Waste Management Impact Assessment

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Sydney Water
IN.P0001436

Quakers Hill Water Resource Recovery Facility Advanced Treatment Upgrade
20 August 2025

Waste Management Impact Assessment

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Executive summary

Background

This Waste Management Impact Assessment Report has been prepared to inform the review of environmental factors for the Quakers Hill Water Resource Recovery Facility (WRRF) Advanced Treatment Upgrade project (the project). The project involves the development of an advanced water treatment plant (AWTP) at Quakers Hill WRRF, an upgrade of the site's existing secondary treatment infrastructure, and a pipeline to transfer brine from Quakers Hill WRRF to the existing Northern Suburbs Ocean Outfall Sewer at Seven Hills.

This report identifies the likely types and quantities of waste that would be generated during the construction and operation of the project and the potential environmental impacts of this waste. It also provides recommendations for avoiding or minimising these impacts.

Waste generation

The key sources of waste expected to be generated by the project include:

- Waste from construction of the brine pipeline including surplus spoil from trenching works and drilling mud from tunnelling works. Trenching of the pipeline in roads and vegetated areas would also generate asphalt and road base waste and vegetation waste respectively
- Waste from the demolition of two intermittently decanted aerated lagoons (IDALs), which are located where the AWTP would be constructed
- Other construction activities that would generate waste, mostly associated with the construction of the AWTP and secondary treatment plant upgrade at Quakers Hill WRRF
- Waste generated during operation of the project.

Rainwater and groundwater that collects in trenches during the construction period will also need to be managed as waste if it contains hydrocarbons, or if it is sediment-laden and there are no feasible means of disposing to the environment without causing pollution.

Waste classification

Waste streams expected to be generated during construction and operation of the project were classified in accordance with *the Waste Classification Guidelines, 2014 - Part 1 Classifying Waste* (NSW Environment Protection Authority, 2014a) and quantities estimated. Most of the waste generated would be classified as liquid waste, general waste (non-putrescible) or general waste (putrescible). Small quantities of special waste (asbestos) are expected from trenching of the brine pipeline through Billy Goat Hill Reserve in Blacktown. There is also the potential to generate hazardous waste from demolition of the IDALs and excavation works for the secondary treatment plant upgrade works. No restricted solid waste is anticipated.

Waste management strategies

The principles of the circular economy and waste management hierarchy have been incorporated into the concept design of the project. Specifically, the *2018 National Waste Policy: Less waste, more resources* provides a framework for collective national action on waste management, recycling and resource recovery to 2030. The policy incorporates the waste hierarchy, and a focus on high order uses, while building on the idea of a circular economy that is continually reusing, recycling and the reprocessing materials.

The waste hierarchy, which is also presented in section 3(b) of the *Waste Avoidance and Resource Recovery Act 2001,* is the governing philosophy that drives the management methodology for the project's waste. The waste hierarchy provides guidance on the order of preference of approaches to achieve efficient resource use, with reducing the generation of waste at the top of the hierarchy, followed by reuse, recycling, energy recovery, waste treatment, and lastly waste disposal.

Strategies to implement the waste hierarchy are presented in this report with a focus on how each waste stream can be avoided, reused, segregated, collected, and transferred to appropriate off-site waste management facilities. The main waste management strategy for the project is the reuse of the two existing stockpiles at Quakers Hill WRRF as fill material at the AWTP work site.

Assessment of impacts, recommendations and conclusions

Based on the findings of this assessment, the planned sustainable approach to the design, construction and operation of the project will minimise the overall amount of waste generated; followed by the appropriate management and storage of wastes that will prevent on-site and off-site pollution and enhance opportunities for reuse, recovery and diversion from landfill.

Waste that cannot be reused or recycled will be transported by a licensed transporter to a licensed disposal facility. The quantities of general waste requiring off-site disposal will not adversely impact the local transportation network and there are several facilities available that have the capacity to receive these residual waste materials.

The project is located in an area that is very well serviced by waste facilities that are licenced to receive the types of waste that would be generated by the project. These waste types are typical of an infrastructure project and there are well established methods for their handling, transportation, reuse, recycling, treatment and/or disposal.

Potential cumulative waste impacts were evaluated by considering proposed developments in the vicinity of the project that could be under construction at the same time as the project. The assessment found there is low potential for cumulative impacts with these proposed developments because the project would generate small volumes of waste fairly evenly across a period of up to about 2 years, which would have minimal impact on the capacity of local waste facilities to receive waste from concurrent waste generating projects.

A comprehensive range of mitigation and management measures is recommended to be implemented to achieve the waste hierarchy, especially during the construction phase when most of the waste generation by the project would occur.

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Acronyms and abbreviations

AGWR Phase 2	Australian Guidelines for Water Recycling
AWTP	Advanced water treatment plant
CLM Act	*Contaminated Land Management Act 1997*
DPIE	Department of Planning, Industry and Environment
DG	Dangerous goods
EIS	Environmental impact statement
ENM	Excavated natural material
EPA	NSW Environment Protection Authority
EPL	Environment protection licence
HDD	Horizontal directional drilling
IDAL	Intermittently decanted aerated lagoon
kg	Kilograms
kL	Kilolitres
km	Kilometres
LOR	Limit of reporting
μS/cm	Microsiemens per centimetre
ML/day	Megalitres per day
m^3	Cubic metres
mm	Millimetres
NSOOS	Northern Suburbs Ocean Outfall Sewer
NSW	New South Wales
NWPA Plan	*National Waste Policy Action Plan 2019*
PFAS	Per- and poly- fluoroalkyl substances
PFHxS	Perfluorohexanesulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
POEA Act	*Protection of the Environment Administration Act 1991*
POEO Act	*Protection of the Environment Operations Act 1997*
PRW	Purified recycled water
REF	Review of environmental factors

RL	Relative level
SAC	Site assessment criteria
t	Tonnes
The project	Quakers Hill WRRF Advanced Treatment Upgrade project
VENM	Virgin excavated natural material
WARR Act	*Waste Avoidance and Resource Recovery Act 2001*
WARR Strategy 2014-21	*Waste Avoidance and Resource Recovery Strategy 2014-21* (EPA, 2014b)
WRRF	Water resource recovery facility

1. Introduction

1.1 Background

This Waste Management Impact Assessment Report has been prepared to inform the review of environmental factors (REF) for the Quakers Hill Water Resource Recovery Facility (WRRF) Advanced Treatment Upgrade project (the project). The project involves the development of an advanced water treatment plant (AWTP) at Quakers Hill WRRF, an upgrade of the site's existing secondary treatment infrastructure, and a pipeline to transfer brine from Quakers Hill WRRF to the existing Northern Suburbs Ocean Outfall Sewer (NSOOS) at Seven Hills. The location of the project is shown in Figure 1-1. Sydney Water is the proponent of the project.

This report identifies the likely waste that would be generated during construction and operation of the project. It also provides recommendations for avoiding, minimising and managing waste.

1.2 Project overview

Upgrades to Sydney Water's Quakers Hill WRRF are required by 2028 to:

- Service industry growth and housing policies as current treatment capacity at the plant of 28 megalitres per day (ML/day) is expected to be exceeded in late 2028
- Meet environment protection licence (EPL) limits that require reduced nutrient loads to the Hawkesbury-Nepean River (Sackville 2 zone)
- Provide high quality water treatment that enables a future purified recycled water (PRW) scheme and its introduction into Prospect Reservoir.

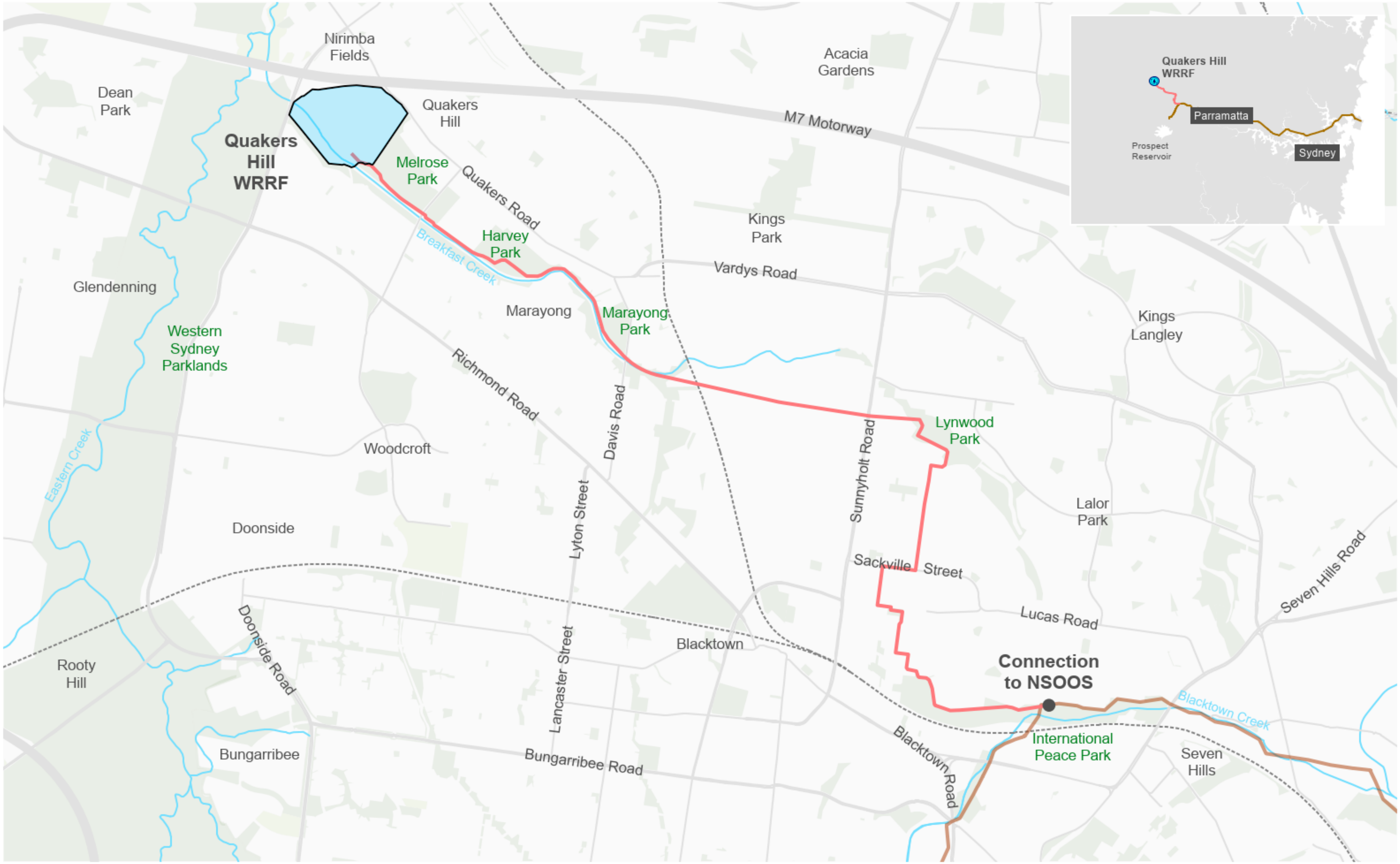
The project is in the Blacktown local government area, in largely urbanised areas with a mix of residential, industrial, and recreational land uses.

The key features of the project include:

- A secondary treatment process upgrade from the current 28 ML/day to 48 ML/day
- A new AWTP, including reverse osmosis, ultrafiltration and stabilisation
- A range of ancillary infrastructure such as new buildings, tanks, pipes, services and chemical storage
- Demolition and restoration of previously decommissioned structures
- A new brine pipeline to transfer the brine generated as a by-product of the reverse osmosis process into the existing wastewater network. The pipeline would:
  - Have flow capacity of up to 12.5 ML/day
  - Be about 8 kilometres (km) long and about 500 millimetres (mm) diameter
  - Be installed largely along shared paths, public parkland, and road corridors
  - Be mostly underground and built using open trench and trenchless methods
  - Be connected into Sydney Water's existing NSOOS.

The AWTP is required to treat wastewater to meet more stringent nutrient limits. However, it would also produce high quality water that could be further treated to produce PRW.

Sydney Water is preparing the REF for the project. PRW is not part of the scope of the REF or this report. Sydney Water is separately assessing the potential introduction of PRW in an environmental impact statement (EIS).



Quakers Hill WRRF
Brine pipeline
NSOOS pipeline
Parks and open space

Figure 1-1 Indicative project location and regional context

0 1 km

Data sources: State of NSW (Spatial Services), NSW Department of Planning and Environment
Basemap: MetroMap 2024

Scale: 1:35,000 @ A4
GDA2020 MGA Zone 56

1.3 Purpose and objectives

The purpose of this Waste Management Impact Assessment Report is to inform the REF about:

- The types of waste that are expected to be generated during the construction and operation of the project
- The potential impacts of project wastes on the existing environment
- The measures that would be implemented to avoid or minimise these potential impacts.

The overarching objective of the report is to describe the principles, procedures and management strategy for waste generated by the project to avoid to the extent feasible waste being disposed of at landfills or burdening local waste management infrastructure. The specific objectives of this report are to:

- Comply with legislative requirements
- Align with Sydney Water policy and procedures
- Assess the impact of the wastes generated by the project during the construction and operational phases and demonstrate how the impact can be minimised through:
  - Avoiding waste generation
  - Maximising the reuse and recycling of waste
  - Storing, handling, transporting and disposing of waste in an environmentally responsible manner that does not cause harm or contamination to soil, air or water.

1.4 Report structure

The report is structured as follows:

- Section 1 – Introduction
- Section 2 – Legislation, policy and guidelines context
- Section 3 – Methodology
- Section 4 – Existing environment
- Section 5 – Waste generation and classification
- Section 6 – Impact assessment
- Section 7 – Mitigation and management measures
- Section 8 – Waste management strategies
- Section 9 – Monitoring requirements
- Section 10 – Summary
- Section 11 – References
- Appendix A – Waste calculations.

2. Legislation, policy and guidelines context

2.1 Overview

Waste generated during construction and operation of the project would be managed in accordance with national and state legislation, policies and guidelines. A summary of relevant national and state legislation, policies and guidelines is provided in sections 2.2 and 2.3 respectively. Relevant Sydney Water strategies and plans are discussed in section 2.4.

2.2 National level

2.2.1 2018 National Waste Policy: Less waste, more resources

The *2018 National Waste Policy: Less waste, more resources* was agreed by Australia's Environment Ministers and the President of the Australian Local Government Association in December 2018. The policy provides a framework for collective national action on waste management, recycling and resource recovery to 2030. The policy incorporates the waste hierarchy, and a focus on high order uses, while building on the idea of a circular economy that is continually reusing, recycling and the reprocessing materials.

The 2018 National Waste Policy provides a national framework for waste and resource recovery in Australia. The policy recognises five principles as underpinning waste management, recycling and resource recovery in a circular economy:

1. Avoid waste – Prioritise waste avoidance, encourage efficient use, reuse and repair, and design products so waste is minimised, they are made to last, and we can more easily recover materials
2. Improve resource recovery – Improve material collection systems and processes for recycling and improve the quality of recycled materials produce
3. Increase use of recycled material and build demand and markets for recycled products
4. Better manage material flows to benefit human health, the environment and the economy
5. Improve information to support innovation, guide investment and enable informed consumer decisions.

The policy also contains 14 strategies that apply circular economy principles for waste, recycling and resource recovery.

2.2.2 National Waste Policy Action Plan 2019

The *National Waste Policy Action Plan 2019* (the NWPA Plan) was prepared by the Australian Government, state and territory governments and the Australian Local Government Association. The NWPA Plan is aligned with the United Nations Sustainable Development Goals that Australia adopted in 2015, including Goal 12 that is focussed on responsible consumption and production patterns.

The NWPA Plan presents seven targets to implement the 2018 National Waste Policy, including:

- Reduce the total waste generated in Australia by 10 per cent per person by 2030
- Achieve an average 80 per cent resource recovery rate from all waste streams following the waste hierarchy by 2030
- Halve the amount of organic waste sent to landfill by 2030.

The NWPA Plan details actions to achieve each target.

2.3 State level

2.3.1 Overview

The State-level legislation and policies that are relevant to management of waste associated with the project are as follows:

- *Protection of the Environment Administration Act 1991* (POEA Act)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Contaminated Land Management Act 1997* (CLM Act)
- *Waste Avoidance and Resource Recovery Act 2001* (WARR Act)
- Protection of the Environment Operations (Waste) Regulations 2014
- *Waste Classification Guidelines, 2014 - Part 1 Classifying Waste* (NSW Environment Protection Authority (EPA), 2014a)
- *NSW Waste Avoidance and Resource Recovery Strategy 2014-21* (EPA, 2014b) (WARR Strategy 2014-21)
- *NSW Circular Economy Policy Statement, 2019* (EPA, 2019a)
- *NSW Asbestos Waste Strategy, 2019-2021* (EPA, 2019b)
- *NSW Waste and Sustainable Materials Strategy 2041, Stage 1: 2021-27* (Department of Planning, Industry and Environment (DPIE), 2021a).

2.3.2 Protection of the Environment Administration Act 1991

The POEA Act establishes the EPA and outlines its responsibilities and management. The POEA Act aims to protect the environment by providing a framework for the EPA to regulate and enforce environmental protection measures. Key provisions of the POEA Act that are relevant to this study include:

- Constitution of the EPA: Establishes the EPA as the primary body responsible for environmental protection in NSW
- Objectives of the EPA: Defines the goals and objectives of the EPA, including the protection, restoration, and enhancement of the environment
- General responsibilities: Outlines the functions and powers of the EPA, such as issuing environmental protection licenses and enforcing compliance
- Advisory committees: Allows for the establishment of advisory committees to assist the EPA in its duties.

The POEA Act is relevant to the project due to the role of the EPA in administering the key legislation regulating waste management in NSW (see following sections).

2.3.3 Protection of the Environment Operations Act 1997

The POEO Act is a key piece of environmental legislation in NSW. It aims to protect, restore, and enhance the quality of the environment by regulating pollution control, waste management, and environmental protection policies. The POEO Act includes provisions for:

- Licensing: Integrated licensing for activities that may impact the environment
- Pollution control: Measures to prevent and reduce pollution
- Enforcement: Powers to issue notices and enforce compliance
- Offences and penalties: Legal consequences for breaches of environmental regulations.

The specific requirements of the POEO Act that are relevant to this study are as follows:

- Definition of waste used to identify waste materials:
  - Any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment, or
  - Any discarded, rejected, unwanted, surplus or abandoned substance, or
  - Any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, processing, recovery or purification by a separate operation from that which produced the substance, or
  - Any processed, recycled, reused or recovered substance produced wholly or partly from waste that is applied to land, or used as fuel, but only in the circumstances prescribed by the regulations or
  - Any substance prescribed by the regulations to be waste
- Application of specific management and licensing conditions.

Section 48 of the POEO Act requires an EPL for certain types of activities as outlined in Schedule 1 of the POEO Act. Resource recovery and waste storage are included as premises-based activities in clauses 34 and 42 respectively of Schedule 1 and therefore require an EPL. However, clauses 34 and 42 of Schedule 1 do not apply to the receiving of waste at premises from off site and its processing and storage if the waste is virgin excavated natural material (VENM) or meets all the conditions of a resource recovery order at the time it is received. Clause 42 of Schedule 1 also does not apply to the receiving from off site and storage of stormwater or up to 60 tonnes of drilling mud.

Sydney Water would establish the project’s approach to spoil management and storage during construction planning, including whether it would trigger the need for an EPL.

Clause 49 of Schedule 1 of the POEO Act defines six classes of waste based on the level of risk that waste poses to the environment and human health. The six waste classes are:

- Special waste
- Liquid waste
- Hazardous waste
- Restricted solid waste
- General solid waste (putrescible)
- General solid waste (non-putrescible).

These waste classes are used in the classification of waste expected to be generated by the project (refer to section 5).

2.3.4 Contaminated Land Management Act 1997

The CLM Act establish a process for investigating and (where appropriate) remediating land that the EPA considers to be contaminated significantly enough to require regulation.

Key provisions of the CLM Act include:

- Identification and declaration: The EPA can declare land as ‘significantly contaminated’ and order investigations
- Management orders: The EPA can issue orders for the management and remediation of contaminated land
- Voluntary proposals: Landowners can submit voluntary management proposals for contaminated sites

- Financial assurances: The CLM Act requires financial assurances to ensure funding for remediation actions
- Site auditors: Accreditation of site auditors to assess and certify land suitability for use.

The CLM Act would be relevant to the management of any project waste generated at or near to a land that is contaminated.

2.3.5 Waste Avoidance and Resource Recovery Act 2001

The WARR Act aims to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development. The WARR Act focuses on reducing waste generation, encouraging recycling, and improving resource recovery. The key aspects of the WARR Act include:

- Waste strategies: Development and implementation of strategies to minimise waste and enhance resource recovery
- Functions of the EPA: The EPA is tasked with overseeing and enforcing the WARR Act's provisions
- Reporting and targets: Establishment of waste reduction targets and regular reporting on progress.

The waste hierarchy presented in section 3(b) of the WARR Act is the governing philosophy that drives the management methodology for the project’s waste. The waste hierarchy is shown in Figure 2-1 and provides guidance on the order of preference of approaches to achieve efficient resource use.

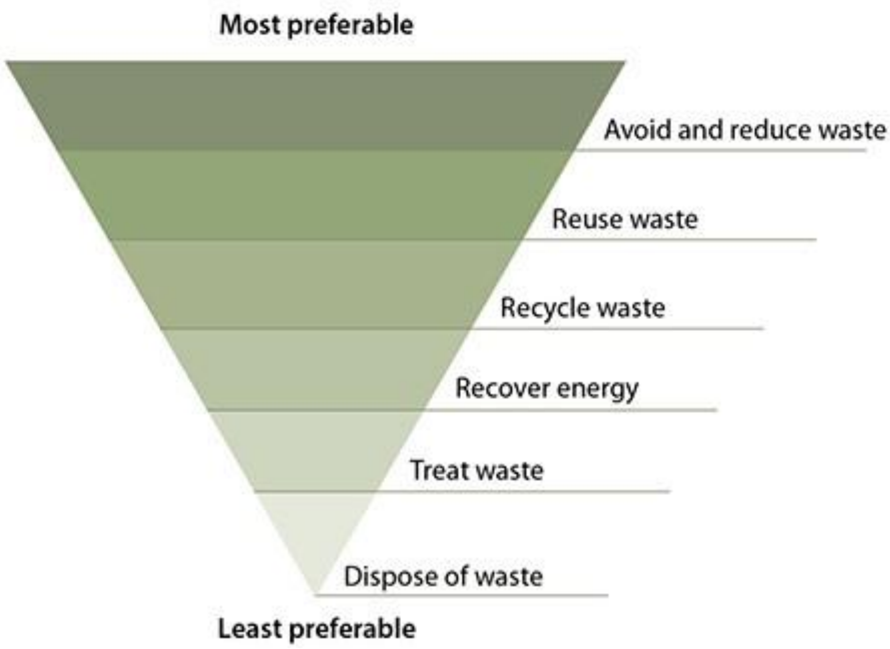


Figure 2-1 Waste hierarchy

At the top of the hierarchy, avoiding and reducing the generation of waste is the most preferred approach. This is because it preserves resources, avoids the use of additional resources to manage waste that would have been generated, and aims to eliminate disposal costs. The goal is to maximise efficiency and avoid unnecessary consumption.

Where avoiding and reducing waste is not possible, the next most preferred option is to reuse the materials without further processing, avoiding the costs of energy and other resources required for recycling. The next step in the hierarchy is recycling, which involves processing waste materials to make the same or different products. Recycling a product generally requires fewer resources than drawing virgin materials from the environment to create a new one.

Where further recycling is not feasible, it may be possible to recover the energy from the material and feed that back into the economy where this is acceptable to the community. Finally, the waste hierarchy recognises that some types of waste, such as hazardous chemicals or asbestos, cannot be safely recycled and direct treatment or disposal is the most appropriate management option.

2.3.6 Protection of the Environment Operations (Waste) Regulation 2014

The Protection of the Environment Operations (Waste) Regulations 2014 allows the EPA to protect human health and the environment and provides a platform for a modern and fair waste industry by setting out provisions related to:

- The storage and transportation of waste
- Reporting and record-keeping requirements
- Special requirements for the management of certain special wastes including asbestos
- Thresholds for EPLs and outlines the payment of waste contributions
- Provides for exemptions to some of the requirements for certain activities under resource recovery orders and exemptions allowing specified reuse of waste streams
- Prohibits the transport of waste for disposal more than 150 km from the place of generation.

The specific requirements of the waste regulation that are relevant to the project are as follows:

- The storage and transportation of waste
- Waste reporting and record-keeping
- Management of asbestos
- Resource recovery orders and exemptions allowing specified reuse of waste streams including:
  - Excavated public road material
  - Excavated natural material (ENM)
  - Treated drilling mud
  - Mulch
  - Stormwater.

2.3.7 Waste Classification Guidelines, 2014 (Part 1 Classifying Waste)

The *Waste Classification Guidelines, 2014 - Part 1 Classifying Waste* (EPA, 2014a) provide a step-by-step process for classifying waste. To determine which of the six waste classifications defined in clause 49 of Schedule 1 of the POEO Act applies to waste, the following steps must be followed in the order below:

- Step 1: Is the waste special waste?
- Step 2: Is the waste liquid waste?
- Step 3: Is the waste pre-classified?
- Step 4: Does the waste possess hazardous characteristics?
- Step 5: Determining a waste's classification using chemical assessment
- Step 6: Is the waste putrescible or non-putrescible?

Once a waste's classification has been established under a particular step, the waste is taken to have that classification and must be managed accordingly.

The POEO Act requires that waste generators and waste facilities must ensure they classify their waste carefully in accordance with the procedures in the guidelines. This is because waste can only be taken to, and accepted at, a waste facility which is lawfully authorised to receive, re-use and/or dispose of that classification or type of waste.

In October 2016, the EPA issued an addendum to the *Waste Classification Guidelines (2014) – Part 1: classifying waste* (EPA, 2014a) in response to the classification of per- and poly- fluoroalkyl substances (PFAS) as emerging contaminants. Generators of waste that contains, or may potentially contain, PFAS must ensure they undertake chemical assessment consistent with Step 5 of Part 1 of the Waste Classification Guidelines for perfluorooctanesulfonic acid (PFOS), perfluorohexanesulfonic acid (PFHxS), and perfluorooctanoic acid (PFOA) and in accordance with the addendum.

The guidelines are used in this report to classify all wastes likely to be generated by the project (refer to section 5).

2.3.8 NSW Waste Avoidance and Resource Recovery Strategy 2014-21

The WARR Strategy 2014-21 outlines the State's approach to managing waste and promoting resource recovery over a seven-year period. The WARR Strategy 2014-21 aims to reduce waste generation, increase recycling rates, and improve waste management practices. Key targets of the WARR Strategy 2014-21 include:

- Reducing waste generation: Lowering the amount of waste produced per person
- Increasing recycling rates: Achieving recycling rates of 70% for municipal solid waste, 70% for commercial and industrial waste, and 80% for construction and demolition waste
- Diverting waste from landfill: Increasing the diversion of waste from landfill to 75%
- Managing problem wastes: Establishing 86 drop-off facilities and services for problem wastes across NSW
- Reducing litter and illegal dumping: Aiming for a 40% reduction in litter and a 30% reduction in illegal dumping incidents.

The WARR Strategy 2014-21 also supports investment in waste infrastructure, encourages innovation, and promotes the development of new markets for recycled materials. Targets established under the WARR Strategy 2014-21that are relevant to the project are as follows:

- Increasing recycling rates to 70% for industrial waste and 80% for construction and demolition waste
- Increasing waste diverted from landfill to 70%.

These targets will be considered in the waste management plan that forms part of the construction environmental management plan.

The *NSW Waste and Sustainable Materials Strategy 2041, Stage 1: 2021-27* (DPIE, 2021a) updates the WARR Strategy 2014-21 (see section 2.3.11).

2.3.9 NSW Circular Economy Policy Statement, 2019

The *NSW Circular Economy Policy Statement* (EPA, 2019a) provides a framework for implementing initiatives throughout the product life cycle, from design, manufacturing, and retail to end-of-life-disposal. These initiatives promote long-lasting design, maintenance, repair, re-use, sharing, transforming products into services, remanufacturing, and recycling. The principles of the Circular Economy Policy Statement were incorporated into the methodology for this study to minimise waste associated with the project.

2.3.10 NSW Asbestos Waste Strategy 2019-21

The *NSW Asbestos Waste Strategy 2019-2021* (EPA, 2019b) proposes innovative measures to reduce illegal dumping and unsafe disposal and promotes lawful and appropriate disposal of asbestos waste. A key principle is the strive to making asbestos waste disposal cheaper by working with local government and industry to provide cheaper ways for householders and licensed contractors to lawfully dispose of asbestos waste under certain circumstances. The strategy has been used to determine the most environmentally and cost-efficient method of disposing of asbestos waste associated with the project.

2.3.11 NSW Waste and Sustainable Materials Strategy 2041, Stage 1: 2021-27

The WARR Act commits the NSW Government to refreshing and updating its waste strategy every five years. The *NSW Waste and Sustainable Materials Strategy 2041, Stage 1: 2021-27* (DPIE, 2021a) updates the WARR Strategy 2014-21 (see section 2.3.8). The strategy commits to adopting the targets in the NWPA Plan including the transition to a circular economy. It also contains additional targets including to:

- Reduce overall litter by 60 per cent by 2030 and a plastic litter reduction target of 30 per cent by 2025, as set out in the *NSW Plastics Action Plan* (DPIE, 2021b)
- Set a goal to triple the plastics recycling rate by 2030, as set out in the *NSW Plastics Action Plan* (DPIE, 2021b).

The strategy outlines the State’s plan to transition to a circular economy and improve waste management over the first six years. The strategy recognises the circular economy as being based on three key principles:

- Design out waste and pollution
- Keep products and materials in use
- Regenerate natural systems.

The strategy illustrates the circular economy as shown in Figure 2-2 and describes it as decoupling economic activity from consumption of finite resources.

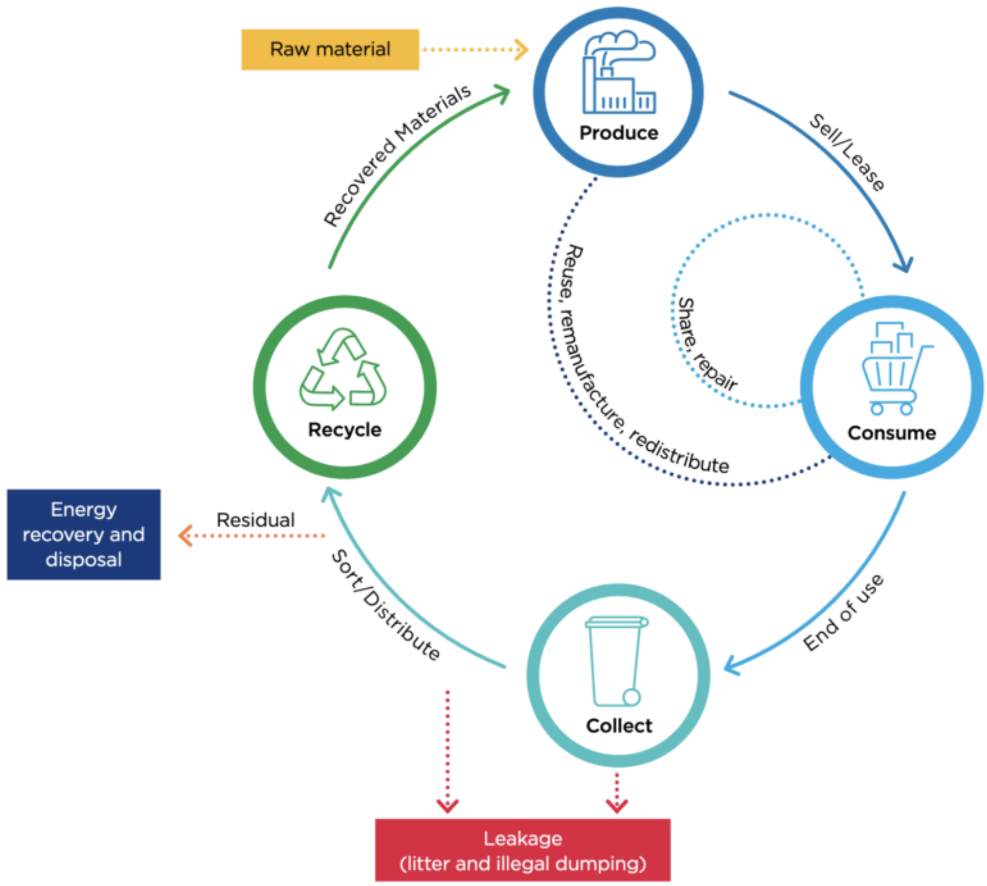


Figure 2-2 Circular economy

Key actions and goals of the strategy include:

- Phasing out problematic plastics: Implementing measures to reduce single-use plastics
- Boosting recycling rates: Enhancing recycling infrastructure and programs
- Supporting innovation: Encouraging new technologies and practices for waste management
- Financial incentives: Providing incentives for manufacturers to design out problematic materials
- Community engagement: Working with consumers, industries, and other governments to achieve these goals.

2.3.12 Draft NSW Waste and Circular Infrastructure Plan

A draft of chapter 1 of the first NSW Waste and Circular Infrastructure Plan was released by the EPA for comment on 14 May 2025. Chapter 1 of the plan addresses residual waste and food and garden organic waste. Residual waste is that part of generated waste that cannot be recycled and which needs to be disposed of at landfill. The draft chapter identifies that Greater Sydney is on track to run out of landfill capacity by 2030 due to the current rate at which the city is sending waste to landfill and the scheduled closure of three of the city's four landfill sites.

The plan sets out how NSW Government agencies will work together with industry and local councils to:

- Streamline planning processes for extending the lifespan of existing priority landfills or expanding them, where doing so is necessary to avoid immediate landfill shortages in Greater Sydney
- Consider energy-from-waste, where doing so will reduce reliance on landfill, to build resilience in waste management, and maintain protections for human health and the environment

- Strengthen how we strategically plan for waste and recycling infrastructure to meet the needs of Greater Sydney's growing populations.

The plan provides confidence that the NSW Government is working to ensure that there will be landfills available in the Sydney region to receive waste from future infrastructure projects where there are no feasible options for reuse or recycling.

2.4 Sydney Water strategies and plans

2.4.1 Environmental Policy

Sydney Water's Environmental Policy (2023) has as its main objective the protection of the environment and conducting operations in compliance with the principles of ecologically sustainable development. The policy includes a commitment to maximising resource value and supporting a circular economy by responsibly managing energy, water and materials, and minimising waste creation.

2.4.2 One strategy to deliver our vision: Our strategy 2025-2035

Environmental protection is one of the three pillars of Sydney Water's corporate strategy, *One strategy to deliver our vision: Our strategy 2025-2035*. Resource recovery is recognised as a key element in the successful delivery of environmental protection through maximising recycling and reuse of water, energy and materials, and minimising and managing waste. By 2035, Sydney Water has committed to deliver projects to improve the recovery and reuse of the waste materials it generates.

The resource recovery objectives of Sydney Water's corporate strategy have been incorporated into the waste management methodology for the project.

2.4.3 Environment Plan 2020-24

Sydney Water's (2022) *Environment Plan 2020-24* outlines the priority actions that will be progressed to meet the environmental objectives and organisational aspirations as outlined in the corporate strategy. The plan is also a key component of Sydney Water's environmental management system.

The environment plan includes several actions in relation to the circular economy and resource recovery. The main resource recovery action relevant to the project is to improve management of construction waste, particularly waste with potential asbestos contamination.

3. Methodology

3.1 Overview

The methodology used to estimate the waste generated during the construction and operation of the project considered relevant legislation, expected types and quantities of waste, waste classification, potential impacts from waste generation, and appropriate management measures to avoid, reduce, or minimise waste.

3.2 Waste types and quantities

Estimates of the quantities of each type of waste likely to be generated during the construction and operation of the project were developed based on the following:

- Desktop reviews of the existing environment and previous land uses within the study area to determine the likelihood of encountering existing wastes in-situ
- A review of previous studies and resources, including similar Sydney Water wastewater treatment and water recycling plants (specifically Wollongong WRRF) to determine typical wastes and quantities likely to be generated during operation
- Other specialist studies carried out for the REF were reviewed. This includes the Soils and Contaminated Land Impact Assessment Report (Jacobs, 2025a) and Groundwater Impact Assessment Report (Jacobs, 2025b)
- Examination of the reference design and drawings, models, geotechnical reports, earthworks and materials take offs, and general construction methodology of the project to determine the likely wastes and quantities.

3.3 Classification of waste

The types and quantities of waste that are expected to be generated by the project have been classified based on the six classes of waste which are defined in clause 49 of Schedule 1 of the POEO Act using the *Waste Classification Guidelines – Part 1, Classifying waste* (EPA, 2014a) (refer to sections 2.3.3 and 2.3.7). Wastes that would be subject to a resource recovery order are also identified.

The classification of the project's expected wastes was informed by the Soils and Contaminated Land Impact Assessment Report (Jacobs, 2025a) and Groundwater Impact Assessment Report (Jacobs, 2025b) prepared for the project and the geotechnical, contamination, and groundwater field investigations carried out for these reports.

3.4 Waste generation and storage locations

The locations where each waste stream would be generated and stored were identified to establish the potential for impacts to any nearby sensitive receivers or environments.

3.5 Impact assessment

The information on the types, quantities, classifications and locations of each waste stream was used to assess the significance of the potential environmental impact of the project's waste. A risk assessment was carried out to characterise the potential environmental impacts to nearby sensitive environments and receivers as a result of generating, handling, storing, and transporting the project's expected waste streams. A risk matrix with likelihood and consequence descriptors was used to rate the significance of the project's potential environmental impacts as negligible, low, moderate, high or major.

The potential for cumulative waste impacts was also assessed. A cumulative impact assessment considers the impacts of a project together with the impacts of other relevant projects that may interact spatially and temporally to change the level of impact. Projects with the potential to result in cumulative waste impacts have been evaluated in accordance with the *Cumulative Impact Assessment Guidelines for State Significant Project*s (DPIE, 2022).

3.6 Mitigation and management measures

Mitigation and management measures have been recommended to guide waste management during the construction and operational phases of the project. Each mitigation and management measure has been linked to one or more of the potential impacts of the project.

3.7 Waste management strategies

Waste management strategies were developed to provide recommendations on how the potential environmental impacts of each waste stream could be avoided, minimise or managed. The strategies focus on the implementation of the waste hierarchy and the effective management of waste through segregation, awareness training and monitoring.

4. Existing environment

4.1 Overview

This section examines the existing environment that the project is located within, focusing on the aspects of the environment that could contribute to the types and quantities of waste generated by the project, as well as the waste management infrastructure facilities within the project area that receive and dispose of residual waste materials.

4.2 Regional setting

The project is located in the suburbs of Quakers Hill, Marayong, Blacktown, Lalor Park and Seven Hills. In Quakers Hill and Marayong, the brine pipeline is located on public land along the northern side of Breakfast Creek between Quakers Hill WRRF and Marayong Park. Much of this section of the pipeline would follow a shared path.

The pipeline would be tunnelled between Marayong Park and Lynwood Park, passing under an industrial area between the Richmond railway line and Sunnyholt Road. The pipeline would be located in local road reserves through residential areas of Blacktown and Lalor Park between Lynwood Park and Blacktown Aquatic Centre. The pipeline would cut through the car park of the aquatic centre and then follow a shared path along the northern side of a tributary to Blacktown Creek through International Peace Park to where it would connect to the NSOOS in Seven Hills.

Built features of the area include the Westlink M7 Motorway along the northern boundary of Quakers Hill WRRF, the Richmond railway line, Sunnyholt Road, and the main Western railway line.

4.3 Land use

Existing land use within and near to the project area includes:

- Wastewater treatment works at Quakers Hill WRRF
- Public open space including sports and recreational facilities along Breakfast Creek, between Quakers Hill WRRF and Davis Road in Marayong. This includes Melrose Park immediately east of Quakers Hill WRRF, Harvey Park, and Marayong Park. All three parks include sports fields. The shared path that follows the creek forms part of the Great West Walk
- A co-located aged care facility, retirement living and early learning centre at Holy Family Services to the east of Falmouth Road in Marayong
- St Andrews College Junior Campus, next to Harvey Park in Marayong
- Public road reserves including local, regional and State roads
- Industrial land use between the Richmond Railway Line and Sunnyholt Road in Blacktown
- Public open space including a sports field at Lynwood Park in Blacktown and Lalor Park
- Public open space including a small playground at Billy Goat Hill Reserve in Blacktown
- Public open space along the northern side of the tributary to Blacktown Creek in Blacktown and Seven Hills, extending between Blacktown Aquatic Centre to the west and International Peace Park to the east, and including sports fields used for playing softball and netball courts
- Residential land use elsewhere, mostly comprising detached dwellings, but with some low- to medium-rise apartment buildings to the west of Boyd Road in Blacktown.

The project would not result in any changes to existing land use.

4.4 Sensitive environments and receivers

Sensitive environments within and near to the project area include:

- Breakfast Creek and the vegetation alongside the creek, in Quakers Hill and Marayong
- Blacktown Creek and the vegetation alongside the creek, at International Peace Park in Seven Hills
- The tributary that joins Blacktown Creek near where the brine pipeline would connect to the NSOOS in Seven Hills and the vegetation alongside this waterway. This tributary is adjacent to the shared path that connects International Peace Park to Blacktown Aquatic Centre
- Vegetation between Melrose Park and Falmouth Road in Quakers Hill.

Sensitive receivers within and near to the project area include:

- Residential receivers around Quakers Hil WRRF
- Residential receivers along the northern side of Breakfast Creek in Marayong, including residents of Holy Family Services
- Students at St Andrews College Junior Campus and children at Holy Family Services
- Users of the sports fields at Melrose Park, Harvey Park, Marayong Park, Lynwood Park and International Peace Park
- Users of the public open spaces along Breakfast Creek and the tributary to Blacktown Creek.

4.5 Soils and contamination

4.5.1 Quakers Hill WRRF

Previous soil investigations at Quakers Hill WRRF indicate fill material is present beneath some areas, consisting of gravelly sand and trace clays (WSP, 2024). Reported fill depths generally ranged from 1.3 m to 4.8 m below ground level with one location reporting fill depths of 16 m below ground level (GHD, 2010). Natural soils at the site consist of medium to high plasticity clays with trace fine sands and gravels at shallower depths (WSP, 2024). The full extent of filling across the site is unknown.

The Quakers Hill WRRF site has known soil contamination including hydrocarbons, heavy metals, polychlorinated biphenyls, per- and poly-fluoroalkyl substances (PFAS) and asbestos from past burial of fill, grit and screenings, sludge and building wastes.

There is potential for contamination of the concrete liner and earth fill used to construct the intermittently decanted aerated lagoon (IDALs) if wastewater has leaked from the IDALs. Whether wastewater leakage from the IDALs has occurred can only be confirmed when they are demolished.

Asbestos stockpile

A stockpile containing known asbestos is present north of the site carpark. The stockpile is about 10,000 m^3 and is the subject of an Asbestos Management Plan. The stockpile is also likely to contain select heavy metals and microbiological contaminants. The *Asbestos Containment Strategy Memo – Quakers Hill WRP* (Sydney Water, 2018) was developed following a contamination and asbestos delineation assessment of the site and it proposed that the asbestos impacted waste be stockpiled onsite in the interim with long-term placement of asbestos containing material impacted soils within the IDALs proposed.

Stockpile QHSP01

A soil stockpile is located in the north-eastern part of the Quakers Hill WRRF site, adjacent to the PRW Discovery Centre. This stockpile is referred to as 'QHSP01' and is about 36,000 m^3 with a height of more than 10 m above the surrounding ground level. The source of this stockpile is reported to be from different parts of the site, however specific locations and activities used to generate the stockpile are unknown.

Inspection of QHSP01 as part of the investigations for the project observed that it generally comprised gravelly clay and sandy clay with man-made materials such as concrete fragments, plastic, metal fragments and asphalt.

An investigation of the stockpile in 2023 involved the excavation of 22 test pits to a maximum depth of 3 m. Some anthropogenic materials were identified in selected test pits. All samples collected detected concentrations of contaminants at levels below the adopted site assessment criteria (SAC) (PRM, 2023).

Additional sampling and analysis of QHSP01 was carried out as part of the investigations for the project to determine whether contaminants are present below the depth of the 2023 assessment. A total of 19 test pits or trenches were excavated across QHSP01 using a 20-tonne excavator to get a representative profile from top to bottom. The samples collected were laboratory tested for a range of contaminants. The results were compared to human health and environmental SAC. The SAC were set at levels that provide confidence that contaminant concentrations below the SAC will not adversely affect human health or on-site terrestrial ecosystems.

The laboratory testing of the QHSP01 samples identified:

- Two samples exceeded the ecological site assessment criteria for perfluorooctanesulfonic acid (PFOS, a type of PFAS)
- Chrysolite asbestos as fibre cement material was identified in one sample, however it was present at a concentration below the commercial/industrial limit for asbestos containing materials
- All other contaminants analysed were below the adopted criteria.

4.5.2 Brine pipeline

Soil sampling was carried out at ten locations along the brine pipeline as part of the investigations carried out for the REF. The results of these investigations are detailed in the Soils and Contaminated Land Impact Assessment (Jacobs, 2025a).

In summary, the investigation found that soils along the brine pipeline comprise shallow fill materials (up to 3.6 m below ground level) underlain by alluvial and residual soils that extend 0.5 m to 4 m to bedrock.

The laboratory testing identified:

- Asbestos-containing material in fill soils sampled from the borehole drilled in Billy Goat Hill Reserve. The asbestos was detected within soils between 0.1 m to 2 m below ground level (fill depth at this borehole was 3.6 m below ground level). Asbestos-containing material was not detected in any other samples
- Heavy metals, pesticides, PFAS, phenols, and petroleum hydrocarbons were below the laboratory limit of reporting and/or below the SAC for all samples, except for one sample in Billy Goat Hill Reserve. This sample had zinc levels above the ecological SAC.

4.6 Groundwater

The Groundwater Impact Assessment Report (Jacobs, 2025b) for the project describes groundwater in the region as generally brackish to saline, with electrical conductivity values ranging from 1,800 microsiemens per centimetre (μS/cm) to over 29,000 μS/cm, rendering it unsuitable for environmental discharge without treatment.

Groundwater levels are typically 1.5 to 3.5 m below ground level, with shallow groundwater flow directions generally following surface topography.

Groundwater at Quakers Hill WRRF is known to contain elevated concentrations of nutrients (based on historical data), selected heavy metals and microbiological organisms. If the IDALs have leaked, they may have also contaminated groundwater.

Groundwater sampling was carried out at four wells drilled along the brine pipeline at Harvey Park, Marayong Park, Lynwood Park, and International Peace Park as part of the investigations carried out for the REF. The results of these investigations are detailed in the Soils and Contaminated Land Impact Assessment (Jacobs, 2025a). In summary, the investigation identified the following contamination:

- Concentrations of PFOS were detected above the ecological SAC in all four wells
- Copper was recorded above the ecological SAC were reported at Harvey Park
- Chromium was reported above the ecological SAC at Harvey Park, Marayong Park and International Peace Park. The chromium concentrations detected could be representative of background water quality
- Zinc was reported above the ecological SAC at International Peace Park.

Concentrations of all other contaminants analysed were below the LOR and/or the SAC.

A pH reading marginally below the adopted ecological SAC pH range of 6.5-8.5 was recorded at Marayong Park.

4.7 Transport networks

The project area is well serviced by State, regional and local roads that would facilitate the easy movement of waste collection vehicles between project sites and local waste management facilities (see section 4.8).

4.8 Waste management facilities

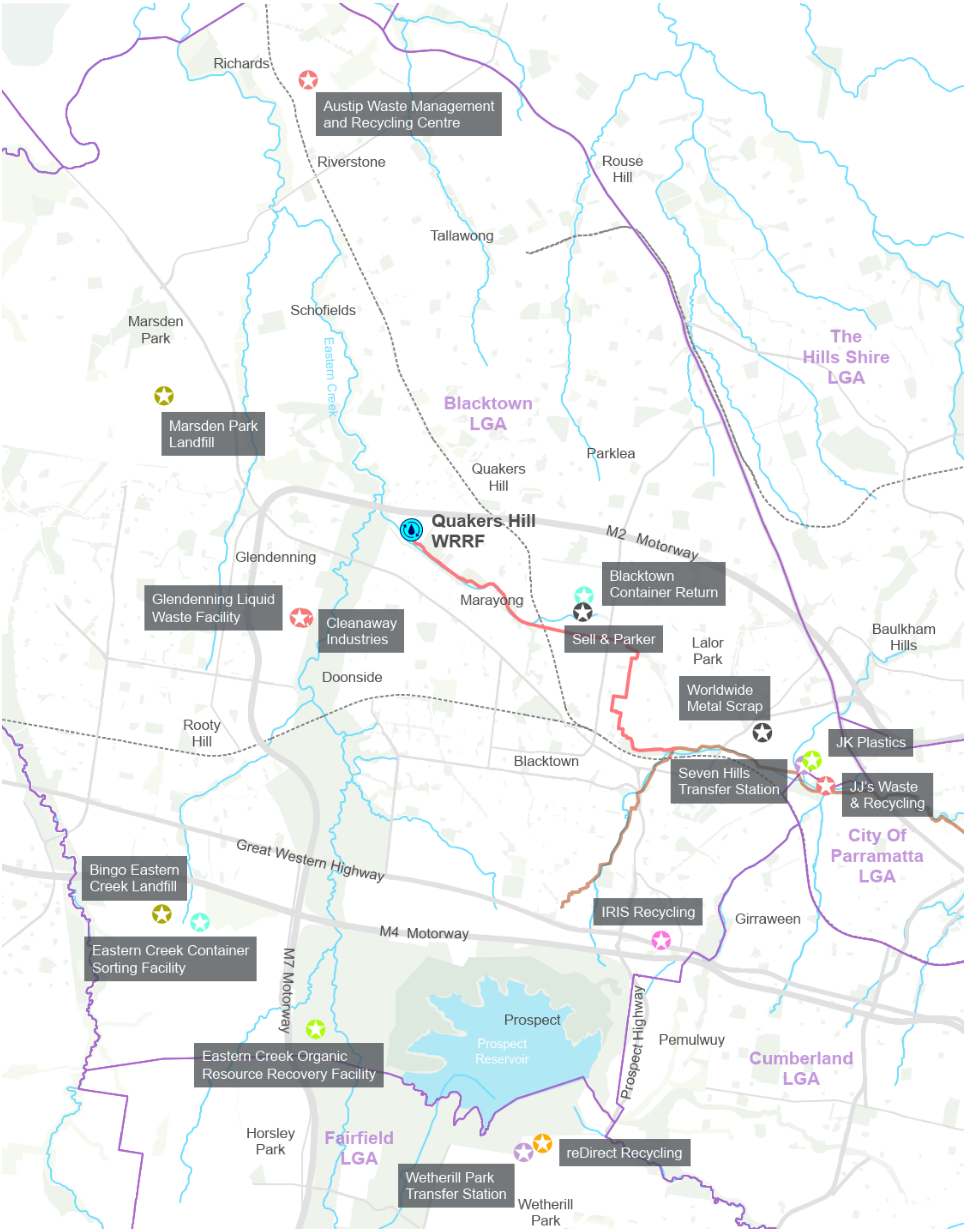
The project area is located close to the main waste management facilities servicing the Sydney metropolitan area. Waste management facilities licensed to handle each type of waste expected to be generated by the project and that are within 10 km of the project area are listed in **Table 4-1** and shown in Figure 4-1.

Table 4-1 Waste management facilities within 10 km of the project area

Waste management facility	Address	Operator	Facility type	Relevant wastes steams licenced to received
Marsden Park Landfill	25 Harris Avenue, Marsden Park	Blacktown Waste Services	Landfill	▪ Geneal solid waste (non-putrescible) ▪ Asbestos waste
Glendenning Liquid Waste Facility	14 Rayben Street, Glendenning	J.J. Richards & Sons	Waste management facility	▪ Waste mineral oils ▪ Waste oil/hydrocarbon mixtures/emulsions in waste

Waste management facility	Address	Operator	Facility type	Relevant wastes steams licenced to received
Cleanaway Industries	6-8 Rayben Street, Glendenning	Cleanaway Operations	Waste management facility	▪ Soils contaminated with a substance or waste referred to in Parts 1 or 2 of Schedule 1 of the Protection of the Environment Operations (Waste) Regulation 2014 ▪ Waste mineral oils ▪ Waste oil/hydrocarbon mixtures/emulsions in waste ▪ A large range of hazardous wastes
Sell & Parker	23-43 and 45 Tattersall Road, Kings Park	Sell & Parker	Metal recycling	▪ Metal
Blacktown Container Return	66 Tattersall Road, Kings Park	Sell & Parker	Waste management facility (Return and Earn scheme only, 150 mL to 3L containers)	▪ Glass, plastic, metal (containers)
Seven Hills Transfer Station	29 Powers Road, Seven Hills	Remondis Australia	Waste transfer station	▪ General solid waste (putrescible) ▪ General solid waste (non-putrescible)
JJ's Waste & Recycling	Units 23-24, 20 Tucks Road, Seven Hills	J.J. Richards & Sons	Waste management facility	▪ Hazardous waste ▪ Liquid waste ▪ Asbestos waste
JK Plastics	30-32 Powers Road, Seven Hills	JK Plastics	Plastic recycling	▪ Polyethylene pipe
Worldwide Metal Scrap	2/123 Station Road, Seven Hills	Worldwide Metal Scrap	Metal recycling	▪ Metal
Eastern Creek Organic Resource Recovery Facility	Wallgrove Road, Eastern Creek	Waste Assets Management Corporation	Composting	▪ Vegetation waste ▪ Untreated timber ▪ Sand
Eastern Creek Container Sorting Facility	Unit 2, 1A Raffles Glade, Eastern Creek	Cleanaway	Waste management facility (Return and Earn scheme only, 150ml to 3L containers)	▪ Paper and cardboard ▪ Glass, plastic, metal (containers)

Waste management facility	Address	Operator	Facility type	Relevant wastes steams licenced to received
Bingo Eastern Creek Landfill	1 Kangaroo Avenue, Eastern Creek	Dial-A-Dump	Landfill	▪ General solid waste (putrescible) ▪ Asbestos ▪ Tyres
IRIS Recycling	15 Rowood Road, Prospect	IRIS Recycling	e-waste recycling	▪ e-waste
Wetherill Park Transfer Station	20 Davis Road, Wetherill Park	Veolia Recycling & Recovery	Waste transfer station	▪ General solid waste (putrescible) ▪ Office and packaging waste ▪ VENM ▪ Waste mineral oils ▪ Lead acid batteries ▪ Asbestos waste ▪ Building and demolition
reDirect Recycling	24 Davis Road, Wetherill Park	reDirect Recycling	Recycling facility	▪ Drilling mud and/or muddy waters from drilling and potholing operations ▪ Concrete slurry ▪ Stormwater contaminated with gross pollutants ▪ Recovered aggregate ▪ ENM and VENM ▪ Metal
Austip Waste Management and Recycling Centre	48-52 Edward Street, Riverstone	Austip Recycling	Waste management facility	▪ Building and demolition waste ▪ ENM and VENM



Proposed Brine pipeline
NSOOS pipeline
Quakers Hil WRRF
LGA boundaries
Waste management facility
Waste transfer station
Waste management facility (Return and Earn scheme only)
Landfill
Composting
Metal recycling
Recycling facility
e-waste recycling

Figure 4-1 Waste management facilities within 10 km of the project area

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

Scale: 1:90,000 @ A4 GDA2020 MGA Zone 56

5. Waste generation and classification

5.1 Overview

This section discusses how waste is expected to be generated during the construction and operation of the project. The identified construction and operation waste streams are classified in accordance with the *Waste Classification Guidelines, 2014 - Part 1 Classifying Waste* (EPA, 2014a) and quantities estimated in Table 5-5 and Table 5-6 respectively.

5.2 Construction waste generation

5.2.1 AWTP and secondary treatment plant upgrade

The AWTP would be built where the intermittently decanted aeration lagoons (IDALs) are currently located. The IDALs would be demolished and the area then benched to create a surface at relative level (RL) 25.0 m for the AWTP, and about RL 27 m for the chemical storage and dosing area. This would require fill material because the design floor level of the IDALs is RL 20.95 m. It is proposed to reuse spoil from the two existing stockpiles at Quakers Hill WRRF. The following sections describe the waste that would be generated and reused by these works.

While the construction works at Quakers Hill WRRF would involve ground disturbance, the design of the project requires fill material to create a level area for construction of the AWTP. The works at Quakers Hill WRRF would therefore generate a negligible volume of spoil compared to the works for the brine pipeline.

5.2.1.1 Demolition of the IDALs

The IDALs consist of two 80 m x 117 m lined earthen wall ponds with aeration pipework and distributors fitted and supported from walkways above the ponds. The external walls are covered with a Fabriform concrete mattress for erosion protection. Internal surfaces have a polyethylene liner with 100 mm underlay covering the full footprint. The base of the ponds includes an underdrainage layer comprising a minimum 100 mm thick no-fines concrete layer with a series of cross drains, trench drains, and a main pipe underdrain.

Demolition of the IDALs would involve:

- Removal of structures within the IDALs
- Removal of the liner
- Removal of buried piping within the IDALs
- Removal of redundant buried piping within 20 m of the IDAL boundary.

Demolition of the IDALs would generate:

- Concrete waste, from the Fabriform concrete mattress and underdrainage layer
- Metal waste, from the aerial pipework and walkways
- Plastic waste, from the polyethylene liner
- Spoil, from the earthen walls.

Sydney Water has estimated that demolition of the IDALs would generate about 3,500 m^3 of concrete, 7.5 m^3 of steel, and 2 m^3 of copper.

There is potential that contamination of material underlying the polyethylene liner has occurred because the integrity of the liner is unknown. The presence and level of contamination can only be practically assessed after demolition. In the interim, a nominal 300 mm layer of material (100 mm liner + 200 mm underlying material) has been assumed as requiring removal from site due to contamination. The quantity of material is estimated to be in the order of 12,000 m^3. For preliminary planning purposes, it has been assumed that this material may be classified as hazardous waste and managed accordingly.

The spoil from the earthen walls is proposed to be distributed across the IDAL area to create a level surface. This assumes that the material in the earthen walls is suitable for use as a base material for the AWTP. Based on this assumption, levelling of the earthen walls would increase the level of the AWTP area to about RL 22.4 and avoid the need for off-site disposal of this spoil. As this spoil would not be transported from where it is currently located but would just being pushed into the IDAL area and levelled it is not identified as waste in Table 5-5.

5.2.1.2 Reuse of stockpile QHSP01

For the purposes of this waste management impact assessment, stockpile QHSP01 is recognised as existing waste and is accounted for in Table 5-4. The stockpile is proposed to be used to fill the IDALs. If material from QHSP01 were to be disposed offsite it is expected to be classified as general solid waste (non-putrescible) including special waste (asbestos).

5.2.1.3 Reuse of the asbestos stockpile

For the purposes of this waste management impact assessment, the asbestos stockpile is recognised as existing waste and is accounted for in Table 5-4. In accordance with the 2018 Asbestos Containment Strategy Memo, Sydney Water proposes to bury this material on-site as part of the filling of the IDALs. The asbestos-impacted stockpile would be classified as special waste (asbestos) if it were to be disposed off-site.

5.2.1.4 Excavations for the secondary treatment plant upgrade

Several excavations would be required for the proposed upgrade of the secondary treatment plant including:

- Fine screen feed pump pit: 11 m x 11 m x 5 m
- Bioreactor: 67 m x 39 m x 1 m
- Membrane bioreactor tank: 43 m x 27 m x 1 m.

These excavations are expected to result in about 3,900 m^3 of spoil.

As discussed in section 4.5.1,the Quakers Hill WRRF site has known contamination. It is therefore assumed that spoil from excavation at the secondary treatment upgrade work site would be classified as hazardous waste. The waste classification for this material would need to be confirmed with sampling and analysis.

5.2.1.5 Building material and other wastes

Construction of the AWTP and secondary treatment plant upgrade would generate a wide range of building material wastes. Key building material wastes for which quantities have been estimated in Table 5-5 include:

- Metal from rebar, steel tanks and structural steel
- Electrical infrastructure waste
- Wood from formwork.

Other construction activities at Quakers Hill WRRF that would generate waste include the use of construction vehicles, plant and equipment, which may generate used tyres, used batteries and waste oil. The construction workforce would also generate office, food and septic waste.

5.2.2 Brine pipeline

The brine pipeline would comprise a 500 mm nominal diameter polyethylene pipe approximately 7.6 km long. The brine pipeline would be constructed using a combination of open trench and trenchless construction methods. Wastes expected to be generated by each of these construction methods and the commissioning of the pipeline are discussed in the following sections.

5.2.2.1 Open trench construction

Open trench (trenching) construction of the brine pipeline would occur in public open spaces and roads (either in the road or road verge). The general sequence of open trench construction is:

- Excavation of an open trench to place the pipe
- Placement of the pipe bedding material
- Placement of the pipe on top of the bedding material
- Backfilling and compaction of the trench. Backfilling may use the materials excavated from the trench
- Reinstatement of the trench surface to the design finish.

Open trench construction may result in the following waste streams:

- **Green waste.** Green waste from vegetation clearing and trimming would be generated where trenching requires disturbance of vegetated areas. Weed free materials may be mulched for re-use on site in reestablishing groundcover for erosion protection or landscaping where possible
- **Surplus spoil.** This includes surplus rock and soil material which is leftover following excavation for the trench. Even where spoil is suitable for use in backfilling of the trench there would be surplus spoil because the installed pipelines and bedding material would occupy space in the ground where there was previously soil. There are unlikely to be many opportunities to reuse the surplus spoil generated at the trenching work sites. If opportunities for reuse of this surplus spoil cannot be identified it would need to be disposed at a suitably licensed waste facility
- **Asphalt, road base and concrete waste.** Trenching may produce these wastes where excavation takes place on roads and footpaths
- **Pipe material.** There may be pipe waste where sections of pipe are cut to required lengths. This may occur at tie-in points between pipe segments and pipe components
- **Rainwater and stormwater** may infiltrate into open trenches. This can be minimised by timing works to avoid wet weather; limiting the exposure time of open trenches; and providing temporary covers such as steel sheets to open trenches when exposed for longer periods. The water may be turbid from exposed sediments. Water collected in trenches may be treated and discharged to the environment, however, if there are excessive volumes of water that impede construction then dewatering of the trench and transfer of the water to a suitably licensed waste facility would be undertaken
- **Groundwater.** Trenching may dig through areas of shallow groundwater. In this instance the intercepted groundwater will infiltrate into the trench. The water may be turbid from exposed sediments in the trench. Groundwater may also be saline, acidic, contain contaminants or otherwise have water quality which may pose risks to surface waters. Groundwater collected in trenches may be treated and discharged to the environment, however, if there are excessive volumes of water that impede construction then dewatering of the trench and transfer of the water to a suitably licensed waste facility would be undertaken
- **Contaminated soils and groundwater.** Trenching may expose previously unknown areas of contaminants. This includes contaminated soils and groundwater. This is discussed in 5.2.3.

5.2.2.2 HDD construction

HDD construction is proposed between Marayong Park and Lynwood Park, to pass the brine pipeline beneath the Richmond railway line, Sunnyholt Road and the industrial area between them. The general process of HDD involves:

- Establishment of HDD launch and retrieval points
- Drilling a pilot bore from the launch point to the retrieval point
- Expanding the bore hole to the required diameter for pipeline installation
- Installation of the pipe by pulling and/or pushing the pipe through the bore hole.

A drilling fluid is used during drilling and pipe installation. The drilling fluid consists of water, inert clay (bentonite) and may include polymers. A slurry (drilling mud) is produced from the drilling fluid and material drilled from the bore.

HDD construction may result in the following waste streams:

- Spoil. The launch and retrieval points for the under bore would be excavated and backfilled at the completion of works
- Drilling mud produced from the HDD and pipe installation. These are slurries that contain a mixture of drilling fluid, soil and rock materials drilled from the bore hole. Drilling mud that has undergone dewatering and which has satisfied the testing requirements of The Treated Drilling Mud Order 2014 (EPA, 2014c) can be applied to land in accordance with The Treated Drilling Mud Exemption (EPA, 2014d). It is assumed that all drilling mud generated during the construction of the project would be treated and classified as general solid waste (non-putrescible)
- Contaminated slurry. HDD can intercept contaminated soils and groundwater. The contaminants are returned in the slurry. This is discussed in section 5.2.3.

5.2.2.3 Pipeline commissioning

Testing and commissioning of the brine pipeline would occur prior to it entering operation. Clean water would be used initially to flush and pressurise the pipeline and test valves and scour chambers. This water would collect sediment or other material left in the pipeline during its construction. The water would be treated before release into the environment or discharged to the NSOOS. Accordingly, no liquid waste is expected to be generated during commissioning of the pipeline.

5.2.2.4 Construction compounds

Up to 20 construction compounds are proposed along the brine pipeline and these would be key locations at which waste is generated and temporarily stored. The proposed types of construction compounds are described in Table 5-1.

Table 5-1 Types of construction compounds along the brine pipeline

Compound type	Key activities and descriptions	Duration
Main	Large compounds that would include: ▪ Temporary buildings such as offices rooms, amenities and first aid facilities ▪ Stockpiling and sorting of waste material before disposal or reuse ▪ Storage of site equipment, including bunded storage for any chemicals such as fuel.	Entire 24-month construction period

Compound type	Key activities and descriptions	Duration
HDD	Compounds at the HDD launch and retrieval pits to accommodate the drill rig, spoil management and pipe placement.	During tunnelling work
Laydown	Small, transient compounds located at trenching sites.	About 4 – 8 weeks

The proposed locations of each of the three types of construction compound and the sensitive environments and receivers near to each compound are provided in Table 5-2.

Table 5-2 Construction compound locations, sensitive environments and sensitive receivers along the brine pipeline

Construction compound	Location	Nearby sensitive environments	Nearby sensitive receivers
C1 – Main	Southern end of Melrose Park, along the northern side of Breakfast Creek	Breakfast Creek Vegetation between Melrose Park and Falmouth Road	Sport and recreational users of Melrose Park
C2 – Laydown	Grassed area immediately west of Falmouth Road, along the northern side of Breakfast Creek	Breakfast Creek Vegetation between Melrose Park and Falmouth Road	Recreational walkers
C3 – Laydown	Grassed area immediately east of Falmouth Road, along the northern side of Breakfast Creek	Breakfast Creek	Recreational users of the shared path
C4 – Laydown	Grassed area at the southern end of St Andrews College Junior Campus sports field, along the northern side of Breakfast Creek	Breakfast Creek	School students Recreational users of the shared path
C5 – Laydown	Grassed area at the western end of Harvey Park, along the northern side of Breakfast Creek	Breakfast Creek	Sport and recreational users of Harvey Park Recreational users of the shared path
C6 – Laydown	Grassed area along the southern and eastern sides of Harvey Park, north of the shared path and Breakfast Creek	Breakfast Creek	Sport and recreational users of Harvey Park Recreational users of the shared path Residents of Benalla Crescent
C7 – Laydown	Grassed area immediately south of Benalla Crescent, along the northern side of Breakfast Creek	Breakfast Creek	Residents of Benalla Crescent Recreational users of the shared path
C8 – Laydown	Grassed area immediately east of Breakfast Road, along the northern side of Breakfast Creek	Breakfast Creek Trees in this grassed area	Residents of Aqua Place Recreational users of the shared path

Construction compound	Location	Nearby sensitive environments	Nearby sensitive receivers
C9 – HDD (launch) and laydown	Graham Whitehouse Fields, at the southern end of Marayong Park immediately west of Davis Road, along the northern side of Breakfast Creek	Breakfast Creek	Sport and recreational users of Marayong Park including Graham Whitehouse Fields
C10 – HDD (retrieval)	Within Gate Road, in the industrial area of Blacktown	Nil	Nil
C11 – HDD (retrieval)	Within Gate Road, in the industrial area of Blacktown	Nil	Nil
C12 - Laydown	Grassed area between Allen Road and Turner Street, along the eastern side of Breakfast Creek	Breakfast Creek	Nearby residents on Allen Road and Turner Street
C13 – HDD (launch) and laydown	Car park and the grassed area between the car park and Breakfast Creek, at the western end of Lynwood Park	Breakfast Creek	Sport and recreational users of Lynwood Park Nearby residents on Allen Road and Wistaria Place
C14 – Laydown	Car park in the middle of Lynwood Park	Breakfast Creek	Sport and recreational users of Lynwood Park Nearby residents at the cul-de-sac end of Camellia Place
C15 – Laydown	Northern end of Cavanagh Reserve, along the southern side of Breakfast Creek	Breakfast Creek	Users of Lalor Park Kookas Junior Rugby League Football Club White House Nearby residents on Venn Street and Jopling Crescent
C16 – Laydown	Grassed area immediately east of Stephen Street within Lynwood Park	Tributary of Breakfast Creek	Sport and recreational users of Lynwood Park Nearby residents of Stephen Street, Boronia Street and Dunstable Road
C17 – Laydown	Billy Goat Hill Reserve	Nil	Recreational users of Billy Goat Hill Reserve Nearby residents of Cardiff Street and Gordon Street
C18 – Laydown	Grassed area between Winifred Crescent and Blacktown Aquatic Centre car park	Nil	Recreational users of Blacktown Aquatic Centre Nearby residents of Winifred Crescent

Construction compound	Location	Nearby sensitive environments	Nearby sensitive receivers
C19 – Main	Northern and eastern part of Blacktown Aquatic Centre car park	Tributaries of Blacktown Creek	Blacktown City Netball Association and recreational users of Blacktown Aquatic Centre and International Peace Park Nearby residents of Winifred Crescent and Dawn Drive
C20 – Main	Part of the sports field and nearby grassed areas at the western end of International Peace Park, on the northern side of Blacktown Creek	Blacktown Creek	Cumberland Nepean Softball Club and other sport and recreational users of International Peace Park Nearby residents on Jean Street

Most waste generated and temporarily stored at construction compounds would be associated with pipeline installation (refer to sections 5.2.2.1 and 5.2.2.2). Other construction activities at compounds that would generate waste include the use of construction vehicles, plant and equipment, which may generate used tyres, used batteries and waste oil. The construction workforce would also generate office, food and septic waste. Table 5-3 identifies the waste streams that may be generated and temporarily stored at each construction compound.

Table 5-3 Waste streams that may be generated and temporarily stored at each construction compound

Compounds	Potential waste streams
C1, C19, C20 – Main	▪ Special waste may include. - Tyres (if vehicles and plant require tyre replacement while on site) ▪ Liquid waste may include: - Water in temporary water treatment basins - Septic waste from on-site amenities - Waste oil if vehicles, plant and equipment are serviced at the compound ▪ Hazardous waste may include: - Used containers that previously held DG Class 1, 3, 4, 5 or 8 - Batteries ▪ General solid waste (putrescible) may include: - Food waste ▪ General solid waste (non-putrescible) may include: - ENM - Asphalt and roadbed materials - Metal waste - Piping (polyethylene) - Vegetation (green waste) if clearing is required as part of site establishment - Wood - Site office waste.

Compounds	Potential waste streams
C2, C4, C5, C6, C7, C8, C12, C14, C15, C16, C17 – Laydown	▪ Liquid waste may include: - Septic waste from on-site amenities such as portable toilets ▪ General solid waste (putrescible) may include: - Food waste ▪ General solid waste (non-putrescible) may include: - ENM - Asphalt and roadbed materials - Metal waste - Piping (polyethylene) - Vegetation (green waste) if clearing is required as part of site establishment.
C9, C13 – HDD (launch) and laydown	▪ Liquid waste: - Waste oil from maintenance of the drilling rig - Septic waste from on-site amenities such as portable toilets ▪ General solid waste (putrescible) may include: - Food waste ▪ General solid waste (non-putrescible) may include: - ENM from excavation of the launch pit - Treated drilling mud - Piping (polyethylene) - Vegetation (green waste) from clearing (if required as part of site establishment).
C10, C11 – HDD (retrieval)	▪ Liquid waste may include: - Septic waste from on-site amenities such as portable toilets ▪ General solid waste (putrescible) may include: - Food waste ▪ General solid waste (non-putrescible) may include: - ENM from excavation of the retrieval pits - Treated drilling mud - Asphalt and roadbed materials from excavation of the retrieval pits - Piping (polyethylene) - Vegetation (green waste) if clearing is required.

5.2.3 Contaminated soils and groundwater

Spoil extracted from Billy Goat Hill Reserve and surrounds that includes asbestos containing material would be classified as general solid waste (non-putrescible) including special waste (asbestos).

The Soils and Contaminated Land Impact Assessment Report (Jacobs, 2025a) notes that, with the exception of fill and soils at and surrounding Billy Goat Hill Reserve, the fill and soils along the brine pipeline would be suitable (from a contamination perspective) for reuse within the construction extents under an open space and/or commercial/industrial land use. This reuse would need to occur in accordance with the excavated natural material order 2014, a resource recovery order made under Part 9, clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014. The report notes that the history of the project area means that there is the potential for contamination to be present that was not identified during the site investigation described in section 4.5.2, particularly asbestos containing material associated with the cutting, filling, and levelling of the impact assessment area to support historical development. It recommends that disposal of surplus spoil from construction of the brine pipeline would need to be subject to further sampling and analysis in order to determine a final waste classification prior to offsite disposal.

About 1.1 km of the trenched section of the brine pipeline would involve excavating below the water table. The HDD launch and retrieval pits would also involve excavations below the water table. At Quakers Hill WRRF, foundation excavations for the fine screen feed pump wet well at the Quakers Hill WRRF have potential to intersect the water table. These works combined are estimated to require dewatering of about 0.21 megalitres of groundwater from excavations.

Based on the results of the groundwater investigation (refer to section 4.6), there is the potential for risks to ecosystems in receiving waterbodies if groundwater is encountered and not managed adequately during open trenching and excavation of tunnelling launch and retrieval pits.

If contaminated water and groundwater are encountered during ground disturbance works, they would require removal and treatment. Contaminated water and groundwater would be managed in accordance with EPA waste classification requirements for liquid waste (see sections 2.3.3 and 2.3.7).

5.3 Operational waste generation

5.3.1 AWTP and secondary treatment plant upgrade

Operation of the project would generate the following process wastes:

- Additional grit and screenings resulting from the project increasing the capacity of Quakers Hill WRRF to 48 ML/day:
  - Screenings comprise coarse solids and fibrous material from sewage, washed and dewatered to an average dryness over of 30% with an organic constituent content less than 5% by weight. There would be an additional 237 tonnes of screenings per annum when the WRRF operates at 48 ML/day compared to the existing capacity
  - Grit comprises heavy settleable solids from sewage, washed and dewatered to an average dryness of over 90% with a volatile solids constituent content less than 5% by weight. There would be an additional 116 tonnes of screenings per annum when the WRRF operates at 48 ML/day compared to the existing capacity
  - Screenings and grit from sewage treatment systems that have been dewatered so that the grit or screenings do not contain free liquids have bene pre-classified by the EPA as general solid waste (putrescible) (EPA, 2014a)
- The reverse osmosis technology incorporated into the AWTP would generate 7 ML/day of brine at average dry weather flow. Brine is a byproduct of the reverse osmosis treatment process and is a concentrated solution of salts and contaminants. An indicative concentration and composition of the brine at average dry weather flow is provided in section 3 of the REF. The brine would be transferred to the NSOOS and enter the North Head WRRF for treatment and discharge via the existing deep ocean outfall
- Some of the technologies used in the new treatment units use filters that would require periodic replacement of the filter elements. Assuming a filter element replacement interval of seven years, the following filter element waste would be generated:
  - The membrane bioreactor modules included in the secondary treatment plant upgrade would generate about 384 waste filters elements per annum
  - The ultrafiltration modules included in the AWTP would generate about 90 waste filter elements per annum
  - The reverse osmosis modules included in the AWTP would generate about 504 waste filter elements per annum
- Waste filter elements would also be generated from cartridge filters, such as clean-in-place cartridge filters. Assuming these filter elements have a replacement interval of two months, they would generate about 660 waste filter elements per annum.

The new infrastructure developed at Quakers Hill WRRF would be integrated into the site's existing operating systems. The operational workforce at Quakers Hill WRRF would increase by four personnel, which would lead to a minor incremental increase in operational wastes such as office waste, food waste and sewage.

5.3.2 Brine pipeline

Normal operation of the brine pipeline would not generate any waste. Maintenance of the brine pipeline may generate waste however maintenance activities are outside the scope of the REF. Sydney Water would seek separate environmental approvals if needed for maintenance activities and these approvals would address the potential waste management impacts of the proposed maintenance works.

5.4 Waste classification and quantities

5.4.1 Existing stockpile waste

The estimated volumes of the two existing stockpiles of waste at Quakers Hill WRRF and their classification in accordance with the *Waste Classification Guidelines – Part 1, Classifying waste* (EPA, 2014a) are provided in Table 5-4. These stockpiles of waste are available for reuse by the project.

Table 5-4 Classification and estimated quantities of wastes stored at Quakers Hill WRRF

Waste classification	Waste stream	Waste description	Estimated quantity
Special waste (asbestos)	Existing stockpile	Soil stockpile known to contain asbestos	10,000 m^3
General waste (non-putrescible) including special waste (asbestos)	Existing stockpile	Soil stockpile QHSP01	36,000 m^3

5.4.2 Construction waste

The estimated quantities of wastes that are expected to require management during the construction phase of the project and their classification in accordance with the *Waste Classification Guidelines – Part 1, Classifying waste* (EPA, 2014a) or the applicable resource recovery order are provided in Table 5-5. Calculations of construction waste quantity estimates are provided in Appendix A.

Table 5-5 Construction waste classification and estimated quantities

Waste classification or resource recovery order	Waste stream	Waste description	Location	Estimated quantity
Special waste	Tyres	Used construction vehicle and plant tyres	AWTP site Secondary treatment plant upgrade site C1, C19, C20 – Main	2.3 t
	Fill material contaminated with asbestos	Fill material excavated during trenching of the brine pipeline	Billy Goat Hill Reserve. Further investigations are needed to assess the presence and spatial distribution of asbestos within and around the reserve	A quantity can only be estimated once the spatial distribution of asbestos contamination is known
Liquid waste	Sediment-laden water and/or oily water	Water and groundwater encountered in: ▪ Open trenches ▪ Excavations ▪ Sediment basins	AWTP site Secondary treatment plant upgrade site Brine pipeline – Open trench areas All compound with temporary water quality treatment basins	260 kL

Waste classification or resource recovery order	Waste stream	Waste description	Location	Estimated quantity
	Septic waste	Sewage collected in ablution blocks at construction compounds	AWTP site Secondary treatment plant upgrade site All construction compounds	1,738 ML
Hazardous waste	IDAL demolition – liner, concrete drainage and soil	Potentially contaminated material underneath the IDALs including the liner, concrete drainage and soil. Sampling and analysis would be required during the demolition works to confirm the appropriate waste classification	IDALs site	12,000 m^3
	Excavated material at the site of the secondary treatment upgrade works	Secondary treatment plant upgrade excavation soil. A hazardous waste classification is assumed based on known contamination of the Quakers Hill WRRF site. Sampling and analysis would be required to confirm this classification	Secondary treatment plant upgrade site	3,900 m^3
	Electrical infrastructure waste	Waste generated during electrical fitout	AWTP site Secondary treatment plant upgrade site	195 kg
	Used batteries	Lead-acid batteries from construction vehicles and plant, rechargeable nickel-cadmium and lithium-ion batteries from portable handheld power tools	AWTP site Secondary treatment plant upgrade site Compounds C1, C19, C20 – Main	58 kg
	Used containers that previously held DG Class 1, 3, 4, 5 or 8	Waste containers mainly from the fit out of the AWTP and upgraded secondary treatment plant	AWTP site Secondary treatment plant upgrade site Compounds C1, C19, C20 – Main	97.5 m^3

Waste classification or resource recovery order	Waste stream	Waste description	Location	Estimated quantity
	Waste oil[1]	Waste oil mostly from construction vehicle, plant and equipment servicing	AWTP site Secondary treatment plant upgrade site Compounds C1, C19, C20 – Main	5,050 L
General waste (putrescible)	Food waste	Food waste generated in crib rooms	AWTP site Secondary treatment plant upgrade site All construction compounds	11,583 kg
General waste (non-putrescible)	Metal waste	Metal waste generated during demolition of the IDALs from aerial piping, walkways and buried pipes Metal waste generated during construction of the AWTP and secondary treatment plant upgrade including waste from rebar, steel tanks and structural steel	IDAL site AWTP site Secondary treatment plant upgrade site C1, C19, C20 – Main	575 t
	Piping (polyethylene)	Waste brine pipeline	C1, C19, C20 – Main	6.8 t
	Wood	Wood waste primarily from formwork	AWTP and secondary treatment plant upgrade work sites	38 t
	Site office waste	Waste generated in work site offices	AWTP site Secondary treatment plant upgrade site C1, C19, C20 – Main	5,792 kg
The excavated natural material order 2014	ENM	Surplus soil from trenching of the brine pipeline	Brine pipeline – open trench sections	1,800 m^3

[1] Waste oil from construction vehicle, plant and equipment servicing is assumed to comprise waste oil/water, hydrocarbons/water mixtures or emulsions (waste code J120).

Waste classification or resource recovery order	Waste stream	Waste description	Location	Estimated quantity
The treated drilling mud order 2014	Treated (dewatered) drilling mud	Dewatered drilling mud from the HDD works for the brine pipeline	HDD compound sites C9, C10, C11, C13	990 m^3
The excavated public road material order 2014	Asphalt and roadbed materials	Excavated road pavement where trenching of the brine pipeline occurs in road pavements, and at the receiving pits in Gate Road for the HDD sections of the pipeline	Brine pipeline – open trench sections, and C10 and C11	1,400 m^3
The mulch order 2016	Vegetation	Vegetation clearing and trimming for the brine pipeline	Brine pipeline – open trench areas	23,850 m^3

5.4.3 Operational waste

All of the project's operational waste would be generated at the AWTP and upgraded secondary treatment plant. The types and estimated annual quantities of wastes that are expected to require management during the operational phase of the project and their classification in accordance with the *Waste Classification Guidelines – Part 1, Classifying waste* (EPA, 2014a) is provided in Table 5-6. Calculations of operational waste quantity estimates are provided in Appendix A.

Table 5-6 Operational waste summary

Waste classification	Waste stream	Waste description	Estimated quantity per annum
Liquid waste	Brine	Brine is a byproduct of the reverse osmosis treatment process and is a concentrated solution of salts and contaminants	2,555 ML
	Waste treatment chemicals	Wastage of non-hazardous chemicals in the chemical dosing building, AWTP and upgraded secondary treatment plant	820 L
	Waste oils, greases and solvents	Used oil, oily water, and waste degreasers, solvents and general cleaning and washdown chemicals from the switchroom, brine pump station, clean water workshop and other locations in the AWTP and upgraded secondary treatment plant	200 L
	Sewage	Sewage generated by the additional staff employed at Quakers Hill WRRF as a result of the project	50 kL

Waste classification	Waste stream	Waste description	Estimated quantity per annum
Hazardous waste	Wastage of hazardous process chemicals	Wastage of hazardous chemicals in the chemical dosing building, bioreactor, membrane bioreactor, reverse osmosis and ultrafiltration units	5.5 kL
	Unwashed containers that previously contained DG Class 1, 3, 4, 5 or 8	Unwashed containers that previously held fuel, paint and non-process chemicals	5 m^3
General waste (putrescible)	Screenings	Additional process waste generated at the preliminary treatment works due to the increased capacity of Quakers Hill WRRF	237 t
	Grit	Additional process waste generated at the preliminary treatment works due to the increased capacity of Quakers Hill WRRF	116 t
	Food waste	Food waste generated by the additional staff employed at Quakers Hill WRRF as a result of the project	335 kg
General waste (non-putrescible)	Water treatment chemicals (non-hazardous)	Wastage of non-hazardous chemicals in the chemical dosing building and AWTP pH correction and stabilisation standpipe	600 kg
	Office waste	Office waste generated by the additional staff employed at Quakers Hill WRRF as a result of the project	165 kg

6. Impact assessment

6.1 Overview

The significance of any potential project impact on the environment from the generation and management of waste has been determined by considering the sensitivity of the environment and the magnitude of the impact.

The sensitivity of the environment has been evaluated using the following criteria:

- The condition of the environment relative to its original natural state
- The uniqueness or rarity of the condition or value of the environment and the ecological receptors that depend on the environment
- The sensitivity of dependant ecological receptors to changes
- Whether the estimated volume of waste generated by the project would exacerbate risks to the environment.

The magnitude of impacts has been evaluated using the following criteria:

- The expected duration of the impact e.g. temporary versus long-lasting/permanent
- The expected extent of the impact e.g. local versus regional/widespread
- The estimated degree of change from pre-development conditions.

For each potential impact, the sensitivity of the environment and magnitude of the impact have been assigned a high, moderate or low rating using the above criteria. The matrix in Table 6-1 has then been used to determine each impact's significance.

Table 6-1 Impact significance matrix

Magnitude of impact	Sensitivity of the environment		
	High	Moderate	Low
High	Major	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Negligible

6.2 Construction

The significance of the potential environmental impacts of waste generated during the construction phase of the project are presented in Table 6-2.

Table 6-2 Construction impact assessment outcomes and significance

Potential Impact	Description	Location	Sensitivity of the environment	Magnitude	Impact significance
Generation and management of special waste	**Reuse of the existing asbestos stockpile** Reuse of waste contaminated with asbestos containing materials can lead to: ▪ Risks to human health and safety from exposure to asbestos containing materials due to inappropriate management and handling ▪ Pollution of soil, groundwater and/or surface water due to inappropriate management of stockpiles, handling and transportation or allowing contaminated materials to enter waterways.	AWTP site	**High**	**Moderate**	**High** Without mitigation measures, reuse of the existing asbestos containing material could be poorly handled and disposed of, which would potentially have a *high* impact on the site environment.
	Spoil from trenching of the brine pipeline at and surrounding Billy Goat Hill Reserve Disturbance and handling of soils contaminated with asbestos containing materials can lead to: ▪ Risks to human health and safety from exposure to asbestos containing materials due to inappropriate management and handling ▪ Pollution of soil, groundwater and/or surface water due to inappropriate management of stockpiles, handling and transportation or allowing contaminated materials to enter waterways.	Brine pipeline at Billy Goat Hill Reserve and surrounds	**High**	**Moderate**	**High** Without mitigation measures, there could be poor handling and disposal of spoil generated during trenching of the brine pipeline at Billy Goat Hill Reserve and surrounds, which would potentially have a *high* impact on the environment at this location.
	Used tyres from construction vehicle and plant servicing Stockpiling of tyres can lead to: ▪ Potential pollution of soil, groundwater and/or surface water due to the leaching properties of tyre materials ▪ Fires due to tyres being highly flammable. When burned, tyres release toxic gases including volatile organic compounds, polycyclic aromatic hydrocarbons and heavy metals.	AWTP site Secondary treatment plant upgrade site C1, C19, C20 – Main	**Low**	**Low**	**Negligible** A small number of used tyres are likely to be generated, and these would be able to be easily segregated, appropriately stored, and transported to nearby suitably licenced waste facilities for recycling.
Generation and management of liquid waste	**Sediment-laden water and/or oily water** If sediment-laden water and/or oily water is released to the environment without treatment it can pollute nearby waterways and reduce the quality of aquatic habitats.	AWTP site Secondary treatment plant upgrade site Brine pipeline – Open trench sections All compound sites with temporary water quality treatment basins.	**Moderate**	**Moderate**	**Moderate** Much of the project site is located close to Breakfast Creek or Blacktown Creek and its tributaries. If sediment-laden and/or oily water enters these waterways from construction sites it could result in poor surface water quality and damage aquatic habitats.
	Septic waste Sewage from ablution facilities and greywater from crib rooms can lead to pollution of soil, groundwater and/or surface water if there is a loss of containment.	AWTP site Secondary treatment plant upgrade site All construction compounds	**Moderate**	**Moderate**	**Moderate** Ablution blocks would be located close to Breakfast Creek or Blacktown Creek and its tributaries. However, the risk to the environment can be readily managed by regular emptying of ablution tanks by suitably licensed waste transporters.
Generation and management of hazardous waste	**IDAL demolition – contaminated soil** Mismanagement of contaminated excavated soil can lead to: ▪ Risks to human health and safety from exposure to contaminated material ▪ Pollution of soil, groundwater and/or surface water.	IDALs site	**Moderate**	**Moderate**	**Moderate** If sampling and testing determines that there is contaminated material beneath the IDAL liner, the removal and off-site disposal of this material has the potential for *moderate* impacts on the surrounding environment if appropriate storage and handling measures are not implemented.

Potential Impact	Description	Location	Sensitivity of the environment	Magnitude	Impact significance
	Excavation at the secondary treatment plant upgrade work site – contaminated soil Mismanagement of contaminated excavated soil can lead to: ▪ Risks to human health and safety from exposure to contaminated material ▪ Pollution of soil, groundwater and/or surface water.	Secondary treatment plant upgrade work site	**Moderate**	**Moderate**	**Moderate** If sampling and testing determines that there is contaminated material at the secondary treatment plant upgrade work site, the removal and off-site disposal of this material has the potential for *moderate* impacts on the surrounding environment if appropriate storage and handling measures are not implemented.
	Electrical infrastructure waste and batteries Mismanagement of electrical infrastructure waste and battery waste can lead to: ▪ Risks to human health and safety through live or improperly decommissioned components that can cause shocks or electrocution, or toxic exposure to carcinogens and neurotoxins ▪ Fire and explosion of used batteries due to exposure to high temperatures, physical damage or overcharging ▪ Pollution of soil, groundwater and/or surface water, including leaching of heavy metals and acids.	AWTP site Secondary treatment plant upgrade site C1, C19, C20 – Main compounds	**Moderate**	**Low**	**Low** Without mitigation measures, electrical infrastructure waste and battery waste could be poorly handled and unnecessarily disposed to landfill. Electrical infrastructure waste and battery waste is likely to be of low volume and contained within a small area of the project site, hence the significance of potential impacts on the surrounding environment is *low*.
	Unwashed containers that previously held DG Class 1, 3, 4, 5 or 8 Mismanagement of DG Classes and their containers can lead to: ▪ Risks to human health and safety through blast injuries, burns, respiratory irritation, and chemical poisoning through exposure to hazardous chemicals ▪ Fire and explosion of DG Classes through exposure to friction or heat, or improper storage near ignition sources or incompatible substances ▪ Pollution of soil, groundwater and/or surface water, including leaching of heavy metals and acids.	AWTP C1, C19, C20 – Main compounds	**Moderate**	**Low**	**Moderate** Very minimal volumes of DG Class waste will be produced during the construction phase, the majority of which are generated within workshops or compound areas.
	Waste oil Mismanagement of waste oils can lead to: ▪ Risks to human health and safety through exposure to carcinogens (e.g., polycyclic aromatic hydrocarbons) and heavy metals, direct contact causing skin irritation and burns, and inhalation of fumes causing respiratory issues ▪ Pollution of soil, groundwater and/or surface water, including leaching of heavy metals and acids ▪ Fire through waste oil being flammable and exposure to heat.	AWTP site Secondary treatment plant upgrade site Compounds C1, C19, C20 – Main	**Moderate**	**Low**	**Low** Very minimal volumes of waste oil will be produced during the construction phase, the majority of which is generated within workshops or compound areas.
Generation and management of general waste (putrescible)	**Food waste** Food waste generated by the project could have an environmental impact through: ▪ Loss of opportunities for resource reuse and recycling if food waste is not segregated ▪ Consumption of landfill airspace and the resultant generation of methane and leachate at the landfill from disposal of food waste to landfill ▪ Litter and impacts to public amenity (vermin, visual and odour impacts).	AWTP site Secondary treatment plant upgrade site All construction compounds	**Low**	**Low**	**Negligible** Food waste would be contained within crib rooms or bins outside crib rooms, which means any impacts of this waste to the surrounding environment would be *negligible*. Waste management facilities for food waste are located near to the project site.

Potential Impact	Description	Location	Sensitivity of the environment	Magnitude	Impact significance
Generation and management of general waste (non-putrescible)	**Construction waste including metal waste and piping** Mismanagement of construction waste can lead to: ▪ Pollution of soil, groundwater and/or surface water due to leaching of metals from metal and piping waste ▪ Loss of opportunities for resource reuse and recycling if waste materials are not segregated or are disposed ▪ Increased transport movements and fuel use for cartage of waste to stockpiles (at construction compounds) or to disposal ▪ Waste of raw materials and resources due to poor handling of materials, overspecification, poor stock management etc. ▪ Consumption of landfill airspace and the resultant generation of methane and leachate at the landfill from disposal of waste to landfill.	Metal waste: ▪ IDAL demolition ▪ AWTP site ▪ Secondary treatment plant upgrade site Piping: ▪ Brine pipeline	**Moderate**	**Low**	**Low** Without mitigation measures, construction waste could not be beneficially reused elsewhere or could be poorly handled and disposed of. Construction waste can be reduced through ordering and handling practices, and the impact would be localised, hence a *low* impact on the site environment.
	Wood waste Mismanagement of wood waste could lead to: ▪ Fires, as accumulated wood waste can become highly flammable ▪ Pest and disease spread, as improper disposal can harbour invasive species, fungi or insect pests ▪ Human health and safety risks, as burning wood waste releases particulate matter, carbon monoxide, and volatile organic chlorides ▪ Increased transport movements and fuel use for cartage of waste (e.g. to stockpiles at construction compounds) if opportunities for resource reuse are not identified early ▪ Consumption of landfill airspace and the resultant generation of methane and leachate at the landfill from disposal of waste to landfill.	AWTP and secondary treatment plant upgrade sites	**Moderate**	**Low**	**Moderate** Wood waste generated by the project has the potential for *moderate* impacts to the surrounding environment because although the quantity of waste generated would be relatively small, some of the potential consequences, such as fires, would be serious. Wood waste is likely to be of low volumes, can be reduced through ordering and handling practices, and would mostly be generated in a small area at Quakers Hill WRRF making it easier to segregate and manage.
	Site office waste Mismanagement of site office waste can lead to: ▪ Lost opportunities for resource reuse and recycling if waste materials aren't correctly segregated ▪ Increased risk of disease if there is contamination with food waste, poor storage, and waste is allowed to accumulate, which can attract vermin and pathogens ▪ Unnecessary consumption of landfill space if reusable and recyclable materials are disposed to landfill.	AWTP site Secondary treatment plant upgrade site C1, C19, C20 – Main	**Low**	**Low**	**Negligible** Site office waste would be contained within site offices or bins outside site offices, which means any impacts of this waste to the surrounding environment would be *negligible*. Waste management facilities for site office wastes are located near to the project site.
Resource recovery orders	**Excavated natural material** Mismanagement of ENM could lead to: ▪ Loss of opportunities for resource reuse if there is insufficient planning for and sampling and testing of excavated soil, or if excavated soil is mixed with contaminated soil ▪ Pollution of waterways if appropriate erosion and sediment controls are not applied to stockpiled soil ▪ Dust when soil is being transported and stockpiled.	Brine pipeline – Open trench sections	**Moderate**	**Moderate**	**Moderate** Without appropriate management, there is a risk of ENM causing pollution of the surrounding environment including Breakfast Creek, Blacktown Creek and its tributaries, and nearby sensitive receivers, and for the potential for beneficial reuse of this resource to not be realised. Mismanagement of ENM has the potential for a *moderate* impact on the site environment given the distance along which ENM would be generated, the volume of ENM that would be moved, and the proximity of Breakfast Creek, Blacktown Creek and its tributaries, and sensitive receivers.

Potential Impact	Description	Location	Sensitivity of the environment	Magnitude	Impact significance
	Asphalt and roadbed materials Mismanagement of asphalt and roadbed material waste can lead to: ▪ Pollution of soil, groundwater and/or surface water due to asphalt containing polycyclic aromatic hydrocarbons and heavy metals ▪ Loss of opportunities for resource reuse and recycling if waste materials are not segregated or are disposed ▪ Increased transport movements and fuel use for cartage of waste to stockpiles (at construction compounds) or to disposal ▪ Waste of raw materials and resources due to poor handling of materials, overspecification, poor stock management etc. ▪ Consumption of landfill airspace and the resultant generation of methane and leachate at the landfill from disposal of waste to landfill.	Brine pipeline – Open trench sections	**Moderate**	**Low**	**Low** Without mitigation measures, road material waste could not be beneficially reused elsewhere or could be poorly handled and disposed of. The impact would be localised, hence a *low* impact on the site environment.
	Vegetation waste Mismanagement of vegetation waste could lead to: ▪ Fires, as accumulated dry vegetation waste can become highly flammable ▪ Pest and disease spread, as improper disposal can harbour invasive species, fungi or insect pests ▪ Human health and safety risks, as burning green waste releases particulate matter, carbon monoxide, and volatile organic chlorides ▪ Increased transport movements and fuel use for cartage of waste (e.g. to stockpiles at construction compounds) if opportunities for resource reuse are not identified early ▪ Consumption of landfill airspace and the resultant generation of methane and leachate at the landfill from disposal of vegetation waste to landfill.	Brine pipeline – Open trench sections	**Moderate**	**Low**	**Moderate** Vegetation waste generated by the project has the potential for *moderate* impacts to the surrounding environment because although the quantity of waste generated would be relatively small, some of the potential consequences, such as fires, would be serious. Vegetation waste would be generated over a large distance which would require early planning to maximise reuse opportunities, arrange disposal to suitably licensed waste facilities that can recycle green waste, and prevent off-site impacts.

6.3 Operation

The operational waste impact assessment is summarised in Table 6-3.

Table 6-3 Operational impact assessment outcomes and significance

Potential Impact	Description	Significance	Magnitude	Impact significance
Generation and management of liquid waste	The generation of brine, non-hazardous water treatment chemicals, waste oils, greases and solvents, and sewage during operation can lead to: ▪ Pollution of soil, groundwater and/or surface water if managed inappropriately ▪ Risks to human health and safety through exposure to chemicals, pathogens and diseases if managed inappropriately.	**Low**	**Low**	**Negligible** Brine would be contained within the brine pipeline and processed at the North Head WRRF in accordance with the conditions of its EPL. Waste chemicals and oils would be contained within the AWTP, upgraded secondary treatment plant and ancillary facilities at Quakers Hill WRRF and there would be *negligible* potential for impacts beyond the site.
Generation and management of hazardous waste	The generation of hazardous water treatment chemicals and unwashed containers that previously contained DG Classes 1, 3, 4, 5 or 8 can lead to: ▪ Pollution of soil, groundwater and/or surface water if managed inappropriately ▪ Risks to human health and safety through exposure to chemicals and fire risk if managed inappropriately.	**Moderate**	**Low**	**Low** Hazardous waste would be contained within the AWTP, upgraded secondary treatment plant and ancillary facilities at Quakers Hill WRRF and there would be negligible potential for impacts beyond the site. Due to the expected small volumes of hazardous waste, this waste stream would have a *low* potential for impact on the environment.

Potential Impact	Description	Significance	Magnitude	Impact significance
Generation and management of general waste (putrescible)	The generation of screenings, grit and food waste can lead to: ▪ Pollution of water through nutrient loading and pathogen spread ▪ Loss of opportunities for resource reuse and recycling if the waste material is disposed. ▪ Consumption of landfill airspace and the resultant generation of methane and leachate at the landfill from disposal of waste to landfill ▪ Litter and impacts to public amenity (vermin, visual and odour impacts).	**Low**	**Low**	**Negligible** Screening and grit process wastes are generated by the existing Quakers Hill WRRF and the additional volume of these wastes generated by the operation of the project would be managed in the same way. The additional four staff expected at Quakers Hill WRRF to operate the project would result in a small increase in the volume of food waste and this would be managed in the same way as food waste generated by the current site staff.
Generation and management of general waste (non-putrescible)	The generation of non-hazardous water treatment chemicals and office waste can lead to: ▪ Pollution of soil, groundwater and/or surface water due to leaching ▪ Increased risk in disease as accumulated waste can attract vermin and pathogens ▪ Loss of opportunities for resource reuse and recycling if the waste material is disposed ▪ Consumption of landfill airspace and the resultant generation of methane and leachate at the landfill from disposal of waste to landfill.	**Low**	**Low**	**Negligible** General waste (non-putrescible) generated by the project would be managed in the same way as that generated by the existing Quakers Hill WRRF. This waste would mostly be contained within buildings which means it has negligible potential for impacts on the surrounding environment. The additional four staff expected at Quakers Hill WRRF to operate the project would result in a small increase in the volume of office waste and this would be managed in the same way as office waste generated by the current site staff.

6.4 Cumulative impacts

A cumulative impact assessment considers the impact of a project together with the impacts of other relevant projects that may interact spatially and temporally to change the level of impact. Cumulative waste impacts may arise if peaks in the rate at which the project generates waste coincide with peaks in waste generation of nearby projects generating similar waste types, and local waste transporters and waste facilities lack the capacity to transport and receive waste at the rate it is being generated.

The following projects were identified as being potentially relevant to waste management based on their proximity to the project, the likelihood that their construction would overlap with the construction of the project, and the types of waste being similar to those generated by the project which could lead to cumulative effects:

- Honeman Close Data Centre
- August Street Warehouse and Distribution Centre
- Davis Road Data Centre (Cundall).

Further details of each of these proposed developments, including an assessment of their potential to result in cumulative waste impacts with the project are presented in Table 6-4. Only the construction phases have been considered because this is when most waste would be generated by the project and the proposed developments assessed.

Table 6-4 Relevant future projects with the potential for cumulative waste impacts during construction

Project	Details and cumulative impact assessment
Honeman Close Data Centre (SSD-58601963)	**Details:** This proposed development would involve the construction and operation of a five-storey data centre with ancillary office, supporting infrastructure and services, including back-up generators and diesel fuel storage, car parking, and landscaping, at 6 Honeman Close, Huntingwood. This location is about 3.6 km southwest of the nearest point along the brine pipeline. **Cumulative impact assessment:** A waste management plan (EnCycle, 2023) was prepared to inform the EIS for the development. The plan estimates that construction of the data centre would generate about 33,000 m^3 of waste, mostly comprising spoil (about 21,000 m^3) and concrete (about 9,000 m^3). There is low potential for cumulative impacts with the project because the project would generate small volumes of surplus spoil over a period of up to about 2 years, whereas earthworks for the Honeman Close data centre would occur over a period of about four month and would generate volume of spoil that are well within the processing capacity of local waste facilities.
Augusta Street Warehouse and Distribution Centre (SSD-36138263)	**Details:** This proposed development involves the construction and operation of a warehouse and distribution centre comprising of four warehouse buildings including one multi-level building, car parking, and intersection and access works. The proposed development is located at Augusta Street, Blacktown. This location is about 3.5 km southwest of the nearest point along the brine pipeline. **Cumulative impact assessment:** A waste management plan (JBS&G, 2023) was prepared to inform the EIS for the development. The plan estimates that construction of the warehouse and distribution centre would generate about 17,000 m^3 of waste, mostly comprising hard material, timber and plastics. There is low potential for cumulative impacts with the project because the project would generate different types of wastes to the main types of waste generated during construction of the August Street Warehouse and Distribution Centre.
Davis Road Data Centre (SSD-59416728)	**Details:** This proposed development involves the construction and operation of two data centre buildings, a tape storage building, a high voltage substation and associated infrastructure, at 3 Davis Road, Wetherill Park. This location is about 7.3 km south of the nearest point along the brine pipeline. **Cumulative impact assessment:** A waste management plan (SALT, 2023) was prepared to inform the EIS for the development. There is an existing distribution centre at the site, however its demolition is not within the scope of the EIS. The waste management plan identifies building waste as the key waste streams for the development, including soil, concrete and bricks There is low potential for cumulative impacts with the project because the project would generate different types of wastes to the main types of waste generated during construction of the Davis Road Data Centre.

7. Mitigation and management measures

Measures to implement the waste management hierarchy and mitigate and manage the potential waste impacts of the project are presented in Table 7-1.

Table 7-1 Waste management and mitigation and measures

No.	Impact	Mitigation and management measure	Timing
W01	Generation and management of all construction waste streams.	Develop and implement a waste management plan as part of the project's construction environmental management plan to appropriately manage and classify any materials including soils, construction/demolition wastes and associated stockpiles. The plan will include: ▪ Expected waste types and their location ▪ Opportunities to minimise the generation of spoil ▪ Targets for different waste streams with disposal being the least preferred approach, including diverting of spoil from landfill (e.g. through offsite reuse), recycling rates for construction and demolition waste and reuse of stormwater for construction activities (where practical to do so) ▪ Classification of all waste generated by the project in accordance with EPA waste classification guidelines ▪ Site-specific measures (in accordance with the compound locations) for waste segregation, storage, stockpile management, handling, collection and transport according to their waste classification, including for liquid wastes ▪ Instructions on clear signage to be provided at construction compounds to encourage correct recycling and reduce contamination ▪ Measures to ensure safe storage and transport of waste materials and avoid or minimise any risk of waste or contaminated materials creating dust or other impacts to the community or surrounding sensitive environments ▪ Regular monitoring and auditing to assess the performance of waste management activities against the determined targets including visual monitoring of materials during excavation and measures to be undertaken to prevent co-mingling / cross-contamination of waste / resource types ▪ Training and awareness for all construction personnel	Prior to and during construction

No.	Impact	Mitigation and management measure	Timing
		▪ A record keeping system on site so that waste tracking systems can be maintained. This should include the use of the EPA's online waste tracking system where required ▪ Delineation of waste /resource types including identification of likely vertical and lateral extents (where warranted) ▪ Ex-situ waste and resource recovery classification program, including timing relative to project / excavation phases as well as proposed hold points ▪ Roles and responsibilities in relation to waste stockpile and material management and a waste monitoring program ▪ Proposed onsite reuse locations and reuse methodology (if applicable) ▪ Proposed offsite reuse, offsite recycling and / or offsite disposal locations / facilities ▪ Legislative compliance requirements ▪ Consideration of future maintenance ▪ Restoration.	
W02	Generation and management of all construction waste streams.	Manage waste in accordance with relevant legislation and maintain records to show compliance e.g. waste register, transport and disposal records. Record and submit SWEMS0015.27 Contractor Waste Report.	During construction
W03	Generation and management of all construction and operational waste streams.	Provide adequate bins for general waste, hazardous waste and recyclable materials.	During construction
W04	Generation and management of all construction waste streams.	Minimise stockpile size and ensure delineation between different stockpiled materials.	During construction
W05	Generation and management of all construction and operational waste streams.	Minimise the generation of waste and sort waste streams to maximise reuse/recycling in accordance with the legislative requirements.	During construction and operation
W06	Generation and management of all construction and operational waste streams.	Prevent litter including by covering skip bins.	During construction and operation

No.	Impact	Mitigation and management measure	Timing
W07	Generation and management of special waste during construction. This includes from: ▪ The existing asbestos stockpile ▪ Existing stockpile QHSP01 ▪ Spoil from trenching of the brine pipeline at and surrounding Billy Goat Hill Reserve ▪ Used tyres from construction vehicles and plant servicing	Develop and implement a procedure for managing special waste in accordance with legislative and policy requirements. This should include as a minimum: ▪ Identify lawful offsite storage and disposal options for all special waste ▪ If fibro or other asbestos containing material is identified, restrict access and follow Sydney Water's Asbestos Management – Minor Works procedure, Document Number 746607 and SafeWork NSW requirements. Contact Sydney Water Project Manager (who will consult with Property Portfolio Environmental team propertyenvironmental@sydneywater.com.au). ensure appropriate containment methods are in place including, as a minimum, wrapping asbestos sheets and wetting down soil contaminated with asbestos containing material ▪ Ensure transportation of asbestos waste by appropriately qualified personnel.	During construction
W08	Generation and management of liquid waste. This includes from: ▪ Contaminated water and groundwater encountered during construction ▪ Contaminated water generated during construction ▪ Septic waste.	Liquid waste will be managed as follows: ▪ Seek approval and discharge criteria from the relevant Sydney Water Network Area Manager prior to discharge of water to the wastewater system. Otherwise, tanker by a licensed waste contractor and dispose off-site to an appropriately licensed waste facility ▪ Effluent and greywater from the ablutions at each construction compound will be stored in a securely sealed system and transported offsite for disposal by an appropriately licensed contractor ▪ Construction runoff will be stored in sediment basins at the Quakers Hill WRRF site or managed by sediment and erosion control measures detailed in the Surface Water Quality and Aquatic Ecology Impact Assessment (Jacobs, 2025c) ▪ Waste oil will be contained in fully sealed containers.	During construction
W09	Generation and management of drilling mud.	Prepare a drilling fluid management plan for trenchless (HDD) construction, including measures to: ▪ Contain and monitor drilling fluids at entry/exit points ▪ Identify and manage frac-outs ▪ Reuse and/or dispose of drilling fluids (checking waste classification) ▪ Dewater drilling mud and satisfy the testing requirements of The Treated Drilling Mud Order 2014 (EPA, 2014c).	During construction

No.	Impact	Mitigation and management measure	Timing
W10	Generation and management of water used to commission the brine pipeline.	Brine pipeline testing and commissioning is to ensure that the release and disposal of pipe commissioning water is undertaken in accordance with the POEO Act and that there are no uncontrolled releases to the environment which may cause scour or localised flooding.	During commissioning.
W11	Generation and management of hazardous waste. This includes from: ▪ IDAL contaminated soil ▪ Excavated material at the secondary treatment plant upgrade work site ▪ Electrical infrastructure including batteries ▪ Unwashed containers that previously held DG class 1, 3, 4, 5 or 8.	Store, test, manage and dispose of hazardous wastes in accordance with legislative and policy requirements, including disposal by a licensed contractor and at a lawful waste facility.	During construction
W12	Generation and management of general solid waste (putrescible). This includes food waste.	Investigate opportunities to divert food waste from landfill. This could include the provision of site waste facilities such as bins to separate food waste at source.	During construction and operation
W13	Generation and management of recoverable resources and general waste (non-putrescible). This includes from: ▪ ENM ▪ Construction waste including asphalt and roadbed materials, metal waste and piping ▪ Wood and vegetation waste ▪ Site office waste.	Manage waste and excess ENM spoil in accordance with the NSW EPA Resource Recovery Orders and Exemptions (if applicable) and / or Waste Classification Guidelines. Where materials are not suitable or cannot be reused onsite or offsite, recycle where appropriate. Recycle soils at a licensed soil recycling facility or dispose at an appropriately licenced landfill facility. Dispose excess vegetation (non-weed) that cannot be used for site stabilisation at an appropriate green waste disposal facility.	During construction

8. Waste management strategies

8.1 Overarching strategies

The principles of the circular economy and waste management hierarchy have been incorporated into the concept design of the project by locating the AWTP at the site of the decommissioned IDALs, which creates the following waste management opportunities:

- Reuse of the earthen batters of the IDALs as base fill material at the AWTP site, which avoids transporting this material
- Reuse of the existing asbestos stockpile as fill material at the AWTP site, in accordance with the *Asbestos Containment Strategy Memo* (Sydney Water, 2018)
- Reuse of existing stockpile QHSP01 as fill material at the AWTP site, which potentially makes the stockpile location available for other purposes if all the material can be used as fill.

8.2 Waste stream strategies

Waste management strategies have been developed for each of the project's expected waste streams. Waste management strategies for the project's construction and operational waste streams are presented in Table 8-1 and Table 8-2 respectively. The strategies provide guidance on how the circular economy and waste hierarchy can be implemented to avoid, reduce, reuse and recycle each waste stream where possible, or otherwise dispose of it offsite at a nearby suitably licensed waste facility. The strategies are intended to be used by the construction contractor and Sydney Water as a starting point for planning how each waste stream generated by the project will be managed.

Table 8-1 Construction waste management strategies

Waste classification	Waste streams	Strategies to avoid, reduce and reuse	Offsite locations for recycling or disposal within 10km of the project
Special waste	Used tyres from construction vehicle and plant servicing.	▪ Construction planning to reduce vehicle trips.	▪ Bingo Eastern Creek
	Spoil from trenching of the brine pipeline at and surrounding Billy Goat Hill Reserve	▪ Further field investigation in the vicinity of Billy Goat Hill Reserve to delineate the extent of asbestos contamination could inform the detailed design of the brine pipeline in this area ▪ Detailed design of the project should investigate opportunities to minimise ground disturbance in the vicinity of Billy Goat Hill Reserve.	▪ Bingo Eastern Creek
Liquid waste	Sediment-laden water and/or oily water from trenches, excavations and sediment basins.	▪ Avoid trenches being left open overnight ▪ Avoid opening new trenches when rain is forecast ▪ Erosion and sediment controls to divert stormwater runoff from entering trenches ▪ At Quakers Hill WRRF, direct runoff from construction work sites into sediment basins.	▪ reDirect Recycling Wetherill Park
	Waste oil from construction vehicle and plant servicing[2].	▪ Avoid construction vehicle and plant servicing on-site where feasible ▪ Use drip trays and bunds to contain leaks and spills ▪ Locate appropriate spill kits at vehicle servicing locations ▪ Manage hydrocarbon leaks and spills as environmental incidents with root causes identified so as actions can be identified and implemented to avoid repeat incidents.	▪ Glendenning Liquid Waste Facility ▪ Cleanaway Industries, Glendenning ▪ Wetherill Park Transfer Station
	Septic waste from construction compounds.	▪ Source portable offices and ablution blocks fitted with water efficient fittings ▪ Promote water efficient behaviours ▪ Promptly repair any leaking taps or fittings.	▪ Glendenning Liquid Waste Facility ▪ JJ's Waste & Recycling, Seven Hills

[2] Waste oil from construction vehicle, plant and equipment servicing is assumed to comprise waste oil/water, hydrocarbons/water mixtures or emulsions (waste code J120).

Waste classification	Waste streams	Strategies to avoid, reduce and reuse	Offsite locations for recycling or disposal within 10km of the project
Hazardous waste	Contaminated soils from beneath the IDALs.	▪ Testing of the soil proposed for excavation to confirm its waste classification ▪ Separate and clearly signposted stockpiling of hazardous waste to avoid contamination of clean spoil ▪ If suitable, reuse as fill material on-site as part of the construction works.	▪ Cleanaway Industries, Glendenning
	Contaminated soils from excavations for the secondary treatment plant upgrade.	▪ Testing of the soil proposed for excavation to confirm its waste classification ▪ Separate and clearly signposted stockpiling of hazardous waste to avoid contamination of clean spoil ▪ If suitable, reuse as fill material on-site as part of the construction works.	▪ Cleanaway Industries, Glendenning
	Electrical infrastructure waste from the AWTP.	▪ Have receptacles for electrical infrastructure waste where works that generate this waste stream are being carried out. Label these receptacles, conduct awareness training, and monitor compliance.	▪ IRIS Recycling, Prospect
	Used batteries from construction vehicle and plant servicing and construction equipment.	▪ Use rechargeable batteries where feasible ▪ Have receptacles for different types of battery waste where works that generate this waste stream are being carried out. Label these receptacles, conduct awareness training, and monitor compliance.	▪ Wetherill Park Transfer Station
	Unwashed containers that previously held DG Class 1, 3, 4, 5 or 8.	▪ Decant from large containers to reusable smaller containers to minimise used container waste ▪ Wash used containers where feasible ▪ Have receptacles for unwashed DG containers where works that generate this waste stream are being carried out. Ensure compliance with DG separation requirements where applicable. Label these receptacles, conduct awareness training, and monitor compliance.	▪ Cleanaway Industries, Glendenning

Waste classification	Waste streams	Strategies to avoid, reduce and reuse	Offsite locations for recycling or disposal within 10km of the project
General waste (putrescible)	Food waste from construction compounds.	▪ Provide receptacles for recyclable food packaging. Label these receptacles, conduct awareness training, and monitor compliance ▪ Segregate compostable and non-compostable food waste, if feasible.	▪ Eastern Creek Organic Resource Recovery Facility
General waste (non-putrescible)	Metal waste (including steel piping) from construction works at Quakers Hill WRRF and the brine pipeline.	▪ Segregate metal waste and sell it to a scrap metal recycling facility.	▪ reDirect Recycling, Wetherill Park ▪ Sell & Parker, Kings Park ▪ Worldwide Metal Scrap, Seven Hills
	Waste polyethylene pipe from construction of the brine pipeline.	▪ Segregate polyethylene pipe waste and dispose of it at a plastics recycling facility or return to supplier.	▪ JK Plastics
	Wood waste.	▪ Segregate waste wood and store it such that waste wood that is suitable for reuse can be readily accessed ▪ Dispose of waste wood at a wood recycling facility.	▪ Wood recycling facilities are available more than 10km from the project e.g. reDirect Wood Recycling, St Marys
	Site office waste from the main construction compounds.	▪ Provide receptacles to segregate recyclable office wastes. Label these receptacles, conduct awareness training, and monitor compliance ▪ Store segregated office wastes in receptacles that avoid litter, keep the waste dry, and do not attract vermin.	▪ Eastern Creek Container Sorting Facility ▪ Wetherill Park Transfer Station
Resource recovery orders	ENM from trenched sections of the brine pipeline.	▪ Where surplus spoil meets the requirements for ENM or VENM, investigate whether there are nearby opportunities for beneficial reuse of the material.	▪ reDirect Recycling, Wetherill Park
	Asphalt and roadbed materials from trenched sections of the brine pipeline in roadways.	▪ Segregate asphalt waste and dispose of it at a waste facility that recycles asphalt waste.	▪ reDirect Recycling, Wetherill Park
	Vegetation from clearing and trimming for the brine pipeline.	▪ Segregate vegetation waste and dispose of it at a waste facility that composts green waste.	▪ Eastern Creek Organic Resource Recovery Facility

Table 8-2 Operational waste management strategies

Waste classification	Waste streams	Strategies to avoid, reduce and reuse	Offsite locations for recycling or disposal
Liquid waste	Brine from reverse osmosis units within the AWTP.	N/A	N/A
	Water treatment chemicals from the chemical dosing building, reverse osmosis, membrane bioreactor and ultrafiltration units, and bioreactors.	▪ Bulk transport of process chemicals to avoid the waste associated with using chemicals in containers. ▪ Locate appropriate spill kits near stored chemicals to facilitate quick clean-up of leaks and spills. ▪ Manage chemical leaks and spills as environmental incidents with root causes identified so as actions can be identified and implemented to avoid repeat incidents.	▪ Cleanaway Industries, Glendenning ▪ JJ's Waste & Recycling, Seven Hills
	Waste oils, greases and solvents from the switch room, brine pump station and clean water workshop.	▪ Use drip trays and bunds to contain leaks and spills. ▪ Locate appropriate spill kits near stored hydrocarbons to facilitate quick clean-up of leaks and spills. ▪ Manage hydrocarbon leaks and spills as environmental incidents with root causes identified so as actions can be identified and implemented to avoid repeat incidents.	▪ Glendenning Liquid Waste Facility ▪ Cleanaway Industries, Glendenning ▪ Wetherill Park Transfer Station ▪ JJ's Waste & Recycling, Seven Hills
	Sewage from the Quakers Hill WRRF administration building.	▪ Install water efficient fittings. ▪ Promote water efficient behaviours. ▪ Promptly repair any leaking taps or fittings.	N/A (sewerage system connection)
Hazardous waste	Hazardous water treatment chemicals from the chemical dosing building, bioreactor and membrane bioreactor units, and reverse osmosis and ultrafiltration units.	▪ Bulk transport of process chemicals to avoid the waste associated with using chemicals in containers. ▪ Locate appropriate spill kits near stored chemicals to facilitate quick clean-up of leaks and spills. ▪ Manage chemical leaks and spills as environmental incidents with root causes identified so as actions can be identified and implemented to avoid repeat incidents	▪ Cleanaway Industries, Glendenning ▪ JJ's Waste & Recycling, Seven Hills

Waste classification	Waste streams	Strategies to avoid, reduce and reuse	Offsite locations for recycling or disposal
	Unwashed containers that previously contained DG Class 1, 3, 4, 5 or 8 from the AWTP, secondary treatment system, clean water workshop and the clean water laboratory.	▪ Decant from large containers to reusable smaller containers to minimise used container waste. ▪ Wash used containers where feasible. ▪ Have receptacles for unwashed DG containers where works that generate this waste stream are being carried out. Ensure compliance with DG separation requirements where applicable. Label these receptacles, conduct awareness training, and monitor compliance.	▪ Cleanaway Industries, Glendenning ▪ JJ's Waste & Recycling, Seven Hills
General waste (putrescible)	Food waste from the Quakers Hill WRRF administration building.	▪ Provide receptacles for recyclable food packaging. Label these receptacles, conduct awareness training, and monitor compliance. ▪ Segregate compostable food waste from non-compostable food waste, if feasible.	▪ Eastern Creek Organic Resource Recovery Facility
	Screenings and grit from process waste generated in the primary treatment works.	N/A	As per disposal of screenings and grit from the existing Quakers Hill WRRF
General waste (non-putrescible)	Site office waste from the Quakers Hill WRRF administration building.	▪ Segregate recyclable wastes such as cardboard, paper, and e-waste.	▪ Eastern Creek Container Sorting Facility ▪ Wetherill Park Transfer Station
	Non-hazardous water treatment chemicals from the chemical dosing building and the AWTP pH correction and stabilisation standpipe.	▪ Bulk transport of process chemicals to avoid the waste associated with using chemicals in containers ▪ Locate appropriate spill kits near stored chemicals to facilitate quick clean-up of leaks and spills. ▪ Manage chemical leaks and spills as environmental incidents with root causes identified so as actions can be identified and implemented to avoid repeat incidents	▪ Marsden Park Landfill ▪ Seven Hills Transfer Station

9. Monitoring requirements

9.1 Construction phase

Monitoring is important for ensuring that construction phase management and mitigation measures are effective, and waste-related impacts across the project do not exceed acceptable limits. Monitoring during the construction phase is proposed to:

- Comply with legislative requirements
- Assess consistency with the project's waste management plans
- Assess the adequacy of proposed mitigation measures and identify where mitigation measures need revision or additional measures
- Monitor potential environmental impacts that will enable positive action to be implemented in case of incidents or accidents related to waste activities.

Monitoring during the construction phase will include regular inspection and auditing against waste management plan requirements and mitigation measures. The inspection and auditing approach would be captured in the project's waste management plan.

9.2 Operation phase

Monitoring of waste management during the operational phase will occur in accordance with the existing site inspection and audit processes that Sydney Water has established under its environmental management system, which is certified to the international standard ISO 14001:2015.

10. Summary

10.1 Conclusion

This report provides a summary of the types and quantities of waste that can be expected to be generated during construction and operation of the project. The report assesses the impacts that these wastes could have on environmental values and proposes management and mitigation measures to avoid adverse impacts on the life, health and wellbeing of people and the diversity of ecological processes and associated ecosystems surrounding the project site.

Based on the findings of this assessment, the planned sustainable approach to the design, construction and operation of the project will minimise the overall amount of waste generated; followed by the appropriate management and storage of wastes that will prevent on-site and off-site pollution and enhance opportunities for reuse, recovery and diversion from landfill.

Waste that can be reused or recycled will be transported by a licensed transporter to a licensed disposal facility. The quantities of general waste requiring off-site disposal will not adversely impact the local transportation network and there are several facilities available that have the capacity to receive these residual waste materials.

10.2 Recommendations

In order to ensure appropriate management of waste, onsite waste monitoring and auditing procedures should be developed in accordance with the recommendations of this report as well as relevant legislation, license and permit conditions, construction procedures and industry best practice standards. These measures should be implemented during both the construction and operational phases of the project.

11. References

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Appendix A. Waste quantity calculations

Calculations of estimated construction and operational waste quantities generated by the project are provided in Table A-1and Table A-2 respectively. Construction waste quantity estimates are for the entire construction phase of the project, whilst operational waste quantity estimates are per annum. Some calculations are based on the number of construction staff on site each day and the basis for these calculations is provided in Table A-3. Note that estimated quantities of existing wastes stored at Quakers Hill WRRF (existing stockpiles) are not outlined in the below tables. An estimate has also not been made of the volume of fill material containing asbestos from trenching of the brine pipeline in and surrounding Billy Goat Hill Reserve as there is insufficient information currently available about the extent of the asbestos contamination.

Table A-1. Estimated construction waste quantities

Waste	Quantity	Waste source	Inputs and assumptions	Calculation
Special waste				
Tyres	2.3 t	Construction vehicle servicing	▪ Replacement of 40 * 50 kg heavy vehicle tyres ▪ Replacement of 20 * 15 kg light vehicle tyres	= (40 * 50 kg) + (20 *15 kg)
Liquid waste				
Sediment-laden water and/or oily water	260 kL	Trenches, excavations and sediment basins	▪ 10,000 L per 4 weeks	= 10,000 L * (104 weeks/4 weeks)
Septic waste	1,738 ML	Construction compounds	▪ 50 L wastewater per person per day	= 50 L/person/day * 34,750 person days (see Table A-3)
Hazardous waste				
IDAL demolition – contaminated waste	12,000 m^3	100 mm thick polyethylene liner 200 mm of soil underlying the liner	▪ Estimated volume	Estimate provided by the designers
Excavated material	3,900 m^3	Excavations for the secondary treatment system upgrade	▪ Estimate provided by the designers	N/A
Electrical infrastructure waste	195 kg	AWTP	▪ 10 kg per 4 weeks	= 10 kg * (78 weeks/4 weeks)
Used batteries	58 kg	Construction vehicle servicing	▪ 1 * 26 kg vehicle batteries ▪ 1 * 22 kg light vehicle batteries ▪ Additional 20% for other batteries	= ((1 * 26 kg) + (1 * 22 kg)) *1.2

Waste	Quantity	Waste source	Inputs and assumptions	Calculation
Used containers that previously held DG Class 1, 3, 4, 5 or 8	97.5 m^3	AWTP	▪ 5 m^3 bin every 4 weeks	= 5 m^3 * (78 weeks/4 weeks)
Waste oil	5,050 L	Construction vehicle servicing	▪ 86 * 50 L heavy vehicle oil changes ▪ 150 * 5 L light vehicle oil changes	= (86 * 50 L) + (150 * 5 L)
General waste (putrescible)				
Food waste	11,583 kg	Construction compounds	▪ 0.5 kg waste generated per person per day, 2/3 of this waste is food waste	= 0.5 kg/person/day * 2/3 * 34,750 person days (see Table A-3)
General waste (non-putrescible)				
Metal waste	575 t	IDAL demolition (aerial pipework and walkways and any buried metal pipes) AWTP and secondary treatment plant upgrade construction	▪ Demolition: 7.5m^3 of steel (assumed density 7,850 kg/m^3) and 2.0 m^3 of copper (density 8,960 kg/m^3) ▪ Construction: Assume use of 10,000 t of various metals (e.g., rebar, steel tanks, structural steel) and 5% wastage	= (7.5 m^3 * 7,850 kg/m^3) + (2.0 m^3 * 8,960 kg/m^3) + (10,000 t * 5%)
Piping (polyethylene)	6.8 t	Brine pipeline	▪ 7.6 km DN500 PE100 PN20 pipeline ▪ 2% wastage on site ▪ 890 kg per 20 m pipe section i.e. 44.5 kg/m	= 7,600 m * 2% * 44.5 kg/m
Wood	38 t	AWTP Secondary treatment plant upgrade	▪ Assume use of 250 t of plywood formwork ▪ 15% wastage	= 250 t * 15%
Site office waste	5,792 kg	Main construction compounds	▪ 0.5 kg waste generated per person per day, 1/3 of this waste is office waste	= 0.5 kg/person/day * 1/3 * 34,750 person days (see Table A-3)

Waste	Quantity	Waste source	Inputs and assumptions	Calculation
Resource recovery orders				
ENM – brine pipeline	1,800 m^3	Trenched sections of the brine pipeline	▪ 5.2 km DN500 pipeline ▪ Bedding material to 150 mm deep, 1 m wide ▪ All spoil is suitable for use as backfill ▪ No on-site reuse of surplus spoil	$= \pi * (0.500 m/2)^2 * 5{,}200 m + (0.15 m * 1 m * 5{,}200 m)$
Treated drilling mud	990 m^3	Trenchless (HDD) sections of the brine pipeline	▪ 2.6 km HDD bore with 550 mm diameter ▪ 60% bulking factor	$= \pi * (0.550 m/2)^2 * 2{,}600 m * 160\%$
Asphalt and roadbed materials	1,400 m^3	Trenched sections of the brine pipeline in roadways	▪ 2.3 km of trenching in road pavement ▪ 2 m wide trench at the surface ▪ 300 mm depth of asphalt and roadbed material	= 2,300 m * 2 m * 0.3 m
Vegetation	23,850 m^3	Vegetation clearing and trimming for the brine pipeline	▪ Removal of 13.25 hectares of vegetation based on the Biodiversity Development Assessment Report (Arcadis, 2025 ▪ 150 mm deep ▪ 20% bulking factor	$= 132{,}500 m^2 * 0.15 m * 1.2$

Table A-2. Estimated operational waste quantities per annum

Waste	Quantity	Waste source	Inputs and assumptions	Calculation
Liquid waste				
Brine	2,555 ML	Reverse osmosis units within the AWTP	▪ Annual estimate based on 7 ML/day of brine when operating at the design average dry weather flow rate of 48 ML/day	= 7 ML/day * 365 days
Water treatment chemicals	820 L	Chemical dosing building RO, MBR and UF units Bioreactors	▪ Average 0.3 kL/day citric acid used the clean-in-place systems for the RO, MBR and UF units ▪ Average 1.2 kL/day liquid sucrose used in the bioreactors ▪ 0.15% wastage	= (0.3 kl/day + 1.2 kL/day) * 365 days * 0.15%
Waste oils, greases and solvents[3]	200 L	Switchroom Brine pump station Clean water workshop	▪ Used oil from electrical transformers ▪ Degreasers, oily water, solvents, general cleaning and washdown chemicals	Estimate
Sewage	50 kL	Quakers Hill WRRF admin building	▪ 50 L wastewater per person per day ▪ 4 operational staff associated with the AWTP, assumed 5 days/week, 50 weeks/year	= 50 L/person/day * 4 people * 5 days/week *50 weeks/year
Hazardous waste				
Water treatment chemicals (hazardous)	5.5 kL	Chemical dosing building Bioreactor and membrane bioreactor units Reverse osmosis and ultrafiltration units	▪ Average 0.9 kL/day of ferric chloride used in the bioreactor and UF units and to dose the sludge transfer to St Marys WRRF ▪ Average 0.4 kL/day of sulphuric acid used in the RO unit ▪ Average 0.36 kL/day of sodium bisulphite used in the RO unit and to dose brine transfer to the NSOOS ▪ Average 0.25 kL/day of phosphoric acid as antiscalant in the RO unit ▪ Average 0.87 kL/day of ammonium hydroxide used in the MBR, RO and UF units ▪ Average 2.6 kL/day of sodium hydroxide used in the bioreactor, RO and UF units	= (0.9 kL/day + 0.4 kL/day + 0.36 kL/day + 0.25 kL/day + 0.87 kL/day + 2.6 kL/day + 4.6 kL/day + 0.1 kL/day) * 365 days * 0.15%

[3] Waste oil from construction vehicle, plant and equipment servicing is assumed to comprise waste oil/water, hydrocarbons/water mixtures or emulsions (waste code J120).

Waste	Quantity	Waste source	Inputs and assumptions	Calculation
			▪ Average 4.6 kL/day of sodium hypochlorite used in the membrane bioreactor, RO and UF units ▪ Average 0.1 kL/day of ACH used in the UF unit ▪ 0.15% wastage	
Unwashed containers that previously contained DG Class 1, 3, 4, 5 or 8	5 m^3	AWTP Secondary treatment system Clean water workshop Clean water laboratory	▪ Unwashed containers that previously held fuel, paint and non-process chemicals	Estimate
General waste (putrescible)				
Screenings	237 t	Process waste, generated in the preliminary treatment works	▪ Annual estimate based on the design average dry weather flow rate of 48 ML/day	Estimate provided by the process designers
Grit	116 t	Process waste, generated at the preliminary treatment works	▪ Annual estimate based on the design average dry weather flow rate of 48 ML/day	Estimate provided by the process designers
Food waste	335 kg	Quakers Hill WRRF admin building	▪ 0.5 kg waste generated per person per day, 2/3 of this waste is food waste ▪ 4 operational staff associated with the AWTP, assumed 5 days per week, 50 weeks per year	= 0.5 kg/ person/ day * 2/3 * 4 people * 5 days/week * 50 weeks/year
General waste (non-putrescible)				
Water treatment chemicals (non-hazardous)	600 kg	Chemical dosing building AWTP pH correction and stabilisation standpipe	▪ Average 1,096 kg/day lime in the AWTP pH correction and stabilisation standpipe ▪ 0.15% wastage	= 1,096 kg/day * 365 days * 0.15%
Office waste	165 kg	Quakers Hill WRRF admin building	▪ 0.5 kg waste generated per person per day, 1/3 of this waste is office waste ▪ 4 operational personnel associated with the AWTP, assumed 5 days/week, 50 weeks/year	= 0.5 kg/ person/ day * 1/3 * 4 people * 5 days/week * 50 weeks/year

Table A-3. Person days worked

Worksite	Average workforce[1]	Construction period	Workdays[2]	Person days worked[3]
Quakers Hill WRRF	50	(78 weeks)	386	19,300
Brine pipeline	30	(104 weeks)	515	15,450
			TOTAL	**34,750**

Notes

[1] The indicative workforce data provided in Table 3-14 of the REF has been used to estimate an average workforce across all stages of construction.

[2] Calculated based on 5.5 workdays per week, and work occurring for 90% of the construction period, to reflect days not worked due to wet weather, public holidays and shutdowns, and additional days worked when out of hours works are permitted.

[3] Person days worked is calculated by multiplying the average workforce by the workdays