

# STRATEGY

## WATER REUSE STRATEGY



SMWSTCTP-AFJ-1NL-WA-STG-000001 Revision 02

Sydney Metro West – Central Tunnelling Package

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## DOCUMENT APPROVAL

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# 1. INTRODUCTION

This Water Reuse Strategy (WRS) has been prepared to inform the construction of the Sydney Metro West – Central Tunnelling Package (SMW-CTP). It identifies water sources and uses of potable and non-potable water during the construction period of the SMW-CTP.

## 1.1 SYDNEY METRO WEST

In November 2016, the NSW Government announced a new underground metro railway line will be built between Parramatta and the Sydney CBD to help cater for Sydney’s growth. Sydney Metro West will provide a direct connection between the CBDs of Parramatta and Sydney, linking communities not previously serviced by rail as well as supporting growth between the two major CBDs.

The Sydney Metro West (SMW) is located largely underground. Excavation of the tunnels and station boxes will be undertaken by a combination of Road-Headers (RHs), Tunnel Boring Machines (TBMs) and other excavation equipment.

## 1.2 CENTRAL TUNNELLING PACKAGE

In July 2021 AFJV was awarded the Sydney Metro West – Central Tunnelling Package (SMW-CTP) which forms part of the Sydney Metro West Project. The Central Tunnel Package (CTP) is a vital part of SMW, involving the construction of 11km of tunnels from The Bays to Sydney Olympic Park. A location map is shown in Figure 1.

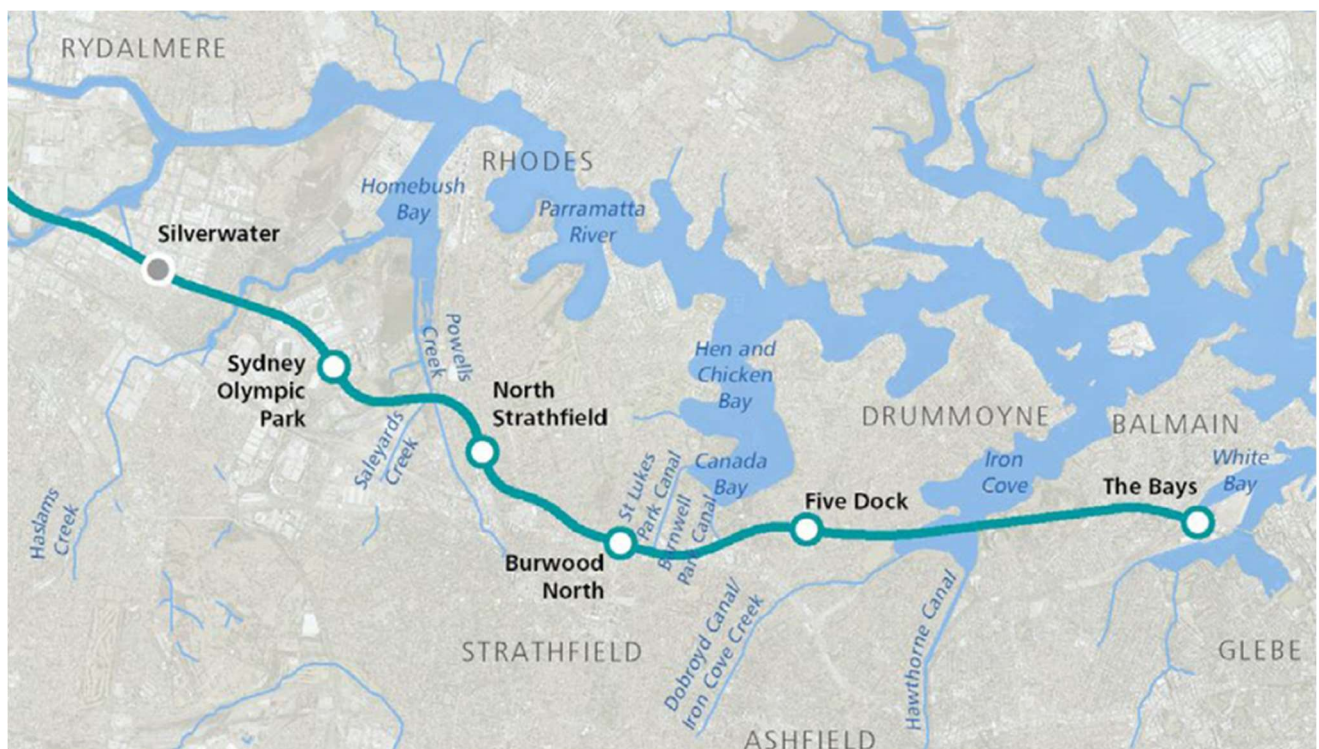


FIGURE 1: MAP SHOWING LOCATION OF THE SMW-CTP, EXTENDING FROM THE BAYS TO SYDNEY OLYMPIC PARK ONLY.

The CTP-SMW involves only the tunnelling and the station excavations, as the building of the permanent stations, buildings and landscaping will be undertaken by others. Commencement of design and construction is mid July 2021, and completion is anticipated in January 2025.

## 2. PURPOSE AND OBJECTIVES

### 2.1 PURPOSE

Acciona Ferrovial Joint Venture (AFJV) are committed to the responsible use and management of water on SMW-CTP. The purpose of this Water Reuse Strategy is to identify and evaluate options for water reuse.

### 2.2 MINISTERS CONDITIONS OF APPROVAL

The Sydney Metro West project has been assessed under Part 5, Division 5.2 of the Environmental Planning and Assessment Act, classified as Critical State Significant Infrastructure (CSSI), and approved by the Planning Minister in March 2021.

This Water Reuse Strategy has been prepared to meet Ministers Conditions of Approval No. D79, which is detailed in the table below.

TABLE 1 CONDITIONS OF APPROVAL RELEVANT TO WATER REUSE

Description	Addressed in this document
D79. A Water Reuse Strategy must be prepared, which sets out options for the reuse of collected stormwater and groundwater during Stage 1 of the CSSI. The Water Reuse Strategy must include, but not be limited to:	This document
(a) evaluation of reuse options;	Section 4
(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 5
(c) measures to avoid misuse of recycled water as potable water;	Section 5.4
(d) consideration of the public health risks from water recycling; and	Section 4.1.2
(e) time frame for the implementation of the preferred reuse option(s).	Section 5.2
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.	Section 4.1
Justification must be provided to the Planning Secretary if it is concluded that no reuse options prevail.	Section 4.1.4
A copy of the Water Reuse Strategy must be made publicly available.	Section 5.5
Nothing in this condition prevents the Proponent from preparing separate Water Reuse Strategies for the construction phases of Stage 1 of the CSSI.	Noted

## 2.3 OBJECTIVES AND TARGETS

The following water management objectives and targets have been established through the project deed, in particular the SMW-CTP General Specification and Particular Specification:

TABLE 2: WATER REUSE OBJECTIVES

Objective	Target	Measurement Tool
Manage water wisely and maximise reuse.	• At least 10% reduction in water use, based on an approved baseline	Measurement of water use against project predictions
	• At least 33% of water used is from non-potable sources	Measurement of water reuse, calculated as a proportion of total water use
	• Reuse at least 90% concrete production water into concrete production at onsite and offsite batching plants	Measurement of water reuse at the concrete batch plant, calculated as a proportion of total water use

## 2.4 SUSTAINABILITY RATINGS SYSTEMS

The following sustainability targets in IS Ratings Version 1.2, provided by the ISC, are relevant to water management for SMW-CTP. The relevant water credits being targeted are as follows.

TABLE 3 ISC TARGETS

ISC Credit	Name of Credit	Comments
Wat-1	Water use monitoring and reduction	This sustainability credit requires monitoring of water usage and comparisons with design stage modelling. Options to reduce potable water use are to be identified and be implemented.
Wat-2	Replace potable water	This sustainability credit measures the replacement of potable water with recycled water.

## 3. PROJECT WATER SOURCES

The following section describes the sources of water for the SMW-CTP construction works.

### 3.1 MAINS WATER

Mains water will be provided to the project from the Sydney Water supply network. This supply is metered and charged by the water utility and is considered to be the cleanest and safest water to use from a human health perspective.

### 3.2 SURFACE WATER

Surface water is generated when it rains, and at the construction sites the surface water run off has the potential to pick up sediment and dirt from the ground. Accordingly, surface water is managed by soil erosion and sediment controls prior to runoff leaving the site.

Due to space limitations, there will be limited opportunity to capture surface water in any significant volume. Surface water will be treated and diverted to the surrounding stormwater system. Surface runoff from the construction sites drains to tidal tributaries of Sydney Harbour and Parramatta River. The downstream waterways are tidal and generally representative of urbanised drainage systems.

### 3.3 GROUNDWATER

Under natural conditions, groundwater needs almost no treatment, as natural subsoil profiles actively attenuate many water pollutants. Trace elements of dissolved salts and ions mean groundwater can have variable quality.

On SMW-CTP groundwater will enter the tunnel construction areas from the surrounding water table. Groundwater ingress and any residual construction water (from rock bolting activities, for example) will be combined and pumped to the surface as one stream.

Groundwater inflow into the tunnels presents the greatest opportunity amongst the water source options for water reuse due to the consistency of supply.

### 3.4 RAINWATER

Rainwater is a highly variable water source and provides relatively small volumes compared to other water source options. Rainwater runoff from building rooves is considered a relatively clean source of water. Despite the variable nature of rainfall, some capture will be carried out with rainwater tanks connected to rooves on site sheds where practical.

### 3.5 OTHER WATER SOURCES

Where there are recycled water networks available, these will be considered for the SMW-CTP where applicable, depending on water quality. A reticulated treated recycled water service may be available at the Sydney Olympic Park site, and this will be further investigated. However other water sources such as greywater (wastewater from basins and sinks) and sewerage water (wastewater from toilet systems) are known to contain high microbial quality and their treatment would be expensive and are not considered feasible for reuse schemes within the project.

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## 4. EVALUATION AND SELECTION OF WATER REUSE OPTIONS

AFJV are committed to managing water wisely on SMW-CTP.

The use of reused water will be prioritised over the use of potable water on all sites where suitable quality and quantity is available. The supply of re-used water will be dependent on rainfall, groundwater inflow, construction activities, and availability of storage at each site.

The following section provides an evaluation of the water sources for the SMW-CTP construction works.

### 4.1 CONSIDERATIONS FOR WATER REUSE

The following water reuse considerations is based on best practice and advice has been sought from relevant agencies websites, as required.

#### 4.1.1 WATER RESTRICTIONS

The current status of water restrictions across New South Wales is displayed in the Bureau of Meteorology's Water Restrictions website, and for metropolitan Sydney:

<https://www.sydneywater.com.au/SW/water-the-environment/what-we-re-doing/water-restrictions/index.htm>

By 2021 the NSW Government has eased water restrictions, and in the Sydney area, the Sydney Water Corporation has released Water Wise Guidelines. These guidelines provide urban water



customers with water saving techniques such as limiting watering of lawns to certain times of the day, with the use of a hand-held hose.

According to the Water Wise Guidelines, for building and construction sites, it is permissible to:

- use water to clean paths, driveways, concrete or other paved areas for health, safety, emergency or surface contamination reasons and for construction activities using a hand-held hose fitted with an instant on-off mechanism, such as a trigger nozzle, or high pressure water cleaning equipment
- large use water for dust suppression if there is no alternative water source (such as recycled water) reasonably available
- use water to safely operate cutting, drilling and tunnelling equipment, or for pipe jetting.

#### 4.1.2 PUBLIC HEALTH CONSIDERATIONS

According to the NSW Health, all forms of household wastewater are a risk to human health and the environment; the website reference:

<https://www.health.nsw.gov.au/environment/water/Pages/wastewater.aspx>

Because of the risk associated with household type wastewater, these water streams will not be reused on the SMW-CTP.

Currently available water recycling guidelines, such as the *NSW Guidance for Recycled Water Management Systems* published in 2015 are geared towards water recycling at a utility scale such as local water utilities and water supply authorities. They are not geared towards private schemes such as those envisaged on SMW-CTP.

The public will not have access to or contact with the recycled water from SMW-CTP. Therefore, public health risks are considered negligible and further advice was not required from the relevant agencies.

#### 4.1.3 EXPERIENCE ON OTHER PROJECTS

Construction water reuse has been implemented on other major infrastructure construction projects in the Sydney area. These have involved predominately the reuse of groundwater and have been considered during the preparation of this strategy.

However, each project has their own project-based constraints due to local geography, levels of groundwater chemistry and contamination, and discharge criteria.

Actual volumes of water generated for reuse depend upon site specific groundwater ingress and amount of rainfall in a given period.

#### 4.1.4 EVALUATION OF REUSE OPTIONS

The following table summarises the evaluation of reuse options, noting that the aim is to meet the 33% water reuse target. Where a particular water source is not proposed for reuse, justification is provided.

TABLE 4 SUMMARY OF WATER SOURCE OPPORTUNITIES

Non-potable water source	Evaluation of reuse option	Justification
Groundwater	Preferred	Due to the volume and consistency of supply there is good opportunity for reuse of groundwater for some site activities. Groundwater would be treated by a site-specific water treatment plant prior to any reuse.
Rainwater	Possible	The reuse of harvested rainwater from site rooves is possible on SMW-CTP. However, the supply of



		<p>rainwater is highly variable and not a reliable source of reuse water.</p> <p>Rainwater tanks will be installed where there is sufficient space on site.</p>
Surface water (site stormwater)	Unsuitable	<p>Due to the limited space available, there will be limited opportunity to capture surface stormwater in any significant volume.</p> <p>Surface water will not be systematically captured for reuse and will be diverted through appropriate site controls to the stormwater system.</p>
Washdown water	Possible	<p>Washdown water, from the washdown of plant and equipment, will be captured at designated wash down areas where there is space on site to establish these.</p> <p>An example of where this may be feasible is at the Precast yard where there is likely to be an on-going need for washdown.</p>
Reticulated treated wastewater network at Sydney Olympic Park	Possible	<p>The reticulated treated wastewater network at Sydney Olympic Park will be further investigated. It is proposed to use an existing building as a temporary project office at Sydney Olympic Park, and it will be investigated whether there already exists any existing connection to this source. It is not feasible to make any new connections from this source to the building.</p>
Other wastewater sources	Unsuitable	<p>Not being used.</p> <p>Other water sources such as greywater (wastewater from basins and sinks) and sewerage water (wastewater from toilet systems) are not suitable because of the high microbial levels associated with these water streams.</p> <p>The treatment of this water is too expensive for reuse on the project and the health risks are too great.</p>

## 5. IMPLEMENTATION AND MONITORING

The following section describes the system of water reuse and the monitoring proposed for the SMW-CTP construction works.

### 5.1 PREFERRED REUSE OPTIONS

The preferred water reuse source is groundwater from the below-ground excavations.

Figure 2 shows a schematic arrangement demonstrating how the water strategy would be implemented where practical.

### 5.2 IMPLEMENTATION

During construction, groundwater ingress will not be generated until the station excavations are extended below the local groundwater table levels. At this point in time, the groundwater ingress will

be collected in the shaft and pumped to a site-specific water treatment plant, as indicated in figure 2. This is when the water reuse system will commence.

A water treatment plant will be located at each of the station excavation sites:

- The Bays
- Five Dock
- Burwood north
- North Strathfield
- Sydney Olympic Park.

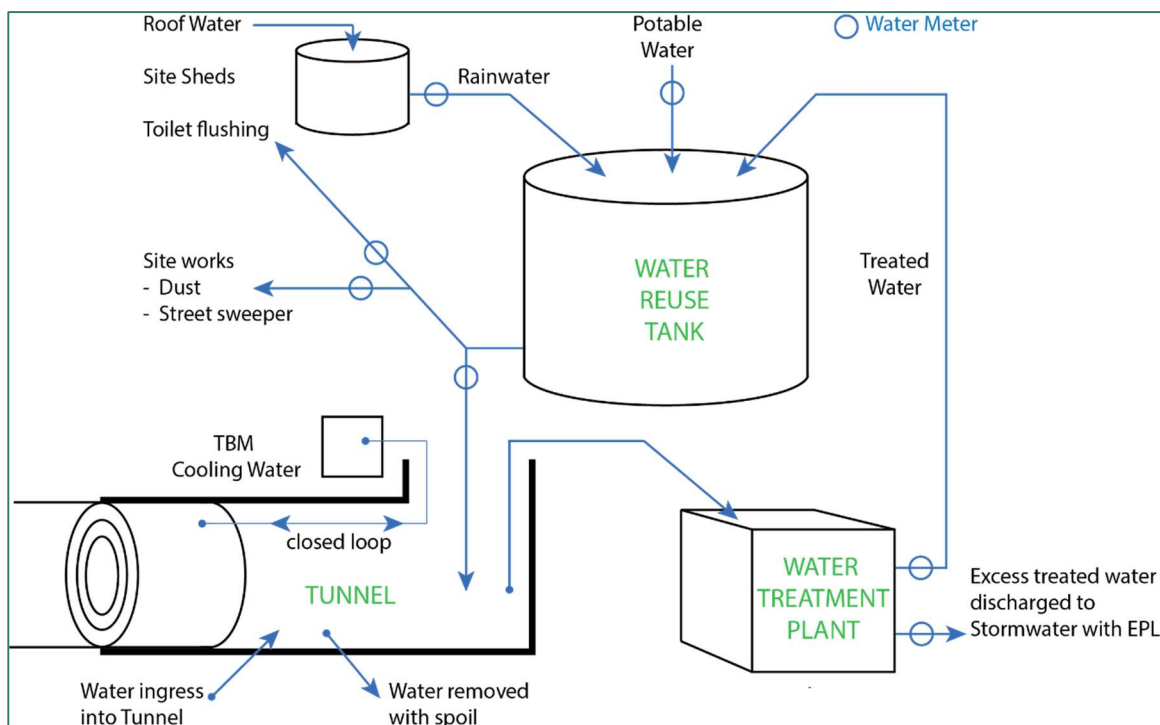


FIGURE 2: WATER REUSE POSSIBILITIES BEING CONSIDERED FOR SMW-CTP

Once groundwater is intercepted and the water treatment plants are in place, they will treat the collected water for the purposes of meeting the criteria for discharge to the downstream stormwater and waterway system, namely the 95% species protection level from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018.

However, if there is capacity in the Holding Tanks on site, the treated water will be directed to these tanks and held for reuse purposes as shown in Figure 2.

Treated water can be used for activities on site such as:

- Dust suppression during rock cutting
- Dust suppression and lubrication for underground activities
- Fill conditioning and compaction
- General surface and equipment washing
- Wheel washing, and
- Toilet flushing (if practical).

The volumes of water to be reused is dependent upon the amount of encountered groundwater and its ingress at the excavation site.

The volume of groundwater available for reuse is difficult to predict with accuracy. There will be necessary engineering controls implemented, such as grouting programs, that will minimise the amount of groundwater ingress into the excavations.

Table 5 lists the maximum permitted groundwater ingress rates at each of the station excavation sites, and may be taken as a possible maximum flow rate.

TABLE 5 MAXIMUM PERMITTED GROUNDWATER INGRESS RATES

Station Excavation Sites	Summary of permitted groundwater ingress*
The Bays	5l/s
Five Dock	0.95l/s (82kl/day)
Burwood north	1.32l/s (114kl/day)
North Strathfield	1.06l/s (92kl/day)
Sydney Olympic Park	1.61l/s (139kl/day)

\* Inflow criteria quoted from Design TAN 0040.2A

At the Precast facility, there is the possibility of collecting washdown water as soon as the facility is operational.

A preliminary water balance has indicated that overall the project is likely to consume approximately 1,322,000 kL of water, with 466,900 kL reused, generating a 35% recycled water rate.

### 5.3 ROLES AND RESPONSIBILITIES

Table 6 provides details of the roles and responsibilities specific to the implementation of this strategy.

TABLE 6 ROLES AND RESPONSIBILITIES

Project Role	Responsibilities
Project Director	Overall delivery of the project including satisfaction of the contractual and CoA including the sustainability requirements and water reuse.
Construction Director	Ensure that this strategy is implemented during construction of the Project.
Project Manager Tunnelling	Ensure that resources and direction is provide to the workforce to facilitate the re-use water options described in this strategy
Tunnel Superintendent	Ensure teams are trained in the water supplies available within the tunnel (i.e. potable and non-potable) and the safe & suitable uses of each water source

Water Treatment Plant Manager	Ensure that water recycling is undertaken safely
Precast Facility Manager	Ensure that Precast teams are trained in the water reuse opportunities available within the facility (i.e. potable and non-potable) and the safe & suitable uses of each water source
Sustainability Manager	Collect and report on water use and reuse data. Review and improve practices where warranted.

#### 5.4 AVOID MISUSE

The following actions will be undertaken to avoid the misuse of recycled water on the site:

- The water pipes will be marked to visually indicate the water type contained in each pipe
- Toolbox awareness training to inform work crews of the water reuse system
- Flow monitoring will be undertaken monthly during SMW-CTP, and data will help determine flow rate trends, and determine water recycle rates. If unexpected trends occur, these will be investigated.

#### 5.5 STRATEGY PUBLICLY AVAILABLE

This water reuse strategy will be made publicly available through the document website.

#### 5.6 RECORDS AND REPORTING

AFJV will retain records of:

- Monthly water usage and reuse data;
- Sustainability inspections;
- And the results of sustainability system auditing.

The Sustainability Manager will:

- Prepare estimates of the quantity of potable and non-potable water which is likely to be consumed during the course of the project. This will form the basis of a water balance study that will guide water management planning on site;
- Prepare a monthly sustainability performance update, which will include information on performance towards achieving sustainability targets.

During construction water use and reuse will be reviewed as part of quarterly internal sustainability audits. Annual external sustainability audits will also be conducted and will review water reuse performance against targets.

Data collected will form evidence for ISC sustainability ratings for the project.

#### 5.7 CONTINUOUS IMPROVEMENT

Continuous improvement of water recycling will be undertaken by the ongoing review and evaluation of water reuse performance against targets. If necessary, the Sustainability Manager will initiate interventions to improve performance.

#### 5.8 SUSTAINABILITY MANAGEMENT PLAN REVISION

Continual improvement is achieved through regular measurement, evaluation, audit and management review.

The Sustainability Management Plan will be updated to incorporate any changed or additional potential sustainability management measures. Affected personnel will be made aware of changes through toolbox talks, daily pre-start meeting, committees or forums arranged to specifically address changes.

## 6. TERMS AND DEFINITIONS

### 6.1 ABBREVIATIONS

Abbreviations used in this plan are shown in 7 below.

TABLE 7 – ABBREVIATIONS

<b>Abbreviation</b>	<b>Definition</b>
AFJV	Acciona Ferrovial Joint Venture
AIMS	Acciona Integrated Management System
CERT	TfNSW Carbon Estimate and Reporting Tool
CEMF	Construction Environment Management Framework
CTP	Central Tunnel Package
EMS	Environmental management System
GS	General Specification
HSEQ	Health, safety, environment and quality
IS	Infrastructure Sustainability
ISC	Infrastructure Sustainability Council
PS	Particular Specification
SMW-CTP	Sydney Metro West – Central Tunnelling Package
TfNSW	Transport for New South Wales
TCDCS	Tunnelling Contractors Document Collaboration System