SSTOM - Soil and Water Management Sub-plan

SMWSASSM-PLD-1NL-PC-PLN-000020

Parklife Metro D&C

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Approval Record

Revision	Author	Date	Issue	Reviewed by	Approved by
00	[redacted] Environment Manager	**26/06/2023**	Final Issue / IFI	[redacted] Environment Manager	[redacted] Project Director
01	[redacted] Environment Manager	**17/07/2023**	First Revision	[redacted] Environment Manager	[redacted] Project Director
02	[redacted] Environment Approvals	**11/07/2024**	Second Revision / Annual Review	[redacted] Environment Manager	[redacted] Project Director
03	[redacted] Environment Approvals	**12/12/2024**	Annual Revision / IFI	[redacted] Environment Manager	[redacted] Project Director
04	[redacted] Environment Approvals	**26/08/2025**	Revision for Appendix B - SWQMP	[redacted] Environment Manager	[redacted] Project Director
05	[redacted] Environment Advisor	**17/02/2026**	Annual Revision / IFI	[redacted] Environment Manager	[redacted] Project Director

[redacted]

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Amendment Record

Date	Revision	Version	Amendment Description
21/02/2023	A	1	Initial Draft
27/03/2023	B	1	Revised following Sydney Metro comment. Issue for external review
19/05/2023	C	1	Revised in response to review comments
09/06/2023	D	1	Revised in response to ER comments
26/06/2023	00	1	Final for ER endorsement and DPE review and approval
11/07/2023	01	1	Revised in response to DPE Comments
11/07/2024	02	1	Annual Review including update to Groundwater Monitoring Program (Appendix G)
11/07/2024	02	1	Not in use
11/07/2024	02	2	Not in use
11/07/2024	02	3	Annual Review including update to Groundwater Monitoring Program (Appendix G)
03/10/2024	02	4	Update following SM and ER comments
12/12/2024	03	1	Final issue for ER endorsement
17/06/2025	03	2	Minor updates and including update to Surface Water Quality Monitoring Program (Appendix B)
26/08/25	04	1	Final issue for ER endorsement
13/11/2025	04	2	Annual Review
17/02/2026	05	1	Final issue for ER endorsement

Details of Revision Amendments

Document Control

The Management Plan's owner Director or his/her delegate is responsible for updating this plan to reflect changes to the project, construction, legal and other requirements, as required.

Plan Authorisation

The implementation and distribution of this Management Plan is under the authority of the Project Director. All personnel employed on the Project will perform their duties in accordance with the requirements of this Management Plan, supporting management plans and related procedures.

Amendments

Any revisions or amendments must be approved by the Project Director and / or client before being implemented and distributed.

Acronym and Definitions

Abbreviation	Expanded Text
AEP	Annual Exceedance Probability
AHD	Australian height datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ARI	Average recurrence interval
ASS	Acid sulfate soils
Bgl	Below Ground Level
BMSP	Biodiversity Management Plan
CEMF	Sydney Metro Construction Environment Management Framework
CEMP	Construction Environmental Management Plan
CLM Act	*Contaminated Land Management Act 1997*
CMS	Parklife D&C Construction Management System
CoA	Conditions of Approval
CoC	Condition of Consent
CSSI	Critical State Significant Infrastructure
DPE	NSW Department of Planning and Environment (now DPHI and DCCEEW)
DPHI	NSW Department of Planning, Housing and Infrastructure (formerly DPE)
DPI	NSW Department of Primary Industries
DPIE	The former NSW Department of Planning, Industry and Environment
DSI	Detailed investigation report
EIS	Environmental Impact Statement
EMS	Environmental Management System
Environmental aspect or hazard	Defined by AS/NZS ISO 14001 as an element of an organisation's activities, products or services that can interact with the environment. The term 'hazard' is used throughout this CEMP and has the same meaning as 'aspect' for the purposes of compliance with ISO14001 requirements.
Environmental impact	Defined by AS/NZS ISO 14001 as any change to the environment, whether adverse or beneficial, wholly, or partially resulting from an organisation's environmental aspects.
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPL	Environment Protection Licence
ER	Environmental Representative nominated by the Proponent and approved by the Planning Secretary in accordance with CoA A27
ERP	Emergency Response Plan
ESCP	Erosion and sediment control plan
EWMS	Environmental Work Method Statement
EY	Exceedances per Year
Hold point	A verification point that prevents work from commencing prior to approval from the appointed authority.
Non-compliance	Failure to comply with the requirements of the Project approval or any applicable licence, permit or legal requirements
NVMP	Noise and Vibration Management Sub-plan
OEH	Office of Environment and Heritage

Abbreviation	Expanded Text
PD	Project Director
POEO Act	*Protection of the Environment Operations Act 1997*
RAP	Remedial Action Plan
REMM	Revised Environmental Mitigation Measures
SEP	Site Environment Plan(s)
SM	Site Manager
SMWSA	Sydney Metro – Western Sydney Airport
SSTOM	Western Sydney Airport Stations, Systems, Trains, Operations and Maintenance
WMSP	Waste Management Sub-plan
WQO	Water Quality Objectives

1 Introduction

This NSW (off-airport) Soil and Water Management Sub-plan (SWMP, this Plan) is applicable to the SSTOM Package of the Sydney Metro Western Sydney Airport (the Project). This Plan forms part of the Construction Environmental Management Plan (CEMP) for the Project and describes how Parklife Metro D&C will minimise and manage impacts to soil and water through the delivery of the SSTOM Works on NSW land (state-controlled land).

This Plan has been prepared to address the requirements of the:

- State Significant Infrastructure (SSI) 10051 Planning Approval (dated 23 July 2021)
- SSI 10051 Mod 1 (determined 14 April 2022), which includes a modification to Condition E4 to reduce the biodiversity offsets credit requirements
- SSI 10051 Mod 2 (determined 20 December 2024), which includes a modification to Condition E13 to decouple tree replacement from the Place, Urban Design and Corridor Landscape Plan and Condition E57 so that information on consultation, respite and out of hours work information be provided to the ER before out of hours work commences and to the EPA and Secretary on request. Sydney Metro Western Sydney Airport – CSSI Staging Report (Staging Report)
- AS/NZS ISO 14001:2015 Environmental Management Systems – Requirements with guidance for use
- Sydney Metro Construction Environmental Management Framework (CEMF)
- Environmental Impact Statement (EIS) and the Submissions Report, including the Revised Environmental Mitigation Measures (REMMs)
- Contractual requirements
- Applicable legislation (NSW and Commonwealth).

1.1 Background

Sydney Metro is Australia's biggest public transport program comprising four main packages of work including Metro North-West Line, Sydney Metro City and Southwest, Sydney Metro West, and Sydney Metro Western Sydney Airport. The Sydney Metro Western Sydney Airport will become the transport spine for Greater Western Sydney, connecting communities and travellers with the new Western Sydney International (Nancy-Bird Walton) Airport (referred to as Western Sydney International) and the growing region.

The Sydney Metro Western Sydney Airport EIS was prepared in October 2020 to assess the impacts of construction and operation of the Project and was placed on public exhibition between 21 October 2020 and 2 December 2020. The Project was declared a Critical State Significant Infrastructure (CSSI) Project and is listed in Schedule 5 of State Environmental Planning Policy (State and Regional Development) 2011.

The Sydney Metro Western Sydney Airport Project was approved by the Minister for Planning and Public Spaces on 23 July 2021 (SSI 10051) under section 5.19 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act). Modification 1 of the Project Approval, to reduce the biodiversity offsets credit requirements, was approved on the 14 April 2022. Modification 2 of the Project Approval, to modify Conditions E13 and E57, was approved on the 20 December 2024.

The Sydney Metro Western Sydney Airport Project involves the construction and operation of a new 23-kilometre metro line to connect Western Sydney suburbs from Bradfield in the south with St Marys in the north. The alignment includes a combination of tunnel, surface, bridges and viaduct sections, and comprises of six new metro stations between St Marys and Bradfield Station (formerly named Aerotropolis Core Station), as well as a stabling and maintenance facility and operational control centre to support the operation of the new metro railway line (see Figure 1).

FIGURE 1OVERVIEW OF SMWSA PROJECT

1.2 Scope

The scope of this SWMP is to describe how Parklife Metro D&C will minimise and manage soil and water impacts of the SSTOM Works and discuss how compliance and implementation of the applicable sections from the following documents, collectively referred to herein as the 'Project requirements':

- NSW Minister for Planning and Public Spaces Conditions of Approval (Conditions) and Modification 1 – Biodiversity Credits
- Revised Environmental Mitigation Measures (REMMs)
- Sydney Metro Construction Environmental Management Framework (CEMF).

The SSTOM Works scope as part of the Sydney Metro Western Sydney Airport Project includes:

- Installation of tracks, signalling, mechanical and electrical systems
- Construction of a stabling and maintenance facility at Orchard Hills
- Construction of the lower chamber of Bringelly shaft, along with capping and backfill
- Construction of the lower chamber of Claremont Meadows shaft, along with capping and backfill
- Construction of six stations, including:
    - A new metro station connecting to, and providing an interchange with, the T1 Western Line (part of the existing Sydney Trains suburban rail network) at St Marys
    - Two new metro stations between the T1 Western Line and Western Sydney International; one at Orchard Hills and one at Luddenham within the Northern Gateway Precinct
    - Two new metro stations within the Western Sydney International site; one at the Airport Terminal and one at the Airport Business Park, both of which are located on Airport land and are managed under a separate CEMP
    - A new metro station within the Bradfield precinct, south of Western Sydney International.
    - Construction of elements of station precinct works to integrate stations into surrounding transport modes, including relevant aspects of Place Urban Design and Landscape Corridor Plan (PUDCLP) within the scope of the Parklife Metro D&C contract.

The SSTOM Works also includes the supplying new driverless trains, and the operation and maintenance of the new metro railway line and its assets, which will be managed under the OEMP, separate to this SWMP.

2 Objectives and Targets

To assess the environmental performance relating to soil and water management during construction, environmental objectives and targets have been established. These objectives and targets have been developed to align with those established through the EIS and set out in the CEMF.

The environmental performance outcomes in relation to soil and water from the EIS (Chapter 14 and 16) and Staging Report are:

- Land and property beyond the construction footprint would not be impacted by construction for the 0.5 Exceedances per Year (EY) storm event
- No aspect of construction to affect existing water quality materially adversely in receiving waters to a minimum 0.5 EY storm event, or in line with the 'Blue Book' (Managing Urban Stormwater: Soils & Construction Volume 1 (Landcom, 2004)
- No material changes to channel shape within the construction footprint for the 0.5 EY storm event for streams classified first order and higher
- Water discharged from the Project, including runoff from hardstand areas, surface and ground water storages would:
  - Meet the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 (ANZG (2018)) default guideline values for toxicants at the 95 per cent species protection level, or 99 per cent species protection level for bioaccumulative and persistent toxicants, and
  - Contribute towards achieving ANZECC guideline water quality trigger values for physical and chemical stressors for slightly disturbed ecosystems in lowland rivers in southeast NSW, or
  - Meet any water quality criteria determined in consultation with the NSW Environment Protection Authority (off-airport) where an EPL is required or in consultation with Western Sydney Airport in accordance with the *Airports (Environmental Protection) Regulations 1997* (on-airport).
- Drainage from the project (including the stabling and maintenance facility, service facilities and stations) designed in accordance with local council requirements for managing urban stormwater quality and quantity
- For all land currently flooded up to the one per cent annual exceedance probability event, no change to peak flood levels up to the following limits, unless otherwise agreed with the affected property owner:
  - Residential, commercial, critical infrastructure – no new above floor flooding, maximum change of 10 millimetres for existing flooded buildings and maximum of 50 millimetres for properties where flooding is below floor level
  - Roads – maximum change of 50 millimetres
  - Crown land open space, farming, grazing and cropping land – maximum change of 200 millimetres.
- Where flood water velocities are currently below one metre per second (m/s), the project is designed and operated to ensure they remain below one metre per second. Where velocities are above one m/s, an increase of no more than 20 per cent is permitted
- No change to flood hazard vulnerability classification limits for residential and commercial buildings or roads
- No change to flood hazard vulnerability classification limits for all land types as a result of the location of the permanent spoil placement areas at Western Sydney International
- No change to the one per cent annual exceedance probability duration of inundation up to the following limits:
  - Residential, commercial, critical infrastructure – no increase for above floor flooding
  - Roads – maximum change of 10 per cent increase in duration
  - Agricultural land for cropping – dependant on cropping type
- For moderate and high fragility watercourses impacted by the project (as defined by the NSW River Styles mapping (NSW, Department of Planning, Industry and Environment 2019)), maintain existing flow regimes and velocities as best as possible to preserve and minimise changes to the watercourses
- Critical infrastructure (including stations entries and tunnel portals) to have immunity against the probable maximum flood event
- Contamination risks to human health and ecological receivers are minimised through effective management of existing contaminated land

- Contaminated land and soil within the footprint of the project is remediated where required, to ensure the land is suitable for the intended future land use.

Section 6.1, 7.1 and 12.1 of the CEMF provides objectives for the management of soil, and water during construction. Table 1 lists those relevant management objectives and identifies the targets and tools to be used by Parklife Metro D&C to meet those objectives.

TABLE 1 OBJECTIVES AND TARGETS

Objectives	Target	Measurement Tool
Soil and Surface Water		
Minimise pollution of surface water through appropriate erosion and sediment control	Soil erosion and sediment controls are implemented throughout the site in accordance with the approved Erosion and Sediment Control Plan (ESCP). 100% of ESC inspections are conducted on the following basis: • Weekly during environmental inspection, and • Following a rainfall event of >20mm in a 24-hour period.	Internal weekly inspections checklist Audit reports Weather monitoring records Wet weather inspection checklist
Minimise leaks and spills from construction activities	All plant on site to have maintenance records and pre delivery inspection report. All plant operators conduct regular Prestart plant checks. Maintain well-stocked spill kits on site.	Pre delivery inspection report Prestart inspection records Internal weekly inspection checklist Audit reports
Maintain existing water quality of surrounding surface watercourses	Conduct water quality monitoring program in accordance with the frequencies committed to in Surface Water Quality Monitoring Program (SWQMP, Appendix B). No pollution incidents resulting in environmental harm or regulatory action.	SWQMP and associated reporting Annual compliance auditing
Source construction water from non-potable sources, where feasible and reasonable	Implement water reuse program. Produce a water balance study prior to commencement of construction	Sustainability Reporting
Groundwater		
Reduce the potential for drawdown of surrounding groundwater resources	Conduct groundwater quality monitoring program in accordance with the frequencies committed to in Groundwater Monitoring Program.	Groundwater monitoring report
Prevent the pollution of groundwater through appropriate controls		
Reduce the potential impacts of groundwater dependent ecosystems		
Contamination		
Site contamination will be effectively managed to limit the potential risk to human health and the environment	100% of contamination identified is sent to a suitably licenced waste facility or remediated in accordance with a Remedial Action Plan (noting the hierarchy of controls in Figure 10 is applied appropriately)	Waste Tracking Registers Site Audit Statements
Manage site in accordance with applicable DSI's	All requirements of applicable DSI's are adopted during construction of the SSTOM Works	Waste Tracking Registers Water discharge and reuse registers

The performance of Parklife Metro D&C will be monitored against the objectives and targets (refer to Section 3.3 of the CEMP) and provide a compliance report at least on an annual basis as part of auditing requirements (refer to Section 3.9 of the CEMP).

In accordance with Condition C14 the SWQMP will compare actual performance of construction against the predicted performance. The SWQMP (Appendix B) details the water quality parameters and monitoring criteria.

The Sustainability Management Plan will detail the reporting and record management associated with greenhouse gas accounting and reporting.

3 Environmental Requirements

3.1 Relevant Legislation and Guidelines

Legislation relevant to this Soil and Water Management Plan includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Environmental Planning and Assessment Regulation 2021*
- *Contaminated Land Management Act 1997* (CLM Act)
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Protection of the Environment Operations Act (General) Regulation 2021*
- *Protection of the Environment Operations (Waste) Regulation 2014* (including relevant resource recovery orders and exemptions).
- *Water Management Act 2000*
- *Water Management (General) Regulation 2018*
- *Work Health and Safety Act 2011 (WHS Act).*

Additional guidelines and standards relating to the management of soil and water include:

- Acid Sulfate Soils Assessment Guidelines (ASSMAC 1998)
- Acid Sulfate Soil Manual. Acid Sulfate Soil Management Advisory Committee, NSW (ASSMAC 1998)
- Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting (collectively known as the 'ANZECC Guidelines') (ANZECC 2000)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 (ANZG 2018)
- Australian/New Zealand Standard 4452:1997 – The storage and handling of toxic substances
- Australian/New Zealand Standard 5026:2012 – The storage and handling of Class 4 dangerous goods
- Australian/New Zealand Standard 1547:2012 – On-site domestic wastewater management
- Australian Standard 1940-2004 – The storage and handling of flammable and combustible liquids
- Contaminated Land Guidelines - Consultants reporting on contaminated land (NSW EPA 2020)
- Contaminated Sites: Sampling Design Guidelines (NSW EPA 1995)
- Floodplain Development Manual – The management of flood liable land (NSW Department of Infrastructure, Planning and Natural Resources 2005)
- Guidelines for Controlled Activities on Waterfront Land Riparian Corridors (Department of Primary Industry 2012)
- Guidelines on the Duty to Report Contamination under the Contaminated Lane Management Act 1997 (EPA 2015)
- Guidelines for the NSW Site Auditor Scheme (3rd edition) (EPA, 2017)
- Managing Urban Stormwater: Soils and Construction (the 'Blue Book') (Landcom (2004)
- Managing Urban Stormwater: Soils and Construction. Volume 2D: Main Road Construction (the 'Blue Book') (DECC, 2008)
- Managing asbestos in or on soil (SafeWork NSW, 2014)
- Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land (Department of Urban Affairs and Planning & Environment Protection Authority 1998)
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (as revised 2013) (NEPM, 2013)

- PFAS –- National Environmental Management Plan Version 2.0 (HEPA, January 2020)
- Waste Classification Guidelines (NSW EPA 2014).

3.2 Project Requirements

The CoA relevant to the development of this SWMP are listed in Table 2. Other requirements relevant to this Plan are included in Appendix A.

TABLE 2 REQUIREMENTS FOR PREPARATION OF THIS SWMP

No.	Condition	Where addressed
SSI 10051 Infrastructure Approval (dated 23 July 2021)		
C1	Construction Environmental Management Plans (CEMPs) and CEMP Sub-plans must be prepared in accordance with the Construction Environmental Management Framework (CEMF) included in the documents listed in Condition A1 of this schedule to detail how the performance outcomes, commitments and mitigation measures specified in the documents listed in Condition A1 of this schedule will be implemented and achieved during construction.	This plan
C5	Of the CEMP Sub-plans required under Condition C1, the following CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP Sub-plan. Details of issues raised by a government agency during consultation (as required by Condition A6) must be provided as part of the relevant CEMP Sub-Plan when submitted to the Planning Secretary / ER (whichever is applicable). Where a government agency(ies) request(s) is not included, the Proponent must provide the Planning Secretary / ER (whichever is applicable) justification as to why. c) Soil and water – DPI Fisheries and relevant Councils	Section 3.5
C6	The CEMP Sub-plans must state how:	
	(a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;	Section 2
	(b) the mitigation measures identified in the documents listed in Condition A1 will be implemented;	Section 6
	(c) the relevant terms of this approval will be complied with; and	Section 7
	(d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles.	Section 6.13
C7	With the exception of any CEMP Sub-plans expressly nominated by the Planning Secretary to be endorsed by the ER, all CEMP Sub-plans must be submitted to the Planning Secretary for approval.	Section 3.6
C8	The CEMP Sub-plans not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all relevant undertakings made in the documents listed in Condition A1. Any of these CEMP Sub-plans must be submitted to the ER with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction or where construction is staged no later than one (1) month before the commencement of that stage.	Section 3.6
C9	Any of the CEMP Sub-plans to be approved by the Planning Secretary must be submitted to the Planning Secretary with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction or where construction is staged no later than one (1) month before the commencement of that stage.	Section 3.6
C10	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary or endorsed by the ER (whichever is applicable), unless otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary or endorsed by the ER (whichever is	Section 3.6

No.	Condition	Where addressed
	applicable), including any minor amendments approved by the ER, must be implemented for the duration of construction.	
Construction Environmental Management Framework		
3.4g(iii)	iii. For each plan under the CEMP include a matrix of the relevant SSI Conditions of Approval referencing where each requirement is addressed	Appendix A
3.4g(iv)	For each plan under the CEMP, set objectives and targets, and identify measurable key performance indicators in relation to these	Section 2
3.5a	Subject to Section 3.4 (b) the Principal Contractors will prepare issue-specific environmental sub plans to the CEMP which address each of the relevant environmental impacts at a particular site or stage of the project. Issue specific sub plans will include: viii. Soil and water management;	This plan Section 1.2

3.3 IS Rating Tool

The project is required to achieve the following ratings using the Infrastructure Sustainability Council Infrastructure Sustainability Design & As-Built Rating Tool v1.2:

- Design rating of Leading with a minimum of 80 points, and
- As-Built rating of Leading with a minimum of 80 points.

To achieve the ratings and minimum points score will require a number of credits to be achieved that relate to environmental management. The following credits are included in the IS rating pathway Sustainability Plan – Delivery Phase. Where these credits are also nominated requirements in the SSTOM Specifications the clause reference is shown.

The IS Rating Tool requirements relevant to this SWMP are outlined in Table 3.

TABLE 3 IS RATING TOOLS REQUIREMENTS

Credit	ISC Rating Tool Requirement	Where addressed
Dis-1 L1	Measures to minimise adverse impacts to receiving water environmental values during construction and operation have been identified and implemented. Monitoring of water discharges and receiving waters is undertaken at appropriate intervals and at times of discharge during construction	Section 6 and Appendix A
Dis-1 L2	Monitoring and modelling of water discharges and receiving waters demonstrates no adverse impact on receiving water environmental values. The infrastructure does not increase peak stormwater flows for rainfall events of up to a 1.5 year ARI event discharge.	Sections 6.2.1, 6.3.1, and 6.6
Lan-2 L1	Conservation of topsoil and subsoil has been considered.	Section 6.7
Lan-2 L2 **GS 2.8.3(c)(x) & (e) (xii)**	All subsoil and topsoil impacted by the project is separated and protected from degradation, erosion or mixing with fill or waste 95% of all topsoil (by volume) retains its productivity and is beneficially re-used on or nearby to the project.	Section 6.7
Lan-3 L1	Site assessment follows the recommended approach in Schedule A 'Recommended general process for assessment of site contamination' of National Environment Protection (Assessment of Site Contamination) Measure 1999. AND Remediation options are identified and selected using a sustainability hierarchy.	Section 6.9
Lan-3 L2	Sustainability appraisal of remediation options is undertaken against the sustainability indicators in Table 1 of 'A Framework for Assessing the Sustainability of Soil and Groundwater Remediation'	Section 6.9
Wat-1 L2	Reduction in water use of 10% compared to a base case footprint	Sustainability Plan Water Reuse Strategy

Credit	ISC Rating Tool Requirement	Where addressed
Wat-2 L1.5	At least 50% of water used is from non-potable sources	Sustainability Plan Water Reuse Strategy

3.4 Licenses and Permits

An Environment Protection Licence (EPL) for Railway activities – railway infrastructure construction (EPL no. 21807) has been obtained for the SSTOM Works. Soil and Water management requirements prescribed by the EPL will be integrated into this sub-plan and associated monitoring programs to ensure compliance.

Which may include conditions:

- Approved water discharge points
- Pollutant concentration limits (water discharge criteria)
- Permitted exceedances of pollution concentration limits
- Turbidity and Total Suspended Solids (TSS) correlation
- Erosion and control requirements
- Monitoring of water discharges
- Weather monitoring
- Monitoring records
- Monitoring reports
- Reporting of pollution incidents.

Copies of documents relevant to the EPL will be made available to Sydney Metro and the ER, where they support compliance with the Conditions, REMMs or other applicable project requirement.

3.5 Document Consultation

Reflecting the requirements of Conditions A6, C5(c) and C6, this Sub-plan has been prepared in consultation with relevant Councils (Penrith City Council and Liverpool City Council), and DPI Fisheries, as shown in Table 4.

TABLE 4 SUB-PLAN AND MONITORING PROGRAM AGENCY CONSULTATION REQUIREMENTS

Plan	Consultation requirement
Soil and Water Management Sub-plan (Condition C5)	DPI Fisheries, Relevant Councils (Penrith City Council and Liverpool City Council)

A summary of this consultation is provided below in Table 5 while details of issues raised by stakeholders during consultation are provided in Appendix F, in accordance with Condition A6. The evidence in Appendix F also includes the consultation undertaken for the Surface Water Quality Monitoring Program, required in accordance with Condition C13.

TABLE 5 CONSULTATION LOG

Agency	Date consulted	Comments received	Discussion
Penrith City Council	29/03/2023	28/04/2023	Penrith City Council requested for any land contamination assessments of management documentation be sent to Council. This has been included in Appendix C.
Liverpool City Council	29/03/2023	26/06/2023	Minor comments on EPL, auditing and qualifications.
DPI Fisheries	5/04/2023	4/05/2023	DPI Fisheries raised various comments around reporting procedures for incidents and notification

Agency	Date consulted	Comments received	Discussion
			requirements. It is noted that environmental incidents will be managed in accordance with the requirements included in Section 3.8 of the CEMP.

3.6 Document Approval

This Sub-plan and SWQMP was endorsed by the Environmental Representative (ER) in accordance with Condition C7 and Condition C19 and submitted to the Planning Secretary for approval no later than one month prior to the commencement of construction.

CEMP and Sub-plans (including monitoring programs) were approved by DPE (now DPHI) on 4 August 2023 with construction commencing on 8 August 2023. This Sub-plan will be implemented for the duration of construction. The process for updates and revisions to this document is addressed in Section 8.2.

4 Existing Environment

4.1 Geology

The project is located within the Cumberland Basin. The Western Sydney area is characterised by the Middle Triassic aged sedimentary rocks of the Wianamatta Group. The Wianamatta Group (from oldest to youngest) consists of the Ashfield Shale, the Minchinbury Sandstone and the Bringelly Shale. Only the Bringelly Shale is expected to be present within the study area.

The Bringelly Shale bedrock is overlain by Quaternary alluvial soils (younger sedimentary unit) in creek channels and older, historic riverbeds. The Quaternary alluvial deposits represent active and historical stream deposits and are associated with the active drainage channels in the area, including South Creek, Blaxland Creek, Cosgroves Creek and Badgerys Creek. The Quaternary alluvial deposits are variable in nature but were found to be predominantly cohesive, comprising silts and clays with fine to coarse sand and trace fine gravel.

In addition to these natural soils, fill is also likely to be encountered in some areas along the alignment, in particular around built up areas such as St Marys, and associated with existing infrastructure and around farm dams.

4.2 Soil Landscape

Soils within the project environment consist primarily of the Blacktown and South Creek soil landscapes. The Blacktown soil landscape consists of shallow to moderately deep (>1m) sandy soils typical of eucalypt forests. The soils are characterised by seasonal waterlogging, low fertility, highly plastic and moderately reactive subsoils, and localised surface movement potential.

The South Creek soil landscape comprises the present active floodplain of many drainage networks of the Cumberland Plain and consists of deep layered sediments over bedrock, including clays and loams. The soils are characterised by seasonal waterlogging, localised permanently high-water tables, localised water erosion hazard and localised surface movement potential.

4.3 Soil Salinity

Salts present in soil can become dissolved and mobilised in surface water and groundwater, causing a build-up of excessive concentrations that can be damaging to plants, soil chemistry and construction materials (e.g., masonry, concrete, and bitumen). In Western Sydney, salinity issues are most associated with dryland salinity. Figure 2 illustrates areas of known and high salinity potential within the SSTOM project area. The remainder of the study area is mapped as having moderate salinity potential. Table 6 summarises the areas of high salinity potential in relation to SSTOM Works.

4.4 Acid Sulfate Soils

Acid sulfate soils (ASS) is the common name given to a range of soil types containing iron sulfides, the most common being pyrite. ASS may be present as actual ASS (AASS) or potential ASS (PASS). PASS are sulfidic soils formed in coastal lowlands subject to tidal inundation or saline groundwater that have not been oxidised.

The EIS identified that the likelihood of Acid Sulfate Soils (ASS) from coastal processes is low to extremely low as the project is not within a coastal area.

The EIS also identified that inland ASS could form within saline waterlogged soils with high quantities of organic matter. These may occur in large dams, drainage channels, riparian zones and wetlands within the SSTOM Works area. The EIS confirms that areas mapped as having high potential or known salinity risk, as illustrated in Figure 2 and summarised in Table 6, have the potential to form ASS.

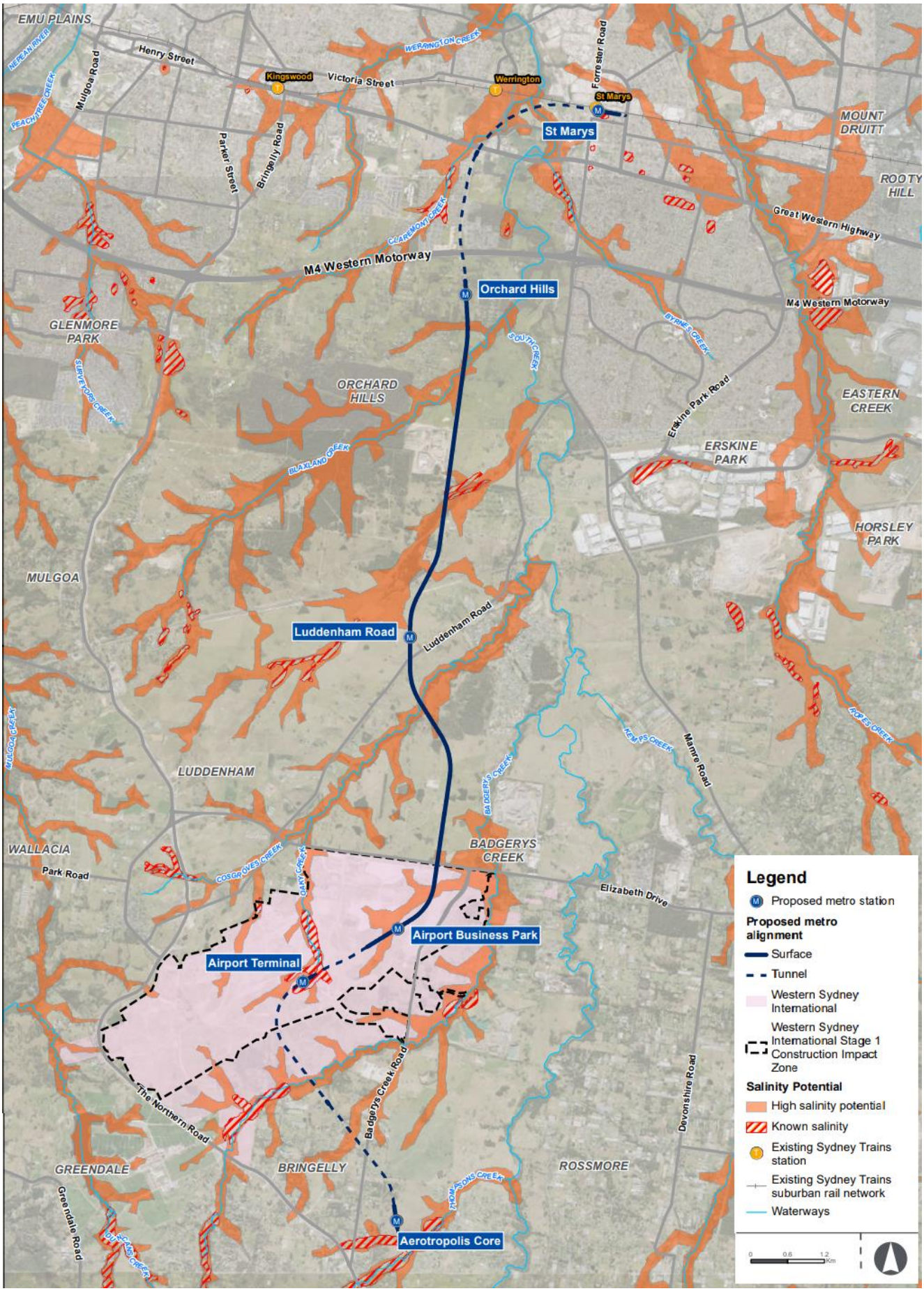

FIGURE 2HIGH SALINITY POTENTIAL AND KNOWN SALINITY RISK AREAS

TABLE 6 RISK AREAS FOR ASS AND HIGH SALINITY POTENTIAL

Area	Potential impacts
Blaxland Creek riparian zone	Pilings and footing excavations for bridge Surface disturbance for at grade construction
Unnamed Creek south of Patons Lane riparian zone	Pilings and footing excavations for bridge Surface disturbance for at grade construction
Cosgroves Creek	Pilings and footing excavations for bridge Surface disturbance for at grade construction
Badgerys Creek	Surface disturbance for at grade construction

4.5 Contamination

Contaminants that could be encountered during excavation and other ground disturbing activities include the areas of environmental concern (AECs) identified in the EIS and detailed in Table 7. Investigations and works carried out in these areas by prior works contractors, as described in Table 7, will inform the required management actions during SSTOM works as outlined further in Section 6.9.

TABLE 7 POTENTIAL CONTAMINATED SITES WITHIN THE SSTOM PROJECT FOOTPRINT

Location	AEC No.	Address	Potential Contamination Sources	EIS Risk Rating	DSI Completed?[1]
St Marys Station (see Figure 11)	1	Commuter carpark at 36-38 Harris Street, St Marys North	Former fuel, oil and chemical storage and use Use of hazardous building materials Off-site industrial land	Medium	Yes (SMWSASBT-CPG-SWD-SW000-GE-RPT-040513) See Appendix G – Groundwater Monitoring Program for further detail of St Marys contamination issues.
	2	Station Street and rail corridor (current bus interchange area), St Marys	Potential former fuel storage Fuel and oils and stockpiling and spills Imported fill Off-site former dry cleaners and service station	High	
	3A	Former unknown council building footprint in Chesham Street, St Marys	Hazardous building material use	Medium	
	3B	St Marys Station Plaza	Chemical storage Hazardous building materials	Medium	
Claremont Meadows Service Facility & tunnel alignment (see Figure 11)	5, 6 & 7	1-31 Gipps Street, Claremont Meadows Gipps St Road Reserve	Waste storage Potential asbestos Potential groundwater contamination Contamination and landfill gases	Medium–High	Yes
	8	8:34-102 Gipps Street, Claremont Meadows	Potential landfill gas migration	High	Not within SSTOM Works areas
	9	Myrtle Road Reserve	Fill	Medium	Not within SSTOM Works areas
	10	Gipps Street north side of Caddens Road intersection	Use of hazardous building materials	Medium	Not within SSTOM Works areas
Tunnel alignment (see Figure 11)	Tunnel alignment	St Marys to Orchard Hills tunnel alignment (note not described in EIS as an AEC however risk has been included here for completeness)	Potential groundwater contamination from industrial areas and landfill gas	Medium	N/A (Reclassified to "Low" risk by SBT contractors)
Orchard Hills (see Figure 12)	11, 12, 13 & 14	52-62 Kent Road, Orchard Hills	Potential storage tank Waste storage/onsite disposal Use or storage of hazardous building materials	High Medium	Yes (SMWSASBT-CPG-SWD-SW000-GE-RPT-040514)

Location	AEC No.	Address	Potential Contamination Sources	EIS Risk Rating	DSI Completed?[1]
	15	64 Kent Road, Orchard Hills	Herbicides and pesticides use Use hazardous building materials	Medium	
	16, 17, 18 & 19	76-80 & 82-86 Kent Road, Orchard Hills	Waste storage/onsite disposal Use or storage of hazardous building materials	Medium	
	20 & 21	94-98 Kent Road, Orchard Hills	Potential cattle / sheep dip Use or storage of hazardous building materials	High / Medium	
	22 & 23	100-104 Kent Road, Hills	Workshop Waste storage/onsite disposal Use or storage of hazardous building materials	Medium	Yes (SMWSASBT-CPG-SWD-SW000-GE-RPT-040514)
	24 & 25	106-112 Kent Road, Orchard Hills	Waste storage/onsite disposal Use hazardous building materials	High	
	26, 27, 28, 29 & 30	114-122 Kent Road, Orchard Hills 34-38 Lansdowne Road, Orchard Hills 28-32 Lansdowne Rd, Orchard Hills 22-26 Lansdowne Rd, Orchard Hills	Workshop Waste storage/onsite disposal Use or storage of hazardous building materials	Medium	
	31a	101 Sweetwater Grove, Orchard Hills	Widespread dumping and storage of wastes Dumping of waste within construction footprint	High	Yes (SMWSASCA-CPU-1NL-NL000-CT-RPT-000008)
	31b	101 Sweetwater Grove, Orchard Hills	Workshop Use of hazardous building materials	Medium	Yes (SMWSASCA-CPU-1NL-NL000-CT-RPT-000010)
Service and Maintenance Facility (see Figure 12)	32 & 33	2 Bordeaux Pl, Orchard Hills	Filled areas. Hazardous building material use	Medium	N/A will not be impacted by construction

Location	AEC No.	Address	Potential Contamination Sources	EIS Risk Rating	DSI Completed?[1]
	34	31-29 Luddenham Rd, Orchard Hills	Filled areas. Hazardous building material use	Medium	Yes (SMWSASCA-CPU-OHE-SF153-CT-RPT-000001)
	35	43A Luddenham Rd, Orchard Hills	Buried farm waste	High	Yes (SMWSASCA-CPU-1NL-NL000-CT-RPT-000002)
Alignment SMF to Luddenham Road Station (see Figure 12)	36	114-122 Patons Rd and 1-3 Stockdale Rd, Orchard Hills	Unexploded Ordnance (UXO) Buried waste. Hazardous building materials Aqueous fire-fighting foams (PFAS)	High	Yes (SMWSASCA-CPU-1NL-NL000-CT-RPT-000003)
	37	Warragamba to Prospect water supply pipelines, Orchard Hills	Lead paint Asbestos	Medium	
	38	459 Luddenham Rd, Luddenham	Fuel storage and use Aqueous fire-fighting foams (PFAS)	High	
Luddenham Road Station (see Figure 13)	39	565-581 Luddenham Rd, Luddenham	Asbestos (pipelines/buildings Zinc (from previous investigations)	Medium	Yes (SMWSASCA-CPU-LDN-SN250-CT-RPT-000001)
Alignment Luddenham Road Station to Airport (see Figure 13)	40	546-640 Luddenham Rd, Luddenham	Unlicensed stockpiling of waste and soil	High	Yes (SMWSASCA-CPU-SWD-EW150-CT-RPT-000001)
	41 & 42	1953-2109 Elizabeth Dr, Badgerys Creek 1793-1951 Elizabeth Drive Badgerys Creek	Illegal stockpiling of waste Imported soil	Medium	Yes (SMWSASCA-CPU-SWD-EW250-CT-RPT-000002)
	43	1793-1951 Elizabeth Drive Badgerys Creek	Fuel/oil/chemical storage and use) Pesticides	High	Yes (SMWSASCA-CPU-SWD-EW250-CT-RPT-000003)
	44	1793-1951 Elizabeth Drive Badgerys Creek	Imported fill	Medium	Yes (SMWSASCA-CPU-SWD-EW250-CT-RPT-000001)
Alignment Airport to Bradfield (see Figure 14)	45	40 Derwent Road, Bringelly	Hazardous building materials	Medium	Yes (Reclassified to "Low" risk)

Location	AEC No.	Address	Potential Contamination Sources	EIS Risk Rating	DSI Completed?[1]
	Tunnel alignment	Western Sydney International to Bringelly	Potential groundwater contamination from fuel and chemical store; agricultural pesticides and herbicides, waste burial and chemical storage, firefighting foam	Medium	N/A (Reclassified to "Low" risk by SBT contractors)
Bradfield (see Figure 14)	46	225-245 Bringelly Creek Road, Bringelly	Hazardous building materials	Medium	
	47	215 Badgerys Creek Road, Bringelly	Fuel and chemical store, storage tank, hazardous building materials Asbestos fragments Aqueous fire-fighting foams	High	Yes (SMWSASBT-CPG-AEC-EN-RPT-040515)
Power supply route corridor in Orchard Hills and Erskine Park (n/a to SSTOM scope of works)	48	Road corridors: Patons Lane, Erskine Park Road and Lenore Lane and John Morphett Place & intersection of Lenore Lane and Erskine Park Road	Historical fill Hazardous building materials	Medium	Not within SSTOM Works areas
Power supply route corridor in Kemps Creek (n/a to SSTOM scope of works)	49	Cuthel Road and Cross Street	Waste tipping.	Medium	Not within SSTOM Works areas
	50	Easement between 130 and 140 Martin Road	Fill containing asbestos	Medium	
	51	Easement south of 113 Western Road	Fill containing asbestos	Medium	
	52	Substation: 120 Cross Street	Storage of chemicals and hazardous building materials	Medium	
	53	Cuthel Road and Cross Street	Waste tipping	Medium	

NOTES:

[1] Confirms whether details of DSI completed by previous contractors or Sydney Metro is available at the time of preparing this Sub-plan. A review of investigations and management reports will be conducted by Parklife Metro D&C at time of handover to identify any additional investigations or management documentation required to be prepared in accordance with Conditions E92 to E97.

4.6 Surface Water Catchments/Waterways

The SSTOM Works lie entirely within the northward flowing South Creek catchment, a major tributary of the Hawkesbury-Nepean catchment.

The alignment of the works crosses the following waterways:

- South Creek
- Claremont Creek
- Blaxland Creek
- Cosgroves Creek
- Badgerys Creek.

The study area for the project however, includes the catchment areas (but does not cross the main channel) for the following creeks:

- Byrnes Creek (at the northeast of the Project)
- Oaky Creek (within the Western Sydney International site, to the west of the Project)
- Moore Gully
- Thompsons Creek (at the southern end of the project)
- Duncans Creek (within the Western Sydney International site, to the southwest of the Project).

South Creek is the receiving waterway for all creeks within the study area. The EIS identifies that South Creek is one of the most degraded catchments in the wider Hawkesbury-Nepean catchment largely associated with increased urbanisation occurring within the catchment resulting in vegetation clearance and the alteration of hydrological and sediment regimes. The waterways, however, form important corridors for remnants of endangered riparian vegetation.

Figure 3 and Figure 4 illustrate the catchment areas in the proximity of the SSTOM construction footprint.

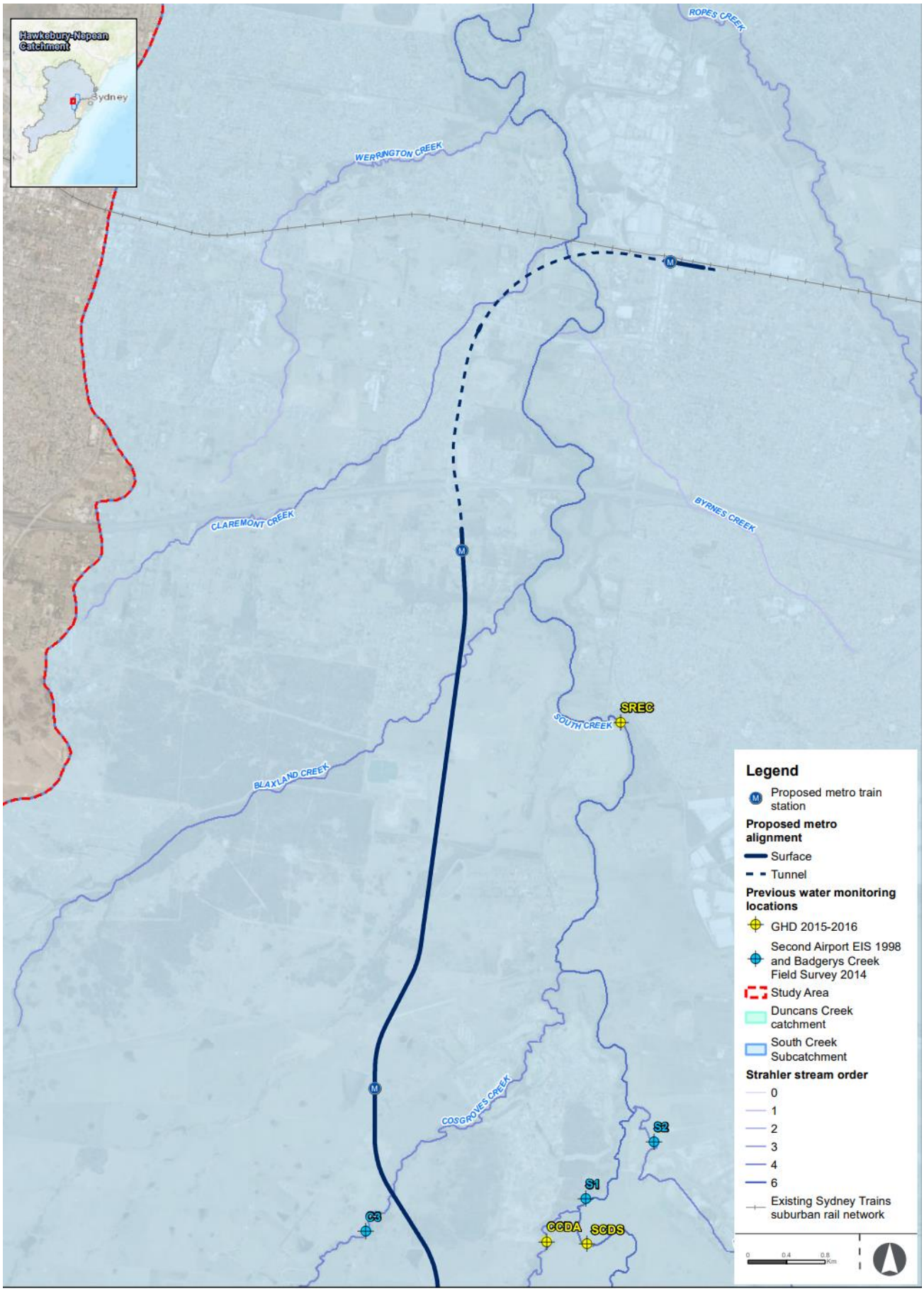

FIGURE 3CATCHMENTS, WATERCOURSES AND MONITORING LOCATIONS - NORTH

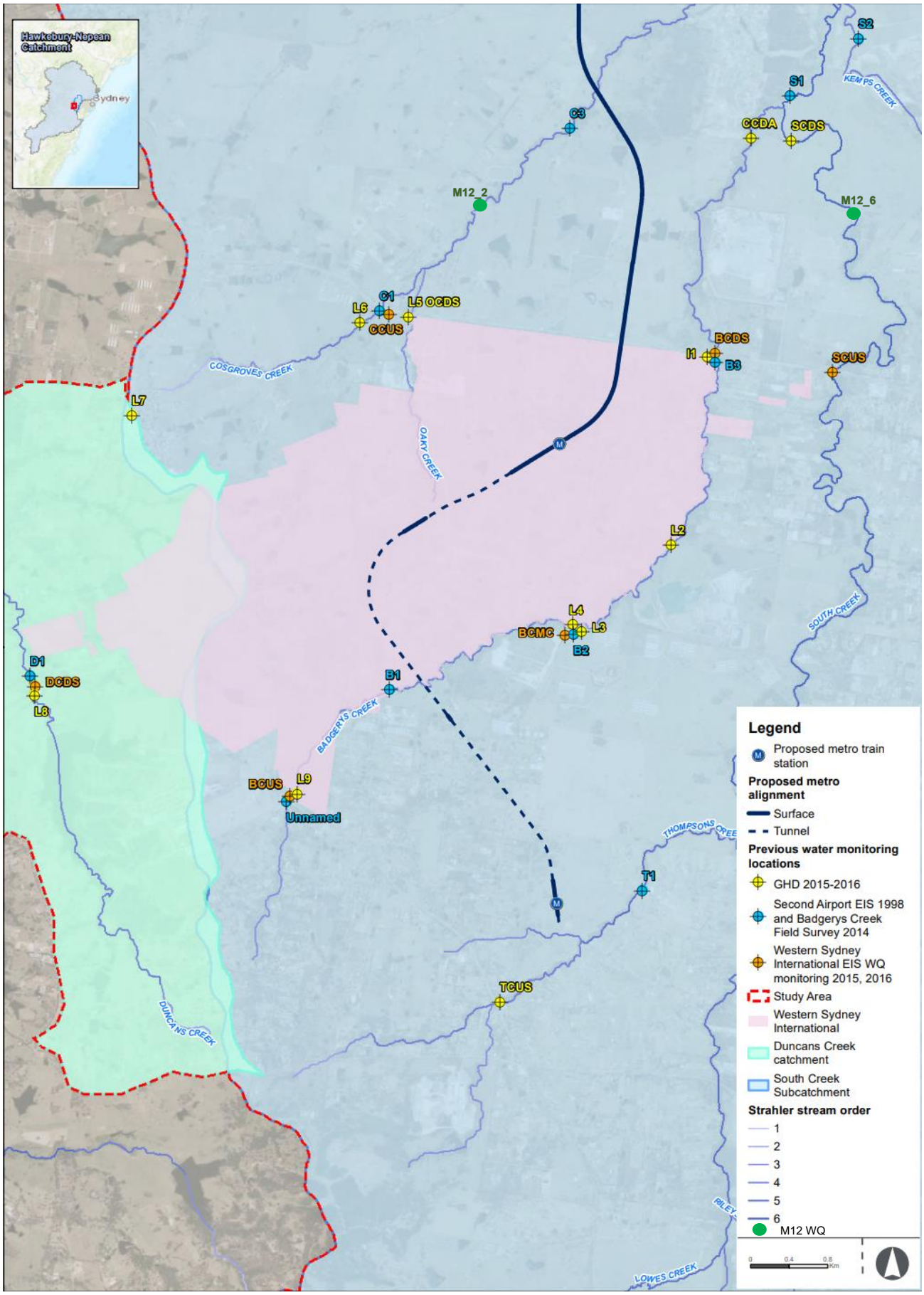

FIGURE 4CATCHMENTS, WATERCOURSES AND MONITORING LOCATIONS - SOUTH

4.6.1 Surface Water Quality

Information provided in the EIS and technical reports indicate the existing water quality in the project corridor is considered poor due to the increasing urbanisation and vegetation clearance within the South Creek catchment. Surface water quality is largely influenced by point source water pollution (e.g., from stormwater drains, effluent) and diffuse water pollution (e.g., market gardens, cattle and sheep grazing, intensive agriculture such as poultry farming). The results of water quality sampling undertaken as part of the adjacent M12 Motorway project (summarised in Table 8 Water Quality Monitoring from the M12 Motorway Project Compared to ANZECC Guidelines) did not generally meet the recommended ANZECC values for the parameters analysed and is considered poor and degraded due to low dissolved oxygen and high nutrient (Total Nitrogen) concentrations.

TABLE 8 WATER QUALITY MONITORING FROM THE M12 MOTORWAY PROJECT COMPARED TO ANZECC GUIDELINES

	Dissolved Oxygen (%)	Electrical Conductivity (µS/cm)	pH	Turbidity (NTU)	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)
ANZECC Guidelines	85-110	125-2200	6.5-8	6-50	0.5	0.05
M12_2 Cosgroves Creek	62.7	3510	8.03	16	2.3	<0.05
M12_6 South Creek	80.1	2640	8.47	14.3	1.4	<0.05

The project environmental values, based on AZNG 2018 guideline trigger values for the protection of 95% of species in slightly disturbed to moderately disturbed freshwater systems are shown in Table 9.

TABLE 9 AZNG 2018 GUIDELINE WATER QUALITY TRIGGER VALUES

Parameter	Trigger Value or Criteria
Chlorophyll-a	0.005 mg/L
Total Phosphorus (TP)	0.05 mg/L
Filterable Reactive Phosphorus (FRP)	0.02 mg/L
Total Nitrogen (TN)	0.5 mg/L
Oxides of Nitrogen (NOx)	0.04 mg/L
Ammonia	0.02 mg/L
Dissolved Oxygen	85% - 110%
Turbidity	6 – 50 NTU
pH	6–5 - 8
Salinity	125 – 2200 µS/cm
Oils, petroleum, and hydrocarbons	Oils and petrochemicals should not be noticeable as a visible film on the water, nor should they be detectable by odour.

4.6.2 Flooding

Existing flood modelling undertaken as part of the project EIS studies and technical papers has indicated that 3.6 kilometres of SMWSA alignment is located on flood prone land (that is, land inundated during the PMF event). This land includes the main South Creek floodplain (in tunnel), numerous minor overland flow paths, and Blaxland Creek and Cosgroves Creek floodplains. Figure 5, Figure 6, Figure 7 and Figure 8 illustrate the existing flood depths for the 1% AEP.

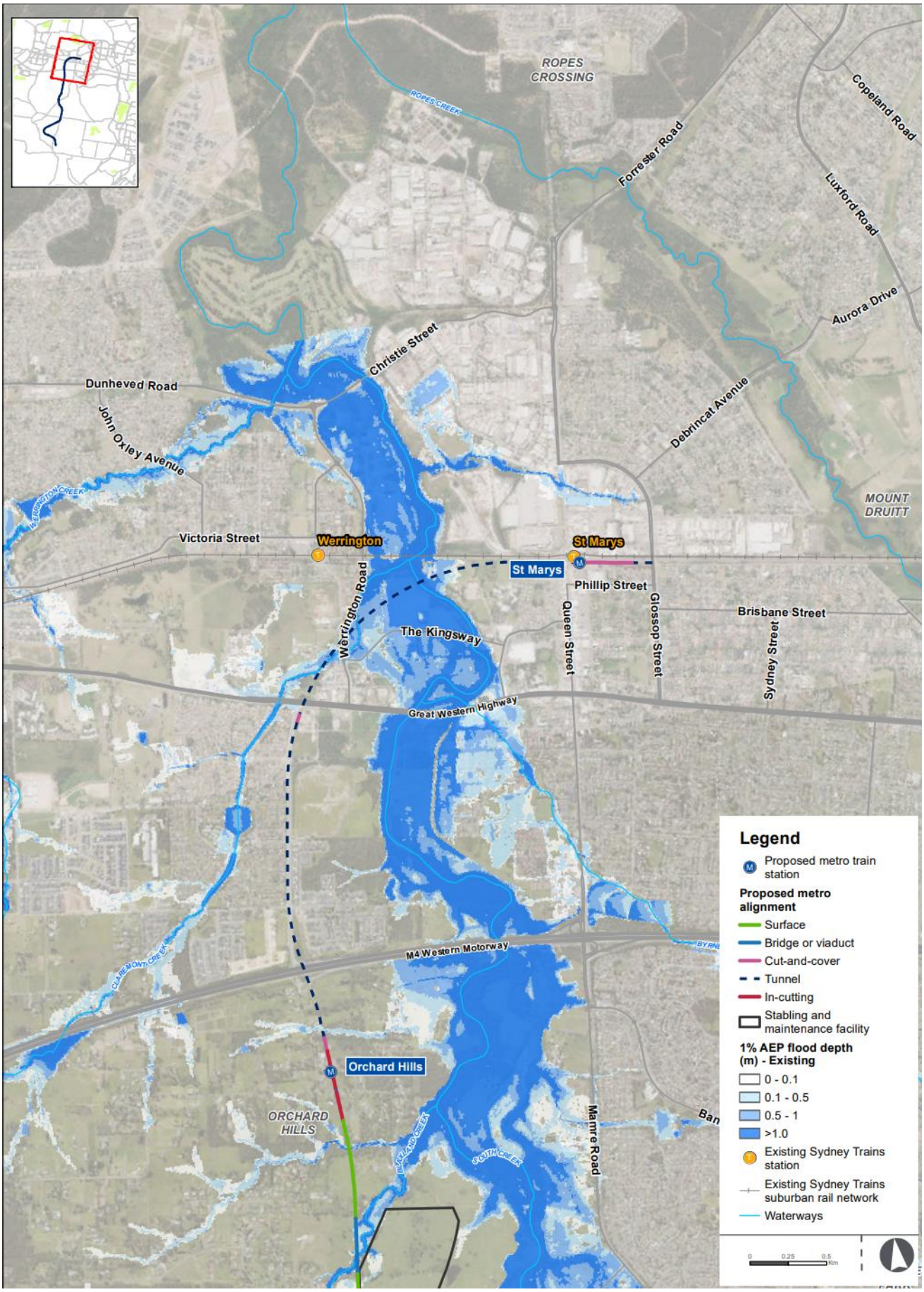

FIGURE 51% AEP BLAXLAND CREEK

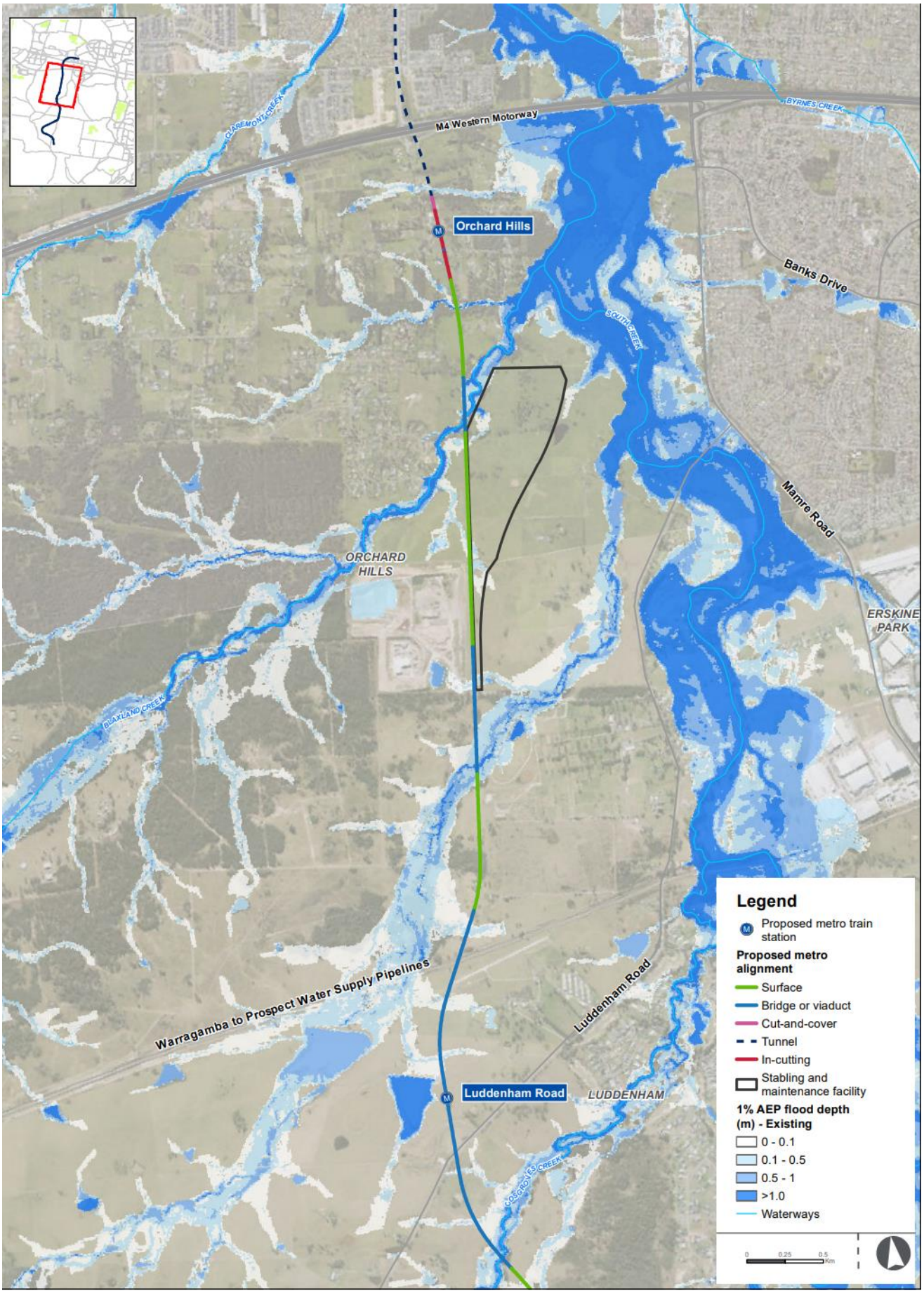

FIGURE 61% AEP AT SOUTH CREEK

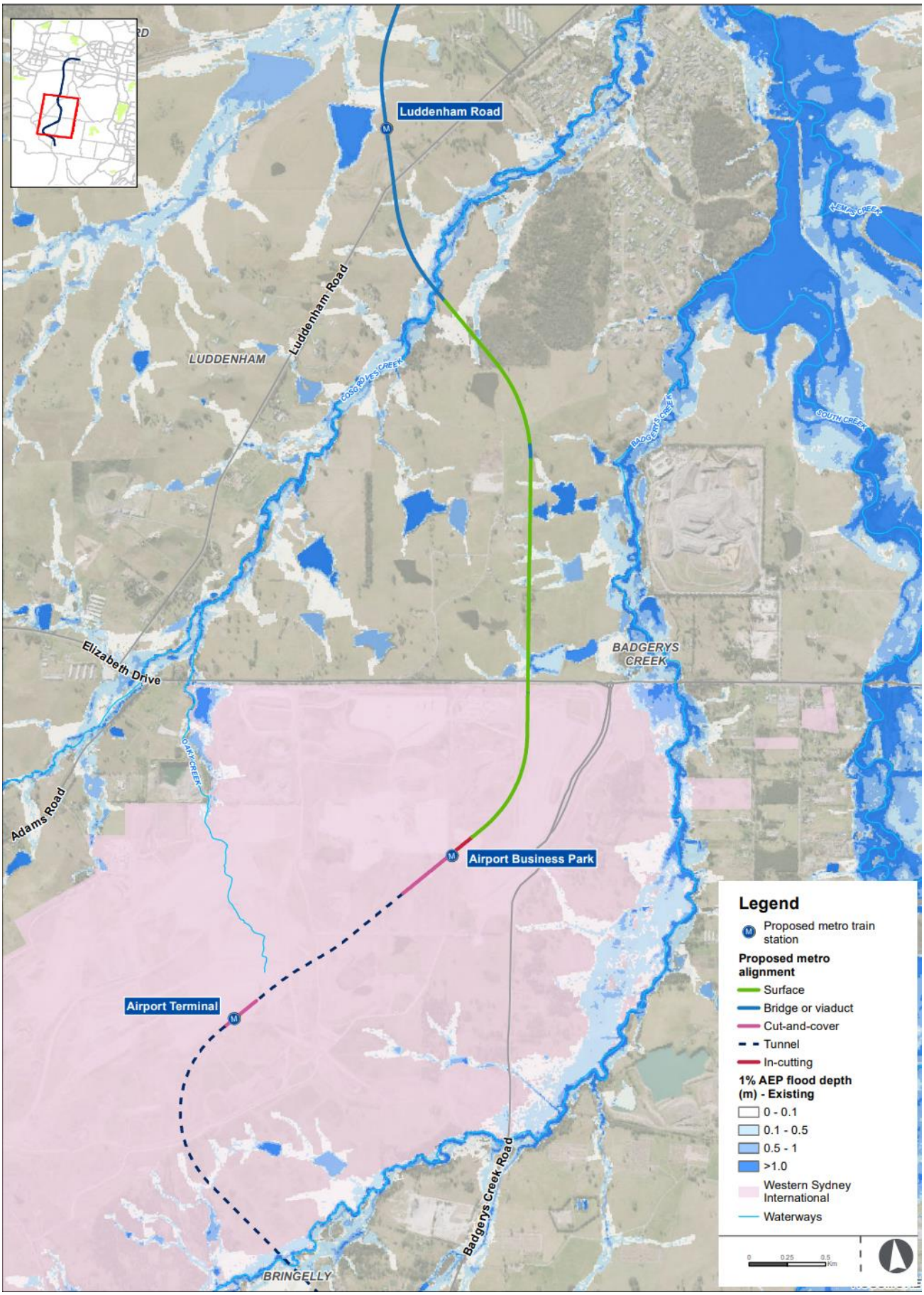

FIGURE 71% AEP AT COSGROVES CREEK

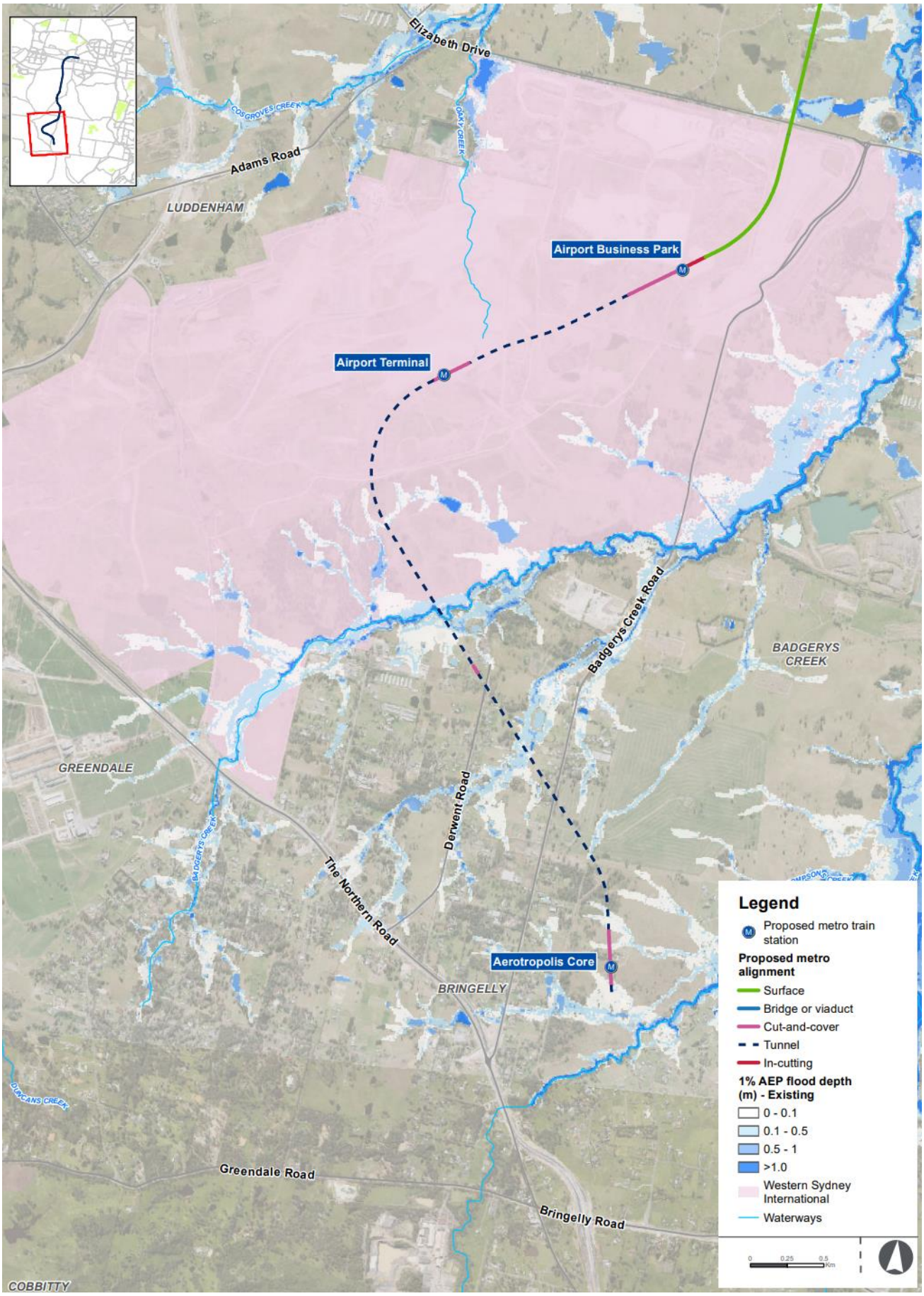

FIGURE 81% AEP BADGERYS CREEK

4.6.3 Wetlands

There are no Ramsar or nationally important wetlands within the project area.

4.7 Climate

There are three weather stations within 15 kilometres of the SSTOM project area. The two nearest stations are those at Badgerys Creek and Orchard Hills Treatment Works. The Badgerys Creek automatic weather stations (AWS) is located at the Western Sydney Airport, to the south of the project extent while Orchard Hills AWS is located to the east of the SSTOM Works. and Figure 9 illustrate the climate averages for both stations which has been obtained from BOM records.

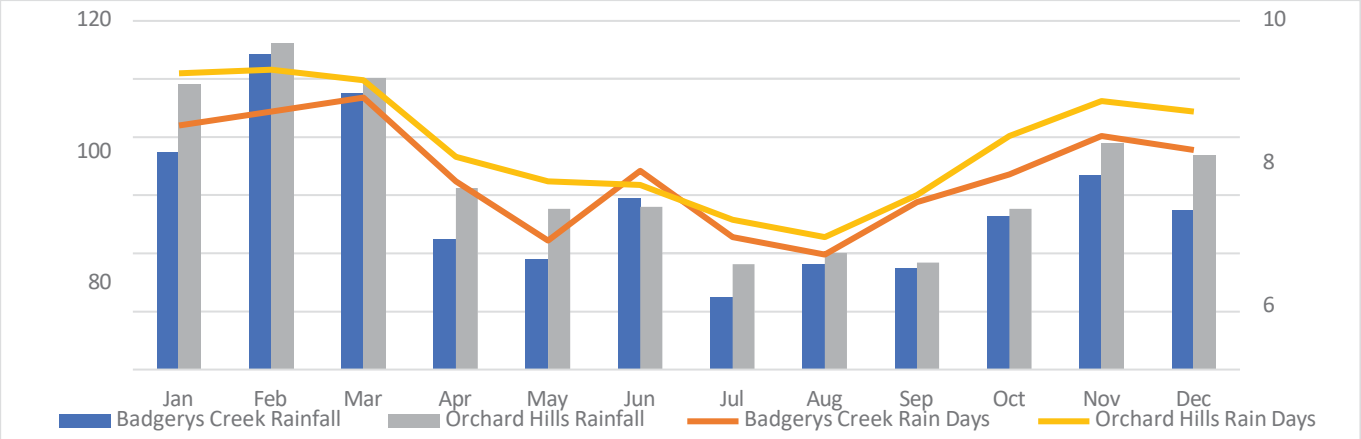

FIGURE 9 HISTORIC RAINFALL DATA FOR BADGERYS CREEK AND ORCHARD HILLS

Although the above tables and figure show a slight dominance to rainfall totals between January and March, local experience by Parklife Metro D&C dictates that significant rainfall can occur at any time of the year. As such, the risk of high rainfall is a significant consideration for construction-phase of the project.

TABLE 10 MONTHLY CLIMATE AVERAGES FOR BADGERYS CREEK AWS (STATION NUMBER 067108, 1995-2021)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Max Temperature (°C)	28.3	27.8	26.5	23.8	20.4	17.3	17.2	18.9	21.8	23.9	25.8	28.5	23.4
Mean Min Temperature (°C)	16.9	17.4	16.0	13.0	9.6	7.0	5.3	5.9	8.7	11.1	13.2	15.5	11.6
Mean Rainfall (mm)	98.4	112.5	100.1	62.5	55.3	56.0	36.3	40.1	36.8	55.3	77.8	73.8	819.9
Mean rain days (>1mm)	8.5	8.6	8.3	6.1	5.4	5.3	4.3	3.8	5.0	6.7	7.7	7.4	77.1
Mean 9am wind speed (km/hr)	5.3	4.7	5.1	5.4	4.4	6.7	5.2	5.4	6.9	6.3	6.6	5.8	5.6
Mean Max Temperature (°C)	30.3	28.8	26.8	24.1	20.8	17.8	17.5	19.2	22.6	25.0	26.7	28.6	24.0
Mean Min Temperature (°C)	17.3	17.1	15.3	11.4	7.7	5.6	4.1	4.7	7.7	10.6	13.6	15.5	10.9
Mean Rainfall (mm)	74.8	108.4	95.1	45.1	38.0	59.2	24.8	36.2	34.9	52.9	66.9	55.0	658.1
Mean rain days (>1mm)	7.0	7.4	7.8	5.4	3.7	5.7	3.8	3.3	4.8	5.6	6.7	6.3	67.5
Mean 9am wind speed (km/hr)	9.4	8.7	8.4	9.8	9.6	9.1	9.6	10.6	11.7	11.8	11.0	9.8	10.0

5 Environmental Aspects and Impacts

The key aspects and potential impacts in relation to the overall management of Soil and Water during SSTOM are listed in Table 11.

TABLE 11 SUMMARY OF OVERALL ASPECTS AND POTENTIAL IMPACTS ON SOIL AND WATER

Aspect	Potential Impact
Storage and use of chemicals near stormwater systems and waterways	Soil contamination as a result of a spill Pollutants to wash into the stormwater system, then into/directly into receiving waters
Clearing and grubbing	Increased sediment load in run off impacting aquatic fauna and flora. Spills of fuel/hydraulic fluids impacting soil and water quality
Material stockpiles	Sedimentation and air quality impacts potential due to improper stabilisation of material stockpiles
Wheel wash facilities	Sedimentation and potential for turbid water to runoff site due to improper management of wheel washing facilities
Dewatering of excavations	Turbid, saline or contaminated water to enter stormwater systems and subsequently causing degradation of freshwater habitat and water quality
Modifications to natural hydrology or water quality from earthworks activities	Localised Pollution of stormwater systems and/or directly into receiving waters Potential increases to peak flood levels during operation Potential afflux issues on surrounding properties and residences Increased risk of erosion and sedimentation due to clearing, loss of riparian vegetation, removal of farm dams, levee banks and flood control works
Working within riparian corridor	Ecological impacts on receiving water environment. Increased risk of erosion and sedimentation due to clearing, loss of riparian vegetation Localised pollution directly into receiving waters
Sediment tracking onto public roads from vehicles leaving construction worksites	Sediment and gravel on roads Sediment entering into stormwater systems and/or directly into receiving waters, causing pollution
Dust blowing from the worksites or from vehicles during spoil removal	Air quality impacts to nearby residents
Floodwaters impacting on worksites	Contamination of floodwaters by sewerage, fuels and/or chemicals Potential for floodwaters to drain into works excavations
Encountering contaminated material/water during SSTOM (existing and unknown)	Delaying the works or requiring additional controls to be implemented Potential impacts on receiving water environments if not managed correctly (e.g. salinity) Impacts to human health and environment Risk of not meeting required land use suitability Ongoing management measures being required post-construction
Incorrect reuse, disposal, or management of contaminated soil	Spreading of contaminated material to land causing pollution Impacts to human health and environment Risk of not meeting required land use suitability
Concreting and grouting	Water quality impacts on surface and ground water from runoff Spills of excess or waste concrete Waste concrete slurry to be discharged into stormwater systems
Construction or modification to stormwater systems	Accidental discharge of sediment-laden runoff into stormwater systems

6 Management Strategy

6.1 Erosion and Sediment Control

6.1.1 Erosion and Sediment Control Plans

Before undertaking any work and during construction activities that require soil/ground disturbance, site-specific Erosion and Sediment Control Plans (ESCPs) will be progressively developed for each SSTOM work area. An indicative Erosion and Sediment Control Plan (detailed in 6.1.2) will be used as a guide by the SSTOM Project team in developing and implementing ESCPs and will be based on the hierarchy of controls outlined in Figure 10.

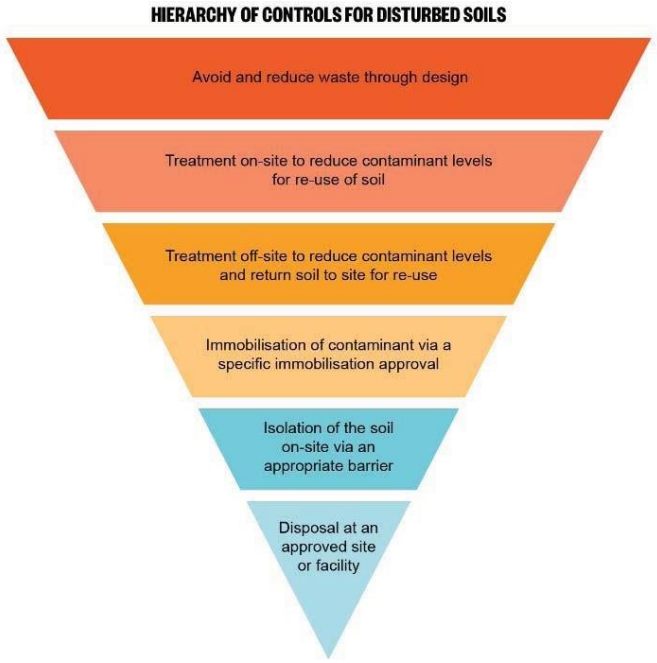

FIGURE 10 HIERARCHY OF CONTROLS FOR DISTURBED SOILS

All ESCPs will be prepared and implemented in a manner consistent with currently accepted Best Management Practice (i.e. Managing Urban Stormwater: Soils and Construction 4th Edition Landcom, 2004). The project Soil Conservationist or the Parklife Metro D&C Environment Team will prepare ESCPs, which will require sign-off by the Environmental Manager (or delegate) prior to implementation. The Soil Conservationist will also conduct regular reviews of ESCPs to ensure they meet best practice (i.e., the NSW Blue Book). Any ESCPs developed and associated further revisions will be provided to Sydney Metro and the ER for information. Details of the specific design parameters for the project erosion and sediment controls, including the design rainfall and basin sizing calculations will be contained within the site specific ESCPs.

ESCPs will be updated as works progress to ensure they are always relevant to on-ground activities. ESCPs will be reviewed during the weekly environmental inspection, which will identify any updates or revisions required. For minor changes, these can be notated onto the ESCP. Major changes to the type or nature of sediment controls or to stormwater runoff and flow regimes will warrant preparation of an updated ESCP.

During construction, disturbed areas will be managed in accordance with the Blue Book, such as stabilising stockpiles if they are to be in place for more than 10 days. ESC devices will be installed prior to ground disturbance activities commencing and will be maintained in good working order for the duration of the works and subsequently until the site has been stabilised and the risk of erosion and sediment movement from the site is minimal. Any areas disturbed during construction will be stabilised as part of rehabilitation efforts in accordance with the Blue Book or the final design.

Copies of the current ESCPs will be kept by the SSTOM Project team in Teambinder with a working copy displayed on site notice boards for all active construction sites.

6.1.2 Erosion and Sediment Control Strategy

The Indicative Erosion and Sediment Control Strategy for SSTOM includes the following measures and techniques:

- Clean water approaching the site from external catchments beyond the construction worksites will be managed via clean water drains and diversion practices to minimise run-on into the site. Impacts on adjacent land users will be considered to ensure that localised flooding or excessive run-on does not occur
- Where sediment basins or sediment sumps cannot reasonably be constructed to the Blue Book requirements, undersized structures or alternatives (e.g., sediment fence) will be used, but with an enhanced focus on erosion control
- Where possible, vegetation removed as part of the works will be mulched and reused on site for erosion and/or sediment control purposes, such as for soil stability on bare areas or bunds to reduce the erosive energy of flows
- Mulch reused on site will avoid use or stockpiling in low lying areas that remain consistently wet and will be monitored for generation of tannins throughout construction
- If tannins are observed, reassess the location of the mulch stockpile, and if it cannot be moved into a more favourable position, ensure tannin impacted water is captured and reused on site for dust suppression, landscape watering or other on site use
- Stormwater flow velocities through work areas will be controlled using temporary berms or other suitable devices and water will be directed to appropriate locations
- The spatial extent of exposed soils will be minimised, with no-go (exclusion) areas clearly marked on ESCPs, delineated and signposted
- Temporary ground cover (e.g., geo-fabric, soil binder/stabiliser, hydro-mulch, other suitable products etc.) will be used to lock down high risk areas whenever significant rain is imminent
- Rainfall forecasts will be actively monitored and used to trigger inspection (when greater than 20mm in 24 hours is predicted within the next 3 days) and, where required, implementation of additional measures such as the application of soil binder, as deemed necessary through inspection by the Parklife Metro D&C Environment Team
- All channels along the Premises boundaries carrying clean water away from site are to drain either onto surrounding lands, into culverts or into existing drainage i.e., natural creeks or existing road drainage in accordance with the natural, pre-development drainage patterns
- All exposed stockpiles will have sediment controls around their perimeter and will be provided with adequate temporary cover if they will remain for more than 10 days. Short term stockpiles (<10 days) will be located outside the 10% AEP flood extent , whilst longer term stockpiles (>10 days) will be located outside the 5% AEP flood extent
- At vehicle egress points from the SSTOM work areas, washdown bays, rumble grids and/or stabilised laybacks or other solutions consistent with Section 6.3.9 of the Blue Book will be used to minimise the risk of sediment tracking onto public roads. Any tracked material will be cleaned from site egress points as soon as possible
- All erosion and sediment controls will be inspected by Parklife Metro D&C Environment Team at least weekly, before a site closure of more than 4 days, prior to forecast heavy rain (greater than 20mm in 24 hours predicted), after rainfall exceeding 20mm in 24 hours (if safe to do so) or as directed by the applicable ESCP, which takes into account site conditions and erosion risk
- Maintenance will be carried out as soon as practical and prior to the next forecast rainfall event
- Concrete washout activities will be confined to designated washout bays, which will be bunded and will be restricted to areas outside the flood prone areas, and at least 50m from creeks, drainage lines and other watercourses, wherever possible.
- Sediment collected from sediment basins or other traps will be transported to nominated stockpile sites or removed offsite as required
- Dust generation will be minimised using water carts, soil stabilisers, reduced traffic speeds and application of temporary ground covers as required
- Any discharge points will include appropriate scour protection/dissipation

- Any relevant guidance in the Blue Book must be considered when implementing erosion and sediment controls.

6.2 Sediment Basins

Temporary sediment basins may be implemented where required, based on the calculations and details established in each site ESCP. The sediment basins will capture water runoff from SSTOM work areas and be designed in accordance with the Blue Book. Any modifications required will be undertaken in consultation with a Soil Conservationist and in accordance with the design calculations.

Where possible, any runoff contained in temporary basins would be used for dust suppression to maintain sufficient capacity in the basin. Where immediate emptying of the basin is required in anticipation of a rainfall event, water treatment will be undertaken to treat water to required standards for discharge to stormwater systems or waterways. Treatment will involve removal of oil and grease (if visible), accumulated rubbish, coarse sediment, chemical flocculation, and pH correction. Maintenance of these sediment basins may be required in accordance with Blue Book requirements to ensure they are operating effectively.

6.2.1 Sediment Basin Discharge Monitoring

All water will be tested (and treated if required) prior to discharge from the site in order to determine compliance with the appropriate approvals (including applicable EPL requirements). Except as may be expressly provided by an EPL, Parklife Metro D&C will comply with section 120 of the POEO Act 1997.

A permit to dewater (Appendix E) will be prepared for each dewatering event, or in accordance with the sampling required by the EPL, and will be used to ensure discharge criteria are maintained. The dewatering and discharge permit must be issued and signed by the Environmental Manager, or delegate, prior to discharge and constitutes a hold point. Discharge of water will be from clearly identified and accessible points, and as approved by the EPA where the EPL is in force, in accordance with the requirements of the EPL.

For each discharge and monitoring point the concentration of a pollutant discharged must not exceed the concentration limits specified in detailed in Table 12 unless:

- Discharge occurs solely as a result of rainfall measured at the premises exceeding the design rainfall depth value for the corresponding discharge point
- The sediment basins and other erosion and sediment controls corresponding to the discharge point(s) have been designed, constructed, operated and maintained in accordance with the EPL.

TABLE 12 WATER CONCENTRATION LIMITS

Pollutant	Units	100 percentile concentration limits	Sampling method*	Frequency
Oil and grease	Visible	Not visible	Visual inspection	Less than 24 hours prior to a controlled discharge and daily for any continued controlled discharge, when it is safe to do so. When rainfall causes a discharge from a sediment basin which has not been emptied within the design management period following cessation of a rainfall event, when it is safe to do so.
pH	pH	6.5 – 8.5	Probe or grab sample	
Turbidity	Nephelometric Turbidity Units	50	Probe or grab sample	

6.3 Water Treatment Plants (WTP)

The discharge of treated wastewater from construction water treatment plants (WTPs) has the potential to impact on receiving environment water quality if not adequately managed. Groundwater inflow into the tunnels and station boxes will require ongoing management of collected water.

The CSSI must be designed and constructed so as to maintain the NSW Water Quality Objectives (NSW WQO) where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW WQO over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect

of the CSSI contains different requirements in relation to the NSW WQO, in which case those requirements must be complied with. Water treatment plants, established by the SBT contractor, will continue to be used for the management of groundwater. Water treated through the WTPs that does not meet required environmental criteria for discharge to the environment may be discharged to sewer under an approved Trade Waste Agreement. This is discussed further in the Groundwater Monitoring Program contained in Appendix G.

Reuse of treated wastewater will be maximised in accordance with the Water Reuse Strategy.

6.3.1 Discharge Criteria and Targets

A Water Pollution Impact Assessment would be prepared to meet the requirements of CoA E130 will be prepared prior to any operation of a WTP or sediment basin where discharge to the environment is required. The WPIA will be provided to the EPA and will be used to support site-specific discharge criteria to be applied to the SSTOM Environmental Protection Licence (EPL).

A permit to dewater (Dewatering Permit) will be prepared for each applicable dewatering event, and/or in accordance with the sampling requirements of the EPL, and will be used to ensure discharge criteria are met which will assist in meeting the NSW Water Quality Objectives (NSW WQO).

6.4 Water Usage and Reusage

Parklife Metro D&C has established project targets to optimise water usage throughout the SSTOM Package.

Water balance modelling will be undertaken for both construction and operational phases of the project. Further details on water usage and reuse strategies are provided in the Sustainability Management Plan. A water reuse strategy has been prepared as a stand-alone document as required by E102 and is publicly available on the Parklife Metro D&C Website.

Parklife Metro D&C will monitor and measure water consumption during project delivery; refer to the Sustainability Management Plan for details on potable and non-potable water consumption monitoring and reporting.

6.5 Works in Waterways and Temporary Waterway Crossings

Work in and around waterways (within 40m), including in the main creek channels (at Blaxland Creek, unnamed watercourse south of Patons Lane and Cosgroves Creek), will be conducted in accordance with the *Guidelines for controlled activities on waterfront land riparian corridors* (Department of Industry 2018). Works will be scheduled in waterways during periods of predicted low flow to minimise impacts and will be avoided during rainfall events. Where possible, existing creek bed material will be reclaimed and re-used in the reconstruction or stabilisation of creeks. Disturbed creeks will be progressively stabilised to avoid potential scouring and sedimentation with permanent stabilisation measures implemented as soon as practicable.

Temporary waterway crossings, if required, will be designed, constructed, and maintained, consistent with the Blue Book, the *Fish Passage Requirements for Waterway Crossings and Policy* (2003) and *Guidelines for Fish Friendly Waterway Crossings* (2003). This design process will be completed in consultation with DPI Fisheries to minimise impacts on natural flow regimes and to not present any barriers.

Temporary waterway crossings will be designed by a suitably qualified and experienced person and will incorporate suitable hard, durable material that will avoid erosion of fine particles into waterways or siltation of waterways. Erosion and sediment controls will be implemented at the entry and exits points of temporary waterway crossings and will be included in the progressive ESCPs.

The progressive ESCPs will document that works within the main creek channels will be avoided during and immediately following rainfall events, unless necessary in an emergency to avoid property damage or prevent the loss of life.

6.6 Surface Water and Flooding Management

Surface water control and/or diversion is to be designed in such a manner as to manage any potential flooding impacts on the project. There are sections of the project that are particularly susceptible to flooding. Site risk assessments will be conducted and mitigation measures for any identified flood risk will be incorporated into site layout designs and ESCPs as required. Detailed ESCPs plans will:

- Review the site layout and staging of construction works to avoid or minimise obstruction of overland flow paths
- Consider flood risks, obstruction of overland flow paths and limit the extent of flow diversion required
- Identify controls to be implemented and reviewed to minimise surface water flows impacting adjoining private properties during construction.

6.6.1 Flood Management

Potential flooding during the construction phase will be considered by the design team in the temporary works design, with appropriate safeguards implemented during construction. The construction of the SSTOM Project should have a negligible impact on flooding within the catchment, with minimal loss of flood storage and minimal changes or restrictions to existing flood regimes. The majority of the SSTOM Project construction sites are at a low risk of flooding as the sites are generally located away from overland and mainstream flood areas.

The ESCPs will provide detail on flood-proofing to excavations at risk of flooding during construction, which may include increasing the size and capacity of temporary sediment basins and pumping or dewatering techniques to be employed to reduce water storage prior to and following rain events were considered feasible.

Following detailed design, Stormwater and Flooding Management Plans would be prepared for construction sites that have a residual risk of flooding after mitigation. These plans would:

- Identify the appropriate design standard for flood mitigation based on the duration of construction, proposed activities, and flood risks
- Develop procedures so that threats to human safety and damage to infrastructure are not exacerbated during the construction period. If a stormwater and flooding management plan is required to be developed, consultation with the State Emergency Service (SES), and relevant Councils will be carried out in accordance with CoA E17, during the development of the management plans.

6.6.2 Incident & Emergency Management Plan

Any events or incidents resulting from flooding will be managed in accordance with the Parklife Metro D&C Incident & Emergency Management Plan (I&EMP). The I&EMP identifies floods and heavy rain events as a hazard for project works. Key prevention measures include:

- Monitoring of weather, alerts and water levels in key watercourses
- Inform staff working in flood plain areas of flood risk
- Set up compounds on higher ground - away from natural water courses and flood prone land
- Temporary stockpiling locations to prevent contamination and sedimentation of adjacent lands.

Copies of the ERP have been provided to a range of stakeholders, including the Penrith City Council, Liverpool City Council and the SES.

6.7 Stockpile Management

Stockpile management will aim to ensure appropriate design, establishment and management of stockpiles is implemented to minimise impacts to the environment during construction. Management of stockpiles will include topsoil, subsoil, construction materials, construction waste, mulch, and other materials. Stockpile management will be undertaken in accordance with:

- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004)

- Stockpile Site Management Guidelines (Roads and Maritime, 2015)
- Sydney Metro's Construction Environmental Management Framework (CEMF).

To ensure potential environmental impacts from stockpiles is minimised, they will be located:

- Outside of the tree protection zone of trees or native vegetation identified to be retained
- Outside riparian zones (up to 40m from waterways)
- To ensure no cross contamination of contaminated materials with non-contaminated materials
- To ensure topsoil and subsoil are conserved and not mixed with other fill types or wastes
- In areas where appropriate erosion and sediment control measures can be installed and will operate effectively
- Readily accessible via the SSTOM Works footprint or road network
- To minimise the need for heavy vehicles to travel on local roads
- On relatively level land that is outside the 10% AEP flood extent (short term) or 5% AEP flood extent if stockpiling longer than 10 days
- Within the approved Project boundary
- With consideration of the potential contamination status of the material.

Stockpiling locations will be included on the ESCPs for the work area, with appropriate erosion and sediment controls implemented as required to minimise erosion and sedimentation, which will include, but not necessarily be limited to:

- Upstream diversion bunds and protection of the perimeter of the stockpile with a bund, fencing or barrier
- Erosion and sediment controls to be erected between the stockpile site and any drainage lines, down-slope areas and native vegetation
- Temporary sediment basins or sumps/traps
- Appropriate ground cover or stabilisation for stockpiles that will be in place for more than 10 days, where they are susceptible to wind, water erosion or potential to impact sensitive receivers.

Other controls to minimise impacts from stockpiling activities would include:

- Differential handling of topsoil so the upper layers which may be weed-laden, are stripped and stockpiled separately to the underlying topsoil
- Limiting topsoil stockpile heights to 2m, where practicable, and slopes no steeper than 2:1
- Stabilisation measures will be applied to stockpiles where they are over 2m high and present increased sedimentation or erosion risks
- Implementation of air quality management measures to minimise dust generation, in accordance with the Air Quality Management Plan (AQMP)
- Installation of stabilised haul routes, where practicable, and stabilised egress points with rumble grids or similar to minimise mud tracking
- Utilise appropriate identification signage for material type and implement segregation of stockpiles of differing waste streams, contamination status, to avoid cross-contamination
- Regular wetting down of stockpiling areas
- Implementation of odour controls, if required
- Minimise stockpile size as far as practical for contaminated material.

Where topsoil stockpiling occurs, the above controls will be implemented to ensure 100% of all topsoil (by volume) retains its productivity and is beneficially reused, where practicable. Beneficial reuse will be prioritised in accordance with the following spoil reuse hierarchy, in order of preference: within the construction site; for environmental works; other development projects (including the airport site); for land restoration; and landfill management.

Reusable spoil stockpiles will be managed appropriately to ensure that the project can meet the requirement that requires 100% of all reusable spoil to be beneficially reused.

Once stockpiling areas are no longer in use, the area will be rehabilitated to remove any excess stockpiled material, stabilising the area, and making the area fit for use for future land use, where appropriate.

6.8 Chemicals, Refuelling and Spill Management

Spills will be managed in accordance with Appendix D – Emergency Spill Response Procedure. The management of environmental incidents where material harm to the environment is caused or threatened will be managed in accordance with the Pollution Incident Response Management Plan required by Section 153A of the POEO Act for EPL holders.

Chemicals, hazardous substances, and dangerous goods will be stored and used onsite in accordance with Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005), the Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (Department of Planning, Industry and Environment, 2011) the Work Health and Safety Act 2011 (Commonwealth and NSW) and the requirements of the Environmentally Hazardous Chemicals Act 1985 (NSW) which include the following protocols:

- Hazardous substances will be stored onsite in lockable containers, in their original receptacles
- All chemicals and fuels will be clearly labelled and will have Safety Data Sheets available through Chemwatch
- All chemical storage facilities will be designed and constructed in accordance with:
  - All relevant Australian Standards
  - For liquids, a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund
  - Storing and Handling Liquids: Environmental Protection - Participants Manual
  - Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management - Part B Review of Best Practice and Regulation
  - Storage locations for non-liquids must be identified, away from stormwater drains and waterways
  - Easily accessible for maintenance and spill clean-up in the event of a rupture
  - Bunding maintenance must be undertaken to ensure capacity is maintained
- Mobile bunds to be inspected after rain and where required dewatered in accordance with the Dewatering and Water Treatment EWMS
- Storage and handling of flammable or combustible liquids will be in accordance with EPA guidelines for Bunding and Spill Management, as well as AS1940-1993 – The Storage and Handling of Flammable and Combustible Liquids
- An up-to-date register of hazardous substances will be kept onsite at all times
- Hazardous substances will only be used onsite as required, in accordance with the manufacturer/supplier instructions
- Any substances with the potential to impact water quality will be assessed, to determine what environmental safeguards or procedures are required for that substance to minimize the risk of environmental harm
- The use of any hazardous substance that could result in a spill will be undertaken away from drainage or stormwater lines and, wherever possible, within defined bunds
- Any refuelling on site shall be undertaken in designated areas only. Where this is not practicable i.e., large immobile plant, small equipment items such as pumps, small generators etc. refuelling will be undertaken away from stormwater drains and at least 50m from waterways. A fully stocked spill kit will be with the refuelling truck during refuelling
- Spill kits will be available on site, near batch plants, storage areas and main risk work areas as identified on ECM's
- All spills or leakages will be immediately contained and cleaned up
- Spills to be managed in accordance with the emergency spill response procedure, provided in Appendix D
- Where possible, equipment working over water will have sheathed hydraulic hoses and use biodegradable oil as well as the implementation of additional controls (e.g. booms) in accordance with the site ESCPs.

All wastes associated with chemicals will be managed in accordance with the Waste Management Sub Plan (WMSP)

6.9 Contamination Management

A number of medium and high risk contaminated sites, identified as AECs in the EIS (see Table 7) are located along the SSTOM Works alignment. The location of the AECs in relation to the SSTOM footprint are shown in Figure 11 through to Figure 14. Table 7 also identifies the Detailed Site Investigations (DSI) that have already been undertaken by prior contractors. Parklife Metro D&C will review the DSI findings and, where appropriate, commence work in these areas in accordance with the Project Deed and including the requirements of any approved site contamination Environmental Management Plan or remedial action plan (RAP). These requirements will be captured within construction planning documentation.

Parklife Metro D&C may undertake additional DSI in other areas if works disturb medium or high risk AEC's or other areas within or outside the Construction Site as required.

Parklife Metro D&C will undertake a review of the available documentation prior to handover of sites to ensure appropriate investigations and management documentation is available, and will undertake/prepare these documents where required. Preparation of any additional DSI would be in accordance with Condition E92, REMM SC1 and SC2 and NSW EPA Contaminated Land Guidelines.

The Sampling, Analysis and Quality Plan (SAQP) and DSIs, if required, will be prepared, or reviewed and approved, by consultants certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CEnvP (SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme.

Where contamination is identified in the DSI's, RAPs will be prepared to address contamination in accordance with Condition E93 and REMM SC3. No remediation works will occur in the areas until the RAPs are approved by the NSW EPA-accredited Site Auditor.

The RAPs will be prepared by consultants certified under either the CEnvP (SC) or the CPSS CSAM scheme. Where RAPs are prepared, a NSW EPA-accredited Site Auditor will be engaged to undertake the statutory audit functions.

Condition E94 and REMM SC4 requires that before commencing remediation, a Section B Site Audit Statement must be prepared by an NSW EPA-accredited Site Auditor that certifies that the RAPs is/are appropriate and that the site can be made suitable for the proposed use. All remediation will be performed in accordance with Australian standards and other relevant government guidelines (as listed in Section 3.4) as an integrated component of construction and to a standard commensurate with the proposed end use of the land.

Validation Reports will then be prepared in accordance with Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA, 2020) and relevant guidelines made or approved under section 105 of the CLM Act to meet the objectives of Condition E95 and REMM SC4.

As required by Condition E96, the Site Auditor would develop a Site Audit Statement and its accompanying Site Audit Report, which state that the contaminated land disturbed by the work has been made suitable for the intended land use. This would include an assessment of the suitability of the proposed land use of any residual land (not used as part of the operational footprint) in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority. A copy of relevant plans and reports would be submitted to the Planning Secretary and relevant Councils for information, as required by Condition E97.

Where ongoing management of residual contamination needs to be documented, a Long Term Environmental Management Plan will be prepared, which would be provided to the Site Auditor for approval.

Where applicable, a sustainability appraisal of remediation options will be completed against the indicators provided in, *A Framework for Assessing Sustainability of Soil and Groundwater Remediation* document.

6.9.1 Contamination Controls

Controls to minimise contamination impacts, to ensure compliance, and to reduce risk will be implemented before the relevant works commence. Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls used on this project are included in Table 13.

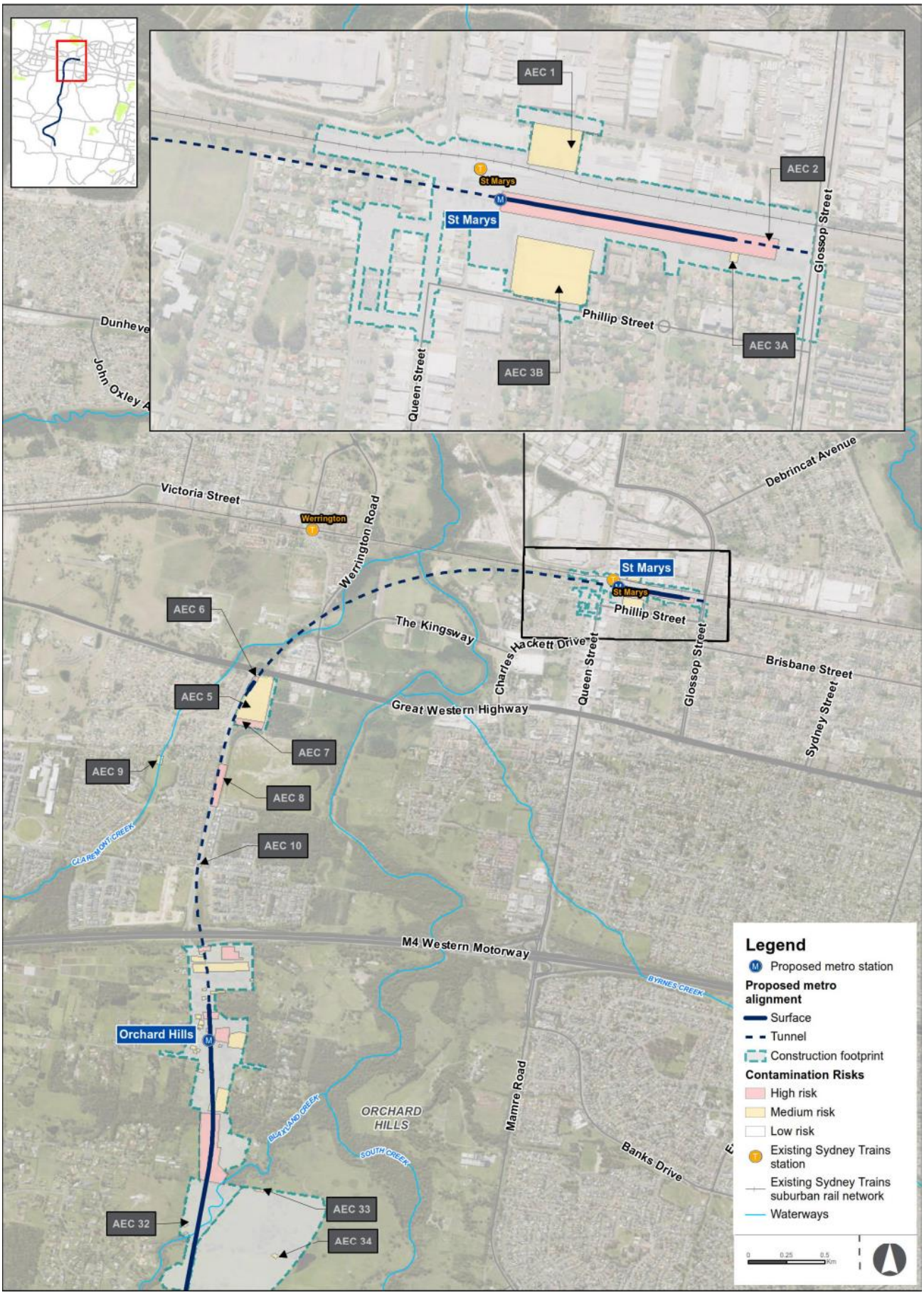

FIGURE 11 AECS – ST MARYS TO ORCHARD HILLS

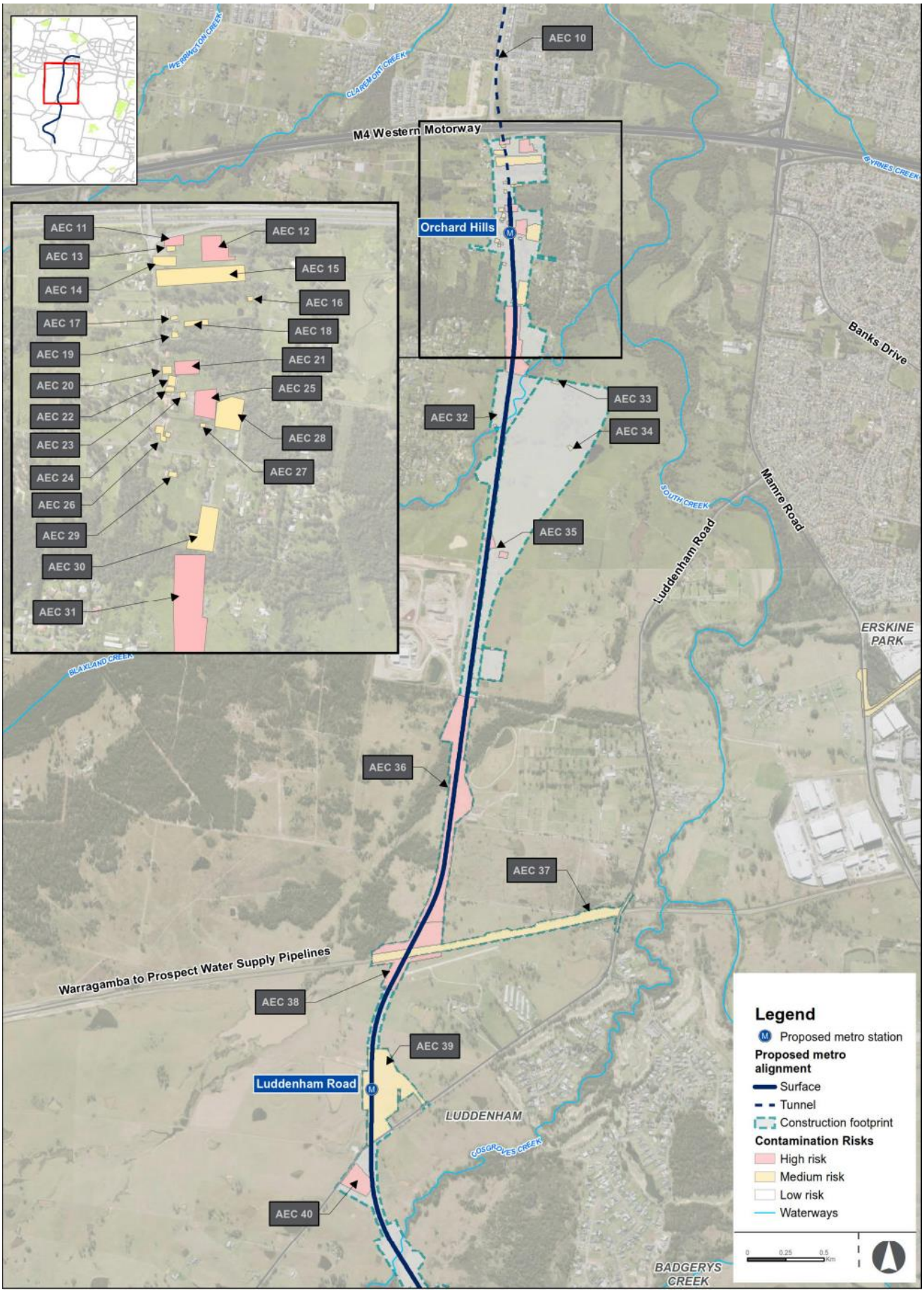

FIGURE 12AECS – ORCHARD HILLS TO LUDDENHAM

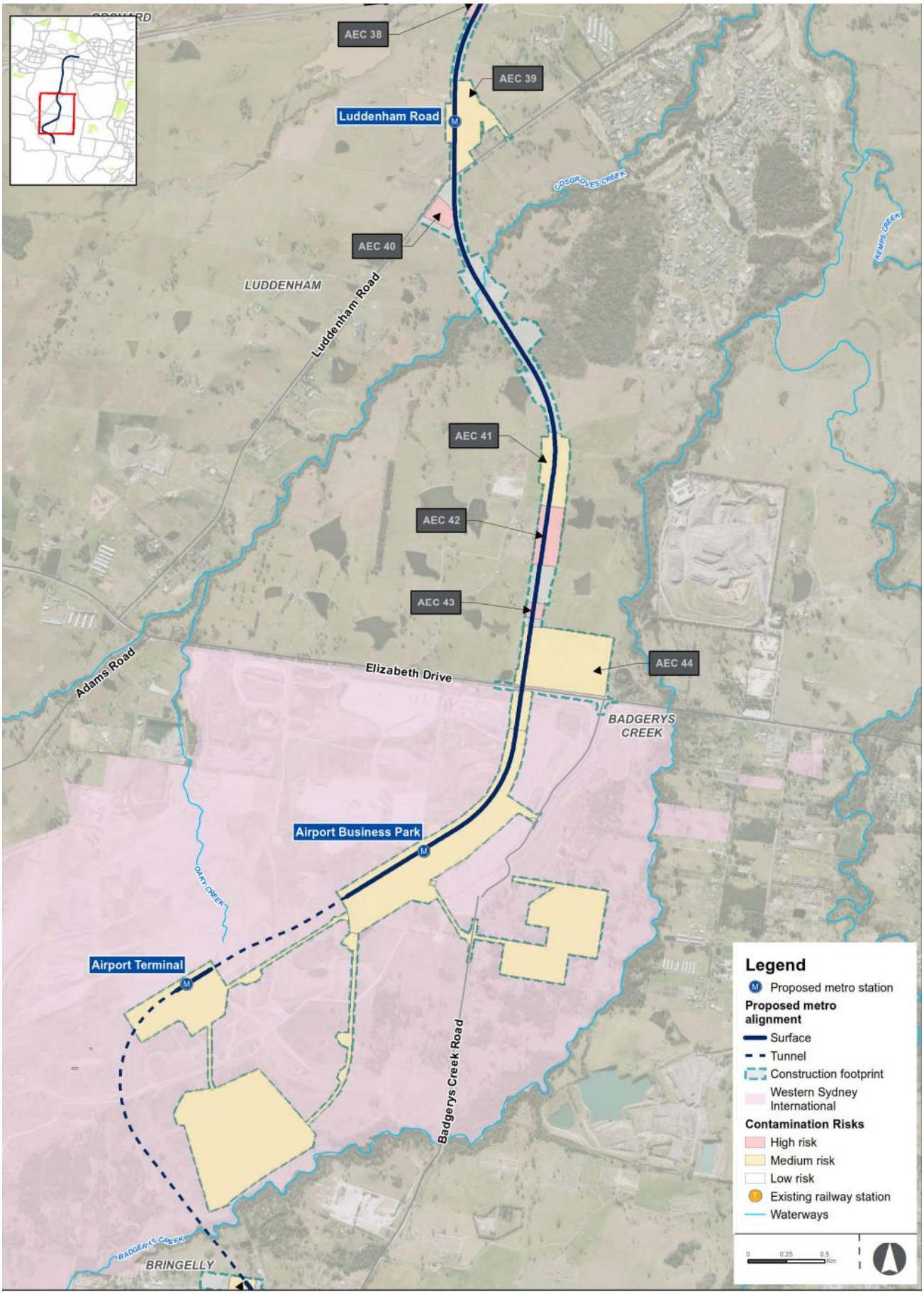

FIGURE 13AECS - LUDDENHAM TO BADGERYS CREEK

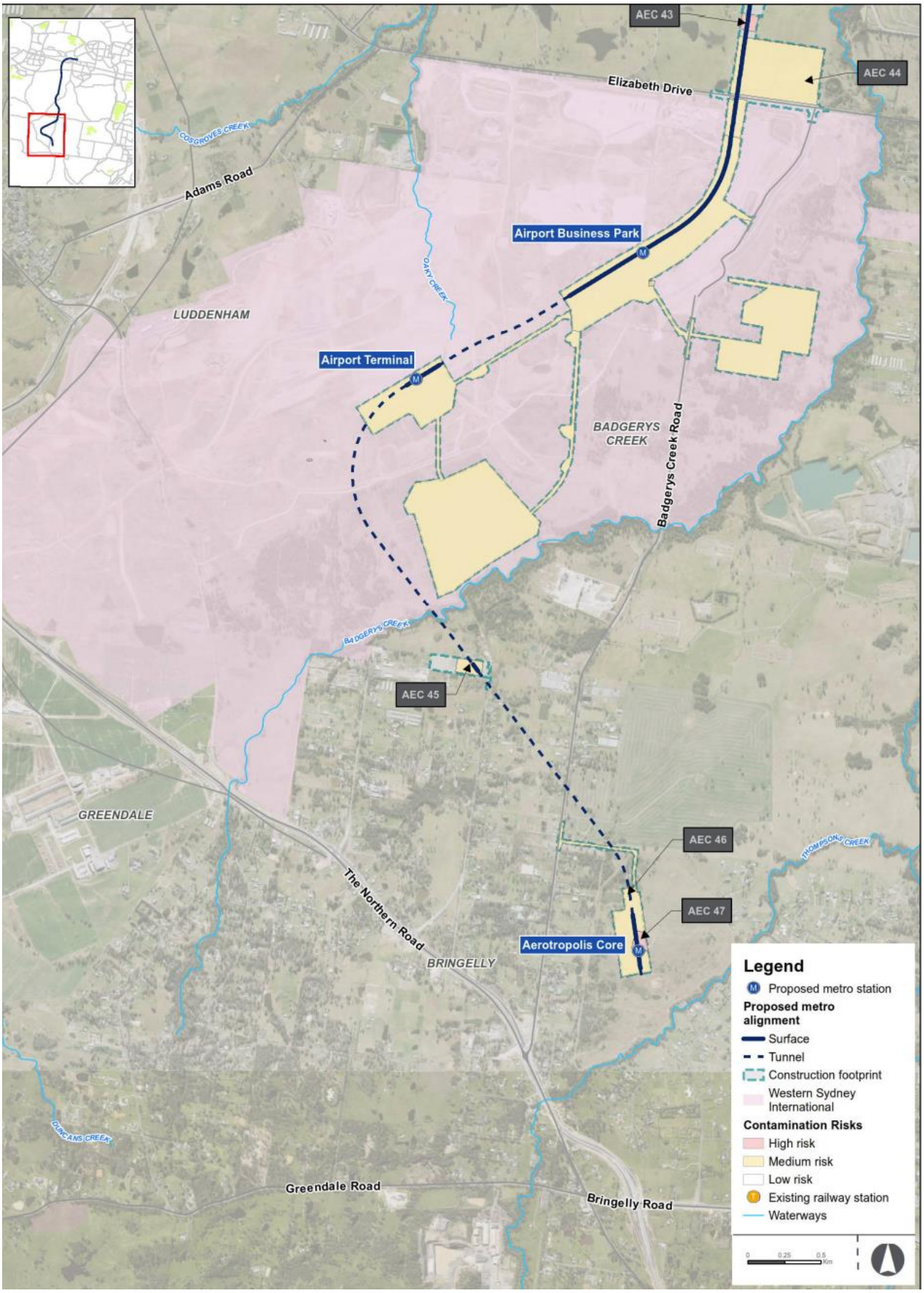

FIGURE 14AECS BADGERYS CREEK TO BRADFIELD

6.9.2 Unexpected Finds

Any unexpected, contaminated soils, water, gas or vapour risks encountered during SSTOM Works will be managed as per the Contamination and Asbestos Unexpected Finds Procedure in Appendix C, as required by Condition E98 and E99.

In the event any contaminated soil needs to be temporarily stockpiled on site, this will be undertaken under guidance by the Environmental Manager. Potential controls include covering with geofabric material, erosion and sediment controls flagging, signage and fencing. Management of any contamination will be in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority.

6.9.3 Saline Soils

To meet the requirements of REMM SC8, sampling will be undertaken in areas of high salinity probability to determine the presence of saline soils prior to disturbance. If saline soils are encountered, expert advice will be obtained from the project soil conservationist, and salinity will be managed in accordance with the following documents:

- Site Investigations for Urban Salinity (DLWC, 2002)
- Western Sydney Salinity Code of Practice (WSROC 2004)
- Book 4 Dryland Salinity: Productive Use of Saline Land and Water (DECC 2008)
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004).

Wherever possible, avoid disturbance or exposure of saline soils. Consideration must be given to lowering the water table through the following:

- Reducing infiltration rates (e.g., lining of waterways with impervious materials)
- Improving drainage (e.g., installation of subsoil drains).

Due to the limited interaction with groundwater, the SSTOM project is not predicted to cause any significant changes in groundwater quality or level, however, further investigations will be completed if required. Additional measures for salinity, if practical, will be implemented as required by REMM SC9.

6.9.4 Acid Sulfate Soils

The ASS risk is considered low given the low probability of ASS and the relatively minor ground disturbance to be undertaken by Parklife Metro D&C.

In the event that ASS is encountered, this will be managed in accordance with the following documents:

- Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998)
- Waste Classification Guidelines - Part 4: Acid Sulfate Soils (EPA, 2014).

Further testing will be undertaken by Parklife Metro D&C to confirm the existence of ASS and will be managed in accordance with REMM SC7. If ASS is confirmed to be present within the SSTOM Works area, and is likely to be encountered during the SSTOM Works, an EWMS and contingency plan will be prepared to manage the process of handling, treatment and disposal of potential ASS material.

Whilst the tests that were undertaken did not indicated PASS in the samples analysed, in the event that PASS/ASS is uncovered, mitigation measures will be implemented, such as those identified in the Acid Sulfate Soil Manual (ASSMAC 1998). An EWMS will be prepared to manage the process of handling, treatment and disposal of potential ASS material, which would include the below controls in accordance with the Acid Sulfate Soil Manual:

- Avoid disturbing or exposing the material in the first instance
- Neutralise any acid produced and capture any acid water for treatment
- Keep the ASS material below the water table

- Dispose of ASS at an appropriately licenced facility under the water table before it has had a chance to oxidise or as a neutralised material.

6.9.5 Hazardous Materials

Demolition and hazardous material stripping works will be relatively minor in scope for the SSTOM Works given the majority of this scope has been completed in previous WSA packages. Buildings to be demolished which are suspected of containing hazardous materials (particularly asbestos) will undergo a hazardous materials audit as required by REMM HR3.

Hazardous materials and special waste will be classified in accordance with the Waste Classification Guidelines and removed and disposed of in accordance with the relevant legislation, codes of practice and Australian Standards (including the Work Health and Safety and Regulation 2011 (NSW)).

6.10 Ongoing Environmental Identification and Management

The ongoing identification and management of environmental risks and opportunities is a key consideration during all project risk assessment activities and is described in the CEMP.

A Project Preliminary Environmental Risk Assessment has been conducted to identify key risks and control measures; to inform the preparation of the CEMP, sub-plans and procedures; and to provide input into the project Risk Register. The project Risk Register is a dynamic document that will be reviewed and updated as the project progress.

Environmental risk assessments are completed at each stage of project planning and delivery, and each level of risk assessment is periodically reviewed. The key documents and activities underpinning ongoing environmental risk assessment are:

- Construction planning documents,
- Environmental Work Method Statements (EWMS)
- Pre-start Meetings.

6.11 Management Controls

Controls that are adequate to minimise water use and potential water quality impacts, manage construction stage flooding and contamination impacts will be implemented before works commence and during construction. Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. Typical controls used on this project are included in Table 13.

Where mitigation measures or controls are identified in this SWMP or during construction that are not necessarily sourced from industry guidelines and standards but are considered industry best-practice and are the most suitable approach for management of the SSTOM Works, this will be approved by the Parklife Metro D&C Environmental Manager, in consultation with Sydney Metro and the ER, as required.

TABLE 13 MANAGEMENT CONTROLS

ID	Control	Source or Requirement	Accountability
Water Quality			
SW_M1	Erosion and sediment controls will be designed, developed, and implemented in consultation with the construction team and approved by the Environment Manager (or delegate)	Condition E128 CEMF 12.2b Blue Book	Site Supervisor Environmental Manager
SW_M2	Prior to the commencement of works, a Water Pollution Impact Assessment shall be prepared to assess the impacts of proposed construction-phase project discharge limits against the NSW Water Quality Objectives (WQOs)	Condition E130	Environmental Manager
SW_M3	Wherever possible, clean water will be diverted around disturbed site areas, stockpiles, and contaminated areas. These diversions would be installed prior to the commencement of works wherever possible.	CEMF 12.3a	Site Supervisor Project Engineer
SW_M4	Erosion and sediment controls will be installed downstream of works, stockpiles and other disturbed areas prior to or immediately upon any disturbance to vegetation or soil. These controls will remain in place until revegetation, stabilization or hard scaping has occurred.	CEMF 12.3a	Site Supervisor Project Engineer
SW_M5	Cleared areas will be kept to a minimum and be progressively rehabilitated/revegetated as they become available.	Best practice	Site Supervisor
SW_M6	All materials will be stockpiled at least 2m from water flow paths, outside riparian zones (up to 40m from waterways) and not within low lying flood prone land.	Best practice	Site Supervisor
SW_M7	Sediment laden water (dirty water) captured onsite will be preferentially reused e.g., dust control.	Best practice	Site Supervisor Engineer
SW_M8	Water transfers/movement around site and discharged from site is in strict accordance with the site's dewatering procedure and Permit to Dewater, which is approved by the Environmental Manager (or delegate).	Best practice	Environmental Manager Site Supervisor
SW_M9	An adequate number of concrete washout facilities will always be maintained. The washout facilities will be isolated from surface water flows using bunds to prevent contamination of clean surface waters and will be lined to prevent contamination of soil and ground water	Best practice	Site Supervisor Project Engineer
SW_M10	Dangerous good and hazardous materials storage will be within bunded areas with a capacity of 110% of the maximum single stored volume.	CEMF 12.3	Site Supervisor

ID	Control	Source or Requirement	Accountability
SW_M11	All hazardous substances (liquids and solids) are stored and managed according with AS1940.	CEMF 12.3	Site Supervisor
SW_M12	Chemicals will be stored and handled in accordance with relevant Australian standards	CEMF 12.3	Site Supervisor
SW_M13	Spill kits are to be available on site where activities are being undertaken with risks of spillages (e.g., batch plants, storage areas and main work sites)	CEMF 12.3	Site Supervisor
SW_M14	All refuelling points, including refuelling trucks, will carry hydrocarbon spill kits.	Best practice	Site Supervisor
SW_M15	All spills on site will be managed in accordance with the Emergency Spill Response Procedure	Best practice	Site Supervisor
SW_M16	The quantity of water consumed on the project from each of the following sources are reported monthly including potable water, water obtained under an extraction license or other regulatory authority and recycled water sourced from outside the project.	IS Rating Requirement	Project Engineer Sustainability Manager
SW_M17	Water reuse and conservation for the project will be implemented as much as practicable	IS Rating Requirement	Sustainability Manager
SW_M18	Material storage and stockpiling should occur well away from waterways	Best practice	Site Supervisor Environment Manager
SW_M19	An EWMS is to be prepared prior to any water discharge and will include provisions to protect fish during the dewatering process, which will contain mitigation controls to effectively treat any discharge waters to prevent offsite pollution of any receiving waters	Best Practice	Environment Manager
SW_M20	When conducting works in waterways a floating silt curtain is to be erected in a semicircular arrangement with ends against the bank so as to contain all suspended sediments within the work area.	Best Practice	Site Supervisor Environment Manager
SW_M21	Where possible compostable or reusable temporary erosion control devices will be used	Particular specification 1	Project Engineer Sustainability Manager
Contamination			
CL_M1	Contaminated land and general contamination risks shall be considered when developing Construction Area Plans and Work Packs	Best practice	Project Engineers Environmental Manager
CL_M2	When contaminated materials are discovered or suspected, works will cease, and the Site Supervisor and Environmental Manager notified immediately and the Contamination and Asbestos Unexpected Finds Procedure will be implemented.	REMM SC1	All staff Site Supervisor Environmental Manager

ID	Control	Source or Requirement	Accountability
CL_M3	Ensure contaminated land is managed, stockpiled, reused and/or disposed of as per the RAP	Condition E93	Site Supervisor
CL_M4	Contaminated water runoff from suspected or actual contaminated land and stockpiles will be contained, treated, and managed	CEMF 12.3	Site Supervisor
CL_M5	All vehicles, plant and other machinery operating in contact with contaminated soil will be decontaminated prior to leaving site	Best Practice	Site Supervisor
Soil Conservation			
SC_M1	Topsoil stockpile heights are to be kept below 2m, where practicable	Best practice Blue Book	Site Supervisor Environmental Manager
SC_M2	Utilise appropriate identification signage for material type, to avoid cross-contamination	Best practice	Site Supervisor Environmental Manager
SC_M3	Weedy topsoil to be stockpiled separately to clean topsoil	Best practice	Site Supervisor Environmental Manager

6.12 Monitoring

Inspections of work activities with the potential for soil and water impacts will occur for the duration of construction. Weekly inspections will be carried out by Parklife Metro D&C. The project requirements for monitoring are detailed in the CEMP and contained in Table 14.

TABLE 14 MONITORING AND INSPECTIONS RELEVANT TO SOIL AND WATER MANAGEMENT

Monitoring/inspection	Frequency	Responsibility
Site inspections	Weekly and prior to heavy rainfall (greater than 20mm predicted)	Environmental Manager
Post rainfall inspections	Following >20mm rain in 24 hours, or as indicated in the applicable ESCP	Environmental Manager
Shutdown inspections	Prior to shutdowns > 4 days	Environmental Manager
Surface water quality monitoring program	Quarterly	Environmental Manager
Visual surveillance of ESCPs, stockpiles, mud tracking	Daily	Site Supervisors

6.12.1 Surface Water Quality Monitoring Program

Appendix B contains the SWQMP that has been prepared in accordance with CoA C13 and in consultation with DPE Water, DPI Fisheries, and Penrith City Council and Liverpool City Council.

To meet REMM WQ1, a copy of this program will be provided to NSW EPA as part of the application for the EPL. The Secretary's approval and ER endorsement of this SWQMP will be sought as part of seeking approval and endorsement of this Sub-plan.

Results of the SWQMP, in the form of a Construction Monitoring Report, will be submitted to the Planning Secretary, ER and relevant regulatory agencies in accordance with CoA C22.

Water quality will be monitored to ensure discharge from the construction impact area is in accordance with regulatory guidelines, ANZECC/NSW Water Quality Objectives (required by CoA E126), or EPL discharge criteria, and to confirm conclusions from the Water Pollution Discharge Impact Assessment (prepared to CoA E130) and to identify potential non-compliances and corrective actions.

6.12.2 Groundwater Monitoring

A Groundwater Management Procedure is provided in Appendix G, which includes the Groundwater Monitoring Program. The Groundwater Management Procedure and Monitoring Program will be implemented during construction to monitor the extent and nature of potential impacts to the groundwater level and quality during SSTOM Works.

6.12.3 Meteorological Monitoring

Meteorological data will be checked to assist with managing impacts and to identify potential non-compliances. Weather data including daily weather conditions and forecasts will be obtained from Bureau of Meteorology (BOM) monitoring stations at the Orchard Hills Treatment Works AWS (Station Number 067084) and Badgerys Creek AWS (Station Number 067108).

In the absence of electronic meteorological information, the Site Supervisor, Site Engineers, and Environmental Coordinator will monitor rainfall events on site and coordinate activities with the site teams.

The criteria for monitoring rain events and the associated response is provided in Table 15.

TABLE 15 METEOROLOGICAL MONITORING CONDITIONS

Event	Criteria	Response
Rain Event	>20mm in 24 hours	• Inspect rumble grid and wheel-wash facilities. • Inspect adjacent roads for signs of mud tracking. • Inspect site erosion and sediment controls for effectiveness/maintenance

6.12.4 Post Construction Monitoring

Post construction, an inspection of construction, stockpiling and laydown sites and soil validation of redundant sedimentation/water quality basins would be undertaken to assess if further investigation and remediation is required in accordance with REMM SC6 and SC10.

All inspections, investigations and remediation would be undertaken by a qualified contaminated lands consultant with reports prepared or reviewed by a Certified Contaminated Land Consultant.

The inspections reports will include as a minimum:

- Details of any contamination / remediation / validation undertaken in the area (if applicable)
- Visual confirmation that all wastes and construction materials have been removed
- Details of any soil sampling undertaken and comparison of the results against land use requirements.

6.13 Cumulative Impact Management

Parklife Metro D&C will manage the potential for cumulative impacts via coordination and engagement with key stakeholders and other SSI projects in accordance with the Sydney Metro Construction Cumulative Impacts Management Plan (developed in accordance with REMM CL1) and the SSTOM Community Communications Strategy.

Cumulative impacts from soil and water quality will be managed through the monitoring requirements detailed in Section 6.12 and Appendix B which will be used to monitor the cumulative impacts from the SSTOM Project and other surrounding projects or waste facilities and identify if further management measures are required.

7 Compliance Management

7.1 People, Responsibilities and Communication

7.1.1 Parklife Metro D&C Staff

The roles and responsibilities of key Parklife Metro D&C project personnel with respect to Soil and Water are detailed in Table 16 and are further detailed in Section 3.5 of the CEMP.

TABLE 16 SOIL AND WATER MANAGEMENT ROLES AND RESPONSIBILITIES

Role	Authority and Responsibility
Project Director	• Managing the delivery of SSTOM Works including overseeing planning approval, environmental management and act as the Contractor's Representative • Authority to direct personnel and/or subcontractors to carry out actions to avoid or minimise unintended environmental impacts.
Environmental Manager	• Oversee the implementation of all soil and water management initiatives. • Prepare and implement this Sub-plan. • Oversee monitoring, inspections and auditing. • Have the ability to stop works on environmental grounds. • Report any incidents or non-compliances to Sydney Metro and the ER
Environmental Advisor / Coordinator	• Assist the Environmental Manager in the day-to-day environmental management of SSTOM. • Manage the on-ground application of soil and water management measures during construction (e.g. dust suppression using water, application of dust suppressants, covering stockpiles). • Monitor and report on soil and water management during construction. • Have the ability to stop works on environmental grounds.
Commercial Manager	• Ensure that relevant soil and water management requirements are considered in procuring materials and services.
Senior Engineering Manager	• Ensure relevant soil and water management requirements are addressed in design development.
Construction Manager and delegates	• Manage the delivery of the construction process in relation to soil, water and groundwater management for their work activity in conjunction with the Environmental Manager and Environment Advisors/Coordinators • Ensure compliance with this Sub-plan and associated procedures.
Sustainability Manager/ Coordinator	• Track and report soil and water elements against sustainability targets.
Superintendents/ Site Supervisors	• Construction delivery in relation to environmental management and compliance in conjunction with the Environmental Manager. • Authority to direct personnel and/or subcontractors to carry out actions to avoid or minimize unintended environmental impacts.
Project Manager Civil/Structures Project Engineers Site Engineers Supervisors	• Implement and monitor onsite environmental management and compliance measures across all sites in conjunction with environmental coordinators. • Undertake site inspections.
Stakeholder and Community Engagement Manager	• Assist in response to and management of complaints relating to soil and water

7.1.2 Soil Conservationist

A soil conservationist will provide expert advice which will be incorporated into this SWMP and into the development of Erosion and Sediment Control Plans (ESCPs). The soil conservationist will provide specialist advice and services in the development and implementation erosion and sediment controls (ESC) to ensure that impacts can be avoided, minimised, or appropriately mitigated including:

- Review and/or development and sign-off as a Certified Professional in Erosion and Sediment Control (CPESC) of ESCPs, where deemed to be required by the Environment Manager
- Providing input into design of erosion and sediment controls
- Providing input into the design and implementation of surface cover, surface treatments and on stabilisation controls
- Reviewing ESCPs and advising on the proposed strategy for erosion and sediment control and use of new technologies (where appropriate) regarding construction-phase soil and water management
- Conducting regular site inspection with environmental and construction personnel to review performance, recommend improvements and advise on potential enhancements
- Providing training to all key staff regarding erosion and sediment control. This will include legislative requirements, the application of best practice (i.e., Blue Book Volumes 1 and 2), correct use, maintenance and installation of erosion and sediment control techniques.

7.1.3 Contamination Specialist

A consultancy specialising in the fields of contamination management and materials identification will be engaged to undertake contamination assessments and provide advice on contamination management. They will also prepare:

- Detailed investigation reports (DSI, where required) – required by CoA E92
- Remedial Action Plan (RAPs, where required) – as required by CoA E93
- Validation reports (where required) as required by CoA E95.

The consultant will have within their team a person certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CenvP (SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme to either prepare or review and approve the DSIs, RAPs and validation reports.

7.1.4 Site Auditor

Should contamination be found, and remediation be required to make land suitable for the final intended land use, an accredited Site Auditor will be engaged under the NSW site auditor scheme (administered by the EPA under Part 4 of the CLM Act), who will provide review of the investigation, remediation, and validation work done by the contamination specialist and prepare Site Audit Statements to determine:

- The RAP is appropriate, and the site can be made suitable for the proposed use (Section B Site Audit Statement) – as required by CoA E94, and
- The remediation has been completed (Section A1 or A2 Site Audit Statement) – as required by CoA E96.

The Site Auditor will also review DSI reports as required by the Deed.

7.2 Training

Parklife Metro D&C will ensure that SSTOM Works personnel can competently perform their duties and meet environmental obligations. The SSTOM Works training needs will be determined on an ongoing basis throughout the life of the works program and will include as a minimum:

- Site induction including sensitivities relating to soil and water impacts
- Erosion and sedimentation hold points

- Permits to disturb and other legislative requirements
- Maintenance of environmental controls (e.g. erosion and sediment controls).
- Duty to notify of environmental harm (or the potential for it) including chain of reporting.

A Training Needs Matrix is included in Section 3.6.4 of the CEMP which further outlines the training strategy for the delivery of works.

7.2.1 Toolbox Talks and Awareness

Toolbox talks will be held regularly throughout site establishment and into commencement of construction to further reiterate environmental obligations to the project team. Toolbox talks will be topical and will relate to current and emerging risks in order to plan ahead for areas of risk. Topics will include:

- Water Management including discharge procedures
- Spill Management including mitigation and reporting requirements
- Unexpected Finds Soil Contamination and ASS
- Erosion and Sediment Control Management, including maintenance and inspections.

Pre-starts will be undertaken each morning by the smaller work crews onsite with more detailed training and awareness topics relevant for the days work. Pre-starts will increase awareness of site specific ESCPs, ERSED maintenance, establishment of new controls, rehabilitation and other topics.

7.2.2 Daily Pre-Start Meetings

Prestart will be undertaken each morning by the smaller work crews onsite with more detailed training and awareness topics relevant for the day's work. Prestart will increase awareness of the site specific EWMS, ESCPs, ERSED maintenance, establishment of new controls, rehabilitation, and other topics. All attendees will be required to sign on to the pre-start and acknowledge their understanding of the issues explained. The environmental component of pre-start meetings will be determined by relevant Supervisor and environmental personnel.

7.3 Non-compliance

In the event of an incident or non-compliance the reporting requirements detailed in Section 3.8 and 3.9 of the CEMP will be followed. Parklife Metro D&C will investigate the exceedance and determine the source and whether it can be attributed to SSTOM Works. If determined to be attributable to SSTOM Works, the incident will be classified in accordance with Section 3.8 of the CEMP and the Sydney Metro Environmental Incident Classification and Reporting Procedure.

In accordance with Condition A44, the Planning Secretary will be notified in writing via the Major Projects website within seven days after becoming aware of any non-compliance with the Infrastructure Approval. The notification will identify the project and application number, set out the conditions of approval in which a non-compliance has been identified, the way in which it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance, in accordance with Condition A45.

Sydney Metro and the ER will be made aware of any incidents or non-compliances, as will any relevant government agencies, in accordance with reporting protocols detailed in the CEMP.

7.4 Reporting and Records

Reporting requirements relevant to this Plan are detailed in Section 3.9 and 3.10 of the CEMP, in the Surface Water Quality Monitoring Program (Appendix B). In addition, the following records will be retained onsite for the duration of works:

- Register of all ESCP and their current revision status
- Copies of current ESCPs for all active construction sites

- Records of Environmental Inspections undertaken
- Observations and works undertaken to repair and/or maintain soil and water management works
- Records of Surface Water Discharge and Re-use Permits undertaken in accordance with the Parklife Metro D&C Dewatering and Water Treatment EWMS
- Records of water quality monitoring and results
- Records of unexpected finds
- Records for contamination management, including soil classification, spoil tracking, disposal dockets, remedial action plans, occupational hygienist clearances, and Site Auditor sign-offs.

8 Review and Improvement

8.1 Continuous Improvement

Parklife Metro D&C will continually improve environmental systems and performance through the implementation of an audit and review program. The audit and review program includes internal and external audits, reporting, and management reviews.

Continual improvement will be achieved by closely monitoring environmental performance through policy implementation, construction planning, risk management, corrective and preventive actions auditing, design review and auditing/review processes. See Section 3.9 of the CEMP for further details.

8.2 Sub-plan Update and Amendment

Management reviews of the SWMP will be undertaken as part of our rigorous continual improvement process. The purpose is to periodically examine the effectiveness and proper implementation of the SWMP to ensure that the system and controls are fit for purpose and are being implemented effectively. Management reviews will be undertaken annually by the Environmental Manager to review aspects and impacts, analysis of non-compliances and incidents, and to identify improvement opportunities.

If changes to this SWMP are identified as required as a result of an annual performance review, or as a result of project changes, construction updates, risk reviews, or general observations throughout construction, they may be approved by the ER in accordance with Condition A32(j) or by the Planning Secretary. Minor changes to this SWMP that may be approved by the ER would generally comprise changes that are of an administrative or minor nature, which do not increase impacts to nearby sensitive land use(s), and are consistent with the terms of the Infrastructure Approval and with the document as approved by the Planning Secretary. Where the ER deems it necessary (ie. where the change is not considered to be minor), the amended SWMP will be provided to the Planning Secretary for approval.

Parklife Metro D&C

Appendices

Soil and Water Management Sub-plan

Appendix A Other Conditions of Approval, REMMS and CEMF Requirements Relevant to this Plan

Note: additional CoAs relevant to the preparation and approval of this Sub-plan are included in Section 3.2

Minister's Conditions of Approval (23 July 2021) SSI 10051		
Ref	**Requirement**	**Where addressed**
A6	Where the terms of this approval require a document or monitoring program to be prepared, or a review to be undertaken, in consultation with identified parties, evidence of the consultation undertaken must be submitted to the Planning Secretary with the document. The evidence must include: (a) documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval; (b) a log of the dates of engagement or attempted engagement with the identified party and a summary of the issues raised by them; (c) documentation of the follow-up with the identified party(s) where feedback has not been provided to confirm that the party(s) has none or has failed to provide feedback after repeated requests; (d) outline of the issues raised by the identified party(s) and how they have been addressed; and (e) a description of the outstanding issues raised by the identified party(s) and the reasons why they have not been addressed.	Section 3.5 Appendix F
C12	In addition to the relevant requirements of the CEMF, the Soil and Water CEMP Sub-Plan must include but not be limited to: (a) details how the requirements of Conditions E127, E128 and E129 will be met; (b) the unexpected contaminated finds protocol required by Condition E98.	See below for E127, E128, E129 and E98.
E15	The CSSI must be designed and constructed with the objective of not exceeding the flood impacts presented in the documents listed in Condition A1 or the flood impact criteria in Table 5, whichever is greater, within and in the vicinity of the CSSI for all flood events up to and including the one (1) per cent Annual Exceedance Probability (AEP) flood event. **Table 5: Flood Impact Criteria** **Parameter** / **Location** / **Criteria** **Afflux** / Land zoned as residential, industrial or commercial, and critical infrastructure / Maximum 10 mm to buildings that are flood prone in existing conditions / / No new above floor flooding / / Maximum 50 mm where flooding is below floor level / Roads / Maximum 50 mm / Land zoned as rural, primary production, environment or public recreation / Maximum 100 mm **Velocity** / All areas / Velocities are to remain below 1 metre per second. Where existing velocities exceed 1 metre per second, increase by less than 10 per cent **Flood hazard** / Residential and commercial land / No increase in the flood hazard or risk to life / Roads / No increase in the flood hazard or risk to life **Flood duration** / Residential and commercial buildings / No increase to duration of above floor flooding / Roads / No more than one hour increase / Crown land, open space, farming, grazing and cropping land / No more than one hour increase Measures identified in the documents listed in Condition A1 to limit flooding impacts or measures that achieve the same outcome must be incorporated into the detailed design of the CSSI.	Design Reports
E16	Updated modelling that incorporates these measures and is calibrated and validated with consideration of the results of the Wianamatta-South Creek Catchment Flood Assessment prepared by Infrastructure NSW as part of Stage 2 of the South Creek Sector Review must be prepared by a suitably qualified flood consultant The modelling must identify changes in post-development flood	Design Reports

Minister's Conditions of Approval (23 July 2021) SSI 10051		
Ref	**Requirement**	**Where addressed**
	behaviour including cumulative flood impacts associated with Western Sydney International Airport and the M12, where this information is available, prior to detailed design being finalised.	
E17	Where flooding characteristics exceed the levels identified in Condition E15 above the Proponent must undertake the following: (a) consult with affected landowners for properties adversely flood affected as a result of the CSSI regarding appropriate mitigations; and (b) consult with the NSW State Emergency Service (SES) and Relevant Council(s) regarding the management of any continuous and residual flood risk from rarer flood events larger than the 1 per cent AEP and up to the probable maximum flood. In the event that the Proponent and the affected landowner cannot agree on the measures to mitigate the impact as described in Condition E15, the Proponent must engage a suitably qualified and experienced independent person to advise and assist in determining the impact and relevant mitigation measures.	Design Reports
E90	Settlement must be monitored for any period beyond the minimum timeframe requirements of Condition E87 if directed so by the IPIAP following its review of the monitoring data from the period not less than six (6) months after settlement has stabilised, consistent with Condition E87. The results of the monitoring must be made available to the Planning Secretary upon request.	Not applicable to SSTOM scope of works
E92	Before commencement of any construction that would result in the disturbance of moderate to high risk contaminated sites as identified in the documents identified in Condition A1, Detailed Site Investigations (for contamination) must be conducted to determine the full nature and extent of the contamination. The Detailed Site Investigation Report(s) and the subsequent report(s), must be prepared, or reviewed and approved, by consultants certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CEnvP(SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme. The Detailed Site Investigations must be undertaken in accordance with guidelines made or approved under section 105 of Contaminated Land Management Act 1997 (NSW). Note: Nothing in this condition prevents the Proponent from preparing individual Detailed Site Investigation Reports (for contamination) for separate sites.	Section 6
E93	Should remediation be required to make land suitable for the final intended land use, a Remedial Action Plan must be prepared, or reviewed and approved, by consultants certified under either the Environment Institute of Australia and New Zealand's Certified Environmental Practitioner (Site Contamination) scheme (CEnvP(SC)) or the Soil Science Australia Certified Professional Soil Scientist Contaminated Site Assessment and Management (CPSS CSAM) scheme. The Remedial Action Plan must be prepared in accordance with relevant guidelines made or approved by the EPA under section 105 of the Contaminated Land Management Act 1997 (NSW) and must include measures to remediate the contamination at the site to ensure the site will be suitable for the proposed use when the Remedial Action Plan is implemented. Note: Nothing in this condition prevents the Proponent from preparing individual Remedial Action Plans for separate sites.	Section 6
E94	Before commencing remediation, a Section B Site Audit Statement(s) must be prepared by an NSW EPA-accredited Site Auditor that certifies that the Remedial Action Plan(s) is/are appropriate and that the site can be made suitable for the proposed use. The Remedial Action Plan(s) must be implemented and any changes to the Remedial Action Plan(s) must be approved in writing by the NSW EPA-accredited Site Auditor.	Section 6

Minister's Conditions of Approval (23 July 2021) SSI 10051		
Ref	**Requirement**	**Where addressed**
	Note: Nothing in this condition prevents the Proponent from engaging an NSW EPA-accredited Site Auditor to prepare individual Site Audit Statements for Remedial Action Plans for separate sites.	
E95	Validation Report(s) must be prepared in accordance with Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA, 2020) and relevant guidelines made or approved under section 105 of the Contaminated Land Management Act 1997 (NSW). Note: Nothing in this condition prevents the Proponent from preparing individual Validation Reports for separate sites.	Section 6
E96	A Section A1 or Section A2 Site Audit Statement (accompanied by an Environmental Management Plan) and its accompanying Site Audit Report, which state that the contaminated land disturbed by the work has been made suitable for the intended land use, must be submitted to the Planning Secretary and the Relevant Council(s) after remediation and before the commencement of operation of the CSSI. Note: Nothing in this condition prevents the Proponent from obtaining Section A Site Audit Statements for individual parcels of remediated land.	Section 6
E97	A copy of Detailed Site Investigation Report(s), Remedial Action Plan(s), Validation Report(s), Site Audit Report(s) and Site Audit Statement(s) must be submitted to the Planning Secretary and the Relevant Council(s) for information	Section 6
E98	An Unexpected Contaminated Land and Asbestos Finds Procedure must be prepared before the commencement of construction and must be followed should unexpected, contaminated land or asbestos (or suspected contaminated land or asbestos) be excavated or otherwise discovered during construction.	Section 6.9.2 Appendix C
E99	The Unexpected Contaminated Land and Asbestos Finds Procedure must be implemented throughout construction.	Section 6.9.2 Appendix C
E102	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: (a) evaluation of reuse options; (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; (c) measures to avoid misuse of recycled water as potable water; (d) consideration of the public health risks from water recycling; and (e) time frame for the implementation of the preferred reuse option(s). 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. Justification must be provided to the Planning Secretary if it is concluded that no reuse options prevail. A copy of the Water Reuse Strategy must be made publicly available.	Section 6.4 Sustainability Plan

Minister's Conditions of Approval (23 July 2021) SSI 10051		
Ref	**Requirement**	**Where addressed**
	Note: Nothing in this condition prevents the Proponent from preparing separate Water Reuse Strategies for the construction and operational stages of the CSSI.	
E126	The CSSI must be designed and constructed so as to maintain the NSW Water Quality Objectives (NSW WQO) where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW WQO over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the NSW WQO, in which case those requirements must be complied with.	Section 6.3.1 and Section 6.12.1
E127	The Proponent must consider the Guidelines for controlled activities on waterfront land riparian corridors (Department of Industry 2018) when carrying out work within 40 metres of a watercourse, including its bed.	Section 6.5 Section 6.7
E128	Before undertaking any work and during maintenance or construction activities, erosion and sediment controls must be implemented and maintained to prevent water pollution consistent with Managing Urban Stormwater: Soils and Construction Vol 1 4th ed. By Landcom, 2004 (The Blue Book).	Section 6.1.1 Section 6.1.2 Section 6.11
E129	Unless an EPL is in force in respect to the CSSI and that licence specifies alternative criteria, discharges from construction wastewater treatment plants to surface waters must not exceed: (a) the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 (ANZG (2018)) default guideline values for toxicants at the 95 per cent species protection level; (b) for physical and chemical stressors, the guideline values set out in Tables 3.3.2 and 3.3.3 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC/ARMCANZ); and (c) for bioaccumulative and persistent toxicants, the ANZG (2018) guidelines values at a minimum of 99 per cent species protection level. Where the ANZG (2018) does not provide a default guideline value for a particular pollutant, the approaches set out in the ANZG (2018) for deriving guideline values, using interim guideline values and/or using other lines of evidence such as international scientific literature or water quality guidelines from other countries, must be used.	Section 6.3 Section 6.12 Appendix B
E130	If construction stage stormwater discharges are proposed, a Water Pollution Impact Assessment will be required. Any such assessment must be prepared in consultation with the EPA and be consistent with the National Water Quality Guidelines, with a level of detail commensurate with the potential water pollution risk. Note: If an EPL is required the Water Pollution Impact Assessment will be required to inform licensing consistent with section 45 of the POEO Act.	Section 6.3.1
E131	Drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drainage swales and depressions must be carried out in accordance with relevant guidelines and designed by a suitably qualified and experienced person.	Section 6.5
E133	Make good provisions for groundwater users must be provided in the event of a material decline in water supply levels, quality or quantity from registered existing bores associated with groundwater changes from either construction and/or ongoing operational dewatering caused by the CSSI.	Appendix G

Revised Environmental Management Measures		
Ref	**Requirement**	**Where addressed**
HYD1	Construction planning would consider flood related mitigation, including: • Staging construction works to reduce the duration of works within the floodplain • Daily and continuous monitoring of weather forecasts and storm events, rainfall levels and water levels in key watercourses to identify potential flooding events and related flood emergency response • Consultation with NSW State Emergency Services and relevant local councils to ensure consistent approaches to the management of flood events (off airport only) • Provide flood-proofing to excavations at risk of flooding during construction, where reasonable and feasible, such as raised entry into shafts and/or pump-out facilities to minimise ingress of floodwaters into shafts and the dive structure • Review of site layout and staging of construction works to avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required	Section 6.6 Progressive ESCPs
HYD2	Minimise works in the main creek channels (at Blaxland Creek, unnamed watercourse south of Patons Lane and Cosgroves Creek) where possible and avoid works in the channel during rainfall events	Section 6.5 Progressive ESCPs
HYD3	Surface water flows during construction would be managed to ensure that there is no increase in flows into or through the Warragamba to Prospect Water Supply Pipelines corridor	Progressive ESCPs Design Reports
LU1	Areas of land leased for the purposes of construction would be reinstated at the end of the lease to at least equivalent standard in consultation with the landowner	Section 6.12.4
WQ1	A surface water quality monitoring program would be implemented to monitor water quality during construction. The program would be developed in consultation with (as relevant) Western Sydney Airport, NSW Environment Protection Authority, relevant sections of the Department of Planning, Industry and Environment and relevant local councils. The program would consider monitoring being undertaken as part of other infrastructure projects such as the M12 Motorway and Western Sydney International On-airport, the water quality monitoring program would ensure that works meet the requirements under Schedule 2 of the Airports (Environment Protection) Regulations 1997 The program would monitor all construction discharge locations	Section 6.12 Appendix B
WQ2	Water treatment plants would be designed to ensure that wastewater is treated to a level that is compliant with the ANZECC/ARMCANZ (2000), ANZG (2018) and draft ANZG (2020) default guidelines for 95 per cent species protection and 99 per cent species protection level for toxicants that bioaccumulate unless other discharge criteria are agreed with relevant authorities	Section 6.3.1
WQ3	The design and construction of the project would take into account the former NSW Office of Water's Guidelines for controlled activities on waterfront land	Section 6.5
SC1	The Soil and Water Management Plan would incorporate the following measures:	Section 6.9

Revised Environmental Management Measures		
Ref	**Requirement**	**Where addressed**
	• For low risk areas of environmental concern, worker health and safety measures, waste management and tracking for contamination would be outlined • For medium and high risk areas of environmental concern, detailed site investigations and review of further available information would be undertaken prior to the start of construction	
SC2	Based on outcomes of SC1: • If a medium or high risk area of environmental concern is reassessed as low risk, the site would be managed in accordance with the Soil and Water Management Plan. This would typically occur where there is minor, isolated contamination that can be readily remediated through standard construction practices such as excavation and off-site disposal • For areas of environmental concern that remain or change to medium risk, visual inspections and monitoring would be performed during earthworks. If suspected contamination is encountered, the materials would be subject to sampling and analysis to assess management requirements in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority • For areas of environmental concern that remain or change to high risk, a Sampling, Analysis and Quality Plan would be prepared for Detailed Site Investigations or data gap investigations. The results from the site investigations would be assessed against criteria contained within the National Environment Protection (Assessment of Site Contamination) Measure (2013) and other applicable NSW statutory guidelines to assess whether remediation is required. Remediation works would be performed in accordance with the hierarchy of preferred strategies in the Guidelines for the NSW Site Auditor Scheme (NSW Environment Protection Authority, 2017) and other guidelines made or endorsed by the NSW Environment Protection Authority. Where practical, remediation works would be integrated with excavation and development works performed during construction	Section 6.9
SC3	Where information gathered from investigations for medium and high risk areas of environmental concern (as per mitigation measure SC1) is insufficient to determine the risk of contamination, a detailed site investigation would be carried out in accordance with the National Environment Protection Measure (2013) and other guidelines made or endorsed by the NSW Environment Protection Authority Where data from the additional data review (mitigation measure SC1) or the detailed site investigation (mitigation measure SC2) confirms that contamination would require remediation, a Remediation Action Plan would be developed for the area of the construction footprint If a Remediation Action Plan is required, it would be developed in accordance with NSW Environment Protection Authority statutory guidelines and a Site Auditor would be engaged. Remediation methodologies would be undertaken in accordance with Australian Standards and other relevant government guidelines and codes of practice Remediation would be performed as an integrated component of construction and to a standard commensurate with the proposed end use of the land	Section 6.9

Revised Environmental Management Measures		
Ref	**Requirement**	**Where addressed**
SC4	If a duty to report to the NSW Environment Protection Authority under Section 60 of the Contaminated Lands Management Act 1997 is triggered, or where a medium to high risk of contamination is identified, an accredited Site Auditor would review and approve the Remediation Action Plan (including issue of interim audit advice), and would develop a Site Audit Statement and Site Audit Report upon completion of remediation	Section 6.9
SC5	An unexpected finds procedure would be developed and implemented as part of the project Soil and Water Management Plan, outlining a set of potential contamination issues which could be encountered, and detailing the management actions to be implemented. The unexpected finds procedure would include a process for chemical and asbestos contamination and would generally include: • Cessation of works within the affected area until inspection of the suspected contamination by a qualified contaminated lands consultant • Collection of soil samples for chemical or asbestos analysis, where required, based on observations • Assessment of results against applicable land use or waste classification criteria in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority • Management of the contamination in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority • The unexpected finds procedure for on-airport construction would be consistent with the Western Sydney Airport unexpected finds procedure detailed in the Western Sydney Airport Soil and Water Construction Environmental Management Plan	Section 6.9.2 Appendix C
SC6	Post construction, an inspection of construction, stockpiling and laydown sites and soil validation of redundant sedimentation/water quality basins would be undertaken to assess if further investigation and remediation is required. Investigation and remediation (if required) would be undertaken in accordance with the Soil and Water Management Plan (off-airport) and a project specific Remediation Action Plan that would be prepared in a manner consistent with the Western Sydney Airport Remediation Action Plan (on-airport). All inspections, investigations and remediation would be undertaken by a qualified contaminated lands consultant with reports prepared or reviewed by a Certified Contaminated Land Consultant	Section 6.12.4
SC7	Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the actual presence of acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998)	Section 6.9.4
SC8	Prior to ground disturbance in high probability salinity areas testing would be conducted to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC 2008). Erosion controls would be implemented in accordance with the Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004)	Section 6.9.3

Revised Environmental Management Measures		
Ref	**Requirement**	**Where addressed**
SC9	Targeted groundwater investigations would be undertaken prior to construction to identify high salinity areas at risk from rising groundwater. Where high saline areas (>1000 µS/cm) are identified, measures such as planting, regenerating and maintaining native vegetation and good ground cover in recharge, transmission and discharge zones would be implemented where possible	Section 6.9.3 Appendix G
SC10	Where the construction footprint is not used as part of the operational footprint (residual land), an assessment of the suitability of the site for the proposed land use would be undertaken in accordance with statutory guidelines made or endorsed by the NSW Environment Protection Authority	Section 6.9
HR1	All hazardous substances that may be required for construction would be stored and managed in accordance with the Storage and *Handling of Dangerous Goods Code of Practice* (WorkCover NSW, 2005), the *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (Department of Planning, Industry and Environment, 2011) the W*ork Health and Safety Act 2011* (Commonwealth and NSW) and the requirements of the *Environmentally Hazardous Chemicals Act 1985* (NSW)	Section 6.8

Construction Environmental Management Framework		
Ref	**Requirement**	**Where addressed**
3.12a	Principal Contractors undertaking off-airport work in accordance with an EPL must develop and implement a Pollution Incident Response Management Plan, in accordance with the requirements of the POEO Act. Contractor's emergency and incident response procedures will also be consistent with any relevant Sydney Metro procedures and, for on-airport works, consistent with the environmental incident and emergency management requirements identified in the Western Sydney Airport Site Environmental Management Framework and will include: i. Categories for environmental emergencies and incidents; ii. Notification protocols for each category of environmental emergency or incident, including notification to Sydney Metro, WSA (where required for on-airport works) and notification to owners / occupiers in the vicinity of the incident. This is to include relevant contact details; iii. Identification of personnel who have the authority to take immediate action to shut down any activity, or to affect any environmental control measure (including as directed by an authorised officer of any regulator or government department); iv. A process for undertaking appropriate levels of investigation for all incidents and the identification, implementation, and assessment of corrective and preventative actions; and v. Notification protocols of incidents to relevant regulators and stakeholders including (but not limited to) the EPA, DPIE, the AEO, WSA and DITRDC for incidents that are made by the Contractor or Sydney Metro.	Section 6.6.2 Section 6.8 Emergency Response Plan Pollution Incident Response Plan (to be developed with EPL application0
7.1a	The following groundwater management objectives will apply to construction: i. Reduce the potential for drawdown of surrounding groundwater resources; ii. Prevent the pollution of groundwater through appropriate controls; and iii. Reduce the potential impacts of groundwater dependent ecosystems. iv. For on-airport works, the Sydney Metro Western Sydney Airport Soil and Water CEMP will detail all the groundwater management objectives and will be consistent with the WSA Soil and Water CEMP, including all appendices to the CEMP.	Section 2

Construction Environmental Management Framework		
Ref	**Requirement**	**Where addressed**
7.2a	For off-airport works, the following content may be provided within other sub plans such as the Soil and Water Management Plan and Flora and Fauna Management Plan. Groundwater management of on-airport works will be implemented through the groundwater management plan approved as part of the SMWSA Soil and Water CEMP. In particular the groundwater quality criteria will be in accordance to the WSA Soil and Groundwater CEMP Appendix G.	Appendix G
7.2b	Principal Contractors will develop and implement a Groundwater Management Plan for off-airport works. The Groundwater Management Plan will include as a minimum: i. The groundwater mitigation measures as detailed in the planning approval documentation; ii. The requirements of any applicable licence conditions; iii. Details of proposed extraction, use and disposal of groundwater, and measures to mitigate potential impacts to groundwater sources, incorporating monitoring, impact trigger definition and response actions for all groundwater sources potentially impacted by SMWSA; iv. Evidence of consultation with the relevant government agencies, such as DPIE for off-airport works or land; v. The responsibilities of key project personnel with respect to the implementation of the plan; vi. Procedures for the treatment, testing and discharge of groundwater from the site; vii. Compliance record generation and management; and viii. Details of groundwater monitoring if required.	Appendix G
12.1	The following soil and water management objectives will apply to construction:	
	i. Minimise pollution of surface water through appropriate erosion and sediment control;	Section 6.1.1 Section 6.1.2
	ii. Minimise leaks and spills from construction activities;	Section 6.8
	iii. Maintain existing water quality of surrounding surface watercourses;	Section 6.1.1 Section 6.1.2
	iv. Source construction water from non-potable sources, where feasible and reasonable; and	Sustainability Management Plan Water Reuse Strategy
	v. For on-airport works, the Sydney Metro Western Sydney Airport Soil and Water CEMP will detail all the soil and water management objectives and will be consistent with the WSA Soil and Water CEMP, including all appendices to the CEMP.	N/A
12.2a	On-airport management of soil and water will be achieved through the implementation of the SMWSA Soil and Water CEMP and Principal Contractors will develop and implement a Soil and Water Management Plan for all off-airport works. Both plans will include as a minimum:	
	i. The soil and water mitigation measures as detailed in the planning approval documentation and sustainability requirements;	Section 6.11
	ii. Details of construction activities and their locations, which have the potential to impact on water courses, storage facilities, stormwater flows, and groundwater;	Section 5

Construction Environmental Management Framework		
Ref	**Requirement**	**Where addressed**
		Progressive ESCP
	iii. Surface water and ground water impact assessment criteria consistent with the principles of the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines for off-airport works and the Airports (Environment Protection) Regulations 1997 for on-airport works (with due consideration of the ANZECC guidelines);	Section 6.2.1 Section 6.3.1 Appendix B
	iv. Management measures to be used to minimise surface and groundwater impacts, including identification of water treatment measures and discharge points, details of how spoil and fill material required by the project will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; salinity control measures and the consideration of flood events;	Section 6 Appendix G
	v. A contingency plan, consistent with the NSW Acid Sulfate Soils Manual (EPA 1998), to deal with the unexpected discovery of actual or potential acid sulfate soils both on and off-airport lands. The plan must include procedures for the investigation, handling, treatment and management of such soils and water seepage;	Section 6.9.4
	vi. Management measures for contaminated material (soils, water and building materials) and a contingency plan to be implemented in the case of unanticipated discovery of contaminated material, including asbestos, during construction;	Section 6.9.2 Appendix C
	vii. A description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, how the results of the monitoring would be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified;	Section 6.12 Section 8 Appendix B
	viii. The requirements of any applicable licence conditions;	Section 6.2.1 and 6.3.1
	ix. The responsibilities of key project personnel with respect to the implementation of the plan;	Section 7.1
	x. Procedures for the development and implementation of Progressive Erosion and Sediment Control Plans;	Section 6.1.2
	xi. Identification of locations where site specific Stormwater and Flooding Management Plans are required; and	Section 6.6.1
	xii. Compliance record generation and management	Section 7
12.2b	Principal Contractors will develop and implement Progressive Erosion and Sediment Control Plans (ESCPs) for all active worksites in accordance with Managing Urban Stormwater: Soils & Construction Volume 1(Landcom, 2004) (known as the “Blue Book”). The ESCPs will be approved by the Contractor’s Environmental Manager (or delegate) prior to any works commencing (including vegetation clearing) on a particular site. Copies of the approved ESCP will be held by the relevant Contractor personnel including the Engineer and the Site Foreman.	Section 6.1.1
12.2c	ESCPs will detail all required erosion and sediment control measures for the particular site at the particular point in time and be progressively updated to reflect the current site conditions. Any amendments to the ESCP will be approved by the Contractor’s Environmental Manager (or delegate).	Section 6.1.1
12.2d	Principal Contractors will develop and implement Stormwater and Flooding Management Plans for the relevant construction sites. These plans will identify the appropriate design standard for flood mitigation based on the duration of construction, proposed activities	Section 6.6.1 Emergency Response Plan

Construction Environmental Management Framework		
Ref	**Requirement**	**Where addressed**
	and flood risks. The plan will develop procedures to ensure that threats to human safety and damage to infrastructure are not exacerbated during the construction period.	
12.2e	Principal Contractors will undertake the following soil and water monitoring as a minimum:	
	i. Weekly inspections of the erosion and sediment control measures. Issues identified would be rectified as soon as practicable;	Section 6.12, 6.12.1
	ii. Additional inspections will be undertaken following significant rainfall events (greater than 20 mm in 24 hours); and	
	iii. All water will be tested (and treated if required) prior to discharge from the site in order to determine compliance with the appropriate approvals and licencing. No water will be discharged from the site without written approval of the Contractor's Environmental Manager (or delegate). This is to form a HOLD POINT.	Section 6.2.1
12.2f	The following compliance records will be kept by the Principal Contractors:	
	i. Copies of current ESCPs for all active construction sites;	Section 7.3
	ii. Records of soil and water inspections undertaken;	Section 7.3
	iii. Records of testing of any water prior to discharge; and	Section 7.3
	iv. Records of the release of the hold point to discharge water from the construction site to the receiving environment.	Section 7.3 Appendix E
12.2g	The following water resources management objectives will apply to the construction of the project:	
	i. Minimise demand for, and use of potable water;	Section 6.4 Sustainability Management Plan Water Reuse Strategy
	ii. Maximise opportunities for water re-use from captured stormwater, wastewater and groundwater;	
	iii. Examples of measures to minimise potable water consumption include: • Water efficient controls, fixtures and fittings in temporary facilities; • Collecting, treating and reusing water generated in tunnelling operations, concrete batching and casting facility processes; • Using recycled water or treated water from onsite sources in the formulation of concrete; • Harvesting and reusing rainwater from roofs of temporary facilities; • Using water from recycled water networks; • Collecting, treating, and reusing groundwater and stormwater; • Using water efficient construction methods and equipment; and • Providing designated sealed areas for equipment wash down.	
12.3a	The on-airport Soil and Water CEMP and the off-airport Soil and Water Management Plan will include the following surface water and flooding mitigation measures as well as any relevant Conditions:	

Construction Environmental Management Framework		
Ref	**Requirement**	**Where addressed**
	i. Clean water will be diverted around disturbed site areas, stockpiles and contaminated areas;	Section 6.11
	ii. Control measures will be installed downstream of works, stockpiles and other disturbed areas;	Section 6.11
	iii. Exposed surfaces will be minimised, and stabilised / revegetated as soon feasible and reasonable upon completion of construction;	Section 6.11
	iv. Dangerous good and hazardous materials storage will be within bunded areas with a capacity of 110 per cent of the maximum single stored volume;	Section 6.11
	v. Chemicals will be stored and handled in accordance with relevant Australian standards such as:	Section 6.9.5
	• AS 1940-2004 The storage and handling of flammable and combustible liquids	Section 6.8
	• AS/NZS 4452:1997 The storage and handling of toxic substances	
	• AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods	
	• AS/NZS 1547:2012 On-site domestic wastewater management	
	vi. Spill kits will be provided at the batch plants, storage areas and main work sites;	Section 6.9.5
	vii. A protocol will be developed and implemented to respond to and remedy leaks or spills.	Section 6.8 Appendix D
	viii. A remedial action plan and unexpected finds protocol would be established to facilitate the quarantining, isolation and remediation of contamination identified throughout the construction programme. Any asbestos identified on site would be managed in accordance with applicable regulatory requirements.	Appendix C

Appendix B Surface Water Quality Monitoring Program

Doc No Ref: SMWSASSM-PLD-1NL-PC-PLN-000021

SSTOM - Surface Water Quality Monitoring Program

SMWSASSM-PLD-1NL-PC-PLN-000021

Parklife Metro D&C

Approval Record

	Author	Date	Issue	Reviewed by	Approved by
00	[redacted] Environment Manager	**26/06/2023**	Final issue / IFC	[redacted] Environment Manager	[redacted] Project Director
01	[redacted] Environment Manager	**17/07/2023**	First revision	[redacted] Environment Manager	[redacted] Project Director
02	[redacted] Environment Approvals	**17/07/2024**	Annual Review	[redacted] Environment Manager	[redacted] Project Director
03	[redacted] Environment Approvals	**16/12/2024**	Annual Revision / IFI	[redacted] Environment Manager	[redacted] Project Director
04	[redacted] Environment Advisor	**12/08/2025**	Revision for monitoring locations / IFI	[redacted] Environment Manager	[redacted] Project Director
05	[redacted] Environmental Advisor	**01/12/2025**	Annual Revision / IFI	[redacted] Environment Manager	[redacted] Project Director
Signatur	[redacted]				

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Amendment Record

Date	Revision	Version	Amendment Description
20/02/2023	A	1	Initial Draft
27/03/2023	B	1	Issued for stakeholder consultation
19/05/2023	C	1	Revised in response to comments
09/06/2023	D	1	Revised in response to comments
26/06/2023	00	1	Final for ER endorsement and DPE review and approval
17/07/2023	01	1	Revised in response to DPE review
17/07/2024	02	1	Annual Review
06/11/2024	02	2	Revised in response to SM and ER comments
16/12/2024	03	1	Final issue for ER endorsement
19/05/2025	03	2	Minor update triggered as Surface Water Construction Monitoring Report data indicated monitoring locations were not representative of PLM construction activities. Updated using the SMART principles in Section 1.3
12/08/2025	04	1	Final issue for ER endorsement
12/11/2025	04	2	Annual Review
01/12/2025	05	1	Final issue for ER endorsement (No IC Certification required)

Details of Revision Amendments

Document Control

The Management Plan's owner Director or his/her delegate is responsible for updating this plan to reflect changes to the project, construction, legal and other requirements, as required.

Plan Authorisation

The implementation and distribution of this Management Plan is under the authority of the Project Director. All personnel employed on the Project will perform their duties in accordance with the requirements of this Management Plan, supporting management plans and related procedures.

Amendments

Any revisions or amendments must be approved by the Project Director and / or client before being implemented and distributed.

Abbreviations and Acronyms

Abbreviation	Expanded Text
AS	Australian Standard
CEMF	Construction Environmental Management Framework
Condition	Planning Minister's Condition of Approval
Construction	Includes all work required to construct the CSSI as described in the documents listed in Conditions A1, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work.
DPE	NSW Department of Planning and Environment (now DPHI and DCCEEW)
DPHI	NSW Department of Planning, Housing and Infrastructure (formerly DPE)
EC	Electrical conductivity
EIS	Environmental Impact Statement
EM	Environment Manager
EMS	Environmental Management System
EPA	NSW Environmental Protection Authority
EPL	Environmental Protection License
ER	Environmental Representative nominated by the Proponent and approved by the Planning Secretary in accordance with Condition A27
LGA	Local Government Area
Minister, the	NSW Minister for Planning and Public Spaces (or delegate)
Non-compliance	An occurrence, set of circumstances, or development that results in a non-compliance or is non-compliant with Infrastructure Approval or other licence, permit or legal requirements.
Non-conformance	Observations or actions that are not in strict accordance with the CEMP and the aspect specific Sub-Plan
NTU	Nephelometric Turbidity unit
POEO Act	*Protection of the Environment Operations Act 1997.*
REMM	SSD 7308 Revised Environmental Management Measures
SSTOM	Stations, Systems, Trains, Operations and Maintenance
SSTV	Site-Specific Trigger Values
the Principal	Sydney Metro
the Project	Sydney Metro Western Sydney Airport
Parklife Metro	Consortium comprising entities of Plenary, Siemens, RATP Dev and Webuild as the Applicant for the Sydney Metro Western Sydney Airport SSTOM Package.
Parklife Metro D&C	Parklife Metro Design and Construct. Consists of Webuild S.P.A, Siemens Mobility Pty Ltd and Richard Crookes Constructions Pty Ltd. Responsible for the construction of SSTOM Works

1 Introduction

1.1 Background

The Project involves the construction and operation of a new metro railway line around 23km in length that extends from the existing Sydney Trains suburban T1 Western Line at St Marys in the north to Bradfield in the south at Bringelly. The alignment includes a combination of tunnel, surface, bridges and viaduct sections, and comprises of six new metro stations between St Marys and the Bradfield precinct, as well as a stabling and maintenance facility and operational control centre to support the operation of the new metro railway line (see Figure 1).

The Project will be delivered in multiple stages, consisting of

- **Advanced and Enabling Works (AEW)** – Site investigations, modification of the existing transport network, power and water supply for construction sites, utility and stormwater diversions and some demolition works.
- **Station Boxes and Tunnelling (SBT)** – Two sections of twin running tunnels, constructed with the use of tunnel boring machines (TBMs), dive structures and station box excavations.
- **Surface and Civil Alignment Works (SCAW)** – Construction of bridges and viaducts to cross floodplains, watercourses and existing and proposed permanent infrastructure.
- **Stations, Systems, Trains, Operations and Maintenance (SSTOM)**, being the subject of this Monitoring Program, and will include the following:
    - Station design and fit-out, urban and landscape design, precinct and transport integration works,
    - Finishing works and testing and commissioning, and
    - Operation of the Western Sydney Airport metro service (operation of Sydney Metro WSA will be managed by separate CEMP and Sub-plans).
- **Finalisation Auxiliary Works**.

The SSTOM Works scope as part of the Sydney Metro Western Sydney Airport Project includes:

- installation of tracks, signalling, mechanical and electrical systems,
- construction of a stabling and maintenance facility at Orchard Hills,
- construction of the lower chamber of Bringelly shaft, along with capping and backfill,
- construction of the lower chamber of Claremont Meadows shaft, along with capping and backfill, and
- construction of six stations, including:
    - a new metro station connecting to, and providing an interchange with, the T1 Western Line (part of the existing Sydney Trains suburban rail network) at St Marys,
    - two new metro stations between the T1 Western Line and Western Sydney International; one at Orchard Hills and one at Luddenham within the Northern Gateway Precinct,
    - two new metro stations within the Western Sydney International site; one at the Airport Terminal and one at the Airport Business Park, both of which are located on Airport land and are managed under a separate CEMP and Sub-plan documents, and
    - a new metro station within the Bradfield precinct, south of Western Sydney International.

The SSTOM Works also includes the supplying new driverless trains, and the operation and maintenance of the new metro railway line and its assets, which will be managed separately to this Monitoring Program.

FIGURE 1 OVERVIEW OF SMWSA PROJECT

1.2 Context

This Surface Water Quality Monitoring Program (Monitoring Program) is an appendix of the Soil and Water Management Sub-plan (SWMP) and forms part of the Construction Environmental Management Plan (CEMP) for the SSTOM Works being undertaken on NSW land (off-airport). This Monitoring Program has been developed in consultation with relevant Councils, DPHI (DPE) Water and DPI Fisheries (refer to Appendix F of the Soil and Water Management Plan for details of consultation), in accordance with Condition A6.

1.3 Scope

The Monitoring Program has been prepared in accordance with the requirements of Planning Approval Conditions (refer to Table 1) and will describe how Parklife Metro D&C will approach monitoring requirements for surface water on the SSTOM Works. The Monitoring program has been developed considering the SMART principles, in that they are specific to surface water quality monitoring for the SSTOM Works being undertaken off-airport, they are measurable against monitoring parameters, they are actionable as trigger action responses, they are realistic and achievable, and they are timely in that they apply to the construction phase of the SSTOM Works.

This Monitoring Program is the key measurement tool and has been prepared to compare actual performance of the SSTOM Works against the predicted performance the EIS and will describe how Parklife Metro D&C proposes to monitor potential impacts to surface water during construction of the SSTOM Works.

1.4 Conditions of Approval

Conditions relevant to the preparation of this Program are identified in Table 1. A cross reference is also included to indicate where the requirement is addressed in this Program or other documents

TABLE 1 REQUIREMENTS FOR THE PREPARATION OF THIS MONITORING PROGRAM

Ref	Requirement	Where Addressed
Condition C13	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies (as required by Condition A6) identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP. Where a government agency(ies) request(s) is not included, the Proponent must provide the Planning Secretary / ER (whichever is applicable) justification as to why. (b) Surface water quality: DPIE Water, DPI Fisheries and Relevant Councils	Section 3 Appendix F of the SWMP
Condition C14	Each Construction Monitoring Program must provide:	
	(a) details of baseline data available including the period of baseline monitoring;	Section 4
	(b) details of baseline data to be obtained and when;	Section 4
	(c) details of all monitoring of the project to be undertaken;	Section 5
	(d) the parameters of the project to be monitored;	Section 5.4
	(e) the frequency of monitoring to be undertaken;	Section 5.2
	(f) the location of monitoring;	Section 5.1
	(g) the reporting of monitoring results and analysis results against relevant criteria;	Section 5.3.3 Section 6.3
	(h) details of the methods that will be used to analyse the monitoring data;	Section 6.2

	(i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts;	Section 6
	(j) a consideration of SMART principles;	Section 1.3, Section 5
	(k) any consultation to be undertaken in relation to the monitoring programs; and	Section 3
	(l) any specific requirements as required by Conditions C15 to C16.	N/A
Condition C17	With the exception of any Construction Monitoring Programs expressly nominated by the Planning Secretary to be endorsed by the ER, all Construction Monitoring Programs must be submitted to the Planning Secretary for approval.	Section 2
Condition C18	The Construction Monitoring Programs not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all undertakings made in the documents listed in Condition A1. Any of these Construction Monitoring Programs must be submitted to the ER for endorsement at least one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage.	Section 2
Condition C19	Any of the Construction Monitoring Programs which require Planning Secretary approval must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage.	Section 2
Condition C20	Unless otherwise agreed with the Planning Secretary, construction must not commence until the Planning Secretary has approved, or the ER has endorsed (whichever is applicable), all of the required Construction Monitoring Programs and all relevant baseline data for the specific construction activity has been collected.	Section 2
Condition C21	The Construction Monitoring Programs, as approved by the Planning Secretary or the ER has endorsed (whichever is applicable), including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary or the ER (whichever is applicable), whichever is the greater.	Section 2
Condition C22	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program. Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 6.3

1.5 Environmental Protection Licence

An Environmental Protection Licence (EPL) 21807 was obtained for the Project. Surface water quality monitoring requirements from the EPL will be undertaken in addition to the monitoring described in this Monitoring Program, where they are not already included in this document.

1.6 Construction Environmental Management Framework

The CEMF requirements relevant to the preparation of this Program are identified in Table 2. A cross reference is also included to indicate where the requirement is addressed, in this Program or other documents.

TABLE 2 CEMF REQUIREMENTS

Ref	Requirement	Where Addressed
CEMF 3.16a	Issue specific environmental monitoring will be undertaken as required or as additionally required by any approval, permit or licence conditions.	This document
CEMF 3.16a	The results of any monitoring undertaken as a requirement of a license or permit that is required to be published will be published on the Principal Contractor's, or a project specific, website within 14 days of obtaining the results.	Section 6.3

1.7 Revised Environmental Mitigation Measures

The revised environmental mitigation measures (REMMs) from the Submissions Report relevant to the preparation of this Monitoring Program are identified in Table 3. A cross reference is also included to indicate where the requirement is addressed in this Program or other documents.

TABLE 3 REMM REQUIREMENTS

Ref	Requirement	Where Addressed
REMM WQ1	A surface water quality monitoring program would be implemented to monitor water quality during construction. The program would be developed in consultation with (as relevant) Western Sydney Airport, NSW Environment Protection Authority, relevant sections of Department of Planning, Industry and Environment and relevant local councils. The program would consider monitoring being undertaken as part of other infrastructure projects such as the M12 Motorway and Western Sydney International. On-airport, the water quality monitoring program would ensure that works meet the requirements under Schedule 2 of the Airports (Environment Protection) Regulations 1997. The program would monitor all construction discharge locations.	This Monitoring Program

2 Document Approval

This Monitoring Program was endorsed by the ER in accordance with Condition C19 and submitted to the Planning Secretary for approval prior to the commencement of construction in accordance with Condition C13. Minor amendments to this monitoring program will be approved by the ER in accordance with section 3.5.3 of the CEMP.

This Monitoring Program will be implemented for the duration of construction in accordance with Condition C21.

3 Agency Consultation

Agencies to be consulted for this Monitoring Program are specified in Condition C13 and summarised in Table 4 below. Parklife Metro D&C have engaged with these agencies in developing and finalising this Monitoring Program.

TABLE 4 AGENCY CONSULTATION REQUIREMENTS

Subject	Agency Consultation
Surface Water Quality Monitoring Program Condition C13(b)	DPE Water, DPI Fisheries and Relevant Councils (Penrith City Council and Liverpool City Council)

A summary of this consultation is provided below in Table 5 whilst records of consultation are provided in Appendix F of the SWMP in accordance with Condition A6. The evidence in Appendix F of the SWMP also includes the consultation undertaken for the Soil and Water Management Plan, required in accordance with Condition C5.

TABLE 5 CONSULTATION LOG

Agency	Date consulted	Comments received	Discussion
Penrith City Council	29/03/2023	28/04/2023	Penrith City Council requested for any land contamination assessments of management documentation be sent to Council. This has been addressed in Appendix C of the SWMP.
Liverpool City Council	29/03/2023	No response received	
DPI Fisheries	5/04/2023	4/05/2023	DPI Fisheries raised various comments around reporting procedures for incidents and notification requirements. It is noted that environmental incidents will be managed in accordance with the requirements included in Section 3.8 of the CEMP.
DPE Water	5/04/2023	4/05/2023	Confirmed that DPE Water have no issues to raise.

4 Baseline Data

The EIS reviewed the results from previous water quality monitoring undertaken in the surrounding environment around the Project and concluded South Creek as one of the most degraded catchments in the wider Hawkesbury-Nepean catchment. The existing results that were reviewed during development of the EIS confirmed that existing water quality in the area is generally not meeting the ANZECC guidelines values for protection of aquatic ecosystems, primary and secondary contact recreation and irrigation water used for food and non-food crops. The existing water quality is considered poor and degraded due to high nutrient concentrations and low dissolved oxygen concentrations.

It is noted that additional surface water quality monitoring is being undertaken as part of other infrastructure projects, such as the M12 Motorway and Western Sydney International, which will also be reviewed during construction and during development of any site-specific trigger values (SSTVs), as further discussed in Section 5.5.

The locations of the previous water quality monitoring points are illustrated below in Figure 2 and Figure 3. Table 6 lists the upstream and downstream sample IDs as they are relevant to this Monitoring Program.

TABLE 6 BASELINE WATER MONITORING LOCATIONS RELEVANT TO SSTOM WORKS

Sample ID	Location	Source
SREC	South Creek – D/S of Luddenham Station, U/S of Orchard Hills Station and SMF	GHD 2015 - 2016
S1	South Creek – D/S of Airport land, U/S of Luddenham Station	PPK, 1998 and SMEC, 2014
S2	Kemps Creek – U/S of alignment	PPK, 1998 and SMEC, 2014
S3	D/S of Orchard Hills Station, U/S of St Marys	PPK, 1998
C3	Cosgroves Creek – U/S of Luddenham Station	PPK, 1998 and SMEC, 2014
L5	Oaky Creek – D/S of Airport land	GHD 2015 - 2016
BCDS	Badgerys Creek – D/S of Airport Land	WSI EIS WQ Monitoring 2105, 2016
L1	Badgerys Creek – D/S of Airport Land	GHD 2015 - 2016
B3	Badgerys Creek – D/S of Airport Land	PPK, 1998 and SMEC, 2014
L2	Badgerys Creek – D/S of Airport Land	GHD 2015 - 2016
L3	Badgerys Creek – D/S of Airport Land	GHD 2015 - 2016
L4	Badgerys Creek – D/S of Airport Land	GHD 2015 - 2016
B1	Badgerys Creek – U/S of Airport Land and Bringelly Services Facility	PPK, 1998 and SMEC, 2014
B2	Badgerys Creek – D/S of Airport Land and Bringelly Services Facility	PPK, 1998 and SMEC, 2014
TCUS	Thompsons Creek – U/S of Bradfield Station	GHD 2015 - 2016
T1	Thompsons Creek – D/S of Bradfield Station	PPK, 1998 and SMEC, 2014

Water quality monitoring undertaken at the above locations surrounding the SSTOM Works was previously completed to inform various environmental assessments or as part of monitoring programs for various projects. The monitoring undertaken at the locations described in Table 6 and illustrated in Figure 2 and Figure 3 have included a variety of water quality parameters. The various parameters sampled have included:

- Total recoverable hydrocarbons (TRH),
- Polycyclic aromatic hydrocarbons (PAHs) and trace phenols,
- Volatile organic compounds (VOCs),
- Benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN),
- Metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn),
- Trace organochlorine and organophosphorus pesticides,
- Nutrients (nitrate, nitrite, ammonia, total Kjeldahl nitrogen, total phosphorous, reactive phosphorous, total nitrogen),
- Total suspended solids (TSS),
- Turbidity, and

- Thermotolerant coliforms, and Chloropyhll-(a).

Table 7 provides a summary of the baseline water quality data for the historic monitoring programs. This baseline water quality data will be utilised to inform SSTVs, as further discussed in Section 5.5.

TABLE 7 HISTORICAL BASELINE WATER QUALITY DATA

Parameter	ANZG (2018) / ANZECC (2000)*	Monitoring Location					
		S1	S2	BCDS	B3	S3	T1
DO % sat	85 - 110	83 - 105	39 - 79	53.99	60.44	39 - 79	15 - 50
Conductivity (µs/cm)	125 - 2,200	Not tested	<500-3200	1075.92	7857.92	<500-3200	Not tested
pH	6.5 - 8.0	7-7.2	6.9 - 7.4	7.74	7.5	6.9 - 7.4	6.4 - 7.3
Turbidity (NTU)	6 - 50	15 - 65	12 - 40	41.08	49.16	12 - 40	4.9 - 17
TSS (mg/L)	3 - 25	9-56	4-14	44.7	42.12	4-14	5-31
TN (mg/L)	0.5	0.49 - 1.6	0.8 - 1.52	3.46	3.6	0.8 - 1.52	0.02 - 1.14
TP (mg/L)	0.05	0.01 - 0.14	0.05 - 0.5	0.52	0.6	0.05 - 0.5	0.01 - 0.07
Arsenic	0.013	Not tested	Not tested	0.0017	0.0027	Not tested	Not tested
Cadmium	0.002	Not tested	Not tested	<0.0002	0.0002	Not tested	Not tested
Chromium (VI)	0.001	1.7	Not tested	0.0025	0.004	Not tested	Not tested
Copper	0.0014	3.6	Not tested	0.0076	0.0083	Not tested	Not tested
Lead	0.0034	1.61	Not tested	0.0024	0.0032	Not tested	Not tested
Mercury	0.0006	Not tested	Not tested	<0.0001	<0.0001	Not tested	Not tested
Nickel	0.011	Not tested	Not tested	0.0026	0.0035	Not tested	Not tested
Zinc	0.008	9.1	Not tested	0.0125	0.0147	Not tested	Not tested

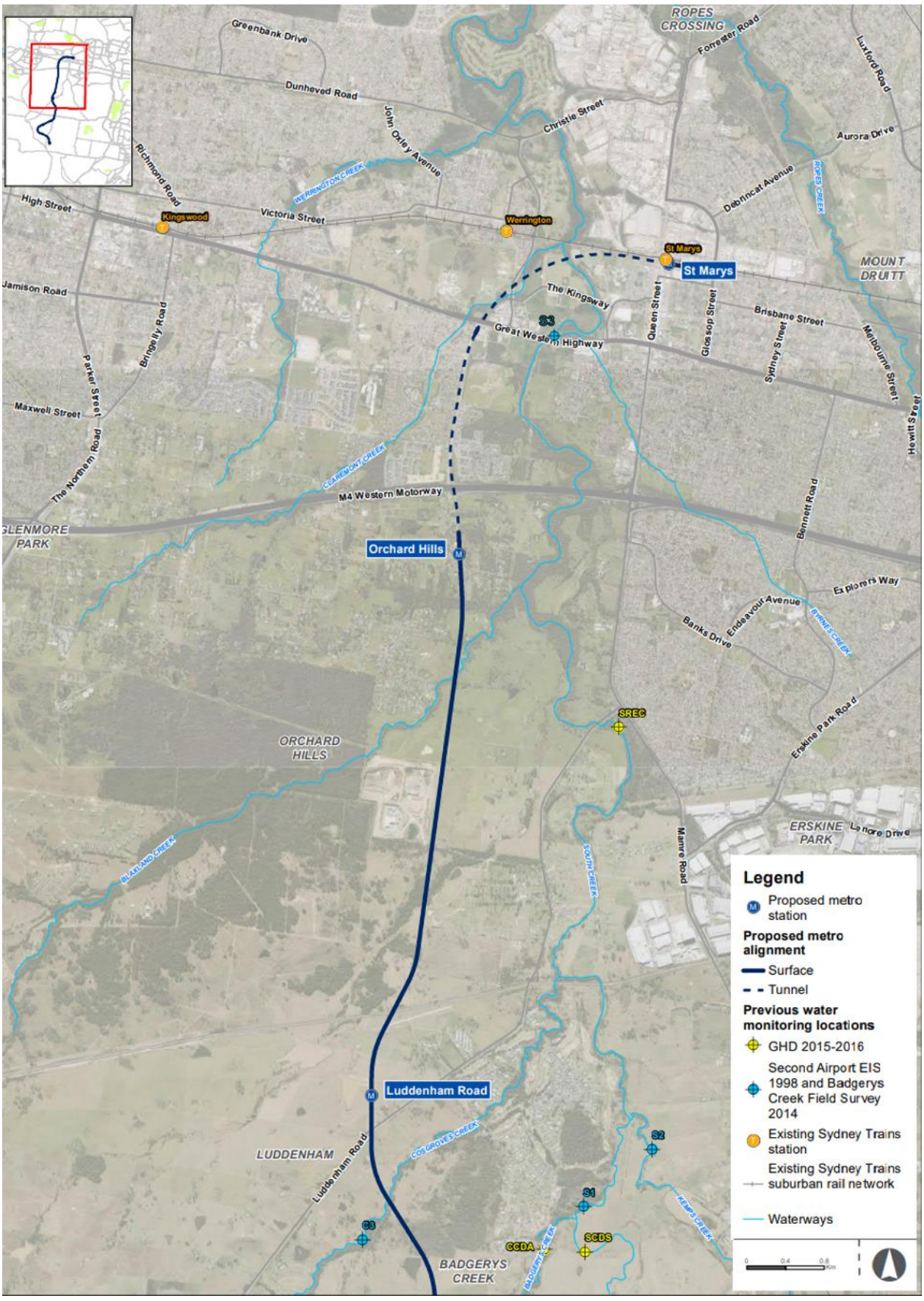

FIGURE 2 HISTORICAL SURFACE WATER QUALITY MONITORING LOCATIONS - NORTH (EIS, OCTOBER 2020)

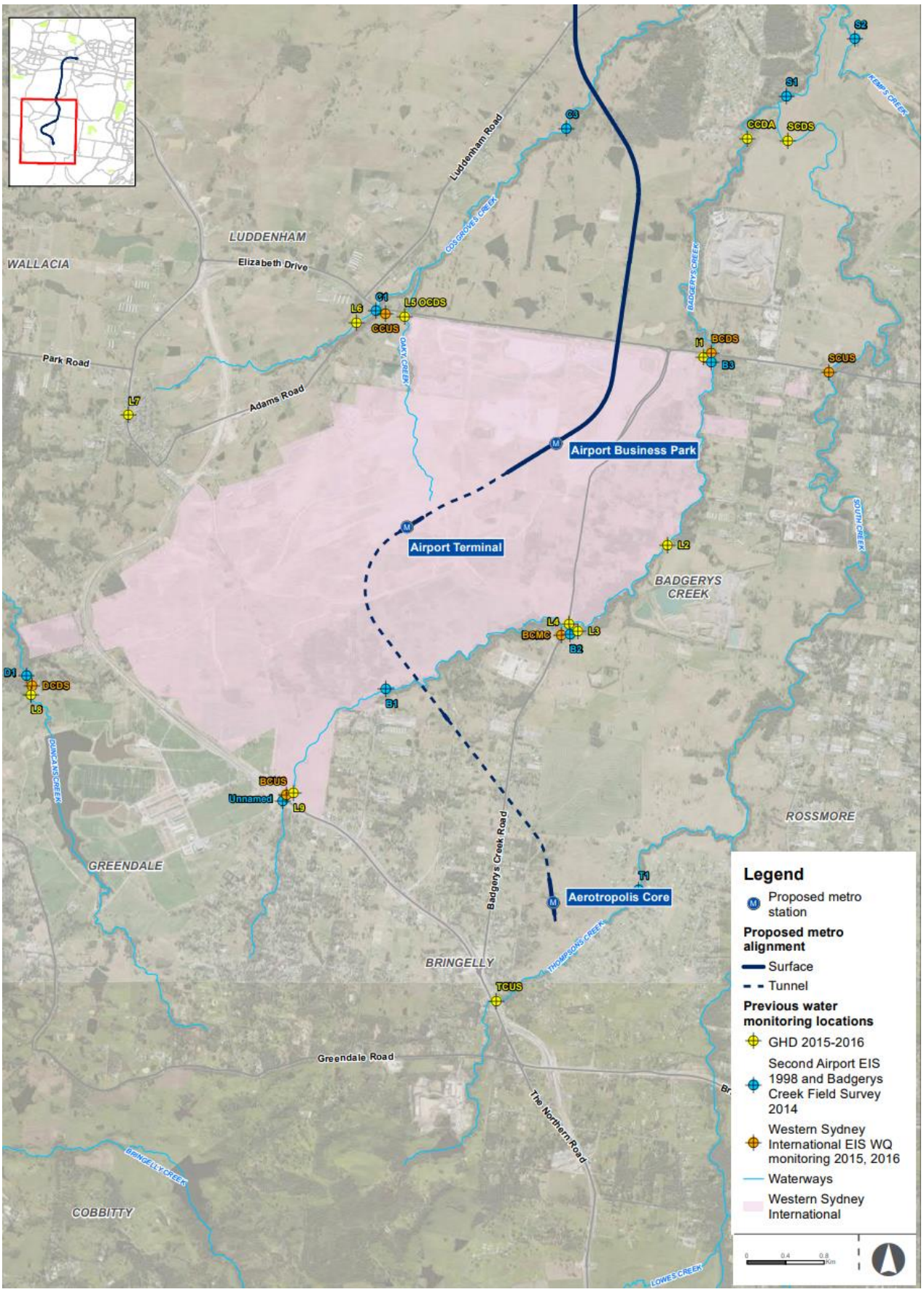

FIGURE 3 HISTORICAL SURFACE WATER QUALITY MONITORING LOCATIONS - SOUTH (EIS, OCTOBER 2020)

5 Monitoring

The water quality monitoring undertaken as part of this Monitoring Program will be used as the key measurement tool to compare actual performance of the SSTOM Works against the predicted performance in the EIS and as an indicator of compliance with the water quality trigger values. The Monitoring Program will identify potential impacts on surface water within the catchment and waterways of the SSTOM Works alignment and determine the effectiveness of water quality and erosion and sediment controls on site.

The Project EPL may authorise discharge of water from specific locations or premises and establish criteria that differ from those given in this Program. In such circumstances the EPL, and any conditions and criteria of that EPL, take precedence over this Program. In accordance with the requirements of the EPL, this Monitoring Program includes the monitoring of all construction discharges, in the locations and parameters required by the EPL.

5.1 Monitoring Locations

The monitoring points identified in Table 8 all lie within the northward flowing South Creek catchment, which are illustrated in Figure 4 and Figure 5. Monitoring locations, as shown in Figure 4 and Figure 5, are indicative and approximate and will be varied slightly as required to enable safe monitoring location during all weather conditions. In this Monitoring Program's revision there have been updates to the monitoring locations and trigger criteria. The amended monitoring locations consider the recent land use changes surrounding the SSTOM project and where sampling points are unable to capture SSTOM impacts, due to wider catchment activities, they have been removed from the monitoring program. The monitoring points have been revised to capture "specific" SSTOM work impacts.

TABLE 8 CONSTRUCTION SURFACE WATER QUALITY MONITORING POINTS

ID	Representative Historical Sampling Location	Monitoring Location	Updated Monitoring Location (May 2025)	Monitoring Requirements [1]	Work Areas Targeted / Notes
~~**SW1**~~	N/A	South Creek, Christie Street Bridge	Location removed. The location is highly impacted by urban and industrial activities in the wider catchment. SSTOM runoff is discharged via the rail corridor and WTP (to wastewater via tradewaste licence). Impact from SSTOM construction can not be monitored at this location.	N/A	Previously monitored by SBT contractor as SBT1 D/S monitoring point for works around St Marys Station
~~**SW2**~~	S3	South Creek, end of north end of The Kingsway, Orchard Hills	Location removed. As per SW1	N/A	Previously monitored by SBT contractor as SBT2 U/S monitoring point for works around St Marys Station
SW3	N/A	Blaxland Creek, downstream of alignment, Orchard Hills	No Change	Probe handheld monitor	Previously monitored by SCAW contractor as SCAW 1 (DS) D/S monitoring point for works on the alignment between Orchard Hills Station and Luddenham Road Station and for the stabling and maintenance facility
SW4	N/A	Blaxland Creek, upstream of alignment, Orchard Hills	No Change	Probe handheld monitor	Previously monitored by SCAW contractor as SCAW 1 (US) U/S monitoring point for works on the alignment between Orchard Hills Station and Luddenham Road Station and for the stabling and maintenance facility

~~**SW5**~~ **SW5a**	COSDS	Cosgroves Creek, Twin Creeks Drive crossing, Luddenham	Location adjusted to be closer to SSTOM works. Location will better capture potential SSTOM impacts. New ID for adjusted monitoring location.	Probe handheld monitor	Previously monitored by SCAW contractor as SCAW 3 (DS) D/S monitoring point for works at Luddenham Road Station and surrounding alignment
~~**SW6**~~ **SW6a**	C3	Cosgroves Creek, downstream of alignment, Luddenham	Location adjusted to upstream of alignment Cosgrove Creek. New ID for adjusted monitoring location.	Probe handheld monitor	Previously monitored by SCAW contractor as SCAW 3 (US) U/S monitoring point for works at Luddenham Road Station and surrounding alignment
~~**SW7**~~	CCDA	Badgerys Creek, near Ganton Way, Luddenham	Location removed. No access point and location does not measure any impact from SSTOM construction.	N/A	Previously monitored by SCAW contractor as SCAW 4 (DS) D/S monitoring point for works on the alignment between the WSA and Luddenham Road
SW8	BCDS	Badgerys Creek, Elizabeth Drive crossing, Badgerys Creek	No change	Probe handheld monitor	Previously monitored by SCAW contractor as SCAW 4 (US) U/S monitoring point for works on the alignment between the WSA and Luddenham Road
~~**SW9**~~	D/S Basin 3	Badgerys Creek, Badgerys Creek Road crossing, Bringelly	Location removed. Location does not measure any impact from SSTOM construction.	N/A	Previously monitored by SBT contractor as SBT3 D/S monitoring point for works at Bringelly Services Facility
~~**SW10**~~	D/S Badgerys	Badgerys Creek, near Mersey Road, Bringelly	Location removed. Location does not measure any impact from SSTOM construction.	N/A	Previously monitored by SBT contractor as SBT4 U/S monitoring point for works at Bringelly Services Facility
SW11	T1	Thompsons Creek, The Retreat crossing, Bringelly	No change	Probe handheld monitor	Previously monitored by SBT contractor as SBT5 D/S monitoring point for works at Bradfield Station

SW12	N/A	Thompsons Creek, The Northern Road crossing, Bringelly	No change	Probe handheld monitor	Not included in previous SMWSA Monitoring U/S monitoring point for works at Bradfield Station

[1] Trigger values will be applied to probe readings and further sampling and laboratory analysis may be required.

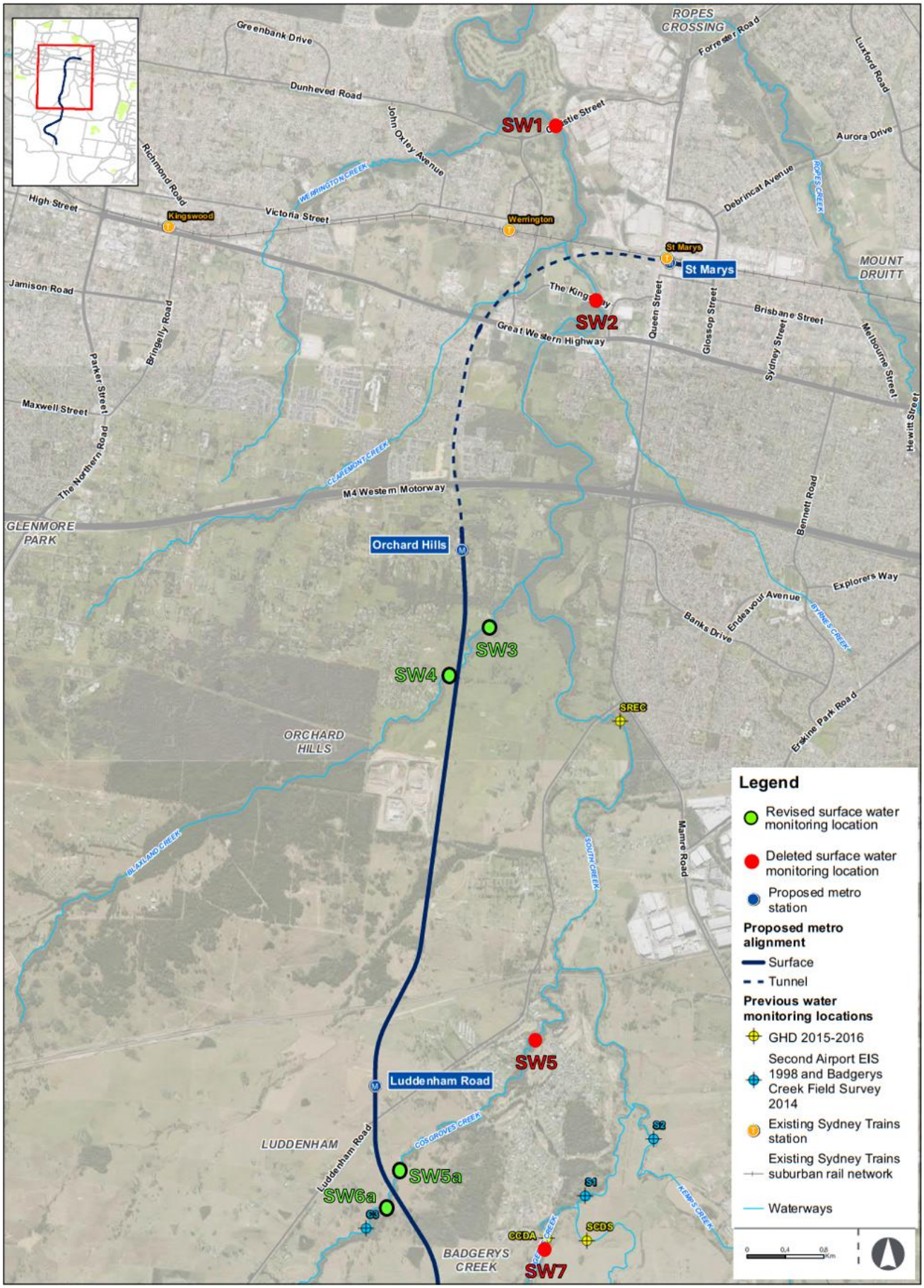

FIGURE 4 INDICATIVE CONSTRUCTION SURFACE WATER QUALITY MONITORING LOCATIONS - NORTH

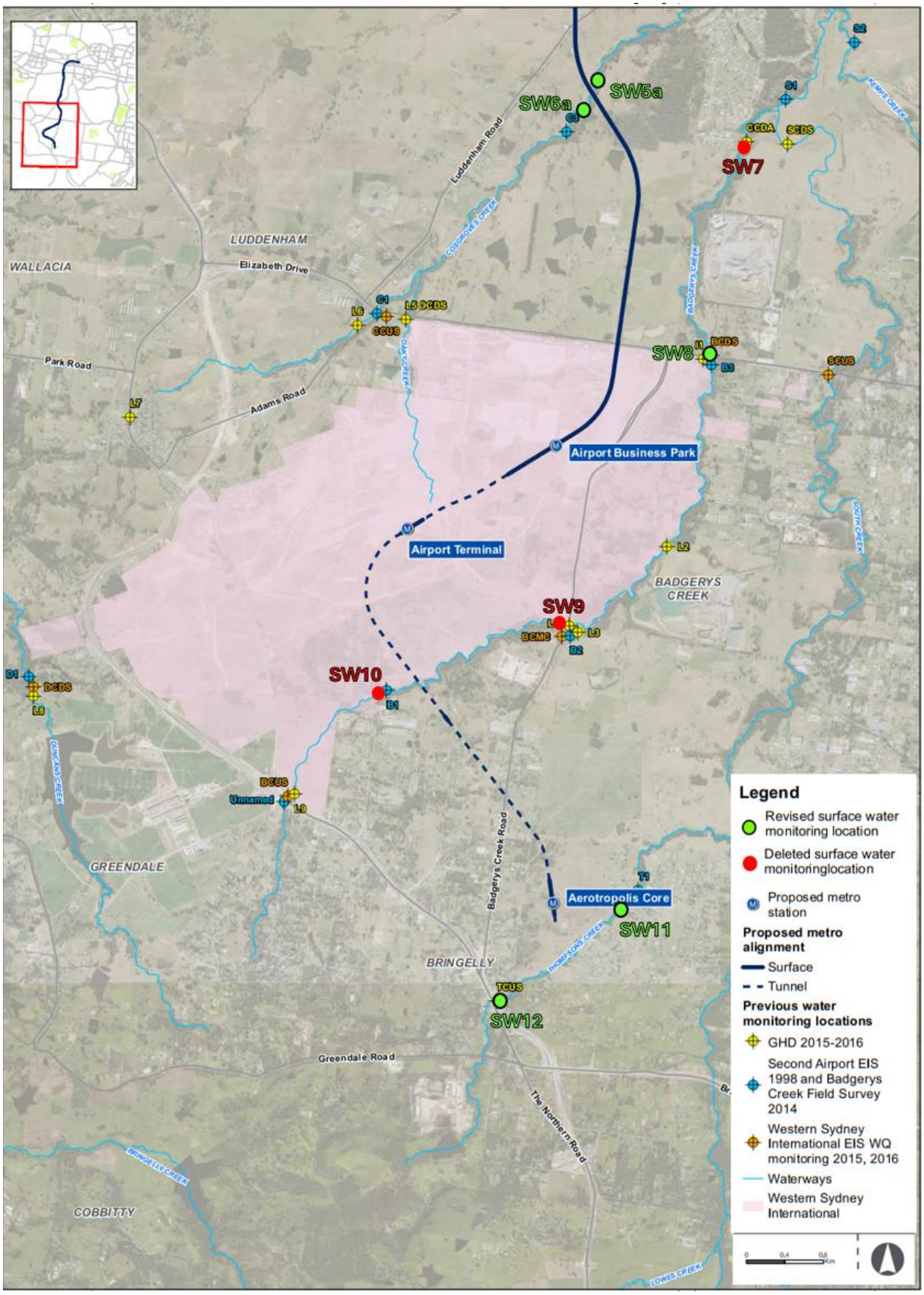

FIGURE 5 INDICATIVE CONSTRUCTION SURFACE WATER QUALITY MONITORING LOCATIONS - SOUTH

5.2 Sampling Frequency

During the SSTOM Works, surface water quality monitoring will be undertaken quarterly at the locations identified in Section 5.1.Monitoring will be conducted during the first month of the quarter where possible, contingent upon the presence of appropriate conditions. Quarterly monitoring will be conducted in periods of no rainfall (i.e. no rainfall in the preceding 96 hours) and no surface runoff or discharge events from site.

Wet weather monitoring will also be carried out at least once every quarter after a rainfall of >20mm is received during a 24-hour period and has generated runoff from site. Sampling will be undertaken within 24 hours of peak runoff where possible.

If works causing ground disturbance is identified to be required within waterways or their riparian zones, localised sampling points would be identified to measure any potential impacts. These works would be planned in accordance with an EWMS, and will require monthly monitoring for the duration of the associated works in that area.

5.3 Monitoring Methodology

5.3.1 Field Measurements

Field physio-chemical parameters including EC/salinity, pH, DO, Redox potential, temperature and turbidity (NTU) will be measured at each sampling location using a fully calibrated multi-probe water quality meter(s) or provided for laboratory analysis. Other observations including odour, colour and presence of oil or grease will also be recorded where anomalies are observed.

The multi-probe field water quality meter(s) will be calibrated against known standards, as supplied by the manufacturer, at the start and completion of each day of water quality sampling.

The sampling method for the appropriate water quality parameter is presented in the EPA publication, *Approved Methods for Sampling and Analysis of Water Pollutants in NSW (2004)*.

5.3.2 Sample Collection

As described in Section 5.3.1 manual probe measurements will be conducted at the sampling locations identified in Table 8. Sample collection will be carried out where the field measurement indicates a certain trigger level as described in Table 9.

Grab samples will be collected for laboratory analysis for those pollutants that cannot be tested in the field. The bottle selection, required preservative and recommended holding times and conditions will be determined by the laboratory.

5.3.3 Recording Measurements and Monitoring Data

Results for each monitoring location will be recorded on appropriate field sheets (hard copy or digital) using unique sampling identification nomenclature consisting of the sample date and time, location, sampler details, and any unique observations noted during the sampling event.

Monitoring data will be digitally recorded and compared against trigger values and previous monitoring data to determine environmental performance.

5.4 Sampling Parameters

During water quality monitoring, the parameters identified in Table 9 will be measured via the sampling methodology identified. The potential for impact to water quality from nutrients is generally considered low risk as topsoil has been stripped from the majority work areas and replaced with DGB and hard stand. Monitoring for nutrients will commence in parallel with landscaping activities when replacement of topsoil and fertilizer use increases the risk of nutrient run off. In the event that any indicators of additional contamination are observed, the sampling parameters identified in Table 9 would be reviewed.

TABLE 9 SAMPLING PARAMATERS TO BE MEASURED

Category	Grab Sampling Trigger	Sampling Method	Parameters Measured
Physio-chemical parameters	n/a	In-Situ using a calibrated multi parameter probe.	• Temperature (˚C) • Dissolved Oxygen (% saturation) • Electrical Conductivity / Salinity (µS/cm) • Reduction-Oxidation Potential (Redox)(mV) • pH • Turbidity (NTU) • Visible oil and grease
Physio-chemical parameters	TSS when downstream field probe > 50 NTU and above upstream NTU. Grab sample to be taken at up and downstream locations	Laboratory testing	• Total suspended solids (TSS)[1]
Metals	Dissolved Metal testing when downsteam field probe pH < 6.5 or pH > 8.5 Grab sample to be taken at up and downstream locations	Laboratory testing	• Cadmium • Chromium (VI) • Copper • Lead • Nickel • Zinc
Nutrients	During SSTOM landscaping activities	Laboratory testing	• Total Phosphorus (TP) • Total Nitrogen (TN) • Oxides of Nitrogen (NOx)

[1] Total suspended solids (TSS) may be determined via statistical correlation with Turbidity (NTU), if such a relationship has been determined.

5.5 Water Quality Trigger Values

The project environmental values, based on ANZG 2018 and ANZECC guideline trigger values for the selected toxicants, would be applied for the protection of 95 percent of species in slightly disturbed to moderately disturbed freshwater systems, and 99 percent species protection level for toxicants that bioaccumulate. For physical and chemical stressors, the ANZG 2018 guidelines are the same as the ANZECC 2000 and provide guideline trigger values for slightly disturbed ecosystems in lowland rivers in south-east Australia as shown in Table 10.

An ongoing review of monitoring data from this Monitoring Program and historical monitoring events will be undertaken to provide SSTVs, noting that some surface water quality parameters exceed the default ANZECC (2000a) water quality trigger values for slightly to moderately disturbed ecosystems. It is anticipated that SSTVs will be determined based on a rolling mean value following the first three rounds of sampling events, which will then provide an easily identifiable indication of any potential changes in water quality.

TABLE 10 WATER QUALITY TRIGGER VALUES

Parameters	Units	Trigger value
Dissolved Oxygen (DO)	% saturation	85 – 110
Turbidity (NTU)	NTU	0 – 50

Parameters	Units	Trigger value
Total suspended solids (TSS)	mg/L	0 – 25
pH	pH	6.5 – 8.5
Salinity	µS/cm	125 - 2200
Oil and grease	Visible	Visible
Cadmium	mg/L	0.0002
Chromium (VI)	mg/L	0.001
Copper	mg/L	0.0014
Lead	mg/L	0.0034
Nickel	mg/L	0.011
Zinc	mg/L	0.008
Total Phosphorous (TP)	mg/L	0.025
Total Nitrogen (TN)	mg/L	0.35
Nitrogen oxides (NOx)	mg/L	0.04

5.5.1 Trigger Actions Response

During construction of the SSTOM Works, the ongoing surface water quality monitoring events will be used to initiate a trigger action response. A trigger action response will be initiated if:

- A parameter exceeds the SSTV for any single monitoring event by more than 30%,
- Visible oil and grease is observed at a downstream monitoring location for any single monitoring event,
- A parameter downstream exceeds the corresponding parameter upstream for any single monitoring event by more than 20%,
- A parameter exceeds the SSTV for two consecutive monitoring events, and
- A parameter exceeds the SSTV for half of the sampling events in a twelve-month period.

In the event that the above trigger values, or SSTV, are exceeded, the below investigations and actions will be enacted:

- Comparison of downstream monitoring results against upstream monitoring results will be undertaken to determine if any significant reduction in water quality can be attributed to SSTOM Works,
- Investigation of surrounding land use changes or activities that may be impacting surface water quality, and
- Inspection and evaluation of the existing erosion and sediment controls around site.

If the exceedance is determined to be attributable to SSTOM Works, the event will be treated as an environmental incident, recorded in Glaass Pro and managed in accordance with the requirements included in Section 3.8 of the CEMP. Corrective and preventative actions will be identified and implemented as part of that process.

6 Compliance Management

6.1 Roles, responsibility and training

All surface water quality monitoring will be carried out by appropriately trained and competent personnel, who are familiar with the requirements of the relevant standards and procedures. Training will be provided to the Environment Team in appropriate sampling methodologies, as required.

6.2 Data analysis and management response

Results from the construction monitoring program will be compared with the trigger values and/or SSTVs and with previous results.

If a trigger is observed a review will be initiated to determine the significance of the exceedance(s) and possible causes. The review will assess available surface water data, baseline data for the relevant waterway, recent rainfall records, and recent activities or recorded erosion/sediment control incidents occurring in the catchment.

If the exceedance is determined to be attributable to SSTOM Works, the event will be treated as an environmental incident and managed in accordance with the requirements of Section 3.8 of the CEMP. Corrective and preventative actions will be identified and implemented as part of that process.

6.3 Reporting

During construction, surface water quality data will be collected, tabulated and assessed against baseline conditions, trigger values and/or SSTVs. Construction Monitoring Reports will be submitted to the Planning Secretary, the ER and relevant regulatory agencies on an annual basis from the commencement of construction in accordance with Condition C22.

Reporting requirements associated with the Program for the construction phase of the Project are presented in Table 11.

TABLE 11 REPORTING REQUIREMENTS

Report	Requirement	Recipient
Surface Water Quality Construction Monitoring Report	Data summary reports presenting tabulated surface water monitoring data collected during the reporting period (annually). Surface water quality results will be presented, and performance criteria exceedances will be highlighted. Applicable management responses will be documented.	DPHI ER DPHI (Water) DPI (Fisheries) Penrith and Liverpool City Council Publicly available
EPL Monitoring Reports and Annual Returns	EPL monitoring reports and related reporting requirements will be prepared in accordance with the requirements of the EPL.	EPA Publicly available
EPL Monitoring Results	The results of any monitoring undertaken as a requirement of the EPL that is required to be published will be published on the project website within 14 days of obtaining the results.	Publicly available

Appendix C Contamination and Asbestos Unexpected Finds Procedure

Contamination and Asbestos Unexpected Finds Procedure

MANAGEMENT & RESPONSIBILITIES

Environmental Coordinator → All personnel must receive **site inductions and on-going Toolbox Talks** which will include requirements of this Unexpected Finds Procedure.

All Personnel → Observe signs of contamination.
Examples of materials that could indicate presence of contamination can be found on the right side of this procedure.

Evidence of contamination observed

- **No** → If observations do **not** indicate the presence of contamination **works can continue.**
- **Yes** →

All Personnel → If observations **indicate presence of potential contamination,** then **STOP ALL WORK** in the immediate area, notify the Site Supervisor and Environment Coordinator and cordon off area.

Site Supervisor → Do not touch or disturb the item/ material
Delineate the find from the rest of the worksite
Inform the Project Manager regarding the potential contamination find and document the details in an unexpected finds form.

Site Supervisor Env. Manager → Additional Assessment: Environmental Manager will obtain assistance from a qualified contaminated land consultant; this may include sampling and laboratory analysis.

Env. Manager Safety Manager → Management Strategy: Develop a plan for managing and/or remediating the suspect material. Notify Sydney Metro and the ER and obtain any required approvals.

Site Supervisor Env. Coordinator → Implement the approved Site Management and/ or Remediation Action Plan (RAP). If the material is to be removed, refer to Waste Classification Procedure for classification and disposal. Undertake all validation requirements required by the RAP.

Document compliance with the approved management and Remediation Plan.
Provide documentation to Sydney Metro's representative, and the Regulator (if required).

Site Supervisor Site Engineer → Once contamination find has been addressed the Site Engineer is to approve recommencement or works in the vicinity of the remediation site.

Return to Work

PROTOCOL

Contamination of the environment is the release (whether by act or omission) of a contaminant into the environment. Examples of materials that could indicate the presence of contamination include:

- Asbestos cement fragments or other potentially asbestos containing materials
- Odorous or stained soil
- Buried chemical drums or containers
- Waste materials or building debris
- Tarry or ashy material
- Brightly or unusually coloured material

ACTIONS

If unexpected contamination is discovered the following procedure will be implemented:

- **STOP ALL WORKS** in the vicinity immediately,
- Follow the adjacent flow chart
- Notify the Site Supervisor and Environment Manager
- Provide any assessment or management documentation (DSI, RAP, EMP, etc.) to the relevant local Council, Government Agency.

Asbestos:

An unexpected find occurs when Asbestos Containing Materials (ACM) not identified in the Asbestos Register is found on site. Asbestos finds are to be managed in accordance with the **Project Health and Safety Management Plan** and applicable regulatory requirements. If unexpected ACM is uncovered, potential management measures will include:

- Appropriately delineate the area and employ dust suppression measures
- Ensure the material is handled and removed by a licensed contractor to a facility licensed to receive the material.
- Arrange for validation testing and certification is

Acid Sulfate Soils (ASS):

ASS are naturally occurring soils, sediments or organic substrates that are formed under waterlogged conditions in coastal areas. When exposed to air after being disturbed, soils containing iron sulfides produce sulfuric acid and often release toxic quantities of iron, aluminum and heavy metals.
If ASS is encountered, possible management strategies include:

- Redesign of the Project to avoid the area of ASS,
- Delineation and removal by a licensed contractor to a suitably licensed facility, and
- Onsite treatment to neutralise the ASS, in accordance with an EWMS, which would be developed, if required.

Monitoring

- Observation during excavation or following unexpected find, and
- As required by the contamination consultant in the event of an unexpected find.

Recording

- Unexpected find record form, and
- Details of any additional sampling and analysis required to identify contaminant.

Personal Protective Equipment

The appropriate PPE will be worn prior to any contamination investigation/management.

Appendix D Emergency Spill Response Procedure

Emergency Spill Response Procedure

Document Approval

Revision	Author	Date	Comments	Approved by
A	[redacted]	17/02/2023		[redacted]
B	[redacted]	19/05/2023	Revised as per review comments	[redacted]
C	[redacted]	17/02/26	Update for site contacts	[redacted]

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Glossary/Abbreviations

Abbreviation	Expanded Text
CEMF	Sydney Metro Construction Environment Management Framework
CEMP	Construction Environmental Management Plan
CoA	Conditions of Approval
ECM	Environmental Control Measures
EMS	Environmental Management System
Environmental aspect or hazard	Defined by AS/NZS ISO 14001 as an element of an organisation's activities, products or services that can interact with the environment. The term 'hazard' is used throughout this CEMP and has the same meaning as 'aspect' for the purposes of compliance with ISO 14001 requirements
Environmental impact	Defined by AS/NZS ISO 14001 as any change to the environment, whether adverse or beneficial, wholly, or partially resulting from an organisation's environmental aspects
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
ER	Environmental Representative nominated by the Proponent and approved by the Planning Secretary in accordance with CoA A27
ESRP	Emergency Spill Response Procedure
EWMS	Environmental Work Method Statement
Hold point	A verification point that prevents work from commencing prior to approval from the appointed authority
POEO Act	Protection of the Environment Operations Act 1997.

1 Introduction

1.1 Background

This Emergency Spill Response Procedure (ESRP) has been prepared to identify and manage the risk of pollution incidents and facilitate a coordinated management response to pollution incidents during the construction of the SSTOM Works.

The Parklife Metro D&C approach is to carry out construction activities in a planned and controlled manner, considering potential environmental risks, to prevent pollution incidents from occurring on the project. This is achieved using preventive measures including:

- Construction planning including environmental risk assessments,
- Implementation and maintenance of identified control measures,
- Compliance with legislative and regulatory requirements,
- Implementation of, and compliance with, requirements of the project Construction Environmental Management Plan (CEMP) and associated sub-plans, and
- Implementation and compliance with the requirements of this procedure.

1.2 Purpose

The primary purpose of the procedure is to describe how Parklife Metro D&C will identify and manage the risk of pollution incidents, plan the response to pollution incidents and to facilitate the coordination with the relevant agencies. The management of environmental incidents will be managed in accordance with the Pollution Incident Response Management Plan as required by Section 153A of the Protection of the Environment Operations Act 1997 (POEO Act) for Environment Protection License (EPL) holders and Sydney Metro's Central Environmental Management Framework (CEMF).

The objectives of the plan are to:

- Minimise and control the risk of a pollution incident at the premises through the early identification of risks and the development of planned actions to minimise and manage those risks,
- Ensure timely communication about pollution incidents by Parklife Metro D&C to SM-WSA Environment Manager, Infrastructure Department, and relevant response agencies/authorities,
- Minimise leaks and spills from construction activities (CEMF 12.1.ii),
- Ensure spill kits are provided at the batch plants, storage areas and main work sites (CEMF 12.3a.vi), and
- Develop a protocol that will be implemented to respond to and remedy leaks or spills (CEMF 12.3a.vii).

1.3 Legislation

Key environmental legislation relating to pollution incident response management includes:

- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act),
- POEO Act,
- Protection of the Environment Operations (General) Regulation 2009, and
- Protection of the Environment Operations (General) Amendment (Pollution Incident Response Management Plans) Regulation 2012.

2 Incident Preparedness and Response

Spills will be managed in accordance with this procedure. The management of environmental incidents where material harm to the environment is caused or threatened will be managed in accordance with the Pollution Incident Response Management Plan required by Section 153A of the POEO Act for EPL holders.

Chemicals, hazardous substances, and dangerous goods will be stored and used onsite in accordance with the following control measures:

- Hazardous substances will be stored onsite in lockable containers, in their original receptacles,
- All chemicals and fuels will be clearly labelled and will have Safety Data Sheets available nearby,
- All chemical storage facilities will be designed and constructed in accordance with:
    - All relevant Australian standards,
    - For liquids, a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund,
    - Storing and Handling Liquids: Environmental Protection - Participants Manual,
    - Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management - Part B Review of Best Practice and Regulation,
    - Storage locations for non-liquids must be identified, away from stormwater drains,
    - Easily accessible for maintenance and spill clean-up in the event of a rupture, and
    - Bunding maintenance must be undertaken to ensure capacity is maintained.
- Mobile bunds to be inspected after rain and where required dewatered in accordance with the controls described in the Soil and Water Management Sub-Plan.
- Storage and handling of flammable or combustible liquids will be in accordance with Environment Protection Authority (EPA) guidelines for Bunding and Spill Management, as well as AS1940-1993 – The Storage and Handling of Flammable and Combustible Liquids,
- An up-to-date register of hazardous substances will be kept onsite at all times,
- Hazardous substances will only be used onsite as required, in accordance with the manufacturer/supplier instructions,
- Any substances with the potential to impact water quality will be assessed, to determine what environmental safeguards or procedures are required for that substance to minimize the risk of environmental harm,
- The use of any hazardous substance that could result in a spill will be undertaken away from drainage or stormwater lines and, wherever possible, within defined bunds,
- Any refuelling on site shall be undertaken in designated areas only. Where this is not practicable i.e., large immobile plant, small equipment items such as pumps, small generators etc. refuelling will be undertaken away from stormwater drains and waterways. A fully stocked spill kit will be on site during refuelling,
- Spill kits will be available on site, in particular near batch plants, storage areas and main work areas,
- All spills or leakages will be immediately contained and cleaned up,
- Spills to be managed in accordance with the Emergency Spill Response Procedure. The management of environmental incidents where material harm to the environment is caused or threatened will be managed in accordance with the projects Emergency Response Plan, and

- Where possible, equipment working over water will have sheathed hydraulic hoses and use biodegradable oil.

2.1 Preventative Strategy

It is considered that the key to effective incident prevention on site is via ongoing monitoring, surveillance, and training. During construction, the following preventative strategies will be implemented onsite:

- Daily inspections of active work sites,
- Completion of Environmental Inspection Checklist,
- Issue and quick close-out of non-compliance notices (as required),
- Prompt maintenance and repairs,
- Ongoing environmental training,
- Environmental audits of worksites, sub-contractors, and general compliance, and
- Environmental and safety information on hazardous substances (e.g., SDS) will be available at the main site office and where such substances are to be stored.

Testing of environmental response procedures will be conducted annually to confirm appropriateness of management measures. Additional testing will be carried out in areas where a pollution risk is present, such as in workshops and work areas near water courses. Personnel involved in emergency response activities will be provided with specific training.

An up-to-date list of emergency response personnel and relevant organisations (emergency services, Department of the Environment and Energy, NSW EPA, etc) will be maintained at the main office and site compounds. See Table 2 - Emergency Contacts.

Spill kits are in compound areas, site vehicles and at the location of high-risk activities. Spill kits will be monitored as part of weekly inspections and will be replenished as required. These kits are designed for immediate containment and management of pollution incidents and, as a minimum, are stocked with the following material:

- Absorbent mats,
- Absorbent floor sweep material,
- Floating booms to control spills in water, and
- Disposal bags.

3 Incident Procedure

3.1 Immediate Response

Personnel in the vicinity must stop works. Consider any safety hazards created by the incident and if safe to do so, apply immediate controls to attempt to minimize further harm to the environment. This could include use of spill kit material depending on the severity of the incident.

After works cease in the vicinity of the spill, the procedure in Figure 1 will be followed to ensure impacts are minimised as much as practicable.

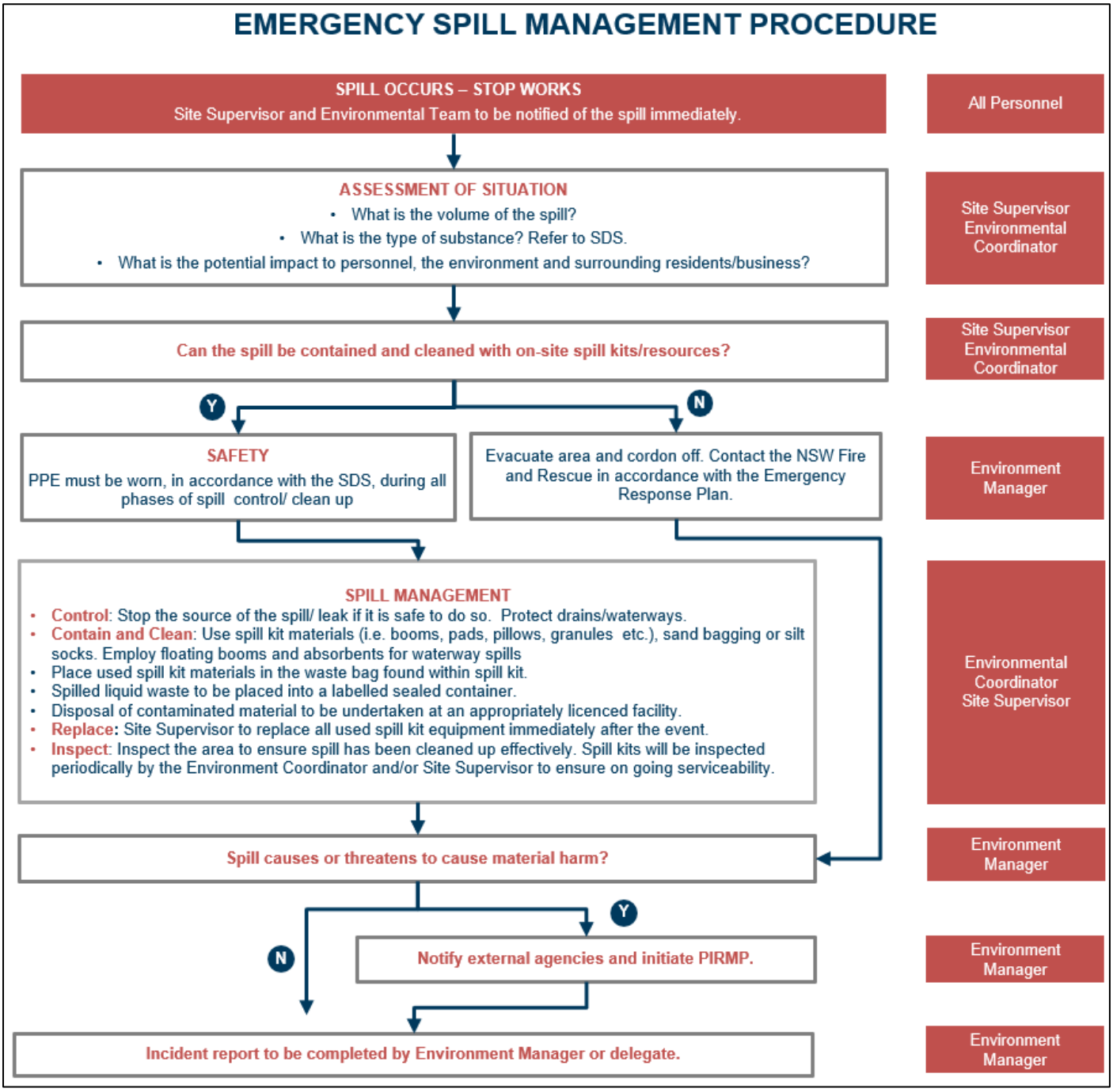

FIGURE 1 - PARKLIFE METRO D&C SPILL MANAGEMENT PROCEDURE

3.2 Classify Incident

Incident classification will be undertaken in accordance with Sydney Metro's Environmental Incident and Non-compliance Reporting Procedure, a copy of which is provided in the CEMP. The Sydney Metro procedure classifies environmental incidents into one of three Classes that are based upon the consequence descriptors for environmental risks in the Sydney Metro Risk Matrix (refer to Sydney Metro Risk Management Standard). Each of these classifications trigger a variety of management actions and/or legislative requirements depending on the severity of the consequence described where Class 3 represents minor consequences and Class 1 represents major consequences.

This matrix is further sub-divided into consequence ratings ranging from C6 (low impact) to C1 (high impact). An incident transitions between a Class 3 to a Class 2 incident once material harm has been caused, and transitions into a Class 1 incident once it is determined that the Environmental Harm caused in large-scale and cannot be remediated. See Table 1 - Classification System for Environmental Incidents

TABLE 1 - CLASSIFICATION SYSTEM FOR ENVIRONMENTAL INCIDENTS

Class 3			Class 2		Class 1
C6	**C5**	**C4**	**C3**	**C2**	**C1**
No appreciable changes to environment and/or highly localised event	Change from normal conditions within environmental regulatory limits and environmental effects are within site boundaries	Short-term and/or well-contained environmental effects. Minor remedial actions probably required	Impacts external ecosystem and considerable remediation is required.	Long-term environmental impairment in neighbouring or valued ecosystems Extensive remediation required	Irreversible largescale environmental impact with loss of valued ecosystems

4 Incident Notification

Personnel onsite to immediately contact their supervisor who then will notify the Parklife Metro D&C Environment Manager, or delegate. The Environment Manager will notify relevant stakeholders, as required by Sydney Metro's Environmental Incident and Non-compliance Reporting Procedure.

The Parklife Metro D&C Environmental Manager (or delegate) will notify the SM Environment Manager and Environmental Representative (ER). Incident notification and reporting will be undertaken in accordance with Sydney Metro's Environmental Incident and Non-compliance Reporting Procedure, a copy of which is provided in the CEMP.

The following organisations may be notified if the incident 'causes or threatens to cause material harm to the environment':

- Commonwealth Department of the Environment and Energy and Commonwealth Department of Infrastructure Regional Development and Cities,
- NSW EPA,
- Ministry of Health (via the Public Health Unit),
- Work Cover Authority,
- Local Council, and
- Fire and Rescue NSW.

The information that will be reported is:

- Time, date, location, and likely duration of incident,
- Location of place where incident is occurring or likely to occur,
- Type of incident (e.g., chemical spill, water pollution etc.),
- Extent of incident (e.g., magnitude of spill, area covered etc.), and
- Action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution.

Notifications to authorities must be made via verbal communication (i.e. – via telephone call.)

TABLE 2 - EMERGENCY CONTACTS

Position	Responsibility	Contact	Contact Details
Parklife Metro D&C Environmental Manager	24hr availability for activating Emergency Spill Response Procedure (ESRP). Notifying SM Environment Manager	[redacted]	[redacted]
Parklife Metro D&C Community Relations Manager	Notifying community, key stakeholders, coordinating media communications.	[redacted]	[redacted]
Parklife Metro D&C Project Director	Notifying SM	[redacted]	[redacted]
Parklife Metro D&C Construction Manager	Notifying Project Director. Managing Incident as per ESRP.	[redacted]	[redacted]

Parklife Metro D&C General Superintendent	Notifying Construction Manager. Notifying Area Manager. Coordinating incident response Liaising with emergency response organizations. Provision of labour, equipment or support to the Environmental Staff and emergency response organizations as requested.	[redacted]	[redacted]
Sydney Metro Environment Manager	Liaising with Parklife Metro D&C Environment Manager	[redacted]	[redacted]
NSW EPA	Report pollution in NSW	Environment Line	131 555
WaterNSW	Any incident within or potentially affecting the Controlled Areas of the WaterNSW Pipelines corridor	WaterNSW 24-hour Incident Notification Number	1800 061 069
Fire and Rescue NSW			000
Police Department			000
NSW Health			1300 066 055
SafeWork NSW			13 10 50
Liverpool City Council		[redacted]	1300 362 170
Penrith City Council		TBA	4732 7777

Appendix E Dewatering Permit

Parklife Metro D&C

Permit No:

Dewatering and Water Reuse Permit

Sydney Metro – Western Sydney Airport: Stations, Systems, trains, Operations and Maintenance

Date & Time Inspected:		**Location:**	
Permit Validity:		**Personnel Involved:**	
Is inspection following a rainfall event? Yes / No	If yes, record rainfall for previous 24 hours	Rainfall 24hr:	mm
	If no, when was the last rainfall event	Date:	
Approximate volume of water in the basin (as a % of the total capacity)?		Approximate volume of water requiring dewatering?	

Water Source				
Sediment Basin ☐	Excavation ☐	WTP ☐	Holding Tank ☐	Other _____

Discharge Location				
Holding Pit / Tank ☐	Vacc Truck ☐	Water Cart / Dust Suppression ☐	EPL Discharge Point ☐ **ID** ____	Other _____

Pollutant	**Units**	**Test Results**		**100 Percentile Concentration Limits**
		Sample 1 (pre-treatment)	**Sample 2** (post-treatment)	
Oil & grease	Visible (visual inspection)			Not visible
pH	pH (probe)			6.5 – 8.5
Turbidity	NTU (probe)			50

Note for testing frequency:

- Oil & grease and pH should be tested less than 24 hours prior to a controlled discharge and daily for any continued controlled discharge, when it is safe to do so.
- Turbidity should be tested when rainfall causes a discharge from a sediment basin which has not been emptied within the design management period following cessation of a rainfall event, when it is safe to do so.

Treatment Required (e.g. flocculant, pH adjustment):	
Controls in place (e.g. scour protection, float to avoid disturbance of settled material, visual monitoring):	

Notes of permit:

- Supervision is required for all pumping / discharge activities.
- Discharge must cease if water quality changes.

Responsible Person (Supervisor / WTP Operator)	**Permit Approver**
Name:	Name:
Signature:	Signature:
Date:	Date:

Notes on discharge approval:

- Two signatures are required prior to dewatering.
- The approval to discharge from the sediment basin must be given by the ESR and Project Manager (or engineer with delegated authority).

Appendix F Records of Consultation

Consultation Summary

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
Appendix C	Penrith City Council	It is requested that where contamination is identified within the Penrith Local Government Area, and is to be addressed through preparation and implementation of a Detailed Site Investigation, Dam De-Watering Plan, Remediation Action Plans, Site Audit Statements or similar that Council be notified and copies of the Contamination Assessment and any associated documentation be provided to Council. This will in turn allow for these Assessments to be registered to the subject property filers and future consideration under each corresponding Section 10.7 Planning Certificate. It is also requested that this be implemented into the Contamination and Asbestos Unexpected Finds procedure in Appendix C of the Soil and Water Management Plan.	Noted. The Contamination and Asbestos Unexpected Finds Procedure found in Appendix C of the SWMP has been revised to include an action to forward any assessment or management documentation to the relevant Local Council.
SWMP	DPI Fisheries	It is noted that condition C5 required referral of this document to DPI Fisheries.	Noted.
SWMP	DPI Fisheries	NSW Environment Protection Authority (EPA) is the regulatory authority for water quality. It is recommended that advice on this document is sought from the NSW EPA.	Noted. Ongoing discussions are being held with NSW EPA regarding the regulatory framework and approvals for water quality discharge.
SWMP Section 4.6	DPI Fisheries	Please review section 4.6, dot point should read “Blaxland Creek” not “Blaxland Cree”	Typo has been fixed.
SWMP Section 6.1.1	DPI Fisheries	An Erosion and Sediment Control Plan (ESCP) must be prepared and implemented in a manner consistent with currently accepted Best Management Practice (i.e. Managing Urban Stormwater: Soils and Construction 4th Edition Landcom, 2004). Erosion and sediment control (ESC) devices must be designed to prevent sediment from entering the waterway and to prevent sediment plumes from spreading within the waterway. ESC devices must be installed prior to earth works commencing and be maintained in good working order for the duration of the works and subsequently until the site has been stabilised and the risk of erosion and sediment movement from the site is minimal.	Section 6.1.1 includes details on the ESCP, which includes that ESCPs are to be prepared in accordance with the Bluebook. This section has been updated to more closely align with the wording provided by DPI Fisheries.
SWMP	DPI Fisheries	Material storage and stockpiling should occur well away from the waterway (with the aim of keeping the impacted area to a minimum).	Sections 6.7 and 6.8 updated to reflect the wording around keeping materials storage and stockpiling away from waterways. In addition, a new mitigation measure (SW_M18) has been added to Table 12.

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
SWMP	DPI Fisheries	A Dewatering Management Plan should include provisions to protect fish during the dewatering process. It should specifically consider any potential off-site impacts as a result of the dewatering operations and contain mitigation controls to effectively treat any discharge waters to prevent offsite pollution of any receiving waters.	The considerations identified identified by DPI Fisheries in this comment would be incorporated into any EWMS prepared to manage dewatering activities. Table 12 has been updated with a new management measure to prepare this EWMS (SW_M19).
SWMP	DPI Fisheries	Dewatering of temporary in-stream structures requires notification to NSW DPI seven days prior to any dewatering activities commencing in order to organise any fish rescue activities. If required, a separate s.37 permit should be obtained from NSW DPI to relocate fish.	This comment relates to management and permitting of flora and fauna impacts under the Fisheries Management Act 1994 and is managed under the Flora and Fauna Management Sub-plan (See Section 6.9 of that Sub-plan).
SWMP Section 6.5	DPI Fisheries	Temporary waterway crossings should be designed in accordance with Fish Passage Requirements for Waterway Crossings and Policy (2003) and Guidelines for Fish Friendly Waterway Crossings (2003).	The references to Fish Passage Requirements for Waterway Crossings and Policy (2003) and Guidelines for Fish Friendly Waterway Crossings (2003) has been added to Section 6.5.
SWMP Section 6.11, Table 12	DPI Fisheries	When conducting works in waterways a floating silt curtain is to be erected in a semicircular arrangement with ends against the bank so as to contain all suspended sediments within the work area.	Table 20 has been updated with SW_M20 to include this management measure.
Appendix B SWQMP	DPI Fisheries	It is noted that condition C13 required referral of this document to DPI Fisheries.	Noted.
Appendix B SWQMP	DPI Fisheries	Section 4 Baseline Data has an error at the end of the second paragraph, it is unclear in which section the site-specific trigger values are further discussed.	Reference has been updated.
Appendix B SWQMP	DPI Fisheries	As NSW EPA are the regulatory authority for water quality, advice should be sought by them to determine the adequacy of the trigger values.	Ongoing consultation is being undertaken with NSW EPA. Whilst trigger values are not required to be agreed with NSW EPA, the ongoing consultation does include determination of the appropriate discharge criteria in accordance with Condition E130.

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
Appendix B SWQMP	DPI Fisheries	It is recommended that where an exceedance is detected in the monitoring that work ceases immediately until the cause of the exceedance is identified and rectified. Monitoring of the exceedance should continue and works only allowed to recommence when a sampling event confirms reading have dropped below the limit.	If the exceedance is determined to be attributable to SSTOM Works, the event will be treated as an environmental incident and will be managed in accordance with the requirements included in Section 3.8 of the CEMP.
Appendix B SWQMP	DPI Fisheries	Where an exceedance is confirmed as per the Trigger Action Response, increased monitoring frequency should be determined in consultation with the EPA.	If the exceedance is determined to be attributable to SSTOM Works, the event will be treated as an environmental incident and will be managed in accordance with the requirements included in Section 3.8 of the CEMP.
Appendix B SWQMP	DPI Fisheries	Both DPI Fisheries and NSW EPA should be notified in the event of an exceedance.	Pollution incidents and events with the potential to pollute will be reported to DPE and relevant public authorities (as determined by the Planning Secretary) in accordance with Appendix A of the Project Approval (SSI-10051) and to the EPA and any other public authorities identified in the EPL, which is yet to be finalised (see Section 3.8 of the CEMP.)
Appendix B SWQMP	DPI Fisheries	DPI Fisheries (1800 043 536) and the EPA (131 555) is to be notified immediately if any fish kills occur in the vicinity of the works. In such cases, all works other than emergency response procedures are to cease until the issue is rectified and approval is given by DPI Fisheries and/or the EPA for the works to proceed.	Fish kills that occur as a result of SSTOM Works will be treated as an environmental incident and will be managed in accordance with the requirements included in Section 3.8 of the CEMP.
SWQMP	DPE Water	Confirmed that DPE Water have no issues.	Noted.
SWMP and SWQMP	Liverpool City Council	The Environmental Impact Statement for the Project confirms that operation of the Project would be a scheduled activity under Schedule 1 of the Protection of the Environment Operations (POEO) Act 1997. 'Railway activities-railway infrastructure construction' and 'Railway activities-railway infrastructure operation' are identified in Schedule 1 of the Protection of the Environment Operations Act 1997 as scheduled activities requiring an Environment Protection Licence.	Parklife Metro D&C have ongoing consultation with the NSW EPA regarding licencing and consultation will continue during construction. The SSTOM Works will have an EPL applicable to construction. Application for an operational EPL will occur prior to

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
		It is therefore expected that the Project will be constructed and operated in accordance with the requirements of the POEO Act 1997 and any relevant Environment Protection Licence issued by the NSW EPA. Consequently, it is understood that the NSW EPA would be the Appropriate Regulatory Authority (ARA) for the proposed construction and operation of the Project. Although not specified in Condition C5 of the Project Approval, it is requested that the NSW EPA is also consulted in relation to soil and water management and noise and vibration matters including preparation of the individual sub-plans for the Project.	that phase of the works, in consultation with the NSW EPA.
SWMP and SWQMP	Liverpool City Council	Independent audits are required of the Project in accordance with Condition A36 of SSI 10051 and the Department's 2020 Independent Audits Post Approval Requirements (or IAPAR). In this case, it is requested that the submitted documentation is audited as it relates to post-approval requirements and compliance for the Project. The required audit scope is outlined in Section 3.3 of the IAPAR and necessitates an assessment of all conditions of consent applicable to the phase of the development. It is requested that the auditor assesses conformance with all post approval and compliance documents prepared to satisfy the conditions of consent, including an assessment of the Construction Environmental Management Plan and sub-plans. Consistent with Section 3.3 of the IAPAR, the auditor must review the environmental performance of the development with consideration for the Environmental Impact Statement and assess the adequacy of the Environmental Management Plans and sub-plans (Conditions C1 to C12). In particular, the auditor must focus on the construction noise and vibration and soil and water CEMP sub-plans and any other relevant monitoring requirements imposed by the Applicant's Environmental Management System. In addition to the above requirements, it is requested that the auditor ascertains whether the Applicant has addressed the key issue conditions relating to noise and vibration (Conditions E37 to E60); and water (Conditions E126 to E134). The auditor must also consider any other matters raised by the Department, regulatory requirements, Project performance and industry best practice.	The independent audits will be undertaken for the project in accordance with Condition A36. The audits are described in Section 3.9.4 of the CEMP, and are the responsibility of Sydney Metro.
SWMP and SWQMP	Liverpool City Council	To improve environmental health outcomes and efficiency during the development assessment process, Council requires development applications to be supported by technical reports prepared or reviewed and certified by suitably qualified and industry certified environmental consultants. In this regard, Council requires acoustic reports to be prepared or reviewed and certified by a suitably qualified acoustic consultant who is a member of the Australian Acoustical	The CEMF, CNVS, CTMF, REMMs and the Infrastructure Approval identify where technical experts are required to prepare document or provide review and/or endorsement. Parklife Metro D&C acknowledge Liverpool City Councils comment and will ensure documents are prepared, reviewed

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
		Society or employed by an Association of Australasian Acoustical Consultants (AAAC) member firm. In accordance with Council's requirements, general environmental reports are required to be prepared or reviewed and certified by a suitably qualified environmental consultant who is certified under the Environment Institute of Australia and New Zealand- Certified Environmental Practitioner (CEnvP) scheme. It is recommended that the Department adopts a similar approach during their assessment of the Application. Further information is available on Council's website at https://www.liverpool.nsw.gov.au/development/development-and-building	and/or endorsed by expert practitioners, as applicable.

1 Penrith City Council

Note: Applicable to the Soil and Water Management Sub-plan and the Surface Water Quality Monitoring Program.

REVIEW COMMENTS SHEET

DOCUMENT NO.	TITLE	VER	STATUS	NO.	DATE	COMPANY	RAISED BY	REVIEW DOC. NO.*	DOCUMENT REF*	DEED REF*	COMMENTS / RESPONSE	COMMENT CATEGORY*	CLOSED OUT
				46	24/04/2023	PCC	[redacted]	SMWSASSM-PLD-1NL-PC-PLN-000020	General	NA	It is requested that where contamination is identified within the Penrith Local Government Area, and is to be addressed through preparation and implementation of a Detailed Site Investigation, Dam De-Watering Plan, Remediation Action Plans, Site Audit Statements or similar that Council be notified and copies of the Contamination Assessments and any associated documentation be provided to Council. This will in turn allow for these Assessments to be registered to the subject property files for future consideration under each corresponding Section 10.7 Planning Certificate. It is also requested that this be implemented into the Contamination and Asbestos Unexpected Finds procedure found in Appendix C of the Soil and Water Management Sub-Plan.	Observation	N
						PLM		SMWSASSM-PLD-1NL-PC-PLN-000020	General	NA	Noted. The Contamination and Asbestos Unexpected Finds Procedure found in Appendix C of the SWMP has been revised to include an action to forward any assessment or management documentation to the relevant Local Council.	Observation	N

2 Liverpool City Council

Note: Applicable to the Soil and Water Management Sub-plan and the Surface Water Quality Monitoring Program.

From: [redacted]
To: [redacted]
Cc: [redacted]
Subject: FW: Liverpool Council Response RE: SMWSA Project - SSTOM Works Environmental Management Plans for review
Date: Monday, 26 June 2023 10:00:34 AM
Attachments: [redacted]

From: [redacted]
Sent: Monday, June 26, 2023 9:40 AM
To: [redacted]
Subject: Liverpool Council Response RE: SMWSA Project - SSTOM Works Environmental Management Plans for review

[redacted]

Many apologies for not replying to your e-mail requests in a timely manner.

Council has reviewed the e-mails you indicated were sent through for comment on 13th March, 29th March, 5th April. Council have received the following documents:

13 March – Document provided: "Non-Aboriginal Heritage Management Sub-plan SMWSASSM-PLD-1NL-PC-PLN-000026 (Rev B)"

27 March – Document Provided: "Non-Aboriginal Heritage Management Sub-plan SMWSASSM-PLD-1NL-PC-PLN-000026 (Rev B)"

30 March – Documents Provided: "Sydney Metro - WSA - SSTOM - Noise and Vibration Management Plan SMWSASSM-PLD-1NL-PC-PLN-000024 (Rev B)"
"Sydney Metro WSA - SSTOM - Soil and Water Management Plan SMWSASSM-PLD-1NL-PC-PLN-000020 (Rev B)"

Following internal referral to Council's relevant subject matter experts, the following advice is provided:

Heritage

1. Prior to commencement of works, a dilapidation report should be prepared for Kelvin Park House.
2. During works, vibration monitoring should be undertaken at Kevlin Park House during excavation and tunnelling works.
3. On completion, a post works dilapidation report should be undertaken and any changes assessed and repaired where required.

Environmental Health

It is noted that the Minister for Planning and Public Spaces granted approval for the critical State Significant Infrastructure (CSSI) project on 14th April 2022 subject to conditions of consent. Condition C5, Part C of the Project Approval requires the Construction Environmental Management Plan (CEMP) noise and vibration sub-plan and soil and water sub plan to be prepared in consultation with Council.

In accordance with the Project Approval, CEMP Sub-plans, except for any subplans expressly nominated by the Planning Secretary, must be endorsed by the Environmental Representative only. Council was recently provided with the opportunity to provide feedback regarding the following documentation for the Project:

- Soil and Water Management Sub-Plan SMWSASSM-PLD-1NL-PC-PLN-000020 (Rev B) prepared by Parklife Metro D & C dated 27th March 2023; and
- Noise and Vibration Management Sub-Plan SMWSASSM-PLD-1NL-PC-PLN-000024 (Rev B) prepared by Parklife Metro D & C dated 27th March 2023

The Environmental Impact Statement for the Project confirms that operation of the Project would be a scheduled activity under Schedule 1 of the *Protection of the Environment Operations (POEO) Act 1997*. 'Railway activities-railway infrastructure construction' and 'Railway activities-railway infrastructure operation' are identified in Schedule 1 of the *Protection of the Environment Operations Act 1997* as scheduled activities requiring an Environment Protection Licence.

It is therefore expected that the Project will be constructed and operated in accordance with the requirements of the *POEO Act 1997* and any relevant Environment Protection Licence issued by the NSW EPA. Consequently, it is understood that the NSW EPA would be the Appropriate Regulatory Authority (ARA) for the proposed construction and operation of the Project. Although not specified in Condition C5 of the Project Approval, it is requested that the NSW EPA is also consulted in relation to soil and water management and noise and vibration matters including preparation of the individual sub-plans for the Project.

Independent audits are required of the Project in accordance with Condition A36 of SSI 10051 and the Department's 2020 *Independent Audits Post Approval Requirements* (or IAPAR). In this case, it is requested that the submitted documentation is audited as it relates to post-approval requirements and compliance for the Project.

The required audit scope is outlined in Section 3.3 of the IAPAR and necessitates an assessment of all conditions of consent applicable to the phase of the development. It is requested that the auditor assesses conformance with all post approval and compliance documents prepared to satisfy the conditions of consent, including an assessment of the Construction Environmental Management Plan and sub-plans.

Consistent with Section 3.3 of the IAPAR, the auditor must review the environmental performance of the development with consideration for the Environmental Impact Statement and assess the adequacy of the Environmental Management Plans and sub-plans (Conditions C1 to C12). In particular, the auditor must focus on the construction noise and vibration and soil and water CEMP sub-plans and any other relevant monitoring requirements imposed by the Applicant's Environmental Management System. In addition to the above requirements, it is requested that the auditor ascertains whether the Applicant has addressed the key issue conditions relating to noise and vibration (Conditions E37 to E60); and water (Conditions E126 to E134). The auditor must also consider any other matters raised by the Department, regulatory requirements, Project performance and industry best practice.

To improve environmental health outcomes and efficiency during the development assessment process, Council requires development applications to be supported by technical reports prepared or reviewed and certified by suitably qualified and industry certified environmental consultants. In this regard, Council requires acoustic reports to be prepared or reviewed and certified by a suitably qualified acoustic consultant who is a member of the Australian Acoustical Society or employed by an Association of Australasian Acoustical Consultants (AAAC) member firm.

In accordance with Council's requirements, general environmental reports are required to be prepared or reviewed and certified by a suitably qualified environmental consultant who is certified under the Environment Institute of Australia and New Zealand- Certified Environmental Practitioner (CEnvP) scheme. It is recommended that the Department adopts a similar approach during their assessment of the Application. Further information is available on Council's website at https://www.liverpool.nsw.gov.au/development/development-and-building.

Regards,

[redacted]
Principal Strategic Planner
LIVERPOOL CITY COUNCIL
[redacted] | [redacted] [redacted]
Customer Service: 1300 36 2170 | 33 Moore Street Liverpool, NSW 2170, Australia
www.liverpool.nsw.gov.au

We acknowledge the traditional custodians of the land that now resides within Liverpool City Council's boundaries, the Darug and Dharawal nations and pay our respects to their Elders past, present and emerging.

From: [redacted]
Sent: Wednesday, May 10, 2023 11:39 AM
To: [redacted]
Subject: SMWSA Project - SSTOM Works Environmental Management Plans for review

Dear [redacted]

In relation to the emails/transmittals sent to you on the 13th March, 29th March, 5th April regarding the review of the Non-Aboriginal Heritage Management Sub-plan, Flora and Fauna Management Sub-plan, Soil and Water Management Sub-plan, Noise and Vibration Management Sub-plan and Air Quality Monitoring Program. Should you have any questions regarding any of these documents or would like to meet to discuss any issues please contact me at your convenience.

It is our intention to finalise these documents in the near term and we would greatly appreciate any comments you may have or alternately if you have no comment a response to this affect.

Kind Regards

[redacted]
Environment Manager
Mob. [redacted]
email: [redacted]
Parklife Metro JV
680 George Street, Sydney NSW 2000


Think eco-friendly before printing this message

3 DPI Fisheries

Note: Applicable to the Soil and Water Management Sub-plan and the Surface Water Quality Monitoring Program.

NSW GOVERNMENT | Department of Primary Industries

Our Ref: C23/218 **04 May 2023**

Your Ref: SSI-10051

Parklife Metro D&C
Attn: [redacted]

Dear [redacted]

Consultation for Western Sydney Airport Stations, Systems, Trains, Operations and Maintenance (SSTOM) – Soil and Water Management Sub-plan and Appendix B Surface Water Quality Monitoring Program

Thank you for your referral of 05/04/2023 seeking comment on the proposal from DPI Fisheries, a division of NSW Department of Primary Industries on the proposed works stated above. This notification complies with s.199(1)(a) of the *Fisheries Management Act 1994* (FM Act) concerning the proposed dredging and reclamation activities.

DPI Fisheries is responsible for ensuring that fish stocks are conserved and that there is no net loss of key fish habitats upon which they depend. To achieve this, DPI Fisheries ensures that developments comply with the requirements of the *Fisheries Management Act 1994* (FM Act) (namely the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the Act, respectively), and the associated *Policy and Guidelines for Fish Habitat Conservation and Management (2013)*. DPI Fisheries is also responsible for ensuring the sustainable management of commercial, recreational and Aboriginal cultural fishing, aquaculture, marine parks and aquatic reserves within NSW.

DPI Fisheries has reviewed the Soil and Water Management Sub-plan and Appendix B Surface Water Quality Monitoring Program in light of those provisions and has the following advice:

Soil and Water Management Sub-plan

1. It is noted that condition C5 required referral of this document to DPI Fisheries.
2. NSW Environment Protection Authority (EPA) is the regulatory authority for water quality. It is recommended that advice on this document is sought from the NSW EPA.
3. Please review section 4.6, dot point should read “Blaxland Creek” not “Blaxland Cree”.
4. An Erosion and Sediment Control Plan (ESCP) must be prepared and implemented in a manner consistent with currently accepted Best Management Practice (i.e. Managing Urban Stormwater: Soils and Construction 4th Edition Landcom, 2004). Erosion and sediment control (ESC) devices must be designed to prevent sediment from entering the waterway and to prevent sediment plumes from spreading within the waterway. ESC devices must be installed prior to earth works commencing and be maintained in good working order for the duration of the works and subsequently until the site has been stabilised and the risk of erosion and sediment movement from the site is minimal.
5. Material storage and stockpiling should occur well away from the waterway (with the aim of keeping the impacted area to a minimum).
6. A Dewatering Management Plan should include provisions to protect fish during the dewatering process. It should specifically consider any potential off-site impacts as a result of the dewatering operations and contain mitigation controls to effectively treat any discharge waters to prevent offsite pollution of any receiving waters.
7. Dewatering of temporary in-stream structures requires notification to NSW DPI seven days prior to any dewatering activities commencing in order to organise any fish rescue activities. If required, a separate s.37 permit should be obtained from NSW DPI to relocate fish.

DPI Fisheries
Mail to: M.Coughran,1243 Bruxner Hwy, Wollongbar NSW 2477
Email: ahp.central@dpi.nsw.gov.au
ABN 19 948 325 463

8. Temporary waterway crossings should be designed in accordance with Fish Passage Requirements for Waterway Crossings and Policy (2003) and Guidelines for Fish Friendly Waterway Crossings (2003).
9. When conducting works in waterways a floating silt curtain is to be erected in a semi-circular arrangement with ends against the bank so as to contain all suspended sediments within the work area.

Appendix B Surface Water Quality Monitoring Program (Rev B)

10. It is noted that condition C13 required referral of this document to DPI Fisheries.
11. Section 4 Baseline Data has an error at the end of the second paragraph, it is unclear in which section the site-specific trigger values are further discussed.
12. As NSW EPA are the regulatory authority for water quality, advice should be sought by them to determine the adequacy of the trigger values.
13. It is recommended that where an exceedance is detected in the monitoring that work ceases immediately until the cause of the exceedance is identified and rectified. Monitoring of the exceedance should continue and works only allowed to recommence when a sampling event confirms reading have dropped below the limit.
14. Where an exceedance is confirmed as per the Trigger Action Response, increased monitoring frequency should be determined in consultation with the EPA.
15. Both DPI Fisheries and NSW EPA should be notified in the event of an exceedance.
16. DPI Fisheries (1800 043 536) and the EPA (131 555) is to be notified immediately if any fish kills occur in the vicinity of the works. In such cases, all works other than emergency response procedures are to cease until the issue is rectified and approval is given by DPI Fisheries and/or the EPA for the works to proceed.

If you require any further information, please contact me on [redacted]

Yours sincerely,

[redacted]

[redacted]
Fisheries Manager, Coastal Systems

DPI Fisheries
Mail to: M.Coughran,1243 Bruxner Hwy, Wollongbar NSW 2477
Email: ahp.central@dpi.nsw.gov.au
ABN 19 948 325 463

4 DPE Water

Note: Applicable to the Surface Water Quality Monitoring Program only.

From: DPIE Water Assessments Mailbox
To: [redacted]
Cc: DPIE Water Assessments Mailbox
Subject: FW: HPE CM: FW: SMWSA Project - SSTOM Works - Surface Water Quality Monitoring Program Consultation
Date: Friday, 14 April 2023 10:45:59 AM
Attachments: [redacted]

Hi Mark, we do not have any issues to raise. [redacted]

[redacted]
Manager Assessments

Water Group | Department of Planning and Environment
| **M** [redacted] | **E** [redacted]
Prince Street, Locked Bag 21, Orange NSW 2800
www.dpie.nsw.gov.au
Our Vision: Together, we create thriving environments, communities and economies.
I live and work on Wiradjuri Country

NSW GOVERNMENT

The Department of Planning and Environment acknowledges that it stands on Aboriginal land.
We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

From: [redacted]
Sent: Thursday, 6 April 2023 11:28 AM
To: [redacted]
Cc: DPIE Water Assessments Mailbox <water.assessments@dpie.nsw.gov.au>; [redacted]
Subject: HPE CM: FW: SMWSA Project - SSTOM Works - Surface Water Quality Monitoring Program Consultation

Hi [redacted] thanks for getting in contact with DPE Water.

Also please note that we will not be able to get advice to you within 2 weeks. We will endeavour to respond within 28 days.

I see that you have requested DPI Fisheries to provide comment in your request below. DPI Fisheries is located in a separate agency and we do not coordinate any advice on their behalf.

Thanks,

[redacted]
Manager Assessments

Water Group | Department of Planning and Environment
| **M** [redacted] | **E** [redacted]
Prince Street, Locked Bag 21, Orange NSW 2800
www.dpie.nsw.gov.au
Our Vision: Together, we create thriving environments, communities and economies.
I live and work on Wiradjuri Country

NSW GOVERNMENT

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the traditional custodians of the land and we show our respect for elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

From: [redacted] **On Behalf Of** DPIE Water Assessments Mailbox
Sent: Thursday, 6 April 2023 10:02 AM
To: [redacted]
Subject: FW: SMWSA Project - SSTOM Works - Surface Water Quality Monitoring Program Consultation

FYI

From: [redacted]
Sent: Wednesday, 5 April 2023 1:21 PM
To: [redacted]
Cc: DPIE Water Assessments Mailbox <water.assessments@dpie.nsw.gov.au>
Subject: SMWSA Project - SSTOM Works - Surface Water Quality Monitoring Program Consultation

Dear [redacted]

As part of the Sydney Metro Western Sydney Airport (SMWSA) Project, Parklife Metro will be constructing the Stations, Systems, Trains, Operations and Maintenance (SSTOM) package. You're probably aware that the SMWSA Project involves the construction and operation of a new metro line around 23km in length that extends from the existing station at St Marys in the north to a new Aerotropolis Station at Bringelly in the south, but by way of providing background to the SSTOM Project, it includes the construction of the six new metro stations, installation of tracks, signalling and support systems, construction of a stabling and maintenance facility at Orchard Hills, as well as operation and maintenance of the newly constructed metro line.

In accordance with the SMWSA Project's infrastructure approval (SSI-10051), we have prepared a Surface Water Quality Monitoring Program for the construction of the SSTOM Works, and as per Condition C13 of the infrastructure approval, Parklife Metro requests that DPI Fisheries review this document (attached) and if required, provide comment. Any review comments or issues raised will be duly considered by Parklife Metro in the name of open and honest communication and consultation.

You may have previously been contacted by other parties regarding earlier stages of the SMWSA Project, and Parklife Metro appreciates the time and effort in reviewing documents. Therefore, Parklife Metro are more than happy to offer a suitable time to go through any comments or questions regarding the reviewed documents prior to the end of the two week review period, until 23 April 2023. If you have any questions, or would like to set up a time to meet, please contact me via reply email or on [redacted]

Regards,

[redacted]
Environment Manager
Mob. [redacted]
email: [redacted]
Parklife Metro JV
680 George Street, Sydney NSW 2000

Parklife Metro D&C

Think eco-friendly before printing this message

Appendix G Groundwater Management Procedure

Groundwater Management Procedure

Parklife Metro D&C

Document Approval

Revision	Author	Date	Comments	Reviewed by	Approved by
A	[redacted]	21/02/2023	Initial Draft	[redacted]	[redacted]
B	[redacted]	4/04/2023	Revised for Submission	[redacted]	[redacted]
C	[redacted]	19/05/2023	Revised in response to comments	[redacted]	[redacted]
D	[redacted]	9/06/2023	Revised in response to additional Sydney Metro comments	[redacted]	[redacted]
E	[redacted]	17/07/2024	Annual review and update of Groundwater Monitoring Program	[redacted]	[redacted]
F	[redacted]	03/10/2024	Final following SM and ER comment	[redacted]	[redacted]
G	[redacted]	17/02/2026	Update with annual review SWMP	[redacted]	[redacted]

Signature

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1 Introduction

As the SSTOM Works have a low likelihood of negatively impacting groundwater during construction, a Groundwater Management Sub-plan has not been prepared. To manage residual risk and ensure groundwater impacts are duly considered, this Groundwater Management Procedure (GMP, Procedure) has been prepared. This GMP describes how Parklife Metro Design and Construct contractor (Parklife Metro D&C) will manage potential groundwater associated impacts of the SSTOM Works. This GMP also provides a framework to manage the ongoing development and implementation of the Groundwater Monitoring Program.

2 Existing Environment

2.1 Groundwater

Groundwater within the alluvial deposits is likely to be in connection with the surface water within the creeks when flowing. The alluvial groundwater is likely to provide some baseflows into the local creeks, particularly during periods of low rainfall and surface runoff.

Groundwater levels from monitoring bores around the project area indicate that the groundwater is generally between 2 to 5m below ground level (mbgl).

There are no high priority aquatic or karst groundwater dependent ecosystems within the project area, nor have any Ramsar wetlands been identified in the area.

2.2 Groundwater quality

The results of groundwater quality testing undertaken as part of the EIS indicated that groundwater has elevated salinity (electrical conductivity) and contained elevated concentrations of heavy metals and nutrients. The EIS observed the pH of groundwater to be generally neutral to acidic, largely in the pH range 5 to 7.5.

The groundwater is dominated by sodium and chloride, with lesser amounts of magnesium and calcium cations. Electrical conductivity ranged from 1,500 – 36,000 µS/cm. Contamination testing undertaken as part of the EIS indicated the existing environment experienced exceedances above the ANZECC 95% threshold for freshwater ecosystem guidelines (ANZG, 2018) for ammonia, nitrate, phosphorus and several heavy metals. Cobalt, Nickel and Zinc had the greatest number of exceedances compared to the number of samples collected, although other heavy metals exceeded the 95% threshold water quality criteria including aluminium, cadmium, chromium, copper, lead, manganese and selenium.

2.3 Groundwater recharge

Recharge to the alluvial deposit aquifer is predominately via rainfall recharge. Some recharge from watercourses may occur during periods of high flow and from small farm dams within and adjacent to the project area. The watercourses are however expected to act predominantly as the line of groundwater discharge. Groundwater levels are expected to mound between watercourses with vertical infiltration downward through the residual clay cover and lateral migration from the elevated areas towards the watercourses via the Bringelly Shale.

Due to the low permeability of the residual soil cover, groundwater recharge to the underlying shale aquifers is expected to be low perhaps between 1 and 2 % of the average annual rainfall. An increase in development around the area is likely to result in the reduction of a direct recharge from rainfall.

2.4 Groundwater levels and flow

Groundwater flow is understood to be controlled by rainfall infiltration and discharge along the nearby watercourses. As a result, the groundwater flow direction is expected to generally follow topography towards the main drainage

channels in a northerly and easterly direction towards Cosgroves Creek, a southerly and easterly direction towards Badgerys Creek and South Creek and westwards towards Duncans Creek. Groundwater levels are typically within 5 m of the ground surface though groundwater is deeper than 5 m depth in the higher ground away from the watercourses.

Groundwater levels from monitoring bores within the project area indicate that the groundwater is generally between 2 to 5 mbgl, as shown below in Table 1, which utilises data from the EIS and from monitoring available from previous contractors documentation.

TABLE 1 GROUNDWATER LEVELS

Location	Groundwater Level (mbgl)
St Marys Station	-1.71[1] to 7.7
Claremont Meadows services facility	1.6 to 2.4
Orchard Hills Station	4.1 to 5.7
Bringelly Services Facility	2.8 to 7.4
Bradfield Station	1.8 to 5.0

[1] *rapid pressure response observed following extreme rainfall event*

2.5 Groundwater Dependent Ecosystems

Groundwater dependent ecosystems (GDEs) are defined as ecosystems that require access to groundwater to meet all or some of their water requirements to maintain their communities of plants and animals, ecological processes and ecosystem services. Ecosystems which have their species composition and natural ecological processes wholly or partially determined by groundwater may include native plant communities. GDEs which are surface expressions of groundwater within the locality of the study area (<10 kilometres) include South Creek and associated tributaries. Other GDEs which are reliant on subsurface groundwater in the study area include:

- Cumberland Plain Woodland in the Sydney Basin Bioregion
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Shale Gravel Transition Forest in the Sydney Basin Bioregion
- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

No high priority aquatic or karst GDEs have been identified within the SSTOM Works area, and no impacts to GDEs are expected to occur as a result of the SSTOM Works. Therefore, this Procedure has not prescribed any additional environmental controls specifically for GDE management.

3 Groundwater Impacts and Controls

Given the minimal amount of excavation required during construction of the SSTOM Works, and the minimal interaction with groundwater, SSTOM Works have a low likelihood of negatively impacting groundwater during construction. Table 2 details the potential impacts on the groundwater environment during the construction phase, as they were assessed in the EIS, and provides details of the anticipated controls.

TABLE 2 GROUNDWATER ASPECTS AND IMPACTS AND PROPOSED CONTROLS

Aspect	Impact	Control
Changes in groundwater levels impacting GDEs	Moderate potential for adverse effects has been identified at several locations along the project alignment (Claremont Meadows facility, Orchard Hills station, and Bringelly services facility) where dewatering is likely to cause groundwater levels to be temporarily drawn-down below the root zone of facultative terrestrial GDEs for a period of greater than six months.	Groundwater level and quality monitoring Tree health monitoring Manual tree watering
Changes in groundwater levels impacting water supply wells	The project is unlikely to have any adverse impacts on water supply wells, due to the existing water supply wells being reported as over 200m deep, targeting bedrock aquifers.	Groundwater level and quality monitoring
Changes in groundwater levels impacting creeks	Due to the low hydraulic conductivity of the Bringelly Shale and overlying soils, the amount of interflow between the creeks and the groundwater is likely to be small, with creeks being principally surface water run-off fed or supported by baseflow from alluvial deposits. As a result, the potential impact of groundwater drawdown at creek lines is anticipated to be minor	None proposed
Changes in groundwater levels impacting other environmental receptors	The potential impact to artificial wetlands (stock and farm dams) from the project is likely to be negligible since these features are expected to be largely disconnected from the underlying Bringelly Shale groundwater, where changes in groundwater level would predominantly occur.	Groundwater level and quality monitoring
Impacts on groundwater quality due to contamination from release of chemicals used during construction activity and potential impacts on other connected environmental receptors	Potential impacts to groundwater quality are mainly concerned with fuel and chemical spills or seepage of contaminants from construction processes on the surface.	Groundwater level and quality monitoring Water treatment Spill Response Procedure
Impacts on groundwater quality due to exposure, storage and leaching of saline soils along the alignment	Potential impacts to groundwater quality associated with exposure, storage and leaching of saline soils is predominately associated with bulk earthworks, which is not part of SSTOM Works.	Groundwater level and quality monitoring
Impacts on buildings and infrastructure from ground movement related to groundwater drawdown and excavation during construction	The expected groundwater changes may result in settlement of the surrounding ground at worksites, which is likely to be negligible due to the relatively thin soil layers present, combined with the relatively stiff consistency of the soils.	Groundwater level and quality monitoring Settlement monitoring

3.1.1 Groundwater Monitoring Program

The Groundwater Monitoring Program included in Appendix B of this document has been adapted from the Groundwater Monitoring Program prepared by CPBG, the contractors responsible for constructing the SBT Works (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4 dated 12/08/2024). Groundwater monitoring responsibilities for the SMWSA Project have now been fully transferred to Parklife Metro D&C.a.

3.1.2 Groundwater Flow Management

The EIS assessment concluded that the majority of groundwater inflows would occur during construction in the period between excavation and installation of the tunnel lining and station box waterproofing. The drained station box excavations and tunnel development are likely to result in the greatest initial groundwater inflows prior to Parklife Metro D&C assuming responsibility of the construction area. Groundwater inflows into the tunnels and station boxes is therefore expected to be minimal at the point when Parklife Metro D&C take possession of the tunnel and station boxes.

To ensure that groundwater flows are managed appropriately, the process illustrated in Figure 1 has been developed and will be implemented during construction of the SSTOM Works. The flowchart describes the management response to unforeseen and excessive groundwater inflows into excavations and illustrates the decision-making process to determine the need for a site-specific groundwater management strategy.

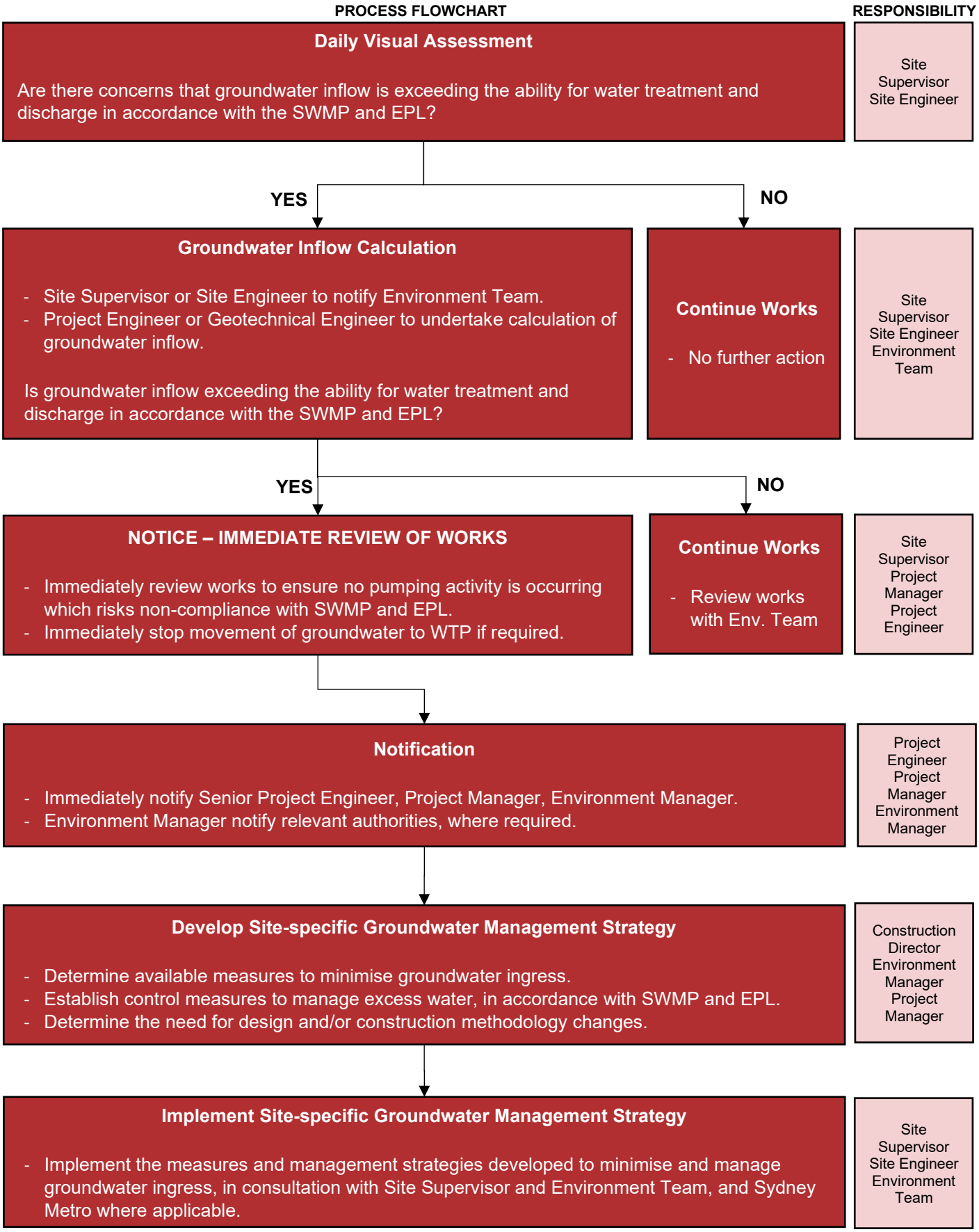

FIGURE 1 GROUNDWATER INFLOW MANAGEMENT PROCESS

3.1.3 Other environmental control measures

Specific measures and requirements to meet the objectives of this GMP and to address potential impacts on groundwater are outlined in Table 3. Based on the mitigation and management measures it is considered that potential groundwater impacts that may arise as a result of the construction of the SSTOM Works can be effectively managed through the implementation of this procedure and the controls in Table 3.

TABLE 3 GROUNDWATER MANAGEMENT AND MITIGATION MEASURES

ID	Requirement	Timing	Source or req.	Responsibility
GW_M1	Within the scope of the SSTOM Works, all feasible and reasonable measures will be implemented to limit groundwater inflows to stations and crossovers.	Construction	CEMF 7.3a	Construction Manager Environment Manager
GW_M2	A Groundwater Monitoring Program will be developed implemented as required during construction, as determined to be applicable to SSTOM Works, in consultation with Sydney Metro, ER and previous contractors.	Prior to groundwater monitoring by Parklife Metro D&C Construction	Condition C13 Condition C14 Condition C16 Condition C17	Environment Manager Sydney Metro ER
GW_M3	The Groundwater Monitoring Program will record ground water level and quality and will be used to identify whether additional mitigation is required.	Construction	CEMF 7.3a	Environment Manager
GW_M4	Groundwater that cannot be reused for SSTOM Works, will be removed from site and disposed of at an appropriately licenced facility, treated and discharged in accordance with the EPL or discharged to trade waste (sewer) in accordance with consultation and approval with Sydney Water.	Construction	EPL Condition E122	Construction Manager Environment Manager
GW_M5	Whilst no groundwater users have been identified, in the event of a material decline in water supply levels, quality or quantity from registered existing bores associated with groundwater changes from SSTOM Works, make good provisions will be provided.	Construction	Condition 133	Construction Manager Environment Manager

Appendix A Other Conditions of Approval, REMMs and CEMF Requirements Relevant to this Procedure

REF	Requirement	Reference	How Addressed
E86	The Proponent, where liable, must rectify any property damage caused directly or indirectly (for example from vibration or from groundwater change) by the work at no cost to the owner. Alternatively, the Proponent may pay compensation for the property damage as agreed with the property owner. Rectification or compensation must be undertaken within 12 months of completion of the work identified in Condition E84 unless another timeframe is agreed with the owner of the affected surface or sub-surface structure or recommended by the Independent Property Impact Assessment Panel (IPIAP).	Section 3	Condition survey reports Groundwater level and quality monitoring
E102	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: (a) evaluation of reuse options; (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; (c) measures to avoid misuse of recycled water as potable water; (d) consideration of the public health risks from water recycling; and (e) time frame for the implementation of the preferred reuse option(s). 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. Justification must be provided to the Planning Secretary if it is concluded that no reuse options prevail. A copy of the Water Reuse Strategy must be made publicly available. Note: Nothing in this condition prevents the Proponent from preparing separate Water Reuse Strategies for the construction and operational stages of the CSSI.	Sustainability Management Plan	Water reuse strategy has been developed as part of the Sustainability Management Plan
E133	Make good provisions for groundwater users must be provided in the event of a material decline in water supply levels, quality or quantity from registered existing bores associated with groundwater changes from either construction and/or ongoing operational dewatering caused by the CSSI.	Section 3	Consultation records / hydrologist report Groundwater level and quality monitoring
GW1	Further assessment would be undertaken during design development, and prior to construction commencing, to ensure that damage to buildings and structures at risk of ground movement impacts around St Marys, Claremont Meadows, Orchard Hills and Bringelly are avoided or managed. Where building damage risk is rated as slight, moderate or high (as per Rankin 1988), a structural assessment of the affected buildings/structures would be carried out and specific measures implemented to address the risk of damage	Building Condition Surveys	Settlement Monitoring and Building Condition Surveys will be undertaken as required
GW2	Further assessment of road and rail infrastructure and utility assets (including the Warragamba to Prospect Water Supply Pipelines) considered to be at risk from ground movement would be undertaken during design development. Consultation would be undertaken with the infrastructure and asset owners in	Settlement Monitoring Survey Reports	Settlement Monitoring

REF	Requirement	Reference	How Addressed
	each case to determine appropriate ground movement criteria for the assessment and, if required, to agree management measures to manage potential impacts		
GW3	Further assessment of potential ground movement impacts on the Goods Shed building at St Marys Station, including a building condition survey, would be carried out during design development and prior to the commencement of construction. The assessment would be carried out in consultation with a suitably qualified heritage architect and would identify acceptable ground movement criteria and, if required, feasible measures to reduce or mitigate the effects of ground movement on this structure	Building condition surveys	Settlement monitoring is undertaken where required as part of the SSTOM Works
GW5	Detailed hydrogeological and geotechnical models for the project would be developed and progressively updated during design and construction These models would: •be informed by the results of groundwater monitoring undertaken before and during construction •identify predicted changes to groundwater levels, including at nearby water supply works and at groundwater dependent ecosystems or other sensitive groundwater receptors	N/A	Design reports
GW6	A Groundwater Management Plan would be prepared and implemented. The plan must include the following trigger-action response measures in relation to groundwater levels in areas identified as subject to potential drawdown (at groundwater dependent ecosystems or other sensitive receivers) but outside the construction footprint and Western Sydney International Stage 1 Construction Impact Zone: a. target criteria, set with reference to relevant standards and site specific parameters; b. trigger values and corresponding corrective actions to prevent recurring or long-term exceedance of the target criteria described in (a); c. corrective actions to compensate for any recurring or long-term exceedance of the target criteria described in (a). Response measures may include: •targeted ground improvement and grouting to limit groundwater inflows into station excavations, tunnels and cross-passage to reduce groundwater drawdown •design of undrained temporary retention systems to minimise groundwater inflow into station excavations and reduce groundwater drawdown •supplementing groundwater supply at affected groundwater dependent ecosystems or watercourses •make good provisions for groundwater supply wells impacted by changes in groundwater level or quality	This Procedure	Due to the low risk associated with SSTOM Works, a Groundwater Management Plan has not been prepared. This Groundwater Management Procedure and the implementation of the Groundwater Monitoring Program (Appendix B) has been prepared to manage any residual risk.
SC9	Targeted groundwater investigations would be undertaken prior to construction to identify high salinity areas at risk from rising groundwater. Where high saline areas (>1000 µS/cm) are identified, measures such as planting, regenerating and maintaining native vegetation and good ground cover in recharge, transmission and discharge zones would be implemented where possible	N/A	Generally addressed in previous WSA packages. Geotechnical design package

Appendix B Groundwater Monitoring Program

Doc No Ref: SMWSASSM-PLD-1NL-PC-PLN-000022

SSTOM - Groundwater Monitoring Program

SMWSASSM-PLD-1NL-PC-PLN-000022

Parklife Metro D&C

Approval Record

Revision	Author	Date	Issue	Reviewed by	Approved by
00	[redacted] Environment Manager	**07/07/2023**	Final Issue / IFI	[redacted] Environment Manager	[redacted] Project Director
01	[redacted] Environment Approvals	**3/12/2024**	Updates to address revised SBT GW Monitoring Program / Annual Review	[redacted] Environment Manager	[redacted] Project Director
02	[redacted] Environment Approvals	**19/12/2024**	IFI / issue for ER endorsement	[redacted] Environment Manager	[redacted] Project Director
03	[redacted] Senior Environment Advisor	**28/01/2026**	Annual Review IFI for ER endorsement	[redacted] Environment Manager	[redacted] Project Director
Signature	[redacted]				

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Amendment Record

Date	Revision	Version	Amendment Description
19/05/2023	**A**	**1**	Initial Draft
07/07/2023	**00**	**1**	Revised in response to consultation with EPL-Water. For ER endorsement
24/05/2024	**01**	**1**	Revised in line with Parklife Metro D&C acceptance of groundwater monitoring responsibilities. For SM and ER review
09/07/2024	**01**	**2**	Updated to address SM and ER Comments
23/10/2024	**01**	**3**	Duplicate version of 01.02
03/12/2024	**01**	**4**	Updated to reflect revised and approved SBT Groundwater Monitoring Program, in line with PLM D&C acceptance of groundwater monitoring responsibilities.
19/12/2024	**02**	**1**	Final issue for ER endorsement
22/01/2026	**02**	**2**	Annual Review
28/01/2026	**03**	**1**	Final issue for ER endorsement

Details of Revision Amendments

Document Control

The Management Plan's owner Director or his/her delegate is responsible for updating this plan to reflect changes to the project, construction, legal and other requirements, as required.

Plan Authorisation

The implementation and distribution of this Management Plan is under the authority of the Project Director. All personnel employed on the Project will perform their duties in accordance with the requirements of this Management Plan, supporting management plans and related procedures.

Amendments

Any revisions or amendments must be approved by the Project Director and / or client before being implemented and distributed.

Notes on this document

The technical content and details included in this Monitoring Program have been adopted from the revised Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4 dated 12/08/2024) prepared by CPB Contractors Ghella Joint Venture (CPBG), endorsed by the SBT Environmental Representative and approved by Department of Planning, Housing and Infrastructure (DPHI) (approval dated 27/09/2024). As the contractors undertaking the Station Box and Tunnelling (SBT) for the Sydney Metro Western Sydney Airport (SMWSA) Project, CPBG were initially responsible for groundwater monitoring on the Project. Groundwater monitoring responsibilities for the SMWSA Project have now been fully transferred to Parklife Metro D&C as SBT work on the station boxes, shafts and tunnels has been completed and all work areas handed over.

Acronym and Definitions

Abbreviation	Expanded Text
AIP	Aquifer Interference Policy
ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
ANZG (2018)	Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)
ASS	Acid Sulphate Soil
AS/NZS	Australia/New Zealand Standards
CEMF	Sydney Metro Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
Conditions	Minister's Conditions of Approval
CPBG	CPB Contractors and Ghella Joint Venture – Station Boxes and Tunnelling Works Contractors
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water (Formerly DPE)
DPE	NSW Department of Planning and Environment
DPHI	NSW Department of Planning, Housing and Infrastructure (Formerly DPE)
DQO	Data Quality Objective
DPI (Water)	NSW Department of Primary Industries (Water) (Former Office of Water, now DCCEEW)
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	NSW Environment Protection Authority
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPL	NSW Environment Protection Licence under the *Protection of the Environment Operations Act 1997*.
ESCP	Erosion and Sediment Control Plan
EWMS	Environmental Work Method Statements
GDE	Groundwater Dependent Ecosystem
GIR	CPBG Geological Interpretative Report (SMWSASBT-CPG-SWD-SW000-GE-RPT-040302)
GMP	Groundwater Management Procedure
GWQ	Groundwater Quality
HIR	CPBG Hydrogeological Interpretive Report (SMWSASBT-CPG-SWD-SW000-GE-RPT-040403)
LOR	Limit of Reporting
mAHD	Elevation in metres with respect to the Australian Height Datum
mbgl	metres below ground level
mbtoc	Metres below top of casing
Monitoring Program	Groundwater Monitoring Program (this document)
m/day	Metres per day
m/s	Metres per second

NRAR	Natural Resources Access Regulator
Parklife Metro D&C	Parklife Metro Design and Construct. Consists of Webuild S.P.A, Siemens Mobility Pty Ltd and Richard Crookes Constructions Pty Ltd. Responsible for the construction of SSTOM Works
PIRMP	Pollution Incident Response Management Plan
POEO Act	NSW *Protection of the Environment Operations Act 1997*
Project, the	Sydney Metro Western Sydney Airport
REMM	Revised Environmental Mitigation Measure
RPD	Relative Percent Difference
SBT	Station Boxes and Tunnelling
SMART	Specific, Measurable, Achievable, Realistic, and Time-based goals
SMWSA	Sydney Metro Western Sydney Airport
SSTV	Site-Specific Trigger Value
SSTOM	Stations, Systems, Trains, Operations and Maintenance
SWMP	Soil and Water Management Sub-plan
TfNSW	Transport for NSW
µS/cm	Micro-Siemens per centimetre
WSI	Western Sydney International
WTP	Water Treatment Plant

1 Introduction

1.1 Background

The Sydney Metro Western Sydney Airport Project involves the construction and operation of a new 23-kilometre metro line to connect Western Sydney suburbs from Bradfield in the south with St Marys in the north. The alignment includes a combination of tunnel, surface, bridges and viaduct sections, and comprises of six new metro stations between St Marys and Bradfield Station (formerly named Aerotropolis Core Station), as well as a stabling and maintenance facility and operational control centre to support the operation of the new metro railway line (see Figure 1-1).

The Project will be delivered in multiple stages, consisting of

- Advanced and Enabling Works (AEW) – Site investigations, modification of the existing transport network, power and water supply for construction sites, utility and stormwater diversions and some demolition works.
- Station Boxes and Tunnelling (SBT) – Two sections of twin running tunnels, constructed with the use of tunnel boring machines (TBMs), dive structures and station box excavations. SBT's scope will interact and require management of groundwater, and occurs prior to Parklife Metro D&C works commencing. Therefore, the SBT contractor will undertake the required groundwater monitoring under their approved Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404) until handover of monitoring responsibilities to Parklife Metro D&C occurs.
- Surface and Civil Alignment Works (SCAW) – Construction of bridges and viaducts to cross floodplains, watercourses and existing and proposed permanent infrastructure.
- Stations, Systems, Trains, Operations and Maintenance (SSTOM), being the subject of this Monitoring Program, and will include the following:
  - Station design and fit-out, urban and landscape design, precinct and transport integration works,
  - Finishing works and testing and commissioning, and
  - Operation of the Western Sydney Airport metro service (operation of Sydney Metro WSA will be managed by separate CEMP, Sub-plans and Monitoring Programs).
- Finalisation Auxiliary Works.

The SSTOM Works scope as part of the Sydney Metro Western Sydney Airport Project includes:

- installation of tracks, signalling, mechanical and electrical systems
- construction of a stabling and maintenance facility at Orchard Hills
- construction of the lower chamber of Bringelly shaft, along with capping and backfill
- construction of the lower chamber of Claremont Meadows shaft, along with capping and backfill
- construction of six stations, including:
  - a new metro station connecting to, and providing an interchange with, the T1 Western Line (part of the existing Sydney Trains suburban rail network) at St Marys
  - two new metro stations between the T1 Western Line and Western Sydney International; one at Orchard Hills and one at Luddenham within the Northern Gateway Precinct
  - two new metro stations within the Western Sydney International site; one at the Airport Terminal and one at the Airport Business Park, both of which are located on Airport land and are managed under a separate CEMP and Sub-plan documents

- a new metro station within the Bradfield precinct, south of Western Sydney International.

- The SSTOM Works also includes the supply of new driverless trains, and the operation and maintenance of the new metro railway line and its assets, which will be managed through an Operational Environmental Management Plan or Environmental Management System as agreed with the Planning Secretary.

FIGURE 1-1 OVERVIEW OF SMWSA PROJECT

1.2 Context

This Groundwater Monitoring Program (Monitoring Program) is an attachment of the Groundwater Management Procedure (GMP), which is an appendix of the Soil and Water Management Plan (SWMP) for the SSTOM Works being undertaken on NSW land (off-airport).

The technical content and details included in this Monitoring Program have been adopted from the Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4) prepared by CPB Contractors Ghella Joint Venture (CPBG), endorsed by the SBT Environmental Representative and approved by DPHI (approval dated 27/09/2024). As the contractors undertaking the Station Box and Tunnelling (SBT) for the Sydney Metro Western Sydney Airport (SMWSA) Project, CPBG have been responsible for the development and initial implementation of the groundwater monitoring program on the Project and as such, Parklife Metro D&C have adopted the Groundwater Monitoring Program prepared by CPBG. Groundwater monitoring responsibilities for the SMWSA Project have been progressively transferred to Parklife Metro D&C as sections of station box, shaft and tunnelling work areas are completed and handed over, with Parklife Metro D&C the sole contractor responsible for groundwater monitoring for the SWMSA Project, as of the end of January 2025.

This Monitoring Program has been developed in consultation with DPHI Water (refer to Section 1.4 and Appendix A for details of consultation), in accordance with Condition A6.

The Monitoring Program is required under Condition C13 and in accordance with the SMWSA Staging Report, this Monitoring Program was endorsed by the SSTOM Environmental Representative (ER) before commencement of construction in accordance with Condition C18.

1.2.1 Applicability to SSTOM Works

Parklife Metro D&C will implement this Monitoring Program, as reviewed and endorsed by the ER, in accordance with Condition C13, C14 and C16, for the duration of construction in accordance with Condition C21.

1.3 Scope

The Monitoring Program has been prepared in accordance with the requirements of Planning Approval Conditions and describes how Parklife Metro D&C will approach monitoring requirements for groundwater level and quality during SSTOM Works. The Monitoring program has been developed considering the SMART principles, in that they are specific to groundwater monitoring for the SSTOM Works being undertaken off-airport, they are measurable against monitoring parameters, they are actionable as trigger action responses, they are realistic and achievable, and they are timely in that they apply to the construction phase of the SSTOM Works.

This Monitoring Program is the key measurement tool and has been prepared to compare actual performance of the SSTOM Works against the predicted performance the EIS and will describe how Parklife Metro D&C proposes to monitor potential impacts to groundwater during construction of the SSTOM Works.

Operational monitoring measures do not fall within the scope of the construction phase and therefore are not included in this Monitoring Program.

1.3.1 Conditions of Approval

Conditions relevant to the preparation of this Program are identified in Table 1. A cross reference is also included to indicate where the requirement is addressed in this Program or other documents

TABLE 1 REQUIREMENTS FOR THE PREPARATION OF THIS MONITORING PROGRAM

Ref	Requirement	Where Addressed
Condition C13	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies (as required by Condition A6) identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP. Where a government agency(ies) request(s) is not included, the Proponent must provide the Planning Secretary / ER (whichever is applicable) justification as to why. (c) Groundwater: DPIE Water	Section 1.4, Appendix A
Condition C14	Each Construction Monitoring Program must provide:	
	(a) details of baseline data available including the period of baseline monitoring;	Section 5
	(b) details of baseline data to be obtained and when;	Section 5
	(c) details of all monitoring of the project to be undertaken;	Section 5, Section 6
	(d) the parameters of the project to be monitored;	Section 6, Section 7
	(e) the frequency of monitoring to be undertaken;	Section 6, Section 7
	(f) the location of monitoring;	Section 6,
	(g) the reporting of monitoring results and analysis results against relevant criteria;	Section 7, Section 8
	(h) details of the methods that will be used to analyse the monitoring data;	Section 7, Section 8.3
	(i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicated unacceptable project impacts;	Section 6
	(j) a consideration of SMART principles;	Section 5, Section 6
	(k) any consultation to be undertaken in relation to the monitoring programs; and	Section 1.4
	(l) any specific requirements as required by Conditions C15 to C16.	Section 1.3
Condition C16	Groundwater Construction Monitoring Program must include:	
	(a) groundwater monitoring networks at each construction excavation site predicted to intercept groundwater in the documents listed in Condition A1;	Section 6
	(b) detail of the location of all monitoring bores with nested sites to monitor both shallow and deep groundwater levels and quality;	Section 6
	(c) define the location of saltwater interception monitoring where sentinel groundwater monitoring bores will be installed between the saline sources and that of each construction excavation site predicted to intercept groundwater in the documents listed in Condition A1;	Section 2.4, Section 6

Ref	Requirement	Where Addressed
	(d) results from existing monitoring bores;	Section 2.3, Section 2.4, Section 5
	(e) monitoring and gauging of groundwater inflow to the excavations predicted to intercept groundwater in the documents listed in Condition A1, appropriate trigger action response plan for all predicted groundwater impacts upon each noted neighbouring groundwater system component for each excavation construction site;	Section 6, Section 7
	(f) trigger levels for groundwater quality, salinity and groundwater drawdown in monitoring bores and / or other groundwater users;	Section 6
	(g) daily measurement of the amount of water discharged from the water treatment plants;	Section 7
	(h) water quality testing of the water discharged from treatment plants;	Section 6, Section 4.3
	(i) management and mitigation measures and criteria, including measures to address impacts on groundwater dependent ecosystems;	Section 6, Section 7
	(j) groundwater inflow to the excavations to enable a full accounting of the groundwater take from the Sydney Basin Central Groundwater Source;	Section 5
	(k) reporting of groundwater gauging at excavations, groundwater monitoring, groundwater trigger events and action responses; and	Section 5
	(l) methods for providing the data collected to Sydney Water where discharges are directed to their assets.	Section 8.5
Condition C18	The Construction Monitoring Programs not requiring the Planning Secretary's approval must obtain the endorsement of the ER as being in accordance with the conditions of approval and all undertakings made in the documents listed in Condition A1. Any of these Construction Monitoring Programs must be submitted to the ER for endorsement at least one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage.	Section 1.5
Condition C20	Unless otherwise agreed with the Planning Secretary, construction must not commence until the Planning Secretary has approved, or the ER has endorsed (whichever is applicable), all of the required Construction Monitoring Programs and all relevant baseline data for the specific construction activity has been collected.	Section 1.5
Condition C21	The Construction Monitoring Programs, as approved by the Planning Secretary or the ER has endorsed (whichever is applicable), including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary or the ER (whichever is applicable), whichever is the greater.	Section 1.2, Section 1.5
Condition C22	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, ER and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program. Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 8.5

Ref	Requirement	Where Addressed
Condition E133	Make good provisions for groundwater users must be provided in the event of a material decline in water supply levels, quality or quantity from registered existing bores associated with groundwater changes from either construction and/or ongoing operational dewatering by the CSSI	Section 2.5, Section 3.2

1.3.2 Construction Environmental Management Framework

The CEMF requirements relevant to the preparation of this Monitoring Program are identified in Table 2. A cross reference is also included to indicate where the requirement is addressed, in this Program or other documents.

TABLE 2 CEMF REQUIREMENTS

Ref	Requirement	Where Addressed
CEMF 7.2 (b) viii	Details of groundwater monitoring if required.	Section 6
CEMF 3.16 (a)	Issue specific environmental monitoring will be undertaken as required or as additionally required by any approval, permit or licence conditions.	This document
CEMF 3.16 (a)	The results of any monitoring undertaken as a requirement of a license or permit that is required to be published will be published on the Principal Contractor's, or a project specific, website within 14 days of obtaining the results.	Section 8.5

1.3.3 Revised Environmental Mitigation Measures

The revised environmental mitigation measures (REMMs) from the Submissions Report relevant to the preparation of this Monitoring Program are identified in Table 3. A cross reference is also included to indicate where the requirement is addressed in this Program or other documents.

TABLE 3 REMM REQUIREMENTS

Ref	Requirement	Where Addressed
GW5	Detailed hydrogeological and geotechnical models for the project would be developed and progressively updated during design and construction. These models would: • be informed by the results of groundwater monitoring undertaken before and during construction • identify predicted changes to groundwater levels, including at nearby water supply works and at groundwater dependent ecosystems or other sensitive groundwater receptors Where changes to groundwater levels are predicted at nearby water supply works, groundwater dependent ecosystems or other sensitive groundwater receivers, an appropriate groundwater monitoring program would be developed and implemented. Where changes to groundwater level are close to the ground surface, dryland salinity monitoring would be implemented to allow for management of any identified impacts.	Section 1.3, Section 6

Ref	Requirement	Where Addressed
	The groundwater monitoring program would aim to confirm no adverse impacts on the receiver during construction or to effectively manage any impacts with the implementation of appropriate mitigation measures. Monitoring at any specific location would be subject to the status of the water supply work and agreement with the landowner	
GW6	A Groundwater Management Plan would be prepared and implemented. The plan must include the following trigger-action response measures in relation to groundwater levels in areas identified as subject to potential drawdown (at groundwater dependent ecosystems or other sensitive receivers) but outside the construction footprint and Western Sydney International Stage 1 Construction Impact Zone: a) target criteria, set with reference to relevant standards and site specific parameters; b) trigger values and corresponding corrective actions to prevent recurring or long-term exceedance of the target criteria described in (a); c) corrective actions to compensate for any recurring or long-term exceedance of the target criteria described in (a) Response measures may include: • targeted ground improvement and grouting to limit groundwater inflows into station excavations, tunnels and cross-passage to reduce groundwater drawdown • design of undrained temporary retention systems to minimise groundwater inflow into station excavations and reduce groundwater drawdown • supplementing groundwater supply at affected groundwater dependent ecosystems or watercourses • make good provisions for groundwater supply wells impacted by changes in groundwater level or quality	Section 6.1 and 8.3
SC9	Targeted groundwater investigations would be undertaken prior to construction to identify high salinity areas at risk from rising groundwater. Where high saline areas (>1000 µS/cm) are identified, measures such as planting, regenerating and maintaining native vegetation and good ground cover in recharge, transmission and discharge zones would be implemented where possible	Section 5

1.3.4 Environmental Protection Licence

Environmental Protection Licence (EPL) 21807 is applicable to the Project. There are currently no specific groundwater monitoring requirements under the current EPL.

1.4 Document Consultation

Reflecting the requirements of Conditions A6, C13(c) and C14, Revision A of this Monitoring Program has been prepared in consultation with relevant agencies as summarised in Table 4 below. Parklife Metro D&C have engaged with these agencies in developing and finalising this monitoring program.

TABLE 4 AGENCY CONSULTATION REQUIREMENTS

Subject	Agency Consultation
Groundwater Monitoring Program Condition C13(c)	DPE Water (now DPHI Water)

A summary of this consultation is provided below in Table 5 whilst records of consultation are provided in Appendix A in accordance with Condition A6.

TABLE 5 CONSUTLATION LOG

Agency	Date consulted	Comments received	Discussion
DPE Water	19/05/2023	21/06/2023	DPE Water provided recommendations regarding monitoring data presentation, reporting and water and enhancements to the monitoring bore network and Trigger Action Response Plan.

Updates for this annual review (January 2026) of this document have not been subject to additional agency consultation.

Additional updates to this document are required to align with recommendations from the following construction monitoring reports:

- Biannual Groundwater Monitoring Report June 2024 to December 2024, prepared by CPBG (SMWSASBT-CPG-SWD-SW000-GE-RPT-040426).
- Biannual Groundwater Construction Monitoring Report – September to November 2024, prepared for Parklife Metro D&C (SMWSASSM-PLD-SWD-SW000-WA-RPT-000004)
- Biannual Groundwater Construction Monitoring Report – December 2024 to July 2025, prepared for Parklife Metro D&C (SMWSASSM-PLD-SWD-SW000-WA-RPT-000006)

The SBT Groundwater Monitoring Program was consulted with relevant agencies, endorsed by the SBT ER and approved by DPHI (approval dated 27/09/2024). No additional agency advice was received through the SBT consultation process not already received by PLM. No further consultation is therefore currently required on this document.

1.5 Document Approval

Construction commenced following ER approval of this monitoring program and the ER may endorse minor updates to this Groundwater Monitoring Program in accordance with Condition C21 of the Approval. Groundwater monitoring will be implemented for the duration of construction, or other period as required, in accordance with Condition C21.

1.6 Groundwater Regulatory framework and legislation

Groundwater in NSW is regulated by the Department of Climate Change, Energy and the Environment (DCCEEW Water)under *the Water Act 1912* (NSW) and the *Water Management Act 2000* (NSW). If an activity results in the removal of water from a water source, movement of water from one part of an aquifer to another, or movement of water from one water source to another water source, then approval and/or license is required.

The *Water Management Act 2000* requires:

- A Water Access Licence (WAL) with adequate water allocation (or shares) within a specified water management area
- A Water Supply Works Approval authorises the holder to construct and use specified water supply work (dewatering pumps, sump pumps etc.)
- A Water Use Approval to use the water for a particular purpose.

The processes and requirements that DCCEEW Water apply to assess aquifer interference of a project under the *Water Management Act 2000* are outlined in the *Aquifer Interference Policy* (AIP) (NSW Office of Water (2012)).

- Where an activity results in the loss of water from the environment, a WAL is required under the *Water Management Act 2000* to account for this water take
- An activity must address minimal impact considerations in relation to the water table, groundwater pressure and groundwater quality
- Where the actual impacts of an activity are greater than predicted, planning measures must be put in place ensuring there is sufficient monitoring.

For the SSTOM Works, which is a Critical State Significant Infrastructure (CSSI) project, the following exemptions are relevant:

- The *Environmental Planning and Assessment Act 1979* (EPA Act 1979) Clause 5.23 Part 1 (g) states that water use approval, water management work approval, or activity approval (other than an aquifer interference approval) under the *Water Management Act 2000* is not required for SSI.
- The *Water Management (General) Regulation 2025* Division 3 Clause 45 and Part 2 Clause 4 of Schedule 4 exempts Sydney Metro, and any person acting on behalf of them, from the requirement for WAL under the Water Management Act 2000 if the transport authority, after considering the environmental impact of the activity, in accordance with section 5.5 of the EP&A Act (as if the transport authority were the determining authority under that section) is satisfied that the activity is not likely to significantly affect the environment.

The project footprint is also subject to the rules of the Sydney Basin Central Groundwater Source which is covered by the Greater Metropolitan Region Groundwater Source Water Sharing Plan.

The water-sharing plan outlines the recommended management approaches of surface and groundwater connectivity, minimisation of interference between neighbouring water supply works, protection of water quality and sensitive environmental areas and limitations to the availability of water.

The Sydney Basin Central Groundwater Source is a porous hard rock aquifer and is considered to be a “less productive” groundwater source as defined in the AIP.

Key considerations for the Sydney Basin Central Groundwater Source with respect to the level 1 minimal harm considerations for a less productive porous rock aquifer and highly productive coastal aquifer (as defined in the AIP) are:

1. Water table impacts:
   - Less than or equal to 10 per cent cumulative variation in the water table allowing for typical climatic 'post-water sharing plan' variations, 40 metres from any high priority groundwater- dependent ecosystem or high priority culturally significant site listed in the Schedule of the water sharing plan.
   - A maximum of two metres cumulative groundwater level decline at any water supply works.
2. Water pressure impacts:
   - A cumulative pressure head decline of not more than two metres at any supply work.

3. Water quality impacts:

- Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.

Developments conducted on waterfront land and along waterways are regulated by the *Water Management Act 2000* in accordance with the *Guidelines for riparian corridors on waterfront land* (DCCEEW- 2024). These guidelines state that waterfront land includes the bed and bank of any waterway and all land within 40 metres of the highest bank of the waterbody.

Controlled activities on waterfront land are administered by DCCEEW (water) and include removal of vegetation, earthworks and construction of temporary detention basins. A controlled activity approval must be obtained from DCCEEW)(water) before commencing the controlled activity, however as noted above, a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000* is not required for SSI projects.

An overview of the relevant legislation and policy and their project implications is provided in Table 6.

TABLE 6 RELEVANT LEGISLATION AND POLICY

Policy	Relevance
Water Management Act 2000 (NSW)	SSI projects are exempt from requiring some water supply works approvals and controlled activity approvals. Transport authorities (including Sydney Metro) are exempt from requirement for water access licence if the transport authority, after considering the environmental impact of the activity, is satisfied that the activity is not likely to significantly affect the environment. Aquifer interference activity approval provisions have not yet commenced but are administered under the Act Water Sharing Plans are administered under this Act.
Water Management (General) Regulation 2025	The regulation addresses groundwater management planning, licensing for taking water, approvals for associated works, and metering requirements for taking groundwater. The Water Management (General) Regulation 2018 Division 2 Clause 21(1) and Clause 3 of Schedule 4 exempts transport authorities from the requirement for water access licence (WAL) under the Water Management Act 2000 if the transport authority, after considering the environmental impact of the activity, in accordance with section 5.5 of the Environmental Planning and Assessment Act 1979 (EP&A Act) (as if the transport authority were the determining authority under that section) is satisfied that the activity is not likely to significantly affect the environment.
Water Act NSW (1912)	Administration of water access licences and trade of water licences and allocations.
NSW Aquifer Interference Policy (2012)	Manages the impacts of aquifer interference activities in accordance with the Water Management Act and Water Sharing Plans. Aquifer interference activities must address minimal impact considerations as outlined in the policy. In the event that actual impacts are greater than predicted there should be sufficient monitoring in place.
Water Sharing Plan, Greater Metropolitan Region Groundwater Sources (2011)	Manages the long-term surface and groundwater resources of a defined area. The plan outlines rules for the sharing and sustainability of water between various uses such as town water supply, stock and domestic, industry and irrigation.

NSW Water Extraction Monitoring Policy (2007)	Sets out monitoring requirements with regards to evaluating aquifer interference.
NSW Groundwater Quality Protection Policy (1998)	Sets out monitoring requirements with regards to degradation of groundwater quality.
NSW Groundwater Quantity Management Policy (2001)	Complements the aquifer interference policy.
NSW Groundwater Dependent Ecosystem Policy (2002)	Sets out guidelines to evaluate potential impacts on groundwater dependent ecosystems.
Australian Groundwater Modelling Guidelines (2012)	Sets out guidelines for developing models appropriate to evaluate potential impacts.

1.7 Related documents

The primary documents supporting this plan include:

- M2A Joint Venture (WSP and AECOM) (2020). Sydney Metro Western Sydney Airport – EIS Chapter 14: Flooding, hydrology and water quality
- M2A Joint Venture (WSP and AECOM) (2020). Sydney Metro Western Sydney Airport – EIS Chapter 15: Groundwater and geology
- M2A Joint Venture (WSP and AECOM) (2020). Sydney Metro Western Sydney Airport – EIS Technical Paper 6: Flooding, hydrology and water quality
- ARUP (2020). Sydney Metro Western Sydney Airport – EIS Technical Paper 7: Groundwater. Ref. SMGW-ARP-AEC-GE-REP-002447. October 2020
- Golder and Douglas Partners (2021). Sydney Metro Western Sydney Airport – Groundwater Monitoring Report – Phase 1 – 4 Locations Ref. 19122621-018-R-GWMR12 Rev 0. 24 March 2021 (SBT Document)
- Cardno (2021). Sydney Metro Western Sydney Airport – Groundwater Monitoring Report Ref. 8002188-CDO-GWMR5-RPT003 – Rev A 8 September 2021 (SBT Document)
- Western Sydney Airport Station Boxes and Tunnelling works – Hydrogeological interpretative Report, (Document reference: SMWSASBT-CPG-SWD-SW000-GE-RPT-040403)
- Western Sydney Airport Station Boxes and Tunnelling works – Geological interpretative Report, (Document reference: SMWSASBT-CPG-SWD-SW000-GE-RPT-040302).
- Tetra Tech Major Projects (2022) Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works Aerotropolis Detailed Site Investigation Ref: SMWSASBT-CPG-SWD-SW000-GE-RPT-040515_RevA06
- Tetra Tech Major Projects (2022) Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works Bringelly Services Facility Detailed Site Investigation Ref: SMWSASBT-CPGSWD-SW000-GE-RPT-040512_C.01
- Tetra Tech Major Projects (2022) Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works Orchard Hills Station Detailed Site Investigation Ref: SMWSASBT-CPG-SWDSW000-GE-RPT-040514_RevA05
- Tetra Tech Major Projects (2022) Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works St Marys Station Detailed Site Investigation Ref: SMWSASBT-CPG-SWDSW000-GE-RPT-040513_A03

- Tetra Tech Major Projects (2023) Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works Hydrogeological Report (Project-wide) Ref: SMWSASBT-CPG-SWD-SW000-GE-RPT-040403
- Tetra Tech Major Projects (2023) Sydney Metro Western Sydney Airport Station Boxes and Tunnelling Works Project-wide Groundwater Modelling Report Ref: SMWSASBT-CPG-SWDSW000-GE-RPT-040402
- Tetra Tech Major Projects (2023) Former Dry Cleaner, 1-7 Queen St – Assessment of Human Health Risk and Mitigation Options report (Ref: SMWSASBT-CPG-SWD-SW000-GE-RPT-040540)
- Tetra Tech Major Projects (2023) St Marys Station – Implementation of Permeable Reactive Barrier Ref: SMWSASBT-CPG-SWD-SW000-GE-RPT-040561
- Tetra Tech Major Projects (2023) Baseline Groundwater Report (Project-wide) Ref: SMWSASBTCPG-SWD-SW000-GE-RPT-040405.
- ADE Consulting Group (2025) Biannual Groundwater Monitoring Report – December 2023 to August 2024 SMWSASSM-PLD-SWD-SW000-WA-RPT-000003
- ADE Consulting Group (2025a) Biannual Groundwater Monitoring Report – September to November 2024 SMWSASSM-PLD-SWD-SW000-WA-RPT-000004
- ADE Consulting Group (September 2025) Groundwater Monitoring Report – December 2024 to July 2025 SMWSASSM-PLD-SWD-SW000-WA-RPT-000006

1.8 Limitations

In addition to data obtained by CPBG during detailed site investigations (DSI) and the assessment of baseline groundwater conditions, this monitoring program relies on information obtained directly from Sydney Metro, supplied digital databases and the EIS, which includes but is not limited to: groundwater level/pressure, water quality and aquifer parameter data, survey data, laboratory analytical data and engineering borehole logs.

Testing has been carried out across the alignment, however, data gaps and uncertainty regarding site-specific conditions remain. Where site-specific information is not available, reported ranges for the area have been made based upon published information, local experience and correlations.

The following key groundwater related data gaps and limitations are noted:

- The influence of structural geology (i.e. faults, folds and dykes) on groundwater flow behaviour and the mobilisation of existing groundwater contamination.
- The influence of permanent water bodies, open drains and similar on groundwater flow behaviour and interaction with groundwater dependant ecosystems (GDEs).
- Geology and groundwater elevation is characterised along the alignment, however, less information exists off-alignment and extrapolation of ground conditions beyond the alignment for the assessment of groundwater levels and drawdown is required which creates uncertainty in the assessments and predictions.
- Changes to groundwater conditions are expected to have occurred as a result of filling on the airport site. Groundwater monitoring data post filling is extremely limited. This affects the reliability of the assessment of groundwater levels.
- Unidentified sources of existing groundwater contamination may be present.
- Limited long-term groundwater level data is available to characterise historical groundwater conditions including temporal variability. This introduces uncertainty around the nomination of representative stable groundwater levels which are used to derive aquifer boundary conditions for numerical modelling as well as design groundwater levels.

- Due to limitations in the testing and water level monitoring records, there is uncertainty in the outcomes of the assessment. This uncertainty extends to the assessment of inflow rates to excavations and the extent and magnitude of drawdown associated with the construction of the Project.

Monitoring results during construction will need to be compared with predictions to provide early warning of deviation from anticipated responses. Ongoing comparison against observed conditions and refinement of operation of any mitigation systems (if required) may be needed throughout the construction phase to address the uncertainties in aquifer behaviour and response to construction activities. The trigger action levels established by the SBT Groundwater Monitoring Program and described here in Section 6 will continue to be used to monitor groundwater behaviour.

2 Existing Environment

2.1 Geology

This section provides an overview of the key geological units across the Project based on the available data. For further detail, refer to the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4).

The geological map for Penrith indicates that the Project alignment is located within the Cumberland Basin and Penrith Basin which forms part of the Permian-Triassic Sydney Basin. The Sydney Basin is a structural trough which is the southern continuation of a much longer structural trough including the Sydney, Gunnedah, and Bowen Basins.

The region is dominated by the mid-Triassic Wianamatta Group of sedimentary rocks while the underlying Hawkesbury Sandstone (also of mid-Triassic age) dominates the Blue Mountains to the west. The late Permian-Early to Middle Triassic Narrabeen Group which lies below the Hawkesbury Sandstone can be observed in the gorges of the Blue Mountains. The underlying Permian Illawarra Coal Measures are exposed along the western margin of the Sydney Basin.

Geological long sections for the Project alignment are presented in Appendix B of the GIR. Anticipated geological units are described in more detail below, and in

The three geological units relevant to hydrogeology and groundwater monitoring and management along the alignment are described in Section 2.1.1 to Section 2.1.3 below.

2.1.1 Alluvial deposits

Quaternary alluvial deposits are mapped where the Project alignment crosses local waterways such as the lower-lying area of South Creek and its tributaries. The areas of Quaternary Alluvium typically comprise laterally discontinuous layered sequences of silts, clays, and sandy clays with trace carbonaceous inclusions. Localised sandy/gravelly deposits can be found within the alluvial floodplains and in proximity to the existing watercourses and may represent major historical flood events, or creek paleochannels.

2.1.2 Weathered bedrock

Weathered bedrock is characterised by residual soil, extremely weathered rock, and highly weathered rock. Residual soil comprising silty clay produced by surface weathering of the underlying bedrock is expected along the alignment with varying thickness but is generally thicker at the north end of the project. Extremely weathered rock is characterised by very stiff to hard, silty clay, sandy clay, clayey sand. Highly weathered rock however is characterised by frequent fractures and iron-staining which can extend for several metres above the more competent rock. It is frequently friable and generally very low to low strength.

2.1.3 Bedrock

The Bringelly Shale Formation forms the underlying bedrock for the Project alignment and is believed to be about 150m thick below the Project area. It is largely comprised of claystone, siltstone, and laminate, with localised layers of higher strength sandstone. These sandstone beds typically range in thickness from about 0.5 m to 7 m, and often cap the higher hills. Further detail on the geology of the Bringelly Shale Formation is provided in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4).

2.2 Hydrogeology

2.2.1 Aquifers

The aquifers present across the Project alignment can be broadly characterised as either the bedrock aquifer of the Wianamatta Group fracture bedrock and Hawkesbury Sandstone formation (bedrock aquifer) or Quaternary alluvium deposit aquifers along drainage lines of tributaries associated with South Creek. Localised perching of groundwater on the extremely weathered bedrock (which due to its clayey nature is likely to be very low permeability) can also be expected.

2.2.1.1 Fill

Fill in the form of a mixture of sand, gravel and clay is present in places across the project where bulk excavation and tunnelling will occur. Fill is typically thin (less than 2 m thick) and is almost invariably above the groundwater table. Fill may be saturated in places where infiltrated water is perched on the underlying residual clay soil.

2.2.1.2 Quaternary alluvial aquifer

The Quaternary alluvial aquifer overlies bedrock along the main drainage channels and creek lines including South Creek and its tributaries. Quaternary alluvial deposits typically comprise a mixture of gravels, sands, silts and clays. The alluvial deposits within the channels associated with watercourses typically act as zones of discharge of groundwater from the underlying residual soil and rock. Therefore, while the shallow aquifer can be relatively fresh, during droughts the discharge of groundwater from the bedrock aquifer can resulting an increase in salinity in the shallow aquifer and streams such as South Creek (McNally 2009).

2.2.1.3 Residual soil

Residual soil derived from the in-situ weathering of Bringelly Shale units typically comprise clay and have low hydraulic conductivity. Outside the alluvial channels, the residual soil has shallow topsoil or fill cover.

Recharge to the aquifer is from rainfall and flow along the soil horizon interface, and therefore closer to perched water than true groundwater (McNally 2009). Rainfall is expected to percolate through the residual soil, potentially leaching salt stored in the residual soils into local waterways, rather than recharging to the underlying Bringelly Shale.

2.2.1.4 Bedrock aquifers

The bedrock units of the Wianamatta Group (Bringelly Shale, Minchinbury Sandstone and Ashfield Shale) and underlying Mittagong Formation and Hawkesbury Sandstone form heterogeneous fractured rock aquifers where groundwater flows occur within defects within the rock mass. The bedrock aquifers in the Wianamatta Group are typically semi-confined to confined in low lying areas where the residual soils are rich in clay and can act as a confining layer.

The origin of the saline water in the shales and residual soils is thought to be due to windblown aerosols, rather than historically trapped sea water. The salt accumulates by evapotranspiration, and infiltrates into the residual soils, and the underlying shales of the bedrock aquifer (McNally 2009).

Bringelly Shale is the upper rock unit beneath the tunnel alignment. It comprises shale with sandstone bands. Defects including faults, dykes and shear zones are present. Permeability of the intact shale is low with flow occurring through defects associated with bedding, joints, shear zones and fractures. On exposure, the shale swells, and its exposed surface deteriorates with time. The permeability of the sandstone beds may be significantly greater than the intact shale.

As a result of the interbeds of sandstone within the shale, vertical permeability of the rock mass is expected to typically be lower than the horizontal permeability.

2.2.2 Groundwater recharge and discharge

Recharge to the alluvial deposit aquifer is primarily via rainfall recharge. Some recharge from watercourses may occur during periods of high flow and from small farm dams within the area. The watercourses are however expected to act predominantly as the line of groundwater discharge.

Groundwater levels are expected to mound between watercourses with vertical infiltration downward through the residual clay cover and lateral migration from the elevated areas towards the watercourses via the Bringelly Shale.

Due to the low permeability of the residual soil cover, groundwater recharge to the underlying shale aquifers is expected to be low perhaps between 1 and 2 % of the average annual rainfall.

An increase in development around the area is likely to reduce the direct recharge from rainfall.

2.3 Groundwater levels and flow

Groundwater flow is interpreted to be controlled by rainfall infiltration and discharge along the watercourses. As a result, the groundwater flow direction is expected to generally follow topography towards the main drainage channels in a northerly and easterly direction towards Cosgroves Creek, a southerly and easterly direction towards Badgerys Creek and South Creek and westwards towards Duncans Creek. Groundwater levels are typically within 5 m of the ground surface though groundwater is deeper than 5 m depth in the higher ground away from the watercourses.

Groundwater level contours have been interpreted based on measured levels, watercourses and topographic contours (Figure 2-1 to Figure 2-5). Groundwater flow is complex, and the interpretation is considered to provide a general indication of the broad pattern of existing groundwater flow. Local-scale influences may not be captured.

Downward head gradients are interpreted to be present away from the watercourses linked to infiltration of rainfall through the residual soil to the deeper rock aquifer. Upward gradient may be present at the water courses where the potentiometric pressures in the deep bedrock are above the base of the creek/ watercourse level. This has been reported near the west bank of Claremont Creek (refer Section 13.4.1 of the HIR) and is noted to cause of periodic increases in salinity in South Creek due to the discharge of saline water from the Bringelly shale aquifer (McNally 2009).

More detailed discussion on groundwater level and flow direction is provided in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4).

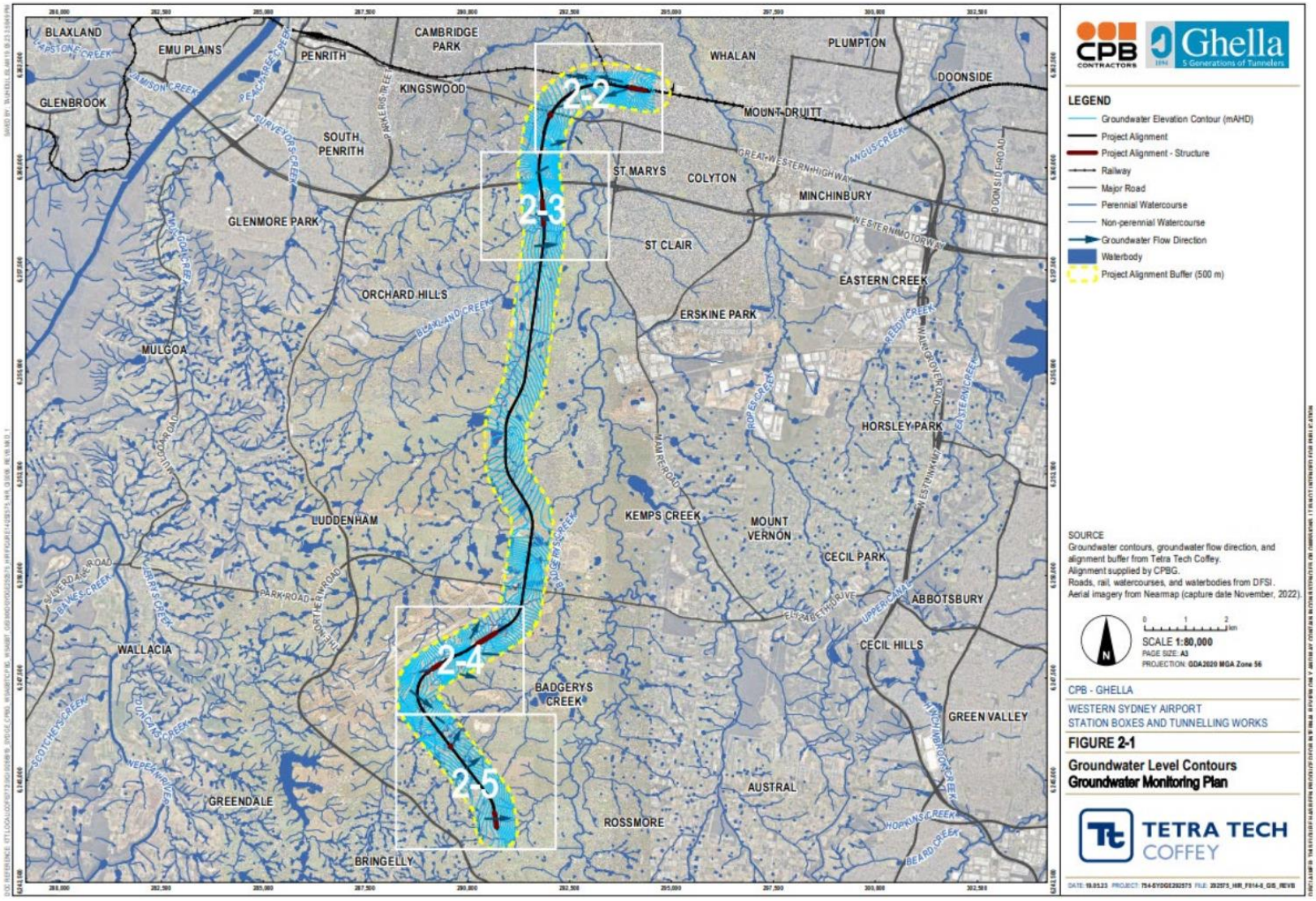

FIGURE 2-1 GROUNDWATER LEVEL CONTOURS AND FLOW DIRECTION – ALIGNMENT OVERVIEW

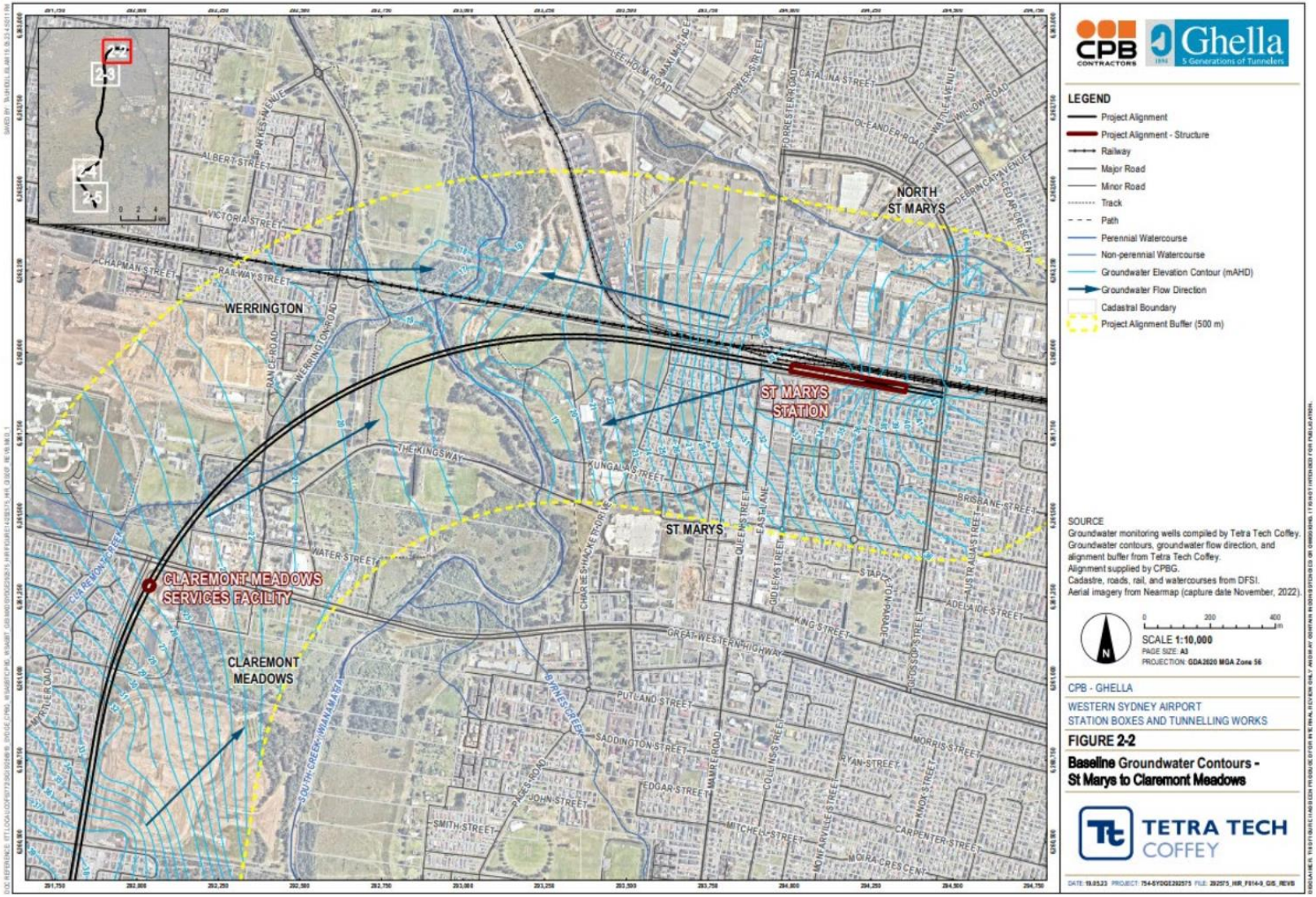

FIGURE 2-2 GROUNDWATER LEVEL CONTOURS AND FLOW DIRECTION – ST MARYS STATION AND CLAREMONT MEADOWS

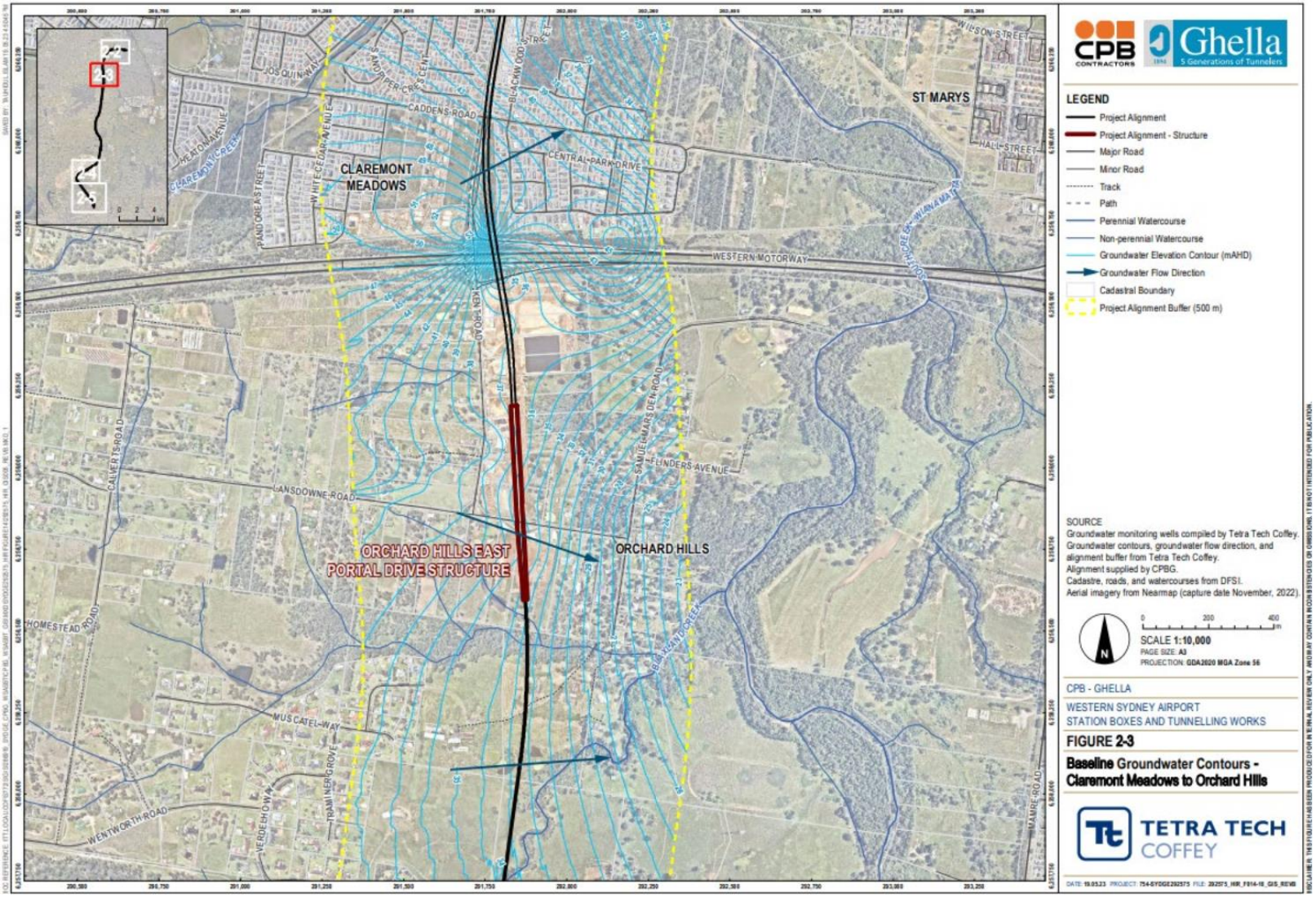

FIGURE 2-3 GROUNDWATER LEVEL CONTOURS AND FLOW DIRECTION – CLAREMONT MEADOWS AND ORCHARD HILLS STATION

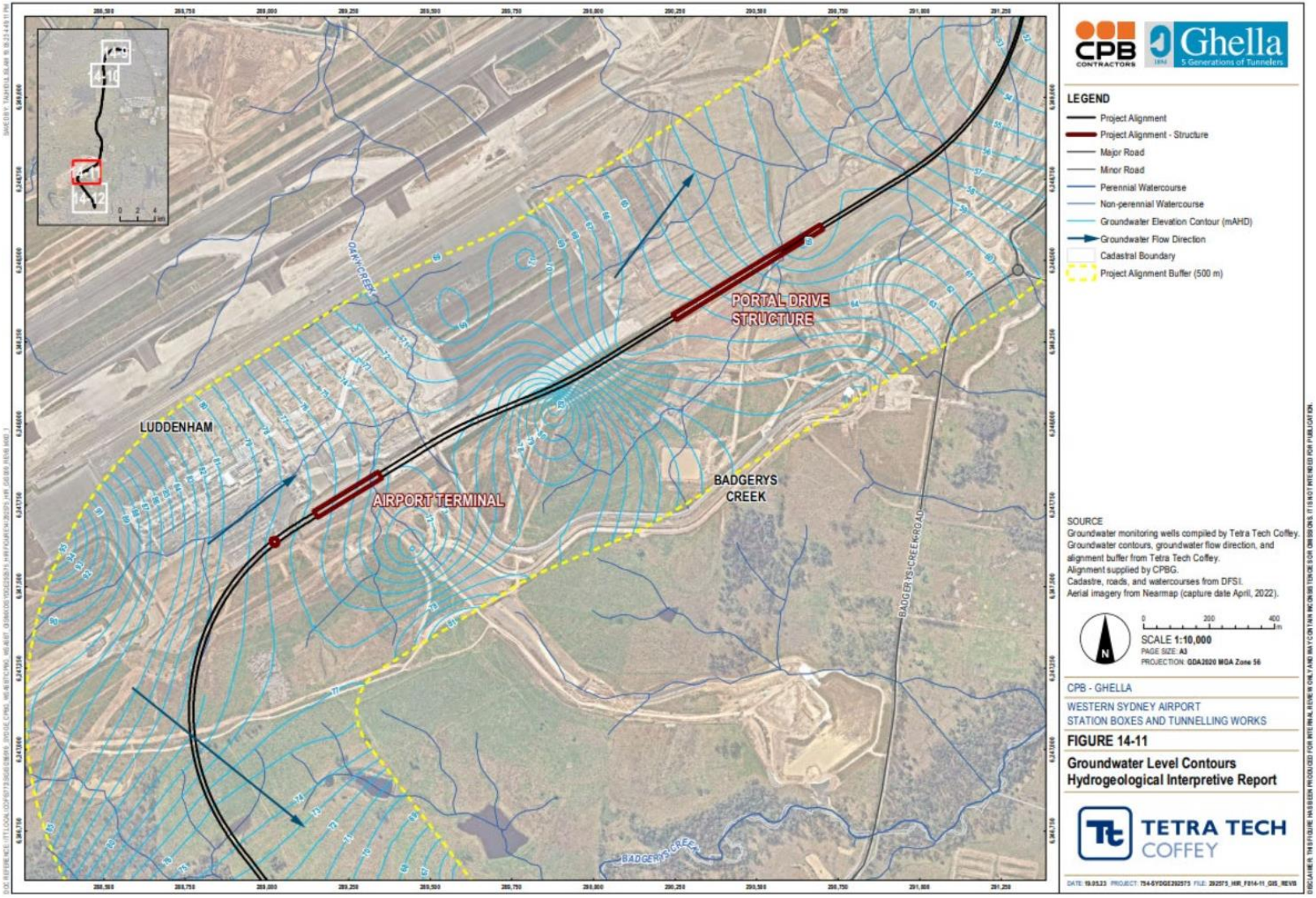

FIGURE 2-4 GROUNDWATER LEVEL CONTOURS AND FLOW DIRECTION – AIRPORT TERMINAL AND PORTAL DIVE STRUCTURE

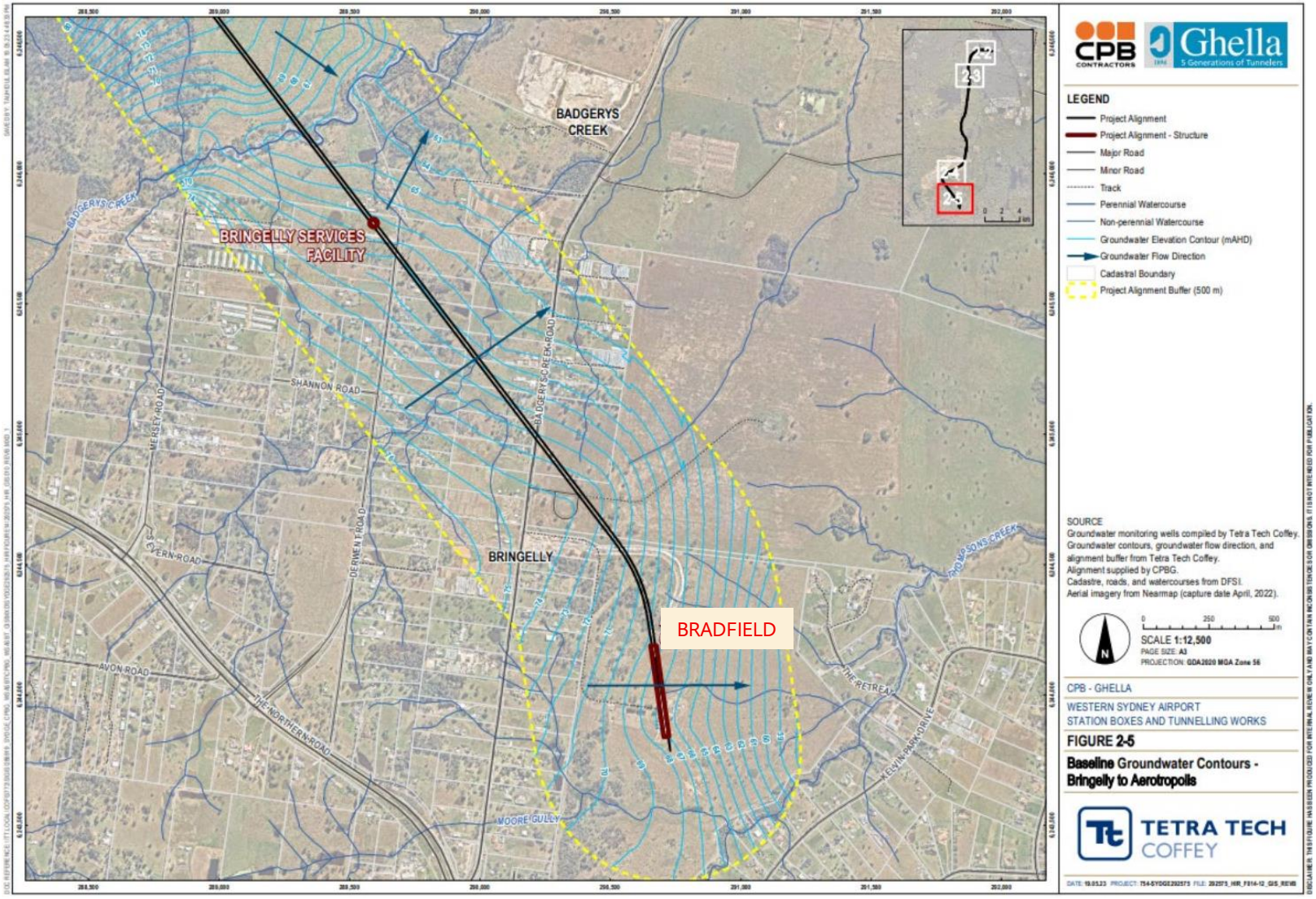

FIGURE 2-5 GROUNDWATER LEVEL CONTOURS AND FLOW DIRECTION – BRINGELLY SERVICE FACILITY AND BRADFIELD / AEROTROPOLIS CORE

2.4 Groundwater quality

A general summary of groundwater quality is provided in Table 7, with the summary statistics provided separately for the alluvial, residual and bedrock aquifers. For further information refer to the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4). Further discussion is provided below.

The general characteristics of groundwater across the Works area are:

- Groundwater along the alignment ranges from fresh to saline, generally exceeding 10,000µS/cm. The groundwater EC is typically higher in wells screened in the bedrock and residual soils. The lowest salinity (<1,000uS/cm) were reported near South Creek and Claremont Creek between St Marys and Claremont Meadows, indicating that fresh surface water bodies discharge to shallow groundwater in some areas.
- Groundwater along the alignment is generally neutral to acidic, ranging from 3.87 to 11.74 pH units (average pH of 6.54). Generally, pH readings were below 8 pH units. Low pH groundwater (pH <6) along the alignment is commonly associated with elevated metals in the groundwater. Strongly alkaline groundwater (pH>10) has consistently been reported in one location (SMGW-BH-A122) at tunnel depth to the south of Claremont Meadows and the Gipps St Landfill, and in SBT-GW-1806 to the west of Orchard Hills Station.
- Sulfate concentrations in groundwater along the alignment groundwater varied widely. Concentrations do not always correlate with groundwater EC, which is attributed to the presence of organic compounds, including hydrocarbon contamination at several locations along the alignment. The lowest relative sulfate concentrations were reported in groundwater bores at the northern end of the alignment at St Marys, Claremont Meadows, Orchard Hills and to a lesser extent at WSI.
- Groundwater is typically of sodium-chloride water type. An increased sulfate and bicarbonate to chloride ratio is present at some locations in St Marys, along the northern tunnel alignment to the Claremont Meadows Service Facility, and at Bringelly, which is attributed to the hydrocarbon or other organic impact in groundwater in these areas.

TABLE 7 GENERAL GROUNDWATER QUALITY SUMMARY

Parameter	Units	Alluvial	Residual	Bedrock	Alluvial	Residual	Bedrock	Alluvial	Residual	Bedrock	Alluvial	Residual	Bedrock
		No of Samples			Minimum			Maximum			Average		
TDS	mg/L	43	106	128	468	638	283	26,700	29,500	44,000	10,680	12,422	14,107
EC (Lab)	µS/cm	46	133	144	826	876	390	37,000	35,600	37,200	15,515	18,360	19,173
pH (Field)	pH	156	134	149	4.32	3.87	3.62	8.38	8.26	11.74	6.49	5.89	7.01
pH (Lab)	pH	46	134	143	4.20	3.65	3.83	9.31	8.51	12.20	6.82	6.62	7.61
Redox Potential (Field)	mV	95	133	114	-271.7	-392.7	-337.1	301.2	297.4	193.4	-22.5	36.0	-47.4
Chloride[1]	mg/L	81	165	172	3	<1	2	454	510	1,290	160	127	299
Calcium	mg/L	84	167	178	86	65	64	13,700	12,600	19,000	5,704	6,487	6,648
Sulfate (SO^4)	mg/L	84	167	178	12	<0.273	3	3,110	2,200	2,200	620	650	597
Alkalinity (Total)	mg/L	83	165	175	1	<1	<1	1,400	5,100	11,000	466	370	730
Biocarbonate Alkalinity ($CaCO^3$)	mg/L	83	165	175	1	<1	<1	1,400	5,100	11,000	464	369	712

1. The summary includes total sulfate and total chloride concentrations as filtered concentrations were similar when analysed for in the same samples.

Several suspected or known contamination source areas have been identified on or adjacent to the Works alignment within the areas where groundwater drawdown during construction is predicted to be >1 metre. Sites that were identified as having the potential to result in contamination of groundwater, or where there was no baseline data, and informed the DSIs and baseline groundwater assessment.

Key sites include:

- Former Dry Cleaner – 1-7 Queen St, St Marys
- Harris Street construction laydown area, St Marys
- Industrial area Queen and Phillip Streets, St Marys
- St Marys Plaza
- Current and suspected historical Service Stations to the west of Claremont Meadows Facility
- Gipps Street Landfill
- 34-38 Lansdowne Road, Orchard Hills
- 106-112 Kent Road, Orchard Hills
- 94-98 Kent Road, Orchard Hills
- Former OTC site, Bradfield Station.

Further discussion on potential sources of groundwater contamination is provided in Section 3.2.2. The data gaps identified were addressed through DSI and the baseline groundwater monitoring report, as prepared by CPBG, to provide an assessment of existing groundwater conditions. For further information refer to the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4).

2.5 Groundwater users

A search of the Bureau of Meteorology's Groundwater Explorer database (BOM, 2021) identified 42 registered groundwater bores within 1 km of the project. Of the 42 registered bores within 1 km project alignment, only two are registered with an extractive use (Table 8). All other registered wells are registered for groundwater monitoring purposes and are not considered further.

The two extractive use wells are registered for industrial use and are reported to be over 200 m deep. These wells are expected to access groundwater from the bedrock aquifer which is consistent with the understanding that shallow groundwater typically has a higher salinity that would not be desirable for most extractive uses. Details of the two extractive use wells are summarised in Table 8, with the locations shown on Figure 2-6.

TABLE 8 REGISTERED GROUNDWATER WELLS WITH EXTRACTIVE USE

Bore ID	Easting	Northing	Drilled Date	Depth	Distance to alignment	Registered Use
GW105382	291651	6255672	19/04/2004	252 m	120 m east	Commercial Industrial
GW105054	291424	6256068	2/10/2002	210 m	152 m west	Commercial Industrial

In addition to registered groundwater users, consideration has also been given to constructed farm dams in areas where groundwater levels approach the ground surface. It is possible that in these areas farm dams may be partly supported by shallow groundwater and construction induced drawdown beneath these dams could potentially result in reduced dam water levels. These conditions may particularly exist around Orchard Hills East portal drive structure and the Bringelly services facility. Groundwater bores installed for construction monitoring of groundwater levels in the vicinity of these features are discussed in Section 6.

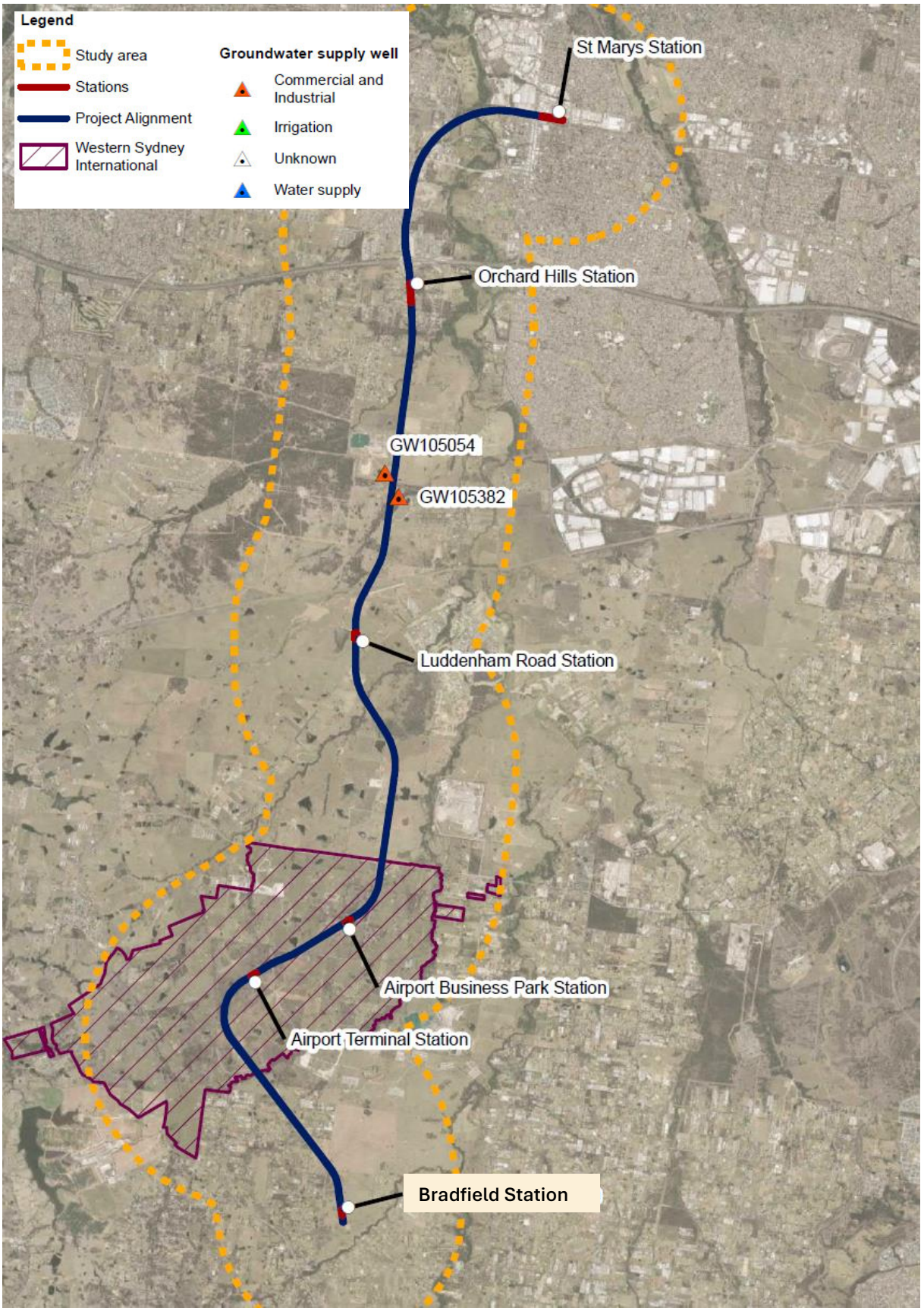

FIGURE 2-6 REGISTERED GROUNDWATER WELLS WITH EXTRACTIVE USE

2.6 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are receptors that rely wholly or partially on groundwater to provide all or some of their water needs. GDEs relevant to the works can broadly be categorised as:

- Terrestrial GDEs: Ecosystems reliant on the subsurface presence of groundwater (i.e. vegetation that is accessing the water table and/or capillary fringe)
- Aquatic GDEs: Ecosystems reliant on the surface expression of groundwater (i.e. wetlands and baseflow fed watercourses).

Terrestrial GDEs are ecosystems with vegetation that rely on the availability of shallow groundwater, which is within reach of the root zone. Mature, large trees are likely to have the deepest root systems and are the most likely vegetation type in a given ecosystem to access groundwater. Two classifications of terrestrial GDEs are recognised:

- Obligate groundwater dependency – where vegetation (or some vegetation in a wider ecosystem) sources most, or all of its water requirements from groundwater or the capillary fringe.
- Facultative groundwater dependency – where groundwater may be used periodically either only when it is available, or only when it is required.

Subterranean GDEs have not been mapped in the vicinity of the off-airport works area and as such are not considered further. There are also no Ramsar or nationally important wetlands within the study area.

A desktop search of groundwater dependent ecosystems within a 1 km buffer of the potential groundwater impact areas identified several aquatic and terrestrial ecosystems listed as having moderate or high potential for groundwater dependence (BoM, 2021). Data sources and the assessment process used to identify potential GDEs are detailed in the HIR (SMWSASBT-CPG-SWD-SW000-GE-RPT-040403).

A detailed description of the suspected aquatic and terrestrial GDEs in the vicinity of the Project provided below.

2.6.1 Terrestrial GDE's

There are a large number of native vegetation stands mapped by the GDE atlas (BoM, 2021) as having a moderate and high likelihood of groundwater dependence. The main areas of intact vegetation communities that are indicated to likely be groundwater dependent were identified as areas of:

- Cumberland River Flat Forest
- Cumberland Shale Plains Woodland
- Swamp Oak Floodplain Forest
- River Flat Forest
- Shale Gravel Transition Forest
- Cumberland Shale Plains Woodland.

Vegetation surveys of these and other mapped areas have not been reviewed and further commentary around the intactness and value of these vegetation stands has not yet been considered. They are assumed to be healthy, mature native vegetation of high ecological value.

Cumberland Shale Plain Woodland is the most widely distributed form of Cumberland Plain Woodland in the project area. Published descriptions of this ecosystem notes that Bursaria spinosa is the dominant shrub species and there are canopy trees such as grey box (*E. moluccana*), forest red gum (*E. tereticornis*), spotted gum (*Corymbia maculata*) and thin leaved stringybark (*E. eugenioides*) (NSW National Parks and Wildlife Service, 2004).

These mature trees are likely to have root zones that could extend several metres to the capillary fringe and would mostly be considered facultative GDEs, particularly outside of riparian corridors.

The Cumberland Plain Woodland vegetation class, which includes the Cumberland Shale Plain Woodland, is listed as an endangered ecological community under the Threatened Species Conservation Act 1995 (NSW) (TSC Act) and the Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth) (EPBC Act).

Stands of Cumberland River Flat Forest present in the riparian zone along South Creek to the east and southeast of Orchard Hills station also have a high conservation value. It is listed as endangered under the TSC Act and critically endangered under the EPBC Act.

The river flat forest is commonly comprised of *Eucalyptus tereticornis* (forest red gum), *E. amplifolia* (cabbage gum), *Angophora floribunda* (rough-barked apple) and *A. subvelutina* (broadleaved apple). Groundwater is expected to be shallow in the riparian zone, would be maintained by recharge from South Creek during dry periods, and would likely provide year-round water to this groundwater dependent ecosystem.

This terrestrial GDE assessment has focussed on moderate and high likelihood terrestrial GDEs where they exist within close proximity to structures that will require dewatering during construction. These areas are discussed in the following sections.

2.6.1.1 St Marys Station

There are no mapped or suspected terrestrial GDEs within 1 km of the St Marys station. The closest area of mapped terrestrial GDE is approximately 1.3 km to the northeast at Boronia Park (see Figure 2-7).

2.6.1.2 Claremont Meadows facility

A high likelihood terrestrial GDE is located approximately 80 m east and southeast of the proposed Claremont Meadows facility. Local groundwater level monitoring at SMGW-BJ-A304 and SMGWBH-A109S confirm groundwater is in the order of 2.0 to 2.5 m below ground level (mbgl) and would be expected to support mature native vegetation for some of their water needs.

Vegetation to the north of the facility along the ephemeral Claremont Creek riparian zone is not mapped as a terrestrial GDE, however it is likely to rely on the subsurface presence of groundwater in the alluvial sediments mapped along the creek line. This vegetation may be considered obligate, but further investigation would be required to confirm this assumption.

2.6.1.3 Orchards Hill Station

Most stands of mature native vegetation in the vicinity of the Orchards Hill Station are considered high likelihood GDEs (see Figure 2-8). The native vegetation in the area immediately surrounding the proposed station is predominantly Cumberland Shale Plains Woodland. Groundwater levels measured along the project alignment confirm a relatively shallow water table ranging between 3 to 5 m below ground level. Larger trees (particularly forest red gum, spotted gum and cabbage gum) would have a root zone that could extend to the capillary fringe and would likely be considered facultative GDEs.

Areas of Cumberland River Flat Forest also exist south of Lansdowne Road and east along South Creek. Groundwater is expected to be shallow in the riparian zone, would be maintained by interaction with South Creek during dry periods, and would likely provide year-round water to this groundwater dependent ecosystem. Some or all of the vegetation in the riparian zone could be considered obligate, but further investigation would be required to confirm this assumption.

2.6.1.4 Bringelly services facility

The Bringelly Services facility is located within approximately 30 m of a 1.3 ha stand of Cumberland Shale Plains Woodland that is mapped as a high likelihood GDE. This small stand of large trees appears in aerial

photographs to be located on private property and may be highly altered from its natural condition. Ecological surveys of this vegetation may be warranted where there is potential impact.

Groundwater level monitoring at SMGW-BH-D103 indicates that the depth to groundwater is approximately 7.5 mbgl in the area. While this groundwater level is potentially approaching the maximum root depth of some large native trees (such as red gum) the degree of facultative groundwater dependence requires further site investigation to confirm.

Cumberland Shale Plains Woodland is also present 300 m north towards Badgerys Creek where this vegetation class may also be present as riparian vegetation along the creek line (see Figure 2-10). Groundwater levels are likely to be shallower towards Badgerys Creek (likely <5mbgl) and likelihood of groundwater dependence is expected to be high. Vegetation may be both facultative and obligate in this area.

2.6.1.5 Bradfield

Cumberland River Flat Forest follows the riparian zone of Thompsons Creek and its minor tributaries and is listed as a high potential terrestrial GDE (see **Error! Reference source not found.**). Other isolated stands of Cumberland River Flat Forest exist to the southwest and northwest of the station which are mapped with moderate potential for groundwater dependence. The condition of this vegetation is unknown and is mapped across private land which is likely to be highly altered from its natural condition.

2.6.2 Aquatic GDEs

The Project is located within the South Creek catchment, which forms part of the wider Hawkesbury catchment. There are no high priority aquatic GDEs listed in the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources (2011) within 1 km of the SBT Works.

Several creeks, including South Creek, exist within 1 km of the project area and may be groundwater dependent. This desktop GDE assessment has included reviewing the GDE Atlas (BoM, 2019), the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources, and relevant Technical Papers attached to the EES to provide an assessment of their potential dependence on groundwater.

Surface water features with suspected groundwater dependence are discussed in the following sections.

2.6.2.1 South Creek

South Creek flows in a northerly direction typically at more than a kilometre to the east of the project alignment, except towards the north where the alignment approaches and crosses the creek.

The full length of South Creek is mapped as a high likelihood GDE from national assessments, meaning that the surface water flow in South Creek is likely to rely on baseflow discharge from groundwater to some extent. South Creek is likely to be in direct hydraulic connection with the alluvial sediments which overlies the Bringelly shale aquifer. Groundwater from the Bringelly shale aquifer is expected to discharge upwards to the alluvial aquifer which in turn, contributes baseflow to South Creek.

South Creek was noted to be highly altered from its natural state due to the surrounding rural, agricultural and urban land uses. Despite this, it is listed as a 'Type 1 – Highly sensitive key fish habitat' by the NSW Department of Primary Industries (2013). The EES indicated the potential for Australian Grayling, Macquarie Perch, and Murray Cod to be present at the site, which are listed as threatened species by EPBC Act. The macroinvertebrate communities present in South Creek were noted to have a high tolerance to severe pollution levels but included two threatened invertebrate species listed by the Fisheries Management Act (1994); Adam's Emerald Dragonfly and the Sydney Hawk Dragonfly.

2.6.2.2 Badgerys Creek

Badgerys Creek runs along the southern boundary of the Western Sydney International development site and discharges to South Creek. The reference design includes tunnelling beneath Badgerys Creek to the south of the airport site.

While Badgerys Creek is not listed as a potential aquatic GDE by the GDE atlas, the available groundwater level data indicates that it is likely to have variable groundwater interaction along its length, with some sections receiving groundwater discharge and others recharging groundwater (ARUP Technical Paper 7, 2020).

The stream as a whole is likely to have some reliance on groundwater, particularly where permanent pools of water are observed on aerial imagery. The total volume contributed by groundwater is likely to be a small proportion of the total passing flow. This is consistent with the measured salinity in surface water being an order of magnitude lower than the local groundwater quality.

Badgerys Creek is listed as a moderately sensitive key fish habitat by NSW DPI and provides some level of fish passage. The unnamed tributaries of Badgerys Creek have lower levels of ecosystem sensitivity (unlikely fish habitat).

2.6.2.3 Thompson Creek

Thompson Creek passes the Bradfield approximately 320 m to the southeast. Thompsons Creek is not mapped as potentially groundwater dependent and is understood to only flow intermittently. This is largely supported by the review of aerial photography which suggests a predominantly dry creek bed. Thompson Creek is not considered to contain an aquatic GDE.

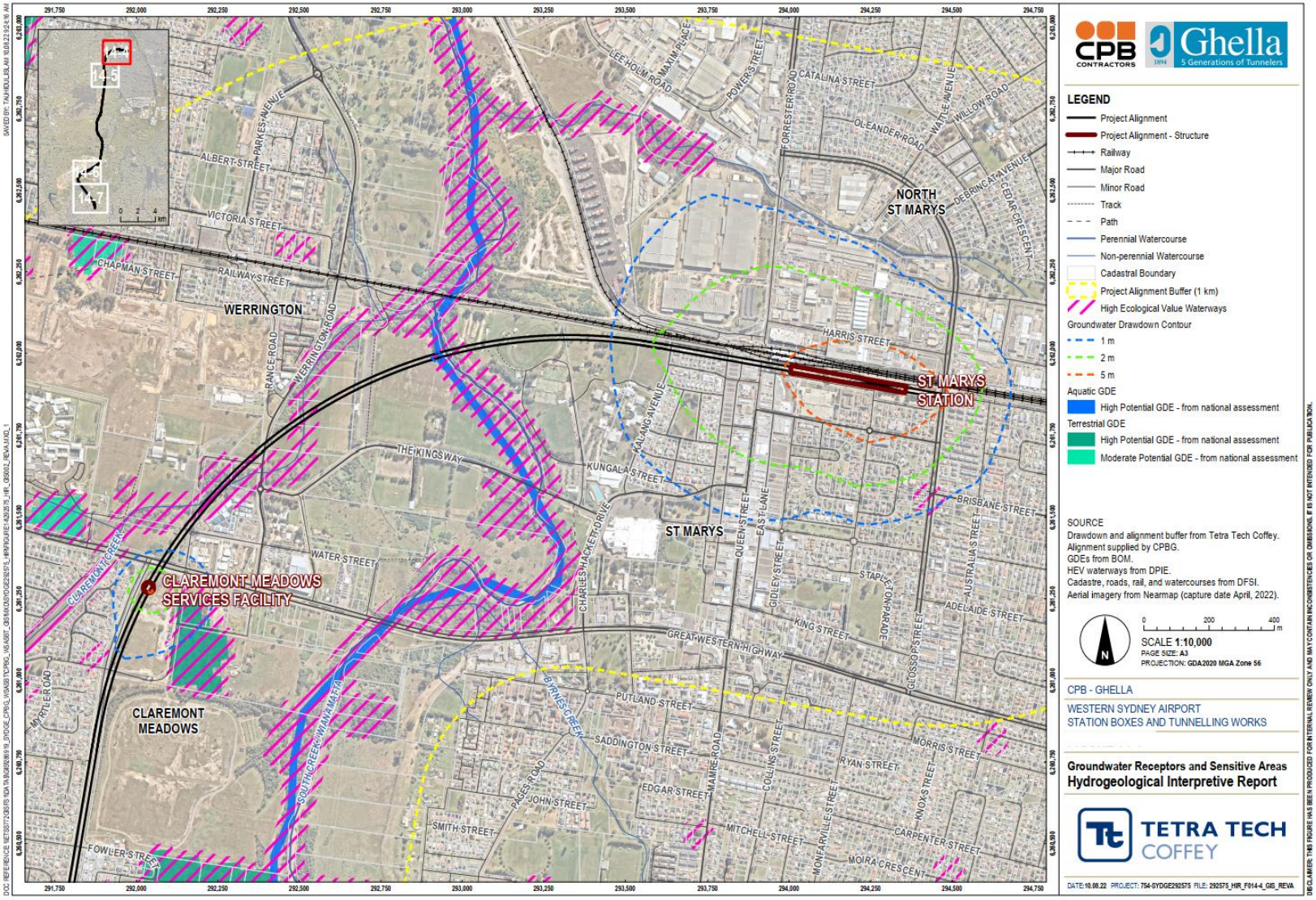

FIGURE 2-7 GROUNDWATER RECEPTORS AND SENSITIVE AREAS ST MARYS AND CLAREMONT MEADOWS

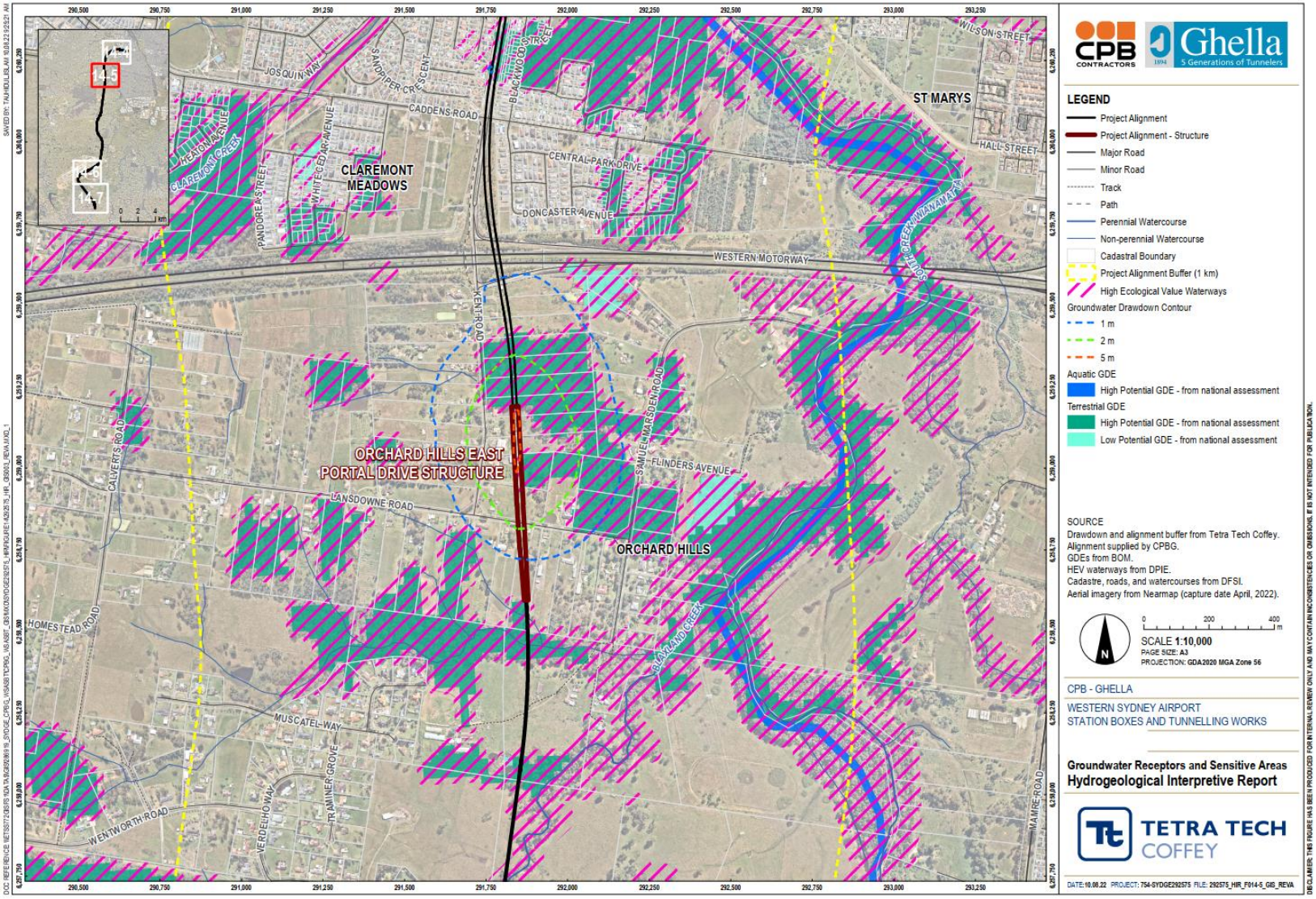

FIGURE 2-8 GROUNDWATER RECEPTORS AND SENSITIVE AREAS ORCHARD HILLS

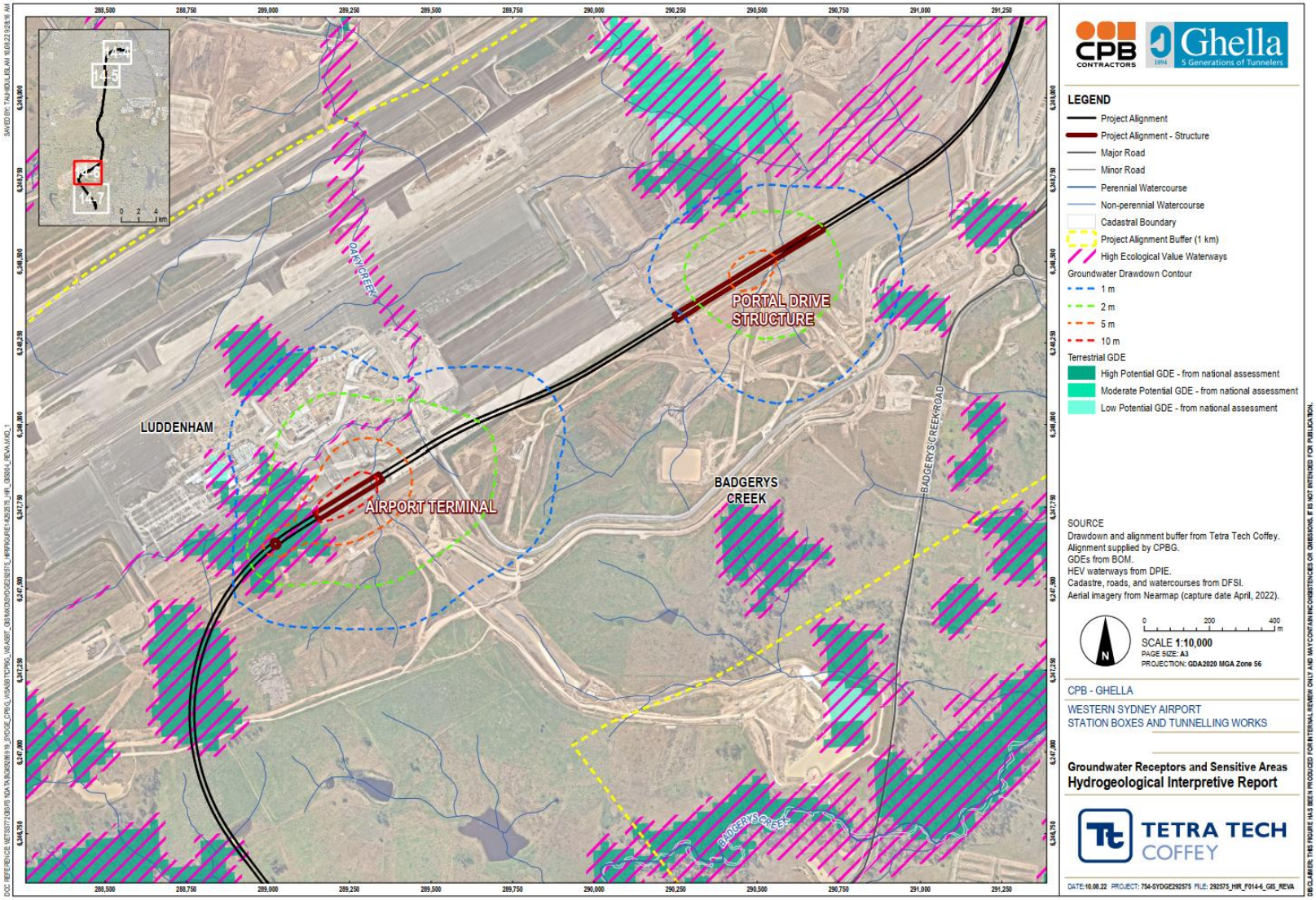

FIGURE 2-9 GROUNDWATER RECEPTORS AND SENSITIVE AREAS AIRPORT

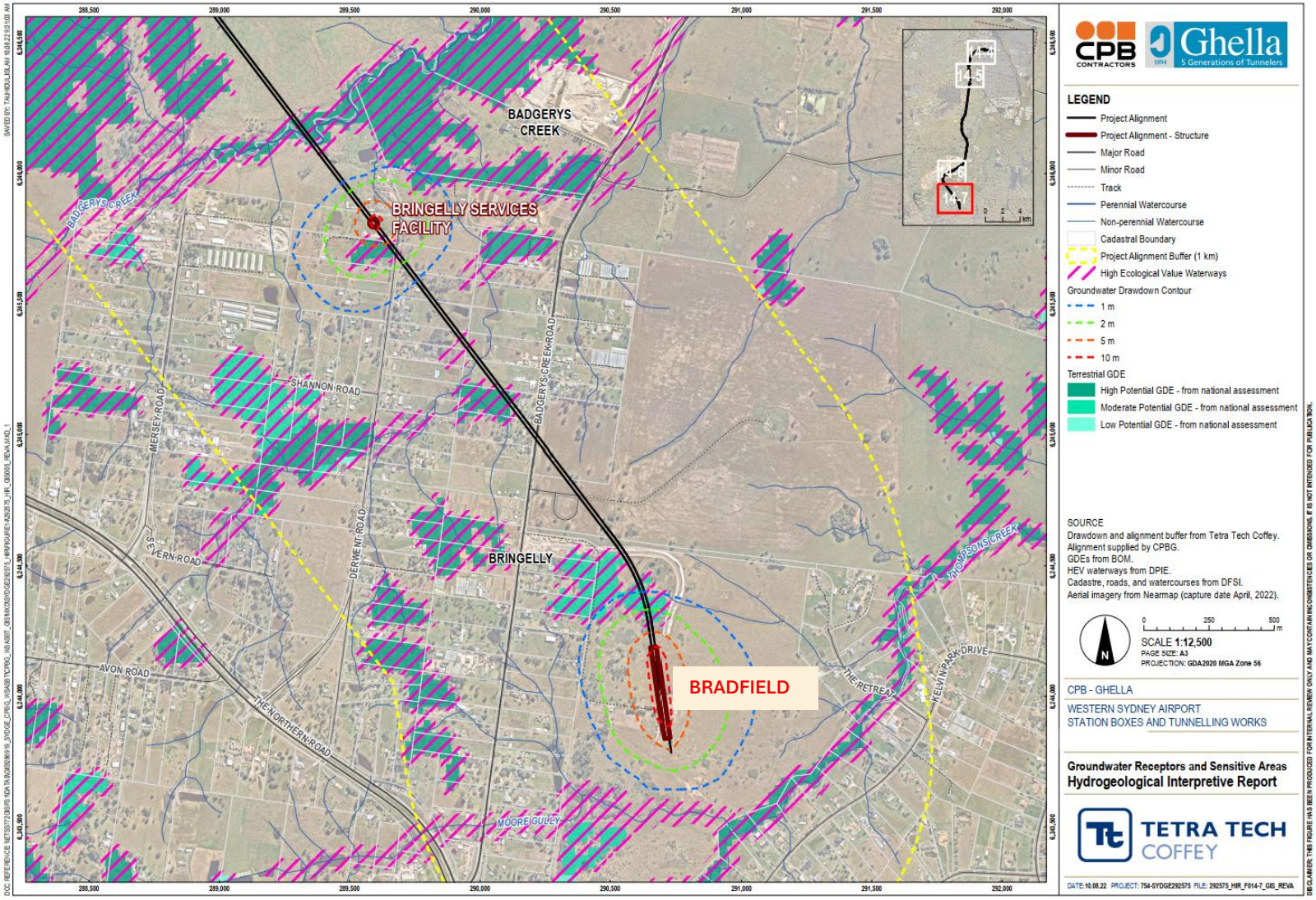

FIGURE 2-10 GROUNDWATER RECEPTORS AND SENSITIVE AREAS BRINGELLY AND BRADFIELD

3 Environmental Impacts

3.1 Construction groundwater inflow and drawdown assessment

The sections below details those areas of the project where bulk excavation or tunnelling will have a potential impact on groundwater and are based on the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4). The assessment includes design changes of various excavations since tender, including the secant pile walls proposed instead of diaphragm walls at both the Claremont Meadows and Bringelly Service Facilities.

3.1.1 St Marys Station

The existing groundwater level at the station in the main aquifer is assessed to be 32.5 to 33 mAHD, with some higher levels toward the east end of the station. This level was adopted for the assessment of drawdown impacts associated with construction. A higher level of 34 mAHD was adopted for the assessment of potential sustained groundwater inflow due to periods of sustained high rainfall.

For construction groundwater assessment, it is assumed that groundwater level will be controlled to 18.5 mAHD within the excavation allowing for excavation to facilitate foundation preparation and casting of the base slab.

South Creek is present 800 m to the southwest and a minor tributary of South Creek is present 420m to the north. The estimated sustained inflow is 0.8L/s if untreated. Higher inflow may occur initially depending upon the rate of excavation. Drawdown of 1m associated with the excavation is assessed to occur for a distance of up to 550 m from the excavation. As a result, the excavation is considered unlikely to influence the nearby watercourses.

Based on the borehole logs Bringelly Shale is interpreted to be present at the bulk excavation level over the lower 16 m of the excavation. Perched groundwater (at the shallow level than the recorded groundwater level within shale) is anticipated in the shallow soil profile at higher elevations than the main aquifer. The groundwater inflow assessment assumed that such shallow groundwater would be address separately by surface drainage or cutoff trenching.

Groundwater inflow volume will be progressively reduced as waterproofing and construction of the of the station box is completed as part of SSTOM Works.

3.1.2 Claremont Meadows Facility

The depth to groundwater at the Claremont Meadows facility has been measured within 2.5 m of the ground surface in places.

Secant walls will be used during construction, which will likely result in a higher magnitude of groundwater drawdown propagating from the construction site when compared with the original diaphragm wall design option.

Claremont Creek is approximately 140 m to the northwest of the facility. Based on the parameters adopted by SBT the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4) and making allowance for the presence of Claremont Creek, sustained inflow to the excavation if untreated is estimated to be 0.44L/s, with greater initial inflow in the short term. Minor inflows are expected provided adequate waterproofing is installed. During construction, influence is estimated to extend 350 m to the east, and 1 m drawdown of the water table up to 250 m from the excavation. The magnitude of groundwater level drawdown towards the north, where higher hydraulic conductivity alluvial sediments exist, is expected to be limited.

Groundwater impacts are expected to be eliminated with the construction and waterproofing of the final tunnel segment prior to the infill of the shaft carried out as part of SSTOM Works.

3.1.3 Orchard Hills Station

The Orchard Hills Station excavation is anticipated to extend to about 27 mAHD allowing some over excavation for the preparation of the floor for the casing of the base slab. A ramp to the ground surface will be constructed to the south and will provide construction access and will form part of the metro rail system.

An ephemeral watercourse is present to the north of the station. This is treated as having little influence on groundwater levels. It is interpreted to act as a zone of groundwater discharge under pre-development conditions.

Based on the parameters outlined in the HIR, the sustained estimated seepage to the station excavation and dive structure is assessed as 0.43 L/s and the extent of the impact is assessed to be within 350 m of the station. This zone of influence does not extend as far as South Creek to the west so no adverse impacts on South Creek are predicted. No existing groundwater bores have been identified within the assessed zone of influence.

Drawdown related settlement is assessed to be less than 5 mm (allowing a drained modulus of 35 MPa and a Poisson's Ratio of 0.3 for depressurisation of up to 5 m of residual soil).

Groundwater inflow volume will be progressively reduced as waterproofing and construction of the of the station is completed as part of SSTOM Works.

3.1.4 Bringelly Services Facility

Secant walls will be used during construction of the Bringelly Service Facility, which will likely result in a higher magnitude of groundwater drawdown propagating from the construction site than initially predicted based on previous assumed use of solider piles or a diaphragm wall.

A pre-development groundwater level of 69 mAHD was adopted for assessment of drawdown impact and construction groundwater seepage inflow based on the records from monitoring location SMGWBH-D303S.

A sustained construction groundwater seepage inflow of 0.44 L/s is assessed during construction, with minor inflows expected provided adequate water proofing is installed. Drawdown response is expected to be limited to 400 m from the shaft, with greater than 1 m assessed to occur within 200m (north) to 330m (southwest) of the excavation.

Groundwater impacts are expected to be eliminated with the construction and waterproofing of the final tunnel segment prior to the infill of the shaft carried out as part of SSTOM Works.

3.1.5 Bradfield Station

Bradfield Station is approximately 200 m to the northwest of Thompsons Creek. Groundwater levels recorded at location SMGW-BH-D326 showed a 1.1 m rise in response to a heavy rainfall event in March 2021 with subsequent recovery to a level of 66.8 mAHD. Based on these measurements a pre-development groundwater level of 67 mAHD was adopted for assessment of construction groundwater inflow and drawdown response.

Borehole logs for the area show thin residual soil cover over Bringelly Shale.

A sustained construction groundwater seepage inflow of 0.49 L/s is assessed if untreated, with a drawdown response limited to 450 m from the shaft. Drawdown greater than 1 m is assessed to occur within 300 m of the excavation.

Groundwater inflow volume will be progressively reduced as waterproofing and construction of the of the station box is completed as part of SSTOM Works.

3.2 Environmental impacts

Potential impacts resulting from the SBT Works before the implementation of mitigation measures were identified and assessed as part of the preliminary groundwater impact assessment. These impacts may also be applicable to SSTOM Works in places along the alignment where SSTOM work areas are within excavations, as constructed by SBT contractors, that are below the water table.

The Works will interact with the groundwater environment during the construction phases. The construction methods and permanent design adopted for the underground structures directly influences how the Works will impact groundwater systems and sensitive receptors.

Table 9 summarises key risks to the groundwater environment during construction.

TABLE 9 KEY POTENTIAL CONSTRUCTION STAGE GROUNDWATER RISKS

Issue	Risk
Change in groundwater level	Reduced availability for groundwater-dependent ecosystems (aquatic and terrestrial)
	Reduced availability for existing extractive groundwater users
	Impact on third party structures (property, utilities, and the environment) due to consolidation settlement
	Mounding and barrier effects upstream of buried structures (stations, dive structures) and the tunnel.
Change in groundwater quality	Mobilisation of existing groundwater contamination into previously unaffected areas resulting in unacceptable risk to sensitive receptors/third parties
	Mobilisation or generation of groundwater having quality that is adverse to underground structures
	Degradation of groundwater quality by drawing saline water from the deep bedrock aquifer into possibly fresh to brackish shallow (alluvial) aquifers
	Contamination of groundwater due to surface spills and leaks
	Acidification of groundwater due to oxidation of acid sulphate soil and rock
Disposal of groundwater	Management of groundwater seepage, including potentially contaminated groundwater, into construction excavations or permanent structures resulting in unacceptable impacts at the point of discharge

3.2.1 Registered groundwater users

3.2.1.1 Extractive use groundwater bores

Extractive groundwater users require consideration of both potential level and quality impacts associated with the SMWSA Project works.

The current SMWSA works are required to comply with Table 1 – Minimal Impact Considerations for Aquifer Interference Activities of the *NSW Aquifer Interference Policy* which specifies that the Project Works must not result in a cumulative water level decline of more than 2 m at any water supply work (groundwater bore).

Two extractive use bores reported to be over 200 m deep are registered for commercial or industrial use in close proximity (between 120 m and 150 m) to the project alignment. These wells are expected to access groundwater from the bedrock aquifer which is consistent with the understanding that shallow groundwater typically has a higher salinity that would not be desirable for most extractive uses. The project design includes only above-ground infrastructure in this area and no groundwater level or quality impacts are expected as a result of project activities.

3.2.1.2 Farm dams

It is possible that if dams are constructed in low-lying areas, or where groundwater levels are shallow (i.e., within 2 mbgl), they may have a level of connectivity with the underlying aquifer. Where this occurs, temporary groundwater drawdown could result in temporarily reduced surface water levels in some farm dams.

Make good arrangements could be considered as a contingency mitigation measure during construction if impacts were observed.

3.2.2 Mobilisation of groundwater contamination

Potential sources of groundwater contamination that may be mobilised by construction activities, and data gaps as identified in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4), are summarised in Table 10 below.

These data gaps were addressed through a series of DSI completed by Tetra Tech in 2022 and 2023, for the SBT contractor, and the baseline groundwater assessment (discussed in Section 5).

TABLE 10 SUMMARY OF GROUNDWATER CONTAMINATION

Area	Site	Current Understanding	Identified data gap
St Marys Station	Former dry cleaner	Investigations have confirmed the presence of chlorinated hydrocarbons in groundwater and vapour at site. The composition (predominantly perchloroethene (PCE)) and increasing concentrations at depth is consistent with an onsite dense nonaqueous phase liquid (DNAPL) source.	The vertical and lateral extent of chlorinated hydrocarbon impact is unknown
St Marys Station	Harris St construction laydown	Former wreckers, workshop, bus depot and plastic manufacturer. There is limited groundwater quality data in area, including a suspected source areas adjacent to the station excavation. Underground storage tank fill points and pumps were also identified in 2019 at the north-east corner of Harris Street and Forrester Street within drawdown area	No groundwater data within or downgradient of suspected source areas
St Marys Station	Former industrial sites to south of station on Queen and Philip Streets	Former site uses within the predicted 5m draw down area include a water proofer, former service stations and a dry cleaner.	No groundwater data within or downgradient of suspected source areas.
St Marys Station	St Marys Plaza	Former service station and potential chemical storage for backup generators	No groundwater data within or downgradient of the suspected source area, or between the area and station construction area
Claremont Meadows Facility	Possible historic service station	Suspected source within 60m of excavation based on site layout on historic aerial imagery	No groundwater data within the suspected source area, and shallow well downgradient not analysed for petroleum hydrocarbons
Claremont Meadows Facility	Gipps Street Landfill	Previous investigation of the Gipps Street Landfill described in the EIS reported contamination in groundwater derived from landfill leachate including but not limited to ammonia, metals, pesticides, and other organic compounds.	Vertical and lateral extent of impact is not known

Orchard Hills Station	34-38 Lansdowne Road	Suspected use of herbicides and pesticides on cultivated land. Site within predicted drawdown area.	Groundwater data indicates metals contamination is present. Vertical and lateral extent of impact is not known
Orchard Hills Station	64 Kent Road	Unlicensed waste disposal suspected adjacent to and downgradient of construction area and within predicted drawdown area.	No groundwater data within or downgradient of suspected source area, or between the area and station construction area
Orchard Hills Station	94-98 Kent Road	Suspected former cattle or sheep dip, and area of stressed vegetation. Directly on station construction area, and within predicted drawdown area	Elevated metals concentrations in groundwater, and detectable concentrations of hydrocarbons. The vertical and lateral extent of groundwater impact is not known
Airport Dive Portal	Draw down area	No indications of gross contamination, however limited groundwater quality data. Metals, PAH and TRH detected in soil data in vicinity of drawdown area, and PFAS detected in soil on alignment in construction area (SMGW-TP-C343).	Limited groundwater data available within predicted groundwater drawdown area
Airport Terminal	Draw down area	No indications of gross contamination, however limited groundwater quality data. Elevated zinc identified in soil in area.	Limited groundwater data available within predicted groundwater drawdown area.
Bringelly Service Facility	Draw down area	Elevated strontium detected in groundwater (source unknown). PFAS detected in groundwater, and low-level volatile hydrocarbons detected at depth in soil.	Insufficient groundwater data to assess whether contaminant concentrations reported represent maximum in construction/drawdown area.
Bradfield Station	Former OTC site compound	Site inspection in 2019 identified UST, transformer and substation, fire hydrants and pumphouse. PFAS, volatile hydrocarbons and low concentrations of methane and DDD detected in groundwater	Extent of groundwater impact is unknown.

Significant chlorinated hydrocarbon contamination in groundwater has been identified beneath the former dry cleaner at 1-7 Queen St. Existing groundwater quality and associated environmental impacts, are detailed in the following reports:

- Former Dry Cleaner, 1-7 Queen St – Assessment of Human Health Risk and Mitigation Options report (Tetra Tech Major Projects, 2023 Ref: SMWSASBT-CPG-SWD-SW000-GERPT-040540);
- St Marys Station Detailed Site Investigation (Tetra Tech Major Projects, 2023, Ref: SMWSASBT-CPG-SWD-SW000-GE-RPT-040513).

Except for the former dry cleaner at 1-7 Queen Street, St Marys, the results of the DSIs and baseline groundwater assessment indicate that no active mitigation is required to manage groundwater contamination along the remainder of the alignment. However, the requirement for groundwater management may need to be reviewed, and revised (if necessary), should groundwater conditions change.

3.2.3 Groundwater dependent ecosystems

The SSTOM Works are expected to interact with the groundwater environment in places along the alignment where excavation has occurred below the water table during SBT Works.

Key potential impacts posed by the SMWSA Project works to GDEs during construction and operation are summarised in Table 11.

TABLE 11 KEY GROUNDWATER POTENTIAL IMPACTS

Issue	Potential impact
Change in groundwater level	Reduced availability for GDEs (aquatic and terrestrial).
	Acidification of groundwater due to oxidation of acid sulfate soil and rock.
Change in groundwater quality	Mobilisation of existing groundwater contamination or saline groundwater into previously unaffected areas resulting in unacceptable risk to sensitive receptors.

A risk-based assessment approach has been adopted to assess the potential impacts to identified GDEs along the alignment. The assessment approach adopts a GDE risk ranking matrix that was established for the project by the SBT contractor. The risk ranking matrix considers both groundwater level and quality changes, their magnitudes and duration.

This approach is intended to identify potential impacts that would be considered unacceptable or undesirable and allows for alternative engineering design options to be developed, or suitable mitigation measures to be implemented prior to construction commencing.

GDEs and predicted drawdown along the alignment are shown on Figure 2-7 to Figure 2-10 above.

3.2.3.1 Aquatic GDE impact assessment

An assessment of impacts to aquatic GDEs was undertaken by the SBT contractor, which considered the potential influence of the Works. This assessment is also considered applicable to SSTOM Works as a worst-case scenario for potential impact to GDEs. The following aquatic GDEs were assessed:

- South Creek
- Badgerys Creek
- Thompsons Creek

The groundwater inflow and drawdown assessment concluded that the predicted zone of 1 m groundwater drawdown is unlikely to extend to within 50 m of either South Creek, Badgerys Creek or Thompsons Creek. Based on this assessment there is a negligible risk of impact to aquatic GDEs during construction based on the current engineering design and inflow assessment. A lower magnitude drawdown of between 0.1 and 1 m was also assessed by the SBT contractors and modelling results indicated the 0.1 m drawdown contour does not extend below South Creek or Badgerys Creek

Mitigation measures are currently not proposed for aquatic GDEs but this may be revised in future versions of this document.

3.2.3.2 Terrestrial GDE impact assessment

The design phase groundwater drawdown estimates adopted for the GDE impact assessment are based on construction phase modelling and drawdown estimates developed by the SBT contractor (see SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4 for further information).

The magnitude of groundwater level drawdown around the rail tunnels and the cross passages during construction is expected to be relatively minor due to the relatively short construction duration and the low hydraulic conductivity of the Bringelly Shale. Therefore, the assessment has been limited to the areas of predicted groundwater level drawdown around dewatered excavations, such as station boxes, portals and other major infrastructure. The potential impact during SSTOM works is considered to be more limited than described in this assessment due to the progressive waterproofing of excavations as works on the station boxes is completed. The potential impacts to GDEs is predicted to decrease as SSTOM works are completed.

A summary of the terrestrial GDE impact assessment is provided in Table 12.

TABLE 12 TERRESTRIAL GDE IMPACT ASSESSMENT SUMMARY

Works site	Terrestrial GDE	Assumed GDE type	Potential impact (worst case during SBT works)	Risk ranking
Claremont Meadows Facility	Cumberland Shale Plains Woodland east of Gipps Street	Facultative	Unquantified groundwater drawdown (potentially up to 2m) through secant piled walls, estimated for more than 6 months	Moderate
	Claremont Creek riparian zone	Unknown (potentially obligate)	Unquantified groundwater drawdown unlikely to significantly alter levels in alluvial sediments	Minor
Orchard Hills Station	Cumberland Shale Plains Woodland north and east of the station	Facultative	Temporary drawdown in excess of 2 m across large area, persisting for at least 6 months.	Moderate
	Cumberland River Flat Forest south of Lansdowne Road	Facultative	Temporary drawdown in excess of 1 m across large area, persisting for at least 6 months.	Minor
	Cumberland River Flat Forest in South Creek riparian zone	Facultative	Temporary drawdown in excess of 1 m across large area, persisting for at least 6 months.	Minor
Bringelly Services facility	Cumberland Shale Plains Woodland 30 m south of the construction zone	Facultative	Temporary drawdown of approximately 5 m predicted across 1.3 ha stand on private property, persisting for at least 6 months.	Moderate
	Cumberland Shale Plains Woodland 300 m north of the construction zone	Facultative	Temporary drawdown of up to 2 m is predicted to extend beneath the southern edge of the woodland, persisting for at least 6 months.	Moderate
Bradfield	Cumberland River Flat Forest along Thompson Creek riparian zone	Facultative	There are no mapped terrestrial GDEs that fall within the predicted 1 m drawdown contour extending around the station box.	Negligible

4 Environmental control measures

The need for active control measures is based on the identification of unacceptable risk to a sensitive and relevant groundwater receptor. Mitigation and management measures are then implemented to control impacts to within acceptable levels.

The approach to groundwater mitigation and management has been based on the SBT contractor review of the DSI and baseline assessment, summarised above and described in further detail in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4). The effectiveness of any measures implemented will be validated through the groundwater construction monitoring program (Section 6).

4.1 Inflow control

Estimated inflows are detailed in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4). The assessments indicate that inflows will be quite low, with local geological defects potentially resulting in short term higher flows during SBT works. SSTOM will continue to implement lining and waterproofing and in-flow control measures as required to manage groundwater inflow volumes. The operational state of St Marys, Orchard Hills Station and Dive, Airport Terminal and Bradfield Particular Specs, Cl 3.6.1 (a) requires watertightness with the complete absence of any leakage, seepage and damp patches and groundwater inflow control will not be required as these works progress.

4.2 Groundwater contamination

The results of the DSIs and baseline assessment have informed the approach to groundwater mitigation and management as summarised below and in further detail in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4). Active control measures are required where Project activities may result in an unacceptable risk to a sensitive and relevant groundwater receptor.

Contamination requiring active mitigation has been confirmed at the former dry cleaner at 1-7 Queen Street, St Marys, with measures implemented to control impacts to within acceptable levels. Mitigation, management and construction monitoring measures are detailed in:

- *St Marys Station - Remedial Action Plan* (Tetra Tech Major Projects, 2023, SMWSASBTCPG-SWD-SW000-GE-RPT-040521)
- *St Marys Station – Implementation of Permeable Reactive Barrier* (Tetra Tech Major Projects, 2023, SMWSASBT-CPG-SWD-SW000-GE-RPT-040561.

Except for the former dry cleaner at 1-7 Queen Street, the risk of adverse groundwater related impacts due to mobilisation of contamination during construction is considered to be low and no active groundwater mitigation is proposed. Control measures for groundwater contamination elsewhere along the alignment therefore consist of management via monitoring to assess whether existing conditions change such that there is an adverse change in risk profile.

The effectiveness of any measures implemented will be validated through the groundwater construction monitoring program (Section 6).

4.3 Water Treatment

Water treatment plants (WTPs) are operational at St Marys Station and the Claremont Meadows Service Shaft, and on-airport at the Airport Portal Dive and Airport Terminal Station.

Following treatment, the WTPs will discharge effluent either to receiving waterways or to trade waste (sewer) depending on whether environmental criteria for discharge to waterways are achieved. On-site beneficial reuse of treated water is also considered a viable option to support dust suppression measures.

Details of the proposed water treatment processes and the resulting effects on water quality are summarised in Table 13, noting that treatment to reduce salinity is not proposed, and saline water will need to be discharged as trade waste if not acceptable for release to waterways.

TABLE 13 MINIMUM WATER TREATMENT PLANT PROCESSES

Site Location	WTP Process
Primary Solids Removal	First order reduction of suspended solids and suspended contaminants.
Flocculation / Coagulation	Second order reduction of turbidity suspended solids, and suspended contaminants. Coagulant aids may be used to improve softening of water and enhance reduction in concentrations of dissolved solids / contaminants.
Clarification	Third order reduction of turbidity suspended solids, and suspended contaminants. Combination softening-clarification units may improve and enhance reduction in concentrations of dissolved solids / contaminants.
Media Filtration	Fourth order reduction of turbidity and suspended solids, and suspended contaminants. May be used with softening process to reduce concentrations of dissolved solids / contaminants.
Breakpoint Chlorination	Reduce concentrations of ammonia.
Activated Carbon Filtration	Remove organic contaminants, hydrocarbons, chlorine, PFAS, chloramines, nitrate, and improve colour and odour.
pH Correction	Adjustment of pH to appropriate discharge limits.

4.4 GDE Mitigation Measures

Moderate potential for adverse effects has been identified at several locations along the project alignment (Claremont Meadows facility, Orchard Hills station, and Bringelly services facility) where dewatering is likely to cause groundwater levels to be temporarily drawn-down below the root zone of facultative terrestrial GDEs for a period of greater than six months.

In many cases these facultative GDEs may be unaffected by short term dewatering where there are sufficient alternative sources such as rainfall and soil moisture. However, given the high ecological value of the Cumberland Shale Plain Woodland and Cumberland River Flat Forest, and in the absence of site-specific assessment of groundwater dependence, a conservative assessment has been adopted assuming that any temporary decline in tree health would be considered unacceptable.

Table 14 summarises the recommended monitoring and mitigation measures to minimise potential impacts (such as declining tree health or dieback) to terrestrial GDEs assessed as having moderate risk rankings. Monitoring requirements are detailed further in Section 6.

TABLE 14 GROUNDWATER ASSESSMENT, MONITORING AND MITIGATION MEASURES – TERRESTRIAL GDES

Measure	Proposed action	Description
Assessment	Groundwater drawdown assessment	Refinement of the potential zone of terrestrial GDE impact based on numerical groundwater modelling, groundwater level and quality monitoring, and confirmation of the period of dewatering.

	Pre-construction groundwater level monitoring	Additional groundwater monitoring wells have been installed in the vicinity of suspected GDEs to assess the zone of drawdown during construction (Section 6).
Monitoring	Groundwater level and quality monitoring	A program of groundwater level and quality monitoring will be implemented during construction (Section 6). This program has been taken over by PLM D&C following completion of SBT works. Monitoring will be carried out via data loggers at six hourly intervals is proposed as detailed in Section 7.2. Periodic review of monitoring results will consider whether drawdown is progressing in line with modelled estimates or if additional areas of terrestrial GDE may require management.
	Tree health monitoring (predicted drawdown >2m)	In areas of non-certified GDEs where modelling predicts drawdown of greater than 2 metres, tree health monitoring will be conducted twice a year during the Works and by ecological specialists. Monitoring will guide the need for further mitigation (such as manual tree watering) or longer-term mitigations
	Tree health monitoring (predicted drawdown >1m)	Where groundwater levels at GDE monitoring locations exceed the trigger levels detailed in Table 6-4 and Table 6-11 for 6 consecutive months as a result of works, site specific tests will be conducted by ecologists and hydrogeologists to determine vegetation reliance on groundwater to identify any additional monitoring and/or mitigations to be implemented
Mitigation system	Manual tree watering	Where the tree health monitoring program identifies signs of declining tree health during construction, and groundwater monitoring confirms a reduced water table, manual tree watering events should commence until tree health recovers, or until groundwater levels recover post-construction. (where permanent drawdown is not expected). Manual watering events will continue during low rainfall periods until tree health recovers, or groundwater levels recover to levels that return supply to the root zone. Further detail is provided in the Flora and Fauna Management Sub-Plan.

The monitoring and mitigation measures presented in Table 14 are considered appropriate and effective to manage the potential impacts of temporary groundwater level drawdown. Should unforeseen permanent drawdown, or vegetation dieback occur despite the proposed mitigation, the contingency measures detailed in Table 4-4 would be implemented. Other mitigation, monitoring and contingencies measures are detailed in the Flora and Fauna Management Sub-Plan.

TABLE 15 PROPOSED CONTINGENCY MEASURES FOR TERRESTRIAL GDES

Measure	Description	Proposed design
Contingency measure	Replanting	Where long term drawdown occurred and tree health monitoring indicated the likely declining health in the absence of manual watering, the affected area would be replanted with juvenile trees. As these juvenile trees mature in the absence of groundwater, they will adapt to the new groundwater conditions and replace affected trees over the long term
Contingency measure	Native vegetation offsets	In the case where tree health monitoring identifies dieback or expects dieback to occur in the future as a result of project activities and the ecosystem cannot be appropriately maintained by replanting in the time available, native vegetation offsets will be secured.

5 Baseline Conditions - Groundwater Monitoring

The baseline monitoring, including review of groundwater data from the pre-award project monitoring network, was completed and documented by CPBG to inform existing conditions and to refine the construction monitoring program. A discussion of the baseline monitoring is provided in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4), including summary annexures of all data.

6 Construction Monitoring

Groundwater monitoring locations are as shown in Figures A1 to A7 contained in Appendix B. The monitoring locations will not remain fixed for the duration of the work as the scope of surface works, including precinct works, will impact on monitoring locations which may be removed, or relocated/replaced as required. The requirement for any monitoring location will be assessed against the performance criteria described in this Section and will include review of the adopted trigger levels and trend reporting as required. Any modification to the monitoring program will be explained in the six-monthly monitoring reports, with any minor updates to the monitoring program to be endorsed by the ER. Replacement wells will not need ER endorsement, but justification for relocation to a suitable location will need to be discussed.

6.1 Groundwater level

Groundwater levels during construction will be monitored predominantly through the vibrating wire piezometers (VWPs) or groundwater wells with a logger installed as listed in Table 17, with the methodology and data reporting detailed in Section 7.2.1 and Section 8.2. The groundwater trigger levels developed by the SBT contractor and applied to the Project will continue to be adopted unless otherwise recommended through the review period.

Levels in groundwater monitoring bores, without loggers, will also be measured prior to water quality sampling (six monthly) or monthly gauging and downloading of loggers to assess GDEs and salinity (Section 6.2).

6.1.1 Groundwater level performance criteria

Groundwater trigger levels were developed by SBT to manage potential impacts associated with drawdown propagation during construction (Table 16).

A traffic light system has been adopted based on baseline groundwater conditions and anticipated groundwater level drawdown from the works, with Table 16 summarising proposed actions when the specific trigger level is activated. The groundwater level action trigger criteria for each monitoring bore location is included in Table 17.

TABLE 16 GROUNDWATER LEVEL TRIGGER LEVEL SYSTEM

Trigger Level	Action
Green	• Groundwater levels observed are within the target / green trigger level range and require no additional action.
Amber	• Investigate the possible reason for the drawdown or drawdown trend. • Consider an increase in monitoring frequency to confirm trend. • Check instrumentation / monitoring equipment. • Consider the need for mitigation (i.e. targeted recharge) where drawdown is not found to be a seasonal variation, and is identified to be due to Project activities
Red	• Investigate the possible reason for the drawdown or drawdown trend. • Increase monitoring frequency to confirm trend. • Change groundwater level management where trend is deemed to be a function of the Project activities. May include implementation of localized recharge or other hydraulic control.

6.1.2 Groundwater well replacement trigger level verification

If applying existing trigger levels to replacement groundwater wells, the installation and construction logs will be reviewed to confirm that ground conditions, screened intervals and depths (mAHD), and well construction profiles are comparable to those of the original groundwater bore. Where material differences are identified, the applicability of the existing trigger levels will be reassessed and, where necessary, new trigger levels derived.

TABLE 17 GROUNDWATER LEVEL MONITORING AND TRIGGER ACTION LEVELS

Area	Location ID	Monitoring bore screen range or VWP sensor elevation (m AHD)	Pre-development groundwater level range (mAHD)	Trigger levels based on anticipated groundwater level at completion of excavation and tunnelling		
				Green Trigger Level (m AHD)	Amber Trigger Level (m AHD)	Red Trigger Level (m AHD)
St Marys	SWD-TU100-17275-VWP01-A	15.15	42 to 43.3	35.0	34.5	34.0
St Marys	SWD-TU100-17275-VWP01-B	20.15	42 to 43.3	35.0	34.5	34.0
St Marys	SWD-TU100-17443-VWP03-A	13.56	26.6 to 32.8	19.9	19.4	18.9
St Marys	SWD-TU100-17443-VWP03-B	18.56	28 to 34	21.3	20.8	20.3
TBM Tunnel - South Creek	SMGW-BH-A107	-4.44 to 3.46	20.9 to 21.6	20.8	20.3	19.8
TBM Tunnel - South Creek	SBT-GW-1804	16.0 to 19.0	18.7 to 19	18.5	18.0	17.5
Claremont Meadows SF	SBT-GW-1805	18.3 to 24.3	24.7 to 25.6	21.5	21.0	20.5
Claremont Meadows	SWD-TU100-20071-VWP07-A	2.813	26.9 to 27	25.4	24.9	24.4
Claremont Meadows	SWD-TU100-20071-VWP07-B	7.813	27.1 to 27.3	25.6	25.1	24.6
Orchard Hills	SWD-TU150-22010-VWP02	22.81	33.8 to 35.3	31.5	31.0	30.5
Orchard Hills	SBT-GW-1042	32.1 to 38.1	37.7 to 37.8	33.5	33.0	32.5
Orchard Hills	SMGW-BH-A315-R*	32.3 to 38.3	38.8 to 40	37.4	36.9	36.4
Orchard Hills	SBT-GW-1063	20.6 to 29.6	25.4 to 25.7	24.8	24.3	23.8
Airport Portal	SWD-TU300-33565-VWP02-R* (SBT-VWP-3401-R)	52.466	55.2 to 64	50.3	49.8	49.3
Portal / Cross passage XPS01 (APDS)	SBT-GW-3003-A-R*	62.7 to 65.7	63.7 to 63.9	60.0	59.5	59.0
Portal / Cross passage XPS01 (APDS)	SBT-GW-3003-B-R*	54.4 to 57.4	55 to 63	51.3	50.8	50.3
Portal / Cross passage XPS01 (APDS)	SBT-GW-3003-C-R*	45.3 to 48.3	59.4 to 59.6	55.7	55.2	54.7
Airport Terminal	SBT-GW-3006-R*	49.3 to 55.3	72.9 to 74.6	65.0	64.5	64.0
Airport Terminal	SWD-TU300-34874-VWP03-01	60	74.2 to 74.6		(Note 1)	
Airport Terminal	SWD-TU300-34874-VWP03-02	64	74.2 to 74.6		(Note 1)	

Airport Terminal	SWD-TU300-34874-VWP03-03	68	74.4 to 74.6		(Note 1)	
Airport Terminal	SWD-TU300-34874-VWP03-04	73	74.8 to 75.2		(Note 1)	
Western Sydney Airport	SBT-GW-4000	59.2 to 69.7	70.5 to 70.9	70.5	70.0	69.5
Bradfield	SBT-GW-4008	50.3 to 56.3	72 to 72.2	71.8	71.3	70.8
Bradfield	SWD-TU400-39287-VWP01-R* (SBT-VWP-4403R*)	57.506	67 to 67.6	60.3	59.8	59.3
Bradfield	SWD-TU400-39340-VWP02 (SBT-VWP-4404)	55.831	65.6 to 66.8	55.6	55.1	54.6
Bradfield	SBT-GW-4021	51.9 to 60.9	59.8 to 59.9	59.6	59.1	58.6

Notes: (1) Purpose of monitoring asset is wall design where drawdown is not the critical design case.

* Trigger levels for replacement well have been retained based on comparable bore profiles and will be reviewed if required following initial monitoring results

6.2 Groundwater quality monitoring

6.2.1 St Marys – Mitigation system monitoring

Significant chlorinated hydrocarbon contamination in groundwater has been identified by the beneath the former dry cleaner at 1-7 Queen Street, St Marys. This contamination has been investigated and measures have been implemented by the SBT contractor to mitigate potential construction related risks and adverse changes in risk profile due to station excavation related drawdown. Mitigation, management and construction monitoring measures are detailed in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4).

In summary, a permeable reactive barrier (PRB) has been installed to mitigate the potential risk of construction related drawdown mobilising chlorinated hydrocarbon impact in groundwater to the west of St Marys Station.

Given the potential for unacceptable inhalation or direct contact risk, a targeted groundwater monitoring and mitigation approach has been applied, to allow for contingency mitigation to be implemented if required before an unacceptable exposure occurs.

A PRB mitigation monitoring program as detailed in the Remedial Action Plan (RAP) was implemented by CPB Ghella Joint Venture (CPBG) with weekly monitoring from 30 June 2023. In December 2023, after six months of weekly monitoring, the frequency of monitoring was reviewed and amended to fortnightly, as the groundwater gradient in the vicinity of the former dry cleaner had not changed, and chlorinated hydrocarbon concentrations in all monitoring wells were below the level of reporting (LOR). The change in sampling frequency, was agreed to by the SBT auditor on 21 December 2023, and Sydney Metro on 22 December 2023.

Given the stability of conditions, in combination with no detectable chlorinated hydrocarbons to the west of the PRB, in February 2025 a memo was provided to the current Site Auditor, proposing a further reduction in monitoring frequency from fortnightly to monthly, and implementation of data logging groundwater levels in all four wells. On 17 March 2025 the Auditor advised that the reduction in monitoring frequency was appropriate.

In addition to sampling and analysing for chlorinated hydrocarbons, groundwater levels in key wells will be used to assess hydraulic gradients between the source area and the Station excavation as shown in Table 18.

TABLE 18 MITIGATION GROUNDWATER MONITORING - ST MARYS

Monitoring Well	Monitoring frequency	Analytes	Comment
SBT-GW-1347a	Monthly from March 2025	Volatile chlorinated hydrocarbons	Shallow well downgradient of PRB
SBT-GW-1347c			Deep well downgradient of PRB
SBT-GW-0001			Shallow well upgradient of PRB and downgradient of suspected source area
SBT-GW-0001b			Mid-level well upgradient of PRB and downgradient of suspected source area

Monitoring completed to date by the SBT and SSTOM contractors indicate that the extent of drawdown may be less than conservatively predicted, and construction activities have not yet influenced the groundwater flow direction in the source area. conditions indicate that any change in groundwater flow direction, and mobilisation of contamination, will be slow (in the order of months or years).

If detectable concentrations of chlorinated hydrocarbons are reported and, the risk profile will be assessed, and additional measures will be put in place if required. Monitoring of the chlorinated hydrocarbon impact will be continued by PLM D&C as required by the site auditor.

6.2.2 Groundwater quality monitoring

Groundwater quality monitoring during construction will be undertaken using a combination of pre and post-award groundwater monitoring bores as listed in Table 20. The frequency of water quality monitoring along the alignment is six monthly.

The analytical suites for construction monitoring for groundwater quality are provided in Table 19.

TABLE 19 CONSTRUCTION MONITORING - ANALYTICAL SUITES

Program	Analysis suites
Construction Monitoring – Base Analytical Suite	General indicators (pH, EC, TDS)
	Total organic carbon
	Major cations (calcium, magnesium, sodium, potassium)
	Major anions (chloride, sulphate) and speciated alkalinity (bicarbonate, carbonate, hydroxide)
	Dissolved metals (aluminium, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, zinc) and total metals (aluminium, cobalt, iron, manganese)
	Nutrients (ammonia, nitrate, nitrite, total kjeldahl nitrogen, total nitrogen, total phosphorous, reactive phosphorous)
Additional analytes – included for select wells where compounds were detected and/or exceeded adopted criteria in the Baseline Assessment	Total Recoverable Hydrocarbons (TRH)
	Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene (BTEXN)
	Volatile Organic Compounds (VOCs)
	Phenols
	Per- and Polyfluoroalkyl Substances (PFAS) (short suite)

The revised construction groundwater monitoring program from Table 17 and Table 20 is summarised in Appendix C and includes a list of locations removed from the monitoring network following recommendations in the construction monitoring reports . Bore locations for construction water quality monitoring are shown Figures A1 to A7 contained in Appendix B.

TABLE 20 CONSTRUCTION WATER QUALITY MONITORING WELLS - FREQUENCY, WATER QUALITY ANALYSIS AND LEVEL/EC MONITORING

Location ID [1]	Monitoring Zone	Aquifer	TOC mAHD	Water quality sampling frequency	Base analytical Suite	Additional analytes
SBT-GW-1001-S	St Marys	Residual/ Bedrock	48.8	Six Monthly	✓	
SBT-GW-1002	St Marys	Residual/ Bedrock	42.6	Six Monthly	✓	
SBT-GW-1005-S	St Marys	Residual/ Bedrock	44.2	Six Monthly	✓	
SBT-GW-1016	St Marys	Residual/ Bedrock	36.1	Six Monthly	✓	TRH/BTEXN, PFAS
SBT-GW-1017	St Marys	Residual/ Bedrock	32.5	Six Monthly	✓	TRH/BTEXN, PFAS
SBT-GW-1021	St Marys	Residual/ Bedrock	33.9	Six Monthly	✓	Phenols
SMGW-BH-A401	St Marys	Residual/Bedrock	36.5	Six Monthly	✓	TRH/BTEXN, PFAS
SMGW-BH-A107	TBM Tunnel - South Creek	Bedrock	22.5	As required [2]	✓	
SBT-GW-1030	Claremont Meadows SF Cross passage (XPN13)	Residual/Bedrock	36.8	As required [2]	✓	PFAS
SBT-GW-1024	Claremont Meadows SF	Alluvium/Bedrock	28.5	Six Monthly	✓	TRH/BTEXN, PFAS
SBT-GW-1805	Claremont Meadows SF	Residual	27.3	Six Monthly	✓	PFAS
SBT-GW-1806	Orchard Hills	Bedrock	43	Six Monthly	✓	TRH/BTEXN
SBT-GW-1807	Orchard Hills	Bedrock	37.5	Six Monthly	✓	
SBT-GW-1808	Orchard Hills	Residual	37.5	Six Monthly	✓	
SMGW-BH-A315-R	Orchard Hills	Residual/Bedrock	42.3	Six Monthly	✓	TRH/BTEXN, PFAS
SBT-GW-1063	Orchard Hills	Alluvium/Bedrock	31.6	Six Monthly	✓	
SBT-GW-1042	Orchard Hills	Alluvium	40.1	Six Monthly	✓	
SBT-GW-1048-R	Orchard Hills	Alluvium/Bedrock	39.6	Six Monthly	✓	
SBT-GW-3003-A-R	Portal / Cross passage XPS01 (APDS)	Bedrock	67.7	Six Monthly	✓	
SBT-GW-3003-B-R	Portal / Cross passage XPS01 (APDS)	Bedrock	67.4	Six Monthly	✓	
SBT-GW-3003-C-R	Portal / Cross passage XPS01 (APDS)	Bedrock	67.3	Six Monthly	✓	
SBT-GW-3006-R	Airport Terminal	Bedrock	84.3	Six monthly	✓	

SBT-GW-3012-A	Airport Terminal	Bedrock	84	Six Monthly	✓	
SBT-GW-3012-B	Airport Terminal	Bedrock	83.9	Six Monthly	✓	TRH
SBT-GW-3012-C	Airport Terminal	Bedrock	83.8	Six Monthly	✓	
SBT-GW-3022	Airport Terminal	Bedrock	77.8	Six Monthly	✓	TRH
SBT-GW-4000	Western Sydney Airport	Bedrock	72.2	As required [2]	✓	TRH/BTEXN
SMGW-BH-C320	Western Sydney Airport	Residual/Bedrock	66.5	Six Monthly	✓	TRH/BTEXN, PFAS
SBT-GW-4003	Bringelly SF	Residual/Bedrock	71.9	Six Monthly	✓	TRH/BTEXN, PFAS
SBT-GW-4005	Bringelly SF	Bedrock	73.6	Six Monthly	✓	
SBT-GW-4800	Bringelly SF	Residual/ Bedrock	71.432	Six Monthly	✓	
SBT-GW-4801	Bringelly SF	Residual/ Bedrock	71.372	Six Monthly	✓	
SBT-GW-4802	Bringelly SF	Bedrock	74.348	Six Monthly	✓	
SBT-GW-4403	Bradfield	Bedrock	73.228	Six Monthly	✓	TRH/BTEXN
SBT-GW-4008	Bradfield	Bedrock	78.3	As required [2]	✓	
SBT-GW-4014-R	Bradfield	Residual/Bedrock	73.9	Six Monthly	✓	PFAS
SBT-GW-4017-R	Bradfield	Residual	71.3	Six Monthly	✓	TRH/BTEXN, PFAS
SBT-GW-4021	Bradfield	Alluvium/Bedrock	62.8	Six Monthly	✓	
SBT-GW-4803-R	Bradfield	Bedrock	72.7	Six Monthly	✓	

1. Alternate well IDs listed in Table 5-1
2. Well decommissioned April 2024 due to being located within 3m of the northern tunnel alignment. No replacement warranted.

The frequency of sampling and analysis required has been determined in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4). Six monthly groundwater sampling events for the construction monitoring bore network is considered sufficient as the timing for changes in water quality is expected to be greater than six months, and no contamination requiring active management has been identified with the exception of the former dry cleaner at 1-7 Queen St.

The groundwater monitoring network and program will be refined during construction based on the observed groundwater responses to construction activities and ongoing development.

The construction groundwater monitoring program is considered to be suitable for identification of potential groundwater quality issues as bores have been targeted along the alignment where model predicted drawdown has been identified.

6.2.3 Groundwater Quality Performance Criteria

The baseline data by the SBT contractor indicates that some groundwater quality parameters exceed initial screening criteria based on:

- ANZECC/ARMCANZ 2000 relevant physical and chemical stressors
- ANZG (2018) 95% species protection criteria for freshwater water, with criteria for toxicants known to bioaccumulate assessed based on the 99% species protection criteria
- PFAS National Environmental Management Plan (NEMP 2.0) 99% species protection values
- Australian Standard AS2159 – 2009 Piling design and installation have also been considered to assess potential groundwater aggressivity risks posed by groundwater to underground concrete and steel structures
- Discharge concentration limits negotiated with EPA as detailed in L2.4 of Environmental Licence (EPL 21672 (noting that this licence held by SBT contains the same discharge limit conditions which have been applied to EPL 21807 for SSTOM works)
- Airports (Environment Protection) Regulations 1997 (AEPR) guidelines (on-airport locations only).

Site-specific groundwater quality action triggers have been developed for select locations where baseline assessment identified groundwater contamination may be within the area predicted to be influenced by construction related drawdown, and either:

- Above detect for TPH or PFAS, or
- 10 x EPL for contaminants of potential concern (CoPC) which typically exceed the EPL along the alignment (i.e aluminium, cadmium, copper, zinc, total nitrogen and total phosphorus).

Site specific triggers are based on detection of CoPC concentration above the baseline maximum, with metal action triggers relating to filtered metal concentrations.

This approach acknowledges that existing groundwater conditions exceed the EPL limits for a number of parameters along the alignment. Any adverse change in risk will therefore be likely to be due to where high concentrations already exist with the intent of the triggers to identify where conditions have changed.

For sentinel wells, and for CoPCs where baseline concentrations are less than 10 x the EPL limits, but exceed the initial screening criteria, a potential adverse change in conditions will be identified by statistical trend assessment (Mann Kendall Statistic), rather than via well and analyte specific action triggers. As trend analysis requires a minimum of four values, and many construction sampling locations have three or less baseline values, the trend analysis will be undertaken using the two most recent values from the baseline assessment, and construction monitoring phase data. Where a statistically increasing trend is reported, the baseline data range will be reviewed, and a trigger reported if the construction monitoring concentration is greater than 250% of the maximum historical concentration.

Where a trigger is exceeded, or a statistically increasing trend is identified for a CoPC and concentrations exceed the initial screening criteria, then an investigation will be carried out which may include:

- Further monitoring to confirm groundwater conditions (increased frequency)
- Assessment to identify if the exceedance represents an adverse change in risk profile and a remedial response is required (refer to Section 7.9.1 of the SWMP), or if the Action Trigger should be revised or implemented in a sentinel well for the CoPC triggered.

Where trigger exceedances are identified, and concentrations are outside the background range for groundwater along the alignment, the monitoring program will also be reviewed as outlined in Section 9.

This approach to site specific groundwater quality action triggers has been developed by CPBG and documented in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4).

The action triggers are not intended for use as discharge criteria, or to assess potential risk to ecological receptors.

With the exception of groundwater associated with the former dry cleaner at St Marys, no existing potential vapour intrusion risks have been identified based on baseline data collected, and therefore no SSTVs for VOCs have been developed.

Site specific trigger levels for water quality are provided in Table 21.

TABLE 21 GROUNDWATER QUALITY ACTION TRIGGERS

Location ID [1]	Monitoring Zone	Aluminium	Cadmium	Copper	Zinc	pH	Total N	Total P	Total PFAS	TRH/BTEXN	Other	Trend only
SBT-GW-1001-S	St Marys	>24.4mg/L		>81ug/L	>2,600ug/L	<4.5						
SBT-GW-1002	St Marys	>2.1mg/L		>29ug/L	>172ug/L	<4.0						
SBT-GW-1005-S	St Marys											✓
SBT-GW-1016	St Marys				>236ug/L		>29.8mg/L	>10.1mg/L	>0.032ug/L	BTEXN >9ug/L		
SBT-GW-1017	St Marys						>47.4mg/L	>33.2mg/L	>0.0102ug/L	TPH >C10 >500ug/L		
SBT-GW-1021	St Marys										Phenol >31ug/L	
SBT-GW-1347C*	St Marys											✓
SMGW-BH-A401	St Marys	>3mg/L		>3,240ug/L	>235ug/L	pH <4.6		>3.75mg/L	>0.021ug/L			
SMGW-BH-A107	TBM Tunnel - South Creek											✓
SBT-GW-1030	Cross passage / Tunnel (XPN13)	>7.5mg/L		>26ug/L	>542ug/L	pH <4.4			>0.13ug/L			
SBT-GW-1024	Claremont Meadows SF								>0.09ug/L	TPH C6-C9 > 2,100ug/L		
SBT-GW-1805	Claremont Meadows SF							>6.6mg/L	>19.9mg/L			
SBT-GW-1806	Orchard Hills		>8.1ug/L	47ug/L		pH (11-11.2)				BTEXN >4ug/L		
SBT-GW-1807	Orchard Hills											✓
SBT-GW-1063	Orchard Hills											✓
SBT-GW-1808	Orchard Hills	>2,260ug/L		>79ug/L	>478ug/L	pH <3.65						
SMGW-BH-A315-R	Orchard Hills				>240ug/L				>0.034ug/L	TPH >C10 > 260ug/L		
SBT-GW-1042	Orchard Hills	>1,900ug/L			>2,182ug/L	pH < 4.5	183mg/L					
SBT-GW-1048-R*	Orchard Hills		>2.7ug/L		>833ug/L							
SBT-GW-3003-A-R*	Portal / Cross passage XPS01 (APDS)											✓

SBT-GW-3003-B-R*	Portal / Cross passage XPS01 (APDS)						✓
SBT-GW-3003-C-R*	Portal / Cross passage XPS01 (APDS)						✓
SBT-GW-3006-R*	Airport Terminal						✓
SBT-GW-3012-A-R*	Airport Terminal						✓
SBT-GW-3012-B-R*	Airport Terminal						✓
SBT-GW-3012-C-R*	Airport Terminal						✓
SBT-GW-3022	Airport Terminal					TPH >C10 >3,300ug/L	
SBT-GW-4000	Western Sydney Airport			>5.4mg/L		TPH >C10 >1,620ug/L Toluene > 46ug/L	
SMGW-BH-C320	Western Sydney Airport				> 0.5ug/L	Toluene > 34ug/L	
SBT-GW-4003	Bringelly SF					TPH C6-C9 > 20ug/L	
SBT-GW-4005	Bringelly SF				>0.01ug/L		
SBT-GW-4800	Bringelly SF			2.2mg/L			
SBT-GW-4801	Bringelly SF						✓
SBT-GW-4802	Bringelly SF						✓
SBT-GW-4008	Bradfield						✓
SBT-GW-4014-R*	Bradfield				>0.002ug/L		
SBT-GW-4017_R*	Bradfield				>0.0145ug/L	TPH >C10 >880ug/L TPH C6-C9 > 40ug/L	
SBT-GW-4021	Bradfield		28.3mg/L	>16.2mg/L			
SBT-GW-4803-R*	Bradfield						✓

* Trigger levels for replacement wells have been retained based on comparable bore profiles and will be reviewed if required following initial monitoring results

6.2.4 GDE and Salinity monitoring

Risk posed to GDE health by altered groundwater quality is currently considered negligible, and the implementation of the construction groundwater quality monitoring program was determined in the SBT Groundwater Monitoring Program (SMWSASBT-CPG-SWD-SW000-GE-RPT-040404-Rev 4) to be sufficient for GDE monitoring for the Works.

Level monitoring is the primary, leading indicator of potential impact to GDEs. Groundwater level and EC monitoring will be conducted in monitoring wells identified in Table 22, which includes proposed wells in the vicinity of GDEs to specifically monitor GDE conditions.

Groundwater level and quality monitoring will be conducted using data loggers that can record EC, and groundwater level. The loggers have been installed at key monitoring bores between the alignment and GDEs (Table 22) and programmed to record data hourly.

Data loggers will be downloaded and locations manually gauged on a monthly basis, which is considered sufficient as the timing for changes in water level and quality with respect to GDEs is expected to be greater than one month. The monthly download and review of data will be supported by laboratory testing of water quality as outlined in Section 6.3.

All level / EC loggers will record on six-hourly intervals, which may be adjusted over consecutive monitoring events according to observed fluctuations or trends in groundwater conditions.

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TABLE 22 GROUNDWATER BORES TO BE MONITORED FOR EC AND LEVEL DURING CONSTRUCTION

Location	Area	Easting MGA2020	Northing MGA2020	Target stratigraphic unit	Screen Interval (mBTOC)	Monitoring	Status
SMGW-BH-A107	Cross passage XP-N09	292413	6261713	Bedrock	19 - 26	Level / EC	Installed
SWD-TU100-20071-VWP07-A	Claremont Meadows	92049.6	6261277.9	Residual	2.8	Level	Installed
SBT-GW-1042	Orchard Hills	291874.7	6259123.7	Alluvium	2 - 8	Level / EC	Installed
SBT-GW-1063	Orchard Hills	292193.5	6258861.3	Alluvium/Bedrock	2 - 11	Level / EC	Installed
SMGW-BH-A315-R	Orchard Hills	291726.6	6258863.8	Residual/Bedrock	4 - 10	Level / EC	Installed
SBT-GW-3006-R	Airport Terminal	289368	6247844.4	Bedrock	29 - 35	Level / EC	Installed
SBT-GW-3003-A-R	Airport Terminal	290425.6	6248380.7	Bedrock	2 - 5	Level / EC	Installed
SBT-GW-3003-B-R	Airport Terminal	290424.6	6248382.2	Bedrock	1 - 10	Level / EC	Installed
SBT-GW-4000	Cross passage XP-S13	289140.5	6046360.3	Bedrock	2.5 - 13	Level / EC	Installed
SBT-GW-4008	Bradfield	290230	6244991.9	Bedrock	22 - 28	Level / EC	Installed
SBT-GW-4021	Bradfield	291112.5	6243748	Alluvium/Bedrock	2 - 11	Level / EC	Installed

6.2.5 GDE Monitoring Performance Criteria

SSTVs have been developed following completion of baseline groundwater level and quality monitoring (Table 23). The SSTVs may require future revision as limited EC data is available for some locations

TABLE 23 PRELIMINARY EC SSTVS FOR CONTINUOUS EC MONITORING OF GDES

Area	Bore ID	Screened unit	Installed screen or sensor depth (mbgl)	Baseline EC range (µS/cm)	Preliminary EC SSTV (µS/cm)
Claremont Meadows	SBT-GW-1805	Residual	3 - 9	2,480 – 3,100	3,650
Orchard Hills	SBT-GW-1042	Alluvium	2 - 8	11,900 – 12,400	18,600
Orchard Hills	SBT-GW-1063	Alluvium/Bedrock	2 -11	11,650 – 13,293	19,940
Orchard Hills	SMGW-BH-A315-R	Alluvium/Bedrock	4 -10	1,842 – 2,878	4,317*
Bradfield	SBT-GW-4021	Alluvium/Bedrock	2 - 11	21,400 – 22,000	33,000

*this replacement well has been constructed to the same specifications as the original well with a 6 m screen that intersects clay, sandy clay, siltstone, and sandstone. The elevated salinity is considered a result of the natural sandstone which is also supported by EC readings of 23,000 µS/cm and 23,800 µS/cm recorded in 2019, as reported in the Environmental Impact Statement. It is recommended that this SSTV at this location is revised following further monitoring to obtain a larger dataset.

The SSTVs for EC may be refined over time as additional data is available, and existing variability including seasonal trends and vertical stratification are further assessed.

The SSTVs will provide an identifiable indication of a potential change in salinity. A management response will be initiated if any of the following occurs:

- EC data continuously exceeds the SSTV over a period of three months and displays a rising trend
- EC data exceeds the SSTV at any time by more than 150%.

If one or both of the above EC triggers are observed, a review will be initiated to determine the significance of the exceedance(s) and possible causes, including a review to assess the historical and surrounding monitoring bore data, and modelling predictions (refer to Section 7.2 of the SWMP). If applicable, where high saline areas are identified, measures such as planting, regenerating and maintaining native vegetation and good ground cover in recharge, transmission and discharge zones would be implemented where possible.

SSTVs were also developed for level decline at each GDE based on their obligate or facultative dependence. Groundwater level related SSTVs are provided in Table 24.

TABLE 24 LEVEL SSTVS FOR CONTINUOUS LEVEL MONITORING OR GDES

Area	Bore ID	Screened unit	Installed screen depth (mbgl)	Baseline level (mAHD)	Preliminary Level SSTV (mAHD)
Claremont Meadows	SBT-GW-1805	Residual	3 - 9	24.7 to 25.6	21.5
Claremont Meadows	SWD-TU100-20071-VWP07-A (SBT-VWP-1404)	Residual	2.8 (VWP)	26.9 – 27.0	24.9
Orchard Hills	SBT-GW-1042	Alluvium	2 - 8	37.7 – 37.8	33.0
Orchard Hills	SWD-TU150-22010-VWP02 / SBT-VWP-1404	Bedrock	16 (VWP)	33.8 – 35.3	31.0
Orchard Hills	SBT-GW-1063	Alluvium/Bedrock	2 -11	25.4 - 25.7	24.3
Orchard Hills	SMGW-BH-A315-R	Alluvium/Bedrock	4 -10	38.8 - 40	36.9
Bradfield	SBT-GW-4021	Alluvium/Bedrock	2 - 11	59.8 - 59.9	59.1

Where groundwater levels fall below the SSTVs listed in Table 24 as a result of the Works, the GDE mitigation measures detailed in Section 4.4 will be implemented. Data from the monthly downloads will continue to be assessed against the SSTVs to identify where conditions are not as expected or predicted (discussed further below). Data analysis and groundwater monitoring reports will be produced every 6 months (consistent with Section 8 of this document).

6.3 Water treatment plant monitoring

Inflows to the WTPs will be derived primarily through groundwater inflows to excavations that extend below the water table, with additional inflows from rainfall events that result in incidental rainfall over the excavation footprints, and any washdown activities within the catchment of the WTPs.

Daily inflow volumes for groundwater, washdown water and incidental rainfall will be highly variable over the course of the construction activities in response to both progression of the project and natural variability. Variability in flow will be managed through the influent balance tanks of each WTP.

Incidental rainfall into excavations is unlikely to generate significant volumes of additional inflow to WTPs and will be managed through the onsite WTPs, remaining site stormwater falling outside of WTP capture zones will be stored and treated through stormwater management systems (including sediment ponds).

Additional inflows from rainfall will be highly variable in response to variable intensity-duration and antecedent soil conditions. However, additional inflows from rainfall are considered unlikely to exceed the treatment capacity of the WTPs. Inputs to the WTPs will decrease over time as station box construction progresses and the structures become hydrostatically tanked.

Parklife Metro D&C will continue water quality monitoring at WTPs that are operated as part of SSTOM Works.

The proposed monitoring program will provide monitoring data for effluent water quality retained within the storage tank prior to discharge, including:

1. Live continuous monitoring of pH and turbidity
2. Field monitoring of electrical conductivity

3. Sampling and laboratory testing for the parameters as required by the EPL criteria or Sydney Water Trade Waste agreement where applicable for each WTP

All laboratory testing will be undertaken to quantify contaminants at levels commensurate with comparison against the adopted discharge criteria and ANZECC (2000) and ANZG (2018) default guideline values. Contaminants for which practical quantification limits (PQL) are greater than default guideline values will be noted within each monitoring report.

7 Monitoring methodology

7.1 Overview

This section details the groundwater monitoring methodology which has been implemented during the SBT Works and has been reviewed and incorporated into the methodology implemented during SSTOM Works. Procedures for the collection of continuous and discrete groundwater monitoring data are provided, including all quality assurance / quality control requirements. Specifically, this methodology provides an approach for collection and assessment of the following environmental datasets:

- Groundwater level as metres below top of bore casing (mBTOC) groundwater and mAHD (measurement and datalogger download)
- Groundwater salinity as electrical conductivity (measurement and datalogger download)
- Groundwater quality at key locations (field measurement and sample collection)
- WTP discharge water quality (field measurement and sample collection)
- Groundwater inflows (collection of pump flow meter data).

The methodology also provides quality assurance / quality control procedures for collecting and managing environmental datasets.

The groundwater sampling methodology has been developed for compliance with the following Australian and International Standards and Guidance:

- AS/NZS 5667.11:1998: Water Quality – Sampling Part 11: Guidance on Sampling of Groundwaters (Reconfirmed 2016)
- AS/NZS 5667.1:1998: Water Quality – Sampling Part 1: Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples (Reconfirmed 2016)
- Sundaram, B., Feitz, A., Caritat, P. de, Plazinska, A., Brodie, R., Coram, J. and Ransley, T., 2009. Groundwater Sampling and Analysis – A Field Guide. Geoscience Australia, Record 2009/27 95 pp.

7.2 Continuous Groundwater Monitoring

Continuous groundwater monitoring will be undertaken to monitor for changes to groundwater conditions during the Works. The continuous monitoring infrastructure will include a combination of vibrating wire piezometers and standard monitoring bores fitted with dataloggers. The monitoring and data collection methodology for each are discussed in further detail below.

7.2.1 Vibrating Wire Piezometers

The vibrating wire piezometers (VWPs) that form a part of the groundwater monitoring network for the project are identified in Table 17 and shown on Figures A1 to A7 contained in Appendix B.

VWPs are used to monitor porewater pressure and can also be used to monitor water levels. The VW piezometer converts water pressure to a frequency signal via a diaphragm, a tensioned steel wire, and an electromagnetic coil.

The piezometer is designed so that a change in pressure on the diaphragm causes a change in tension of the wire. An electro-magnetic coil is used to excite the wire, which then vibrates at its natural frequency. The vibration of the wire in the proximity of the coil generates a frequency signal that is transmitted to the readout device.

The readout or data logger stores the reading in Hz. Modern data logger readouts may also automatically convert the reading in Hz to a pressure or level reading when a suitable pre- calibration is used. For non-

vented piezometers, barometric pressure corrections are required because the space inside the piezometer isolated and disconnected from the atmosphere. Vented piezometers designed to eliminate barometric effects, and as such barometric pressure corrections are not required.

VWPs are set to record data at a maximum interval of once every six hours and are telemetered with real time data available via the project portal SensGrid. VWP monitoring data was reviewed on a weekly basis by SBT during the initial construction stages of the project for all excavations, including cross-passages, and as TBM operations progress along the alignment. Following initial expected groundwater drawdown VWP monitoring data will continue to be monitored by PLM D&C on a monthly basis for wells associated with GDE monitoring and six-monthly for the remainder of the network.

Results from repeat monitoring rounds will be collated into continuous data graphs to show any trends in groundwater levels over time and infer any trends that may be attributable to construction activities.

7.2.2 Groundwater monitoring bores

The groundwater monitoring bores that form a part of the groundwater monitoring network for the project are identified in Figures A1 to A7 contained in Appendix B.

Select standpipe piezometers have been fitted with level and EC data-loggers for the continuous measurement of groundwater levels and electrical conductivity of groundwater for GDE monitoring, and level monitoring (detailed in 6.2).

Data-loggers are set at a depth lower than the predicted minimum water table elevation, accounting for natural variations and artificially induced drawdown, with sensors set within the screened interval for accurate assessment of groundwater salinity.

The data-loggers are set to record data at a maximum interval of every six (6) hours. Monitoring data will be downloaded and reviewed monthly for GDE monitoring, and six monthly for other locations to assess changes in groundwater levels and EC during the construction stages of the project. All data will be downloaded directly from the readouts by manual collection.

The static groundwater level will be measured and recorded at each standpipe piezometer using an oil/water interface probe to verify the continuous data recorded by dataloggers and identify any non-aqueous phase liquid (NAPL) contamination. The methodology for the manual measurement of groundwater levels is summarised in Section 7.3.

7.3 Manual groundwater level measurements

Discrete interval groundwater level monitoring will be undertaken on a regular basis where groundwater is sampled for the construction groundwater monitoring (identified in Section 6 **Error! Reference source not found.** to **Error! Reference source not found.**) to collect information on groundwater conditions during construction stages of the project.

Groundwater levels will be measured and recorded at all relevant standpipe piezometers using an oil-water interface probe. Measurements collected using the interface probe will be used to verify / calibrate any continuous data collected by data-loggers and check for the presence of any hydrocarbon Light non-aqueous phase liquids (LNAPL) and dense non-aqueous phase liquids (DNAPL).

The level (to the nearest millimetre) of groundwater and LNAPL / DNAPL (if present) will be referenced to a known (and consistent) surveyed point at the top of the bore casing (mTOC). This measurement will be corrected to mAHD using survey data.

Recorded groundwater level will be tabulated in both mBTOC and mAHD. The base of the bore will be measured and recorded on each manual groundwater monitoring event by lowering the dipper to the base of the bore until it touches the bottom, where possible.

LNAPL product layers will be present as an oil-product layer on top of the groundwater level. DNAPL is determined by lowering the probe to the base of the well.

All groundwater level monitoring will be carried out prior to any purging and sampling activities (where applicable).

7.4 Groundwater Sampling

The purpose of groundwater sampling is to retrieve a water sample that represents the characteristics of water below the ground surface. There are a number of methods that can be adopted to collect representative groundwater samples, including but not limited to:

- Borehole purging
- Low-flow sampling
- Passive sampling
- Hydrasleeve sampling.

The sampling methodology selected for the groundwater monitoring program is discussed in the following sections.

7.4.1 Sampling Methodology

The groundwater monitoring program will adopt the Hydrasleeve™ sampling methodology for the collection of all groundwater samples at all sites identified in Section 6 and **Error! Reference source not found.** to **Error! Reference source not found.**.

The Hydrasleeve™ methodology has been adopted as it allows for multi-level sampling in a single well and are well suited to relatively low permeability aquifers where drawdown can be an issue with low-flow. A Hydrasleeve™ captures a core of water, typically 1 litre, from the screened interval of the well. The Hydrasleeve™ is deployed to a target depth based on screened interval. Where a single depth is sampled, the Hydrasleeve™ is installed at 1.5 m below the top of the screen interval (i.e. within the screen). Where the groundwater table is within the screen interval, the Hydrasleeve™ is installed at 1.5m below the standing groundwater level.

Prior to installation of the Hydrasleeve™ and/ or sample collection, groundwater levels are to manually gauged.

After installation, the Hydrasleeve™ is left undisturbed until conditions are considered to have stabilised. The time to stabilise depends on the transmissivity of the aquifer, with more transmissive aquifer stabilising more rapidly. Typically, a minimum of five (5) days should be allowed for stabilisation, which is considered appropriate given many bores are screened within the bedrock aquifer.

The Hydrasleeve™ is sealed except during sample collection when it is pulled up through the sampling interval, and re-seals once full. Therefore, only groundwater from the target depth interval is sampled and recovered.

For analysis of volatile organic compounds (VOCs), to reduce volatile losses, samples should be collected as rapidly as practicable with minimal agitation and zero headspace in sample bottles. Sample containers should be placed directly into ice filled coolers and transported to the NATA accredited laboratories under Chain of Custody (COC) processes. Samples are required to be documented as received by the laboratory chilled and intact. Samples should be submitted as soon as practicable to the laboratories to prevent loss while in storage or transit and analysed within recommended holding times.

7.4.2 Field Measurements

Some physicochemical parameters cannot be reliably measured in the laboratory as their characteristics change over a very short time scale. Parameters that should thus be measured in the field include pH, electrical conductivity (EC), temperature, dissolved oxygen (DO), redox potential (Eh) and alkalinity.

Water quality parameters will be measured using a calibrated field water quality meter following sample collection and recorded in the field.

Other visual and olfactory observations such as odour, colour and indications of gross contamination (i.e. LNAPL/ DNAPL) should also be recorded in the field on appropriate field sheets/tablets. A Standard Operating Procedure (SOP) compliant with AS/NZS 5667.11:1998 should be developed and adhered to for all Hydrasleeve™ sampling operations, including the collection of field parameters.

7.5 Effluent Water Quality – Water Treatment Plant

7.5.1 In-Line Monitoring

The construction WTPs will be designed to include in-line monitoring sensors to monitor pH and turbidity prior to effluent discharge. If either parameter is out of range an alert will be sent to the WTP operator to recirculate water through the WTP until parameters are within the required range. Once parameters are within the required range, effluent will be discharged to either trade waste or the relevant receiving waterway (depending on whether the effluent is suitable for discharge to receiving waterways under the EPL conditions).

7.5.2 Sampling Methodology

Grab samples will be collected manually from the WTP locations as per the frequencies specified in the EPL to verify that water from the WTPs remain below the limits identified in the EPL, if discharge to the environment is occurring. The volume of sample collected will be sufficient for the required physio-chemical (field) parameter analysis using a multi-probe water quality meter(s). Sampling will otherwise be in accordance with the requirements of any valid Trade Waste Agreement for any discharge to Sydney Water sewer asset.

An SOP will be developed to provide a consistent methodology in collection of samples from each WTP.

7.5.3 Field Measurements

Field physio-chemical parameters including temperature, EC, pH, DO, and turbidity will be measured at each sampling location using a calibrated multi-probe hand-held water quality meter immediately prior to collection of water quality samples. The collection of field measurements should follow a similar approach to that of field parameters collected from groundwater monitoring bores (Section 7.4.2).

Other observations including odour, colour and indications of gross contamination will also be recorded on field logging sheets.

7.6 Field Notes

Field notes for each monitoring location will be recorded on appropriate field sheets (hard copy or digital). Details to be recorded on field notes include:

- Unique sampling identification nomenclature consisting of the sample date, location, and sampler details.
- Stable readings from field parameter testing
- Observations of contamination including odour, colour and indications of gross contamination
- Weather conditions at the time of sampling or field investigation

- Any other relevant observations which may affect field or laboratory testing results.

7.7 Field Quality Assurance / Quality Control

7.7.1 Sampling Records

The following information will be included with the results from water quality monitoring:

1. The date(s) on which the sample was taken
2. The time(s) at which the sample was collected
3. The point at which the sample was taken (location ID)
4. The name of the person who collected the sample

7.7.2 Decontamination Procedures

All non-disposable sampling equipment will be decontaminated before and between sampling events to reduce the potential for cross contamination to occur between samples. Decontamination will include the following procedure:

- Washing non-disposable sampling equipment in a solution of phosphate free detergent (e.g. Liquinox) and potable water
- Rinsing with distilled water
- Rinsing with water from sample location prior to sample collection.

7.7.3 Field Method Blanks

One field method blank will be collected for each sampling round. The field method blank will be used to assess potential for cross contamination from the use of any non-disposable equipment that may be used in the sampling process. The field method blank will be collected by rinsing non- disposable sampling equipment with distilled water (following decontamination procedures) and collecting rinse water in the required laboratory testing containers. Field method blanks will not be required where sampling is conducted without the use of non-disposable equipment.

7.7.4 Intra-Laboratory Duplicates

Intra-laboratory field duplicates will be collected on an average frequency of one sample per twenty samples collected (5%), with an increased frequency for PFAS of one per ten (10%) according to NEMP 2.0. The analytical results of the two spilt samples will be compared to assess the precision of the sampling protocol and provide an indication of variability in the sample source. The relative percentage difference (RPD) acceptance limits will be:

- No limit analytical results <10 times Level of reporting (LOR)
- 50% analytical results 10-20 times LOR
- 30% analytical results >20 times LOR.

The RPD exceedances (if any) will be assessed to determine whether the project DQO's can still be addressed. If not, then further sampling and/or analysis may be required.

7.7.5 Inter-laboratory Duplicates (Triplicates)

Inter-laboratory field duplicates will be collected on an average frequency of one sample per twenty samples collected (5%) with an increased frequency for PFAS of one per ten (10%) according to NEMP 2.0. The

analytical results of the two spilt samples will be compared to assess the precision of the sampling protocol and provide an indication of variability in the sample source. The relative percentage difference (RPD) acceptance limits will be:

- No limit analytical results <10 times LOR
- 50% analytical results 10-20 times LOR
- 30% analytical results >20 times LOR.

RPD exceedances (if any) will be assessed and whether the project data quality objectives (DQO) can still be addressed. If not, then further sampling and/or analysis may be required.

7.7.6 Trip Blanks

Trip blanks will be used and analysed for a batch of samples provided to the laboratory. Trip blanks will be analysed for BTEX and assess whether sample storage and transport procedures minimise the introduction of contamination to a sample during storage and transport.

The acceptance limit shall be the detected concentrations in the trip blank, are less than the applicable LOR. The significance of acceptance limit exceedances will be assessed and whether the project DQO's can still be addressed. If not, then further sampling and/or analysis may be required.

7.8 Laboratory Selection and Water Quality Testing Parameters

7.8.1 Laboratory Selection

The primary and secondary laboratories used for this project will be NATA-accredited for the analyses being undertaken.

7.8.2 Laboratory Testing Parameters

All water quality samples will be scheduled for analysis of the parameters identified in Table 19 at the nominated NATA accredited testing laboratory, with the testing frequency listed in Table 20. Sampling frequencies will be increased to quarterly sampling where action triggers are exceeded as detailed in Table 21 and discussed in Section 6.2.3. Quality control samples will be analysed for the basic suite, with additional QC analysis sufficient to meet the duplicate requirements as detailed in Section 7.7.4 and 7.7.5.

7.8.3 Sample Filtration and Preservative Requirements

The proposed sample filtration and preservative requirements for the laboratory testing parameters are presented in Table 25. Filtration should be carried out in the filed for all samples unless otherwise specified so that results are representative of dissolved concentrations.

TABLE 25 SAMPLE FILTRATION AND PRESERVATIVE REQUIREMENTS

Analyte Suite	Field Filtration	Preservative	Comments
General Water Quality	Not Required	Not required	
Select Nutrients	0.45µm	Sulfuric acid (H2SO4)	
Dissolved Metals	0.45µm	Not required	
Total Metals	Not Required	Hydrochloric acid (HCl)	

Analyte Suite	Field Filtration	Preservative	Comments
Petroleum Hydrocarbons	Not Required	Not required	Sample bottles required to be filled with zero headspace
BTEXN of Volatile organic compounds	Not Required	Sulfuric acid	Sample bottles required to be filled with zero headspace
Semi-volatile organic compounds	Not Required	Not required	Sample bottles required to be filled with zero headspace
Perfluorinated alkyl substances	Not Required	Not required	

7.9 Laboratory Quality Assurance / Quality Control

7.9.1 Laboratory Data Quality Indicators

The laboratory data quality will be assessed by checking the following:

- Laboratory methods used are NATA accredited
- Laboratory limits of reporting are less than adopted assessment criteria
- Samples are extracted and analysed within holding times
- Results of method blanks, surrogate, lab control sample, spike recoveries relative percentage differences (RPDs) between primary and duplicate laboratory samples.

Data Quality Indicators (DQI) that will be adopted for quality control samples are presented in Table 26.

TABLE 26 PROPOSED DATA QUALITY INDICATORS

Type of Quality Control Sample	Control Limit	
Method blank	Analytical result < LOR	
Surrogate % recovery	50% to 150%	
Lab control sample % recovery	70% to 130%	
Spike % recovery	70% - 130% for inorganics 60% - 140% for organics	
RPD	No limit 50% 30%	Analytical results <10 times LOR Analytical results 10-20 times LOR Analytical results >20 times LOR

In the event that the results of a laboratory quality control sample exceed the relevant adopted control limit, the laboratory will be requested assess the significance of the exceedance on the quality of the laboratory analytical data for the relevant batch.

The significance of the control limit exceedance will be assessed and whether the project DQO's can still be addressed. If not, then further sampling and/or analysis may be required.

7.10 Suitability of Sampling Results

If the results of the laboratory analytical data and field data quality assessment are acceptable (i.e., comply with the procedures, requirements and limits set out in Table 27, then the sampling data will be considered

suitable for the purposes of the project. Data will be assessed for completeness, comparability, representativeness, precision, and accuracy.

TABLE 27 SAMPLING DATA QUALITY INDICATORS

Field Considerations	Laboratory Considerations
Completeness	
All critical locations sampled **All samples collected (from grid and at depth)** **SOPs appropriate and complied with** **Experienced sampler** **Correct documentation**	All critical samples analysed in accordance with the data quality objectives All analytes analysed in accordance with the data quality objectives Appropriate methods and LORs. Sample documentation complete Sample holding times compliant
Comparability	
Same SOPs used on each occasion **Experienced sampler** **Climatic conditions (temperature, rainfall, wind)** **Same types of samples collected (filtered, size fractions)**	Sample analytical methods used (including clean-up) Sample LORs (justify/quantify if different) Same laboratories (justify/quantify if different) Same units (justify/quantify if different)
Representativeness	
Appropriate media sampled in accordance with the data quality objectives **All media identified in data quality objectives sampled**	All samples analysed in accordance with the data quality objectives
Precision	
SOPs appropriate and complied with	Analysis of: • Laboratory and inter-laboratory duplicates • Feld duplicates • Laboratory-prepared volatile trip spikes
Accuracy	
SOPs appropriate and complied with	Analysis of: • Feld blanks • Rinsate blanks • Reagent blanks • Method blanks • Matrix spikes • Matrix spike duplicates • Surrogate spikes • Reference materials • Laboratory control samples • Laboratory-prepared spikes

Two types of error should be considered when assessing the results from monitoring, including:

- **Type I error (false positive):** Deciding that water quality samples exceed the environmental trigger values when they do not; and
- **Type II error (false negative):** Deciding that water quality samples do not exceed the environmental trigger values when they do.

The potential for decision errors will be managed through confidence in the reliability of assessment methods (e.g., field observations, laboratory analysis and data review) and appropriate levels of qualification and/or experience in the personnel undertaking the relevant task.

7.11 Suitably Qualified Staff

Any staff or contractors undertaking water quality sampling for the monitoring program should be suitably qualified and experienced to undertake the required activities to ensure a suitable level quality assurance / quality control in sampling results.

At a minimum staff or contractors undertaking water quality sampling must have qualifications and experience relevant to the work being undertaken.

8 Compliance management

8.1 Roles and responsibilities and training

The Parklife Metro D&C organisational structure and overall roles and responsibilities are outlined in Section 3.5 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 7.1 of the SWMP.

All employees, contractors and utility staff working on site will undergo site induction training relating to groundwater management issues, detailed in the Section 3.6.1 of the CEMP.

Further details regarding staff training are outlined in Section 3.6 of the CEMP.

8.2 Groundwater monitoring

Groundwater monitoring requirements are detailed in Section 6 and include the location, parameters to be monitored, analysis suite and frequency of monitoring. Groundwater monitoring methodology is summarised in Section 7.

8.3 Data analysis and response

Groundwater level records from data loggers will be manually compensated for barometric pressure and converted to the Project datum (m AHD). Manual groundwater level measurements will be corrected for salinity and used to validate the accuracy of continuous groundwater level records.

Groundwater level monitoring results from VWPs, data loggers and manual groundwater measurements will be compared to groundwater model predicted drawdown and GDE SSTVs where relevant. If potential adverse impacts arise as a result of this comparison, the implementation of additional mitigation measures will be considered including:

- Targeted ground improvement and grouting to limit groundwater inflows into station excavations to reduce groundwater drawdown
- Design of undrained temporary retention systems to minimise groundwater inflow into station excavations and reduce groundwater drawdown
- Supplementing groundwater supply at affected groundwater dependent ecosystems or watercourses
- Make good provisions for groundwater supply wells impacted by changes in groundwater level or quality.

Local rainfall trends will be considered to assess the impacts of seasonal variability in groundwater levels during construction. Groundwater level observations will be used to inform future revision of this Groundwater Monitoring Program.

Groundwater quality results from monitoring bores will be compared to baseline data following each monitoring event. Trends will be reviewed to assess potential mobilisation of existing contamination due to construction. EC results from data loggers will be compared to SSTVs following data collection and if required, inform the implementation of any mitigation measures.

Water treatment plant sample results will be compared with discharge criteria monthly and reported in the six-monthly groundwater report, or as required by the EPL or Trade Waste Agreement.

8.4 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, and compliance with this Monitoring Program, the SSI 10051 Planning Approval, and other relevant approvals, licences and guidelines.

Additional audit requirements are detailed in Section 3.9 of the CEMP.

8.5 Reporting and records

8.5.1 Reporting

The CEMP details the reporting and record keeping requirements and processes, and complaints management and reporting. Reporting requirements specific to the groundwater monitoring program are presented in Table 28.

Detailed periodic review and reporting of groundwater level and quality will be conducted during construction.

Groundwater level and quality results will be compared to baseline results and adopted performance criteria. Monitoring reports will be submitted to DPHI, DCCEEW, Sydney Water (where required) and Sydney Metro within 90 days of the reporting period unless otherwise agreed with DPHI.

Project reporting requirements are summarised in Table 28.

TABLE 28 GROUNDWATER MONITORING REPORTING SCHEDULE

Report	Requirement	Recipient
Construction Monitoring Reports	Construction monitoring reports be undertaken 6-monthly and will include a comparison of observed levels to model predictions (and GDE SSTVs established in Section 6.4, where relevant) and groundwater quality to SSTV and baseline data. A summary of construction status and inflow during the reporting period will be presented. A summary of WTP discharge compliance will be presented. The operation of groundwater management measures during the reporting period will be summarised and the requirement for any additional management measures will be documented. If connection to a Sydney Water asset is required, then the reporting of the data collected under C16(l) would be provided, as required by Sydney Water. On approval from the ER a final construction monitoring report will be provided at the completion of construction for the final six month monitoring period. This report will: • Confirm excavations and structures are hydrostatically tanked • Advise on decommissioning of remaining monitoring bores in line with the completion of the monitoring program • Provide recommendations for any ongoing operational monitoring if required for Parklife O&M	SM, ER, DPHI, DCCEEW, Sydney Water (if required), NSW EPA (if requested)

Monitoring, reporting and engagement requirements will be agreed with Sydney Water where Sydney Water assets are used to receive discharged water, as part of a trade waste agreement or similar.

8.5.2 Records

In addition to the record keeping detailed in the CEMP, the following compliance records will be retained by Parklife Metro D&C:

- Records of groundwater monitoring bores and wells in the immediate vicinity of project sites (if monitoring locations change due to damage to a bore, or a bore need to be added or removed, this will be noted in the six-monthly Monitoring Report. The Monitoring Program will be revised annually as noted in Section 9).
- Records of groundwater levels and water quality testing
- EPL Annual Reports
- Groundwater monitoring field sheets
- WTP operational performance data
- Laboratory records.

9 Review and Improvement

9.1 Review

Where trigger levels as set out in Section 6 are exceeded, this Monitoring Program will be reviewed, and if necessary, revised to account for the observed conditions. This may include assessment of the appropriateness of existing trigger levels based on the observed response and inferred risk to sensitive groundwater receptors, and revision of trigger levels.

9.2 Continual improvement

Monitoring data will be reviewed throughout construction for continual improvement. Section 3.11 of the CEMP describes the process for the continual improvement of project documents.

Continual improvement of this Monitoring Program will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets and Project performance outcomes of the EIS for the purpose of identifying opportunities for improvement.

The continual improvement process is intended to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets.

9.3 Updates to Monitoring Program

This Monitoring Program has been reviewed and updated in line with the following reports:

- Biannual Groundwater Monitoring Report June 2024 to December 2024, prepared by CPBG (SMWSASBT-CPG-SWD-SW000-GE-RPT-040426)
- Biannual Groundwater Construction Monitoring Report – September to November 2024, prepared for Parklife Metro D&C (SMWSASSM-PLD-SWD-SW000-WA-RPT-000004) and
- Biannual Groundwater Construction Monitoring Report – December 2024 to July 2025, prepared for Parklife Metro D&C (SMWSASSM-PLD-SWD-SW000-WA-RPT-000006)

The monitoring network will be the subject of continual review and revision. The six-monthly monitoring reports will recommend when monitoring locations may be discontinued and/or where destroyed bores may need to be replaced or relocated. This advice will be reviewed by Parklife D&C in conjunction with Sydney Metro and the ER on a six-monthly basis. This review will confirm the adequacy of monitoring program and enable close-out of monitoring locations as required. Appendix B of this document will be used as the basis for ongoing review throughout the Project, and this Monitoring Program will be updated at a minimum annually unless otherwise triggered.

There are a number of mechanisms which may trigger additional review and revision of the document:

- Receipt of new data that materially affects the interpretations that underpin the requirement for groundwater monitoring and/or management
- The identification of previously unknown contaminant sources / plume(s) of contaminated groundwater that may be influenced by the Works)

The ER may endorse minor updates to this Groundwater Monitoring Program in accordance with Condition A32(j) of the Approval.

Appendix A Records of Consultation

Consultation Summary

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
1.1 Water Licensing	DPE Water	**Recommendation prior to approval** That the proponent includes a methodology for how groundwater inflows are to be monitored and gauged/metered to enable accurate accounting for water take. Noting the exemption under Schedule 4(3) of the Water Management (General) Regulation 2018 does not apply to this project. **Explanation** Consent condition C16 notes the Groundwater Construction Monitoring Program should include monitoring and gauging of groundwater inflow to the excavations to enable full accounting from the Sydney Basin Central Groundwater Source. It is unclear how these volumes are going to be estimated and measured. The proponent mentions being exempt from the requirement of a Water Access Licence as they are a transport authority (Schedule 4 Clause 3 of the Water Management (General) Regulation 2018. While this project is a rail project it is not assessed under section 5.5 of the EP&A Act 1979, so the exemption does not apply. A Water Access Licence is required to account for all water take for both construction and operation unless another exemption applies.	Section 6.3 has been amended to refer to a new section (section 7.6) which describes the groundwater inflow monitoring process. PLM believe that the Water Access Licence exemption that is applied under Schedule 4 Part 1 Section 3(1) applies to the project. Section 1.6 of the Monitoring Program has been updated to commit to investigating the applicability of this exemption, and to updating the Monitoring Program if the findings of this investigation determine that changes are required.
2.1 Groundwater monitoring and management	DPE Water	**Recommendation prior to approval** That the proponent clarifies the groundwater level and groundwater quality monitoring data over time (including baseline and during SBTW) for the project by the inclusion of hydrographs and timeseries plots in relevant sections of the document that discuss the background (baseline) and ongoing outcomes of the monitoring. Alternatively this information could be included in an appendix. **Explanation** Whilst data was included in appendices, no hydrographs or groundwater quality time series plots were presented to enable adequate review of the discussed groundwater level data and quality matters. DPE Water consider the document sections discussing the results of existing monitoring	Commitment to including hydrographs and timeseries plots in ongoing construction monitoring report has been included in Section 8.5.1, Table 32 of the Monitoring Program. Commitment to include a review of background and baseline and produce hydrographs and/or timeseries plots is also included in the Groundwater Review Report in Section 8.5.1, Table 32, to be completed by PLM prior to being responsible for groundwater monitoring.

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
		outcomes or background (baseline) including site specific trigger values (SSTV's) would be greatly enhanced by inclusion of groundwater level hydrographs and groundwater quality time-series plots	SBTs 6-monthly construction monitoring report includes hydrographs and timeseries plots, and PLMs construction monitoring reports will continue to provide this information once responsibility for monitoring is transferred to PLM.
2.2 Groundwater monitoring and management	DPE Water	**Recommendation prior to approval** That a commitment be included for groundwater monitoring to be continued after completion of all construction activities for a minimum period of five (5) years, with ongoing monthly assessment and six-monthly reporting. Audits and a monitoring program performance review must be undertaken prior to the start of operation, and annually. **Explanation** Condition C21 states 'The Construction Monitoring Programs must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary or the Environmental Representative, whichever is the greater.' DPE-Water routinely recommends additional post construction groundwater impact monitoring for this scale of project. As the proponent states the SSTOM also includes a component of "operation and maintenance of the new metro railway line and its assets" DPE-Water would reasonably expect that the groundwater monitoring program outlined would continue throughout the whole of this phase without the need to change to a new management regime. However, it is considered that an audit and performance review of the monitoring program to date must be undertaken prior to start of these operations, which may be at this junction in the project.	Recommendation for any ongoing monitoring to be determined prior to completion of construction. Section 8.5.1, Table 32 of the Monitoring Program has been updated to include a commitment for a review of monitoring requirements prior to the end of construction. This review will be undertaken by a suitably qualified professional.
2.3 Groundwater monitoring and management	DPE Water	**Recommendation prior to approval** That the proponent ensures daily measurement of the amount of water discharged from the water treatment plants (WTPs) will be measured and recorded to be compliant with consent condition C16(g).	Section 7.5.1 of the Monitoring Program has been updated to include a commitment to monitor and record the daily volume of water discharged from WTPs.

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
		Explanation The proponent discusses the collection of pump flow meter data from pumping groundwater to the water treatment plants, which DPE-Water considers relevant data to collect. However, this activity does not meet the requirement of consent condition C16 '(g) daily measurement of the amount of water discharged from the water treatment plants.' To be compliant with this condition the proponent will need to clarify that the daily measurement of the amount of water discharged from the water treatment plants will be measured and recorded.	
2.4 Groundwater monitoring and management	DPE Water	**Recommendation post approval** That the proponent includes additional monitoring bore sites perpendicular to the alignment of the station box cuts and tunnel dive sites to capture the groundwater drawdown levels away from the alignment. This is to verify/validate the predicted area of influence and the predicted drawdown levels. **Explanation** The monitoring program groundwater monitoring bores are dominantly along the linear alignment of the project rail corridor, especially off the Western Sydney Airport precinct. This linearity of the monitoring should be improved by some of the intended new monitoring bore instalment, however DPE Water notes that the majority of these are concentrated in areas of known or postulated contamination. As such these bores may not be ideally positioned to capture or enhance the monitoring of the predicted drawdown area of influence away from the alignment	Section 8.5.1, Table 32 of the Monitoring Program has been updated to include a commitment for the Groundwater Review Report to include a recommendation for any ongoing monitoring bore sites.
2.5 Groundwater monitoring and management	DPE Water	**Recommendation post approval** That the proponent includes in the Trigger Action Response Plan (TARP) response "Where an exceedance of a SSTV is identified" the action to report to the appropriate authorities the exceedance, including any qualitative assessments of the cause and of the risks, plus the proposed or enacted management / mitigation measures within sixty days of the event. **Explanation**	Section 6.1.1 and 6.2.1 of the Groundwater Monitoring Program has been updated to include notification of exceedances to the applicable authorities, and includes a reference to reporting exceedances to DPE Water. Note that PLM will only be responsible

Document Reference	Stakeholder	Comment	Parklife Metro D&C Response
		The Trigger Action Response Plan (TARP) response "Where an exceedance of a SSTV is identified" does not include notification of the authorities. DPE Water considers the need to report to the appropriate authorities of the exceedance, including all qualitative assessments of the cause and of the risks, plus the proposed or enacted management / mitigation measures within sixty days of the event must be included in the TARP.	for such reporting once taking over the monitoring.
2.6 Groundwater monitoring and management	DPE Water	**Recommendation post approval** That the proponent updates the Site-Specific Trigger Values (SSTVs) and other impact assessment criteria (Environment Protection Licence (EPL) requirements) in revised groundwater management and monitoring plans upon completion of additional baseline groundwater level and quality monitoring studies or the grant of an EPL. **Explanation** Changes to the fundamental assessment criteria within the monitoring program and management plan must be updated in revised versions of these documents to aid clarity of the procedure and context of the assessment values being used	Noted. PLM commit to updating the GW Mon. Prog. prior to taking responsibility of the monitoring. Section 6.1.1 and 6.2.1 of the Groundwater Monitoring Program has been updated to clarify that this update will include a review of the SSTVs.

1 DPE Water

Department of Planning and Environment

Our ref: OUT23/9244

[redacted]
Director Project Environment, Sustainability and Planning
Sydney Metro-Western Sydney Airport
Sydney Metro
PO Box K659
HAYMARKET NSW 1240

20 June 2023

Subject: **Sydney Metro Western Sydney Airport – Stations, Systems, Trains, Operations and Maintenance (SSTOM) (CSSI-10051) Groundwater Monitoring Program**

Dear [redacted]

I refer to your request for advice sent on 24 May 2023 to the Department of Planning and Environment (DPE) Water about the above matter.

DPE Water has reviewed the groundwater monitoring program and makes recommendations regarding monitoring data presentation, reporting and water licensing prior to finalising the plan, and enhancements to the monitoring bore network and Trigger Action Response Plan for the future. Please note our more detailed advice in Attachment A.

Should you have any further queries in relation to this submission please do not hesitate to contact DPE Water Assessments at water.assessments@dpie.nsw.gov.au

Yours sincerely,

[redacted]
Manager Assessments, Knowledge Division
Department of Planning and Environment: Water

Attachment A

Detailed advice regarding the Sydney Metro Western Sydney Airport – Stations, Systems, Trains, Operations and Maintenance (SSTOM) – Groundwater Monitoring Program (CSSI-10051)

1.0 Water licensing

1.1 Recommendation prior to approval

That the proponent includes a methodology for how groundwater inflows are to be monitored and gauged/metered to enable accurate accounting for water take. Noting the exemption under Schedule 4(3) of the Water Management (General) Regulation 2018 does not apply to this project.

Explanation

Consent condition C16 notes the Groundwater Construction Monitoring Program should include monitoring and gauging of groundwater inflow to the excavations to enable full accounting from the Sydney Basin Central Groundwater Source. It is unclear how these volumes are going to be estimated and measured.

The proponent mentions being exempt from the requirement of a Water Access Licence as they are a transport authority (Schedule 4 Clause 3 of the Water Management (General) Regulation 2018. While this project is a rail project it is not assessed under section 5.5 of the *EP&A Act 1979,* so the exemption does not apply. A Water Access Licence is required to account for all water take for both construction and operation unless another exemption applies.

2.0 Groundwater monitoring and management

2.1 Recommendation prior to approval

That the proponent clarifies the groundwater level and groundwater quality monitoring data over time (including baseline and during SBTW) for the project by the inclusion of hydrographs and timeseries plots in relevant sections of the document that discuss the background (baseline) and ongoing outcomes of the monitoring. Alternatively this information could be included in an appendix.

Explanation

Whilst data was included in appendices, no hydrographs or groundwater quality time series plots were presented to enable adequate review of the discussed groundwater level data and quality matters. DPE Water consider the document sections discussing the results of existing monitoring outcomes or background (baseline) including site specific trigger values (SSTV's) would be greatly enhanced by inclusion of groundwater level hydrographs and groundwater quality time-series plots.

2.2 Recommendation prior to approval

That a commitment be included for groundwater monitoring to be continued after completion of all construction activities for a minimum period of five (5) years, with ongoing monthly assessment and six-monthly reporting. Audits and a monitoring program performance review must be undertaken prior to the start of operation, and annually.

Explanation

Condition C21 states 'The Construction Monitoring Programs must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary or the Environmental Representative, whichever is the greater.'

DPE-Water routinely recommends additional post construction groundwater impact monitoring for this scale of project. As the proponent states the SSTOM also includes a component of "operation and maintenance of the new metro railway line and its assets" DPE-Water would reasonably expect that the groundwater monitoring program outlined would continue throughout the whole of this phase without the need to change to a new management regime. However, it is considered that an audit and performance review of the monitoring program to date must be undertaken prior to start of these operations, which may be at this junction in the project.

2.3 Recommendation prior to approval

That the proponent ensures daily measurement of the amount of water discharged from the water treatment plants (WTPs) will be measured and recorded to be compliant with consent condition C16(g).

Explanation

The proponent discusses the collection of pump flow meter data from pumping groundwater to the water treatment plants, which DPE-Water considers relevant data to collect. However, this activity does not meet the requirement of consent condition C16 '*(g) daily measurement of the amount of water discharged from the water treatment plants.*' To be compliant with this condition the proponent will need to clarify that the daily measurement of the amount of water discharged from the water treatment plants will be measured and recorded.

2.4 Recommendation post approval

That the proponent includes additional monitoring bore sites perpendicular to the alignment of the station box cuts and tunnel dive sites to capture the groundwater drawdown levels away from the alignment. This is to verify/validate the predicted area of influence and the predicted drawdown levels.

Explanation

The monitoring program groundwater monitoring bores are dominantly along the linear alignment of the project rail corridor, especially off the Western Sydney Airport precinct. This linearity of the monitoring should be improved by some of the intended new monitoring bore instalment, however DPE Water notes that the majority of these are concentrated in areas of known or postulated contamination. As such these bores may not be ideally positioned to capture or enhance the monitoring of the predicted drawdown area of influence away from the alignment.

2.5 Recommendation post approval

That the proponent includes in the Trigger Action Response Plan (TARP) response "Where an exceedance of a SSTV is identified" the action to report to the appropriate authorities the exceedance, including any qualitative assessments of the cause and of the risks, plus the proposed or enacted management / mitigation measures within sixty days of the event.

Explanation

The Trigger Action Response Plan (TARP) response "Where an exceedance of a SSTV is identified" does not include notification of the authorities. DPE Water considers the need to report to the appropriate authorities of the exceedance, including all qualitative assessments

of the cause and of the risks, plus the proposed or enacted management / mitigation measures within sixty days of the event must be included in the TARP.

2.6 Recommendation post approval

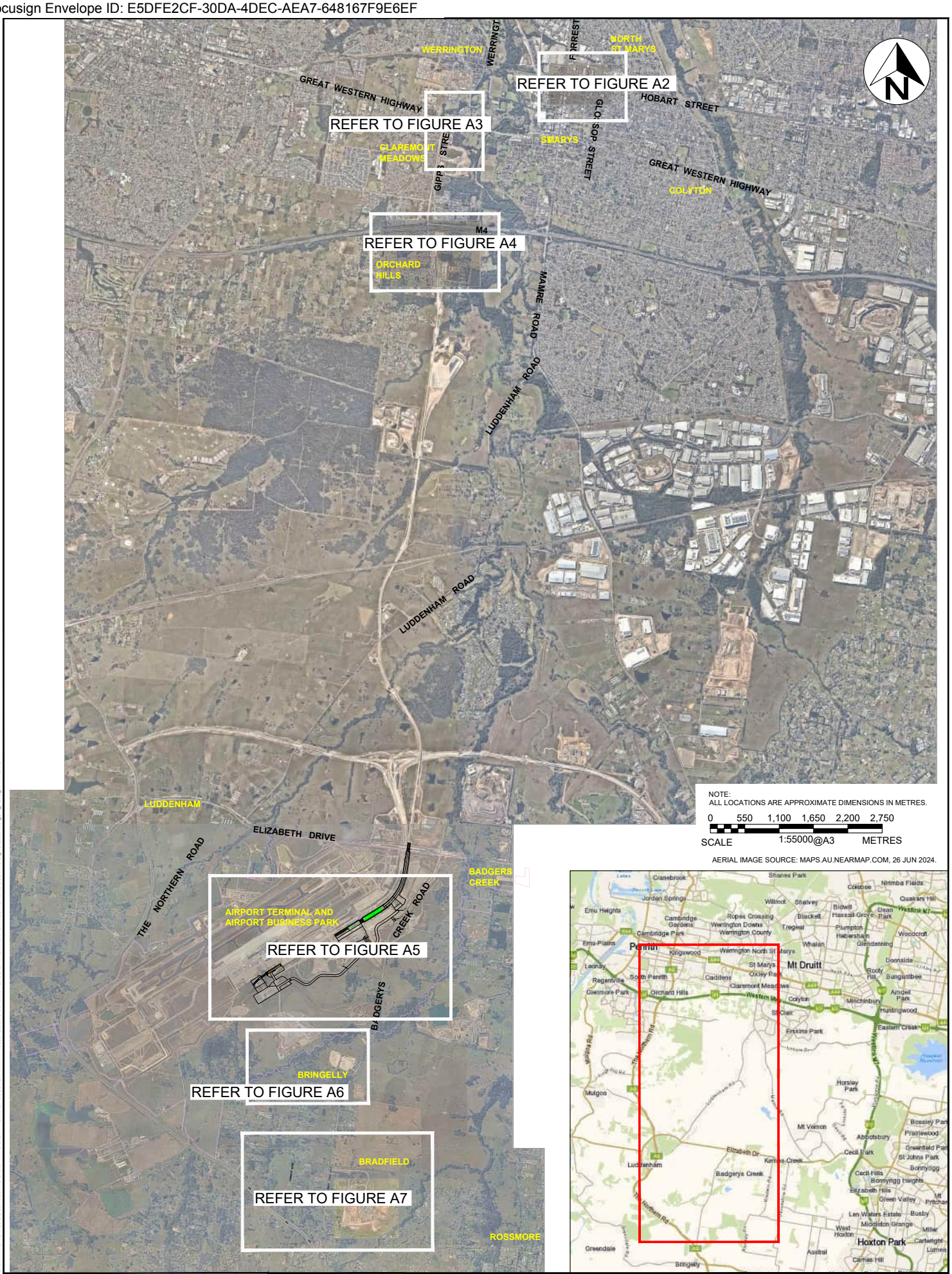
That the proponent updates the Site-Specific Trigger Values (SSTVs) and other impact assessment criteria (Environment Protection Licence (EPL) requirements) in revised groundwater management and monitoring plans upon completion of additional baseline groundwater level and quality monitoring studies or the grant of an EPL.

Explanation

Changes to the fundamental assessment criteria within the monitoring program and management plan must be updated in revised versions of these documents to aid clarity of the procedure and context of the assessment values being used.

End Attachment A

Appendix B Groundwater Monitoring Locations – Figures A1 to A7



NOTE:
ALL LOCATIONS ARE APPROXIMATE DIMENSIONS IN METRES.

0 550 1,100 1,650 2,200 2,750

SCALE 1:55000@A3 METRES

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 26 JUN 2024.

revision no.	description	drawn	approved	date
A	FIRST ISSUE	MC	EG	01/07/24
B	SAMPLE TYPE UPDATE	MC	GH	01/11/24
C	SAMPLE TYPE UPDATE	MC	GH	01/04/25
D	SAMPLE TYPE UPDATE	MC	GH	02/09/25

drawn	MC
approved	GH
date	02/09/2025
scale	AS SHOWN
original size	A3

client: PARKLIFE METRO JV

project: GROUND WATER MONITORING EVENT
WESTERN SYDNEY AIRPORT
BADGERYS CREEK, NSW

title: MONITORING LOCATION PLAN

project no: 22.0343.01 | figure no: FIGURE A1 | rev: D

ADE CONSULTING GROUP
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PLOT DATE: 20/09/2025 2:33:17 PM DWG FILE: C:\USERS\MIRANDA.CHAU\ADE CONSULTING GROUP PTY LTD\ENV-WORKING - DOCUMENTS\NSW\PROJECTS\22.0343 SSTOM.01 GROUNDWATER MONITORING\06 WORKING\DOCS\4 CAD_MC\22.034.01 GW_REV0_APPXA.DWG

LEGEND

- ⊕ EXISTING GROUND WATER MONITORING WELL
- VWP EXISTING PIEZOMETER
- VWP DESTROYED PIEZOMETER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 26 JUN 2024.

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	EG	01/07/24
	B	SAMPLE TYPE UPDATE	MC	GH	01/11/24
	C	SAMPLES UPDATE	MC	GH	01/04/25
	D	SAMPLES UPDATE	MC	GH	02/09/25
	E	SAMPLES UPDATE	MC	GH	22/10/25

N

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SCALE 1:2500 @A3 METRES

NOTE:
ALL LOCATIONS ARE APPROXIMATE DIMENSIONS IN METRES.

drawn	MC
approved	GH
date	22/10/2025
scale	AS SHOWN
original size	A3

client: PARKLIFE METRO JV

project: GROUND WATER MONITORING EVENT
WESTERN SYDNEY AIRPORT
BADGERYS CREEK, NSW

title: MONITORING LOCATION PLAN - ST MARYS

project no: 22.0343.01 | figure no: FIGURE A2 | rev: E

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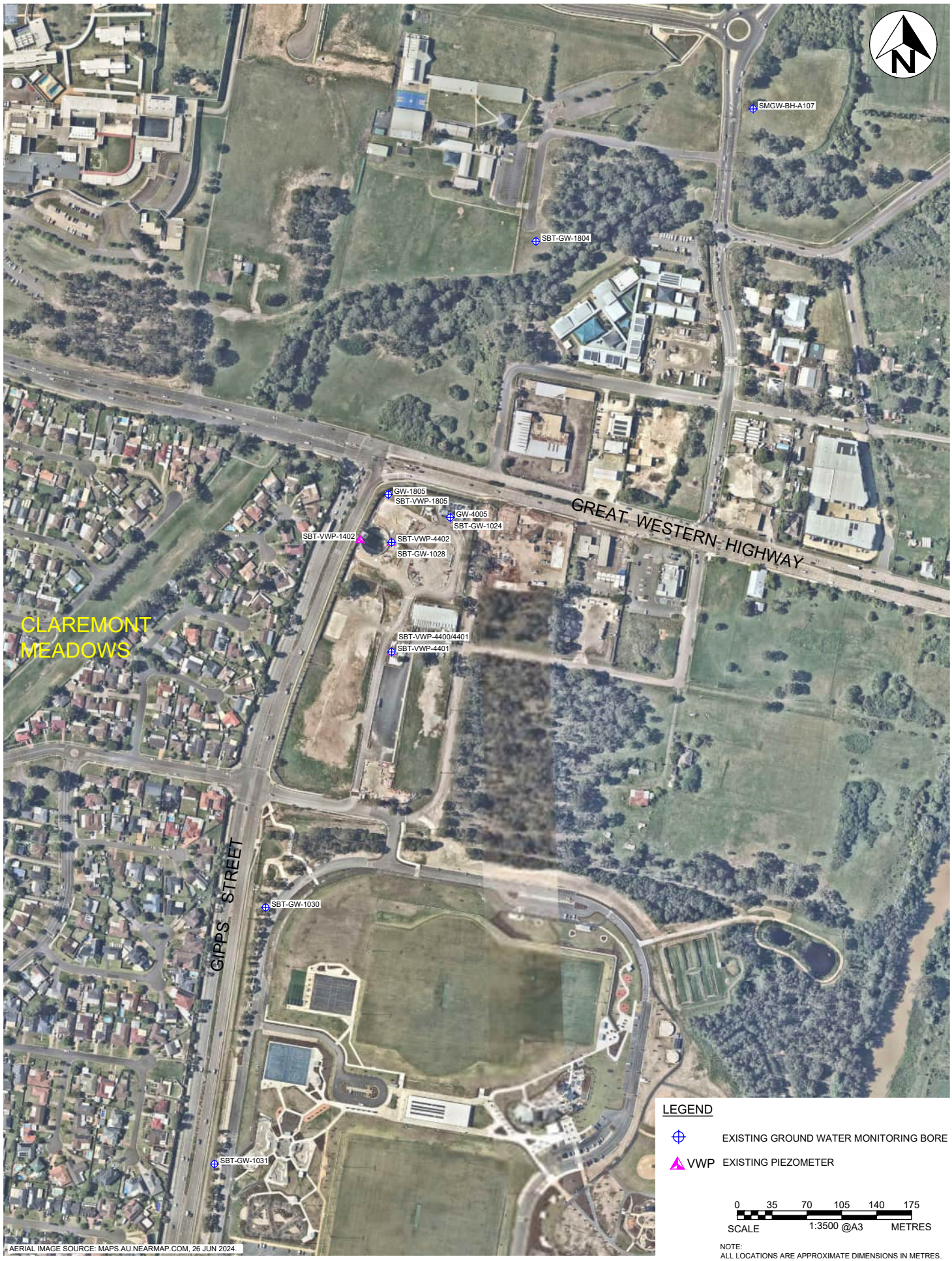

LEGEND

- EXISTING GROUND WATER MONITORING BORE
- VWP EXISTING PIEZOMETER

SCALE 0 35 70 105 140 175 METRES 1:3500 @A3

NOTE:
ALL LOCATIONS ARE APPROXIMATE DIMENSIONS IN METRES.

revision no.	description	drawn	approved	date
D	FIRST ISSUE	MC	GH	02/09/25

drawn	MC
approved	GH
date	02/09/2025
scale	AS SHOWN
original size	A3

client: PARKLIFE METRO JV

project: GROUND WATER MONITORING EVENT
WESTERN SYDNEY AIRPORT
BADGERYS CREEK, NSW

title: MONITORING LOCATION PLAN - CLAREMONT MEADOWS

project no: 22.0343.01 | figure no: FIGURE A3 | rev: D

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LEGEND

- EXISTING GROUND WATER MONITORING WELL
- VWP EXISTING PIEZOMETER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 26 JUN 2024.

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	EG	01/07/24
	B	SAMPLE TYPE UPDATE	MC	GH	01/11/24
	C	SAMPLES UPDATE	MC	GH	01/04/25
	D	SAMPLES UPDATE	MC	GH	02/09/25

0 28 56 84 112 140
SCALE 1:2800 @A3 METRES

NOTE:
ALL LOCATIONS ARE APPROXIMATE DIMENSIONS IN METRES.

drawn	MC
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date	02/09/2025
scale	AS SHOWN
original size	A3

client: PARKLIFE METRO JV

project: GROUND WATER MONITORING EVENT
WESTERN SYDNEY AIRPORT
BADGERYS CREEK, NSW

title: MONITORING LOCATION PLAN - ORCHARD HILLS

project no: 22.0343.01 | figure no: FIGURE A4 | rev: D

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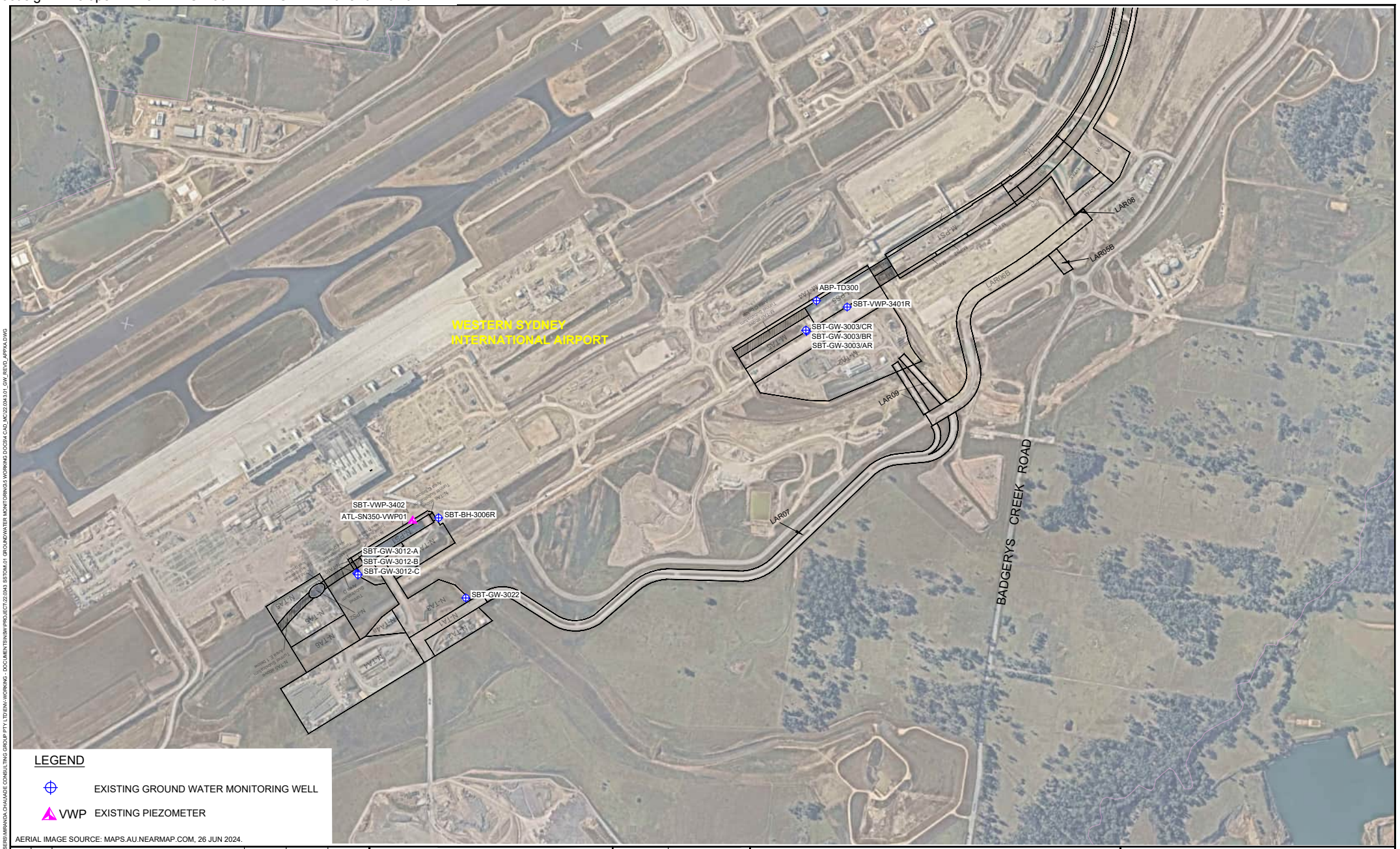

LEGEND

- EXISTING GROUND WATER MONITORING WELL
- VWP EXISTING PIEZOMETER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 26 JUN 2024.

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	EG	01/07/24
	B	SAMPLE TYPE UPDATE	MC	GH	01/11/24
	C	SAMPLES UPDATE	MC	GH	01/04/25
	D	SAMPLES UPDATE	MC	GH	02/09/25

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NOTE:
ALL LOCATIONS ARE APPROXIMATE DIMENSIONS IN METRES.

drawn	MC
approved	GH
date	02/09/2025
scale	AS SHOWN
original size	A3

client: PARKLIFE METRO JV

project: GROUND WATER MONITORING EVENT
WESTERN SYDNEY AIRPORT
BADGERYS CREEK, NSW

title: MONITORING LOCATION PLAN -
AIRPORT TERMINAL AND AIRPORT BUSINESS PARK

project no: 22.0343.01 | figure no: FIGURE A5 | rev: D

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LEGEND

- EXISTING GROUND WATER MONITORING BORE
- VWP EXISTING PIEZOMETER

AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM, 26 JUN 2024.

revision	no.	description	drawn	approved	date
	D	SAMPLES UPDATE	MC	GH	02/09/25

0 50 100 150 200 250
SCALE 1:5000 @A3 METRES

NOTE:
ALL LOCATIONS ARE APPROXIMATE DIMENSIONS IN METRES.

drawn	MC
approved	GH
date	02/09/2025
scale	AS SHOWN
original size	A3

client: PARKLIFE METRO JV

project: GROUND WATER MONITORING EVENT
WESTERN SYDNEY AIRPORT
BADGERYS CREEK, NSW

title: MONITORING LOCATION PLAN - BRINGELLY

project no: 22.0343.01 | figure no: FIGURE A6 | rev: D

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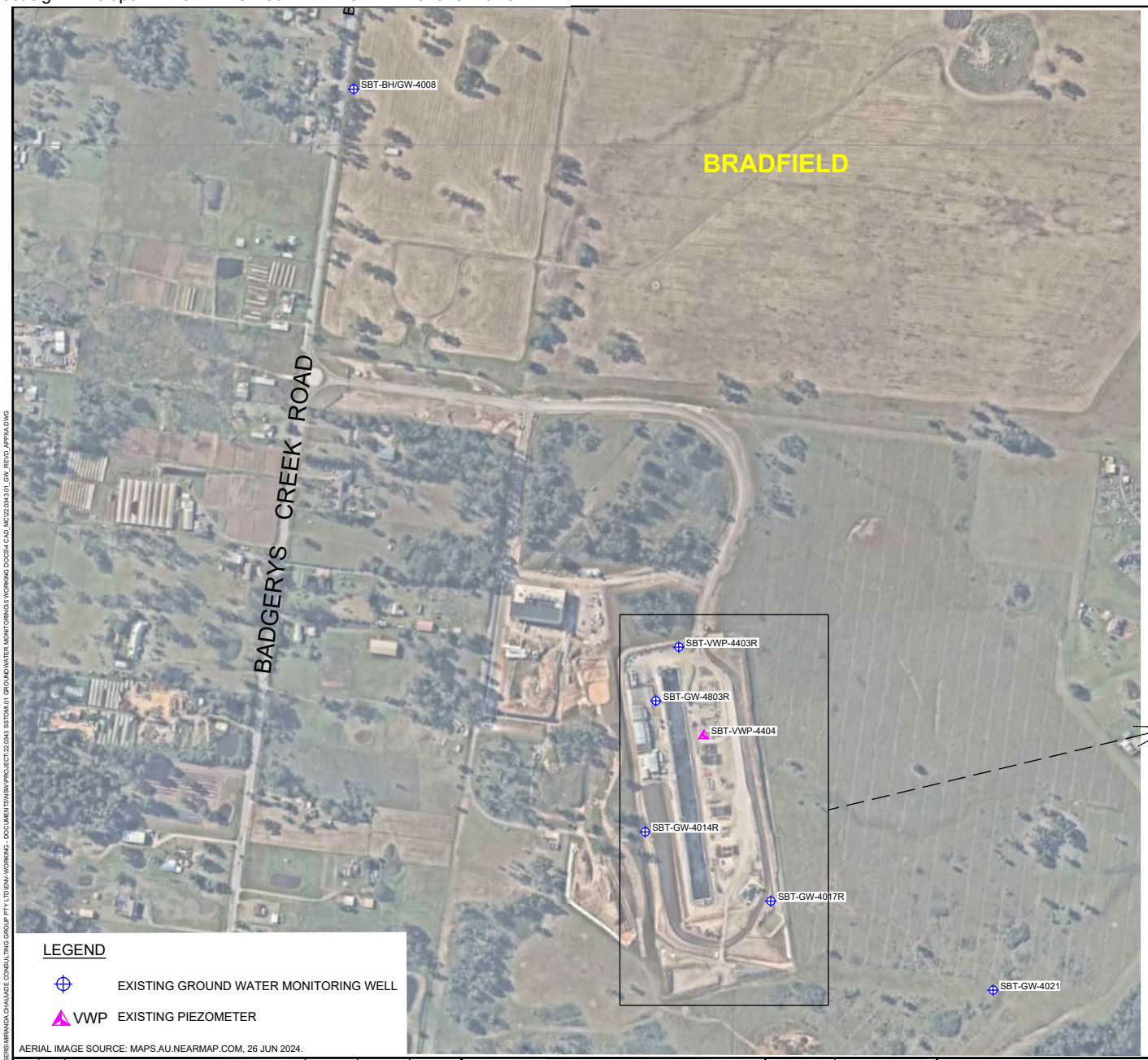

revision	no.	description	drawn	approved	date
	A	FIRST ISSUE	MC	EG	01/07/24
	B	SAMPLE TYPE UPDATE	MC	GH	01/11/24
	C	SAMPLES UPDATE	MC	GH	01/04/25
	D	SAMPLES UPDATE	MC	GH	02/09/25

0 60 120 180 240 300
SCALE 1:6000 @A3 METRES

NOTE:
ALL LOCATIONS ARE APPROXIMATE DIMENSIONS IN METRES.

drawn	MC
approved	GH
date	02/09/2025
scale	AS SHOWN
original size	A3

client: PARKLIFE METRO JV

project: GROUND WATER MONITORING EVENT
WESTERN SYDNEY AIRPORT
BADGERYS CREEK, NSW

title: MONITORING LOCATION PLAN - BRADFIELD

project no: 22.0343.01 | figure no: FIGURE A7 | rev: D

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Appendix C Monitoring Program Summary

Area	Location ID	Alternate ID	Monitoring Type (GWL, WQA, GDE)[1]	Monitored? Y or N	Location status as of August 2025
St Marys	SWD-TU100-17275-VWP01-A		GWL	Y	Active
St Marys	SWD-TU100-17275-VWP01-B		GWL	Y	Active
St Marys	SWD-TU100-17443-VWP03-A		GWL	Y	Active
St Marys	SWD-TU100-17443-VWP03-B		GWL	N	Active. Sensor not active in monitoring round
St Marys	SWD-TU100-17720-VWP04	SBT-VWP-1401	GWL	N	Data was specific for wall design during SBT construction phase. Removed from network.
St Marys	SBT-GW-1001		GWL / WQA	N	Destroyed. Removed from network
St Marys	SBT-GW-1001-S		WQA	Y	Active
St Marys	SBT-GW-1002		GWL / WQA	Y	Active
St Marys	SBT-GW-1005-S	SBT-GW-1005	WQA	Y	Active
St Marys	SBT-GW-1016		GWL / WQA	Y	Active
St Marys	SBT-GW-1017		GWL / WQA	Y	Active
St Marys	SBT-GW-1019R3		GWL / WQA	N	Not handed over by SBT. Removed from network
St Marys	SBT-GW-1021		GWL / WQA	Y	Active
St Marys	SMGW-BH-A360		GWL / WQA	N	Not handed over by SBT. Removed from network
St Marys	SBT-GW-1803		GWL / WQA	N	Not handed over by SBT. Removed from network
St Marys	SMGW-BH-A401		GWL / WQA	Y	Active
TBM Tunnel - South Creek	SMGW-BH-A105S		GWL / GDE	N	Not handed over by SBT. Removed from network
TBM Tunnel - South Creek	SMGW-BH-A107	-	GWL / GDE	N	Active but missed during this monitoring event
TBM Tunnel - South Creek	SBT-GW-1804		GWL / GDE	N	Missed during December 2024 – July 2025 CMR. Ongoing level monitoring
Cross passage / Tunnel (XPN13)	SBT-GW-1030		GWL / WQA	Y	Active

Area	Location ID	Alternate ID	Monitoring Type (GWL, WQA, GDE)[1]	Monitored? Y or N	Location status as of August 2025
Cross passage / Tunnel (XPN14)	SBT-GW-1031		GWL / WQA	N	Not handed over by SBT. Removed from network
Claremont Meadows	SBT-GW-1024		GWL / WQA	Y	Active
Claremont Meadows	SBT-GW-1805		GWL / WQA / GDE	Y	Active
Claremont Meadows	SWD-TU100-19992-VWP06-01	SBT-VWP-1403	GWL	N	Destroyed. No data from SBT since July 24. Remove from network
Claremont Meadows	SWD-TU100-19992-VWP06-02	SBT-VWP-1403	GWL	N	As above
Claremont Meadows	SWD-TU100-19992-VWP06-03	SBT-VWP-1403	GWL	N	As above
Claremont Meadows	SWD-TU100-20071-VWP07-A		GWL / GDE	Y	Active
Claremont Meadows	SWD-TU100-20071-VWP07-B		GWL	Y	Active
Claremont Meadows	SBT-GW-1028		GWL / WQA / GDE	N	Within asbestos exclusion zone (locationSWD-TU100-20071-VWP07(A&B) used as surrogate). Remove from network
Orchard Hills	SWD-TU150-21965-VWP01-A	SBT-GW-1037 (S)	GWL	N	Destroyed. Removed from network
Orchard Hills	SWD-TU150-21965-VWP01-B	SBT-GW-1037 (N)	GWL	N	Destroyed. Removed from network
Orchard Hills	SWD-TU150-22010-VWP02	SBT-VWP-1404	GWL / GDE	Y	Active
Orchard Hills	SWD-TU150-22115-VWP03	SBT-VWP-1405	GWL	N	Destroyed. Removed from network
Orchard Hills	SBT-GW-1042	-	GWL / WQA / GDE	Y	Active
Orchard Hills	SWD-TU150-22193-VWP05-A	SBT-GW-1043	GWL	N	Could not be located. Suspected destroyed. Removed from network
Orchard Hills	SWD-TU150-22193-VWP05-B	SBT-GW-1043	GWL	N	Could not be located. Suspected destroyed. Removed from network
Orchard Hills	SWD-TU150-22205-VWP06		GWL	N	Destroyed. Removed from network
Orchard Hills	SWD-TU150-22333-VWP07		No record GWL	N	No monitoring records from SBT. Destroyed. Removed from network
Orchard Hills	SMGW-BH-A315	-	GWL / WQA	N	Destroyed and replaced

Area	Location ID	Alternate ID	Monitoring Type (GWL, WQA, GDE)[1]	Monitored? Y or N	Location status as of August 2025
Orchard Hills	SMGW-BH-A315-R	-	GWL / WQA / GDE	Y	Active
Orchard Hills	SBT-GW-1063	-	GWL / WQA / GDE	Y	Active
Orchard Hills	SBT-GW-1806		GWL / WQA	Y	Active
Orchard Hills	SBT-GW-1807		GWL / WQA	Y	Active
Orchard Hills	SBT-GW-1808		GWL / WQA	Y	Active
Orchard Hills	SBT-GW-1042		GWL / WQA	Y	Active
Orchard Hills	SBT-GW-1048		WQA	N	Destroyed and replaced
Orchard Hills	SBT-GW-1048-R		WQA	Y	Active
Airport Portal (APDS)	SWD-TU300-33565-VWP02	SBT-VWP-3401	GWL	N	Replaced
Airport Portal (APDS)	SWD-TU300-33565-VWP02-R	SBT-VWP-3401-R	GWL	Y	Active
Airport Terminal (APDS)	ABP-TD300-VWP01	ABP-TD300-1	GWL	N	Logger broken. Remove from network
Airport Terminal (APDS)	ABP-TD300-VWP02	ABP-TD300-2	GWL	Y	Active
Airport Terminal (APDS)	ABP-TD300-VWP03	ABP-TD300-3	GWL	Y	Active
Airport Terminal (APDS)	ABP-TD300-VWP04	ABP-TD300-4	GWL	N	Logger broken. Remove from network
Portal / Cross passage XPS01 (APDS)	SBT-GW-3003-A	-	GWL / WQA	N	Replaced
Portal / Cross passage XPS01 (APDS)	SBT-GW-3003-B	-	GWL / WQA	N	Replaced
Portal / Cross passage XPS01 (APDS)	SBT-GW-3003-C	-	GWL / WQA	N	Replaced
Portal / Cross passage XPS01 (APDS)	SBT-GW-3003-A-R	-	GWL / WQA	Y	Active
Portal / Cross passage XPS01 (APDS)	SBT-GW-3003-B-R	-	GWL / WQA	Y	Active

Area	Location ID	Alternate ID	Monitoring Type (GWL, WQA, GDE)[1]	Monitored? Y or N	Location status as of August 2025
Portal / Cross passage XPS01 (APDS)	SBT-GW-3003-C-R	-	GWL / WQA	Y	Active
Airport Terminal	SBT-GW-3006	-	GWL / WQA	N	Replaced
Airport Terminal	SBT-GW-3006-R	-	GWL / WQA / GDE	Y	Active
Airport Terminal	SWD-TU300-34874-VWP03-01	ATL-SN350-VWP01-01	GWL	Y	Active
Airport Terminal	SWD-TU300-34874-VWP03-02	ATL-SN350-VWP01-02	GWL	Y	Active
Airport Terminal	SWD-TU300-34874-VWP03-03	ATL-SN350-VWP01-03	GWL	Y	Active
Airport Terminal	SWD-TU300-34874-VWP03-04	ATL-SN350-VWP01-04	GWL	Y	Active
Airport Terminal	SWD-TU300-34893-VWP04-04	ATL-SN350-VWP02	GWL	N	Destroyed. Removed from network
Airport Terminal	SWD-TU300-34893-VWP04-01	ATL-SN350-VWP02	GWL	N	Destroyed. Removed from network
Airport Terminal	SWD-TU300-34893-VWP04-02	ATL-SN350-VWP02	GWL	N	Destroyed. Removed from network
Airport Terminal	SWD-TU300-34893-VWP04-03	ATL-SN350-VWP02	GWL	N	Destroyed. Removed from network
Airport Terminal	SBT-GW-3012-A		GWL / WQA	Y	Active
Airport Terminal	SBT-GW-3012-B		GWL / WQA	Y	Active
Airport Terminal	SBT-GW-3012-C		GWL / WQA	Y	Active
Airport Terminal	SBT-GW-3022		GWL / WQA	Y	Active
Airport Terminal Temp Shaft	SWD-TU351-35209-VWP01	SBT-VWP-3404		N	Destroyed. Removed from network
Airport Terminal Temp Shaft	SWD-TU351-35240-VWP02	SBT-VWP-3405		N	Destroyed. Removed from network
Western Sydney Airport	SBT-GW-4000	-	GWL / GDE	Y	Active
Western Sydney Airport	SMGW-BH-C320		GWL / WQA	Y	Active
Western Sydney Airport	SMGW-BH-C321		GWL / WQA	N	Destroyed. Removed from network
Western Sydney Airport	SMGW-BH-C330		GWL / WQA	N	Destroyed. Removed from network

Area	Location ID	Alternate ID	Monitoring Type (GWL, WQA, GDE)[1]	Monitored? Y or N	Location status as of August 2025
Bringelly SF	SWD-TU351-37371-VWP04	SBT-VWP-4400	GWL	N	Destroyed. Removed from network
Bringelly SF	SWD-TU351-37377-VWP05	SBT-VWP-4401	GWL	N	Destroyed. Removed from network
Bringelly SF	SWD-TU351-37471-VWP06	SBT-VWP-4402	GWL	N	Destroyed. Removed from network
Bringelly SF	SBT-GW-4800		GWL / WQA	Y	Active
Bringelly SF	SBT-GW-4801		GWL / WQA	Y	Active
Bringelly SF	SBT-GW-4802		GWL / WQA	Y	Active
Bringelly SF	SBT-GW-4003		GWL / WQA	Y	Active
Bringelly SF	SBT-GW-4005		GWL / WQA	Y	Active
Bradfield	SBT-GW-4008	-	GWL / WQA / GDE	Y	Active
Bradfield	SBT-GW-4010	-	GWL / WQA / GDE	N	Not handed over by SBT. Removed from network
Bradfield	SWD-TU400-39287-VWP01	SBT-VWP-4403	GWL	N	Replaced
Bradfield	SWD-TU400-39287-VWP01-R	SBT-VWP-4403-R	GWL	Y	Active
Bradfield	SWD-TU400-39340-VWP02	SBT-VWP-4404	GWL	Y	Active
Bradfield	AEC-SN450-EW-VWP07	-	GWL	N	Not handed over by SBT. Removed from network
Bradfield	SBT-GW-4803	-	GWL / WQA	N	Replaced
Bradfield	SBT-GW-4803-R		GWL / WQA	Y	Active
Bradfield	SBT-GW-4014	SBT-GW-4014-S	GWL / WQA	N	Replaced
Bradfield	SBT-GW-4014-R	-	GWL / WQA	Y	Active
Bradfield	SBT-GW-4017	-	GWL / WQA	N	Replaced
Bradfield	SBT-GW-4017-R	-	GWL / WQA	Y	Active
Bradfield	SBT-GW-4021		GWL / WQA / GDE	Y	Active