Upper South Creek

Advanced Water Recycling Centre and Pipelines

CoA E92 Water Reuse Strategy

Document No: USCP-JHG-PLN-ENV-0001

Revision No: D

Revisions and Distribution

Recommend Documents to be Read in Conjunction

This strategy is to be read in conjunction with the Construction Environmental Management Plan (USCP-JHG-MPL-ENV-0008), Soils & Contamination CEMP Sub-plan (USCP-JHG-MPL-ENV-0003), Biodiversity CEMP Sub-plan (USCP-JHG-MPL-ENV-0004), Commissioning Management Plan (USCP-MPL-G-0026) and the Project Sustainability Management Plan (USCP-JHG-MPL-PMY-0009).

Distribution

There are no restrictions on the distribution or circulation of this Water Reuse Strategy within John Holland.

Revisions

Draft issues of this document shall be identified as Revision 01, 02, 03 etc. Upon initial issue (generally Contract Award) this shall be changed to a sequential lettering commencing at Revision A. Revision letters shall commence at Rev. A, B etc.

Date	Rev	Remarks	Section	Prepared By	Reviewed & Approved By
07.08.2023	01	Initial draft for internal review	All	MT / AH	RI
23.08.2023	02	Final for Approval.	All	MT / AH	RI
24.08.2023	A	Issued for Use.	All	MT/ AH	RI
04/10/2023	B	Updated following DPE review and comment	All	MT / AH	RI
28/11/2025	C	Updated to review construction inputs and incorporate operational elements where required	All	MT/AH	JJ
06/02/2026	D	Updated following Sydney Water and ER review	All	MT/AH	JJ

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Glossary & Abbreviations

Table 1 Glossary and abbreviations

Abbreviations	Meaning
Amendment Report	Upper South Creek Advanced Water Recycling Centre Amendment Report (March 2022)
Amendment RtS	Upper South Creek Advanced Water Recycling Centre Submissions Report – project amendments (April 2022)
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
ARI	Average recurrence interval
ASS	Acid Sulfate Soil
Assessments related to*	Hydrodynamics and water quality impacts Hydrodynamics relates to the motion of water within the creeks and rivers, including how flows, velocities and water depths may be affected by structures, boundaries or changes in surrounding catchments (relevant project phase is Operation).
	Surface water impacts Assesses construction and operational impacts related to local runoff and stormwater management at the AWRC site and along the pipeline routes (relevant project phases are Construction and Operation).
	Groundwater impacts Assesses construction and operational impacts to local and regional groundwater sources from proposed activities at the AWRC site as well as along the pipeline routes (relevant project phases are Construction and Operation).
	Ecohydrology and geomorphology impacts Ecohydrology links flow patterns in a waterway to aquatic flora and fauna responses. Geomorphology is the study of landforms and analysis of how processes (such as running water) can shape and change landforms. Assesses how AWRC releases will impact the ecohydrology and geomorphology of the Hawkesbury Nepean River and South Creek. Also assesses impacts to the geomorphic attributes of waterways from the construction of pipelines and release structures (relevant project phases are Construction and Operation).
AWRC	Advanced Water Recycling Centre
BoM	Bureau of Meteorology
CAA	Commonwealth Controlled Activity Approval
CEMP	Construction Environmental Management Plan
CoA	Minister's Conditions of Approval
CSSI	Critical State Significant Infrastructure
D&C	Design and construct
DPHI	NSW Department of Planning, Housing and Industry
DPI	Department of Primary Industries
DTW	Depth to Water (groundwater)
EA	Environmental Assessment
EIS	Upper South Creek Advanced Water Recycling Centre Environmental Impact Statement (September 2021)
EIS RtS	Upper South Creek Advanced Water Recycling Centre Submissions Report (March 2022)
EM	Environment Manager
EMS	Environmental Management System
Environmental aspect	Defined by AS/NZS ISO 14001:2015 as an element of an organisation's activities, products or services that can interact with the environment.
Environmental impact	Defined by AS/NZS ISO 14001:2015 as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.

Abbreviations	Meaning
Environmental incident	An unexpected event that has, or has the potential to, cause harm to the environment and requires some action to minimise the impact or restore the environment.
Environmental objective	Defined by AS/NZS ISO 14001:2015 as an overall environmental goal, consistent with the environmental policy, that an organisation sets itself to achieve.
Environmental policy	Statement by an organisation of its intention and principles for environmental performance.
Environmental target	Defined by AS/NZS ISO 14001:2015 as a detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
GMR	Global Mandatory Requirements (John Holland)
HDD	Horizontal Directional Drilling
HEPA	Heads of EPAs Australia and New Zealand
Hold point	Verification point that prevents work from commencing prior to approval from Client / Verifier
HSLs	Health Screening Levels
JH	John Holland (the Principal Contractor)
L/s	Litres Per Second
LGA	Local Government Area
MBGL	Metres Below Ground Level
Non-compliance	Failure to comply with the requirements of the Project approval or any applicable licence, permit or legal requirements.
Non-conformance	Failure to conform to the requirements of Project system documentation including this CEMP or supporting documentation.
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
Project, the	Upper South Creek Advanced Water Recycling Centre and Pipelines Project
SMART	Specific, Measurable, Achievable, Realistic and Timely
SWC	Sydney Water Corporation (the client and Proponent)
SWL	Standing Water Level (elevation of groundwater table)
TW	Treated water
UMM	Updated Management Measures
USC	Upper South Creek
WQO	Water Quality Objectives
WRS	Water Reuse Strategy
WSP	Water Sharing Plan
WSUD	Water Sensitive Urban Design

1 Introduction

1.1 Context

This Water Reuse Strategy (WRS) has been prepared to address the requirements of the Minister's Conditions of Approval (MCoA) for the Upper South Creek Advanced Water Recycling Centre (AWRC) and associated Pipelines during the construction and operational phases.

Earlier revisions of this WRS addressed the construction phase water reuse for the project only. This strategy has been revised to incorporate operational phase water reuse elements and refine or update construction elements of the strategy, where required.

The WRS for Upper South Creek Advanced Water Recycling Centre (AWRC) and Pipelines Project (refer to herein as the Project).

This WRS has been prepared with consideration of the following:

- Minister's Conditions of Approval (CoA),
- *Upper South Creek Advanced Water Recycling Centre Environmental Impact Statement* (EIS) (September 2021),
- *Upper South Creek Advanced Water Recycling Centre Submission Report* (March 2022),
- *Upper South Creek Advanced Water Recycling Centre Amendment Report* (March 2022),
- *Upper South Creek Advanced Water Recycling Centre Submissions Report – Project Amendments* (April 2022),
- Response to DPE RFI 1, regarding responses to advice received on the Response to Submissions Report (dated 01 June 2022, 01 July 2022 and 11 July 2022),
- Response to DPE RFI 2, regarding additional information on Flood Impact Assessment (dated 11 July 2022),
- Modification of Infrastructure Approval CSSI 8609189, 26 May 2023 (herein referred to as Mod-1),
- Modification of Infrastructure Approval CSSI 8609189, 09 October 2023 (herein referred to as Mod-2),
- Modification of Infrastructure Approval CSSI 8609189, 20 June 2025 (herein referred to as Mod-3),
- Infrastructure Sustainability Council technical manual version 2.1 (ISC V2.1),
- Environmental Protection License 21800 issued by the NSW Environment Protection Authority (EPA) under the *Protection of the Environment Operations Act* 1997,
- Upper South Creek Commonwealth approval (EPBC 2020/8816), and
- All applicable legislation.

The USC project will be built in stages, consisting of:

Stage 1

- building and operating the AWRC to treat a daily wastewater flow, known as the average dry weather flow (ADWF), of up to 35 megalitres per day (ML/day); and
- building the treated water and brine pipelines to cater for up to 70 ML/day flow coming through the AWRC (but only operating them to transport and release volumes produced by Stage 1).

Future Stages

It is expected that the AWRC will ultimately require expansion to treat wastewater flows up to 70 ML/day. Sydney Water will remain flexible on the size and timing of these future upgrades to accommodate changes in population projections over time. Future stages will be subject to further environmental assessment.

Further detail on project staging is provided in the EIS and the Staging Report developed in accordance with CoA A11. This WRS applies to Stage1 detailed design, construction and commissioning and operation. John Holland has been appointed by Sydney Water to deliver the USC project works, including detailed design and construction for treating an operational daily wastewater flow of up to 35ML/day. Greater flow capacities (including up to 35ML/day and 70ML/day), as explored in the EIS, are not covered in this WRS.

1.2 Project Description and Background

The Upper South Creek Advanced Water Recycling Centre and Pipelines project (the project) has been proposed to support the population growth and economic development of the Western Sydney Aerotropolis Growth Area (WSAGA or Aerotropolis), South West Growth Area (SWGA) and the new Western Sydney International Airport. The project will provide wastewater services to Western Sydney to produce high-quality treated water for non-drinking reuse and for release to local waterways.

The project will comprise the following components:

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

An overview of the project site and associated pipelines is presented in Figure 1 to Figure 3.

1.2.1 AWRC Site

The AWRC site is approximately 78 ha and is shown in Figure 3. The AWRC site is split into two areas. The operational area is approximately 40 ha and will contain the wastewater and advanced treatment infrastructure and a range of ancillary infrastructure including inlet works, tanks and process chambers, advanced treatment buildings, interconnecting pipelines, digesters, pumping stations, odour treatment units, and biosolids treatment units.

The operational area also includes a range of supporting infrastructure such as roads, carparking, an administration building, security fencing and visual screening. Other features ancillary to the main treatment process includes chemical handling facilities and photovoltaic cells for solar energy production.

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

John Holland will be delivering some of the landscaping proposed to be undertaken in the green space, however, the remainder of it will be completed as part of future stages of the USC project and is not included in the scope of this WRS.

1.2.2 Pipelines

The project includes pipelines to take treated water and the brine waste stream away from the AWRC and release or dispose of them responsibly.

Pipelines include the treated water pipeline to the Nepean River at Wallacia Weir and the brine pipeline from the AWRC to the existing Sydney Water wastewater network at Lansdowne. All pipelines will be built to their full capacity (that is, for a 70 ML/day AWRC capacity) in Stage 1. The treated water pipeline is approximately 16.7 km long and up to 1.2 m in diameter. The treated water pipeline will transfer treated water from the transfer pumping station at the AWRC, to the release point at Nepean River, upstream of Wallacia Weir from where it will then serve as an environmental flow. The brine pipeline is about 24 km in length and about 0.6 m in diameter. The advanced treatment process at the AWRC will produce a brine waste product, which will be transferred from the AWRC to the existing Malabar wastewater system at Lansdowne.

1.3 Purpose

This WRS addresses the water use requirements and reuse options for the construction and operational phases of Stage 1 of the project. Water reuse is limited to stormwater and groundwater that falls and/or is collected within the project boundaries.

This WRS addresses and details the following issues:

- Water use requirements for surface works,
- Water use requirements for specific construction activities of high materiality,
- Stormwater management and discharge during surface works construction activities,
- Stormwater harvesting and management; and
- Treatment and reuse of saline groundwater (contaminated water).

This WRS does not consider the treatment and reuse of sewage.

1.4 Strategy development and submission

This WRS has been prepared in accordance with the relevant conditions of approval and EIS management measures, as detailed in Section 3.3 and Section 3.4, respectively.

This WRS was prepared and submitted to the Planning Secretary on the 04 October 2023 to address the construction-phase requirements only and was approved on the 10 October 2023. This revision of the WRS will be prepared and re-submitted to ensure construction-phase requirements raised in revision B (04 October 2023) are sufficiently closed out, as well as address the operational-phase requirements required by the condition.

This WRS has been prepared in accordance with the relevant Infrastructure Sustainability Council (ISC) requirements as detailed in Section 3.5 of this strategy. This WRS has been prepared by suitably qualified professionals in sustainability and environment, Mark Trethewy (Sustainability Manager, John Holland) and Alyce Harrington (Environment and Approvals Manager, John Holland).

1.5 Operational-phase reuse opportunities

Following finalisation of the detailed design, it has been confirmed that there are no options for reuse of collected stormwater and groundwater during operation of the project.

There was limited opportunity to capture and reuse stormwater on the AWRC site as it was required to be released into South Creek to maintain the natural hydrology of the waterway, and to comply with the operational stormwater quantity targets outlined in the *Technical guidance for achieving Wianamatta-South Creek Stormwater Management Guideline* (NSW DPE, September 2022).

The following aspects of the stormwater system restrict the quantity of water available for reuse on the AWRC site:

- First flush tank was designed to capture 7 mm (the first 7mm of runoff from all hardstand and road surfaces)
- Stormwater is required to maintain the bioretention system

The following water reuse opportunities were considered but were excluded due to the stormwater quantity requirements:

- Roof water captured to be used for flushing toilets
- On-site irrigation

A duplicate drainage and storage system was considered, however was dismissed due to significant additional costs and complexities to accommodate the additional services into the site.

As such, for the remainder of this WRS, the document will continue to focus solely on the construction-phase of the project.

1.6 Relationship to other plans

This WRS details opportunities, measures and project commitments and requirements to harvest, reuse and recycle where feasible and reasonable available water sources during the construction phase of the project. Whilst this WRS is not directly linked to the Construction Environmental Management Plan (CEMP), references to information contained within key CEMP sub-plans have been incorporated throughout this document to ensure a comprehensive and considered approach to the development of the WRS, including:

- Soils and Contamination CEMP Sub-plan (SCCSP) – details controls and management measures related to the potential impact of the project on soils and contamination.

- Surface Water & Groundwater CEMP Sub-plan (SWGCSP) - includes detailed erosion and sediment controls and management measures required to be implemented during the construction of the project. Specific soil management not related to erosion prevention is detailed in the SCCSP.
- Biodiversity CEMP Sub-plan (BCSP) – details controls and management measures related to the potential impact of the project on biodiversity, including provision of controls around waterways.

This WRS should also be read in conjunction with the Sustainability Management Plan for specific water reduction and reuse targets.

Figure 1 Overview of the project site (AWRC) and treated water pipeline (pink)

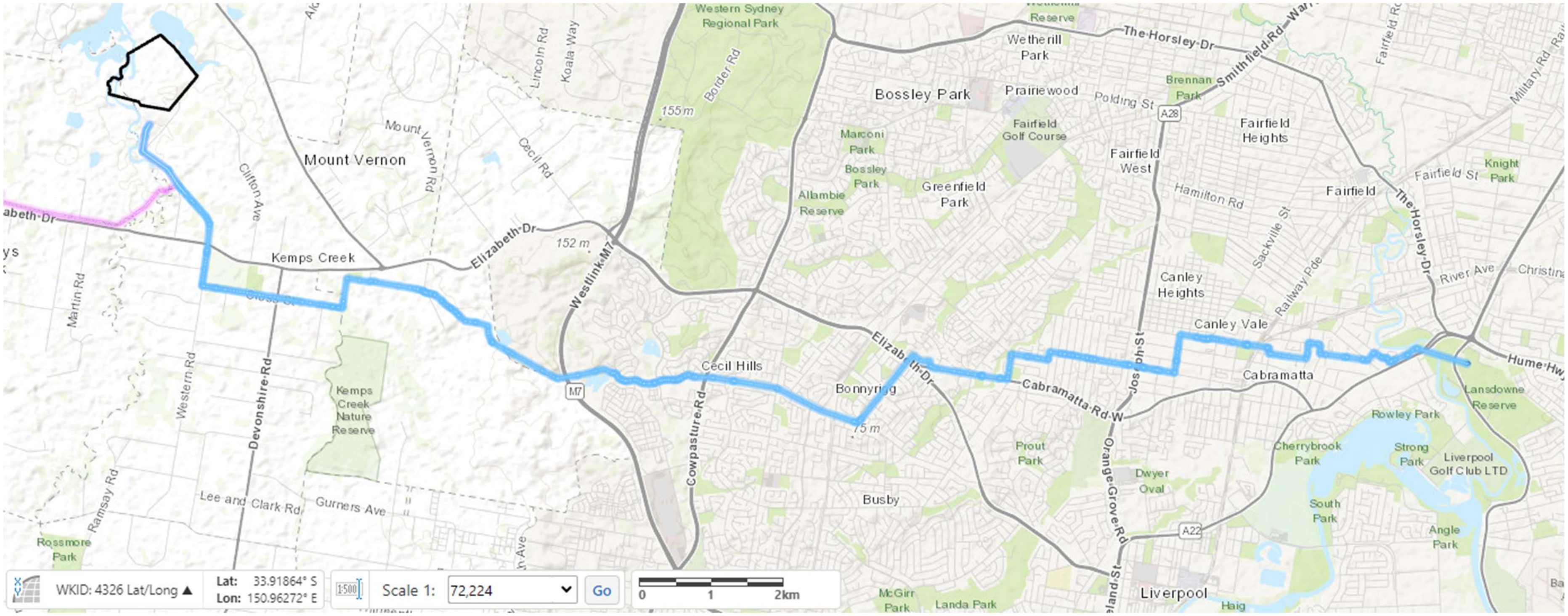


Figure 2 Overview of the project site (AWRC) and brine pipeline (blue)

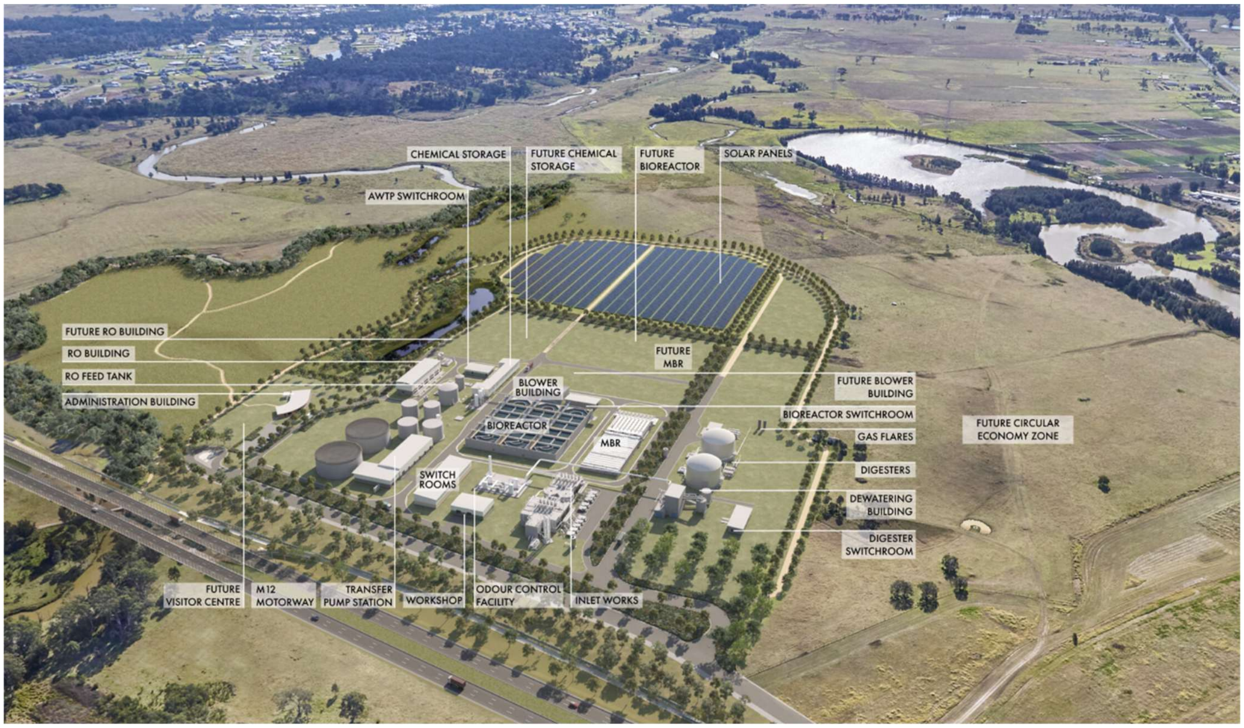


Figure 3 AWRC indicative site arrangement

2 Objectives & Targets

2.1 Objectives

The objective of this WRS is to ensure that all water harvesting, reuse and recycling options relevant to the construction of Stage 1 of the project are investigated and adopted and implemented where feasible and reasonable:

- Demonstrate sustainability leadership and continuous improvement.
- Optimise resource efficiency (materials, energy, water, land, waste) throughout the project life cycles.
- Eliminate, reduce or substitute potable water with all possible alternative sources.
- Limit environmental impacts caused through water extraction and water harvesting from sources such as ground water and available water tables used by external stakeholders.
- Increase resilience to future climate.
- Encourage innovative construction and operation practices for water supply sourcing, treatment, and storage.
- Deliver on project Infrastructure Sustainability Rating objectives and targets.
- Deliver lasting value for stakeholders, and
- Implement innovative solutions in sustainable design and construction.

2.2 Targets

Targets associated with project-specific water reuse requirements are detailed in Section 3 of this WRS and include tabulated references to where each requirement is addressed in this strategy.

3 Project Legislative and Guidance Requirements

The following sections summarise the legislative, guidance and standards, and project-specific requirements applicable to this WRS.

3.1 Project plans

The project plans relevant to the WRS include:

- USC Construction Environmental Management Plan (USCP-JHG-MPL-ENV-0008)
- USC Soils & Contamination CEMP Sub-plan (USCP-JHG-MPL-ENV-0003)
- USC Surface Water & Groundwater CEMP Sub-plan (USCP-JHG-MPL-0002)
- USC Biodiversity CEMP Sub-plan (USCP-JHG-MPL-ENV-0004)
- USC Commissioning Management Plan (USCP-MPL-G-0026)
- USC Sustainability Management Plan (USCP-JHG-MPL-PMT-0009)

3.2 Specifications, guidelines and standards

The main guidelines, specifications and policy documents relevant to this CWRS include:

- Sydney Water Technical Specification – Civil v10.0 (CPDMS0023)
- Sydney Water Management Specification (1041412)
- Sydney Water Policy - Water Quality Management During Operational Activities (D0001667)
- Sydney Water Work Instruction - Guide to Water Quality for Water Main Construction (D0001668)
- Sydney Water Procedure – Water Quality when Commissioning/Returning Reservoirs to Service (D0001909)
- EPA NSW Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 - The stormwater order 2014;
- EPA NSW Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 - The treated drilling mud order 2014;
- Australian Guidelines for Water Recycling Stormwater Harvesting and Reuse, National Water Quality Management Strategy, Document No 23, July 2009, (NWQMS 2009);
- ANZG (2018) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments;
- AS/NZS 5667.1.1988 (R2016) Water quality Sampling Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples;
- Commonwealth of Australia (2012). Australian groundwater modelling guidelines;
- DEC (1997). Bunding & Spill Management. Insert to the Environment Protection Manual for Authorised Officers - Technical section "Bu";
- DEC (2004). Environmental Best Management Practice Guideline for Concreting Contractors;
- DECC (2022). Approved Methods for the Sampling and Analysis of Water Pollutants in NSW;
- DECCW (2008). Managing Urban Stormwater: Soils and Construction Volume 2A Installation of Services;
- DECCW (2008). Managing Urban Stormwater: Soils and Construction Volume 2C Unsealed Roads;
- DECCW (2008). Managing Urban Stormwater: Soils and Construction Volume 2D Main Roads Construction;
- DLWC (1998). Guidelines for the Use of Acid Sulfate Soil Risk Maps (2nd ed);
- DPE (2022) Technical guidance for achieving Wianamatta South Creek stormwater management targets;
- EPA NSW (1995). Bunding and Spill Management Guidelines contained within EPA Environmental Protection Manual for Authorised Officers;
- EPA NSW (2007) Guidelines for the Assessment and Management of Groundwater Contamination;
- EPA Vic. (2009). Acid Sulfate Soil and Rock – Victorian EPA Information Bulletin, Publication 655.1;
- EPA NSW (2020). Guidelines for Consultants Reporting on Contaminated Land;
- Fairfull, S. and Witheridge, G. (2003) Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings. NSW Fisheries;
- Hazelton, P.A. and Murphy, B. W., (2016). What Do All the Numbers Mean? A Guide for the Interpretation of Soil Test Results (3rd ed) CSIRO Publishing, Melbourne;
- HEPA (2020), PFAS National Environmental Management Plan Version 2.0

- IECA (2008). Best Practice Erosion and Sediment Control: Appendix P - Land-Based Pipeline Construction; Isbell, R.F. and the National Committee on Soil and Terrain (2016). The Australian Soil Classification (2nd ed) CSIRO Publishing, Clayton South;
- Landcom (March 2004). Managing Urban Stormwater: Soils and Construction (4th Edition) (reprinted 2006), Volume 1 (the "Blue Book");
- National Environment Protection Council (2013). National Environment Protection Measures for the Assessment of Site Contamination;
- National Uniform Drillers Licensing Committee, (2020). Minimum construction requirements for water bores in Australia, 4th edition;
- NRAR (2018). Guidelines for controlled activities on waterfront land – Riparian Corridors;
- NSW ASSMAC (1998).Acid Sulfate Soil Manual;
- NSW ASSMAC, QASSIT / QLD NRM&E / SCU / NatCASS / QASSMAC(2004). Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1;
- NSW DPI (2013). Policy and guidelines for fish habitat conservation and management (update 2013);
- NSW DPI (Fisheries) (2003). Fishnote – Policy and Guidelines for Fish Friendly Waterway Crossings;
- NSW DPI (Fisheries) (2003). Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings;
- NSW DPIE (2021). Minimum requirements for building site groundwater investigations and reporting;
- NSW DPI (2012). Guidelines for controlled activities on waterfront land;
- NSW Office of Water (2012). NSW Aquifer Interference Policy;
- NSW Office of Water (2012). Guidelines for watercourse crossings on waterfront land;
- NSW Soil Conservation Service (1982). Design Manual for Soil Conservation Earthworks – Technical Handbook No. 5;
- Standards Australia Committee CE/28 (1990). AS2368—1990 Test pumping of water wells;
- Standards Australia, Joint Technical Committee EV/8, (R2016). AS/NZS 5667:11 1998 Water quality - Sampling - Guidance on sampling of groundwaters, Sydney;
- Sundaram, B. et al., (2009). Groundwater Sampling and Analysis—A Field Guide, Canberra: Commonwealth of Australia;
- W.A. Department of Health (2021). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia;
- WorkCover NSW (2005). Storage and Handling of Dangerous Goods Code of Practice

3.3 Minister's Conditions of Approval

Table 2 below provides a summary of the CoA relevant to water reuse and how and where these items are addressed in this WRS.

Table 2 Minister's Conditions of Approval

Condition	Condition Requirement	Document Reference	Evidence
E92	A Water Reuse Strategy must be prepared, which sets out options for the reuse of collected stormwater and groundwater during construction and operation. The Water Reuse Strategy must include, but not be limited to:	This document	This strategy addresses the construction and operational phase of the project.
	a) evaluation of reuse options;	Section 6	Section 6 provides a detailed assessment of identified potential water reuse options and assesses the applicability and feasibility of each opportunity within the context of project constraints and considerations.
	b) details of the preferred reuse option(s), including volumes of water to be reused, proposed reuse locations and/or activities, proposed treatment (if required), and any additional licences or approvals that may be required;	Section 7.2, 8 & 10 Appendix A	Section 7.2 & 10 detail preferred reuse options, treatment where required, and any additional licensing or approvals required for each option. Volumes of water, locations and activities are summarised in section 8 and detailed in Appendix A – Water Balance Study.

Condition	Condition Requirement	Document Reference	Evidence
	c) measures to avoid misuse of stormwater or groundwater as potable water;	Section 6 & 7.2	Stormwater measures for avoidance of misuse are discussed in section 6 and 7.2. Groundwater won't be utilised in place of potable water for the project.
	d) consideration of the public health risks from reuse of stormwater or groundwater recycling; and	Section 7.1.2, 7.1.4 & 7.1.5	The project has determined the reuse of groundwater unviable due to certain limitations related to its existing / background quality. As it is not proposed for reuse, public health risks are deemed to be negligible. Sources and end uses of stormwater selected by the project for reuse have done so in consideration of potential health risks to the public. The project has selected no application of reuse that would pose a potential health risk as a result of contact or downstream effects to the public incurred by water pollution.
	e) a time frame for the implementation of the preferred reuse option(s).	Section 7-2	Table 7-1 details the timing for both investigation and implementation of feasible opportunities.
	The Water Reuse Strategy must be prepared based on best practice and advice sought from relevant agencies, as required. The Strategy must be applied during construction and operation.	Section 7.1	Section 7.1 highlights the considerations utilised to determine potential reuse options and summarises the correspondence and consultation completed by John Holland with relevant agencies for specific reuse opportunities.
	Justification must be provided to the Planning Secretary if it is concluded that no reuse options prevail.	Section 10	Reuse options have been identified and implementation committed to. Opportunities under investigation have been identified and timelines for investigation provided.
	A copy of the Water Reuse Strategy must be made publicly available prior to the commencement of construction. If reuse is only proposed during operation, then the Strategy must be made publicly available prior to the commencement of operation.	A copy will be provided on the project website post submission to DPE.	https://www.sydneywater.com.au/water-the-environment/what-we-are-doing/projects-in-your-area/uppersouthcreek-advanced-water-recycling-centre.html
	Note: Nothing in this condition prevents the Proponent from preparing separate Water Reuse Strategies for the construction and operational phases of the CSSI.	Note	Earlier revisions of this WRS addressed the construction phase water reuse for the project only. This strategy has been revised to incorporate operational water reuse elements and refine or update construction elements of the strategy, where required.

3.4 Updated Management Measures (UMMs)

Table 3 below provides a summary of the relevant Updated Management Measures (UMMs) and how and where these items are addressed in this WRS.

Table 3 Updated Management Measures (UMMs)

Ref	Management Measure	Reference	Evidence
GW10	Develop a Drilling Fluid Management procedure to avoid impacts, including: • potential risk for 'frac-outs' at tunnelled crossings • approach to identify and manage frac-outs • contain and monitor drilling fluid at entry/exit points until it can be transported to a licensed waste facility • **reuse and/or disposal of drilling fluids by appropriately qualified personnel to a licensed facility** prioritising the use of fluids that reduce the risk of seepage into groundwater from boreholes.	Section 7.1 & 7.2	A project-specific waste tracking register has been implemented as part of the project's environmental management system. Where a project feasibility assessment and evaluation for use of drilling fluid and mud deems reuse appropriate, the reuse / handling of the various constituents of drilling fluid will be tracked accordingly. All relevant requirements, including reuse, will be considered in the Drilling Fluid Management Procedure developed as part of the Surface Water and Groundwater CEMP Sub-plan.
W01	Develop and implement a Waste Management Plan as part of the project's CEMP. This plan will include: • opportunities to minimise the generation of spoil including suitability for reuse within the project • **targets for different waste streams with disposal being the least preferred approach, including diverting 75% of spoil from landfill (eg through offsite reuse), recycling rates of 80% for construction and demolition waste and reuse of stormwater for construction activities** • classification of all waste generated by the project in accordance with the EPA waste classification guidelines • site specific measures (in accordance with the compound locations) for waste segregation, storage, 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 • training and awareness for all construction personnel • a record keeping system on site so that waste tracking systems can be maintained. This should include the use of the NSW EPA's online waste tracking system where required. Keep records of receipts to prove that waste diversion and recycling targets have been met.	Section 7.2	Stormwater reuse opportunities for construction activities that have been assessed as viable at this stage or under assessment for the viability of implementation are detailed within section 7.2

3.5 Infrastructure Sustainability Targets

Table 4 below details the Infrastructure Sustainability (IS) credit targets John Holland is pursuing to contribute to the achievement of a Gold Design and As Built rating under the Infrastructure Sustainability Council Design and As-Built rating. As part of the project's Sustainability Strategy, John Holland is targeting the following IS Rating benchmarks relating to the Water Category. Note that these targeted credits and levels may alter throughout the life of the project as materiality adjusts as a result of dynamic and unforeseen project changes.

Table 4 Indicative design phase IS targets

Credit	Name of credit	Target Level	Target Score	Comments	Reference
Wat-1	Avoiding Water Use	2.5 (25% reduction in water demand from Base Case scenario)	3.78	Monitoring of potable and non-potable water usage to take place as part of monthly tracking processes and annual public reporting. The Project will continue to pursue opportunities to avoid and/or reduce water consumption.	Section 6 Section 7 Section 9
Wat-2	Appropriate Use of Water Sources	2.0 (20% reduction in potable water use from Base Case scenario)	3.02	Feasible alternative water sources with a financial payback will be reviewed and considered for implementation.	Section 6 Section 7

4 Water requirements

Water will be required throughout the construction phase of the project for general construction activities and site ablutions. Water use will primarily be for the purposes of earthworks, site ablutions, hydrostatic testing, pipe trenching, drilling and dust suppression.

Water will also be required to supply ancillary sites for ablutions and other ancillary activities. Potable and non-potable will be required for the following activities:

- Dust suppression on construction activities, exposed surfaces, stockpiles, and roads.
- General wash down and wheel wash.
- Maintenance of access points and roadways.
- Dust suppression during demolition activities.
- Non-destructive digging.
- Generation of drilling fluid.
- Compaction and general earthworks.
- Concreting and concrete curing.
- Conditioning of fill material.
- Hydrostatic testing of the AWRC site, brine & treated water pipelines and associated infrastructure.
- Site ablutions including toilets, showers, cleaning, and drinking; and
- Establishment of landscaping.

Water demand from site offices and ablutions will depend on the number of personnel based at a particular site and the hours of operation. Section 8 summarises the water balance study provided in Appendix A and estimates quantities based on current project personnel forecasts and baseline assumptions.

5 Initial water use assessment

Over the course of construction, several water sources will be utilised for the purposes described in Section 4. The project will adopt the Water Use and Sourcing Hierarchy illustrated in Figure 4 during construction. For the assessment undertaken as part of this CWRS, the project will utilise the definition of potable and non-potable water from the ISC v2.1 manual and the NSW Environment Protection Authority (EPA) definition of stormwater, as detailed below:

- Potable Water: High quality water that is suitable, safe, and approved for domestic consumption as set and regulated by national health and water quality standards. This is the standard supplied by water utilities which may also be referred to as town water or reticulated water.
- Non-potable Water: Lower quality water suitable for purposes other than domestic consumption (see potable water), such as toilet flushing or dust suppression.
- Stormwater: Stormwater means rainfall that runs off all urban surfaces such as roofs, pavements, carparks, roads, gardens, and vegetated open spaces.

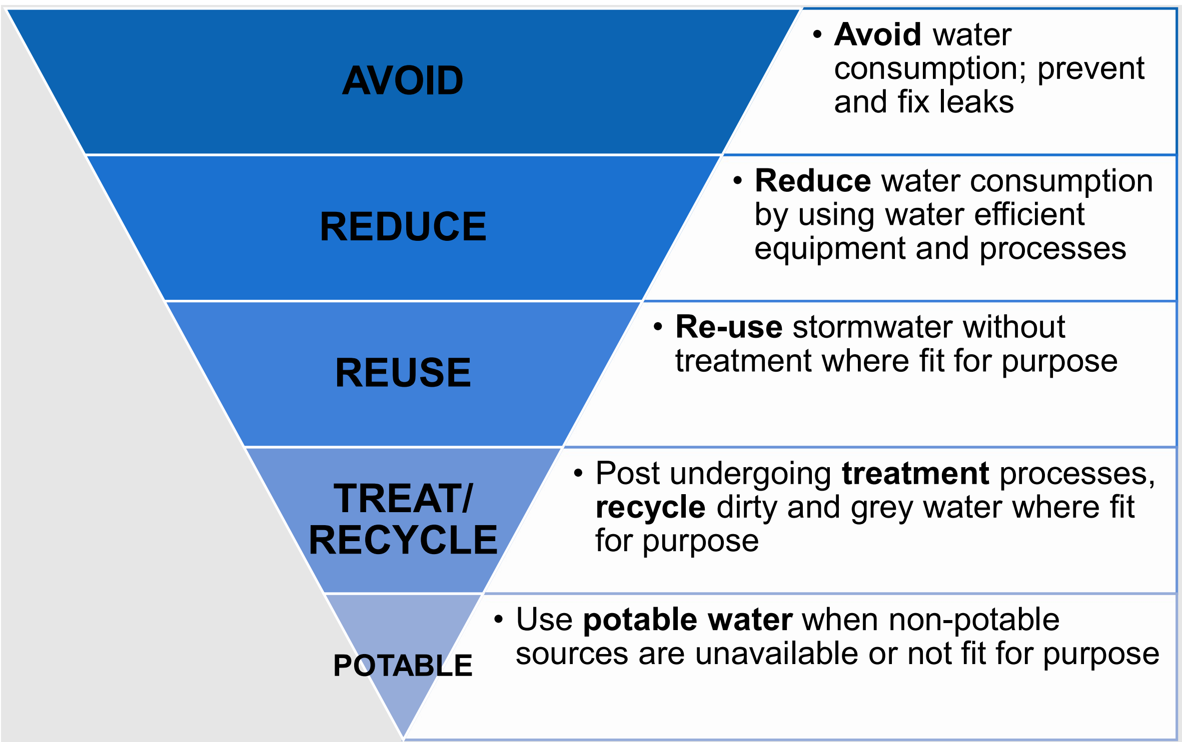


Figure 4 Water use and sourcing hierarchy

All construction sites will have access to potable water through metered connections from the Sydney Water network. During construction, potable water will serve as the primary supply for all water requirements detailed in Section 4. If non-potable sources are identified and the water source is feasible, the requirement will be filled from non-potable source collected and/or available.

Opportunities for the use of non-potable water in place of potable water have been assessed in accordance with the project's Sustainability Strategy.

The viability to which non-potable sources can be utilised is dependent on:

- Project personnel and public health and safety wellbeing.
- Economic feasibility and return on investment for the project.
- Relevant permanent or temporary design and manufacturers specifications.
- Availability and quality of non-potable water, and
- Environmental legislative and approval limitations and restrictions.

Given that minimal to no groundwater sources will be accessed by the project, non-potable water, if possible, will be sourced primarily from rainwater harvesting or portable water reuse as most sites have no stormwater system.

There is a high priority during construction on minimising the project footprint and associated area of disturbance. This in turn will minimise site capacity for containment and treatment, which may limit the above opportunities. Further feasibility has been conducted throughout construction as further detailed in Table7-4 and balanced against environmental, social, and economic factors.

Due to the spatial limitations of the pipelines short term drilling and material storage sites, there will be limited capacity for capture of stormwater on site. Earthworks trenches, sumps and sediment basins will capture relatively small volumes of water after rainfall events. This water will be beneficially used where feasible in accordance with the project's Surface Water & Groundwater CEMP Sub-plan (USCP-JHG-MPL-ENV-0001).

Water supplied during the construction phase, including water for bulk earthworks will be provided from a combination of harvested stormwater runoff from within construction sediment basins and potable water. An On-Site Detention (OSD) Basin, sub basin, and a High Efficiency Sediment (HES) basin have been constructed at the main AWRC site.

For Blue Book-compliant sediment basin sizing, the disturbed area at the main AWRC site is approximately 10 ha, with sub-basin(s), excavations and sumps established to detain water, prior to being transferred to the main OSD basin and/or HES basin. The calculations indicate a required storage volume of approximately 1,420m^3. This is significantly less than the current proposed OSD volume of 9,680m^3 and thus the initial use of these areas for sedimentation purposes is adequate.

In addition to the information presented above for Blue Book compliant sediment basins, calculations based on the approved design constructed confirms that the flood detention basin to be constructed as part of the operational design, also provides sufficient volume for sediment controls during construction, with respect to the HES basins constructed onsite. The flood detention basin volume provide the required 196 m^3/ha of storage to achieve the site sediment management approach, when operated as HES.

Under EPL21800, the project is permitted to discharge water from site for the purpose of construction-phase stormwater discharges and discharges related to hydro-static testing structures and assets on the project (conditions P1 '*discharge locations*', L3 '*concentration limits*' and M2 '*monitoring of discharges*'). A HES basin has been established and maintained onsite during construction to capture sediment entrained stormwater runoff, including the addition of clarifying agents (coagulants and flocculants) to increase the settlement of suspended sediments. The HES basin is designed to meet the construction phase stormwater targets related to Total Suspended Solids (TSS) and pH (50 mg/L or less and 6.5-8.5, respectively) prior to each planned discharge following stormwater and runoff events from the construction area. This design negates the traditional 5-day post rainfall discharge criteria often required for EPA licenced sediment basins and may provide an opportunity to re-use water from the HES on site over longer periods.

The HES basin has been designed in accordance with the Type B Basin from the International Erosion Control Association (IECA) 2008, Appendix B – sediment basin design and operation.

During construction, the OSD has primarily functioned as a water storage facility, where surface and stormwater runoff can be readily available for re-use on site, pending the water is of suitable quality as per the Dewatering Procedure (Appendix A SWGCSP). Whilst the reuse of local runoff is expected to reduce the external demand for potable water significantly, minimum requirements for any reuse activity must not cause ponding or runoff of water, which may generate concentrated runoff and unauthorised discharge offsite.

6 Alternative Water Use, Reuse & Reduction Opportunities

The Upper South Creek project has assessed all viable reduction and reuse opportunities to facilitate infrastructure construction that reduces water use, encourages substitution of potable water with appropriate alternative sources, and minimises environmental impacts of local water extraction/harvesting.

The project notes that throughout construction, water demand and quality vary. As a result, the project has generated a robust water balance and outlined potential reduction and reuse opportunities that will support achievement of project sustainability requirements, as listed below:

- Investigate water efficient dust suppressants and soil binders to prevent repetitive application of potable or non-potable water for dust generation prevention to haul roads, stockpiles and fill areas.
- Schedule water-consuming activities such as dust suppression during cooler periods of the day to avoid evaporation.
- Cost benefit analysis and compound setup for rain harvesting and reuse in site ablutions (toilets and urinals), vehicle washdown and general cleaning.
- Capture rainwater and stormwater in strategic locations for reuse.
- Install water efficient taps within site facilities (push button with aerators) with a minimum WELS rating of 6 Stars or 3.5L/min or less. (In accordance with the Responsible Construction Leadership Guidelines, Site Facilities Requirements, Version 4.)
- Install water-efficient toilets within site facilities with a minimum WELS rating of 4 Stars or 3/4.5L dual flush. (In accordance with the Responsible Construction Leadership Guidelines, Site Facilities Requirements, Version 4.)
- Install water efficient showers within site facilities with a minimum WELS rating of 4 Stars, flow rate of 7.5l/min (In accordance with the Responsible Construction Leadership Guidelines, Site Facilities Requirements, Version 4.)
- Earlier engagement with project suppliers and sub-contractors to identify water avoidance and substitution initiatives for construction activities.
- Strategic planning of exposed site areas and the installation of erosion and sediment control measures to maximise construction water run-off capture from rainfall events for Project reuse.
- Investigation of mobile site-based treatment plants capable of separating liquid fractions and fines (aggregates and sands).
- Non-destructive digging fluid/waste treatment and reuse through portable on-site water treatment tanks to allow reuse.
- Reuse of drilling mud through application to land. Separation of bentonite from water through dehydration or water treatment to allow reuse of bentonite solution through application to land and potentially treated water.
- Selection of drought tolerant and temporary and permanent grasses, spray grass and plantings that minimal water to establish; and
- Strategic retention, transfer, and recycling of hydrostatic and wet commissioning water.

7 Evaluation of reuse options

7.1 Considerations for water reuse

7.1.1 Climatic and seasonal conditions

Construction of the project will occur over a two-and-a-half-year timeframe and therefore seasonal variation and climatic events will affect the volume and quality of water available for reuse at any time (Table 5). As per the Climate Change Risk Assessment (CCRA) in Appendix Y of the EIS, large wet seasons generally occur in the winter months and produce rainfall that exceeds the evaporation rate, increase groundwater recharge and water levels. A water reuse strategy reliant on rainwater and stormwater will therefore be opportunistic to enable beneficial reuse when conditions allow.

In addition, any water collected on-site after a rainfall event may not be usable for irrigation or dust suppression if the site has become saturated. Any reuse activity must not cause the ponding or runoff of water, increase ponding and runoff may generate the potential unauthorised discharge of concentrated runoff offsite as a result. Storage of captured water would only be required for reuse after the site has dried out sufficiently.

Table 5 Annual rainfall and evaporation statistics - Appendix N of the EIS

Statistics	Annual Rainfall (mm)	Annual Pan Evaporation (mm)	FAO-56 Potential Evaporation (mm)
Mean	746	1456	1227
Minimum	314	1257	N/A
Median	725	1445	N/A
Maximum	1725.5	1881	N/A

(Source: Table 4-1 of Appendix H of the Updated Groundwater Report by Aurecon Arup, March 2022)

7.1.2 Soil and Contamination

When considering water reuse in construction, it is essential to assess the quality of the water, potential contaminants, and the intended reuse application. There are certain types of construction water that may be inappropriate and limit ability for reuse within the project due to contamination or quality concerns. Several potential reuse options regarding contaminated and quality of water are discussed below, including limitations of pursuing water reuse.

Concrete wastewater, a biproduct of the concrete placement process, commonly referred to as concrete washout, refers to water that is generated during the mixing, pouring, and cleaning of concrete equipment and tools. This wastewater has significant variation in its quality and can contain various additives. Including chemicals from concrete admixtures, cement particles, suspended solids, and pH altering substances. Concrete wastewater will be generated from several sources during the construction phase including:

- Washout water - washout water is generated from cleaning concrete equipment, such as mixers, pumps, and trucks, and after the concrete has been poured.
- Concrete cutting and grinding - when concrete is cut or ground during construction or demolition activities, wastewater can be generated.
- Concrete curing water - concrete curing involves maintaining adequate moisture and temperature conditions to ensure proper hydration and strength development. The water utilised for curing must be clean water and curing compounds used must conform to AS 3799 (Liquid membrane-forming curing compounds for concrete).

Potable water contaminated by use in activities such as non-destructive digging, surface washing, grit blasting, drilling, washing vehicles and plant typically has limited reuse opportunities due to the risk of potential contamination. Inconsistent or insubstantial quantities can result in limited capture, application and/or storage options. Discharges of such potentially contaminated site water will be strictly controlled. A portion of the quantity encountered will be evaporated, and other smaller captured sources will be sent to a licenced waste facility. Sources such as non-destructive digging that can be captured are possible for water treatment with the limitation that volumes must be consistent (based on a project's construction methodology and scope), site area allows for the spatial impact of a temporary water treatment plant and the process is financially viable through a whole of life cost analysis.

Water can also accumulate from stockpile treatment and the management of saturated material. The water can be or become impacted by a range of pollutants including sediment, trace metals, oil, grease, hydrocarbons and chemicals, depending on the nature of the construction activities on the site. The water also has the potential to become acidic or basic depending on the presence of acid sulphate materials or tannins. Contaminated site water must be treated to an acceptable standard as outlined in the Surface and Groundwater CEMP Sub-Plan before it can be re-used on site and/or discharged from the site to the environment. If this water is unable to be treated to an acceptable quality, it will be taken to a licenced waste facility for disposal.

If not treated or managed correctly reuse of contaminated water could result in the migration of contaminates via leaching, overland flow or subsurface flow which may cause localised soil, surface water or groundwater contamination and result in possible downstream ecological impacts.

7.1.3 Saline Sodic Soil Conditions

Soil testing undertaken as part of geotechnical investigations in the EIS, indicated a potential risk of saline and sodic soils at the AWRC site and along the pipelines, at varying depths and extent (i.e., low, moderate, and high). Saline and sodic soils typically exhibit high levels of soluble salts, which results in soil with excessive sodium (particularly in the case of saline sodic soils). Soil high in sodium prohibits water absorption and infiltration by causing the dispersion of soil particles, which generates poor soil structure making it susceptible to compaction, reduced porosity, and limited water infiltration.

Saline sodic soil conditions pose challenges for water reuse due to the high salt and sodium content of the soil profile. The presence of both high salt and sodium content in the soil has the potential to significantly affect water quality and prevent the reuse of water in various ways:

- Increased Soil Salinity: Saline sodic soils have elevated levels of soluble salts, including sodium chloride (table salt) and other mineral salts. When water is applied to these soils, it can dissolve these salts, resulting in an increase in soil salinity. High soil salinity negatively impacts plant growth and can lead to water stress for plants, reducing crop yields and overall productivity.
- Reduced Water Infiltration: Sodic properties of the soil cause soil particles to disperse, leading to poor soil structure and reduced water infiltration rates. As a result, water is less likely to penetrate the soil and may accumulate on the surface or run off, leading to potential waterlogging and wastage.
- Soil Dispersion and Crusting: In saline sodic soils, sodium causes soil particles to disperse, leading to the breakdown of soil aggregates. When the dispersed particles recombine, they can form a surface crust that hinders water infiltration, increases surface runoff, and further reduces the soil's ability to absorb and retain water.
- Salt Accumulation in Water Sources: When water is used to irrigate saline sodic soils, it can dissolve the salts present in the soil and carry them away with the runoff. Over time, this can lead to the accumulation of salts in nearby water bodies, such as rivers, lakes, and groundwater sources. The increased salinity in these water sources can be harmful to aquatic life, affect water quality, and limit the usability of water for various purposes, including drinking and irrigation.
- Water Quality Concerns: Reusing water that has encountered saline sodic soils can be problematic due to the increased salinity and potential presence of other contaminants. The high salt content and dispersed soil particles in the reused water can negatively affect the health and productivity of plants, making it unsuitable for irrigation and other agricultural purposes.

7.1.4 Rainwater & Stormwater capture and site storage capacity

Rainwater runoff from site shed roof canopies has been captured in rainwater tanks at the main AWRC compound for use in toilet flushing, cleaning, irrigation, and dust suppression excluding use as drinking water. The capacity of rainwater storage at each of the compound areas was assessed on available space and the size of the roof catchment available at each ancillary facility as detailed in Table 7-5.

Installation of rainwater capture was subject to a return on investment (ROI) assessment per site (Appendix A). Indicatively a roof space of 1450m^2 is required to provide a return on investment over a two-and-a-half-year Project construction phase considering the annual rainfall defined in Table 7-1. Following this assessment, the main AWRC compound was the assessed as the only viable facility for capture and re-use, with a roof space of greater than 1450 m^2.

In regard to rainfall detention, an Environmental Protection License (EPL 21800) is currently in place for the project, as work constitutes scheduled development work under the Protection of the Environment Operations Act 1997 (NSW). EPL 21800 includes specific construction-phase erosion and sediment control requirements and water protection requirements. The project will be constructed to meet the requirements documented in EPL 21800. Stormwater runoff will generally be captured in drains, creeks, stormwater systems, basins, trenches and open excavations and would be managed in accordance with EPL 21800. Water is not permitted to be discharged from the site unless it is undertaken in accordance with the conditions stated in the project’s EPL.

The HES basin implemented onsite is designed to capture sediment entrained stormwater runoff by adding clarifying agents (coagulants and flocculants) to increase the settlement of suspended sediments. The HES basin design negates the traditional 5-day post rainfall discharge criteria often required for EPA licenced sediment basins and may provide an opportunity to reuse water from the HES on-site over longer periods. Nonetheless, rainwater and stormwater captured on-site has involved the reuse of the water for dust suppression, irrigation within the project boundary and discharging it after appropriate treatment of the water so that it meets EPL-compliant discharge water quality requirements.

The existing topography indicates a minor ridge line dividing the South Creek and Kemps Creek catchments, as depicted in Figure 5. The split has limited the ability to capture and store the maximum amount of viable water. The infrastructure footprint indicated in the design is primarily located west of this divide. Runoff from this area naturally drains towards Drainage Line 1, where it ponds within a billabong and any excess spills over to South Creek via the connecting spillway channel (see EIS Appendix K Figure 5-19 and Figure 5-20). Runoff generated east of the ridge naturally flows towards Drainage Line 2 and discharges to Kemps Creek upstream of the farm dam.

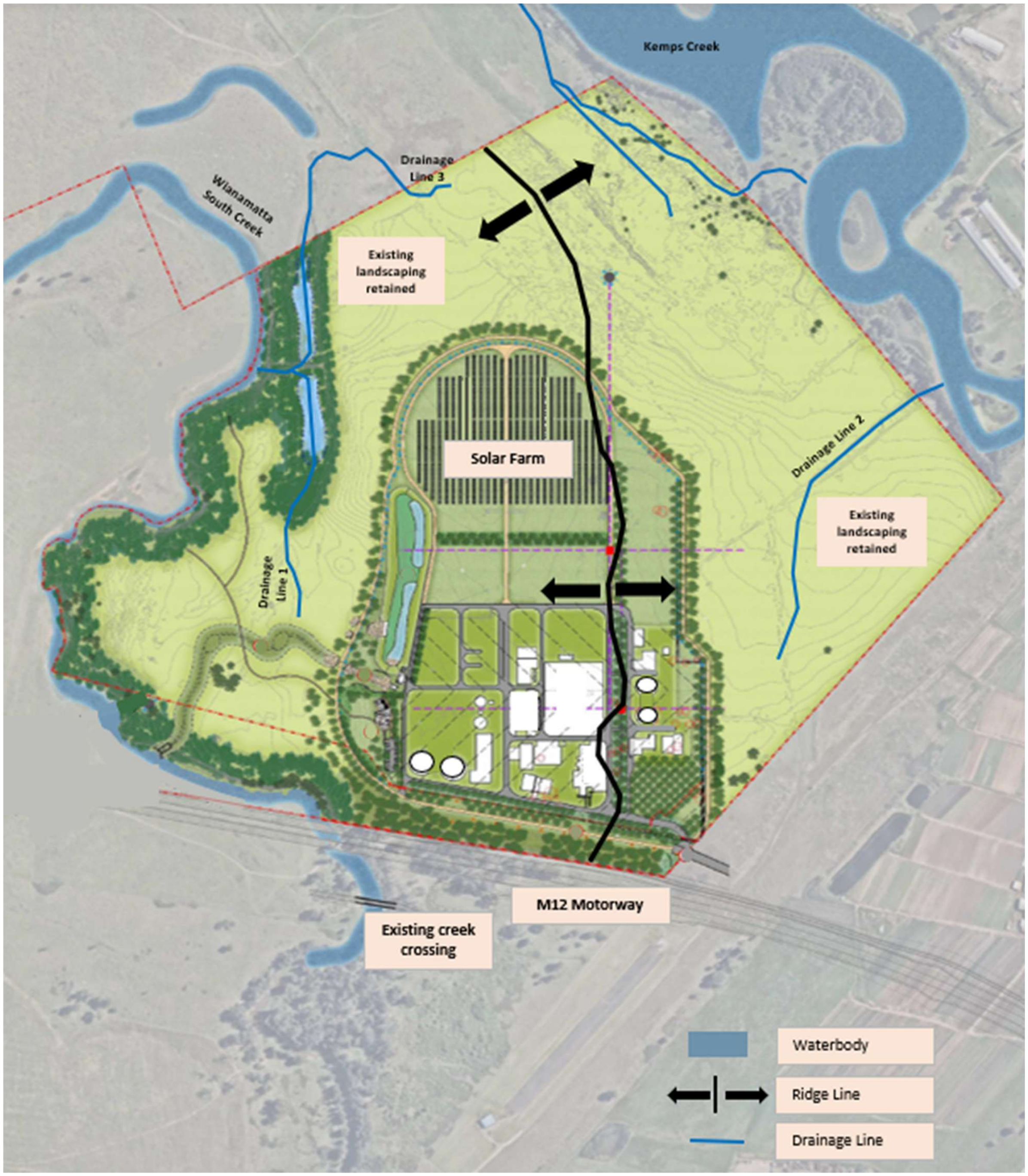


Figure 5 Existing topography indicates a minor ridge line dividing the South Creek and Kemps Creek catchments

Storage of captured stormwater within the OSD, sub-basin, trenches and sumps, and the HES basin will be monitored and assessed ongoingly during construction as the ability to adjust capacities on site, for example via the placement of tanks, increase basin sizing, etc. is dependent on project spatial limitations onsite.

The capture, harvesting and reuse of all rainwater and stormwater will be undertaken in accordance with the industry best practice guidelines, "The safe harvesting water and urban stormwater will be completed in accordance with best practice guidelines, specifically the Australian Guidelines for Water Recycling, Stormwater Harvesting and Reuse (NWQMS 2009)" and the NSW EPA resource recovery order - stormwater order 2014.

7.1.5 Water access and extraction from local waterways, aquifers and neighbouring properties

Water licencing and exemptions

The USC AWRC is a state significant infrastructure (SSI) project that, under section 5.23 of the Environmental Planning & Assessment Act 1979, is not required to obtain certain water approvals nominated under the Act, including a water supply work or water use approval or controlled activity approval where the works were identified and impacts assessed as a part of the state significant project. In the place of these approvals, a miscellaneous work number is issued by the Department of Climate Change, the Environment and Water (the department) to allow the project to be linked to Sydney Water's metro-wide water access licence (WAL), whose conditions form part of the licence and affect the share (quantities) and extraction locations.

Should the project require use of water during construction, water will not been taken without obtaining all required approvals and/or written acknowledgement of public authority exemptions from the regulator, specifically the NSW Natural Resources Access Regulator (NRAR), as summarised below and presented in Table 6.

- Water access licence 44922 has been obtained by Sydney Water and incorporates the share (quantities) and extraction locations required for the USC AWRC project.
- If John Holland or Sydney Water required regulator acknowledgement of a public authority exemption, it will only apply in specific scenarios and only where compliance with legislative requirements under the Water Management (General) Regulation 2018 (NSW) could be demonstrated, as summarised in the below Table 6.

Table 6 Public authority water access licence exemptions (NSW)

Public Authority Water Access Licence	Exemption Requirement	Regulation Reference
Dust suppression by public authorities	• This exemption applies to public authorities that are lawfully engaged in dust suppression activities. • The taking of water must be required for dust suppression.	Clause 21(1) of the Water Management Regulation 2018 Clause 5 of Schedule 4 of the Water Management Regulation 2018

Adjacent and nearby neighbouring properties to the AWRC on the eastern side have stormwater detention basins to service their businesses. As do areas adjacent and near to the pipeline's compounds and drilling locations. The extraction and use of water from dams are subject to landowner consent. Water availability is subject to the seasonal limitation mentioned in section 7.1.1 and the landowner ability to provide a provision of water additional to their own needs for livestock and produce.

7.1.6 Water Quality

Baseline water quality has been established by the Sydney Water monitoring program as detailed in the Hydrodynamic and Water Quality Impact Assessment report (EIS Appendix F). Baseline water quality results covering the period July 2017 to January 2023 from the sites depicted in Figure 6 below are summarised based on the results documented in EIS Appendix K in Table 7. The turbidity of the water in Kemps Creek, Badgerys Creek and South Creek limits the use to applications such as dust suppression or compaction that can utilise water with a high content of total suspended solids that cannot be used in applications such as hydrostatic testing without treatment. Water sourced from the Nepean River could serve as a potential source of water to serve a multitude of applications as a result of the higher quality.

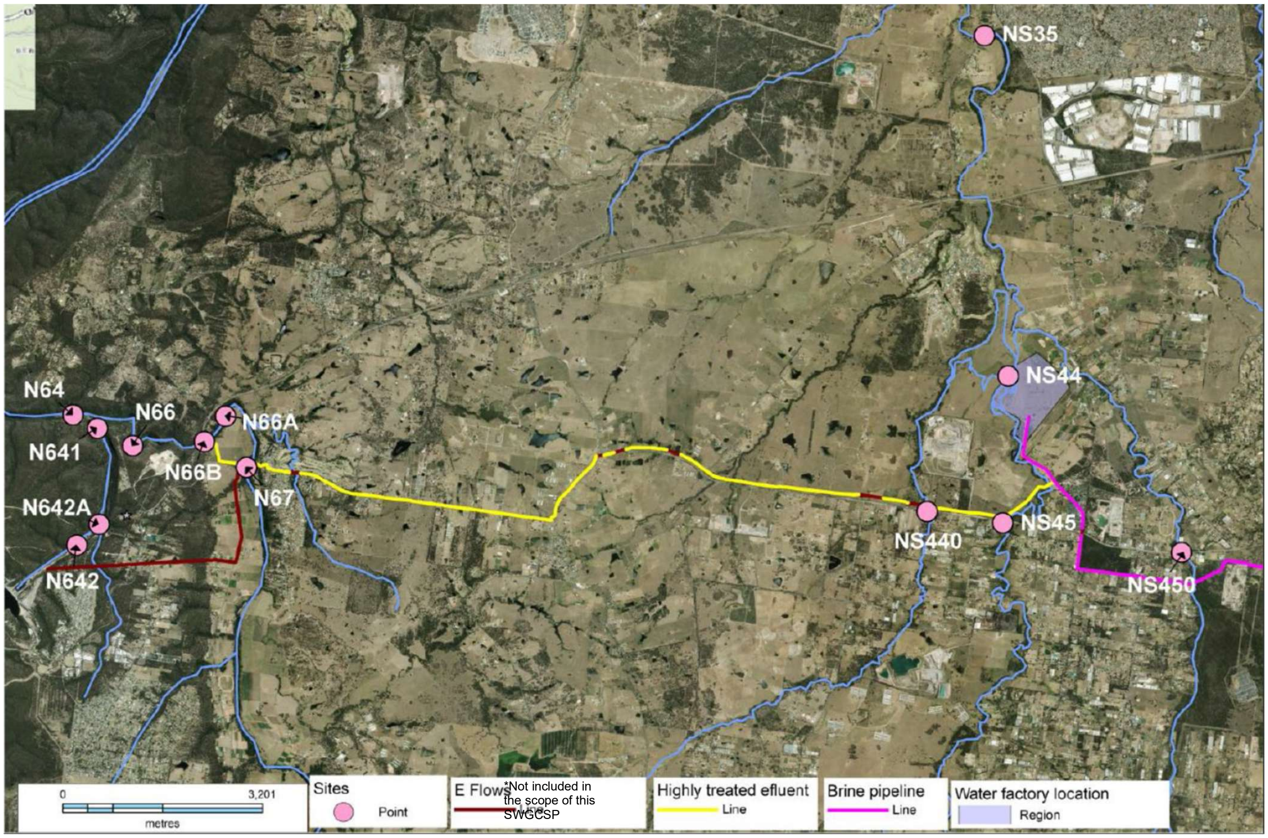


Figure 6 Water quality monitoring sites for AWRC baseline monitoring program (Source: EIS Appendix K)

Table 7 Baseline monitoring program water quality data (95th percentile values)

Location	DO (% satn)	EC (µS/cm)	pH (pH units)	Turbidity (NTU)	TN (mg/l)	TP (mg/l)
South Creek						
NS45 (upstream)	98	1,268	7.6	130	2.58	0.36
NS44 (immediately downstream)	119	1,203	8.2	131	2.31	0.29
NS35 (further downstream)	91	1,171	7.6	225	2.53	0.24
Kemps Creek						
NS450 (upstream)	94	2,660	7.7	114	6.99	0.85
Badgery's Creek						
NS440 (upstream)	72	1,086	7.3	54	2.49	0.29
Relevant performance criteria*	***43 - 75***	***1,103***	***6.2 - 7.6***	***50***	***1.72***	***0.14***
Nepean River						
N67 (upstream 1)	110	492	8.1	13	1.91	0.05
N66A (upstream 2)	99	450	7.7	14	nd	nd
N66B (downstream)	100	448	7.7	13	nd	nd
N66 (further downstream)	102	449	7.8	11	1.75	0.04
N64 (d/s Warragamba)	108	420	7.6	12	1.57	0.03
Warragamba River						
N642 (upstream)	109	317	7.5	12	0.69	0.01
N642A (downstream)	108	226	7.7	13	0.90	0.01
N641 (further downstream)	113	296	7.9	15	0.80	0.02
ANZECC default trigger value***	***85 - 110***	***125 - 2,200***	***6.5 – 8.0***	***6 - 50***	***0.35***	***0.025***

Cell colouring: Red indicates value outside the guideline value range; Green indicates all measured values within the guideline value range; Grey indicates no data (nd)
*Represents laboratory reporting limit
** Draft Wianamatta-South Creek Waterway Health Objectives (DPIE, 2020)***Guideline values for lowland rivers in south-east Australia with slightly disturbed ecosystems (ANZG, 2018)

Source: EIS Appendix K Table 5-10

7.1.7 Public health

John Holland has considered the potential health risks associated with reusing water on site. Reuse strategies identified in Table 7-4 aim to mitigate these risks. Given that no recycled/treated water is proposed to be used, the public health risks are considered negligible, and advice in this regard is not considered necessary from relevant agencies. If at any point the Project plans to utilise stormwater captured from established systems, recycled, or treated sewage public and Project personnel health will be reconsidered and evaluated.

7.1.8 Concrete and material batching

All concrete and asphalt will arrive on site pre-mixed and the use of non-potable water for batching plant production will be encouraged. Concrete and asphalt suppliers to the Project will be encouraged to use recycled water wherever possible and will report monthly on non-potable usage. Given these are offsite facilities, this is not addressed further by this Strategy.

7.1.9 Recycled water network

No network/pipeline exists within a feasible pumping distance for the Project to utilise. The use of any such network is prohibited by cost and distance.

7.1.10 Hydrostatic Testing & Wet Commissioning

Timing & Staging: Hydrostatic testing to identify potential asset leakage is required for all liquid retaining structures (excluding stormwater channels and culverts), steel tanks, pumps, and pipelines prior to the commencement of pre-commissioning as per the Sydney Water civil specification. Generally testing occurs prior to backfill and permanent surface works around the structure or asset.

Water Demand: To provide indication of the forecasted demand, one bioreactor cell requires greater than ten (10) megalitres (ML) for testing (of which there are three) and the treated water pipeline an additional ten (10) ML. These two assets are only one of many requiring significant quantities of water for testing purposes (detailed quantities provided in Appendix A). To fill and test all water retaining assets in a practical period consistent with construction staging and program a water source is required that is in excess of a hundred (100) ML and can supply both the AWRC and pipelines across the geographical area of the project, responding to both the logistical restrictions and water demand requirements. The utilisation of water cart delivered captured and harvested water to fil the treater pipeline would take 1000 water cart deliveries with a 10,000-litre capacity to complete.

Water Quality: The civil specification details that water levels for testing must be maintained for a stabilizing period of 7 days to allow for absorption and autogenous healing of the concrete. For healing to occur any water used must be free of impurities such as suspended solids (less than 2 NTU) unspecified chemicals and pollutants. The quality of water must meet Sydney Water's relevant work instruction and procedures for testing and commissioning (D0001668 & D0001909).

Discharge: Water used for testing and commissioning in accordance with the Sydney Water civil specification requires upon completion of asset testing, the structure be emptied, and the water disposed of. For pressured pipelines (treated and brine), the pipeline must be tested hydrostatically in sections to prove the structural soundness and watertightness of the pipelines. Pressured pipes due to the specification requirement must be tested in sections not exceeding 1 km in length. Sydney Water's work instruction (D0001668) states that water must not be left in the asset for extended periods of time, before or after testing, to prevent pH levels of held water from increasing to parameters outside specified discharge detailed within Sydney Water's discharge policy (D0001667) and the Project's environmental approvals for water discharge.

Upon the completion and acceptance/certification of hydrostatic testing, the commissioning phase can commence with pre-commissioning (Figure 7). The second phase of commissioning, wet commissioning, will require re-circulation of water throughout the entire system as part of the Site Acceptance Test (SAT). SAT is a formal test, that must be conducted prior to the introduction of process fluids(sewage). Water utilised for SAT testing is subject to the same limitations as that of hydrostatic testing and the same Sydney Water work procedures apply.

Vacuum testing has been identified as a possible suitable alternative to hydrostatic testing for stormwater pipes. In accordance with WSA 02 (Sewage Code of Australia), vacuum testing is recognised as an acceptable and widely adopted method for assessing gravity sewer pipelines. This approach effectively detects leaks or defects in sewer and stormwater pipelines, ensures compliance with performance standards, and is both less resource-intensive (elimination of potable water) and more efficient than hydrostatic testing. As the pipelines proposed for testing (WWTP process pipework) are primarily designed for gravity flow, vacuum testing is consistent with industry best practices.

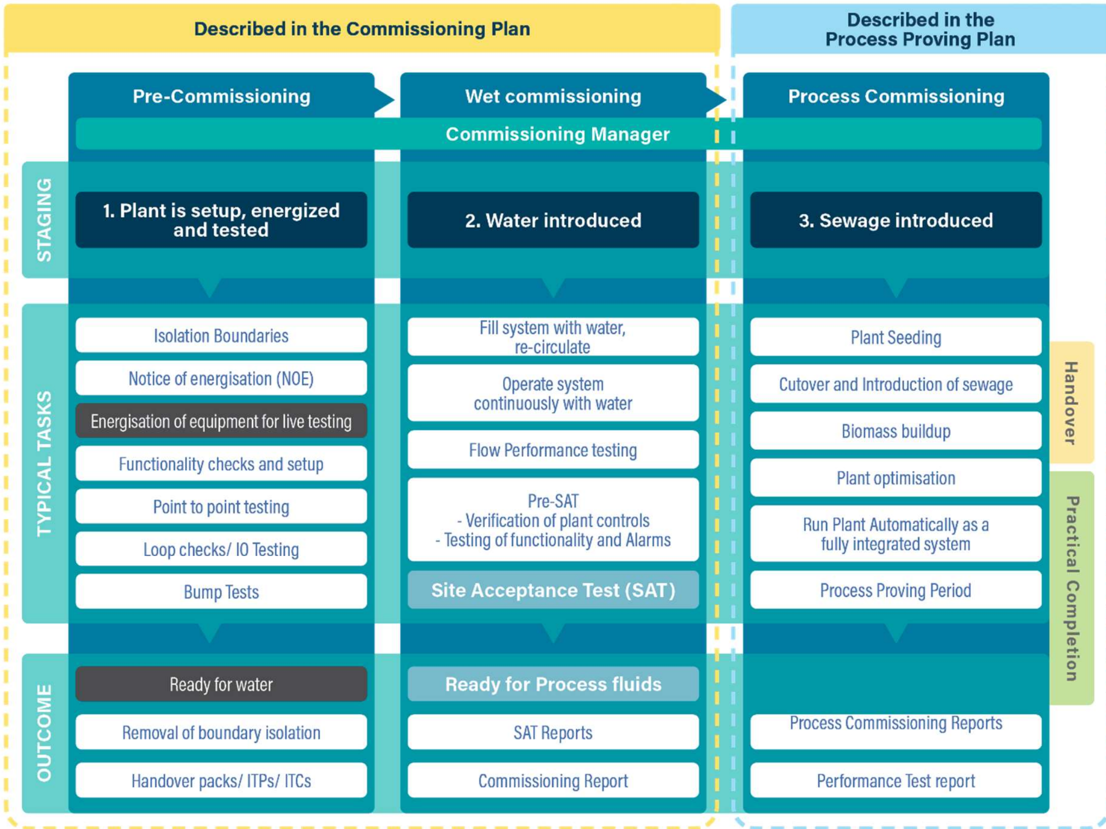


Figure 7 Commissioning phases, extracted from the Project Commissioning Plan (USCP-MPL-G-0026)

7.1.11 Onsite Treatment of drilling fluid and reuse of drilling mud for engineered fill/earthworks

Project drilling contractors undertaking horizontal directional drilling, under boring and pipe jacking will use a bentonite-based fluid Bentonite is a naturally occurring clay mineral, with excellent swelling properties that when mixed with water forms a viscous or gel like solution. The utilisation of Bentonite in the context of HDD (Horizontal Directional Drilling) and other drilling techniques serves several crucial purposes within the drilling fluid composition. It serves to effectively loosen the soil, facilitate the continuous removal of bore spoil, stabilize the bore hole itself, assist in smooth cutting of the material, provide cooling for the drilling tools, and uphold the integrity of the product pipe. The primary and paramount role it assumes is the stabilisation of the bore hole. This is particularly vital due to the consistent gravitational pressure acting on the horizontal bore, necessitating the fluid's safeguarding against collapse and the proper discharge of excavated material. Moreover, it maintains its flowability and material transport capabilities while in motion, all the while retaining its stabilising force. This distinctive consistency of the clay mineral renders Bentonite an indispensable component within HDD drilling fluids.

Reusing and reprocessing drill fluid can be undertaken by separating the solid matter (spoil) that has been extracted by the fluid in the execution of the drilling by means of a recycling or treatment unit and injecting the extracted drilling fluid back into a mixing unit to minimise the need continuous addition of bentonite and potable water. Spatial constraints of sites can prevent reusing and processing as space to install both the mixing and recycling unit is needed along with large scale generators in certain circumstances to power the units.

To treat drilling fluid at the completion of drilling works post processing unit extraction of spoil a water treatment plant is required to separate bentonite from water. Significant space is required to construct temporary holding structures or install tanks capable of holding extracted solution or evaporating the residual drilling fluid to generate drilling mud. Drilling mud and the testing and chemical properties it must meet for allowance to apply to land are defined by the NSW EPA in the resource recovery order for treated drilling mud (2014).

7.1.12 Best practice and industry advice

John Holland has an extensive breadth of experience in sustainability and water reuse initiatives in civil infrastructure projects, the extent of this combined industry knowledge and experience is reflected in the detailed initiatives identified, explored, and evaluated through qualitative and quantitative assessment/modelling in Section 6, Section 7.1, Section 7.2, **Error! Reference source not found.** and Appendix A of this CWRS.

This strategy has considered water use practices and advice from similar major infrastructure projects in NSW. The project has consulted and advised with the following projects in the development of the strategy:

- Sydney Gateway
- M7 Widening & M7-12 Interchange Project
- Botany Rail Duplication
- Sydney Metro - Eastern Tunnelling Package
- Sydney Metro - City and Southwest
- Western Sydney Airport
- WestConnex M4-M5 Link Rozelle Interchange
- Sydney Metro – Western Sydney Airport, Surface and Civil Alignment Works

John Holland has engaged with and sought relevant industry, agency, and regulator advice as necessary for groundwater and surface water runoff capture and reuse. With respect to the project WRS, the following agencies have been engaged with:

- NSW Environment Protection Authority (EPA)
- NSW Department of Planning & Environment, Biodiversity and Conservation Science (BCS)
- NSW Department of Planning & Environment, DPE Water
- NSW Department of Primary Industries, Fisheries (DPI Fisheries)
- WaterNSW
- Relevant Councils, including:
  - Wollondilly Shire Council
  - Penrith City Council
  - Liverpool City Council
  - Fairfield City Council
  - Canterbury-Bankstown City Council
- Certified Professional in Erosion and Sediment Control (CPESC)

The key opportunity for reuse of non-potable water identified, following consultation with the relevant agencies listed above, will be the capture and detention of water on site at the AWRC using the project's high-efficiency sediment basic (including its additional storage area). This approach has been reflected in the progressive erosion and sediment control plan prepared for the site (which incorporates the best practice and industry advice received from BCS) and implemented throughout construction, including the use of the water for dust suppression activities, where possible.

As construction progresses, John Holland will continue to work collaboratively with Sydney Water, suppliers, and subcontractors to investigate any future potential water reuse options on the project and will seek advice on those options from relevant agencies as needed.

7.2 Evaluation of reuse options per application

The subsequent assessment provides a comprehensive overview of the Project's identification and assessment of non-potable water sources for potential reuse, along with the status of implementation. The evaluation is delineated into two specific Project areas: AWRC (Advanced Water Recycling Centre) and Pipelines, as applicable. This division is based on the distinct variations in site layout and geographic positioning, which influence the spectrum of accessible water sources and opportunities within the ambit of the Project.

The evaluation included in Table 8 below will consider and identify opportunities as valid and feasible that:

- Are there significant water end uses across the construction phase, significance being defined by 5% or > than the total water demand.
- Deliver positive reduction in water demand and water reuse.
- Risks and opportunities in reference to section 7.1 considerations for each option for each water source.
- Are considered logistically and technically possible, posing an acceptable risk for the Project; and
- Have identified benefits that outweigh the whole of life costs through a viable financial payback period consistent with the Project construction period.

(Note, red light = unviable reuse opportunity, yellow light = reuse opportunity still under assessment, green light = viable reuse opportunity)*

Table 8 Evaluation of potential reuse options

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
Capture, detention and reuse of site surface water (*Consideration Ref: 7.1.4*)	Dust suppression, ablutions, compaction, washing, concrete curing and ERSED establishment and maintenance.	**Viable**	*Implementation: Q3 2023 – Q1 2026.*	**AWRC Site:** During the construction phase of the AWRC site, stormwater management basins will be utilised as sedimentation basins to capture and contain runoff and facilitate sediment removal. The areas associated with the proposed future on-site detention (OSD) basins, provides a suitable area away from waterways and flooding to be utilised for these basins. The capacity to function as sediment basins was confirmed in accordance with the Blue Book (Soils and Construction Guide Volume [1], 4th Edition for managing urban stormwater by the NSW government (Landcom, 2004)). Water supply during the construction phase, including water for bulk earthworks for the purpose of dust suppression and compaction will be provided from a combination of harvested stormwater runoff from within the construction sediment basins and potable water. It is proposed that across the construction site(s), additional temporary basins would be constructed, and existing on-site dams would be repurposed, where possible, to catch and store any runoff for reuse in the bulk earthworks. Mains water supply would be connected to the AWRC site before construction to top up harvested stormwater as required. The re-use of local runoff is expected to reduce potable demand.	

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
				In addition to the above mentioned sediment basins the flood detention basin to be constructed as part of the operational design, will provide additional volume for sediment controls during construction, should the project choose to implement high efficiency sediment basins (HES). These flood detention basin volumes provide the required 196 m^3/ha of storage to achieve the site sediment management approach if operated as HES. Either management approach, whereby the flood detention storages are used as traditional construction sediment basins or HES, will be able to be utilised for stormwater harvesting and reuse to replace potable water demand for end uses such as dust suppression following stormwater and runoff events from the construction areas. John Holland is currently engaging with the NSW EPA regarding construction-phase stormwater discharges and how this will be represented in the project's EPL and the role that the Water Pollution Impact Assessment (required under CoA E124) will have in determining the requirements for discharges off-site. When determined, these requirements will be incorporated into this SWGCSP. **Pipelines sites (Unviable)**: The pipelines facilities will primarily serve as a location to store pipes prior to installation and for construction personnel ablutions. The pipelines facilities do not require basins in accordance with Blue Book (Soils and Construction Guide Volume 1, 4th Edition for managing urban stormwater by the NSW government (Landcom, 2004)). The Project ultimately wants to limit the environmental footprint of the facilities and restrict ground disturbance as much as possible, as such capturing, detaining and utilising site water by means of basins or storage tanks isn't viable.	
Stormwater – Rooftop capture (*Consideration Ref: 7.1.4*)	Dust suppression, ablutions, compaction, washing, concrete curing and ERSED establishment and maintenance.	**Viable**	*Implementation: Q3 2023 – Q1 2026.*	**AWRC & Pipelines sites:** Rainwater will be captured on all Project sites in which spatial and logistical setup allow roof capture constraints permit. The installation of rainwater capture through roof canopy drainage/tanks and associated infrastructure are to be installed where the return on investment (ROI) threshold is achieved. John Holland has calculated that an average roof area of greater than 1450m^2 installed and in place for a period of 2.5-years or more during the construction period is required to achieve Project ROI based on regional rainfall projections in Table 5.	

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
				All current Project compound layouts (Appendix B) have been assessed for viability to achieve ROI. Due to the spatial restrictions of the Pipelines compound areas needing to be utilised for pipe storage there is little to no roof space provided at the Project ancillary facilities. The AWRC Site is the only viable facility for capture and reuse with a roof space of greater than 1450m^2. The Project cost benefit analysis is provided in Appendix A for information. Please refer to **Error! Reference source not found.** for a site compound specific assessment.	
Extraction of water from local waterways & neighbouring dams (*Consideration Ref: 7.1.5*)	Dust suppression	**Unviable**	*Implementation:* Not feasible for Project implementation.	**AWRC & Pipelines – Local Waterways** The Project conducted a detailed assessment of the feasibility of extracting water from local waterways, including the Nepean River, South Creek, and Kemps Creek. Following this evaluation, the decision was made not to pursue a Water Access Licence (WAL) for surface water extraction due to the significant limiting factors associated with utilising these sources. The findings of the assessment are outlined below: • South Creek: South Creek was initially considered due to its proximity and potential access points for the construction of the AWRC. However, as an ephemeral waterway, the creek's water supply was found to be inconsistent and unreliable. Furthermore, the surrounding land is prone to flooding, and accessing the creek for water extraction would have required extensive infrastructure construction, such as roads and elevated pump stations outside the floodplain. These works were deemed unfeasible within the Project's timeline and budget. Consequently, South Creek was excluded as a viable option, and the on-site high-efficiency sediment basin was identified as a more practical and cost-effective alternative for water storage and reuse purposes. • Kemps Creek: Kemps Creek, a tributary, was also assessed. However, areas nearby that connected to tributaries were determined to be ephemeral waterways with unreliable water supplies. Additionally, viable access points would have required crossing private land or active construction zones, including the Western Sydney Airport and Western Sydney Metro train line works. These logistical challenges made Kemps Creek an unfeasible option for water extraction. • Nepean River: The Nepean River was identified as a more reliable water source compared to South Creek and Kemps Creek, but its location limited its practicality. It was only in proximity to one of the Project's treated water pipeline retrieval pits and permanent discharge points, and the water requirements	

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
				for activities such as dust suppression were minimal compared to the logistical challenges of accessing this source. Transporting water from the Nepean River using water carts would have required a round trip of 24 km, which was deemed logistically inefficient and cost-prohibitive. The option of constructing a pipeline to the site was also considered. However, this would have required more than 20 land access agreements, substantial temporary works, and significant resources. Additionally, this option would have duplicated the treated water pipeline already planned for the Project's operational phase. For these reasons, the Nepean River was also ruled out as a viable water source. The decision not to pursue a surface water WAL was made in light of these combined factors. Instead, the on-site high-efficiency sediment basin was identified as the most practical and sustainable solution for meeting the Project's water requirements during construction. **AWRC & Pipelines – Neighbouring Landowner Stormwater Detention Dams:** The Project also examined the feasibility of using stormwater detention dams (farm dams) on neighbouring properties as a potential water source during construction. Several dams were identified near the AWRC site and along the pipeline alignment, but this option was ultimately deemed unfeasible due to a combination of logistical, financial, and ethical considerations. Dam near AWRC (1 km away): A stormwater detention dam located approximately 1 km from the AWRC site was identified as a potential water source. However, this dam was actively used by the landowner for irrigating crops and supporting farming operations. The Project determined that extracting water from this dam for construction activities would deplete the supply within weeks, leaving the landowner with insufficient water for their agricultural needs. In keeping with the Project's commitment to prioritising water availability for local agricultural businesses, particularly during prolonged dry periods, the decision was made not to request access to this dam. Dams near Pipelines (2–3 km away): Additional stormwater detention dams were identified along the brine and treated pipeline routes. However, these dams were located several kilometres away from the main construction sites, and access to them presented several logistical challenges, including: • The need to secure multiple land access agreements from neighbouring property owners.	

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
				• The construction of temporary infrastructure, including pumping systems, pipelines, hundreds of metres to kilometres of stabilised roads, and power sources to maintain pressure over long distances. These works would have required additional environmental approvals to construct. • The ongoing maintenance of pumping systems and associated infrastructure. These logistical and financial challenges rendered the use of these dams impractical within the Project's timeline and budget. Furthermore, many of these dams were critical for supporting agricultural activities, such as livestock and crop irrigation, particularly during periods of prolonged hot, dry weather and low rainfall. The Project prioritised safeguarding water resources for these regional needs over its own. Based on these findings, the Project determined that utilising neighbouring stormwater detention dams was not a feasible or ethical option. The on-site high-efficiency sediment basin was therefore selected as the preferred solution, as it provided sufficient water storage for construction activities—including dust suppression—without requiring external water sources.	
Stormwater – capture and reuse of existing underground stormwater systems (*Consideration Ref: 7.1. & 7.1.2*)	Ablution blocks and dust suppression.	**Unviable**	*Implementation:* Not feasible for Project implementation.	**AWRC Site:** The AWRC site has no formal existing stormwater system as it is a greenfield site. As such, the connection and extraction of a stormwater source is unviable for Project reuse. **Pipeline Sites:** Treated Pipeline All treated pipeline sites are situated in an equivalent setting to that of the AWRC site, there is no existing stormwater system in place to capture water from. Brine Pipeline The Project sites situated on the brine pipeline will be in areas with existing systems. Stormwater that is unaffected by project works will be diverted to existing stormwater drainage systems as per the Project's erosion and sediment control plans. John Holland doesn't intend to seek permission to intercept this existing water reuse with relevant local authorities. The compounds lack the required area to treat and store stormwater to a level acceptable for use and worker exposure. Due to the unknown pollutants and contaminants that could enter or runoff the sealed surfaces into the stormwater network the water sources present an unacceptable risk of contaminated water for reuse without processed wastewater treatment. The source furthermore offers an inconsistent supply due to reliance on rainfall. Due to these two major limiting factors the water source presents an unviable water source to the Project that poses a risk to worker exposure and is cost prohibitive for project return on investment.	

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
Extraction and reuse of groundwater (*Consideration Ref: 7.1.2 & 7.1.3*)	Compaction, irrigation & dust suppression.	**Unviable**	*Implementation:* Not feasible for Project implementation.	In addition to the groundwater investigations undertaken as part of the development of the EIS, additional site investigations for the purpose of furthering the design of both the AWRC and the treated water and brine pipelines has been undertaken by the project following contract award. The following observations have been made regarding groundwater levels relative to the design of the AWRC site and proposed depths of both the treated water and brine pipelines: **AWRC Site:** 3 additional geotechnical boreholes were established at the AWRC site, at key locations relative to significant structures on site, including the bioreactor and inlet structure. In consideration of the results from these boreholes and historical information obtained during the development of the EIS and subsequent preliminary groundwater monitoring events undertaken by Sydney Water (USC AWRC Pre-construction Groundwater Monitoring Event Report, Aurecon Arup, April 2022), groundwater at the AWRC site ranges from 0.5 – 1.0m below ground level (mbgl) at monitoring wells in close proximity to South and Kemps Creek; and high variability in monitoring well readings from the south to the north of the site, ranging between 1.3 - 2.4mbgl, respectively. **Pipeline Sites:** Brine Pipeline: 41 additional geotechnical boreholes were established along the proposed alignment, including at key waterway crossings, roadways and intersections, railway corridors and existing critical utilities. Groundwater was encountered in 17 of the boreholes with the average depth of groundwater being 2.85m mbgl. The average excavation depth for the BP is 1.8m, indicating that interaction with groundwater during pipe installation will likely be minimal. Treated Water (TW) Pipeline: 28 additional geotechnical boreholes were established along the proposed alignment, including at key waterway crossings, roadways and intersections. Groundwater was encountered in 21 of the boreholes with the average depth of groundwater being 3.74mbgl. The average excavation depth for the TW is 2.5m, indicating that interaction with groundwater during pipe installation will likely be minimal. Both alluvial and porous/fractured rock aquifers intersected by the project are within a “less productive groundwater source” category as defined by the NSW Aquifer Interference Policy criteria based on the relatively low number of registered supply bores, expected low yields and poor water quality (high salinity). Conclusion The results of the detailed investigation by Sydney Water & John Holland have detailed a low yield water source of high salinity. The amount possible for extraction thus make the feasibility from a practical application	

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
				and whole of life cost perspective unviable, furthermore the high salinity of the groundwater prohibits its use for the end uses identified due to the detailed limitations listed in section 7.1.3. Application of such a poor-quality water source would only worsen the ground conditions and create the potential for off-site discharge to the creeks bounding the Project.	
Recycled water network connection and extraction (*Consideration Ref: 7.1.9*)	Concrete activities, ERSED establishment and maintenance (spray grass, soil binder etc.) non-destructive digging, surface/cleaning washing, grit blasting, washing vehicles and plant, street sweeping and hydrostatic testing and wet commissioning.	**Unviable**	*Implementation:* Not feasible for Project implementation.	**AWRC & Pipelines sites:** No network/pipeline exists within a feasible pumping distance to the Projects main compound at the AWRC for the Project to utilise. The use of any such network is prohibited by cost and distance associated with installation of necessary infrastructure or delivery by water carts.	

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
Hydrostatic Testing & Wet Commissioning storage & reuse (*Consideration Ref: 7.1.10*)	Compaction, irrigation, dust suppression & testing reuse.	Feasibility: Refer to individual viable/unviable designations identified in the "Assessment Outcome"	*Implementation:* Implemented for dust supression and re-use of hydrostatic water in further testing and comissioning only. Period of implementation - *Q3 2023 – Q1 2024.*	**AWRC Site:** The Project is currently required to test, treat in-situ and discharge the water of each water retaining structure and asset of the recycle centre in sequence. The following applications have been considered and eliminated or remain under investigation: • Irrigation (***Unviable***) – Noting the limitations of reduced infiltration and increased soil dispersion identified in section 7.1.3 consistent the saline sodic soil profile of the AWRC site, application of water to land poses a significant Project risk. The volume of water requiring discharge post-test completion is greater than 1 megalitre (ML) in the majority of structure and asset testing. The discharge to land for irrigation purposes of >1 ML has a high likelihood of resulting in site inundation, due to the presence of saline sodic soils high likelihood of generating uncontrolled sediment laden water and this waters potential to discharge to locally waterways (South Creek). This poses an unacceptable environmental impact to the surrounding environment that the Project must prohibit and as such the end use of testing water for irrigation purposes has been concluded unviable. • Compaction & Dust Suppression (**Viable**) – The Project assessed the logistical limitations of retaining and reusing portions of the testing water within temporary detention basins. Whilst the total quantity of water required for testing exceeds 80 ML for the plant (excluding pipelines), the Project has limited space to store water at any one time. Where capacity is available within on-site temporary basins, the Project will transfer hydrostatic test water to these basins for treatment and eventual reuse for compaction and dust suppression. • Reuse of testing water in additional tests (**Viable**) - The Project has received approval from the Sydney Water to deviate from the Civil specification and associated guidelines to permit retainment and reuse of testing water providing the following requirements can be met: ○ Water exposed to concrete and concrete-lined structures is subject to increasing pH as a result of the alkali minerals in cement. Water with a high pH (above the neutral pH of 7) can result in risks of corrosion, scaling (due to calcium and magnesium carbonate build up reducing water flow), chemical precipitation issues, disinfection challenges due to reduced effectiveness in chlorine-based disinfection agents, skin irritation to Project personnel and inability to safely discharge due to the potential for environmental impact. The Project can reuse hydrotesting water provided in-situ monitoring and treatment is undertaken using pH correction chemicals to de-risk the potential reuse opportunity. ○ The staging of water retaining structures and asset testing, aimed at facilitating efficient water usage and movement, is restricted by the outcomes of prior tests and the readiness of designated areas. If a test fails or cannot be transferred to proceed with the next	 

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
				structure/asset, the water must be released. This enables re-testing, essential inspection to identify failure points, and access to assets for post-testing dry commissioning. For reference, John Holland's preliminary approach to water retention and reuse through staging can be found in Appendix C and is subject to change throughout construction as works progress. **Pipelines Sites:** • Irrigation, compaction, and dust suppression (**Unviable**)- The staging of pipeline construction works inhibits the use of hydrostatic testing water for the purpose of compaction and dust suppression at pipeline sites. Trenching and compaction works required for pipeline installation must be completed prior to the commencement of hydrostatic testing. As a result, there is limited to no opportunity to utilise testing water for such end uses at the completion of testing. The opportunity to retain and reuse will furthermore be prohibited by the spatially constrained compounds of the pipeline sites and the cost prohibitive nature of onboarding detention tanks with the capacity of holding water in quantities in excess of 1 ML. Irrigation has the identical limitations of the AWRC site mentioned above, prohibiting the discharge to land for such a purpose. • Reuse of testing water in additional tests (**Unviable**) – Sydney Water's Civil Specification requires that water used for pipeline pressure testing is tested and discharged in discrete 1 km sections. This requirement is designed to ensure the integrity of each section, maintain water quality standards, and minimise risks associated with cross-contamination or undetected leaks. While the Project considers whether a deviation from this specification could be justified, it is ultimately deemed unviable due to a range of practical and technical constraints. Many pipeline sections, as installed, have elevation differences that prevent gravity-fed transfer of water to subsequent sections. In addition, the sequencing and timing of pipeline installation and testing rarely align, so adjacent sections are seldom ready for testing at the same time. The narrow windows required to coordinate flow direction, installation, and testing make it extremely difficult to implement water transfer between sections. Given these constraints, even if the Project were to present a robust case for deviating from Sydney Water's specification, the actual benefit is negligible. In practice, very few—if any—sections are able to take advantage of such a deviation, meaning the approach does not deliver a meaningful outcome for the Project and is therefore not pursued.	

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
Vacuum testing in place of hydrostatic testing (*Consideration Ref: 7.1.10*)	Elimination of hydrotesting water all together (i.e reduction not re-use opportunity).	**Unviable**	*Implementation:* Not feasible for Project Implementation	**AWRC Site:** Vacuum testing was identified as a possible suitable alternative to hydrostatic testing for stormwater pipes. In accordance with WSA 02 (Sewage Code of Australia), vacuum testing is recognised as an acceptable and widely adopted method for assessing gravity sewer pipelines. However, upon further discussions with the project Designer's it was identified Vacuum testing would be unable to replicate the pressurised service conditions of the stormwater pipes. It is primarily designed for detecting infiltration in gravity sewers, whereas the main concern here is leakage under pressure. Additionally, vacuum testing risks false failures due to coupling seals not swelling, and its maximum achievable pressure is below the design operating pressure, leaving pipes untested for actual service conditions.	
Drilling Fluid used in pipe jacking, horizonal directional drilling and under bores (*Consideration Ref: 7.1.11*)	Drilling fluid circulation	**Viable**	*Implementation:* Q3 2023 to Q4 2024.	**Pipelines Sites:** Reuse and recycling of drilling fluid in drill rig operations: The satellite sites used to stage and house the required drilling rigs for the treated and brine pipelines have been assessed meeting the spatial constraints to establish the necessary mixing and recycling unit to limit disposal and maximise reuse of drilling fluid in construction.	
	Distillation of drilling fluid	**Unviable**	*Implementation:* Not feasible for Project implementation	**Pipelines Sites:** Transport, detention, and treatment of drilling fluid post drilling: The logistical and technical requirements of transporting drilling fluid from drill sites to the main AWRC compound to a treatment plant capable of separating the two mixtures don't pose an acceptable cost, time or environmental risk the Project is willing to accept. The cost to onboard personnel with the expertise to manage a treatment plant capable of treating the waste, the space required to house the plant and the time to transport the material to the plant past licenced treatment facilities in the area present a negative whole-of-life cost and the water extracted for reuse and bentonite for application to land wouldn't be significant quantities to make the process viable.	

Non-potable Water Source	Potential End Use	Evaluation of reuse option	Assessment timeframe/ implementation	Assessment Outcome	
Capture of water from construction activities (Concrete activities, non-destructive digging, surface washing, grit blasting, washing vehicles) (*Consideration Ref: 7.1.2*)	Concrete activities, ERSED establishment and maintenance (spray grass, soil binder etc.) non-destructive digging, surface/cleaning washing, grit blasting, washing vehicles and plant.	**Unviable**	*Implementation:* Not feasible for Project implementation	**AWRC & Pipelines sites:** Concrete activities, non-destructive digging, surface/cleaning washing, grit blasting, washing vehicles and plant wastewater. Utilising the above identified wastewater (detailed in section 7.1.2) as a potential non-potable water source for re-use has been assessed by the Project and concluded as non-viable for both AWRC and pipelines for the following reasons: • Not a significant end use during the construction phase (<5%). Immaterial and inconsistent quantities based on the concrete design and construction staging make capture, storage, and treatment unviable for financial payback consistent with the construction period and if treated wouldn't provide a positive reduction in order of magnitude for the work delivered. • Logistically, establishment of a water treatment system/plant won't be possible due to spatial and staging constraints within areas of digging, washing, blasting, drilling, concrete pours and subsequent curing activities. Pumping of the remaining water to a treatment plant outside the work zone would be limited and inconsistent in the result as the majority of wastewater used will be absorbed and/or evaporate making capture and pumping prohibitive. • The small quantity of wastewater captured through washout processes in site designated washout areas in accordance with environmental management practices has been assessed as technically unviable for on-site treatment due to the inconsistent mixture and quality of the water. As such this will be removed to a licensed wastewater treatment facility with processes and systems in place to treat such water in accordance with relevant regional wastewater legislation. • Technically, the inconsistent quality of wastewater and requirement for high quality water for concrete curing as per batcher specifications, Project civil specifications and the Australian Standard and Project restrict the use to clean water. Wastewater or recycled water that was treated to anything short of the highest standard of quality wouldn't be a viable alternative.	

Table 9 Water reuse assessment site compound specific (Ancillary site indicative compound layouts provided in Appendix B)

Ancillary facility / site	Area (m^2)	Roof Space (m2)	Roof Capture Viable	Water sources	Estimated volumes of rooftop capture	Proposed reuse	Considerations/ constraints	Duration / timeframes
AWRC	3900	1750	Yes, ROI threshold achieved.	Rainwater capture through roof canopy and sediment basins. Captured runoff from road	**Monthly** =108.79 kL **Total** = 3263.75 kL	Amenities/ Offices – Office & worker ablution urinal and toilet reuse. Construction activities - dust suppression, compaction, machinery/plant wash down or cleaning and erosion control watering (spray grass etc…).	• Water collected from site roofs and stored in tanks for extended periods will be classified as non-potable and unsuitable for human consumption. To ensure the safety of individuals, this non-potable water will only be used for toilet flushing and urinal purposes, minimising any potential health risks associated with human contact or consumption.Space constraints prevent water detention tank installation. • Financial payback greater than 30 months. – Achieved • Logistically and technically not possible to capture rooftop water due to the configuration of the Project offices, lunchrooms, and ablution blocks. • Limited access for water trucks for dust suppression and compaction purposes.	30 months
Pipelines - C5	3600	180	No, ROI threshold not met.	Potable Mains	N/A	Amenities/ Offices – Office & worker ablution urinal and toilet reuse. Construction activities - dust suppression, compaction, machinery/plant wash down or cleaning and erosion control watering (spray grass etc…).	• Space constraints and Project amenities need limit the amount of available roof space and the adequate space for a water detention tank installation. • Financial payback greater than 30 months. • Logistically and technically not possible to capture rooftop water due to the configuration of the Project offices, lunchrooms, and ablution blocks. • Space constraints prevent sediment basin establishment. • Legislative licencing and approval requirements from the EPA or DPE prevent capture and reuse. • Limited access for water carts to reuse water within sediment basin.	12 months

Ancillary facility / site	Area (m²)	Roof Space (m2)	Roof Capture Viable	Water sources	Estimated volumes of rooftop capture	Proposed reuse	Considerations/ constraints	Duration / timeframes
Pipelines - C6	27000	990	No, ROI threshold not met.	Potable Mains	N/A	Amenities/ Offices – Office & worker ablution urinal and toilet reuse. Construction activities - dust suppression, compaction, machinery/plant wash down or cleaning and erosion control watering (spray grass etc…).	• Space constraints and Project amenities need limit the amount of available roof space and the adequate space for a water detention tank installation. • Financial payback greater than 30 months. • Logistically and technically not possible to capture rooftop water due to the configuration of the Project offices, lunchrooms, and ablution blocks. • Space constraints prevent sediment basin establishment. • Legislative licencing and approval requirements from the EPA or DPE prevent capture and reuse. • Limited access for water carts to reuse water within sediment basin. • Sub-contractor and supplier capability to supply recycled water or capture and reuse water during construction activities. • Health risks associated with reusing construction water or groundwater. • Sub-contractor and supplier capability to supply recycled water or capture and reuse water during construction activities. • Sub-contractors and suppliers will alter throughout the construction period providing intermittent sources and no steady supply based on changing scope of works as the Project progresses	10 months

Ancillary facility / site	Area (m^2)	Roof Space (m2)	Roof Capture Viable	Water sources	Estimated volumes of rooftop capture	Proposed reuse	Considerations/ constraints	Duration / timeframes
Pipelines - C7	12640	250	No, ROI threshold not met.	Recirculating water from construction activities	N/A	Amenities/ Offices – Office & worker ablution urinal and toilet reuse. Construction activities - dust suppression, compaction, machinery/plant wash down or cleaning and erosion control watering (spray grass etc…).	• As above.	11 months
Pipelines - C11	4540	350	No, ROI threshold not met.	Potable Mains	N/A	Amenities/ Offices – Office & worker ablution urinal and toilet reuse. Construction activities - dust suppression, compaction, machinery/plant wash down or cleaning and erosion control watering (spray grass etc…).	• As above	12 months
Pipelines - C21	5600	520	No, ROI threshold not met.	Potable Mains	N/A	Amenities/ Offices – Office & worker ablution urinal and toilet reuse. Construction activities - dust suppression, compaction, machinery/plant wash down or cleaning and erosion control watering (spray grass etc…).	• As above	3 months

8 Total Water Consumption

The initial water balance assessment for the project has been completed, following the finalisation of the project's design and construction methodology. This assessment identifies the main water usage categories during the construction phase, as summarised in Table 10 and Figure 8. The analysis displays that the primary water demands are associated with landscaping, hydrostatic testing, site acceptance testing, and street sweeping.

A range of potential water reuse opportunities has been evaluated for feasibility. Those options considered both feasible and viable, as indicated in Table 8, have been integrated into the project's design and construction methodology. The project remains committed to increasing water reuse and minimising overall consumption by concentrating on the initiatives outlined in Section Six (6). As a result, the project achieves a substitution of 86.72 megalitres (ML) of potable water, representing a 13% reduction from the base case scenario.

Table 10 Summary of water consumption

CONSTRUCTION PHASE WATER USE	Base Case	% Total Contribution	Proposed Case	Substitution with non-potable	% Substitution
	Total (ML)	(%)	Total (ML)	Total (ML)	(%)
Site Facilities	5.22	1%	4.40	2.94	**67%**
Street sweeping	104.64	14%	81.58	25.90	**32%**
Dust Suppression	70.59	9%	17.49	15.13	**86%**
Subgrade Conditioning	2.39	0%	2.39	0.00	**0%**
Concrete Curing	13.09	2%	13.09	0.00	**0%**
NDD	1.39	0%	1.39	0.00	**0%**
Trenchless	8.09	1%	5.18	0.00	**0%**
Landscaping	399.37	52%	399.37	0.00	**0%**
Testing of Pipes - AWRC	1.55	0%	1.55	0.00	**0%**
Hydrostatic Testing - AWRC	93.78	12%	93.78	40.80	**44%**
Hydrostatic Testing - Pipelines and First Flush	15.11	2%	15.11	0.00	**0%**
Commissioning - SAT Testing	48.36	6%	48.36	1.95	**4%**
TOTAL	**763.58**	**100%**	**683.68**	**86.72**	**13%**

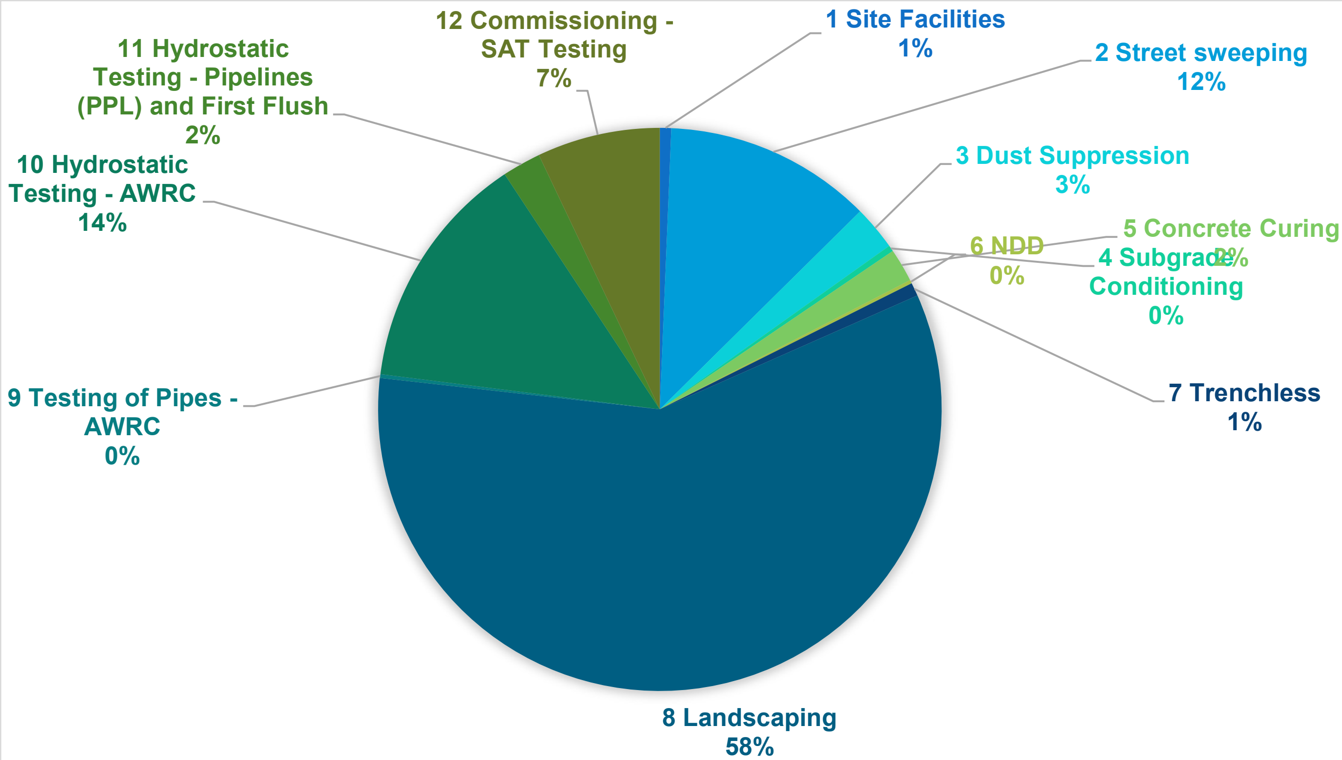


Figure 8 Percentage breakdown of water consumption per end use

9 Monitoring and management

The project's consumption of water summarised within Section 8 of this report will be regularly monitored and reported by John Holland through the establishment and implementation of a monitoring program managed by the project Sustainability Team and implemented by on-site construction personnel and sub-contractors.

The project Sustainability team will review all water use to ensure health and safety of project personnel and to monitor effectiveness of water avoidance and reuse strategies.

The project will monitor all water consumption sources (Table 11) throughout the construction phase to evaluate project performance towards ISC requirements and targets defined in Section 3.5.

Audits, inspections, and reviews of project performance, including water reuse, will be undertaken throughout project delivery and at the discretion of the Project Sustainability Manager as required.

Measurement and tracking will be through following measures:

- A permit system for reuse of any rainwater captured on site will be implemented in accordance with procedures set out in the Surface Water & Groundwater CEMP Sub-plan (USCP-JHG-MPL-ENV-0001).
- Water meters and sub-meters at key water use points.
- Water cart load tracking and reuse estimates.
- Smart metering at key locations to allow site water consumption to be monitored and recorded; and
- Project collation and evaluation of data through data collection portals (sub-contractors), Sustainability data registers and dashboards.

Table 11 Water data capture sources to be monitored during the Project.

Resource Type		Source/s	Responsible Party	Frequency
Water	Potable water	Project invoices Subcontractor monthly reports	Sub-contractor, JH Commercial Team	Monthly
		Water meter reads and smart meter dashboard.	Site personnel & Environment & Sustainability team	Monthly
	Non-potable water	Water meter reads	Site personnel & Environment & Sustainability team	Monthly
		Modelled consumption estimates (where water meter reads are unavailable)	Sub-contractor, commercial Environment Team	Monthly
		Subcontractor monthly reports Water Discharge & Reuse Permits		Monthly
	Water discharge	Water meter reads	Site personnel & Environment & Sustainability team	Monthly
		Modelled estimates (where water meter reads are unavailable)		
		Water Discharge & Reuse Permits		

Sustainability performance will be reported as per the requirements of the Sydney Water Engineering and Construction Contract, the EIS and ISC v2.1 credit requirements. The sustainability reports will include details on objectives, targets, indicators, etc. and identify areas for improvement.

Reporting will be conducted as per the Upper South Creek Project reporting requirements (Table 12), reporting will be consolidated and reviewed by the Sustainability team and provided to the project client representative monthly though summary dashboards and the public annually by means of the project annual Sustainability Report. The ISC targets set by the project and detailed in Section 3.5 will be reported and project achievement towards documented within the Annual Sustainability Report and ISC rating submissions.

Table 12 Project's sustainability reporting requirements

Reporting Requirement	Description	Frequency
Client		
Monthly Sustainability Progress Reporting	A monthly summary of key deliverables, risks, innovations/opportunities and performance summary in meeting sustainability requirements and targets will be provided to Sydney Water, as well as data on carbon emissions, waste disposal, concrete, and steel quantities in the form of dashboards extracted from the Project Sustainability Assurance Platform/tool.	Monthly
Presentation to Project Leadership Team	During design and construction, a quarterly summary of performance against the sustainability objectives and targets stated in section 3.3.1 Project wide targets.	Quarterly
Public Reporting		
Annual Sustainability Report	An annual sustainability report will be prepared for John Holland and include a performance update of sustainability requirements, implementation of strategies, targets and initiatives, climate change risks assessments, greenhouse gas reduction initiatives, life cycle assessments, sustainability in procurement and corrective actions taken where non-conformances are identified. The report will be prepared annually and provided for public viewing within 6 months of the end of the reporting period the 21st of April each year.	Annual (within 6 months following 21 April each year)
Legislation		
NGERS Reporting	The Project is required to report sustainability data to John Holland Group to fulfil legislative reporting requirements under the National Greenhouse and Energy Reporting Act 2007 (NGER Act).	Annual (Financial Year)
Infrastructure Sustainability Council		
ISC rating submissions	John Holland is required to obtain a Gold ISC rating for the Project for the Design and As-Built phases. Sustainability data captured by John Holland will be used to support the preparation and evidence towards the Project ISC rating submissions.	End of Design and Construction phases

10 Conclusion

John Holland is committed to using non-potable water sources and reusing water wherever possible and when feasible. As detailed within this Construction Water Reuse Strategy, currently the project is committed to delivering and further assessing viable water reuse opportunities identified in Table 8. The following key limitations require further consideration and assessment prior to the project committing to the delivery of further stormwater harvesting and reuse opportunities:

- Logistical limitations of retaining and reusing portions of the testing water within temporary detention basins that have no design stormwater catchment for use in compaction and dust suppression activities.
- Finalisation and acquisition of the necessary approvals to extract and use surface water during construction from a local waterway or neighbouring property.
- Resolution of limitation in reference to coordinated staging, deviation from specification and quality restrictions, devising a monitoring and treatment regime to enable the reuse of hydrostatic testing and site acceptance testing water.
- Site-specific soil testing is yet to be undertaken to confirm the appropriate settlement rate for the Project HES basin and further inform the basins final sizing is yest to be undertaken. Once testing is complete the Project will be able to confirm the capacity and ability of the basin to provide a surface and stormwater runoff source of non-potable water for reuse on-site.

As the project design and construction progress, John Holland will continue to work collaboratively to find a successful outcome with Sydney Water and our construction partners to make all possible endeavours with project suppliers and sub-contractors through the procurement process, construction planning and onboarding and site establishment processes, to implement the options identified as under review within Table 8.

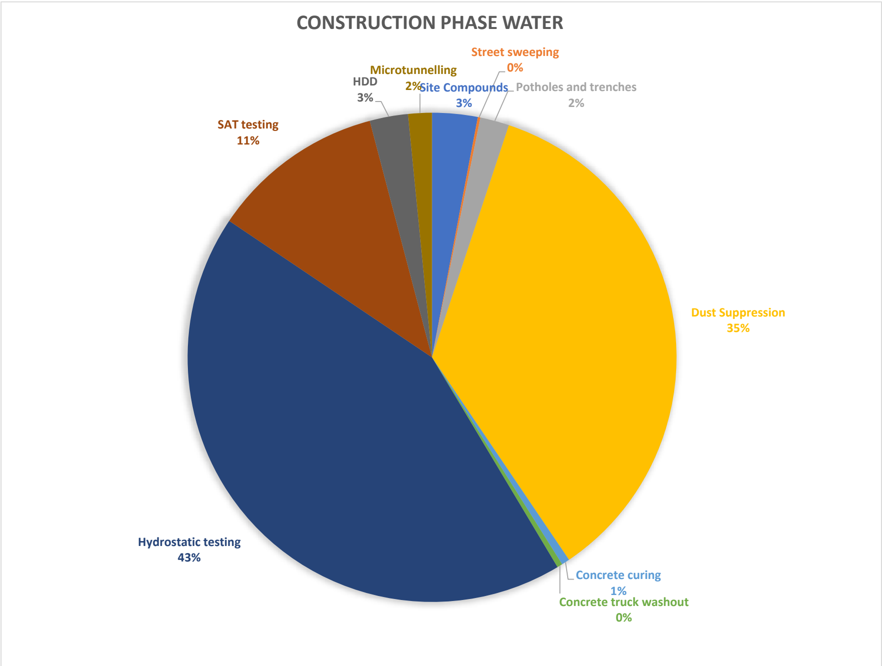
The project will continue to investigate any further identified water reuse options and will seek advice on those options from relevant stakeholders and agencies as needed.

This revision of the strategy serves as the finalised version, addressing both construction and operational phases. It will be submitted to the Planning Secretary as confirmation of the project’s comprehensive approach to water reuse, incorporating all requirements and outcomes as assessed in Table 8.

Appendix A: Viability Analysis for Stormwater Harvesting of Ancillary Facility/ Compound Roof Canopy

WAT-1 RESULTS SUMMARY

	Base Case	% Total Contribution	Proposed Case	% Total Contribution	% reduction
CONSTRUCTION PHASE WATER USE					
	Total (ML)	**(%)**	**Total (ML)**	**(%)**	**(%)**
Site Compounds	6.26	3%			
Street sweeping	0.34	0%			
Potholes and trenches	4.00	2%			
Dust Suppression	73.69	35%			
Concrete curing	1.10	1%			
Concrete truck washout	0.73	0%			
Hydrostatic testing	89.42	43%			
SAT testing	23.88	11%			
HDD	5.27	3%			
Microtunnelling	3.25	2%			
TOTAL Construction	**207.94**	**100%**	**0**	**0%**	**0%**
OPERATIONAL PHASE WATER USE					
	Total (ML/lifespan)	**(%)**	**Total (ML/lifespan)**	**(%)**	**(%)**
TBC					
TOTAL Operation	**0**	**0%**	**0**	**0%**	**0%**
TOTAL LIFECYCLE WATER USE	**207.94**				
LEVEL					



Upper South Creek

SITE COMPOUNDS

Results Summary

Wat-1	Base Case (ML)	Proposed Case (ML)	% Reduction	Comments
Site Compounds	6.26	4.32	31%	

Inputs and Assumptions

Mascot Site Office	Input	Unit	Source
Occupancy (hours)	40	hr/week	JHSW
Occupancy (days)	5	full days/week	JHSW
Duration of use	Whole construction Period, however, designers finish in early so capacity halves		JHSW
Number of staff			
Female staff on site at one time (average):	30		Staffing (JHSW)
Male staff on site at one time (average):	270		
Total staff on site at one time (average):	**300**		

Water Use Assumptions								
	Base Case				Proposed Case - TBC			
	Star Rating	Water Consumption	Unit	Source	Star Rating	Water Consumption	Unit	Source
Taps	WELS - 4 stars	7.5	L/min	Responsible Construction Leadership Guidelines (RCLG) and/or Green Star Potable Water Guide (2019) & Upper South Creek Base Case Proposal	RCLG - push button taps with aerat	3.5	L/min	Sustainability Specification, Base Case and RCLG min. requirements
Toilets	WELS - 3 stars	4	L/flush		RCLG - 3 stars	4	L/flush	
Urinals	WELS - 3 Stars	2	L/flush		RCLG - 3 stars	2	L/flush	
Showers	WELS	7.5	L/min		RCLG	7.5	L/min	
Dishwashers	3.5 Stars	1.35	L/place setting		4 Stars	1.35	L/place setting	

Fitting use assumptions									
General						Base Case		Proposed Case - TBC	
	No. uses	Unit	Time per use	Unit	Source	Base Case Daily Consumption	Unit	Proposed Case Daily Consumption	Unit
Wash Basin	3.3	per person per day	0.5	m per use	Responsible Construction Leadership Guidelines (RCLG) and/or Green Star Potable Water Guide (2019) & Upper South Creek Base Case Proposal	12.375	L per person per day	5.775	L per person per day
Toilets	1.3	per person per day	N/A	N/A		5.2	L per person per day	5.2	L per person per day
Urinals	2	per person per day	N/A	N/A		4	L per person per day	4	L per person per day
Showers	0.05	uses per person	5	m per use	Responsible Construction Leadership Guidelines (RCLG), & Upper South Creek Base Case Proposal and Green Star Industrial Potable Water Calculator Guide (2010) - Table 1	1.875	L per person per day	1.875	L per person per day
Dishwashers	0.05	per person per day	N/A	N/A	filled with 20 plates before wash	0.0675	L per person per day	0.0675	L per person per day
Kitchen Sink	1	per person per day	0.5	m per use	v1 Potable Water Calculator	3.75	L per person per day	1.75	L per person per day
Water Consumed	1	L per person per day	N/A	N/A	Assumption	1	L per person per day	1	L per person per day

Site data	AWRC Main Compound	C5	C6	C7	C11	C21	
Installation Date:	Sep-23	Jan-24	Sep-23	Sep-23	Aug-23	Oct-23	
End date:	Dec-25	Apr-24	Jul-24	Aug-24	Aug-24	Jan-24	
Duration (months):	27.98	2.99	9.93	11.28	12.03	3.02	
Duration (days):	851	91	302	343	366	92	
Duration (weeks):	122	13	43	49	52	13	
Duration (years):	2.33	0.25	0.83	0.94	1.00	0.25	
Working days (6 days a week-2 weekshut down):	699.452055	75	248	282	301	76	
Female staff on site at one time (average):	30	0	1	1	1	1	
Male staff on site at one time (average):	270	0	10	10	30	5	*C6 and C7 personnel based on 5 office workers and 15 site personnel (who I have assumed will only be using the facilities 1/3 of the time for prestart, smokos and lunch)
Total staff on site at one time (average):	**300**	**0**	**11**	**11**	**31**	**6**	

Calculations

	Base Case						
	AWRC Main Compound	C5	C6	C7	C11	C21	***No confirmed site compound at C5**
Wash Basin (L/day)	3712.5	0	136.125	136.125	383.625	74.25	
Toilets female (L/day)	156	0	5	5	5	5	
Toilets male (L/day)	1404	0	52	52	156	26	
Urinals male (L/day)	1080	0	40	40	120	20	
Showers (L/day)	563	0					*No showers in satellite compounds
Dishwashers (L/day)	20	0	1	1	2	0	
Kitchen Sink (L/day)	1125	0	41	41	116	23	
Water Consumed (L/day)	300	0	11	11	31	6	
Total daily consumption (L/day)	8,360	-	286	286	814	154	
Total monthly consumption (L)	254,291		8,709	8,709	24,764	4,695	
Total construction phase consumption (ML)	**5.85**	**-**	**0.07**	**0.08**	**0.24**	**0.01**	

	Proposed Case - TBC						
	AWRC Main Compound	C5	C6	C7	C11	C21	***No confirmed site compound at C5**
Wash Basin (L/day)	1732.5	0	63.525	63.525	179.025	34.65	
Toilets female (L/day)	156	0	5.2	5.2	5.2	5.2	
Toilets male (L/day)	1404	0	52	52	156	26	
Urinals male (L/day)	1080	0	40	40	120	20	
Showers (L/day)	562.5	0	0	0	0	0	*No showers in satellite compounds
Dishwashers (L/day)	20.25	0	0.7425	0.7425	2.0925	0.405	
Kitchen Sink (L/day)	525	0	19.25	19.25	54.25	10.5	
Water Consumed (L/day)	300	0	11	11	31	6	
Total daily consumption (L/day)	5,780	-	192	192	548	103	
Total construction phase consumption (ML)	**4.04**	**-**	**0.05**	**0.05**	**0.16**	**0.01**	

On site Rainwater Tank at AWRC Compound			
	Unit	Value	Source/ Assumptions
Tank connected to	No.	Toilets	Male toilet, femail toilets and urinals at AWRC
Number of tanks	No.	1	AWRC Site compound plans
Capacity total	L	15000	AWRC Site compound plans
Roof area available for water collection	m^2	1750	AWRC Site compound plans
Mean yearly Average Rainfall	mm	727.5	Bureau of Meteorology
Construction Period	months	30	Refer to Appendix B
Maximum potential rain capture per month	kL	108.7	Refer to Appendix B
Total rainfall captured over project	ML	3.261	Construction phase from Sep 23 to December 25
Total water required	ML	6.26	
Total water replaced	ML	2.64	AWRC site toilets
Total water replaced	%	42%	Formula

Upper South Creek

CONSTRUCTION WATER

Results Summary

Wat-1	Base Case (ML)	Proposed Case (ML) - TBC	% reduction	Comments
Street sweeping - AWRC	0.15			
Street sweeping - Pipelines	0.19			
Potholes and trenches	4.00			
Dust Suppression	73.69			
Concrete curing	1.10			
Concrete truck washout	0.73			
TOTAL	**79.86**			

Inputs and Calculations

Street sweeping - AWRC						
	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Source	Type	Potable Water				
Area to be swept	m2	10,000.00				Area provided by Construction team
	m2/day	1,666.67				
Total sweepers	No.	1.00				Water use per Sweeper
Duration	months	27.00				
	days	618.75				Assuming 5.5 working days a week and 50 weeks in a year (2 week shutdown)
Operation hours per day	hrs	8.00				Assume running from 8am to 4pm
Total street sweeper hours	hrs	4,950.00				
Spray per hour	L/hr	30.77				One street sweeper tank consumes approximately 200L of water across 6.5 hours
Total water consumption	**L**	152,307.69				
Total water consumption	**ML**	**0.15**				

Street sweeping - Pipelines						
	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Source	Type	Potable Water				
Area to be swept	m2	80,000.00				Area provided by Construction team
	m2/day	13,333.33				
Total sweepers	No.	1.00				Water use per Sweeper
Duration	Date	27.00				
	Days	618.75				Assuming 5.5 working days a week and 50 weeks in a year (2 week shutdown)
Operation hours per day	hrs	10.00				Assume running from 7am to 5pm
Total street sweeper hours	hrs	6,187.50				
Spray per hour	L/hr	30.77				One street sweeper tank consumpes approximately 200L of water across 6.5 hours
Total water consumption	**L**	190,384.62				
Total water consumption	**ML**	**0.19**				

Dust Suppression						
DEMOLITION - AWRC						
	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Total Exposed Area to be dust suppressed	m2	15,000.00				Area provided by Construction Team
Demolition program	Weeks	3.00				Demolition Program
	Days	16.50				Assume 5.5 working days a week
Hours per day	Hrs/day	10.00				
Average days rainfall	days/annual	68.90				Source: BOM Mean number of days of rain >=1mm at Badgerys Creek
	days/week	1.33				
Days requiring dust suppression	days	12.53				
Water Cart used	L	15,000.00				Assume 15,000L Water cart
Daily Water use rate	L/day	45,000.00				Assumption - 3 fills of water cart per day
Water Consumption rate per day	L/m2	3.00				
Total Consumption (L)	**L**	**563,625.00**				
Total water consumption	**ML**	**0.56**				

Dust Suppression						
SITE STRIPPING (TOPSOIL) - AWRC						
	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Site area cleared	m2	168,500.00				Source: Plant Programme - Inlet, Permanent OSD Basin, ACM, Bench.
Time Site Clearing Phase	months	3.00				Period of exposure prior to install of hardstand and application of spray seal and internal roads Souce: Plant Programme - August 2023 to November 2023. No 2 week shutdown.
	weeks	13.00				
Average days rainfall	days/annual	68.90				Source: BOM Mean number of days of rain >=1mm at Badgerys Creek
	days/month	5.74				
Days requiring dust suppression	days	54.28				Assuming 5.5 working days a week - 700-1700 Monday to Friday and 800 - 1300 Saturday
Water Cart used	L/load	15,000.00				
Average Number of Refills per day	No.	5.00				Assume 5 refills of water cart per day
Daily Water use	L	75,000.00				
Water Consumption rate per day	L/m2	0.45				
Total Consumption (L)	**L**	**4,070,625.00**				
Total Consumption (ML)	**ML**	**4.07**				

Dust Suppression						
STOCKPILES - AWRC						
	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Stockpiled material requiring dust suppression	m2	50,000.00				Area provided by Construction team
Water use rate for dust suppression (day)	L/m2	3.00				Based on water consumption rate per day for AWRC demolition dust supression. Based on 15,000L water carts and 3 refills per day
Period of Exposure	years	2.00				
	weeks	100.00				Assume 2 week shutdown per year
	days	550.00				Assume 5.5 working days a week
Average days rainfall	days/annual	68.90				Source: BOM Mean number of days of rain >=1mm at Badgerys Creek
	days/month	5.74				
	days/week	0.82				
Days requiring dust suppression	days	99.18				Assume 1 x wet down of stockpiles per week
Total Consumption (L)	**L**	**14,876,964.29**				
Total Consumption (ML)	**ML**	**14.88**				

Dust Suppression						
STOCKPILES - Pipelines						
	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Exposed area to be dust suppressed	m2	351.00				Source: C6 Site layout, stockpile area
Water use rate for dust suppression (day)	L/m2	0.45				Reference: Dust Management Plan, Meriton Site, URS, 2009
Period of exposure	months	10.00				Period of operation for C6
	weeks	43.33				
	days	238.33				
Average days rainfall	days/annual	68.90				Source: BOM Mean number of days of rain >=1mm at Badgerys Creek
	days/month	5.74				
Days requiring dust suppression	days	180.92				
Total Consumption (L)	**L**	**28,264.87**				
Total Consumption (ML)	**ML**	**0.03**				

Dust Suppression						
FILL/OPEN TRENCH - AWRC						
	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Total Exposed Area to be dust suppressed	m2	42,500.00				Source: Plant Programme
Average days rainfall	days/annual	68.90				Source: BOM Mean number of days of rain >=1mm at Badgerys Creek
	days/month	5.74				
	months	12.00				

	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Period of exposure	days	250.00				12 months of work, assumption from "Copy of Water Reuse_MT", assume 5 working days a week and 2 weeks shutdown
Days requiring dust suppression	days	181.10				Total days in a year minus annaul rainfall days
Equipment capacity	L	30,000.00				Based off 3 water carts (10,000L each)
Daily usage	L/day	60,000.00				Assume 2 fill of water cart for 3 water carts per day
Water use rate for dust suppression (day)	L/m2	1.41				
Total Consumpotion (L)	**L**	**10,866,000.00**				
Total water consumption	**ML**	**10.87**				

Dust Suppression

FILL/OPEN TRENCH - PIPELINES

	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Total Exposed Area to be dust suppressed	m2	120,000.00				Provided by Construction Manager and Team
Average days rainfall	days/annual	68.90				Source: BOM Mean number of days of rain >=1mm at Badgerys Creek
	days/month	5.74				
Period of exposure	months	12.00				Construction Programme
	days	275.00				12 months of work from construction programme, assume 5.5 working days a week and 2 weeks shutdown
Days requiring dust suppression	days	206.10				Total days in a year minus annaul rainfall days
Equipment capacity	L	30,000.00				Based off 3 water carts (10,000L each)
Daily usage	L/day	60,000.00				Assume 2 fill of water cart for 3 water carts per day
Water use rate for dust suppression (day)	L/m2	0.50				
Total Consumpotion (L)	**L**	**12,366,000.00**				
Total water consumption	**ML**	**12.37**				

Dust Suppression

BULK EARTHWORKS CUT TO FILL - AWRC

	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Total stockpile surface area	m2	61,400.00				Source: Plant Programme
Average days rainfall	days/annual	68.90				Source: BOM Mean number of days of rain >=1mm at Badgerys Creek
	days/month	5.74				
Period of exposure	months	24.00				Period of exposure assumption from "Copy of Water Reuse_MT) from Engineers and Site Supervisor
	days	550.00				
Days requiring dust suppression	days	412.20				
Equipment capacity	L	15,000.00				Assume water cart size of 15,000L
Daily usage	L/day	75,000.00				Assume 5 reflls of water cart per day
Total Consumpotion (L)	**L**	**30,915,000.00**				
Total water consumption	**ML**	**30.92**				
TOTAL						
Total water consumption	**L**	73,686,479.16				
Total water consumption	**ML**	**73.69**				

POTHOLES & TRENCHES

	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
No. of NDD trucks per day	no.	2.00				Construction Schedule
No. loads per day	no.	2.00				
Duration of Use	months	12.00				
	weeks	50.00				Assuming 2 week shutdown
	days	250.00				Assume no weekends
Equipment size	L	4,000.00				
Total Consumpotion (L)	**L**	**4,000,000.00**				
Total water consumption (ML)	**ML**	**4.00**				

Plant Equipment/ Construction Water Use

	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Water Source	Source	Potable				

Plant Equipment/ Construction Water Use

CONCRETE CURING

	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Water Source	Source	Potable				
Volume of concrete	m3	22,000.00				Based on Project design
Total no. of pours	no.	220.00				Based on constructability programe
Water requirement per pour	L	5,000.00				Based on information provided by engineers in "Copy of Water Reuse_MT"
Total water consumption (L)	**L**	1,100,000.00				
Total water consumption (ML)	**ML**	**1.10**				

Plant Equipment/ Construction Water Use

Concrete Truck Washout

	Unit	Base Case	Proposed Case	Reduction %	Replacement %	Notes
Water Source	Source	Potable				
Volume of Concrete	m3	22,000.00				Base Case - Tender BOQ, Proposed Case - FDD BOQ
Total no. of trucks	no.	3,667.00				Confirmed JHSW
Water volume per truck	L	200.00				
Total water consumption	**L**	733,400.00		1.00	1.00	
Total water consumption (ML)	**ML**	**0.73**				
TOTAL						
Total water consumption (L)	**L**	1,833,400.00				
Total water consumption (ML)	**ML**	**1.83**				

Upper South Creek

HYDROSTATIC TESTING VALUES

Results Summary

Wat-1	Base Case (ML)	Proposed Case (ML) - TBC	% reduction	Comments
AWRC	89.41			
AWRC - SAT	23.88			
Pipelines	0.01			
TOTAL	**113.30**	-		

Inputs and Calculations

AWRC Hydrotesting

BASE CASE

Inlet Works	Program Start	24/05/2024		Program Finish	12/06/2024								
Inlet Works Test 1													
	Top of Base	Top of Water for Test	300mm for stab	Effective Water Depth	Length	Width	Area	Internal Wall Length	Internal Wall Width	Internal Wall Area	Total Area	Total Volume	**kL Required**
Receival Chamber	48.40	53.49	0.30	5.38	11.00	8.00	88.00	0.00	0.00		88.00	473.62	**473.62**
Primary Screens	49.40	53.79	0.30	4.68	20.70	24.00	496.80	99.20	0.40	39.68	457.12	2,140.24	**2,140.24**
TOTAL kL Required	**2,613.85**	**kL**											
Inlet Works Test 2													
	Height First Lift	Dia	Volume	Height second lift	Dia	Volume	Total	**Total kL**					
Grit Collector Below Sus Floor	2.50	1.50	8.84	0.90	7.40	77.42	684.02	**684.02**					
	Top of Base	Top of Water for Test	300mm for stab	Effective Water Depth	dia	Total circular	Length	Width	Volume	Total Volume	**Total kL**		
Grit Collector Above Sus Floor	49.40	51.39	0.30	2.29	7.40	196.72	10.40	2.50	59.46	256.18	**256.18**		
	Top of Base	Top of Water for Test	300mm for stab	Effective Water Depth	Length	Width	Area	Internal Wall Length	Internal Wall Width	Internal Wall Area	Total Area	Total Vol	**Total kL**
Fine Screens and Outlet	49.40	51.69	0.30	2.59	18.20	12.20	231.88	36.00	1.00	36.00	195.88	506.74	**506.74**
	Height	Length	Width	Volume	**Total kL**								
Grit Collector Inlet Channel	1.30	7.00	6.07	55.24	**55.24**								
TOTAL kL Required	**1,502.18**	**kL**											

Bioreactor	Program Start	45,414.00		Program Finish	45,450.00								
				Program Test 1 Finish	45,435.00								
	Top of Base	Top of Water for Test	300mm for stab	Effective Water Depth	Length	Width	Area	Internal Wall Length	Internal Wall Width	Internal Wall Area	Total Area	Total Volume	**kL Required**
Per Ox ditch (For planning purpose)	39.02	46.49	0.30	7.77	85.63	24.29	2,079.95	239.56	0.40	95.82	1,984.13	15,416.68	**15,416.68**
Entire Tank (3 chambers)													**46,250.04**
Total Volume	**46,250.04**	kL											
Membrane Tank	Program Start	See below		Program Finish	See below								
	Top of Base	Top of Water for Test	300mm for stab	Effective Water Depth	Length	Width	Area	Internal Wall Length	Internal Wall Width	Internal Wall Area	Total Area	Total Volume	**kL Required**
Inlet Chamber	41.00	45.29	0.30	4.59	33.25	3.08	102.41				102.41	470.06	**470.06**
Membrane Train (5 of 10 for one test)	43.83	47.86	0.30	4.33	17.40	15.00	261.00				261.00	1,130.39	**1,130.39**
Membrane Train Sump Allowance				0.90	30.00	0.90	27.00				27.00	24.30	**24.30**
Outlet Chamber	43.58	47.86	0.30	4.58	37.65	2.00	75.30				75.30	344.95	**344.95**
		Program St		**Program Finish**									
TEST Inlet	**470.06**	28/07/2023		13/08/2023									
TEST Main Tank	**2,285.08**	4/04/2024		17/04/2024									
TEST Even Trains (separating walls)	**1,142.54**	18/04/2024		29/04/2024									
TEST OUTLET	**344.95**	17/05/2024		1/06/2024									
TOTAL Volume	**4,242.63**	kL											

Digester Tank	Program Start	45,386.00		Program Finish	45,418.00		(program is both tanks overlapping but 150 days float in program - plan for 1 after the other)		
	Wall Height	Freeboard	300mm for stab	Effective Depth	Dia	Area	Volume (m^3)	**kL**	
Conical Bottom (1 Tank)	2.50	0.00	0.30	2.80	25.00		458.15	**458.15**	
Tank Volume (1 Tank)	12.50	0.50	0.30	12.30	25.00	490.87	6,037.75	**6,037.75**	
Total 1 Tank							6,495.90	**6,495.90**	
Total 2 Tanks							12,991.79	**12,991.79**	Total for 2 tanks

Brine Tank	Program Start	45,476.00		Program Finish	45,520.00		(program is both tanks overlapping but 50 days float in program - plan for 1 after the other)		
	Wall Height	Freeboard	300mm for stab	Effective Depth	Dia	Area	Volume (m^3)	**kL**	
Tank Volume (1 Tank)	12.70	0.30	0.30	12.70	32.00	804.25	10,213.95	**10,213.95**	
Total 2 Tanks Water Vol							20,427.89	**20,427.89**	Total for 2 tanks

First Flush Tank									
	Top of Base	Top of Water for Test	300mm for stab	Effective Water Depth	Length	Width	Area	Volume	**Total kL**
	35.50	39.70	0.30	4.50	12.00	7.00	84.00	378.00	**378.00**
Disinfection Chamber							8.00		
	Top of Base	Top of Water for Test	300mm for stab	Effective Water Depth	Length	Width	Area	Volume	**Total kL**
	38.60	41.40	0.30	3.10	5.60	2.00	11.20	34.72	**34.72**
Drainage Pumpstations x 3									
	Wall Height	Freeboard	300mm for stab	Effective Depth	Dia	Area	Volume (m^3)	**kL**	
	6.00	0.30	0.30	6.00	4.00	12.57	75.40	**75.40**	
Total for 3 tanks							226.19	**226.19**	

Flow Splitter													
	Top of Base	Top of Water for Test	300mm for stab	Effective Water Depth	Length	Width	Area	Internal Wall Length	Internal Wall Width	Internal Wall Area	Total Area	Total Volume	**kL Required**
Inlet Chamber	38.80	47.06	0.30	8.56	16.00	6.05	96.80	20.70	0.50	10.35	86.45	739.84	**739.84**

AWRC Site Acceptance Testing (SAT) - Wet commissioning

Component	**Total Water Use (kL)**
MBR Trains	1969.7022
Digestor	6495.89731
Bioreactor	15416.68
Total	**23882.27951**

Pipelines Hydrotesting

Treated			
Water use for test (per 1 km)	0.63	kL	
Treated pipeline length	16.68	km	Pipeline design
Total water use	10.43	kL	

Brine			
Water Use for test (per 1km section)	0.10	kL	
Brine pipeline length	23.95	km	Pipeline design
Total Water use	2.49	kL	

Upper South Creek

TRENCHLESS - HDD and Microtunnelling

Results Summary

Wat-1	Base Case (ML)	Proposed Case (ML) - TBC	% reduction	Comments
Microtunnelling	3.25			
HDD	5.27			
TOTAL	**8.52**	-		

Inputs and Calculations

Pipelines Trenchless Crossings Summary

	Pipeline	Location	Crossing Type	Pipe Size (mm)	Pipe Type	Pit Size (m x m)	Length (m)	Maximum Depth IL (m)	Estimated Spoil Quantity (m3)	Program - Days	Per day approx (M3)	Water calculation (m3)	Water use (L)	Assumption
1	Brine	Elizabeth Dr - Western Road	HDD	DN450	PE100 PN20	2x2x2	366	11.15	180	20	8.98275		309,400.00	Received from subcontractor - SEE
2	Brine	Eastern Gas Pipeline	Micro Tunnelling	DN600 Jacking Pipe, DN450 Pipeline	RC (Jacking) PE100 PN20 (PVC)	6x3x6	140	5.72	429	25	17.14688	1286.016	1,286,016.00	Assume 3 m3 water used per m3 of spoil
3	Brine	Upper Canal	HDD	DN450	PE100 PN20	2x2x2	250	18.89	114	15	7.608333333		212,500.00	Received from subcontractor - SEE
4	Brine	M7	HDD	DN450	PE100 PN20	2x2x2	288	30.20	129	18	7.168888889		140,395.00	Received from subcontractor - UEA
5	Brine	Cowpasture Road/North Liverpool Rd	HDD	DN450	PE100 PN20	2x2x2	498	13.82	211	25	8.4586		243,612.00	Received from subcontractor - UEA
6	Brine	Elizabeth Dr	HDD	DN450	PE100 PN20	2x2x2	229	13.48	106	18	5.882361111		194,650.00	Received from subcontractor - SEE
7	Brine	Cabramatta Rd Culverts	HDD	DN450	PE100 PN20	2x2x2	236	10.68	109	15	7.242		212,500.00	Received from subcontractor - UEA
8	Brine	Cumberland Highway Crossing	Micro Tunnelling	DN450	PE100 PN20	2x2x2	150	10.47	75	10	7.4875	224.625	224,625.00	Quantity from Senior Project Engineer
9	Brine	Railway Crossing	HDD	DN400	PE100 PN20	2x2x2	271	16.88	122	16	7.64796875		109,874.00	Received from subcontractor - UEA
10	Brine	Lennox Reserve	HDD	DN450	PE100 PN20	2x2x2	178	15.90	86	15	5.724333333		151,300.00	Received from subcontractor - SEE
11	Brine	Prospect River	HDD	DN450	PE100 PN20	2x2x2	736	45.91	305	32	9.5275		357,591.00	Received from subcontractor - UEA
12	Treated Water	Badgery's Creek	HDD	DN1000	PE100 PN20	3x2x2	484	23.26	214	56	3.820892857		1,180,546.00	Received from subcontractor - UEA
13	Treated Water	Farm Dams - Elizabeth Dr	HDD	DN1000	PE100 PN20	3x2x2	322	26.06	150	40	3.759625		782,965.00	Received from subcontractor - UEA
14	Treated Water	The Northern Rd	Micro Tunnelling	DN1200 jacking, OD914	RC (Jacking), SCLSC FPBE	7x4x6	100	6.4	581	25	23.2525	1743.9375	1,743,937.50	Assume 3 m3 water used per m3 of spoil
15	Treated Water	Jerry's Creek	HDD	DN1000	PE100 PN20	3x2x2	302	19.25	595	37	16.07403649		589,123.00	Received from subcontractor - UEA
16	Treated Water	Nepean River	HDD	DN1000	PE100 PN20	3x2x2	400	32.5	716	51	14.04647059		781,570.00	Received from subcontractor - UEA
												HDD Total	**5,266,026.00**	
												Microtunnel Total	**3,254,578.50**	

Info from UEA (project subcontractor)

Crossing Location	Crossing Type	Pipe size (mm)	Cut size Inches	Cut size mm's	Expected Water usage (Litres)
Badgerys Creek	HDD	1000	49"	1246mm	1,180,546.00
Farm Dam	HDD	1000	49"	1246mm	782,965.00
Jerrys Creek	HDD	900	44"	1118mm	589,123.00
Nepean River	HDD	900	44"	1118mm	781,570.00
M7 Motorway	HDD	450	22"	558mm	140,395.00
Cowpastrure Road	HDD	450	22"	558mm	243,612.00
Cabramatta Rail	HDD	400	20"	508mm	109,874.00
Hume Highway/Prospect Creek	HDD	450	22"	558mm	357,591.00

Info from SEE (project subcontractor)

Brine Pipeline	Crossing type	Pipe dimensions			Pipe Type	Water usage (L)
Elizabeth Drive Crossing	HDD	2040	2404	364	DN450 PE100 PN20	309400
Upper Canal Crossing	HDD	7750	8000	250	DN450 PE100 PN20	212500
Monash Pl / Montgomery Rd - Elizabeth Drive Crossing No2	HDD	14298	14527	229	DN450 PE100 PN20	194650
Lennox Reserve (along Willowbank Cres)	HDD	22925	23103	178	DN450 PE100 PN20	151300

Appendix B: Indicative Site Layouts

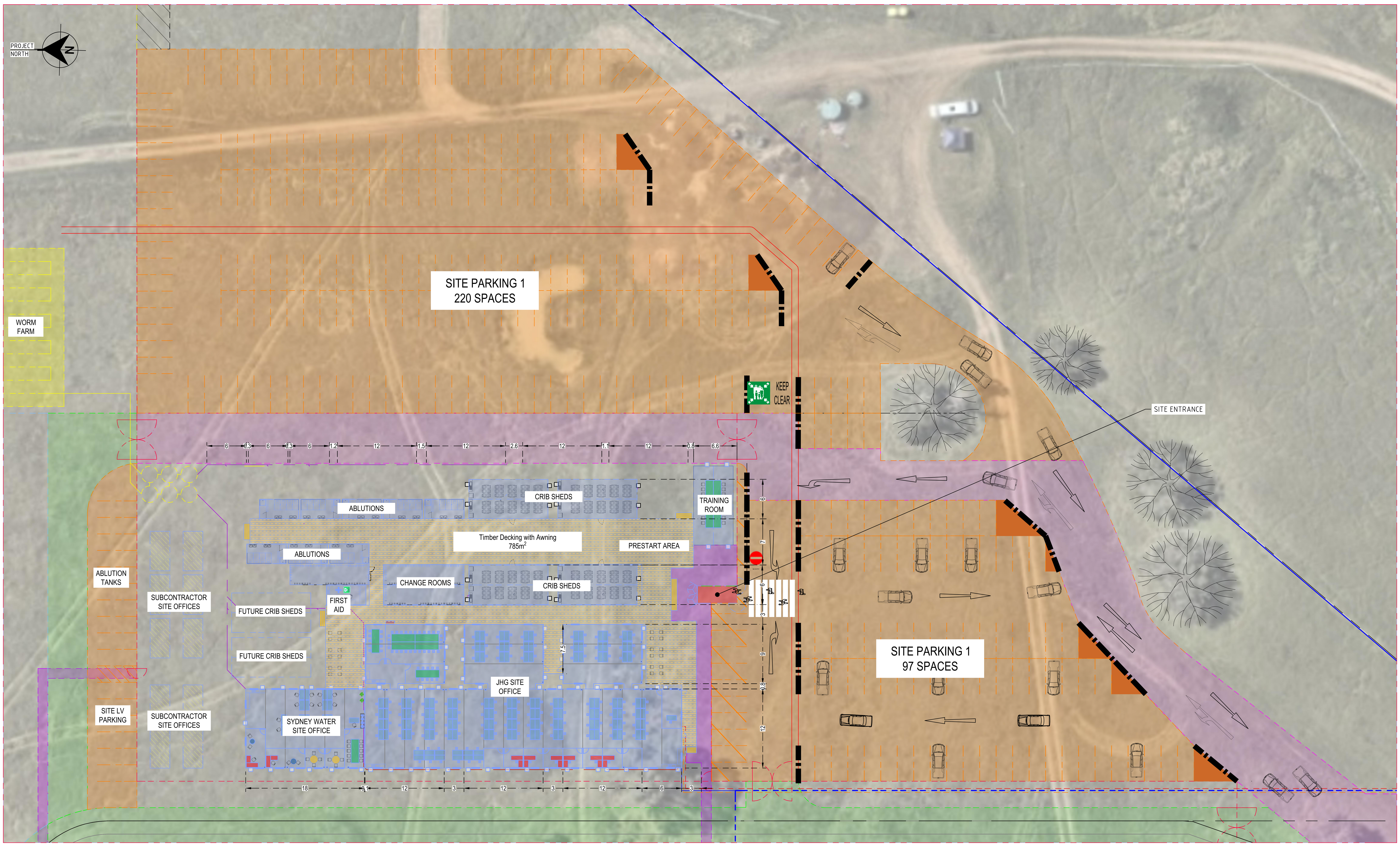
Viability Analysis for Stormwater Harvesting of Ancillary Facility/ Compound Roof Canopy

Ancillary Facility/ Compound(Refer to Table 6-2 within CWRS)	**Unit**	**AWRC Main Compound**	**C5**	**C6**	**C7**	**C11**	**C21**
Ancillary Site Total Area	m2	3168.00	3595.93	26970.56	12636.93	4535.87	6580.00
Rooftop Capture Area (**Note* If 0, No facilities to be Installed**)	m2	1750.00	179.19	990.00	250.23	352.00	520.00
Period	Months	30.00	12.00	10.00	11.00	12.00	3.00
Mean Rainfall (***Note Extracted from EIS Appendix N**)	mm	746.00	746.00	746.00	746.00	746.00	746.00
Monthly Rainfall	mm	62.17	62.17	62.17	62.17	62.17	62.17
Max Potential Rainwater Capture Per Month	kL	108.79	11.14	61.55	15.56	21.88	32.33
Total Rainfall Capture of Period of Ancillary Facility/ Compound	kL	3263.75	133.68	615.45	171.12	262.59	96.98
Sydney Water Supply Cost (2023–24 charge)	$ a kL	2.67	2.67	2.67	2.67	2.67	2.67
Savings p/y (Syd Water cost * Max Potential Rainwater Capture)	$	3485.69	356.91	1971.90	498.41	701.12	1035.75
Years on hire	Years	2.50	1.00	0.83	0.92	1.00	0.25
Total Savings over Installaiton (Compound) Life	$	8714.21	356.91	1643.25	456.88	701.12	258.94
Plumber Quote for Instillation (14000Litre Tank and setup)	$	7134.00	7134.00	7134.00	7134.00	7134.00	7134.00
Net Profit (Savings - Total Cost of Install)	$	1580.21	-6777.09	-5490.75	-6677.12	-6432.88	-6875.06
Return on Investment (ROI) (net profit/total cost of install)	$	**22%**	**-95%**	**-77%**	**-94%**	**-90%**	**-96%**
Simple Payback in years	Years	**2.0**	**20.0**	**3.6**	**14.3**	**10.2**	**6.9**

**Note - Sydney Water kL price extracted from Sydney Water Website. - 2023*

**Note for Ancillary Sites where compound setout is still under development, a 15% spatial requirement for Project site sheds is assumed.*

AWRC Site Compound - Indicative Layout



PLAN

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ABN: 11 004 282 268
LVL3, 63-65 PIRRAMA RD,
PYRMONT NSW 2009
PH: (02) 9552 4288

TRILITY PTY LTD
ABN: 48 053 122 562
LVL10, 115 GRENFELL ST,
ADELAIDE SA 5000
PH: (08) 8408 6500

GHD PTY LTD
ABN: 39 008 488 373
LVL15, 133 CASTLEREAGH ST,
SYDNEY NSW 2000
PH: (02) 9239 7100

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LETTER	DETAILS OF AMENDMENT	APP'D	DATE
1	PROGRESS ISSUE	A	9/3/23

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KEMPS CREEK SEWERAGE NETWORK
ST0079 WATER RESOURCE RECOVERY FACILITY - KEMPS CREEK

A1 PROJ No. 7027 DRAWING STATUS: FOR CONSTRUCTION

DRAWING No.

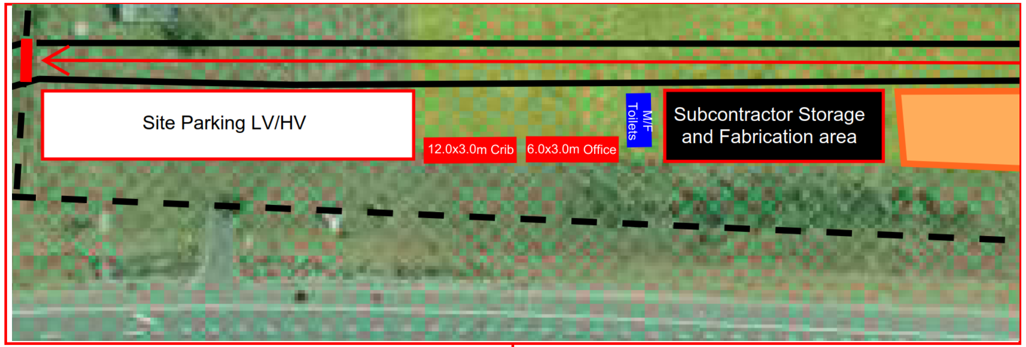
SHEET No. 1

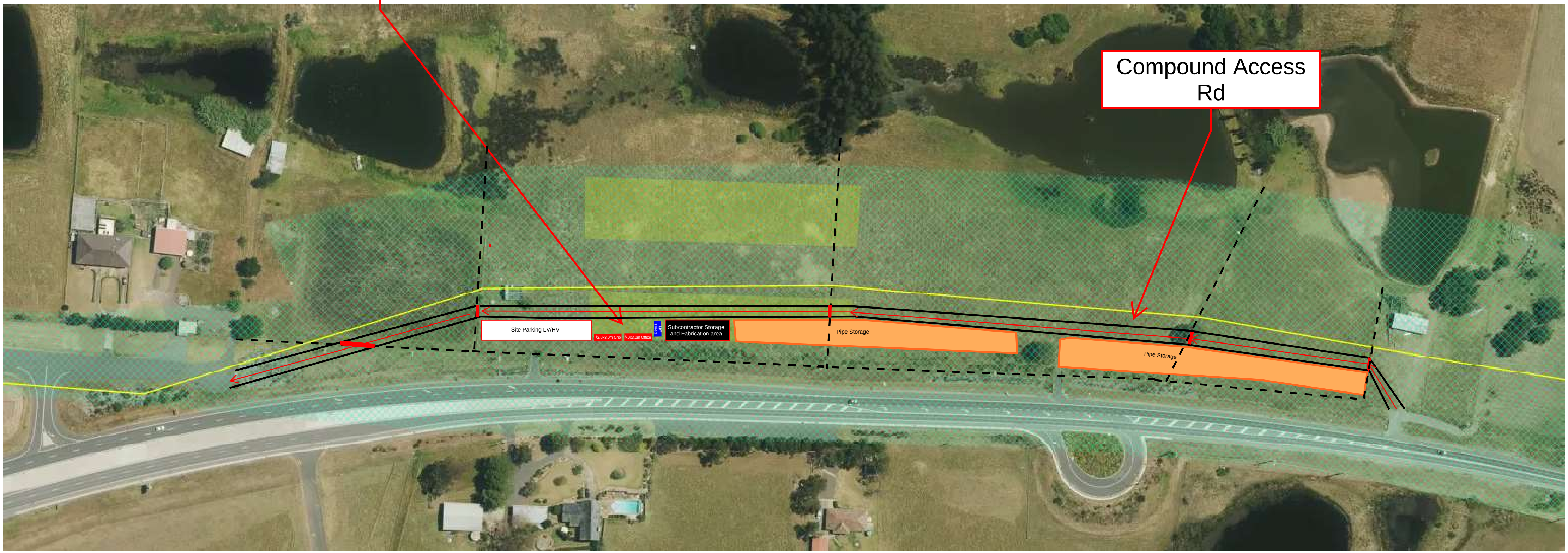
SWA1-EXT AUG 2014

Plot Date: 1 August 2023 - 3:15 PM Cad File No: C:\Users\shunt2\OneDrive - John Holland Group\Desktop\Site Layout CAD\Site Layout (Xref1).dwg

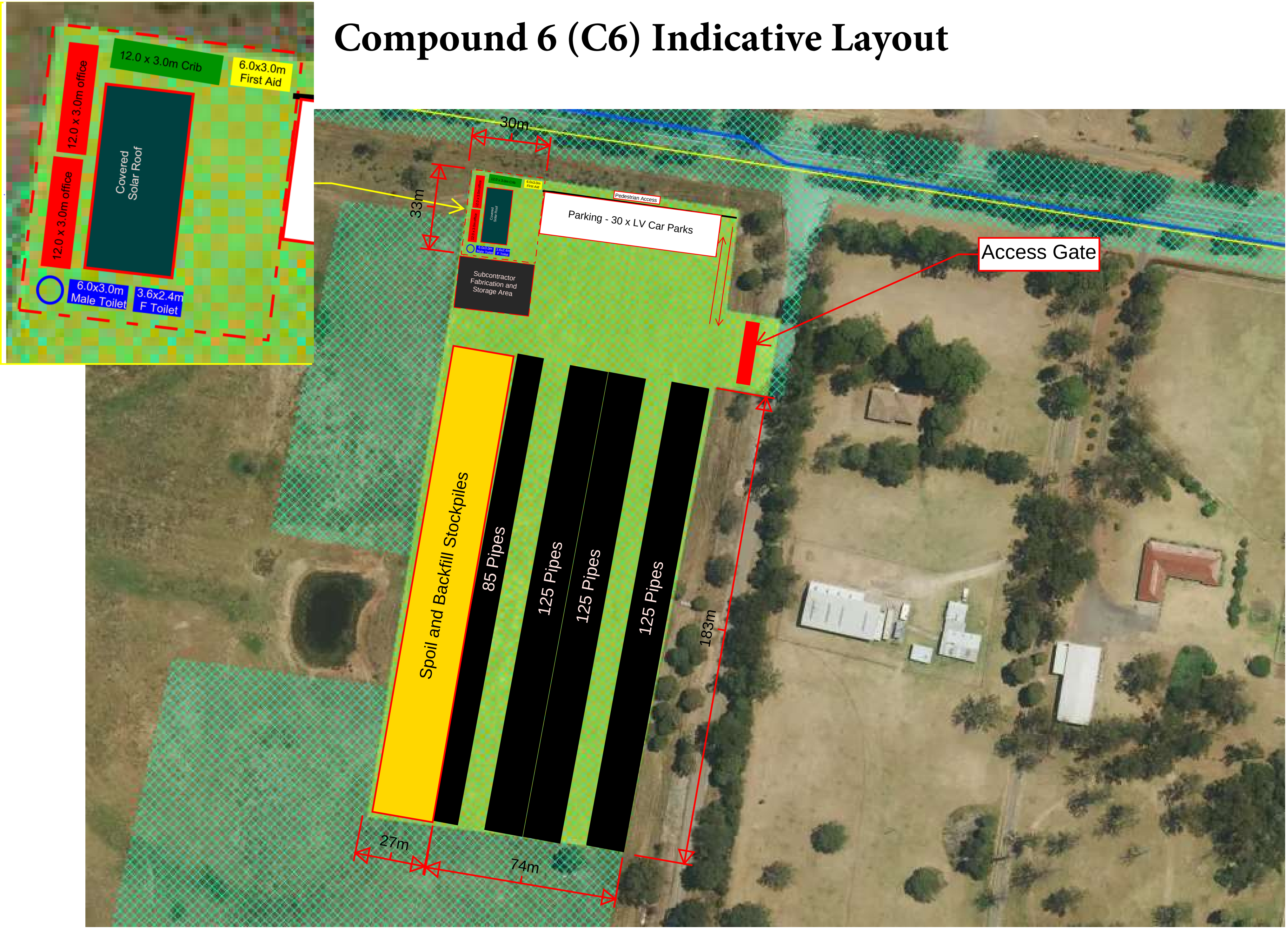
Compound 5 (C5) Indicative Site Layout

Compound 7 (C7) Indicative Site Layout



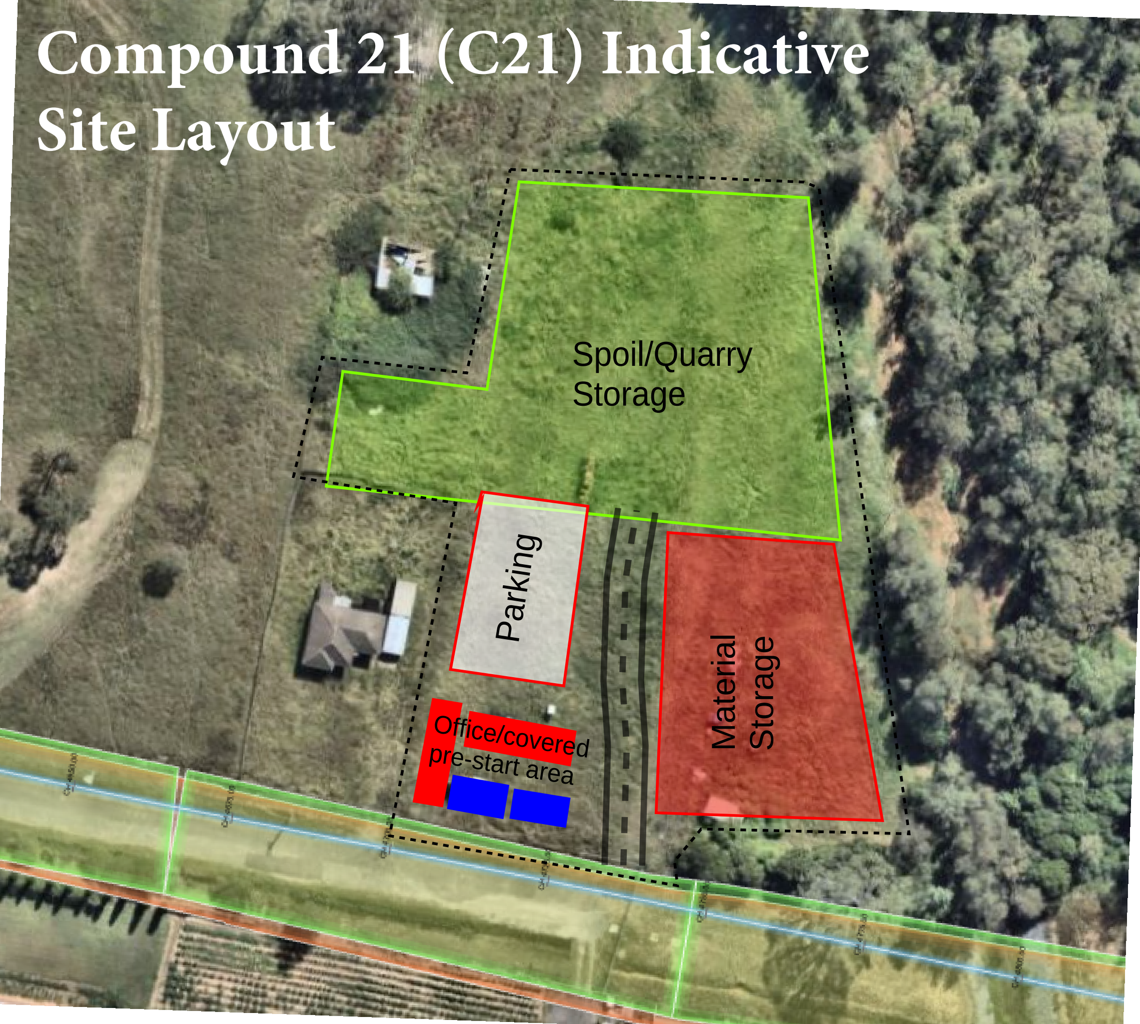


Compound 6 (C6) Indicative Layout



Compound 11 (C11) Indicative Site Layout

Compound 21 (C21) Indicative Site Layout



Appendix C: Hydrostatic testing & Wet Commissioning Water Retention and Reuse Unapproved Draft Methodology

<u>Stage 1:Oxidation Ditches</u>

Source - Water Main

i) OD#1 = 11.62 ML
-> ii) OD#2 = 11.62 ML
-> iii) OD#3 = 11.62 ML
-> iv) Outlet Channel = 0.546 ML

Notes:
Fill 1 ditch
Move water between diteches after each test

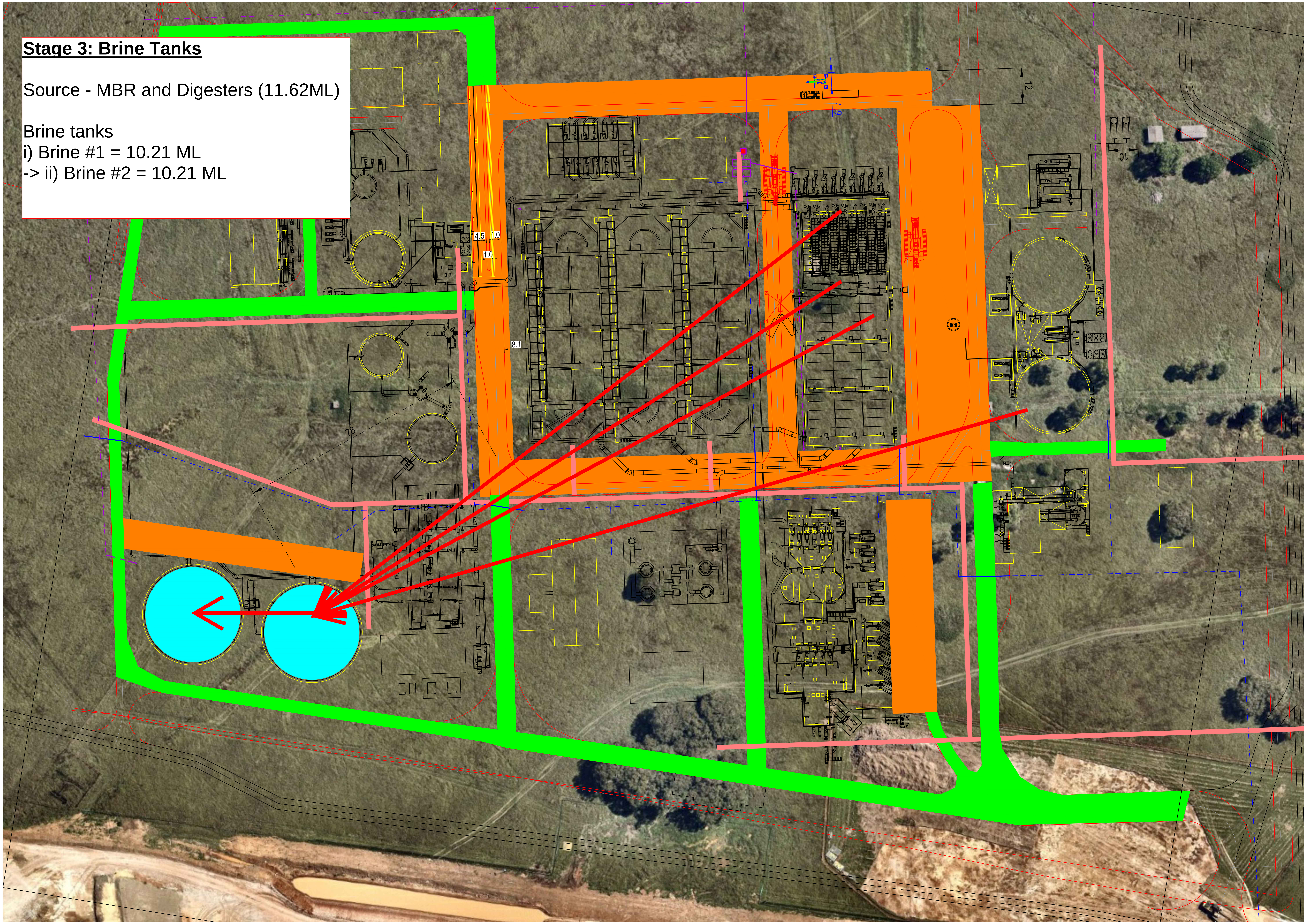
Stage 2:MBR and Digester Tanks

Source - Oxidation Ditches (11.62ML)

MBR
i) Anaerobic Zone #1 = 2.13 ML
& Feed mixing Boxes = 0.24ML
& MCR Cells x5 = 1.49ML
&BioR Outlet Channel = 0.54ML

-> ii) AZ#2 & MBR Cells
-> iii) AZ #3, MBR Inlet, Influent Splitter

Digesters
i) Digester #1 = 7.01 ML
-> ii) Digester #2 = 7.01 ML


Stage 3: Brine Tanks
Source - MBR and Digesters (11.62ML)
Brine tanks
i) Brine #1 = 10.21 ML
-> ii) Brine #2 = 10.21 ML
12
10
4.5
4.0
1.0
8.1

Stage 4: Inlet Works

Source - Brine Tanks (10.62 ML)

Inlet Works
i) Stage #1 (Coarse Screen) = 1.763 ML
-> ii) Stage #2 (Grit Chambers) = 0.791 ML
-> iii) Stage #3 (Fine Screens) = 0.633 ML