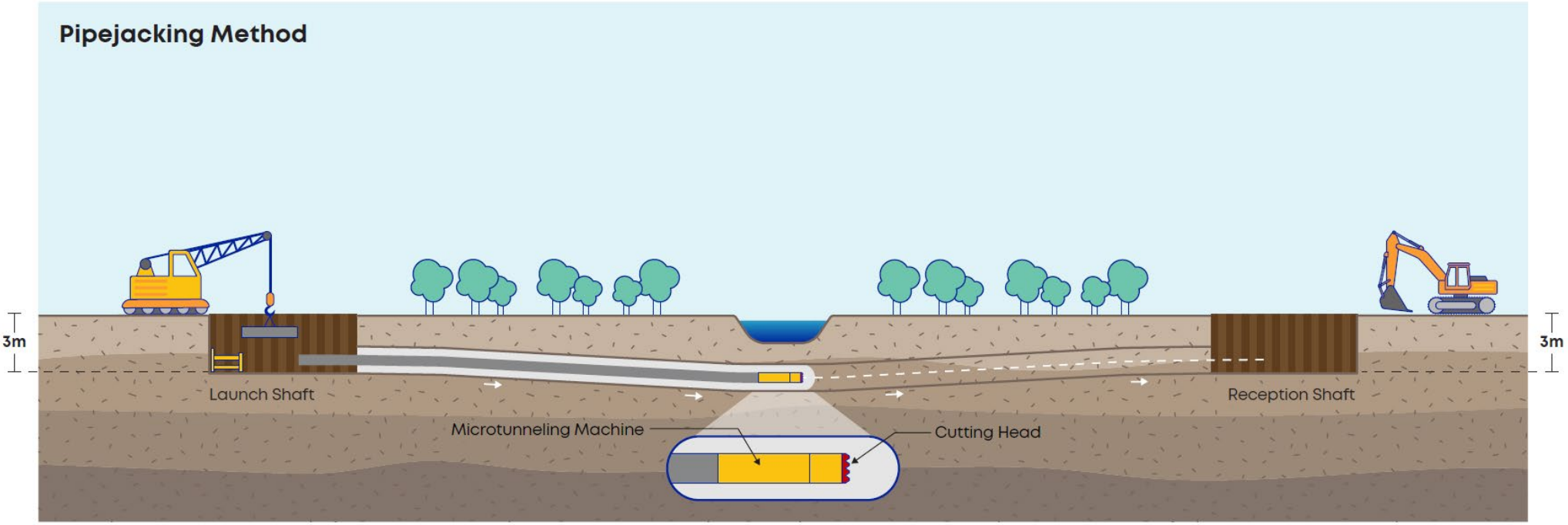


Figure 4-23 Illustration of pipe jacking tunnelling construction

Construction of the pipeline release structures

The release structures at Nepean River and Warragamba River will take about 12 months to construct. Construction of these release structures will include:

- survey, delineation of pipeline alignment and working corridor
- installing fencing and security measures
- clearing to form access track and construction corridor
- establishing land and waterway environmental controls, sedimentation fence, silt curtain. Geofabric will be laid over the bed and bank of the stream prior to filling with high clay content soils. The soil will be compacted and then covered with geofabric to prevent erosion
- installing a flow diversion barrier (portadam or temporary cofferdam) to segregate wet section and provide a dry section of works. Material will be de-watered on site or at the closest compound prior to reuse or disposal
- dewatering work area
- excavating existing embankment, including any required rock breaking
- installing pipeline, chambers, release structures and energy dissipation structures such as baffle blocks
- installing concrete outlet and apron with energy dissipation rock rip rap
- reinstating impacted banks and creek bed
- removing flow diversion barrier
- landscaping works
- removing security and environmental controls.

Construction of the flow splitter structure

The flow splitter structure at Bents Basin Road, Wallacia will take about six months to build. Construction of the flow splitter structure will require activities including:

- survey and delineation of work area
- installing fencing and security measures
- clearing site to form access track off Bents Basin Road and construction corridor
- establishing environmental controls, for example sedimentation fencing
- excavation and earthworks for pipeline construction
- installing below ground equipment, for example pipelines, services and concrete pad
- backfilling and compaction works

- installing valves, and permanent above-ground structures such as fencing, gates and electrical kiosk
- restoration and rehabilitation
- removing security and environmental controls.

4.9.4 Construction workforce

The number of construction staff will depend on the schedule of works and construction program which will be developed during the detailed design and construction planning phase of the project. It is likely multiple crews will be working at various places along the pipeline at the same time. The pipelines will have about 200 construction staff at any given time during construction. This number will fluctuate across the construction program and represents the peak construction of the program.

4.9.5 Landscape and restoration

All areas impacted by pipeline construction will be restored upon completion of works. Where possible, impacted areas will be restored to their pre-construction condition. However, this is not always possible when mature vegetation has been removed as Sydney Water needs to ensure that plants over the pipeline would not develop root systems that could damage the pipeline. Sydney Water will consult with relevant landowners and local councils in planning for restoration after pipeline construction.

4.10 Construction across the project

4.10.1 Construction compounds

Construction compounds will store equipment and materials and provide site office facilities and parking for construction staff. They will be required throughout the construction phase of the project at several locations close to the project. Table 4-12 and Table 4-13 describe indicative locations and types of compounds required, and Table 4-14 describes the activities likely to occur at each compound. Figure 4-24 shows indicative compound locations.

Sydney Water may not need all compounds that are proposed, or alternative locations may be required. Depending on the type of compound, they will be required for different lengths of time during construction. In general, main compounds will be required for the entire 36-month construction duration, and smaller satellite and tunnelling compounds will be required for about three to 12 months.

Flexibility is sought for compound locations provided they meet the requirements outlined in section 4.13. This means that Sydney Water is seeking approval for the construction compounds identified in Figure 4-24 and set out in Table 4-13, but also for potential alternative construction compounds, where those alternative compounds meet the criteria outlined in Table 4-14. Sydney Water notes that construction compounds in Table 4-12 would normally not require development consent and Sydney Water would assess them under Division 5.1 of the *Environmental Planning and Assessment Act 1979*. Compound locations, layouts and their timing will be established during detailed design.

Table 4-12 Overview of types of construction compounds

Compound type	Key activities and description	Duration
Main	Large compounds that will 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 waste material prior to disposal or reuse. Storage of site equipment, including bunded storage for any chemicals such as fuel.	Entire 36-month construction period of the project
Satellite	Smaller compounds that will be active for the entire construction of the project. They will have similar activities to main compounds.	About 3 – 12 months
Tunnelling	Only identified for larger tunnelling locations where an increased construction presence will be required. Include the launch and receival pits for sections of pipeline constructed by tunnelling. Accommodate activities associated with drilling such as the drill rig, spoil management and pipe placement. Only required during tunnelling.	About 3 – 12 months
Laydown	Small rolling compounds located at pipeline construction sites. These will only be required for short periods of time and will move along the pipeline alignments as construction progresses.	Entire duration of pipeline construction

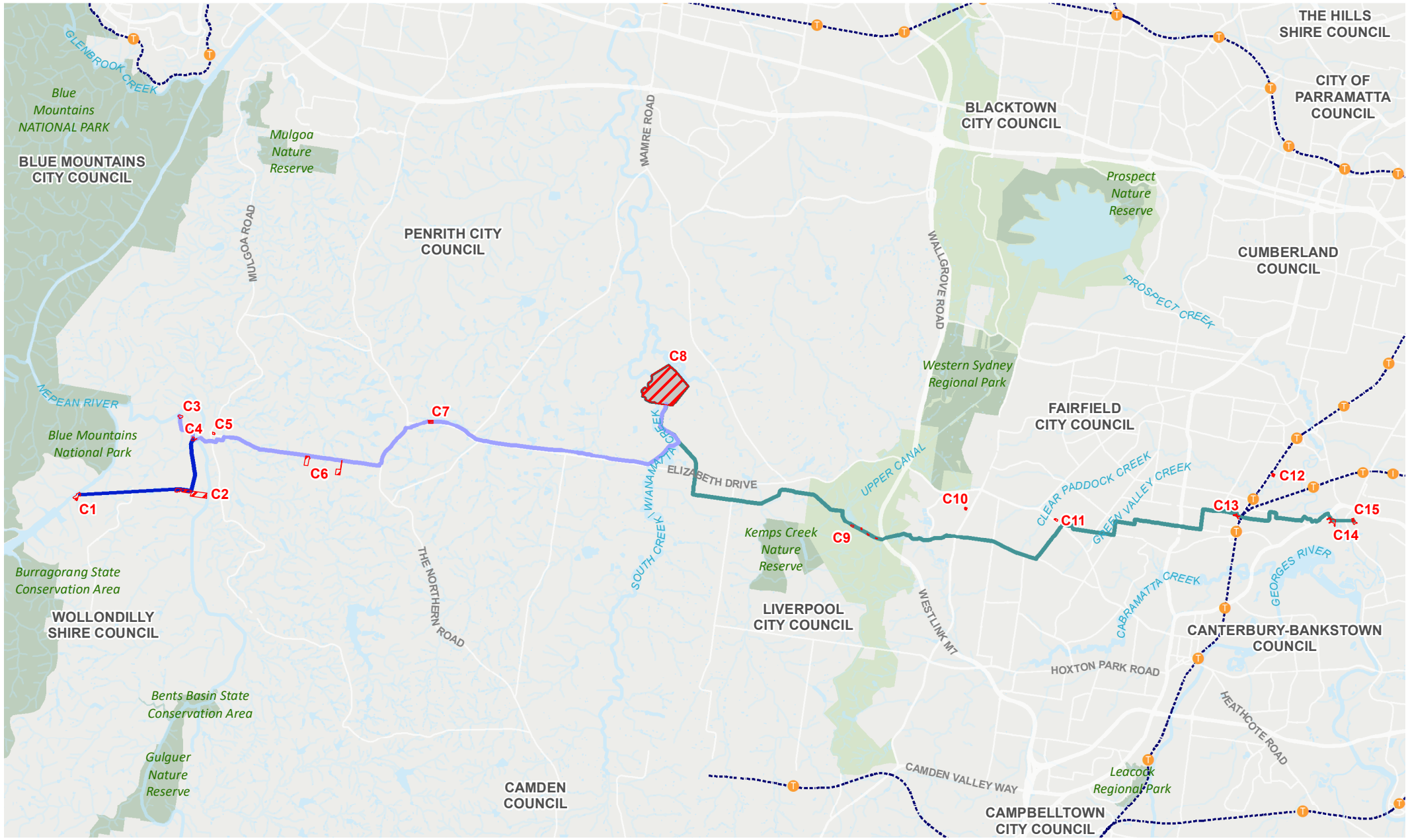


Figure 4-24 Indicative locations of construction compounds

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

Table 4-13 Numbering, location and type of indicative compounds

Number	Location	Compound type
C1	Warragamba River via Core Park Road	Tunnelling
C2	Bents Basin Road, Wallacia	Tunnelling
C3	Treated water release location near Wallacia Weir at Nepean River	Satellite
C4	West of Wallacia and Nepean River	Tunnelling
C5	1 Park Rd, Wallacia	Main
C6	344 Park Rd, Wallacia 260 Park Road, Wallacia (alternative location)	Main
C7	Elizabeth Drive between The Northern Road and Luddenham Road	Satellite
C8	AWRC site	Main
C9	Western Sydney Parklands, near Liverpool Offtake Reservoir – multiple small compounds, including tunnel under M7	Satellite/ Tunnelling
C10	Liverpool reservoir, Cecil Hills	Main
C11	Lot 419 DP262454, Bonnyrigg	Satellite
C12	East Parade, Fairfield	Main
C13	Cabravale Park	Tunnelling
C14	Lansvale Park, Lansdowne - west of Henry Lawson Drive and Prospect Creek	Satellite/ Tunnelling
C15	Lansdowne east of Henry Lawson Drive	Tunnelling

Table 4-14 Indicative activities required at each construction compound

Activity	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
Earthworks	✓	✓	✓	✓			✓	✓	✓				✓	✓	✓
Site office	✓	✓			✓	✓	✓	✓		✓	✓	✓			
Worker parking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Spoil storage	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Drilling	✓	✓		✓			✓		✓				✓	✓	✓
Equipment storage	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Materials laydown	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pipe welding	✓	✓		✓			✓	✓	✓				✓	✓	✓

4.10.2 Construction materials

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

4.10.3 Excess spoil

The AWRC site will require the removal of spoil that is unsuitable as a foundation for construction. Topsoil material will be temporarily stockpiled on the AWRC site for later use in landscaping. As spoil from these areas is removed, they will be filled with imported engineered fill that is suitable for construction.

Where spoil quality is suitable and timeframes align, Sydney Water proposes to use excess spoil from pipeline construction at the AWRC site. Estimates indicate the project will generate about 181,000 m^3 of excess spoil that cannot be reused on site. Excavated materials will be transported to project construction compounds for storage and ultimately reused or disposed. Storage of excess spoil at compounds will be in accordance with the indicative compound duration outlined in Table 4-15, however extended presence may be required if there are any delays in available disposal locations. Section 12.2 of the EIS provides further details on waste and excess spoil.

4.10.4 Construction schedule and hours

Where reasonable and feasible, construction will be carried out during standard working hours as defined by the Interim Construction Noise Guidelines (DECC, 2009a) and presented in Table 4-15. Due to the size and duration of the project, out of hours work will be required for certain project locations and activities. These include:

- delivery of oversized plant or structures that police or other authorities determine to require special arrangements to transport along public roads
- trenched pipeline construction along busy roads, such as along the brine pipeline alignment, 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 tunnelling for the environmental flows pipeline which might require 24 hours drilling for three to six months.

The exact locations and duration of out of hours work will be determined during the construction planning phase of the project when a construction contractor has been engaged. Communities will 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.

Table 4-15 Indicative construction hours for the project

Period	Days and hours	
Standard hours	Day	Monday to Friday – 7 am to 6 pm Saturdays – 8 am to 1 pm
OOHW Period 1	Day	Sundays and public holidays – 8 am to 6 pm Saturday – 7am to 8am and 1 pm to 6 pm
	Evening	Monday to Saturday – 6 pm to 10 pm
OOHW Period 2	Evening	Sunday and public holidays – 6 pm to 10 pm
	Night	Sundays and public holidays – 12 am to 8 am and 10 pm to 12 pm

4.10.5 Construction traffic and access

Most impacts associated with traffic and access will be during the construction phase of the project. Construction traffic related to the project will be generated by activities including:

- worker crews - crews undertaking tunnelling and open trenching along the pipeline alignment
- light vehicles accessing site compounds, including the AWRC construction site

- heavy vehicles accessing site compounds, including the AWRC construction site, construction materials and equipment deliveries and removing waste.

Table 4-16 provides the estimated peak traffic movements for light vehicles and heavy vehicles during construction. Section 11.4 provides further details on traffic impacts and management.

Table 4-16 Indicative construction traffic generated by the project

Segment	Location	Estimated peak daily vehicle movements within standard construction hours	Estimated peak daily vehicle movements outside standard construction hours
1	Warragamba River to Northern Road	180 light vehicles 33 heavy vehicles	75 light vehicles 26 heavy vehicles
2	Northern Road to AWRC	400 light vehicles 302 heavy vehicles	30 light vehicles 0 heavy vehicles
3	AWRC to M7 Motorway	40 light vehicles 1 heavy vehicle	10 light vehicles 0 heavy vehicle
4	M7 Motorway to Joseph St, Cabramatta West	140 light vehicles 51 heavy vehicles	40 light vehicles 50 heavy vehicles
5	Joseph St, Cabramatta West to Lansdowne Reserve, Lansdowne	115 light vehicles 29 heavy vehicles	70 light vehicles 25 heavy vehicles

Construction access for the AWRC will be via a new access road off Clifton Avenue, Kemps Creek. This access road will be built before construction of the AWRC and has not been included in the scope of works assessed by the EIS. Sydney Water has completed a separate environmental impact assessment for this access road.

The pipelines will generally be built along existing roads, mostly in the road or road verge. Construction access for the pipelines will be via existing roads. In some instances, such as along Elizabeth Drive, temporary access will be needed to access the pipeline construction areas. These temporary access tracks are included in the project's impact area and shown on Figure 4 17. All temporary access tracks will be restored to pre-construction condition at the completion of works.

Most truck movements during construction of the AWRC will occur in the first 18 months. This will be associated with the removal and importing of spoil. For pipeline construction, the number of daily truck movements is likely to be consistent for most of the pipeline construction.

4.11 Commissioning and decommissioning

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 will 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 will function and perform in an adequate manner and avoid potential environmental issues after they become operational.

Commissioning is required for all project components, including AWRC treatment process trains, pump stations, electrical, control elements and pipelines. The activities will 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 will 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
- control functionality check
- wet commissioning,
- process and operational testing,
- performance and acceptance testing
- process proving
- training.

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

Once the pipelines and the AWRC have been commissioned, there will 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 will require flexibility in the Environment Protection Licence water quality release limits.

The AWRC and pipelines are unlikely to be decommissioned, as this is not Sydney Water's usual practice for this type of infrastructure. Instead, infrastructure will be repaired and upgraded throughout its design life to maintain its operation. However, as the AWRC undergoes future stages of upgrade, the ground mounted solar will likely be decommissioned to make room for additional wastewater treatment infrastructure. There may be opportunities to reuse the ground mounted solar as roof mounted solar.

4.12 Project timing

The construction phase of the project is planned to start in mid-2022 and take about 36 months to complete. The exact timing of construction and operation of the project is linked to growth projections and forecasts in the servicing area. If these projections change, this may result in changes to the timing and staging of construction and operation of the AWRC.

The staging of construction will be determined once construction contractors have been engaged. It is likely that construction activities will occur concurrently across the entire footprint, with some components, such as the AWRC, having longer construction periods then other project components. Pipeline construction is likely to be staggered across the project alignment.

Figure 2-2 shows proposed timing of key project phases.

4.13 Project flexibility for Stage 1

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 will be further developed after appointment of a construction contractor or contractors after the contract is awarded.

Sydney Water's general principle for flexibility is that changes to design, construction and operation will be consistent with or better than the environmental impact, environmental performance outcomes and management measures described in this EIS. The following sections summarise more specific elements of flexibility.

4.13.1 Design and operation

Table 4-17 outlines the key elements of flexibility Sydney Water proposes during design and operation.

Table 4-17 Flexibility during design and operation of the project

Flexibility proposed	How Sydney Water will confirm approach
Treatment technology or equipment at the AWRC 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 AWRC and its ancillary infrastructure within the operational area shown in Figure 4-1 provided it has no additional noise or air quality impacts on sensitive receivers.	During detailed design

Flexibility proposed	How Sydney Water will confirm approach
Location and design of retention and detention basins provided they can achieve the nominated water quality objectives and are above the 1% AED flood level.	During detailed design
Urban design and landscaping at the AWRC site provided it aligns with the principles described in section 4.4.1.	During detailed design for urban design. During landscaping design in construction phase.
Location and design of the release infrastructure to South Creek provided it is within the construction area shown in Figure 4-16.	During detailed design
Location and size of pipelines provided they are located within the impact assessment area described in section 4.8.2 and shown in Figure 4-17.	During detailed design
Location of environmental flows pipeline provided it meets the following principles: • No changes to construction methodology, i.e. sections currently proposed to be tunnelled. • No additional environmental impact, including no additional vegetation removal. • Release location will be located at Warragamba River downstream of the dam wall within the identified impact assessment area. • The eastern drill site is located along Bents Basin Road between current location and Silverdale Road. This flexibility is needed due to potential geotechnical constraints along the alignment, which may result in the need to change tunnelling alignment.	During detailed design and construction planning
Operating regime (including proportion of releases) from the environmental flows pipeline and treated water pipeline to balance operability and align with NSW Government environmental flows regime, in consultation with DPIE Water.	During detailed design
Location of ancillary infrastructure on pipelines provided that are located within the impact assessment areas described in section 4.8.2 and shown in Figure 4-17.	During detailed design

Flexibility proposed	How Sydney Water will confirm approach
Proportion of renewable energy generated between solar and co-generation	During detailed design
Flexibility in treated water quality during commissioning and early stages of operation.	During commissioning planning in construction phase
Assessment of low impact activities to be completed prior to the approval of the project CEMP.	During detailed design
Providing recreational access to the green space area on the AWRC site.	Timing and whether this proceeds depends on ongoing consultation and agreement with DPIE on Cumberland Plain Conservation Plan and South Creek Corridor Strategy.

4.13.2 Construction

Table 4-18 outlines the key elements of flexibility Sydney Water proposes during construction.

Table 4-18 Flexibility during construction of the project

Flexibility proposed	How Sydney Water will confirm approach
Construction compound locations and layout within the impact assessment area	During detailed design and construction planning
Construction compound locations outside the impact assessment area, provided they meet the following principles as assessed by the project's Environmental Representative: • do not increase total number of compounds described in section 4.9.4 • do not increase traffic movements • landowner agrees to use of site for compound • no nearby sensitive receivers • no disruption to property access • no impact to known items of non-Aboriginal and Aboriginal heritage • outside high-risk areas for Aboriginal heritage • use existing cleared areas • no impacts to remnant native vegetation or key habitat features • no disturbance to waterways	During detailed design, prior to and during construction

Flexibility proposed	How Sydney Water will confirm approach
• no disturbance of contaminated land.	
Access tracks to pipelines, where the pipeline is not located in a road or road verge and the alignment follows areas disturbed by other projects such as the M12 Motorway and Elizabeth Drive widening, or other existing access tracks.	During detailed design, prior to and during construction
Timing for construction and installation for some Stage 1 components. It is likely that the incoming flows at the start of operation will be below the Stage 1 capacity of the AWRC, and flexibility is proposed to delay the installation of some treatment equipment beyond the 36-month construction timeframe.	During detailed design, prior to and during construction and operation
Pipeline construction methodology if it can be demonstrated it has equivalent or reduced environmental and community impact (for example, changing from open trenching to tunnelling methods).	During detailed design, prior to and during construction
Location of construction activities provided they are in the impact area or impact assessment area, as described in section 4.8.2, and have equivalent or reduced environmental and community impact	During detailed design, prior to 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, prior to and during construction
Release location of water from AWRC and pipeline commissioning provided it has been tested, treated and demonstrated not to result in an adverse impact on the environment. Options for release include, but are not limited to, South Creek, local stormwater network, local wastewater network and overland flow.	During detailed design, during construction and commissioning

4.13.3 Staging

Table 4-19 outlines the key elements of flexibility Sydney Water proposes regarding staging of the project.

Table 4-19 Flexibility relating to staging of the project

Flexibility proposed	How Sydney Water will confirm approach
Size of Stage 1 and future stages of the AWRC, provided Stage 1 is 50 ML/day or less and future stages do not exceed 100 ML/day.	During detailed design and operation
Incremental operating capacity of Stage 1. Sydney Water may operate Stage 1 at a lower capacity than what is built, depending on the growth and incoming wastewater flows in the servicing area. This means installation of treatment equipment at the AWRC may be staged beyond the construction timeframe outlined in the EIS.	During detailed design and operation
Timing of delivery of the environmental flows pipeline to build it later than other Stage 1 components and/or to align with NSW Government decisions on whether it is required as outlined in section 3.5.1.	During detailed design and operation

4.14 Project exclusions

This section outlines what components are not part of the project (including concept proposal and Stage 1) and therefore excluded from this project description and the application the subject of this EIS.

4.14.1 Wastewater collection network

A wastewater collection network will be required to transfer wastewater from residences and businesses to the AWRC for treatment. Sydney Water has started planning for this network but it is excluded from the project scope because it will likely be built progressively to integrate with future precinct planning and align with development. This means exact locations and timing are not yet known and this network will be subject to separate planning approvals.

4.14.2 Recycled water schemes

The AWRC will produce treated water that is suitable for a range of recycled water uses. However, recycled water schemes, associated additional facilities on the site (in addition to those described in section 4.4.1), and associated supply pipeline infrastructure are excluded from the project scope. This is because there is uncertainty about recycled water demands in terms of location, quantity and timing. There is also uncertainty about the commercial arrangements for delivering recycled water schemes. Section 3.5.1 provides more detail about how Sydney Water is progressing recycled water schemes.

Having clarity now of future recycled water schemes would not remove the need for waterway releases proposed in the project. Even if recycled schemes were in place, demand varies (for example, it is typically lower over winter). Sydney Water must maintain the ability to manage excess recycled water when supply exceeds demand, or if a recycled water scheme stops for any period.

4.14.3 Additional resource recovery

As the full biosolids digestion capacity of Stage 1 of the AWRC will not be required when it is first built, Sydney Water may consider opportunities to temporarily accept other wastes for co-digestion to produce energy. Sydney Water aspires to build a separate resource recovery plant at the AWRC to become a circular economy hub and co-digest waste to generate energy as outlined in more detail in section 3.5.2. Both these elements are excluded from the scope of this project and will be subject to further investigations and separate planning approval.

4.14.4 Access, utility connections and other infrastructure

The site will require connection of utilities such as electricity and water. These are outside the scope of this project and will be delivered under separate planning approvals. An infrastructure management plan has been provided in section 13.2 which provides further details on the utility connections and impacts of the project.

An access route to the AWRC site is required from Elizabeth Drive including an access road from Clifton Avenue. Upgrade of the Clifton Avenue/Elizabeth Drive intersection is also proposed. These road works are outside the scope of this project and will be delivered by Sydney Water under separate planning approvals.

4.14.5 Property management

Sydney Water may need to carry out a range of property management activities on the AWRC site before the project is approved and during operation. These are excluded from the project scope and will be subject to separate planning approvals if needed. These include:

- relocating/adjusting utility connections
- vegetation management
- vermin/animal control
- site drainage management
- establishing site security
- demolition works
- land remediation activities
- use of surplus land on the AWRC site for other activities.

4.14.6 Minor works and maintenance

Sydney Water proposes that after Stage 1 is built and operational, any maintenance, replacement and repair of that infrastructure, or any minor works or upgrades will be out of scope of the project and assessed as exempt development or in separate planning approvals if needed. Similarly, any activities or works that improve environmental performance or have neutral environmental impact are excluded from the project scope.

4.14.7 Integration with interim servicing arrangements

Development and associated wastewater demand will commence before the AWRC opens in 2025. Interim servicing is required to address this demand but is outside the scope of the project.

Sydney Water is currently planning or delivering several interim servicing projects, including:

- transfer to West Camden Water Recycling Plant (WRP). For parts of the SWGA, wastewater is already transferred to West Camden WRP. Additional projects are underway for servicing the Lowes Creek and Kemps Creek precincts with additional infrastructure, including interim pumping stations to transfer flows from the precincts to West Camden WRP for up to five years
- transfer to Liverpool WRP. For parts of the SWGA wastewater is already transferred to Liverpool WRP, including Leppington and Leppington North. Additional infrastructure, including interim pumping stations, will be constructed to continue to support growth in this area, until the AWRC is operational. In the WSAGA, Sydney Water is also investigating options for the transfer of wastewater from Badgerys Creek, Western Sydney International Airport and Aerotropolis Core to Liverpool WRP until the AWRC is operational
- transfer to St Marys WRP. In the WSAGA, servicing of the Mamre Road precinct is already underway. The eastern catchment of the precinct will be permanently serviced by the St Marys wastewater network and WRP with infrastructure to be delivered by a developer rather than Sydney Water. Concept design is currently underway for interim servicing of the western and northern catchments by St Marys WRP until the AWRC is operational
- additional servicing for WSAGA. Sydney Water is currently discussing additional interim servicing with developers. Potential options include tankers, decentralised water recycling plants and temporary pumping stations.

The process of transitioning from interim servicing arrangements to permanent servicing in the Upper South Creek Servicing Area will need to be managed progressively for each precinct and treatment plant.

5 Statutory context

This section explains the permissibility and approval pathway for the project and summarises approvals required under a range of legislation.

5.1 Relevant Secretary's Environmental Assessment Requirements

Table 5-1 lists the SEARs that are addressed in the chapter and the section in which they are addressed.

Table 5-1 SEARs addressed in statutory context chapter

SEARs	EIS section where requirement addressed
General Requirements (c) a summary of the strategic need with regard to its State significance and relevant State Government policy including: iii. Western Sydney Aerotropolis Discussion Paper on proposed State Environmental Planning Policy (SEPP)	Section 5.2.2 addresses the SEPP, which supersedes the discussion paper.
General Requirements (f) the statutory context of the project (as a whole) including:	This chapter
(f) (i) how it meets the provision of the *Environmental Planning and Assessment Act 1979* (the EP&A Act) and the EP&A Regulation	Sections 5.2.1, 5.2.4
(f) (ii) a list of any approvals that must be obtained under any other Act or law before the project may be lawfully carried out	Sections 5.2.5, 5.2.6
(f) (iii) identification of the existing environmental planning instruments and other current government strategic plans and policies relevant to the project and land subject to the project (including State environmental planning policies, land use and infrastructure strategies and local strategic planning statements)	State environmental planning policies and local strategic planning statements addressed in section 5.2.2 and section 5.2.3. Other government strategic plans, policies, land use and infrastructure strategies addressed in Chapter 2.

SEARs	EIS section where requirement addressed
49. Assessing project impacts to the Western Sydney Parklands including: a) addressing the relevant objectives, strategic directions, land use opportunities and key management priorities of State Environmental Planning Policy (Western Sydney Parklands) 2009, the Western Sydney Parklands Plan of Management 2030, the Western Sydney Parklands Southern Parklands Framework and the Western Sydney Parklands Design Manual	The State Environmental Planning Policy is addressed in section 5.2.2. Chapter 2 addresses other content.

5.2 NSW statutory context

5.2.1 Environmental Planning and Assessment Act

This section explains permissibility and planning approval pathways for the project under the *Environmental Planning and Assessment Act 1979* (EP&A Act), with reference to relevant environmental planning instruments. Sections 5.2.2 and 5.2.3 discuss other relevant planning instruments and documents established under the EP&A Act, including state environmental planning policies and local strategic planning statements.

In accordance with definitions in the Standard Instrument - Principal Local Environmental Plan, the project primarily comprises a sewage treatment plant and a sewage reticulation system. It also includes a stormwater management system (defined in clause 110 of State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP), solar energy system (defined in clause 33 of the Infrastructure SEPP) and development of a green space area. Permissibility of these components is analysed below.

Permissibility – AWRC

As shown on Figure 5-1, the AWRC site is on land zoned as RU2 – Rural Landscape and E2 – Environmental Conservation under Penrith Local Environmental Plan 2010 and ENZ - Environment and Recreation under State Environmental Planning Policy (Western Sydney Aerotropolis) 2020. Table 5-2 describes the types of infrastructure and activities on the Advanced Water Recycling Centre (AWRC) site and their permissibility. This demonstrates that all infrastructure on the AWRC site is permissible without consent.

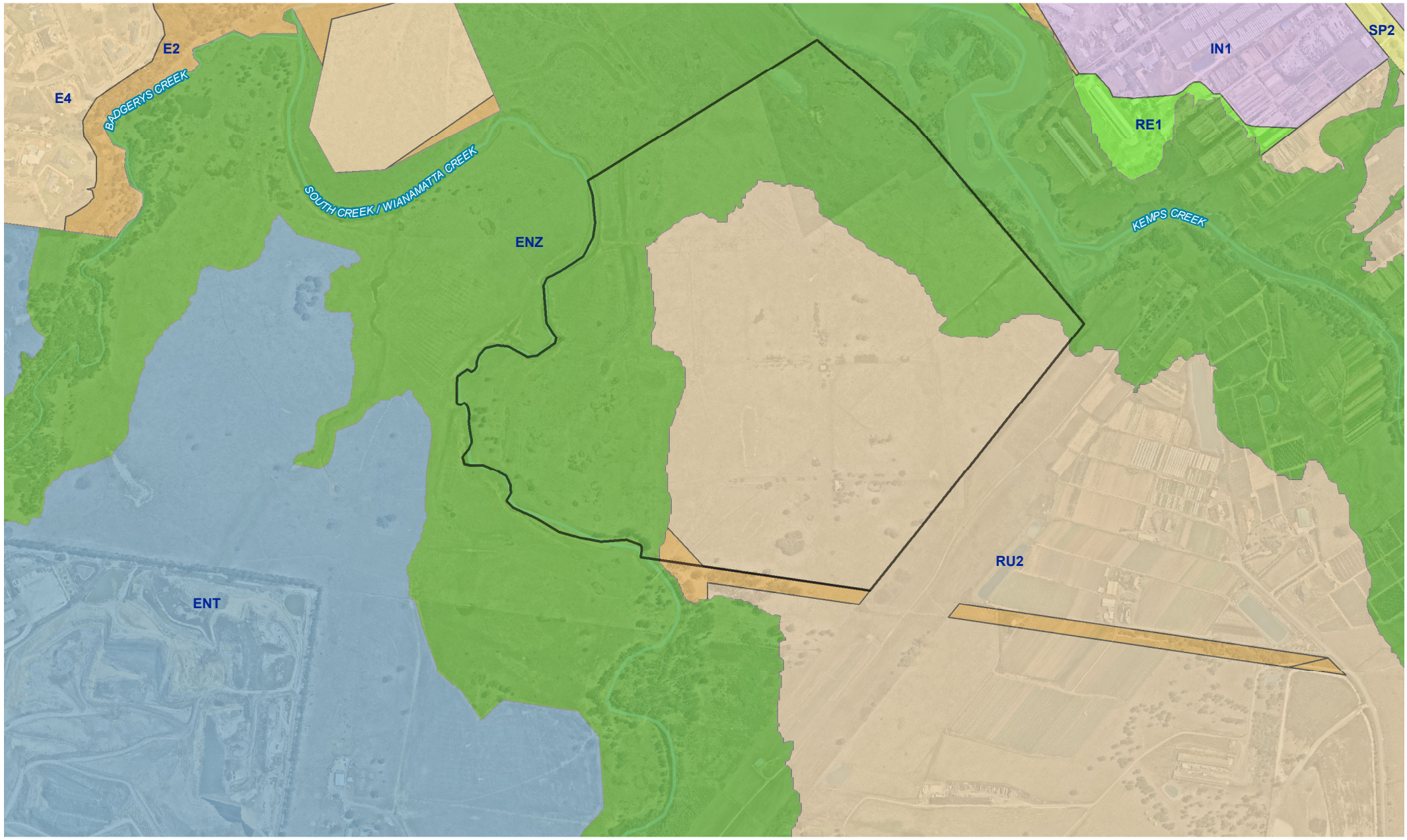


Figure 5-1 Land use zoning for AWRC site

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

Table 5-2 AWRC site infrastructure and permissibility

Infrastructure	Land use zone	Permissibility
AWRC	RU2	The AWRC is a sewage treatment plant and is located on land zoned RU2. Under section 106(2) of the Infrastructure SEPP, sewage treatment plants are permissible without consent in a prescribed zone in the prescribed circumstances. RU2 is a prescribed zone under clause 105 of the Infrastructure SEPP and the prescribed circumstances are met because Sydney Water is a public authority. This means the AWRC is permissible without consent.
Pipelines and release structures to waterways	ENZ and E2	A range of other infrastructure is located on the land zoned as ENZ. This includes sections of the treated water and brine pipelines, and pipelines and infrastructure from the AWRC to release treated water and stormwater to South Creek. Although at this stage infrastructure is not proposed on the area zoned E2, it is possible that detailed design may require some infrastructure in this location. Some of the infrastructure proposed in these land use zones is a sewage reticulation system and some is a stormwater management system. Under clause 106 of the Infrastructure SEPP, sewage reticulation systems are permissible without consent on any land and the prescribed circumstances will be met because Sydney Water is a public authority. Under clause 111 of the Infrastructure SEPP, stormwater management systems are permissible without development consent if they are carried out by or on behalf of a public authority. For these reasons, all this infrastructure is permissible without consent.
Green space area	ENZ	Sydney Water intends to enhance the land zoned as ENZ for green space, with associated landscaping. This is an integrated part of the AWRC site and will be delivered in conjunction with the overall project. It is important this is managed as part of the whole AWRC site to ensure water sensitive urban design, biodiversity and visual impacts are effectively managed across the whole site. Establishing the green space area is permissible with consent under clause 14 of the State Environmental Planning Policy (Western Sydney Aerotropolis) 2020 and is consistent with the objectives of the ENZ zone. However, creating this green space will be undertaken as part of the overall project, which is State significant infrastructure, as described in the approval pathway section below. Clause 14(2) of State Environmental Planning Policy (State and Regional Development) 2011 provides that if a development is only partly State significant infrastructure then the remainder of that development is considered development without consent and is also declared State significant infrastructure. This is provided it is sufficiently related to the State significant infrastructure project and is not State significant development.

Infrastructure	Land use zone	Permissibility
		Creation of the green space area does not meet the criteria for State significant development in Schedules 1 or 2 of State Environmental Planning Policy (State and Regional Development) 2011 and is an integrated part of the project. Therefore, creating this green space area is also permissible without consent. Development of the green space area into a recreation area is currently prohibited under clause 27(5) of the State Environmental Planning Policy (Western Sydney Aerotropolis) 2020, because most of this area is shown as high biodiversity value on the High Biodiversity Value Areas map under this SEPP. Sydney Water considers that section 5.22 (2) of the EP&A Act can apply to override the provisions of the State Environmental Planning Policy (Western Sydney Aerotropolis) 2020 and allow approval for this recreation component to be granted under the project's State significant infrastructure approval. However, as noted in Chapter 4, Sydney Water is continuing to consult with relevant government agencies about the potential for recreational access to this area. Although Sydney Water is seeking approval for the recreation component, this component would only proceed if it aligned with DPIE's position on recreational areas on adjacent land along South Creek.
Solar energy system	RU2	A solar energy system (both roof-mounted and ground-mounted) on the land zoned as RU2. Under clause 36(3)(a) of the Infrastructure SEPP, solar energy systems are permissible without consent if they are ancillary to an existing infrastructure facility. Although the system will be ancillary to an infrastructure facility (the AWRC), it is not yet built so is not an existing facility. However, clause 34(7) of the Infrastructure SEPP provides that solar energy systems are permissible with consent on any land. Given the solar energy system will be developed as part of the overall project and contributes to reducing the project's greenhouse gas emissions, the provisions of Clause 14(2) of State Environmental Planning Policy (State and Regional Development) 2011 can be applied in the same way as for the green space area described above. The current estimated cost for the renewable energy proposed as part of Stage 1 (solar energy and co-generation) is below the threshold that triggers State significant development under Schedule 1 (clause 20) of State Environmental Planning Policy (State and Regional Development) 2011. This means the solar energy system is permissible without consent.

Permissibility – other infrastructure

Outside the AWRC site, the treated water pipeline, environmental flows pipeline and brine pipeline are all classified as sewage reticulation systems and cross a range of land use zones as shown in Figure 5-2, Figure 5-3, and Figure 5-4. The environmental planning instruments that prescribe these land use zones are:

- Bankstown Local Environmental Plan 2015
- Fairfield Local Environmental Plan 2013
- Liverpool Local Environmental Plan 2008
- Penrith Local Environmental Plan 2010
- Wollondilly Local Environmental Plan 2011
- State Environmental Planning Policy (Western Sydney Aerotropolis) 2020
- State Environmental Planning Policy (Western Sydney Parklands) 2009.

Under clause 106 of the Infrastructure SEPP, sewage reticulation systems are permissible without consent on any land and the prescribed circumstances will be met because Sydney Water is a public authority. The project will not be in land reserved under the *National Parks and Wildlife Act 1974* so the limitations in clause 106(3D) are not relevant.

The treated water pipeline also crosses the infrastructure corridor for Sydney Metro – Western Sydney Airport which has been rezoned under State Environmental Planning Policy (Major Infrastructure Corridors) 2020. The pipeline is permissible with consent under clause 9(1) of this SEPP, because it would have been permissible without consent in the former land use zone and will not adversely impact on or prevent the land being used as an infrastructure corridor in the future. The same provisions of State Environmental Planning Policy (State and Regional Development) 2011 as described for the green space area and solar energy systems also apply to make the treated water pipeline in this area permissible without consent. Sydney Water has been and will continue to collaborate with Transport for NSW to ensure pipeline design, construction and operation does not adversely affect the future Sydney Metro – Western Sydney Airport corridor.

Approval pathway

The project is State significant infrastructure under Schedule 3, section 1(1) of State Environmental Planning Policy (State and Regional Development) 2011. This is because Sydney Water would otherwise be the determining authority and has concluded that an EIS is required in accordance with section 5.7(1) of the EP&A Act. Sydney Water is also seeking a staged approval under section 5.20 of the EP&A Act.

The approval authority is the NSW Minister for Planning and Public Spaces.

Section 5.2.6 addresses approval requirements under Commonwealth legislation.

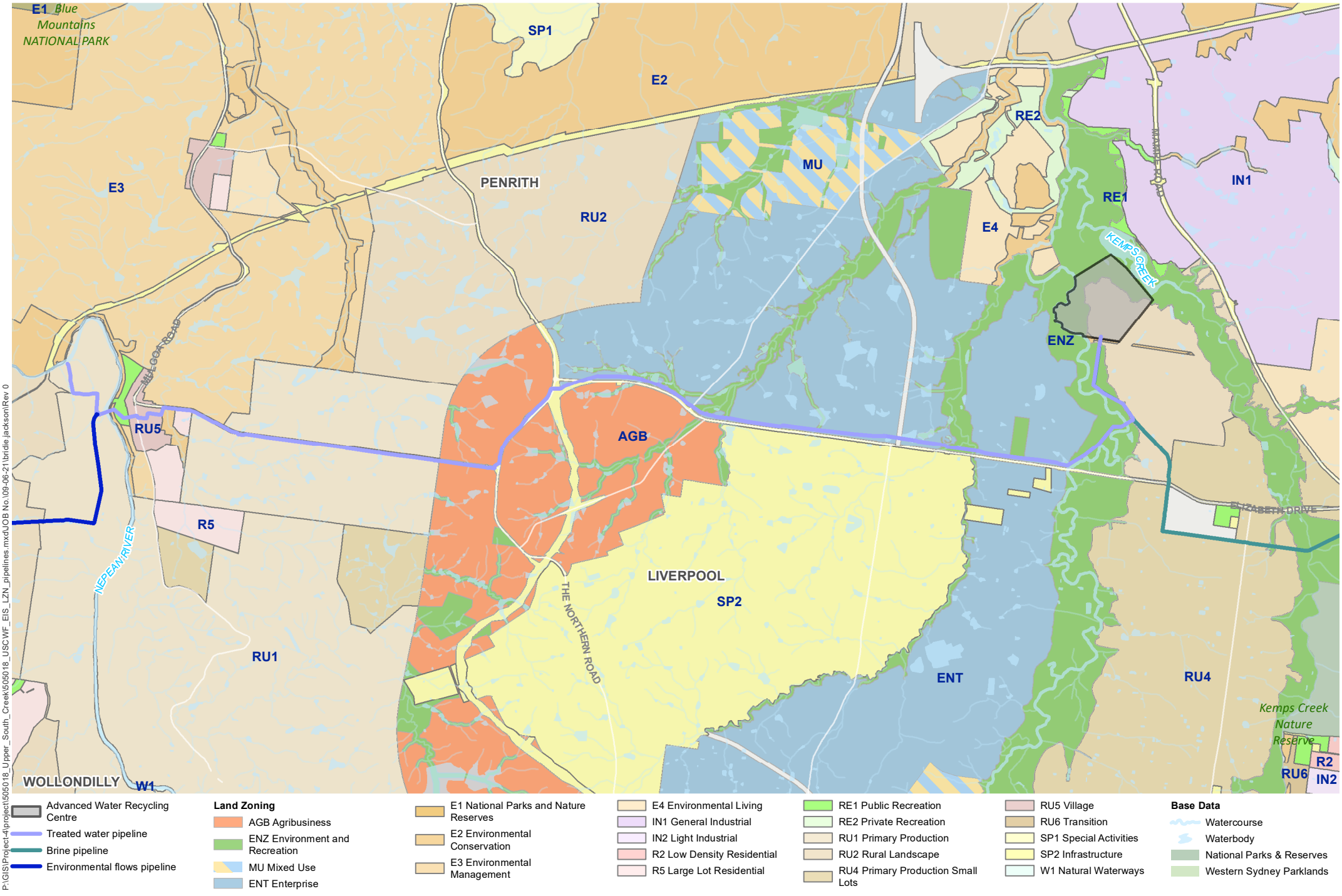


Figure 5-2 Land use zoning for treated water pipeline

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

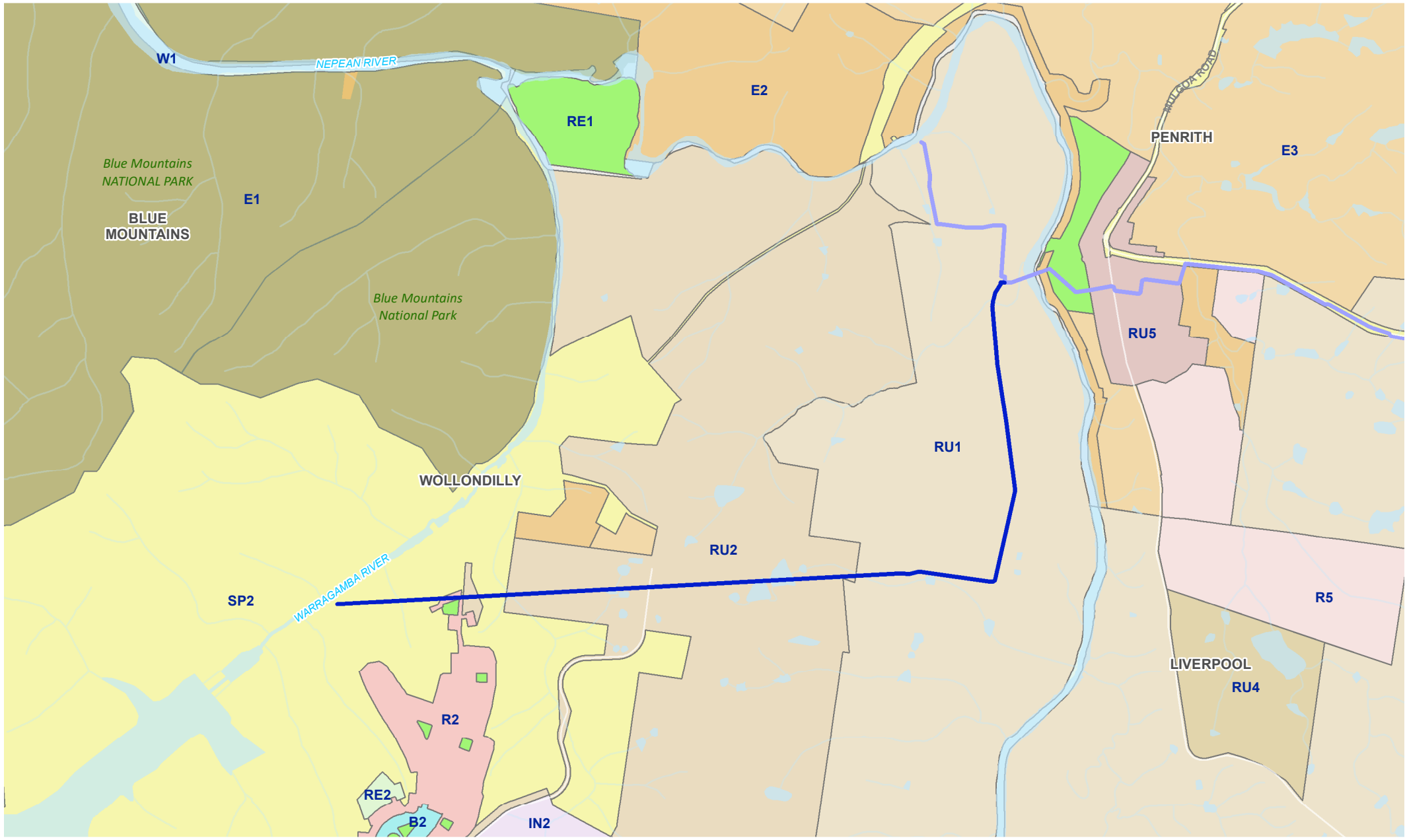


Figure 5-3 Land use zoning for environmental flows pipeline

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

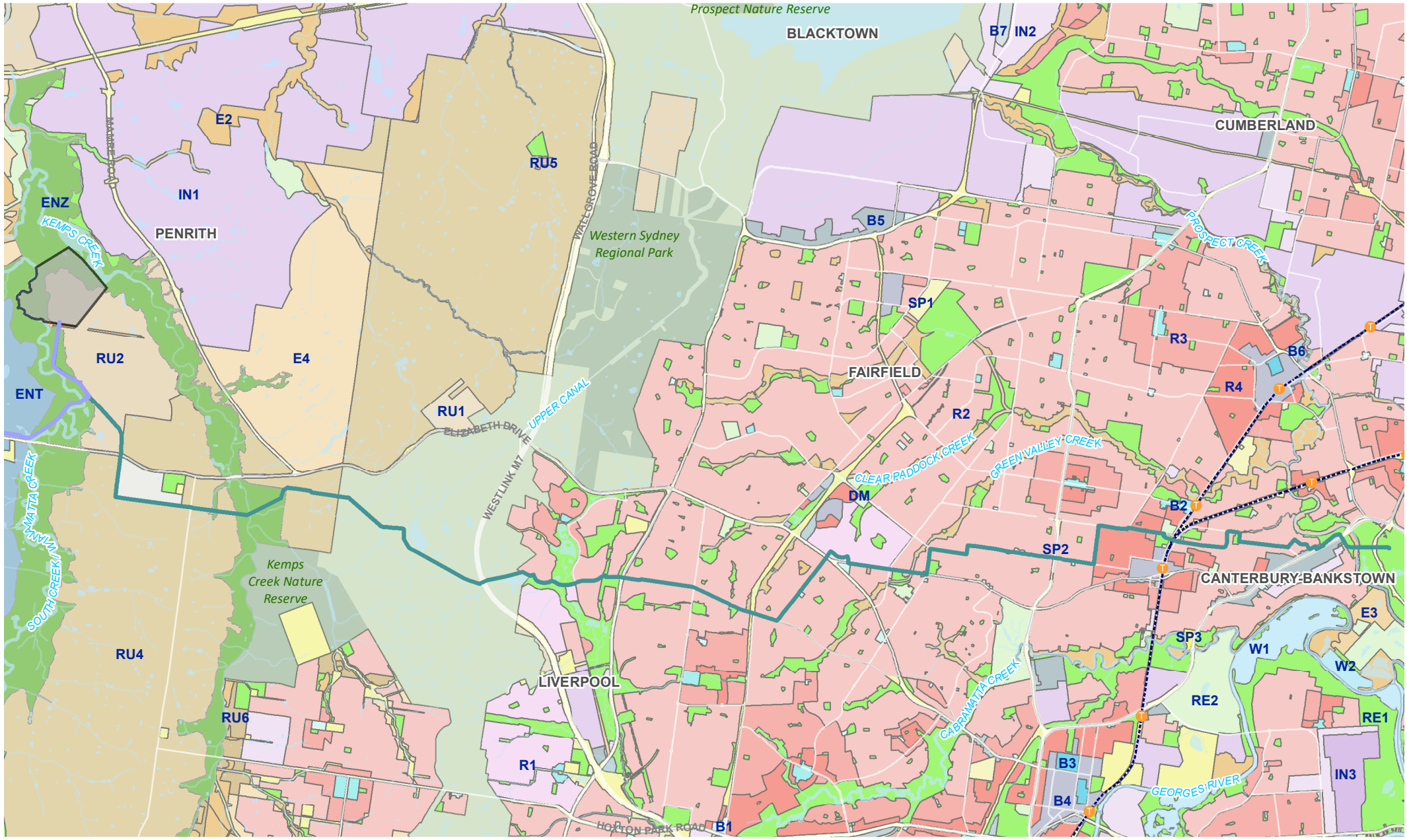


Figure 5-4 Land use zoning for brine pipeline

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

5.2.2 State Environmental Planning Policies

Section 5.22 of the EP&A Act provides that environmental planning instruments (including SEPPs) do not apply to State significant infrastructure projects. There are several exceptions to this, including where the SEPP relates to declaring the project State significant infrastructure or determining whether the project is development without consent.

In addition, there are some SEPPs that would be relevant to the project were it not State significant infrastructure and that contain relevant objectives to help inform Sydney Water's impact assessment. Table 5-3 summarises relevance of all these SEPPs.

Table 5-3 State Environmental Planning Policies considered for the project

SEPP	Relevance and EIS section with further detail
State Environmental Planning Policy (Coastal Management) 2018	Part of the project is located on land mapped as proximity area for coastal wetlands as defined by this SEPP, and adjacent to land mapped as Coastal Wetlands. Section 9.1 addresses relevance of this SEPP in more detail.
State Environmental Planning Policy (Infrastructure) 2007	Section 5.2.1 explains how this SEPP is relevant to the project's permissibility.
State Environmental Planning Policy (Major Infrastructure Corridors) 2020	Section 5.2.1 explains how this SEPP is relevant to the project's permissibility.
State Environmental Planning Policy No 19 – Bushland in Urban Areas	Most of the project is in the area covered by this SEPP, with the exception of Western Sydney Parklands. Section 9.1 addresses relevance of this SEPP in more detail.
State Environmental Planning Policy No 33 – Hazardous and Offensive Development	A preliminary hazard analysis would be triggered by this SEPP given the volumes of dangerous goods stored for the project. Section 11.5 includes the preliminary hazard analysis.
State Environmental Planning Policy (State and Regional Development) 2011	Section 5.2.1 explains how this SEPP is relevant to the project's approval pathway.
State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011	The project is partially located within the Sydney Drinking Water Catchment. Section 8.3 explains how this SEPP has been addressed.
State Environmental Planning Policy (Sydney Region Growth Centres) 2006	About 10 km of the brine pipeline occurs within land subject to the SEPP and the Order to confer biodiversity certification. Section 9.1 addresses relevance of this SEPP in more detail.
State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017	The project is on land mapped under this SEPP given its location in the Bankstown, Fairfield, Liverpool and Penrith LGAs. This SEPP is not relevant to the project in the Wollondilly LGA. Section 9.1 addresses relevance of this SEPP in more detail.

SEPP	Relevance and EIS section with further detail
State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	As discussed in section 5.2.1, the project crosses land zoned under this SEPP and it is therefore relevant in determining the project's permissibility. The subsection below addresses how the project aligns with other elements of the SEPP.
State Environmental Planning Policy (Western Sydney Parklands) 2009	Part of the brine pipeline will be in Western Sydney Parklands. This SEPP provides that land in Western Sydney Parklands is unzoned. The project does not impact on any environmental conservation areas identified in the SEPP and has been designed to avoid and minimise impacts on listed heritage items (Upper Canal and Liverpool Offtake Reservoir) which are also part of bulk water supply. The land use provisions and consent authority considerations apply to projects that require development consent, which is not the case for the project. However, Appendix B addresses consistency of the project with key Western Sydney Parklands strategic plans and design manuals.
Sydney Regional Environmental Plan No 20 – Hawkesbury Nepean River (No 2 – 1997)	Most of the project is in the area covered by this SEPP. The project's alignment with clauses 5 and 6 is addressed in the section below.
Greater Metropolitan Regional Environmental Plan No. 2 – Georges River catchment	Some of the brine pipeline is in the area covered by this SEPP. The project's alignment with clauses 8 and 9 is addressed in the section below.

State Environmental Planning Policy (Western Sydney Aerotropolis) 2020

The key provisions of the SEPP are listed below. These provisions do not apply to the project given the provisions of section 5.22 of the EP&A Act. However, Table 5-4 addresses how the project aligns with them and where further details are available in other chapters of the EIS.

Table 5-4 Project alignment with State Environmental Planning Policy (Western Sydney Aerotropolis) 2020

Western Sydney Aerotropolis SEPP provision	Project alignment
Airport safeguarding (Part 3)	The project is not prohibited development as defined in this part. The EIS provides an assessment of the project's impacts on airport safety matters.
Flood planning (clause 26)	The EIS assesses the project's flood impacts.

Western Sydney Aerotropolis SEPP provision	Project alignment
Preservation of trees (clause 27)	The project includes infrastructure located in the Environment and Recreation zone and land mapped as high biodiversity value under the SEPP. The EIS assesses the project's impacts on native vegetation.
Heritage conservation (clause 28)	The EIS assesses the project's impacts on Aboriginal and non-Aboriginal heritage, including the Fleurs Radio Telescope site and McGarvie-Smith Farm as listed under the SEPP.
Transport corridors (clause 29)	Section 5.2.1 explains how State Environmental Planning Policy (Major Infrastructure Corridors) 2020 is relevant to the project's permissibility.
Warragamba pipelines (clause 30)	The EIS assesses the project's impacts on the Warragamba pipelines.
Design excellence (Part 5)	Chapters 3 and 4 include content about design approach for the project.
Precinct plans (Part 7, Division 1	Appendix B considers the project's alignment with the draft Aerotropolis precinct plan.

Sydney Regional Environmental Plan No 20 – Hawkesbury Nepean River

Table 5-5 demonstrates that the EIS includes assessments to address the objectives in clauses 5 and 6 of the SEPP.

Table 5-5 Project alignment with Sydney Regional Environmental Plan – Hawkesbury-Nepean River

Planning consideration, policy or strategy	Project alignment
5(a) the aim of the plan to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context.	Various sections of the EIS address impacts of the project in the context of the region.
5(b) the strategies listed in the Action Plan of the Hawkesbury-Nepean Planning Strategy	This action plan was developed in 1997. In the two decades since then, management approaches and responsibilities for the Hawkesbury-Nepean have changed and are captured in a range of documents. These are addressed in Chapter 2.

Planning consideration, policy or strategy	Project alignment
5(c) whether there are any feasible alternatives to the development or other proposal concerned	Project options are addressed in Chapter 3.
5(d) the relationship between the different impacts of the development or other proposal and the environment, and how those impacts will be addressed and monitored	Project impacts, management measures and proposed monitoring are addressed throughout the EIS.
6(1) – total catchment management	Sydney Water has consulted relevant local councils in developing the project, as outlined in Chapter 6. Various sections of the EIS assess impacts on the catchment, including cumulative impacts of other major projects.
6(2) – environmentally sensitive areas	The EIS assesses waterway impacts, including rehabilitation of areas impacted, water quality, aquatic habitats and wetlands. It also assesses terrestrial biodiversity, groundwater and acid sulfate soil impacts and measures Sydney Water has taken to minimise them. The project does not have any infrastructure in or immediately adjacent to national parks. Sydney Water has offered to meet with NSW National Parks and Wildlife Service, Blue Mountains Area, about treated water releases to Nepean River and they have advised they do not see a need to consult at this time.
6(3) – water quality 6(4) – water quantity	The EIS assesses the impacts of the project's releases to waterways, including consistency with waterway objectives, impacts to aquatic habitats and riparian areas and stormwater management. It also assesses potential land and soil impacts and groundwater impacts.
6(5) – cultural heritage	The EIS assesses the project's impacts on Aboriginal and non-Aboriginal heritage.
6(6) – flora and fauna	The EIS assesses the project's impacts on terrestrial and aquatic biodiversity, including wetlands.
6(7) – riverine scenic quality	The EIS assesses the project's visual impact.
6(8) – agriculture/aquaculture and fishing	The EIS assesses the project's impact on agricultural land use.
6(9) – rural residential development 6(10) – urban development	Not relevant as the project is not rural residential development or urban development.

Planning consideration, policy or strategy	Project alignment
6(11) – recreation and tourism	The EIS assesses the project's social and visual impacts. Chapter 4 describes an opportunity at the AWRC site to develop the green space area into a recreation area.
6(12) – Metropolitan Strategy	Various sections of the EIS assess outcomes relevant to this strategy including in relation to air quality, waste, climate change risk and sustainability.

Greater Metropolitan Regional Environmental Plan No.2 (Georges River Catchment)

Table 5-6 identifies other chapters of the EIS that address the objectives in clauses 8 and 9 of the SEPP.

Table 5-6 Project alignment with Greater Metropolitan Regional Environmental Plan (Georges River catchment)

Planning consideration, policy or strategy	Project alignment
8(a) The aims, objectives and planning principles of this plan	The project infrastructure in the Georges River catchment includes part of the brine pipeline. The main potential for environmental impacts is during construction. The project design and the management measures in the EIS minimise the project's potential to impact water quality and biodiversity in the Georges River catchment.
8(b) the likely effect of the proposed plan, development or activity on adjacent or downstream local government areas	This EIS addresses project impacts on the environment in all relevant local government areas. The potential impacts on Georges River catchment are primarily localised and during construction. Impacts on downstream local government areas are unlikely.
8(c) the cumulative impact of the proposed development or activity on the Georges River or its tributaries	The impact assessment chapters of the EIS address cumulative impacts of the project.
8(d) any relevant plans of management	Chapter 2 addresses strategic planning documents most relevant to the project.
8(e) the Georges River Catchment Regional Planning Strategy	Chapter 2 considers project alignment with the Georges River Estuary Coastal Zone Management Plan which is the most recent planning document for the Georges River catchment.

Planning consideration, policy or strategy	Project alignment
8(f) all relevant State government policies, manuals and guidelines of which the council, consent authority, public authority or person has notice	The impact assessment chapters of the EIS address relevant policies, manuals and guidelines relevant to the project.
8(g) whether there are any feasible alternatives to the development or other proposal concerned	Project options are addressed in Chapter 3.
9(1) acid sulfate soils	The EIS assesses project impacts on acid sulfate soils.
9(2) bank disturbance	Chapters 3 and 4 describe the waterway crossings where tunnelling methods are proposed and bank disturbance is avoided. This includes the crossing of Prospect Creek.
9(3) flooding	The EIS addresses project impacts associated with flooding.
9(4) industrial discharges	The project does not involve discharging industrial waste to Georges River or its tributaries.
9(5) land degradation	The EIS assesses project impacts on soils, surface water, groundwater, and terrestrial and aquatic biodiversity.
9(6) on-site sewage management	The project does not include on-site sewage management for residential properties.
9(7) river related uses	Although the project includes crossing of some tributaries of Georges River, it will not have any ongoing impacts on public access to the foreshore.
9(8) sewer overflows	The project's releases of brine to the Malabar wastewater system have been designed to avoid contributing to sewer overflows.
9(9) urban/stormwater runoff	Construction of the brine pipeline will incorporate stormwater management measures.
9(10) urban development areas	The project does not involve establishing new or expanded urban development areas.
9(11) vegetated buffer areas	The EIS assesses the project's impacts on vegetation.
9(12) water quality and river flows	The project does not involve operational waterway releases in the Georges River catchment.
9(13) wetlands	The EIS assesses the project's impacts on wetlands.

5.2.3 Local strategic planning statements

Councils are required to prepare local strategic planning statements (LSPS) to outline the 20-year vision for landuse in their local government area. The project spans five local government areas as shown in Figure 5-5. The sub-sections below describe how the project aligns with each LSPS.

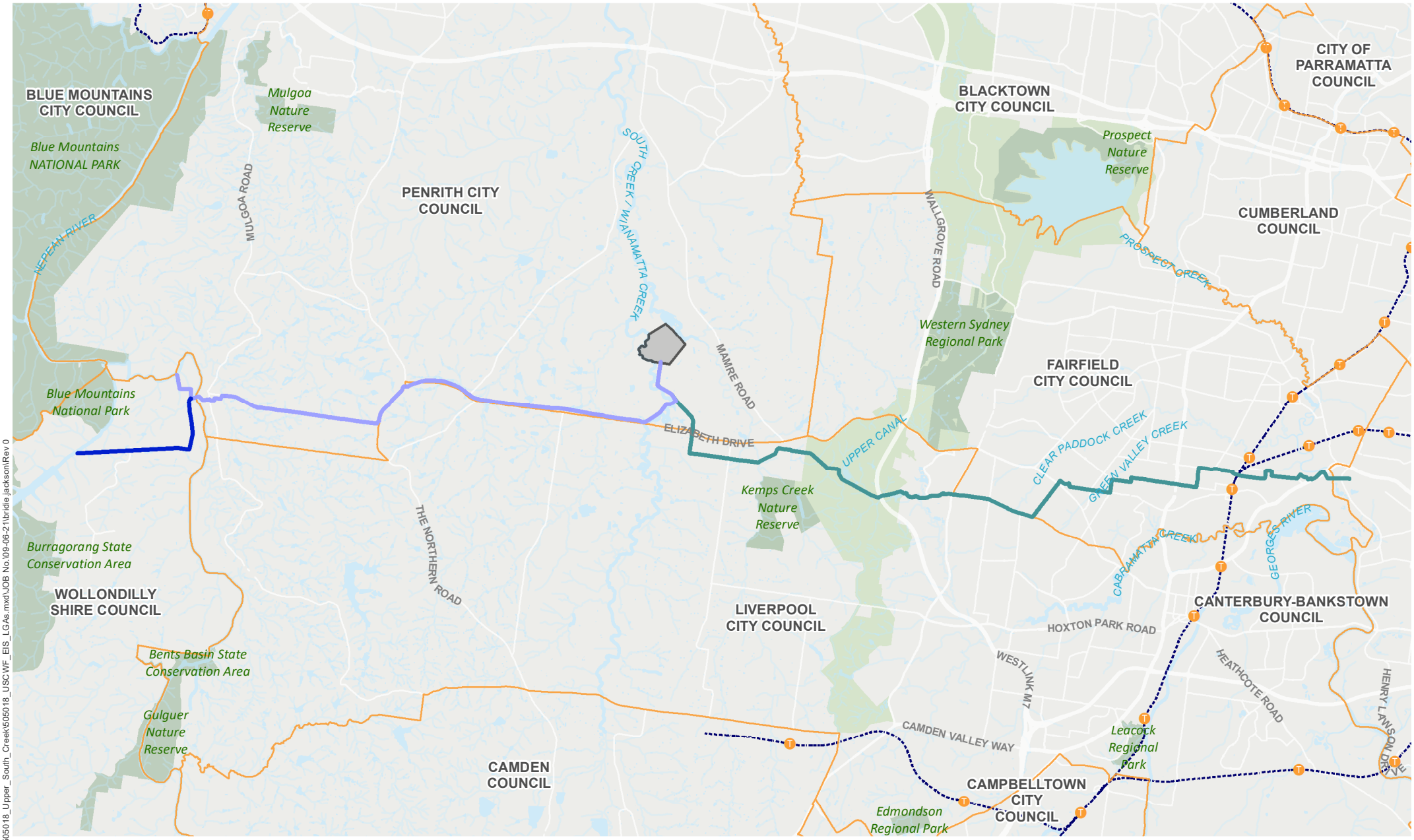


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Figure 5-5 Project location in local government areas

Source: Aurecon, Sydney Water, LPI, Nearmap, ESRI
Projection: GDA2020 MGA Zone 56

Penrith LSPS

Table 5-7 summarises the project's alignment with the most relevant planning priorities from the Penrith Local Strategic Planning Statement – Planning for a Brighter Future 2020. The project components in the Penrith Local Government Area (LGA) are the AWRC and parts of the treated water and brine pipelines.

Table 5-7 Project alignment with Penrith LSPS

Planning priority	Project alignment
1 – align development, growth and infrastructure	The LSPS notes the importance of Sydney Water's water-related infrastructure in servicing growth. The project is a critical part of delivering a wastewater service to the Western Sydney Aerotropolis. Sydney Water plans to deliver and stage the project to align with development timing and future population growth projections.
7 – enrich our places 8 – recognise and celebrate our heritage	The LSPS emphasises the importance of enhancing open space, celebrating local character, ensuring an attractive built environment and protecting and celebrating heritage. The project includes creation of a green space area next to the AWRC with the potential to provide community open space. The AWRC will be designed to minimise its visual impact and take opportunities to celebrate local heritage. Sydney Water has also avoided or minimised impacts on heritage where practical and developed measures to manage its impacts. The treated water and brine pipelines will be below ground which will minimise potential impacts on council's future place-making.
16 – protect and enhance our high value environment lands 18 – connect our blue and green grid	The key high value areas identified in the LSPS are waterways, biodiversity, and scenic and cultural landscapes. South Creek is identified as one of the priority blue and green grid corridors for Penrith LGA. Building pipelines will impact on some waterways which will be restored after construction. Typical releases to waterways, including Nepean River, will be treated to a high or very high quality. The project has been designed to transfer brine away from inland catchments, to protect water quality in these areas. Sydney Water will also enhance the environment along part of South Creek, by developing a green space area on the AWRC site that can contribute to the blue and green grid. Sydney Water has avoided and minimised biodiversity impacts of the project where practical. Sydney Water will also restore impacted areas and offset impacts where relevant. Pipelines will be built below ground which limits the potential for impact on scenic landscapes. Above-ground assets such as the AWRC will be designed to minimise visual impact.

Planning priority	Project alignment
17 – define and protect the values and opportunities within the Metropolitan Rural Area	In the Penrith LGA, the project is primarily in the WSAGA with part of the treated water pipeline in the Metropolitan Rural Area. Given the pipeline is underground, it will not preclude the opportunities outlined for the Metropolitan Rural Area. The AWRC is surrounded by rural landuse zoning but this will likely change over time as the WSAGA develops.
19 – create an energy, water and waste efficient city 21 – cool our city	The project includes energy efficient design and has a range of renewable energy components, including co-generation and solar generation at the AWRC site. The project presents future opportunities to take other wastes for treatment that could increase the energy produced by co-generation. The AWRC will produce treated water that is suitable for a range of beneficial uses, including providing water to the landscape to assist with urban cooling. The project will also beneficially reuse the biosolids produced from the wastewater treatment process.
20 – manage flood risk	Sydney Water has undertaken a flood assessment to demonstrate the project is effectively managing flood risk.

Liverpool LSPS

Table 5-8 summarises the project's alignment with the most relevant planning priorities from the Liverpool Local Strategic Planning Statement – a landuse vision to 2040. The project component in the Liverpool LGA is part of the brine pipeline.

Table 5-8 Project alignment with Liverpool LSPS

Planning priority	Project alignment
6 – high-quality, plentiful and accessible community facilities, open space and infrastructure aligned with growth	Given the brine pipeline is located below ground, it is unlikely to affect Liverpool City Council's plans for developing community facilities or open space. The AWRC will provide wastewater treatment for parts of the Liverpool LGA in the Western Sydney Aerotropolis and South West Growth Area. Sydney Water plans to deliver and stage the project to align with development timing and future population growth projections.
8 – community-focused low-scale suburbs where our unique local character and heritage are respected	Given the brine pipeline will be built underground, once construction is complete the project will have limited impact on the local character of suburbs in the Liverpool LGA. Sydney Water has also avoided or minimised impacts on heritage where practical and developed measures to manage its impacts.

Planning priority	Project alignment
9 – safe, healthy and inclusive places shaping the wellbeing of the Liverpool community	Given the brine pipeline will be built underground, once construction is complete the project will have limited impact on safety, health and inclusivity. Sydney Water will appropriately manage potential construction impacts associated with traffic, pedestrian access, and public transport. In relation to urban heat, the AWRC produces high-quality treated water that is suitable for a range of uses, including providing water to the landscape to assist with urban cooling.
13 – a viable 24-hour Western Sydney International Airport growing to reach its potential	The project will help support the development of Western Sydney International Airport by providing wastewater services and recycled water. Sydney Water is also ensuring it effectively manages the project's risk to airport safety.
14 – bushland and waterways are celebrated, connected, protected and enhanced	Building pipelines will impact on some waterways which will be restored after construction. The project is designed to transfer brine out of inland catchments, to protect water quality in these areas. Sydney Water has avoided and minimised the project's biodiversity impacts where practical and will restore impacted areas and offset impacts where relevant.
15 – a green, sustainable, resilient and water-sensitive city	Given the brine pipeline will be built below ground, it has minimal risk to or from natural hazards. The project can contribute to a water-sensitive city by providing high-quality treated water that is suitable for a range of beneficial uses, including providing water to the landscape to assist with urban cooling.
16 – rural lands are protected and enhanced	Given it will be built below ground, the brine pipeline does not have a long-term conflict with existing land uses.

Canterbury Bankstown LSPS

Table 5-9 summarises the project's alignment with the most relevant planning priorities from the Canterbury-Bankstown Local Strategic Planning Statement – Connective City 2036. The LSPS focuses on 10 evolutions to achieve its vision. The project component in the Canterbury-Bankstown local government area is a short section of the brine pipeline around Lansdowne Reserve and Prospect Creek. Given this, the most relevant priorities are Evolution 4 – Blue Web and Evolution 5 – Green Web, which are discussed below.

Table 5-9 Project alignment with Canterbury-Bankstown LSPS

Planning priority	Project alignment
Evolution 4 – Blue Web	The project will use trenchless methods to cross Prospect Creek and have a range of measures to minimise risks and manage impacts. The project has been designed to transfer brine out of inland catchments, to protect water quality in these areas.
Evolution 5 – Green Web	In consultation with council, the project has been designed to minimise vegetation impacts in and around Lansdowne Reserve, particularly on the most sensitive vegetation communities and species. This has included avoiding the biodiversity stewardship site in this area.

Fairfield LSPS

Table 5-10 summarises the project's alignment with the most relevant planning priorities from the Fairfield Local Strategic Planning Statement – Fairfield City 2040 A Land Use Vision – Shaping a Diverse City. The project component in the Fairfield LGA is part of the brine pipeline, outside the Western Sydney Aerotropolis, in areas that have already been developed.

Table 5-10 Project alignment with Fairfield LSPS

Planning priority	Project alignment
4 – provide attractive, healthy and safe places for the whole community	The brine pipeline will be built below ground so is unlikely to have an adverse impact on future opportunities for open space. During construction, access to some existing open space will be temporarily restricted (for example, part of Cabravale Memorial Park) and Sydney Water will have measures in place to minimise these impacts.
5 – protect the city's heritage	Sydney Water has avoided or minimised impacts on heritage where practical and developed measures to manage its impacts.
6 – ensure infrastructure is aligned to accommodate planned growth and community needs	Sydney Water already provides a wastewater service to most of Fairfield LGA and the project is focused on providing a wastewater service to the WSAGA and SWGA.
8 – protect areas of high natural value and environmental significance and improve the health of catchments & waterways 9 – realise the Parkland City Vision	Building pipelines will impact on some waterways and Sydney Water will restore these after construction. The project has been designed to transfer brine out of inland catchments, to protect water quality in these areas. Sydney Water has avoided and minimised the project's biodiversity impacts where practical and will restore impacted areas and offset impacts where relevant.

Planning priority	Project alignment
10 – adapt to natural hazards and environmental impacts	Given the brine pipeline will be built below ground, it has minimal risk to or from natural hazards. Sydney Water will appropriately manage potential construction impacts associated with traffic, pedestrian access, and public transport.
12 – plan for and manage urban Services land	The pipeline will be along the edge of urban services land mapped around the Hume Highway at Lansvale. The pipeline is not expected to impact the use of this land for urban services.

Wollondilly LSPS

Table 5-11 summarises the project's alignment with the most relevant planning priorities from the Wollondilly Local Strategic Planning Statement – Wollondilly 2040 – A vision for the future of Wollondilly. The project components in the Wollondilly LGA are the environmental flows pipeline and part of the treated water pipeline.

Table 5-11 Project alignment with Wollondilly LSPS

Planning priority	Project alignment
1 – aligning infrastructure with community needs	Although the project will contribute to wastewater servicing for large areas in Western Sydney, the project scope does not include providing wastewater services in the Wollondilly LGA. The project has been redesigned in consultation with Wollondilly Shire Council to avoid conflict with potential future upgrades of the Nepean River road crossing at Wallacia.
7 – cultivating a creative and cultural destination connecting people with places	Sydney Water has avoided or minimised impacts on heritage where practical and developed measures to manage its potential impacts.
8 – enhancing vibrant, healthy and sustainable local towns and villages	Warragamba and Silverdale are listed under this planning priority. The project is expected to have limited impact on these townships as the environmental flows pipeline will be constructed underneath these communities using tunnelling methods.
12 – Valuing the ecological health of Wollondilly's waterways	The operational releases from the AWRC to Nepean and Warragamba Rivers will be very high and high-quality treated water. This provides the opportunity to replace some of the proposed environmental flows from Warragamba Dam.

Planning priority	Project alignment
13 – Protecting biodiversity and koala habitat corridors 15 – delivering an urban tree canopy	Sydney Water has avoided and minimised the project's biodiversity impacts where practical and will restore impacted areas and offset impacts where relevant. The project is unlikely to impact koalas.
14 – planning high quality and well connected open spaces	Given the pipelines are largely below ground, the project is unlikely to impact on future open space strategies.
16 – enhancing and protecting the diverse values of the Metropolitan Rural Area	Project infrastructure will be located in the Metropolitan Rural Area. Sydney Water does not expect the project to fragment rural areas or prevent continuation of rural land uses. Some rural areas will be temporarily affected by construction activities, mostly along existing roads and in several areas where construction compounds or waterway releases structures are required.
18 – living with climate impacts and contributing to the broader resilience of greater Sydney	Given the pipelines will be built below ground, they have minimal risk to or from natural hazards. The operational releases from the AWRC to Nepean and Warragamba Rivers will be very high and high-quality treated water. This provides the opportunity to replace some of the proposed environmental flows from Warragamba Dam. This will provide greater resilience to Sydney's drinking water supply.

5.2.4 Environmental Planning and Assessment Regulation

The Environmental Planning and Assessment Regulation 2000 includes provisions for State significant infrastructure projects. This includes public exhibition requirements, landowner notification requirements and fees payable. The project is being planned in accordance with these requirements.

Part 3 of Schedule 2 of the regulation specifies the form and contents for an EIS. Appendix E includes a summary of how the EIS has addressed these requirements.

5.2.5 Approvals

Table 5-12 lists other legislative approvals required for the project as well as those that otherwise would have been required if the project was not State significant infrastructure. Further information about relevant legislative provisions and approvals is included in specialist studies and chapters 8-13.

Table 5-12 Approvals required

Legislation	Approvals	Issued consistent with SSI approval	Other approvals in addition to SSI approval	Would be required if project not SSI
Protection of the Environment Operations Act 1997	Section 47 and 48 Environment Protection Licences. May trigger waste storage provisions in Schedule 1, clause 42.	✓		
Roads Act 1993	Section 138 consent	✓		
National Parks and Wildlife Act 1974	Section 90 Aboriginal heritage impact permit			✓
Fisheries Management Act 1994	Section 205 (marine vegetation impacts), 219 (blocking fish passage)			✓
Heritage Act 1977	Section 139 excavation permit Approval under Part 4 to impact item listed on State heritage register			✓
Water Management Act 2000	Section 56 water access licence		✓	
Water Management Act 2000	Sections 89 (water use approval), 90 (water management work approval), 91 (aquifer interference once provisions commence)			✓

5.2.6 Protection of the Environment Operations Act

The project will require Environment Protection Licences (EPLs) under sections 43(a) and (b) of the *Protection of the Environment Operations Act 1997* (POEO Act). The EPL under section 43(a) will be required for construction activities. This section focuses on the EPL under section 43(b) and summarises the key EPL provisions proposed in relation to water quality and flows from the AWRC once it is operational. These are presented in a way that aligns with Sydney Water's EPLs for other wastewater systems, focusing on measurable outputs from the AWRC. Sydney Water proposes that the treatment levels and water quality in the project's EPL be based on the details provided in this section, rather than any other content in the EIS, which has been provided as indicative information to inform assessment of impacts. The details below relate to Stage 1 of the project, operating at 50 ML/day.

AWRC treatment levels for the full range of flows

As outlined in section 4.5, the level of treatment at the AWRC varies depending on the volume of incoming flow. In EPLs, this is typically measured in litres per second rather than the total daily flows shown in section 4.5. Table 5-13 outlines the proposed levels of treatment for the full range of flows.

Table 5-13 Treatment level at AWRC for the range of incoming flows

Flow type	Incoming flow range	Required treatment process
Dry weather	Flows up to 752 L/s	Screening, de-gritting, primary sedimentation, activated sludge treatment, ultra-filtration, reverse osmosis
Partial wet weather	Flows from 752 to 1,118 L/s	Screening, de-gritting, primary sedimentation, activated sludge treatment, ultra-filtration
Wet weather	Flows from 1,118 to 1,736 L/s	Screening, de-gritting, primary sedimentation, wet weather disinfection and de-chlorination
Severe wet weather	Flows from 1,736 to 3,472 L/s	Screening, de-gritting, partial disinfection

Wet weather flows to South Creek

Releases to South Creek will be intermittent, during high flow wet weather conditions and may occur for varying periods in any one day. In addition, releases to South Creek will be a combination of advanced treated flows and wet weather treated flows, with the proportions depending on the incoming wastewater flow to the AWRC.

Although section 4.5 of the EIS describes median concentrations if these releases occurred continuously, wet weather releases often may not occur all day, so composite sampling required for concentration licensing is not possible. Typically, Sydney Water's EPLs license intermittent releases based on conservative emissions factors rather than direct measurement and Sydney Water proposes the same approach for the AWRC.

Table 5-14 shows the modelled performance for the wet weather and advanced treated streams and Table 5-15 shows the emission factors proposed to calculate loads, which align with the median values modelled. The emission factors proposed for the AWRC differ from those adopted for existing Sydney Water EPLs. Higher total nitrogen and biochemical oxygen demand (BOD) values are proposed as the incoming wastewater is expected to be more concentrated from a new low infiltration wastewater collection network. Lower values for total phosphorus, oil and grease and total suspended solids are proposed as chemical dosing will be provided for wet weather flows.

Volume monitoring will be conducted on both the wet weather and advanced treated streams. The wet weather flows emissions factor is consistent with existing bypass emission factors adopted for other Sydney Water wastewater system load-based licences.

Table 5-14 Modelled performance of AWRC wet weather and advanced treated flows (median concentration)

Pollutant	Wet weather flows	Advanced treated flows	Combined South Creek releases
Total nitrogen (mg/L)	18	0.35	0.4
Total phosphorus (mg/L)	1	0.009	0.01
Total suspended solids (mg/L)	35	0	0

Table 5-15 Emission factors to be adopted for AWRC wet weather and advanced treated flows

Pollutant	Wet weather flows	Advanced treated flows
Total nitrogen (mg/L)	18	0.35
Total phosphorus (mg/L)	1	0.009
Total suspended solids (mg/L)	35	0
BOD (mg/L)	65[1]	0
Oil and grease (mg/L)	8[2]	0

Notes on table:

1. BOD of 65 mg/L estimated based on adopted influent concentration of 367 mg/L with 40% removal in primary treatment and wet weather dilution.
2. Oil and grease of 8 mg/L estimated based on adopted influent concentration of 70 mg/L and 60% removal in primary treatment and wet weather dilution.

Load limits

As outlined in Chapter 8, the project will be subject to EPA's Hawkesbury-Nepean Nutrient Framework (Environment Protection Authority, 2019a) and will be designed to achieve the nutrient loads in Table 5-16 in the relevant subzones. The Nepean River load applies whether the releases are to Nepean River or Warragamba River. Table 5-16 also includes estimated loads of other assessable pollutants expected to be included in EPL.

Table 5-16 Estimated loads to Nepean River and South Creek

Pollutant	South Creek (Sackville 2)	Nepean River (Yarramundi 2)
Total nitrogen (kg/year)	1,686	8,538
Total phosphorus (kg/year)	105	383
Total suspended solids (kg/year)	3,130	732
BOD (kg/year)	5,744	695
Oil and grease (kg/year)	730	1,738

Concentration limits

Table 5-17 outlines proposed concentration limits for treated water releases to Nepean River. Concentrations for releases to Warragamba River are not included, given the environmental flows pipeline may not be built.

The nutrient concentration limits presented below are consistent with the current EPL for Sydney Water's existing Advanced Water Treatment Plant at St Marys. The ANZECC 2000 toxicant trigger values for the protection of 95% of species are adopted as 90%ile concentration limits for the metals specified. The concentration limits are also different from those outlined in Table 4-6, as the Nepean River release assumes a shandy of tertiary and advanced treated flows, which represents a worst-case release quality.

In addition, there are some differences in pollutants listed in Table 5-17 and Table 4-6. This is because Table 5-17 references licensed pollutants and Table 4-6 references the parameters incorporated in the Hawkesbury-Nepean and South Creek water quality models to inform impact assessment.

Table 5-17 Concentration limits for Nepean River releases

Pollutant	50%ile	90%ile
Nitrogen (ammonia) (mg/L)	0.3	0.75
Nitrogen (total) (mg/L)	0.8	1.5
Phosphorus (total) (mg/L)	0.03	0.1

Pollutant	50%ile	90%ile
BOD (mg/L)	-	<2[1]
Total suspended solids (mg/L)	-	<2[1]
Faecal coliforms (CFU/100mL)	-	<1[1]
Chlorine (total residual) (mg/L)	-	0.1
Aluminium (µg/L)	-	55
Copper (µg/L)	-	1.4
Iron (µg/L)	-	10
Zinc (µg/L)	-	8
Cadmium (µg/L)	-	0.2
Nickel (µg/L)	-	11

Notes on table:

1. Detection limit

5.2.7 Crown land

The project is not located on Crown land and Chapter 8 describes the project's impacts on waterways. Sydney Water does not need to acquire any Crown land or Crown waterways as sections 37 and 41 of the *Sydney Water Act 1994* give Sydney Water authority to carry out works and install and operate infrastructure. As part of acquiring the land for the AWRC site, the property plan registration will clarify the boundary of the new lot with South Creek, in line with property rules that provide that the boundary of the lot is the middle of South Creek.

5.3 Commonwealth statutory context

5.3.1 Environment Protection and Biodiversity Conservation Act 1999

In October 2020, Sydney Water referred the project to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) for a decision about whether the project was likely to have a significant impact on any matters of national environmental significance listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Based on information provided, DAWE determined in December 2020 that the project was likely to have a significant impact on:

- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest which is a threatened community

- Regent Honeyeater, Swift Parrot and Macquarie Perch, which are threatened species
- Greater Blue Mountains Area, which is a World Heritage property and National Heritage place.

The Commonwealth Government's bilateral agreement with the NSW Government applies to the project. As a result, Department of Planning, Industry and Environment (DPIE) revised the project's SEARs to include assessment requirements for the above matters of national environmental significance. Sydney Water has addressed these in the EIS. Section 9.1 and Chapter 8 assess impacts on the threatened community and threatened species and section 10.3 assesses impacts on the Greater Blue Mountains Area. Appendix E summarises how the EIS addresses the requirements of Schedule 4 of the EPBC Act.

The Commonwealth Minister for the Environment will be informed by the EIS and associated NSW assessment processes in their decision about whether to approve the project's impacts on matters of national environmental significance.

5.3.2 Airport safeguarding

Given the AWRC's proximity to the future Western Sydney International Airport, several Commonwealth aviation safeguarding provisions apply to the project. Section 13.1 describes the relevant Commonwealth guidelines and regulations and how the project addresses them.

5.3.3 Commonwealth land

The project is not located on Commonwealth land.

5.3.4 Native title

A search of the National Native Title Register in July 2021 did not identify any project areas where native title has been granted or that is subject to a current native title claim.

The Gundungurra Indigenous Land Use Agreement (ILUA) is an agreement under the *Native Title Act, 1993*. The ILUA is between Gundungurra Tribal Aboriginal Corporation, Gundungurra Aboriginal Heritage Association, the NSW Government and Blue Mountains City Council. It applies to land that is National Park, WaterNSW land, Forestry Corporation land and Blue Mountains City Council land within the area covered by the agreement.

Part of the environmental flows pipeline will be tunnelled under the eastern edge of the area covered by this ILUA and the environmental flows release structure will also be located in the area (on land owned by WaterNSW).

The ILUA sets up a Consultative Committee comprising the organisations who are party to the agreement which can make recommendations to land owners about the care, control, management and protection of the lands covered by the agreement. Sydney Water has spoken to the Chair of the Consultative Committee, provided project information for distribution to the committee and offered to meet with the committee. Issues raised in conversation with the Chair include the importance of protecting plants and animals, including crayfish and frogs. Chapter 8 of the EIS assesses impacts on aquatic ecology.

6 Stakeholder and community engagement

This chapter describes Sydney Water's approach to stakeholder and community engagement for the project, how issues raised have been addressed and Sydney Water's commitment to ongoing consultation as the project progresses.

6.1 Relevant Secretary's Environmental Assessment Requirements

Table 6-1 lists the Secretary's Environmental Assessment Requirements (SEARs) relevant to stakeholder and community engagement and where in this section they are addressed.

Table 6-1 Project SEARs relating to stakeholder and community engagement

SEARs	EIS section where requirement addressed
7. Consult/coordinate with the Department of Planning, Industry and Environment (and Planning Partnership Office) in respect to environmental impacts on the South Creek catchment and the Wianamatta South Creek program. This includes: a) integrating with a blue-green infrastructure delivery strategy to enhance and protect the South Creek catchment.	Section 6.4.5
During the preparation of the EIS, the proponent should consult with the relevant local, State or Commonwealth Government authorities, service providers, aboriginal community, community groups and affected landowners, including but not limited to: a) Registered Aboriginal Parties b) Penrith City Council c) Liverpool City Council d) Fairfield City Council e) Wollondilly Shire Council f) Blue Mountains City Council g) City of Canterbury Bankstown Council h) NSW DPI Fisheries i) Department of Planning Industry and Environment – Biodiversity and Conservation	Sections 6.3, 6.4

SEARs	EIS section where requirement addressed
j) NSW Environment Protection Authority k) Department of Planning Industry and Environment (Water Division) l) Transport for NSW m) Department of Premier and Cabinet, NSW Heritage n) Endeavour Energy o) NSW DPI Agriculture p) NSW Crown Lands q) Western City and Aerotropolis Authority r) Western Sydney Planning Partnership s) WaterNSW	
In particular, the proponent must: a) Document a detailed community and stakeholder participation strategy which identifies who in the community has been consulted and a justification for their selection, other stakeholders consulted and the form(s) of the consultation, including a justification for this approach.	Sections 6.2, 6.3, 6.4
b) Provide a report containing details of how the community and stakeholder participation strategy has been carried out (to date), including details of: a) documentation of all consultation methods. b) timeframes of consultation.	Sections 6.3 and 6.4
c) Report upon any digital engagement strategies and demonstrate the relevance of digital engagement methods to potentially affected stakeholders.	Section 6.2
d) Issues raised by the community and surrounding landowners and occupiers that may be impacted by the project.	Section 6.4
e) Details of how issues raised during community and stakeholder consultation have been addressed and whether they have resulted in changes to the project.	Section 6.4
f) Details of the proposed approach to future community and stakeholder engagement based on the results of the consultation.	Section 6.5

6.2 Approach and objectives

6.2.1 Sydney Water's approach

Sydney Water values customer, community and stakeholder relationships and prioritises ongoing engagement and collaboration to ensure projects are planned, delivered, and managed effectively.

Sydney Water's core value is to have the customer at the heart. This means that customer and community needs are considered before, and while projects are planned and delivered, and communication is done in ways that suit them.

When this is done effectively, it means Sydney Water:

- listens to, understands and responds to concerns and issues
- considers feedback in decision-making
- helps people feel informed, engaged and connected
- builds positive relationships that drive outcomes people value
- gains insights to help improve Sydney Water's water services and how they are delivered
- gets increased customer satisfaction
- gets more compliments and customers become Sydney Water's advocates
- builds public trust in Sydney Water
- promotes and protects Sydney Water's reputation as a world-class water business.

6.2.2 Overview of project approach

Engagement with the full suite of stakeholders, which includes the community, businesses and government entities, has been an important tool in the development of the Advanced Water Recycling Centre (AWRC) project. It has informed the design of the AWRC, helped identify the environmental issues to be assessed and provided inputs into the measures to manage significant impacts. As shown in Figure 6-1, engagement commenced with the reference design phase which started in 2019, has been ongoing through the preparation of this EIS, and will continue through EIS public exhibition, and on into detailed design, construction and operation of the project.

The project will extend from Warragamba and Wallacia in the west to Lansdowne in the east, crossing five local government areas. The community stakeholders across this area are diverse, in terms of the issues important to them, as well as their cultural and linguistic characteristics. The engagement strategy has been tailored to make engagement with this diverse community as effective as possible. Section 11.6 provides more detail on the demographics of the community. The engagement strategy has also been designed to accommodate a diverse and broad set of government stakeholders relevant to the project, including a variety of state agencies and six local councils.

The key stakeholders on the AWRC project are described in detail in section 6.3, but include:

- directly impacted communities

- directly impacted landowners
- Sydney Water customers
- Aboriginal communities
- businesses and commercial entities
- culturally and linguistically diverse communities
- local councils
- State and Commonwealth Government agencies and departments.

Figure 6-1 Project consultation phases

6.2.3 Engagement objectives

Sydney Water is committed to engaging with the stakeholders on all projects and taking their views into consideration. For the project, this commitment is reflected in the objectives for the engagement activities, which have been guided by the core values and codes of ethics of the International Association of Public Participation (IAP2) and include:

- actively encouraging participation in the development decision-making on the project, from both the community and government, and developing processes which allow those stakeholder's priorities and concerns to be considered
- communicating the project objectives, and proposed design solution to all stakeholders
- clearly describing the potential impacts of the project on those impacted, and engaging with them to develop management measures where appropriate
- through all of the above, building strong relationships with the community and other stakeholders, to the benefit of those stakeholders and Sydney Water.

6.2.4 Approach and communication tools

Since commencing the development of the AWRC project, Sydney Water has engaged extensively with NSW Government departments and agencies, with local governments and with peak bodies, as well as with directly-affected landowners, local residents and potentially-affected businesses.

The approach to engagement has been purpose-designed, recognising the unique characteristics of the stakeholders for this project. In particular, it recognises the large geographic area the community stakeholders cover as well as their cultural and language diversity. Similarly, it recognises the diversity of government stakeholders, including the fact that representatives from all three tiers of government need to be consulted.

The approach to engagement therefore involved the following:

- Ensuring that the intensity of engagement, particularly with community stakeholders, is aligned with the level of potential interest and impact. For instance:
  - directly-affected stakeholders (such as landowners whose land will be potentially crossed by pipelines) were engaged one-on-one through letters, door-knocking, phone calls, emails and meetings
  - interested but less directly impacted stakeholders were engaged through 'pop up' community information sessions at key locations, where they could raise issues and concerns and receive feedback
  - indirectly-affected stakeholders were engaged through letterbox drops (18,000 in June 2020 and 31,500 in January 2021), newsletters, 1800 community information lines, project email address and online information.
- Regular meetings with the full set of government agencies identified in the SEARs, to address agency specific issues, and larger scale workshops, to address issues of particular concern for multiple agencies. For instance, specific workshops were held to address waterway and treated water discharge related issues.
- A commitment, reflected in the purpose-designed engagement plan for culturally and linguistically diverse (CALD) communities, that non-English speaking stakeholders will not be disadvantaged in any way.
- A similar commitment to broad engagement with Aboriginal communities.
- A strong commitment to digital engagement strategies, providing additional engagement options and providing access to an even greater number of stakeholders. Sydney Water recognises that some stakeholders do not have access to these tools and traditional engagement approaches were also used where necessary.

The digital engagement strategy was particularly important for the project, as most of the consultation occurred throughout the COVID-19 pandemic, where lockdown and social distancing provisions reduced the amount of in-person interaction that was possible. For this reason, many meetings and community information sessions were held online using tools such as Zoom and Microsoft Teams. Within these online sessions Sydney Water used a range of interactive features to accommodate different communication preferences, including plenary discussion, break-out rooms allowing for small group discussion, polling and survey using Menti, and chat comments.

The following sections detail the stakeholder groups consulted, the key methods used to engage with them, issues raised and how Sydney Water has responded.

6.3 Summary of identified stakeholders

Table 6-2 lists stakeholders Sydney Water has consulted and the reasons they are relevant to the project. Sydney Water identified relevant stakeholders through a range of methods as part of developing the project's Community and Stakeholder Engagement Plan. This included identifying properties on and adjacent to project infrastructure, information from other Sydney Water projects and databases and stakeholder insights as consultation has progressed.

Table 6-2 Stakeholders identified for the project

Stakeholder group	Description and relevance to the project
Customers and general community	In the Upper South Creek Servicing Area, residents, businesses, industry and the broader community will directly benefit from the wastewater servicing this project enables. In Greater Sydney, the community will benefit from the project through improved water resilience. Sydney Water has engaged broadly across the community in Western Sydney, across both the Upper South Creek Servicing Area and around the areas impacted by the project to provide information about the project and to understand any issues or areas of interest. In addition, the project was presented to Sydney Water's Community Advisory Committee, which represents a range of community and business groups, and is consulted regularly on Sydney Water's engagement and decision making as well as the equitable and effective delivery of Sydney Water's services.
Indirectly impacted communities	Properties surrounding the AWRC site, including residents and businesses that will potentially be impacted by construction and operation of the project. Many residents and businesses are located close to the proposed pipeline routes and will be affected by proposed construction work to varying degrees.
Culturally and linguistically diverse communities	Sydney Water consulted with the NSW Ethnic Communities Council to help design its consultation with culturally and linguistically diverse communities and partnered with them in delivering information sessions to community leaders in Arabic, Vietnamese and Chinese (Mandarin).
Local community and interest groups	Sydney Water reached out to a wide range of local community groups including progress associations, heritage societies and community run environment and waterways interest groups. A range of communication methods were adopted including providing information on request and attending community meetings. The groups discussed further below are those groups that either attended community information sessions or contacted Sydney Water with an interest in being involved.

Stakeholder group	Description and relevance to the project
Directly impacted landowners	During project development, Sydney Water has been working with the existing landowner of the proposed AWRC site to enable the acquisition process and seek opportunities for Sydney Water and that landowner to work together to pursue shared objectives. There are 60 properties located along the pipeline route where Sydney Water will require access during construction or operation.
Aboriginal community	Sydney Water consulted with Registered Aboriginal Parties (RAPs) in preparing the project's Aboriginal Cultural Heritage Assessment Report. 26 RAPs registered interest in the project in 2020. This includes the following groups and individuals (and two additional groups who requested their details be withheld): • Deerubbin Local Aboriginal Land Council • Gandangara Local Aboriginal Land Council • Tharawal Local Aboriginal Land Council • A1 Indigenous Services • Aragung Aboriginal Cultural Heritage Site Assessments • Aunty Fran Bodkin • Barking Owl Aboriginal Corporation • Barraby Cultural Services • Butucarbin Aboriginal Corporation • Cubbitch Barta • Darug Custodian Aboriginal Corporation • Dhinawan Culture and Heritage • Didge Ngunawal Clan • Galamaay Cultural Consultants • Ginninderra Aboriginal Corporation • Goodradigbee Cultural and Heritage Aboriginal Corporation • Kamilaroi Yankuntjatjara Working Group • Merrigarn • Muragadi Heritage Indigenous Corporation • Murra Bidgee Mullangari Aboriginal Corporation • Widescope Indigenous Group • Yulay Cultural Services • Yurrandaali • Waawaar Awaa Aboriginal Corporation

Stakeholder group	Description and relevance to the project
Councils	The project will build infrastructure in five local government areas (LGAs) as outlined below. Sydney Water has engaged extensively with these councils to understand potential impacts on the community, share design information and understand potential impacts on council interests. • Penrith City Council. • Liverpool City Council. • Wollondilly Shire Council. • Fairfield City Council. • City of Canterbury-Bankstown Council. Although the project does not include infrastructure in the Blue Mountains LGA, treated water will be released into Nepean River, which runs along the boundary of the Blue Mountains LGA.
Commonwealth government	The project is located close to and under the future flight path of the new Western Sydney International Airport. The project has therefore engaged with Commonwealth agencies including: • Western Sydney International Airport • Air Services Australia • Australian Civil Aviation Safety Authority. The project is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) so Sydney Water has consulted with the Department of Agriculture, Water and Environment. The project crosses the rail line at Cabramatta so Sydney Water has consulted with the Australian Rail Track Corporation.
NSW Government	Sydney Water has engaged with various agencies to coordinate land use, infrastructure and utilities planning including: • Department of Planning, Industry and Environment (DPIE) including Water, Planning and Public Spaces divisions • Western Parkland City Authority • Greater Sydney Commission • Western Sydney Planning Partnership Office • Infrastructure NSW • NSW Crown Lands • NSW State Emergency Service • Transport for NSW (including Elizabeth Drive team, M7 Motorway, M12 Motorway, Sydney Trains, Sydney Metro – Western Sydney Airport) • WaterNSW • Greater Sydney Parklands (formerly Western Sydney Parklands Trust).

Stakeholder group	Description and relevance to the project
	Sydney Water has engaged with NSW Government agencies about approaches to assessment and early consultation on likely impacts including: • DPIE including Environment, Energy and Science • Natural Resources Access Regulator • Department of Primary Industries (including Fisheries, Agriculture) • Department of Premier and Cabinet (NSW Heritage) • NSW Health • Environment Protection Authority.
Utilities	Sydney Water consulted with government and private utility companies where the project requires connection to these utilities or where there is the potential for the project to impact on existing infrastructure. In addition, Sydney Water is a partner of both the Western Sydney Planning Partnerships Office and its Western Sydney Utilities Collaboration Group. These focus on the coordination of the planning instruments for the Western Sydney Aerotropolis Growth Area to coordinate utilities and infrastructure in Western Sydney. These groups include representatives from government agencies including TfNSW and NSW DPIE, local councils and utility owners. Through these partnerships Sydney Water has a strong focus on coordination and collocation of utilities that will be delivered in line with the proposed upgrade of Elizabeth Drive, especially around the Western Sydney International Airport.
Developers	Sydney Water presented on the project in an Urban Development Institute of Australia (UDIA) forum in July 2020 as a means of briefing the development industry. In addition, Sydney Water's City Growth and Development group maintains relationships with developers with an interest in the Upper South Creek Servicing Area about their likely water and wastewater servicing needs and timeframes. Insights from these relationships and conversations have informed, and will continue to inform, ongoing planning of the project, but are not discussed further in this chapter due to the commercial in confidence nature of the information shared.

6.4 Engagement to date (Phases 1 and 2)

Throughout planning for the project, Sydney Water has involved customers, community and stakeholders in a range of ways to understand any issues, concerns or feedback. Sydney Water has used this to help inform planning, design refinements, management measures and its engagement program. Sections 3.3 and 3.4 include more information about how the design has been refined to minimise environment and community impacts and to address matters raised in consultation.

Since 2019, feedback has been received from residents, government agencies, councils, key stakeholders and the wider community. This feedback has been recorded and considered in the preparation of the Environmental Impact Statement (EIS). A summary of this feedback, and how Sydney Water has addressed the issues, is presented in the following sections.

6.4.1 Community consultation

In November 2019, Sydney Water collaborated with the (then) Western City Aerotropolis Authority through the public exhibition phase of the Western Sydney Aerotropolis Plan (WSAP), which identified the planned infrastructure and precinct development for the Western Sydney Aerotropolis Growth Area (WSAGA). The project is identified in the WSAP as key infrastructure for the WSAGA, and as being located in the Kemps Creek precinct.

Since then, Sydney Water has consulted a wide range of community groups, landowners, residents and businesses from across the project area to understand potential impacts and gain a community perspective both for development of the reference design and development of this EIS.

The engagement included:

- Project briefing to Sydney Water's Community Advisory Committee in November 2020.
- In June 2020, Sydney Water delivered 18,000 community newsletters tailored for specific communities near the alignment where works are planned.
- In January 2021, Sydney Water delivered a community newsletter to about 31,500 households and businesses along the project alignment and within the servicing catchment, including a letter from the Managing Director introducing the significance of the project. The newsletter was distributed to Austral, Badgerys Creek, Bonnyrigg, Bonnyrigg Heights, Cabramatta, Cabramatta West, Canley Heights, Canley Vale, Cecil Hills, Cecil Park, Elizabeth Hills, Fairfield, Green Valley, Harrington Park, Kemps Creek, Lansdowne, Lansvale, Leppington, Luddenham, Mount Pritchard, Mulgoa, Oran Park, Wallacia, Warragamba and West Hoxton.
- Establishing a project free-call 1800 information line and email address. Sydney Water responded to 120 and 170 enquiries respectively between 2019-2021.
- Community pop-up sessions in January – February 2021
  - Warragamba Silverdale Neighbourhood Centre (17 attendees)
  - Penrith Markets (63 attendees)
  - Bonnyrigg Plaza (44 attendees)
  - Penrith Westfield (96 attendees)
  - Carnes Hill Shopping Centre (59 attendees)
  - Luddenham Country Market (93 attendees).
- Community pop-up sessions in June 2021
  - Wallacia Progress Association Hall (59 attendees)

  - Warragamba Town Centre (six attendees).
  - Further sessions were scheduled in Mulgoa, Luddenham and Cabramatta, but postponed due to COVID-19 lockdown in Greater Sydney.
- Location specific online community forums (in English) in February 2021 for people who live and work close to:
  - Mulgoa, Wallacia and Warragamba
  - Kemps Creek, near Mamre Road and Elizabeth Drive, and the surrounding suburbs of Badgerys Creek, Luddenham and Penrith
  - the M7 Motorway and Western Sydney Parklands, Abbotsbury, Cecil Park, Cecil Hills and nearby suburbs
  - Bonnyrigg, Bonnyrigg Heights, Busby, Cabramatta, Cabramatta West, Edensor Park, Fairfield, Lansdowne, Mount Prichard, and nearby suburbs.
- Online community forums in languages other than English in July 2021, including:
  - Arabic
  - Vietnamese
  - Chinese (Mandarin).
- Direct contact by letter, email and/or telephone with all landowners directly impacted by the project, including where infrastructure is proposed on their land or land is proposed to be temporarily used for construction compounds or access.
- In December 2020 and January 2021 Sydney Water sent letters and emails to 61 community groups and peak bodies including local chambers of commerce, historical societies, rivercare groups and progress associations inviting them to online community information sessions.
- Social media channels including Facebook and Sydney Water Talk.

Table 6-3 summarises the issues raised by the community, residents and businesses in this consultation and how Sydney Water has addressed these.

Table 6-3 Issues raised in community, residents and businesses consultation

Stakeholder	Issues raised	How issues addressed
Customers and general community	• How the AWRC will fit into plans for providing wastewater and recycled water services to the region and timing of any new connections. • The importance of servicing to amenity and lifestyle in Western Sydney. • Use of recycled water including support for recycled water preferable over release to	Figure 1-1 shows the Upper South Creek Servicing Area and section 2.3 provides more detail about growth projections and project timeframes. The wastewater collection and recycled water networks are outside project scope and will be delivered as separate projects.

Stakeholder	Issues raised	How issues addressed
	the ocean, its high value for local rivers, and pricing structure. • The use of technology at the site and opportunities for renewable energy and circular economy initiatives. • Positive feedback about the high level of treatment proposed and how the treated water could have a broad range of applications. • Interest in project design and how it is a sustainable solution for Western Sydney. • Amenity of the rivers, and their use for recreation and community connection to place (kayaking, swimming and walking next to the river). • Interest in future AWRC layout, including roads, visual amenity for neighbours and building locations.	Section 3.5 provides more detail about the potential uses for recycled water produced by the AWRC, including environmental flows to waterways and a range of potential future circular economy opportunities. The pricing structure is out of scope for the project. The Independent Pricing and Regulatory Tribunal sets Sydney Water's prices for recycled water. Chapter 4 provides a detailed project description, including level of treatment proposed and design of the AWRC, layout, urban design and landscaping approach. It also describes proposed renewable energy generation. Section 12.1 assesses project sustainability and section 11.3 assesses visual impacts.
Indirectly impacted communities along the treated water and environmental flows pipelines	Along the treated water and environmental flows pipelines, people raised questions about: • location of the pipeline alignment and where in the roadway it would be constructed • would trees be cut down to clear a path for pipelines along the roadways • would nearby residents be able to tap into the treated water pipeline for recycled water to be used for agricultural use • what would be the potential impacts on agribusiness • how would access to driveways be impacted • why is the pipeline adopting the alignment through the residential streets rather than along the main road • why is the pipeline crossing of Nepean River not at the Silverdale Road Bridge	Chapter 3 describes options assessed for the project, including why the pipeline alignments have been selected and why the pipeline is not crossing Nepean River at Silverdale Bridge. Chapter 4 describes the project, including construction methods, and pipeline locations in and adjacent to roads. It also describes that the treated water pipeline will not have recycled water offtakes. The impact assessment chapters of the EIS provide detailed assessments of: • traffic in section 11.4, including impacts to access

Stakeholder	Issues raised	How issues addressed
	• what was the potential for flooding impacts to be made worse due to releases to river • noting the potential for impact on sites of historical significance to Aboriginal people, such as at known massacre sites around Bents Basin.	• biodiversity in section 9.1, including vegetation clearing required • flooding in section 9.3 • social impacts in section 11.6, including impacts on agricultural land use • Aboriginal heritage in section 10.1.
Indirectly impacted communities around the AWRC	Around the AWRC site, people raised questions about: • what are the likely impacts on roads and access from construction activities and construction traffic • what is the capacity and design of current roads to cope with construction and operational influx • noting potential for dust that could impact on crops • potential for odour once the AWRC is operational • potential for impacting on flooding along South Creek as a result of site development.	The impact assessment chapters of the EIS provide detailed assessments of: • traffic and access impacts in section 11.4, including impacts on capacity of current roads • air quality impacts in section 11.1, including dust and odour. Impacts on agricultural land uses are addressed in section 11.6 • flooding in section 9.3.
Indirectly impacted communities along the brine pipeline	Along the brine pipeline, people raised questions about: • impacts on businesses and community facilities along the route alignment • impact on local traffic during construction including what impacts would there be on businesses who rely on road access for their customers • impacts on parking during construction and impacts for residents and other community members who typically park on the street • what would be the nature and duration of impacts to driveway access.	The impact assessment chapters of the EIS provide detailed assessments of: • traffic, access and parking impacts in section 11.4 • impacts on businesses and community facilities in section 11.6.

Stakeholder	Issues raised	How issues addressed
Directly impacted landowners	These landowners asked about: • potential impacts to the property during construction • pipeline designs and their potential to conflict with other planned utilities, infrastructure or future road upgrades (especially along Elizabeth Drive) • the extent to which Sydney Water has liaised with the other agencies (such as TfNSW and utilities agencies) to coordinate planning in the area • for construction compound sites, what is the likely timing and nature of use of the land during construction, and what compensation would be provided • impacts on landowners' plans for the property • timing of acquisition or easement processes • to what extent would the owners' land be affected by noise, odour, dust, access and inconveniences because of detailed design, construction and cumulative impacts.	Sydney Water will continue to talk directly to these stakeholders as design and construction progresses about timing and details of impacts on their properties. Sydney Water has well defined processes for working with landowners on construction access, creation of easements, land acquisition and processes to determine fair compensation. Chapter 4 describes the project in more detail, including showing where it is located on private properties, locations of compounds, pipeline designs and project timing. The impact assessment chapters of the EIS provide detailed assessments of: • utilities impacts in section 13.2, including coordination with other infrastructure projects • traffic, access and parking impacts in section 11.4 • noise impacts in section 11.2 • air quality and odour impacts in section 11.1 • social impacts in section 11.6.

In addition, Sydney Water engaged directly with groups that represent customers and communities across Sydney and the WSAGA. Table 6-4 summarises issues raised by these groups.

Table 6-4 Issues raised in specific community and special interest groups

Stakeholder and consultation	Issues raised	How issues addressed
Sydney Water Community Advisory Committee Meeting in November 2020	• Benefits of a local wastewater service, transition towards circular economy, and supporting healthy waterways (no ocean discharge), community engagement, and post-COVID construction recovery • Proposed treatment technology • Importance of consulting Culturally and Linguistically Diverse (CALD) communities.	Chapter 2 describes the need for the project and Chapter 4 describes the project, including treatment technology proposed. Chapter 8 describes the project's impacts on waterways and section 3.5 describes how the project can help transition to a circular economy. The project will provide about 400 construction jobs that present an opportunity to contribute to post-COVID construction recovery. This chapter outlines Sydney Water's approach to community engagement, including consulting with CALD communities.
Wallacia Progress Association Meetings in March 2020 and February 2021	• Location and volume of releases to rivers and avoiding impacts on vulnerable communities • Contribution to existing flooding risk around Wallacia • Health and safety of water releases • Biodiversity impacts including Bushcare sites, mature trees, Cumberland Plain Land Snail and other threatened species.	Chapter 8 addresses waterway impacts, including consideration against waterway objectives aligned with community values and health guidelines. Section 11.5 provides a broader consideration of the project's impacts on human health. Section 9.3 assesses the project's impacts on flooding, including assessment that the project will not exacerbate existing flooding risk around Wallacia. Section 9.1 assesses the project's biodiversity impacts.
Luddenham Progress Association Meeting in June 2021	• Interest in opportunities to support Luddenham Showground	Chapter 4 describes the location of the project, including in relation to Luddenham Showground. Section 11.6 addresses social impacts of the project.

Stakeholder and consultation	Issues raised	How issues addressed
Aerotropolis Community Liaison Group Meeting in February 2021	• Cumulative impacts of government infrastructure projects • Impacts on existing infrastructure	Section 13.2 describes the project's impacts on existing infrastructure and how Sydney Water will continue to consult with other government infrastructure projects as the project progresses.
Hawkesbury-Nepean Riverkeeper Attended online community information session	• Interest in use of recycled water to keep waterways clean • Impacts to waterways • Growth and servicing	Chapter 8 addresses waterway impacts, including consideration of the water quality released to waterways. Section 3.5 provides more information about the potential uses of recycled water, including for use on land and as environmental flows. Section 2.3 describes how the project has been developed considering projected population growth in the Upper South Creek Servicing Area.
Mulgoa Valley Landcare Group Email	• Alternative options to releasing water at Wallacia • Concern about redirecting water from other catchments • Treated water releases to Nepean River • Flood impacts at Wallacia • Impacts on aquatic ecosystems, including platypus • Managing impacts and habitat restoration • Independent assessment of flood and water quality impacts	Chapter 3 describes the project options considered, including options for treated water release locations and why Nepean and Warragamba Rivers were chosen. Chapter 4 describes the project including the volumes and water quality proposed for release to Nepean River. Section 9.3 assesses the project's impacts on flooding, including assessment that the project will not exacerbate existing flooding risk around Wallacia. Chapter 8 addresses waterway impacts, including impacts on aquatic ecosystems and water quality impacts. It also addresses mitigating and managing project impacts. The studies in this chapter were prepared by specialist consultants and have been peer reviewed by two independent experts. Section 10.3 includes more information about the project's potential impacts on platypus.

6.4.2 Aboriginal community consultation

Sydney Water consulted with 26 Aboriginal individuals and community groups who registered interested in the project as part of preparing an Aboriginal Cultural Heritage Assessment Report (ACHAR). These groups are known as Registered Aboriginal Parties (RAPs). Consultation was completed in accordance with NSW Government guidelines, including consulting about methodology, cultural values, and the findings of the ACHAR. Representatives from the Deerubbin and Gandangara Local Aboriginal Land Councils also participated in site surveys.

Appendix O provides full details of consultation and correspondence with these RAPs. Most responses from RAPs supported the proposed methodology and report findings. Table 6-5 identifies the concerns raised by some groups in this consultation process and how Sydney Water has addressed them.

Table 6-5 Issues raised in Aboriginal community consultation

Issue raised	How issues addressed
Treated water being released to local waterways	Sydney Water acknowledges the importance of the cultural value of waterways to the Aboriginal community. The project is using an advanced treatment process to minimise the potential for waterway impacts. Chapter 8 considers in more detail the potential impacts and benefits of treated water releases from the project on water quality, flows and aquatic ecology in local waterways. Section 10.3 considers flooding impacts. Section 10.3 also assesses the potential impacts of treated water releases to Nepean River on World heritage values in Blue Mountains National Park.
Lack of detail in maps provided	Sydney Water provided more detailed project maps to the person who made this request.
Participants in site surveys	While it was not feasible to undertake the archaeological field surveys with representatives from each RAP, representatives from the relevant local Aboriginal land councils participated in the archaeological survey.
Destruction of Aboriginal sites	As outlined in Appendix O, Sydney Water has sought to avoid or minimise impacts on Aboriginal sites. However, it has not been possible to avoid all sites.

Although no location-specific cultural heritage values were identified through consultation, RAPs expressed values including:

- strong association with the land
- responsibility to look after the land, including the heritage sites, plants and animals, rivers, creeks and the land itself
- Aboriginal culturally modified trees
- artefact sites and landscape features

- waterways, particularly Nepean River, Georges River, Wianamatta/South Creek and their tributaries
- indigenous plants and animals
- general concern for burials, as their locations are not always known and they can be found anywhere.

Separate to the project, Sydney Water has also initiated a cultural values study of water in the South Creek catchment and part of Nepean River. This study will engage with Aboriginal people with Connection to Country in this area and there is an opportunity for outputs to inform future elements of the project, including managing the green space area on the AWRC site.

6.4.3 Council consultation

The project is located in five local government areas (LGAs) and Sydney Water has consulted extensively with council officers in these LGAs. Sydney Water has also presented to councillors at council meetings in most of the LGAs. Although the project does not include infrastructure in the Blue Mountains City Council LGA, treated water will be released into Nepean River which adjoins the Blue Mountains LGA.

Table 6-6 summarises the issues raised in Sydney Water's consultation with local councils and how they have been addressed. Sydney Water has also consulted with councils on several other matters:

- Representatives from the six LGAs participated in waterways workshops for the project, with issues raised outlined in more detail in section 6.4.5.
- Sydney Water consulted with these LGAs about social infrastructure and impacts, which is incorporated into the social impact assessment in section 11.6.

Table 6-6 Issues raised in local council consultation

Stakeholder and consultation	Issues raised	How issues addressed
Penrith City Council Council officer meetings – six across 2020 and 2021	• Pipeline alignment through Penrith LGA • Use and availability of recycled water • Traffic – impacts to local roads (including design of AWRC access road and Clifton Ave intersection), residents accessing their properties • Cumulative impacts of government infrastructure projects (including consultation fatigue) • Maintaining nearby open spaces	Section 3.5 provides further detail about how recycled water produced by the AWRC can be used for a variety of purposes, including to support urban cooling. Impacts on existing open space areas in the Penrith LGA will be temporary during construction and the project provides an opportunity to create a new open space on the AWRC site as outlined in section 4.4. Sydney Water will seek to hire local construction workers where possible, as outlined in more detail in section 11.6.

Stakeholder and consultation	Issues raised	How issues addressed
	• Urban heat, climate change and sustainability • Flooding • Hiring local workforce	The impact assessment chapters of the EIS provide detailed assessments of: • traffic (section 11.4) • coordination with other government infrastructure (section 13.2) • climate change and sustainability (section 12.1) • flooding (section 9.3) • biodiversity (section 9.1).
Liverpool City Council Council officer meetings – four across 2020 and 2021 Council meeting April 2021	• Pipeline alignment through Liverpool LGA • Use and availability of recycled water • Production of energy and renewables from AWRC • Opportunities for Aboriginal communities (eg traineeships) • Biodiversity around Cross Street • Contamination • Impacts on council infrastructure, schools and local suburbs, traffic management • Growth and servicing impacts	Section 3.5 provides further detail about how recycled water produced by the AWRC can be used for a variety of purposes. It also considers potential for future energy and renewables opportunities in addition to what is currently in project scope. Section 11.6 considers opportunities for traineeships as part of an Industry Participation Plan. Section 2.3 describes how the project has been developed considering projected population growth in the Upper South Creek Servicing Area. The impact assessment chapters of the EIS provide detailed assessments of: • traffic (section 11.4) • coordination with other government infrastructure (section 13.2) • biodiversity (section 9.1) • contamination (section 9.5).

Stakeholder and consultation	Issues raised	How issues addressed
Wollondilly Shire Council Council officer meetings – six across 2020 and one in March 2021	• Pipeline alignment through Wollondilly LGA • Potential impacts on biodiversity along Park Road • Future plans for development along Park Road • Future upgrade of bridge over Nepean River at Silverdale Road • Use of recycled water • Quality of water released to waterways • Flooding and flood evacuation • Design of release structures to waterways • Community impacts, including use of waterways	Key project changes as a result of consultation with council included: • changing location of Nepean River crossing to avoid impacts on proposed council Silverdale Road and bridge upgrades at Wallacia • minimising impacts on mature trees along Park Rd. Section 3.5 provides further detail about how recycled water produced by the AWRC can be used for a variety of purposes. Section 4.5.1 describes the quality of water produced by the AWRC and section 4.4.2 the design of release structures to waterways. Chapter 8 addresses waterway impacts, including consideration against waterway objectives aligned with community values. Section 9.3 assesses flood impacts and flood evacuation routes.
Fairfield City Council Council officer meetings – four across 2020 and 2021 Council meeting April 2021	• Brine pipeline alignment through Fairfield LGA, including realigning to avoid Green Valley Creek, impacts to traffic pinch points, carparking • Potential impact of construction compounds in the Fairfield LGA, including around Cabravale Park (identified as a highly used heritage precinct) • Impacts to busy business precinct, including nearby facility upgrades • Pressure on green space in the LGA • Cumulative impacts of government infrastructure projects • Recycled water treatment and overflow risks	Key project changes as a result of consultation with council included realigning the brine pipeline so it does not run in green space along Green Valley Creek. Sydney Water is continuing to consult with Fairfield Council about minor brine pipeline realignments around Cabramatta and impacts on Cabravale Park. Sydney Water will investigate opportunities to further mitigate construction impacts on social infrastructure (including green space such as parks) as outlined in section 11.6. Section 4.5.1 describes the quality of recycled water produced by the project and section 3.4.1 how the pipelines

Stakeholder and consultation	Issues raised	How issues addressed
		have been designed to not have overflow points. The impact assessment chapters of the EIS provide detailed assessments of: • traffic (section 11.4) • coordination with other government infrastructure (section 13.2) • biodiversity (section 9.1) • heritage (section 10.2).
Canterbury-Bankstown City Council Six Council officer meetings throughout 2020 and 2021	• Impacts on Lansdowne Reserve including the Biodiversity Stewardship site • Construction access to Lansdowne Reserve and impacts on traffic flow (including considering secondary access from Henry Lawson Drive) • Rehabilitation/revegetation of disturbed areas • Power supply requirements • Groundwater impacts and geotechnical investigations • Consultation recommended in future stages – properties on Tillett Pde, recreational groups using cycling track, residents walking along fire trails, bush regeneration groups. • Pressure on green space in the LGA and do not want to lose more.	Key project changes as a result of consultation with council included avoiding the Biodiversity Stewardship site in Lansdowne Reserve and refining layout of construction activities and site access to Lansdowne Reserve, to minimise green space impacts. Sydney Water explored secondary access from Henry Lawson Drive. This has not been incorporated into the project due to limitations including the speed of traffic on this road, size of trucks entering the site from this direction, location and condition of the existing culvert at the entry. Sydney Water will investigate opportunities to further mitigate construction impacts on social infrastructure (including green space such as parks) as outlined in section 11.7. The impact assessment chapters of the EIS provide detailed assessments of: • traffic (section 11.4) • coordination with other government infrastructure including power supply (section 13.2) • biodiversity including rehabilitation (section 9.1) • groundwater (section 9.4). Sydney Water has noted the identified stakeholders and will capture them in

Stakeholder and consultation	Issues raised	How issues addressed
		future consultation outlined in this chapter.
Blue Mountains City Council Council officer meeting – March 2021	• Noted project borders their LGA • Interest in protection of eucalypts, water quality and volume, sustainability, contribution to water sensitive city • No current need for Councillor briefing	Section 3.5 provides further detail about how recycled water produced by the AWRC can be used for a variety of purposes to support a water sensitive city. The impact assessment chapters of the EIS provide detailed assessments of: • waterway impacts (Chapter 8) • biodiversity (section 9.1) • sustainability (section 12.1).

6.4.4 Commonwealth Government consultation

Sydney Water has consulted with several Commonwealth Government agencies about the project. Table 6-7 summarises the issues raised and how Sydney Water has addressed them.

Table 6-7 Issues raised in Commonwealth government consultation

Stakeholder and consultation	Issues raised	How issues addressed
Australian Rail Track Corporation Meeting May 2021	• Cabramatta Rail Loop project – importance of coordination and cumulative impacts • Rail crossing – requested consultation as project progresses • Culturally and linguistically diverse community around Cabramatta – important consideration in communications	The project will tunnel beneath the rail line in Cabramatta and section 13.2 provides more detail about how Sydney Water will continue to coordinate with other government infrastructure projects. Sydney Water's approach to consulting with culturally and linguistically diverse communities is outlined in this chapter.
Department of Agriculture, Water and Environment (DAWE) Pre-referral meeting in August 2020 Emails	Discussion focused on administrative processes for *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral and relevant guidelines.	Sydney Water submitted a referral to DAWE under the EPBC Act and the project is a controlled action. The EIS includes assessment of the project against matters of national environmental significance, particularly in Chapter 8, section 9.1 and section 10.3.

Stakeholder and consultation	Issues raised	How issues addressed
Western Sydney Airport Co Meeting in October 2020	• Lighting intensity • Bird strikes and risk assessment • Landscaping options at AWRC • Building heights at AWRC • Proximity to Bankstown Airport • Aircraft noise impacts on AWRC administration building	Section 13.1 considers project impacts on lighting intensity, bird strike risk, building heights and aircraft noise associated with Western Sydney International Airport. The project reference design considered potential impacts on Bankstown Airport and concluded given the AWRC meets requirements for Western Sydney International Airport, it is unlikely to impact Bankstown Airport.
Air Services Australia Emails Application for consideration of impacts on communication and navigation systems	• Impacts on airport operation	Section 13.1 describes the project's impact on airport operations, including communication and navigation systems.
Civil Aviation Safety Authority Emails Application for operational assessment of plume rise in July 2020	• Impacts on airport operation	Section 13.1 describes the project's impact on airport operations, including impacts of plumes.

6.4.5 NSW Government consultation

Sydney Water consulted with a range of NSW Government agencies to inform them about project scope and seek feedback about the proposed assessment approach for relevant technical assessments in the EIS or any other matters of interest. Sydney Water also presented key findings of relevant studies where they were available.

Table 6-9 summarises the results of this consultation and how Sydney Water has responded to issues raised in the EIS. Sydney Water also works closely with many of these agencies at an executive level, including conversations about the project.

A range of NSW Government agencies attended a planning focus meeting run by DPIE in May 2020. This meeting helped inform agency responses to DPIE on the draft SEARs and outputs are therefore not included in Table 6-9.

In addition, Sydney Water held two online 'waterways workshops' for the project in December 2020, with a range of state and local government attendees as outlined in Table 6-8. The purpose of these workshops was to seek specific feedback and hold discussions on the project's interactions with waterways, potential benefits of treated water releases, and Sydney Water's approach to assessing waterway impacts.

Table 6-8 Waterways workshops attendees

NSW government attendees	Local government attendees
Department of Planning, Industry and Environment (including Water; Environment Energy and Science)	Blue Mountains City Council
Department of Primary Industries	Canterbury-Bankstown City Council
Environment Protection Authority	Fairfield City Council
Greater Sydney Commission	Liverpool City Council
Infrastructure NSW	Penrith City Council
Natural Resources Access Regulator	Wollondilly Shire Council
WaterNSW	
Western Parkland City Authority	
Western Sydney Planning Partnership	

At Workshop 1, Sydney Water presented details about:

- the policy context for waterways in Western Sydney
- treated water produced by the project and potential benefits of its release to South Creek, Nepean River and Warragamba River
- proposed waterway objectives against which the project will be assessed.

Breakout rooms in the workshop facilitated feedback and discussion from attendees on the relative benefits of using treated water for environmental flows and recycled water, particular considerations for the three waterways, and any policy change or collaboration required to achieve benefits.

At Workshop 2, Sydney Water presented the proposed approach for the key EIS studies related to waterways and sought any feedback from attendees. These studies were:

- water quality and hydrodynamic modelling
- geomorphology and ecohydrology
- aquatic ecology

- flooding
- surface water
- groundwater.

Table 6-9 summarises the key issues raised in both workshops and how Sydney Water has addressed them in the EIS.

Table 6-9 Issues raised in NSW Government agencies consultation

Stakeholder and consultation	Issues raised	How issues addressed
Various Waterways workshop 1	• Opportunity to support a cooler and greener Western Parkland City with recycled water • Importance of project adaptability and flexibility to changing policy and technology • Resilience including circular economy and integrated water cycle management • Complexity of the project including future uncertainties and community/stakeholder expectations • Importance of collaboration across all levels of government (including beyond the scope of the project) • Importance of clear waterway governance • Variety of future uses of the recycled water including for waterways, irrigation and indirect use for drinking • Positive feedback about level of engagement and opportunity to continue to be involved as project progresses • No specific issues were raised about the waterway objectives presented.	Section 3.5 outlines how the project can contribute to circular economy outcomes such as the beneficial use of the treated water produced. The project has built in adaptability and flexibility to accommodate future uncertainties, including by staging delivery of the AWRC and considering recycled water opportunities as they arise rather than locking them in as part of project scope. Key sections of the EIS that address this flexibility include Chapter 2, section 3.5 and section 4.13. Sydney Water is continuing to consult across government as the project progresses, as outlined in this chapter. Cross-government collaboration and waterway governance more broadly is outside the scope of this project, however Sydney Water is working with other government stakeholders on this, particularly in the Western Sydney Aerotropolis Growth Area.

Stakeholder and consultation	Issues raised	How issues addressed
Various Waterways workshop 2	• Ongoing consultation, collaboration and communication (including several requests for additional conversations) • Forward planning for resilience and climate change risk • Challenges of water quality modelling • Environmental flows, low flow scenarios, high flow scenarios and flood impacts	Since these workshops, Sydney Water has continued to consult with a range of attendees, as outlined in this table. Sydney Water is committed to continuing these conversations as the project progresses. Section 12.1 includes a climate change risk assessment for the project. Climate change has also been a consideration in the flood impact assessment in section 9.3. Appendix F and Chapter 8 provide a detailed description of the water quality modelling and its outputs for the project, including how the models have been developed and calibrated. Models evolve over time and Sydney Water is continuing to improve its Hawkesbury-Nepean and South Creek models so they remain a useful tool for future projects. Chapter 8 and section 9.2 address the impacts of waterway releases in terms of environmental flows, surface water releases under a range of flow conditions. Section 9.3 assesses flood impacts.
Department of Planning, Industry and Environment (Biodiversity and Conservation) Emails Meeting offer declined	No issues identified requiring consultation and DPIE advised they will wait to provide comment on EIS.	Appendix J includes a Biodiversity Assessment Report (BDAR) in accordance with NSW and Commonwealth guidelines. This is also summarised in section 9.1.

Stakeholder and consultation	Issues raised	How issues addressed
Department of Planning, Industry and Environment • Wianamatta South Creek Program team • Western Parkland City team • Greener City team • Cumberland Plain Conservation Plan team • Place Design and Public Spaces team • Western Sydney Planning Partnership **NSW Government Architect** Emails Meetings with various combinations of these stakeholders in: • March 2021 • May 2021 • July 2021	• Alignment of AWRC site green space area with NSW Government vision for South Creek in terms of biodiversity, flooding, revegetation, public access, linkages with potential adjoining green space, blue-green infrastructure strategy • Recreation area on AWRC site prohibited under State Environmental Planning Policy (Western Sydney Aerotropolis) 2020 and this unlikely to change prior to EIS submission	Section 4.4 outlines Sydney Water's approach to urban design and landscaping on the AWRC site, including principles to ensure the matters raised are captured in the Urban Design and Landscaping plan for the site. Sydney Water will continue to consult with these teams as the Urban Design and Landscaping Plan for the site is developed.

Stakeholder and consultation	Issues raised	How issues addressed
Department of Planning, Industry and Environment (Environment, Energy and Science) Meeting (June 2021) Outside the project, Sydney Water has consulted with this team as they have developed waterway objectives for the South Creek catchment.	Validation against Wianamatta South Creek Catchment Flood Study (Advisian, 2020)	Section 9.3 assesses the project's flooding impacts, including validation of results against the Advisian flood study.
Department of Planning, Industry and Environment (Natural Resource Access Regulator) Emails Meeting offer declined	No issues raised	The key content likely to be of interest to the Natural Resource Access Regulator given their role is the assessment of groundwater impacts in section 9.4.

Stakeholder and consultation	Issues raised	How issues addressed
Department of Planning, Industry and Environment (Water) A range of meetings and email correspondence throughout 2020 and 2021.	• Alignment with draft Greater Sydney Water Strategy and Metropolitan Water Sharing Plans • Further collaboration required about how treated water flows could contribute to proposed new environmental flows regime	Section 2.7 provides more detail about how the project aligns with the draft Greater Sydney Water Strategy and Metropolitan Water Sharing Plans. The project team continues to work closely with DPIE Water on the project's potential contribution to the environmental flows regime, including working on detailed modelling of potential flow contributions. Section 3.5 outlines the ongoing discussions with DPIE Water about environmental flows.
Department of Premier and Cabinet (NSW Heritage) Two meetings: • Non-Aboriginal heritage (October 2020) • Aboriginal heritage (January 2021)	• Impacts on State heritage-listed items, particularly Upper Canal • Supportive of efforts to minimise heritage impacts, especially at Blaxlands Farm • Aboriginal cultural values • Potential for confusion in the community between the project and Warragamba Dam wall raising project	Sections 10.1 and 10.2 assess the project's impacts on Aboriginal heritage and non-Aboriginal heritage, including Upper Canal, Blaxlands Farm and Aboriginal cultural values.

Stakeholder and consultation	Issues raised	How issues addressed
Department of Primary Industries (Fisheries) One meeting (March 2021) Emails	• Waterway crossing methodology – preference is tunnelling rather than open trenching. If open trenching can be justified, commitment to riparian improvement expected. • Environmental offsets • Protecting environment at waterway release locations • Threatened species - confirmed no survey required for Macquarie Perch; need to justify no suitable habitat for dragonfly species (including Sydney Hawk Dragonfly and Adams Emerald Dragonfly)	Although pipeline construction across most waterways will be constructed by tunnelling, Sydney Water proposes to open trench across some waterways, including where there are geotechnical risks of tunnelling. Section 4.9 describes pipeline construction methodology with impacts and management measures on waterways (including the need for offsets) primarily assessed in Chapter 8 and section 9.1. Section 4.4.2 describes design of the treated water release structures, including measures to protect the environment. Chapter 8 and Appendix H include an aquatic ecology impact assessment, including impacts on threatened species.
Department of Primary Industries (Agriculture) One meeting (March 2021) Emails	• Long-term transition of much of the project area away from agricultural uses noted • Potential contribution to biosecurity risk at nearby poultry farms. Likely to reduce over time with transition to more urban land uses • Potential agricultural use of recycled water produced • Recommend specific consultation with agricultural operations close to AWRC to address specific issues	Appendix X includes a Land Use Conflict Risk Assessment, which is summarised in section 11.6. This considers the potential for impacts to agricultural land uses near the project, including biosecurity risks. Section 13.1 also considers wildlife attraction at the AWRC site in relation to risk of bird strike by aircraft. Measures proposed to manage this risk will also contribute to reducing biosecurity risk. The treated water produced has the potential for a range of uses, including for agriculture as outlined in section 3.5. Matters raised in consultation with agricultural landholders are addressed in Table 6-3.

Stakeholder and consultation	Issues raised	How issues addressed
Environment Protection Authority (EPA) Face to face meeting (February 2020). Further meeting offers declined. Emails Hawkesbury-Nepean Science Working Group meetings. These meetings have been held about every 4-6 weeks starting in 2020. They are not focused on the project but include discussion about upgrade and calibration of the Hawkesbury-Nepean and South Creek hydrodynamic models used in the project.	• Application of the EPA's Hawkesbury-Nepean nutrient framework particularly nutrient loads, subzone boundaries, nutrient trading and nutrient concentrations. • Brine management • Sydney Water sought to consult further with the EPA on these matters, as well as noise, air quality, waste and contamination. The EPA advised its interactions with Sydney Water are most appropriately done through DPIE and the planning process, rather than directly with Sydney Water and have therefore not raised any issues on these topics.	The project has been designed to meet the requirements of the EPA's Hawkesbury-Nepean nutrient framework, which is addressed in more detail in Chapter 8. Sydney Water has completed wastewater system modelling to ensure the project is designed and operated to minimise the risk of brine releases to the environment. Sections 4.4.2, 4.4.4, 4.5.1 and 4.6.2 describe this in more detail. Other matters regulated by the EPA are also captured in impact assessment chapters of the EIS including: • noise (section 11.2) • air quality (section 11.1) • waste (section 12.2) • contamination (section 9.5).

Stakeholder and consultation	Issues raised	How issues addressed
Infrastructure NSW Two meetings • September 2020 • May 2021	• Environmental flows and alignment with releases from St Marys Advanced Water Treatment Plant (AWTP) • Timing of project with Warragamba Dam wall raising EIS and potential for confusion in the community between the project and Warragamba Dam wall raising project • Penrith City Council flood model still relevant and Advisian (2020) study not yet adopted • Climate change sensitivity in flood assessment • Stormwater objective targets at AWRC site • Resilience of environmental flows structure during Warragamba Dam releases • Coordination with existing and future infrastructure • Value for money	Section 3.5 provides further context about the ongoing conversations Sydney Water is having with DPIE Water about how the project can contribute to a proposed new environmental flows regime from Warragamba. Outside the scope of the project, Sydney Water is also consulting with DPIE about its inputs to and extractions from the Hawkesbury-Nepean river system (including St Marys AWTP) as the Greater Sydney Water Strategy and Metropolitan Water Sharing Plans are developed. Appendix L and section 9.3 assess project flood impacts, including alignment with Penrith City Council flood model, validation against Advisian (2020) and climate change sensitivity. Section 9.2 addresses how Sydney Water is aligning stormwater management on the AWRC site with the draft waterway objectives for the South Creek catchment. Section 4.4.2 provides further assessment about the environmental flows release structure design, including implications of flows released from Warragamba Dam. Sydney Water will consider this further as part of detailed design of this structure. Section 13.2 addresses coordination with other utilities. Value for money is not a key element of the EIS, however the project is assured through the Infrastructure New South Wales gateway process, which considers value for money and other criteria.

Stakeholder and consultation	Issues raised	How issues addressed
NSW Health One meeting (November 2020)	• Health impact assessment guidelines and human health risk assessment guidelines both relevant • Health risks from catchment sources • Disinfection in the water treatment process • Consider range of pathogens • Recycled water for drinking – not limited by legislation but requires community support and quantitative human health risk assessment	Appendix V and section 11.5 include a human health risk assessment. Sections 4.4 and 4.5 describe the disinfection process for the treated water to address human health risks and Chapter 8 provides more detailed consideration of project alignment with water quality objectives, including in relation to pathogens. Recycled water for drinking is not included in project scope. This means the EIS does not include quantitative human health risk assessment of this.
State Emergency Service (SES) One meeting (May 2021)	• Flood evacuation routes around Wallacia and Kemps Creek during construction and operation • Advance warning of weather conditions and flooding and warning subscription services	Appendix L and section 9.3 consider flood evacuation routes and flood warning to address the matters discussed with SES.

Stakeholder and consultation	Issues raised	How issues addressed
Transport for NSW Meetings with a range of teams across 2020 and 2021, including: • Land use planning (one meeting) • M12 Motorway team (13 meetings) • M7 Motorway team (one meeting) • Sydney Trains (one meeting) • Elizabeth Drive upgrade team five meetings) • Sydney Metro – Western Sydney Airport (two meetings) • Emails	• Coordination across infrastructure projects • Impacts on existing infrastructure such as M7 Motorway • Traffic and transport modelling • Biodiversity impacts	Section 13.2 addresses impacts on existing infrastructure, including rail crossings and how Sydney Water will coordinate with Transport for NSW as the project progresses. The impact assessment chapters of the EIS provide detailed assessments of: • traffic (section 11.4) • biodiversity (section 9.1).

Stakeholder and consultation	Issues raised	How issues addressed
Western Parkland City Authority Meeting in April 2020	• Coordination across government on the integrated management of waterway systems • AWRC site location and acquisition • Coordination with other utilities to minimise impact to community • AWRC design • Environmental flows and release locations • Network infrastructure • Education opportunities on AWRC site	Chapter 4 describes the AWRC location, design and education opportunities. It also describes release locations. Section 3.5 describes how Sydney Water is continuing to work across government about how the project can contribute to a future environmental flows regime from Warragamba Dam. Section 13.2 describes coordination with other utilities. The integrated management of waterway systems and network infrastructure are outside the scope of the project, however Sydney Water will continue consulting separately across government on these issues.
Greater Sydney Commission Meeting in May 2020	• AWRC site and acquisition • Potential contribution to environmental flows • Renewable energy production at AWRC • Decentralised utilities and facilities • Compatible land uses on flood-prone land at AWRC site • Planning instruments for integrated water cycle management	Chapter 4 describes the AWRC location, renewable energy generation and use of the green space area on the AWRC site. Section 3.5 describes how Sydney Water is continuing to work across government about how the project can contribute to a future environmental flows regime from Warragamba Dam. Decentralised utilities and facilities were considered as part of project options as described in Chapter 3. Planning instruments for integrated water cycled management are outside the scope of the project, however Sydney Water will continue consulting separately across government on these issues.

Stakeholder and consultation	Issues raised	How issues addressed
Western Sydney Planning Partnership Office Meeting in May 2020, March 2021 Emails, phone calls	• Details of AWRC including land size and acquisition • Urban design and visual buffers, including incorporating heritage into site design • Bird strikes • Environmental flows • Potential for co-location of private business at AWRC site • Flooding	Section 4.4.1 provides more information about the AWRC site, including the proposed urban design approach and opportunities to incorporate heritage. Section 3.5 provides more context about environmental flows and the potential for the project to contribute to the NSW Government's proposed environmental flows regime from Warragamba Dam. It also considers future opportunities for co-locating compatible industries. The impact assessment chapters of the EIS provide detailed assessments of: • visual impact • impacts on airport operation (including risk of bird strikes) • flooding.
NSW Crown Lands Emails Meeting offer declined	No issues raised.	Impacts on Crown lands are considered in section 5.2.6. Chapter 8 considers impacts on waterways.

Stakeholder and consultation	Issues raised	How issues addressed
WaterNSW Meetings in June 2020 and April 2021 Emails	• Impacts on WaterNSW infrastructure • Contamination impacts around environmental flows pipeline release structure • Alignment with purified recycled water for drinking • Increased erosion and bare rock downstream of Warragamba Dam after 2021 floods	Chapter 8 and section 13.2 assess the project's impacts on WaterNSW infrastructure including the Upper Canal, Warragamba Pipeline and weirs. Section 9.5 assesses contamination impacts, including around the environmental flows pipeline release structure. Purified recycled water for drinking is not part of project scope and section 3.5 considers how the project can be adaptable to this pathway in the future. Sydney Water will consider the changed conditions in Warragamba River since the 2021 floods as detailed design progresses.
Greater Sydney Parklands Four meetings across 2020 and 2021	• Cumulative impacts of government infrastructure projects (including visitor, recreation and event disruption) • Coordination with future plans for walking tracks and other park development options • Maintenance of brine pipeline and potential for leaks • Impacts to sensitive vegetation including established trees	Section 2.6.6 assesses project alignment with Western Sydney Parkland strategic plans. Section 4.6.2 describes how the brine pipeline has been designed to avoid the potential for leaks. Section 13.2 describes how Sydney Water will continue to consult with other government infrastructure projects as the project progresses and section 9.1 about how project biodiversity impacts will be managed. Sydney Water is also continuing to consult with Greater Sydney Parklands about the brine pipeline alignment along Range Road to minimise impacts to proposed landscaping.

Stakeholder and consultation	Issues raised	How issues addressed
Western Sydney City Deal – Communications and Engagement sub-committee Meetings in April 2020 and May 2021	• Cumulative impacts of government infrastructure projects (including on traffic and transport) • Strategic context of project in Western Sydney • Community engagement activities	Section 13.2 describes how Sydney Water will continue to consult with other government infrastructure projects as the project progresses. Section 2.6 describes the strategic context of the project in Western Sydney. This chapter describes Sydney Water's community engagement approach.

6.4.6 Utilities consultation

Sydney Water has worked closely with key utilities during reference design and EIS preparation and will continue to do so as the project progresses. Table 6-10 summarises the issues raised in consultation to date and how Sydney Water has addressed them.

Table 6-10 Issues raised in utilities consultation

Stakeholder and consultation	Issues raised	How issues addressed
Endeavour Energy One meeting in 2020 Letters and emails	• Power requirements for AWRC • Following relevant standards, legislation and assessments.	Section 13.2 describes the project's utility requirements and impacts, and how Sydney Water will continue to consult with key utilities as the project progresses.
Jemena Three meetings in 2020 Emails	• Impacts on existing gas pipelines and safety requirements when working near high-pressure pipelines • Supplying biogas back into the network	Section 13.2 describes the project's utility requirements and impacts, and how Sydney Water will continue to consult with key utilities as the project progresses. Section 3.5 describes future opportunities for supplying biogas back into the network.
Utilities Collaboration Group Various meetings and correspondence across 2020 and 2021	• Cumulative impacts from government infrastructure projects • Project design, development and operation • Impacts on existing infrastructure	Section 13.2 describes the project's utility requirements and impacts, and how Sydney Water will continue to consult with key utilities as the project progresses.

6.5 Future community and stakeholder engagement (Phases 3-5)

Throughout the engagement undertaken during phases 1 & 2, Sydney Water identified a range of key issues held by customers, community and stakeholders in relation to this project.

The insights gathered during this time have been used and will continue to be used to inform ongoing planning and continued engagement during the remaining phases of the project:

- Phase 3 – EIS Public Exhibition
- Phase 4 – Detailed Design & Construction
- Phase 5 – Operations

6.5.1 Engagement approach

As in previous phases, Sydney Water will continue its commitment to engaging with the community and stakeholders impacted by this project and taking their views into consideration. In particular, Sydney Water will implement any commitments made during the planning phases.

This commitment is reflected in the previously stated objectives for engagement activities (in section 6.2.2), which have been guided by the Policy and Guidelines for Community and Stakeholder Engagement (Sydney Water, 2019) and the International Association of Public Participation (IAP2) core values and codes of ethics.

6.5.2 Phase 3 - EIS public exhibition

Phase 3 involves the placement of this EIS on public display and associated communications with stakeholders and communities to ensure all interested parties are aware of their opportunity to review the EIS and provide feedback.

The Department of Planning, Industry and Environment (DPIE) will place this EIS on public exhibition for a minimum of 28 days in accordance with the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation). During the exhibition period, government agencies, project stakeholders and community members will be able to review the EIS and provide feedback via a written submission to DPIE for consideration in its assessment of the project.

Electronic copies of the EIS will be available for viewing and download from DPIE's Major Projects website, with a link available on Sydney Water's website.

Engagement activities supporting the EIS exhibition

During public exhibition of the EIS, Sydney Water will undertake community and stakeholder engagement activities in addition to requirements under EP&A Regulation. This will help ensure all interested parties are aware of their opportunity to review the EIS and provide feedback. These additional engagement activities may include but are not limited to:

- newspaper advertisements
- community newsletters / brochure
- ongoing engagement with communities and landowners
- project information telephone line and emails
- community and stakeholder meetings (in-person or online)
- community briefing sessions (in-person or online)
- 'you said, we did' report
- Sydney Water Talk project updates and content.

Where possible, Sydney Water will prioritise in-person methods of engagement during this phase. However, as for engagement to date, this may not always be possible due to COVID-19 lockdown restrictions and social distancing provisions in the Greater Sydney area.

In this instance, Sydney Water will again turn to online, written and phone engagement to replace the planned in-person engagement. This will be done by increasing the opportunities to engage with the EIS via written communications and phone calls. It will also leverage tools for briefings and online meetings such as Zoom and Microsoft Teams.

6.5.3 Phase 4 - Detailed design and construction

As the project moves into Phase 4, Sydney Water will develop a community and stakeholder engagement plan (CSEP) that is specifically focused on the detailed design, pre-construction and construction activities.

The objectives of the CSEP during this phase are to:

- keep the community informed about the project including construction activities, program of works, and associated impacts
- ensure there are avenues for the community to provide feedback or to register complaints and impacts, and that the community is aware of these avenues
- provide a process to resolve complaints and issues raised.

The community and stakeholder engagement activities that will be outlined in the CSEP will include:

- ongoing consultation with landowners, stakeholders, local councils and other government agencies
- notifications of construction impacts to impacted communities
- regular project updates to nearby communities
- processes 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 (to be issued at least seven days before taking effect)
- vehicle management signs to communicate traffic changes to road users and communicate traffic management plans.

The CSEP allows Sydney Water to ensure detailed construction methodologies and management are designed with input from those directly affected.

Sydney Water will implement this plan to ensure residents and businesses are aware of what activities are being undertaken, and when and then how they can continue to engage during the construction phase of the project.

Sydney Water will continue to proactively engage with landowners, stakeholders and councils to refine the CSEP.

6.5.4 Phase 5 - Operations

While all project components will operate 24/7, Sydney Water expects the requirement for ongoing community and stakeholder engagement during operations to be minimal. This is due to the pipelines being located below ground and the AWRC being mainly surrounded by agricultural land and commercial businesses, with only a limited number of large rural residential properties nearby.

As the project moves into its operational phase, Sydney Water will develop a new CSEP that will outline the scope of ongoing community and stakeholder engagement that is appropriate and required when construction is completed. At this stage, Sydney Water expects the operational CSEP will be focused on ongoing asset maintenance.

6.5.5 Complaints management

Any complaints relating to the project will be managed in line with Sydney Water's Complaints Management Policy, which is also added to supplier contracts and recorded (in SAP CRM and Consultation Manager) to meet Sydney Water's Operating Licence requirement.

Sydney Water aims to resolve complaints at the first point of contact by providing a solution or negotiating an agreed course of action. Sydney Water will respond to complaints in a prompt, efficient and fair manner and make all reasonable efforts to resolve the complaint to the satisfaction of the person who raised it.

Where it is not possible to fully investigate and resolve a complaint immediately, Sydney Water will provide an initial response within:

- two working days, from a phone call or other verbal contact
- five working days, from an email or letter. Sydney Water will try to respond earlier by making direct contact with the person who made the complaint.

Sydney Water's initial response will be either to:

- offer an acceptable solution
- explain the intended course of action to resolve the complaint.

Sydney Water's Complaint Management Policy is available via the Sydney Water website and is in line with its Customer Contract.

6.5.6 Privacy policy

Sydney Water is committed to managing and protecting personal information in accordance with the requirements of the *Privacy and Personal Information Protection Act 1998 (PPIP Act), Health Records and Information Privacy Act 2002 (HRIP Act)* and the Privacy Amendment (Notifiable Data Breaches) Bill 2017 (NBD Scheme).