



# Soil and Water Management Sub-plan

SMWSASSM-PLD-1NL-PC-PLN-000020 (Rev 01)

Parklife Metro D&C

# Document Approval

Revision	Author	Date	Comments	Reviewed by	Approved by
A	C. Kennedy	20/02/2023	Initial Draft	Mark Chilton	Richard Graham
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<b>Signature</b>	
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# Acronym and Definitions

Abbreviation	Expanded Text
<b>AEP</b>	Annual Exceedance Probability
<b>AHD</b>	Australian height datum
<b>ANZECC</b>	Australian and New Zealand Environment and Conservation Council
<b>ARI</b>	Average recurrence interval
<b>ASS</b>	Acid sulfate soils
<b>Bgl</b>	Below Ground Level
<b>BMSP</b>	Biodiversity Management Plan
<b>CEMF</b>	Sydney Metro Construction Environment Management Framework
<b>CEMP</b>	Construction Environmental Management Plan
<b>CLM Act</b>	<i>Contaminated Land Management Act 1997</i>
<b>CMS</b>	Parklife D&C Construction Management System
<b>CoA</b>	Conditions of Approval
<b>CoC</b>	Condition of Consent
<b>CSSI</b>	Critical State Significant Infrastructure
<b>DPE</b>	NSW Department of Planning and Environment
<b>DPI</b>	NSW Department of Primary Industries
<b>DPIE</b>	The former NSW Department of Planning, Industry and Environment
<b>DSI</b>	Detailed investigation report
<b>EIS</b>	Environmental Impact Statement
<b>EMS</b>	Environmental Management System
<b>Environmental aspect or hazard</b>	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.
<b>Environmental impact</b>	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.
<b>EPA</b>	NSW Environment Protection Authority
<b>EP&amp;A Act</b>	<i>Environmental Planning and Assessment Act 1979</i>
<b>EPL</b>	Environment Protection Licence
<b>ER</b>	Environmental Representative nominated by the Proponent and approved by the Planning Secretary in accordance with CoA A27
<b>ERP</b>	Emergency Response Plan
<b>ESCP</b>	Erosion and sediment control plan
<b>EWMS</b>	Environmental Work Method Statement
<b>EY</b>	Exceedances per Year
<b>Hold point</b>	A verification point that prevents work from commencing prior to approval from the appointed authority.
<b>Non-compliance</b>	Failure to comply with the requirements of the Project approval or any applicable licence, permit or legal requirements
<b>NVMP</b>	Noise and Vibration Management Sub-plan
<b>OEH</b>	Office of Environment and Heritage
<b>PD</b>	Project Director



Abbreviation	Expanded Text
<b>POEO Act</b>	<i>Protection of the Environment Operations Act 1997</i>
<b>RAP</b>	Remedial Action Plan
<b>REMM</b>	Revised Environmental Mitigation Measures
<b>SEP</b>	Site Environment Plan(s)
<b>SM</b>	Site Manager
<b>SMWSA</b>	Sydney Metro – Western Sydney Airport
<b>SSTOM</b>	Western Sydney Airport Stations, Systems, Trains, Operations and Maintenance
<b>WMSP</b>	Waste Management Sub-plan
<b>WQO</b>	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
- 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).

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 and the Aerotropolis 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 Aerotropolis Core 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).



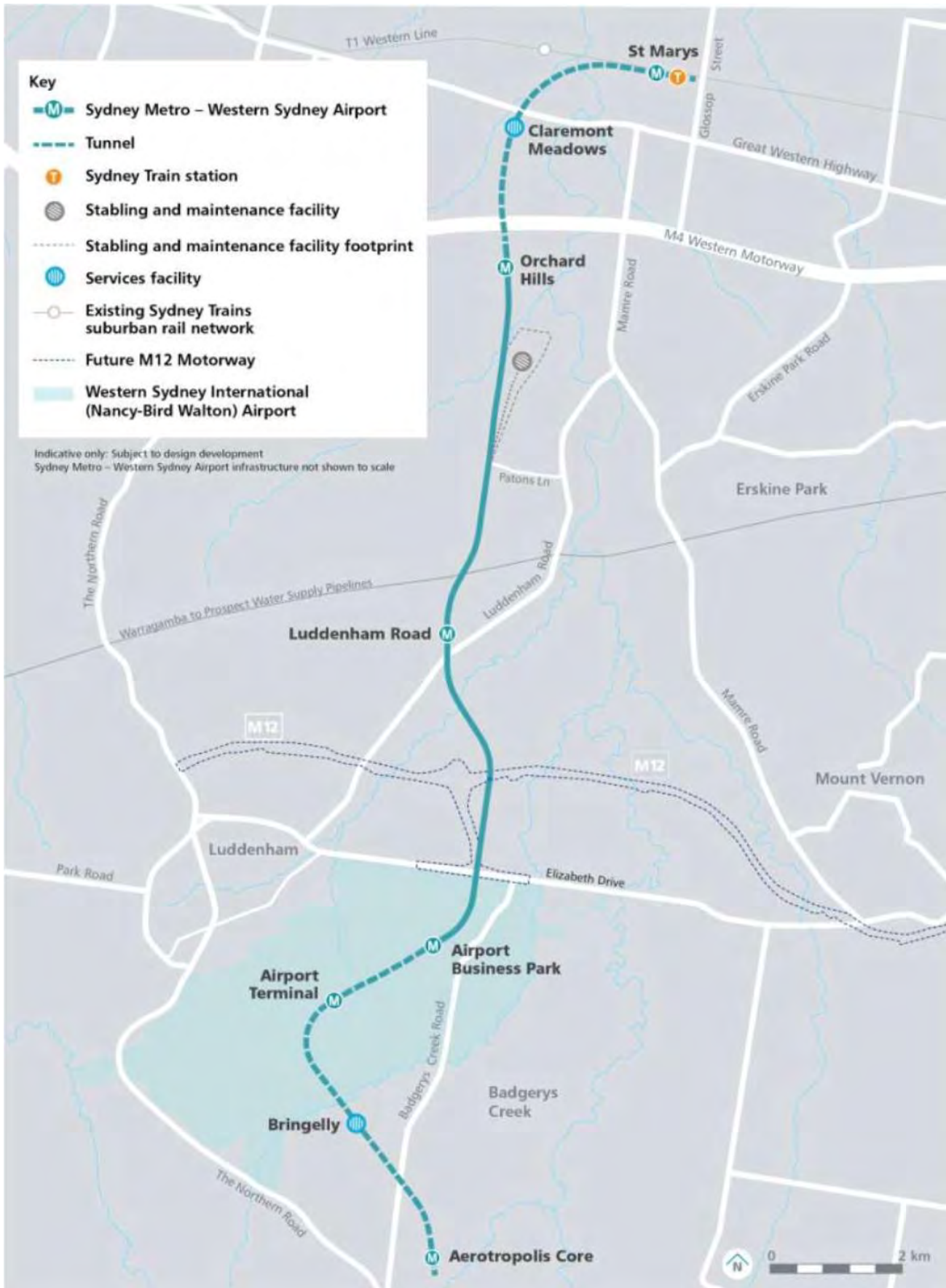


FIGURE 1 OVERVIEW OF SMWSA PROJECT

## 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 Aerotropolis Core 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 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
<b>Soil and Surface Water</b>		
<b>Minimise pollution of surface water through appropriate erosion and sediment control</b>	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: <ul style="list-style-type: none"> <li>Weekly during environmental inspection, and</li> <li>Following a rainfall event of &gt;20mm in a 24-hour period.</li> </ul>	Internal weekly inspections checklist Audit reports Weather monitoring records Wet weather inspection checklist
<b>Minimise leaks and spills from construction activities</b>	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
<b>Maintain existing water quality of surrounding surface watercourses</b>	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
<b>Source construction water from non-potable sources, where feasible and reasonable</b>	Implement water reuse program. Produce a water balance study prior to commencement of construction	Sustainability Reporting
<b>Contamination</b>		
<b>Site contamination will be effectively managed to limit the potential risk to human health and the environment</b>	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
<b>Manage site in accordance with applicable DSI's</b>	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*
- *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 Land 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
<b>SSI 10051 Infrastructure Approval (dated 23 July 2021)</b>		
<b>C1</b>	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
<b>C5</b>	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
<b>C6</b>	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
<b>C7</b>	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
<b>C8</b>	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
<b>C9</b>	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
<b>C10</b>	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 applicable), including any minor amendments approved by the ER, must be implemented for the duration of construction.	Section 3.6



No.	Condition	Where addressed
<b>Construction Environmental Management Framework</b>		
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
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 will be obtained prior to the commencement of 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
<b>Soil and Water Management Sub-plan (Condition C5)</b>	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
<b>Penrith City Council</b>	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.
<b>Liverpool City Council</b>	29/03/2023	26/06/2023	Minor comments on EPL, auditing and qualifications.
<b>DPI Fisheries</b>	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.

## **3.6 Document Approval**

This Sub-plan and SWQMP will be 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.

Construction is not to commence until the CEMP, and all required Sub-plans and Monitoring Programs have been endorsed by the ER and approved by the Department of Planning and Environment (DPE). This Sub-plan will be implemented for the duration of construction.

## 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.



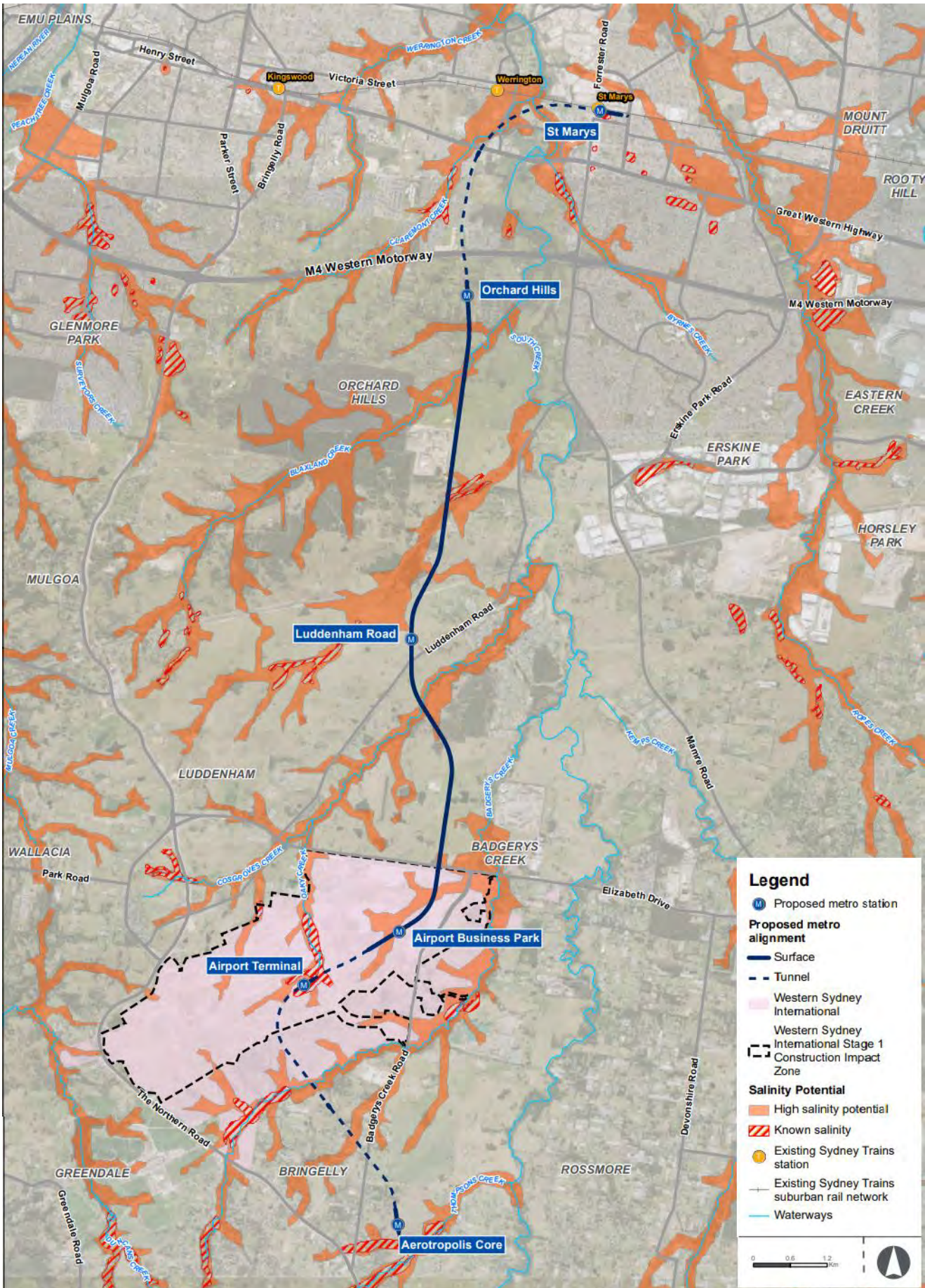


FIGURE 2 HIGH SALINITY POTENTIAL AND KNOWN SALINITY RISK AREAS

**TABLE 6 RISK AREAS FOR ASS AND HIGH SALINITY POTENTIAL**

Area	Potential impacts
<b>Blaxland Creek riparian zone</b>	Pilings and footing excavations for bridge Surface disturbance for at grade construction
<b>Unnamed Creek south of Patons Lane riparian zone</b>	Pilings and footing excavations for bridge Surface disturbance for at grade construction
<b>Cosgroves Creek</b>	Pilings and footing excavations for bridge Surface disturbance for at grade construction
<b>Badgerys Creek</b>	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. Works carried out in these areas by prior works contractors will inform the required management actions during SSTOM works as outlined further in Section 6.9.

Additional sampling has been conducted by previous contractors working on the Sydney Metro Western Sydney Airport Project, which have provided additional information on groundwater quality and contamination risks. The following contamination was noted:

- Suspected fragments of asbestos containing material (ACM) in two samples of fill collected directly adjacent to the former dry-cleaning facility to the west of the site.
- Chlorinated hydrocarbons, including tetrachloroethene (PCE) and breakdown product trichloroethene (TCE), in soil samples collected from the near surface to 2.0-2.1 mbgl at the former dry-cleaning facility in the west of the site.
- Elevated concentrations of chlorinated hydrocarbons were identified in groundwater and soil vapour at the former dry cleaners (outside the proposed area of excavation being undertaken by the previous contractors). The concentrations reported were considered to pose potentially unacceptable risks to future occupants of the property and subsurface construction workers during construction of the station box and tunnel as a result of migration of contamination in groundwater during dewatering of excavations.
- Petroleum hydrocarbons were identified in three groundwater wells located in the centre of the station box in the vicinity of a potential former underground storage tank (UST).
- Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) and nutrients (ammonia) were identified in groundwater which would require management during dewatering.
- Additional waste classification assessments identified the presence of asbestos and an elevated concentration of arsenic above NEPM (2013) ecological criteria in the central portion of the station box.

An interim remediation action plan (interim RAP) has been developed to manage the interim works being undertaken at the site with regards to the contamination risk described above, and it is expected that a subsequent RAP will be prepared to address contamination outside of the scope of the interim works. SSTOM Works will be undertaken in accordance with any information available in DSIs, RAPs or EMPs applicable to contamination management at the various sites available at the time of portion handover for the project.



TABLE 7 POTENTIAL CONTAMINATED SITES WITHIN THE SSTOM PROJECT FOOTPRINT

Location	AEC No.	Address	Potential Contamination Sources	EIS Risk Rating	DSI Completed? <sup>1</sup>
<b>St Marys Station</b> (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	
	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	Yes (SMWSASBT-CPG-SWD-SW000-GE-RPT-040513)
	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	
<b>Claremont Meadows Service Facility &amp; tunnel alignment</b> (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	
	8	8:34-102 Gipps Street, Claremont Meadows	Potential landfill gas migration	High	TBC
	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	TBC
<b>Tunnel alignment (see Figure 11)</b>	Tunnel alignment	St Marys to Orchard Hills tunnel alignment	Potential groundwater contamination from industrial areas and landfill gas	Medium	TBC
<b>Orchard Hills (see Figure 12)</b>	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	TBC
	31b	101 Sweetwater Grove, Orchard Hills	Workshop Use of hazardous building materials	Medium	TBC
<b>Service and Maintenance Facility (see Figure 12)</b>	32 & 33	2 Bordeaux Pl, Orchard Hills	Filled areas. Hazardous building material use	Medium	TBC

Location	AEC No.	Address	Potential Contamination Sources	EIS Risk Rating	DSI Completed? <sup>1</sup>
	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)
<b>Alignment SMF to Luddenham Road Station (see Figure 12)</b>	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	
<b>Luddenham Road Station (see Figure 13)</b>	39	565-581 Luddenham Rd, Luddenham	Asbestos (pipelines/buildings) Zinc (from previous investigations)	Medium	Yes (SMWSASCA-CPU-LDN-SN250-CT-RPT-000001)
<b>Alignment Luddenham Road Station to Airport (see Figure 13)</b>	40	546-640 Luddenham Rd, Luddenham	Unlicensed stockpiling of waste and soil	High	Yes (SMWSASCA-CPU-SWD-EW150-CT-RPT-000001)
	41	1953-2109 Elizabeth Dr, Badgerys Creek	Illegal stockpiling of waste Imported soil	Medium	TBC
	42 & 43	1793-1951 Elizabeth Drive Badgerys Creek	Fuel/oil/chemical storage and use) Pesticides	High	TBC
	44	1793-1951 Elizabeth Drive Badgerys Creek	Imported fill	Medium	TBC
<b>Alignment Airport to Aero (see Figure 14)</b>	45	40 Derwent Road, Bringelly	Hazardous building materials	Medium	Yes (Reclassified to "Low" risk)
	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	TBC

Location	AEC No.	Address	Potential Contamination Sources	EIS Risk Rating	DSI Completed? <sup>1</sup>
	46	225-245 Bringelly Creek Road, Bringelly	Hazardous building materials	Medium	
<b>Aerotropolis Core (see Figure 14)</b>	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)
<b>Power supply route corridor in Orchard Hills and Erskine Park (n/a to SSTOM scope of works)</b>	48	Road corridors: Patons Lane, Erskine Park Road and Lenore Lane and John Morphet Place & intersection of Lenore Lane and Erskine Park Road	Historical fill Hazardous building materials	Medium	TBC
	49	Cuthel Road and Cross Street	Waste tipping.	Medium	TBC
	50	Easement between 130 and 140 Martin Road	Fill containing asbestos	Medium	TBC
<b>Power supply route corridor in Kemps Creek (n/a to SSTOM scope of works)</b>	51	Easement south of 113 Western Road	Fill containing asbestos	Medium	TBC
	52	Substation: 120 Cross Street	Storage of chemicals and hazardous building materials	Medium	TBC
	53	Cuthel Road and Cross Street	Waste tipping	Medium	TBC

**NOTES:**

<sup>1</sup> 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.

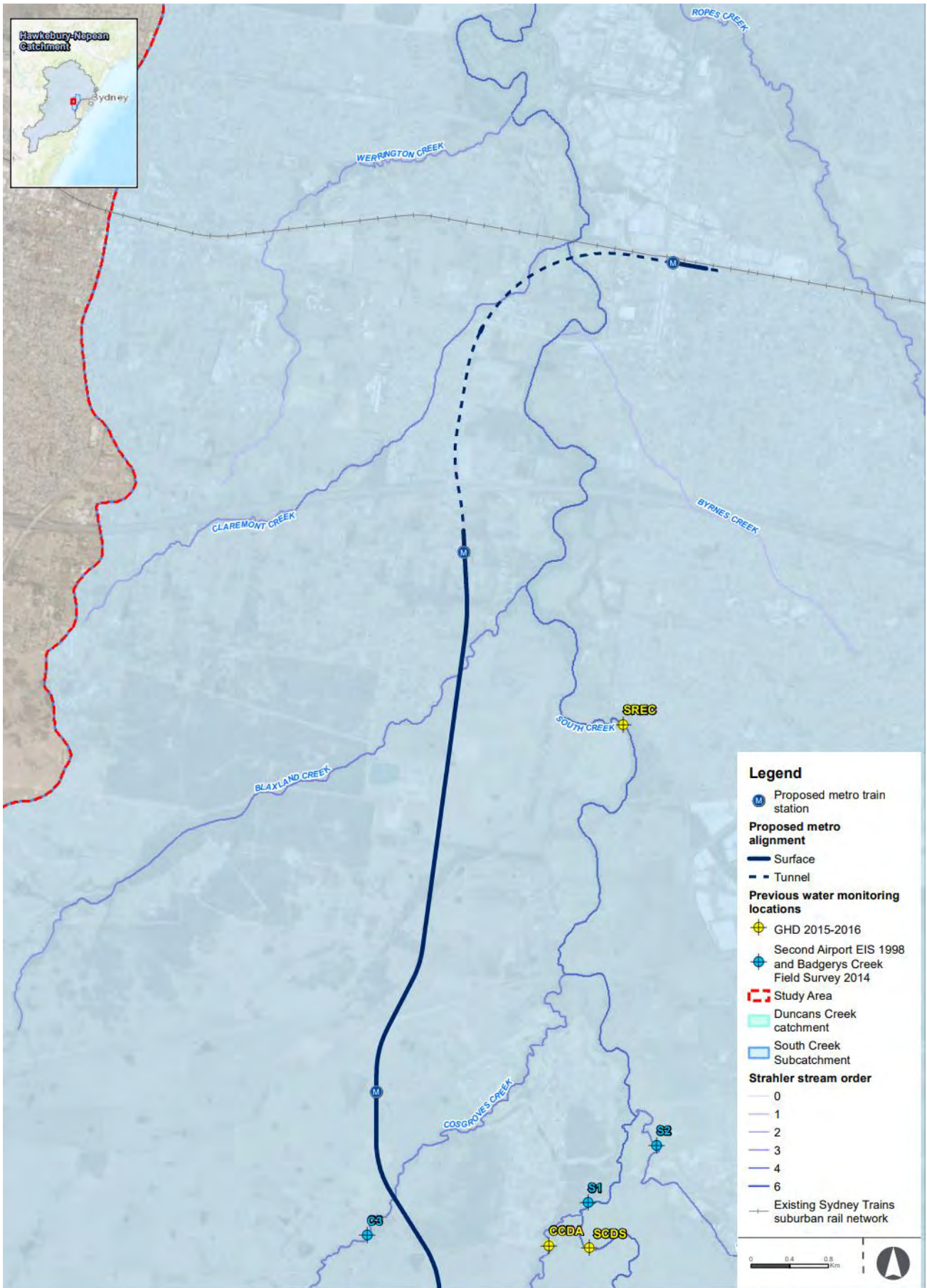


FIGURE 3 CATCHMENTS, WATERCOURSES AND MONITORING LOCATIONS - NORTH



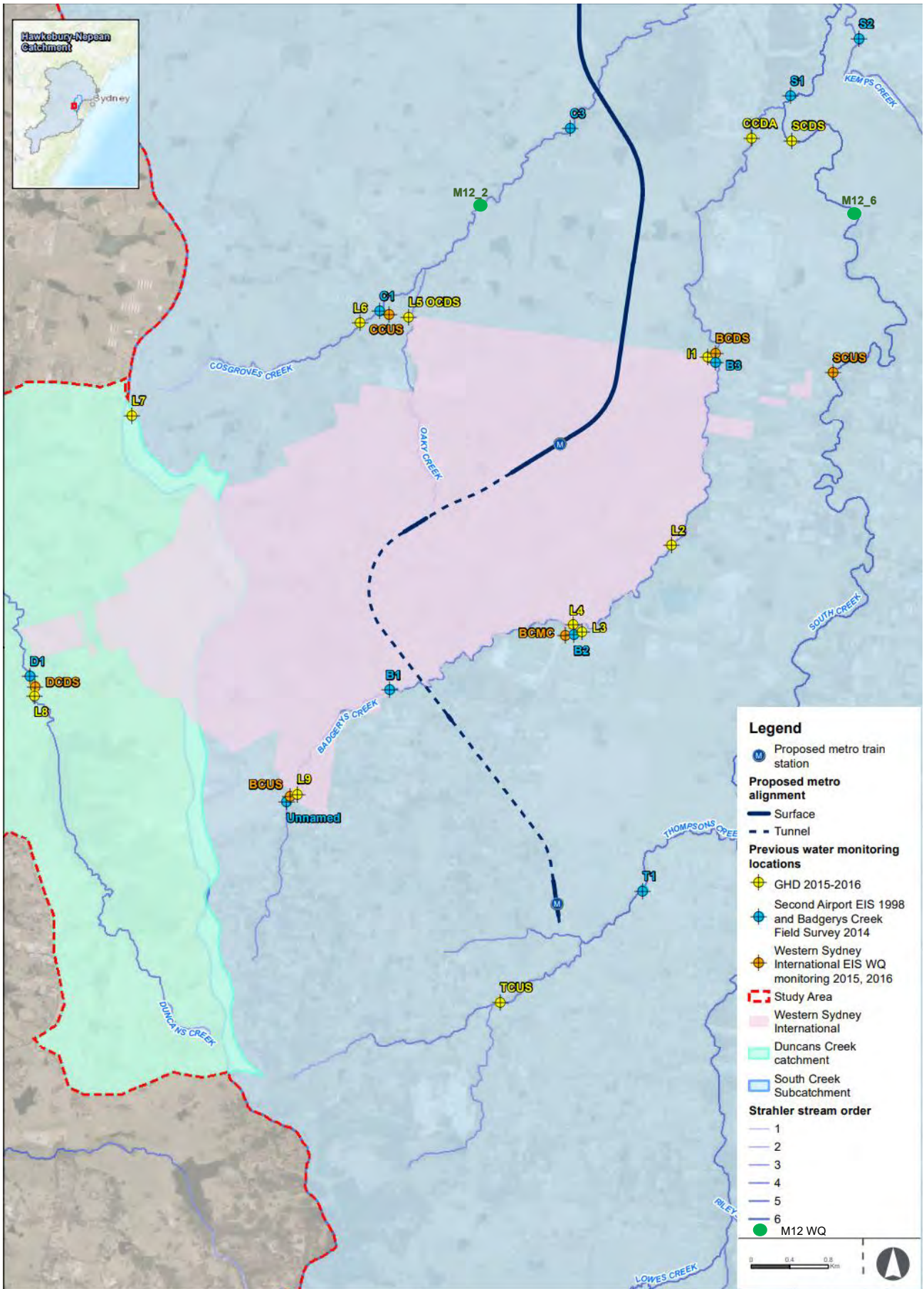


FIGURE 4 CATCHMENTS, WATERCOURSES AND MONITORING LOCATIONS - SOUTH

## 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)
<b>ANZECC Guidelines</b>	85-110	125-2200	6.5-8	6-50	0.5	0.05
<b>M12_2 Cosgroves Creek</b>	62.7	3510	8.03	16	2.3	<0.05
<b>M12_6 South Creek</b>	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
<b>Chlorophyll-a</b>	0.005 mg/L
<b>Total Phosphorus (TP)</b>	0.05 mg/L
<b>Filterable Reactive Phosphorus (FRP)</b>	0.02 mg/L
<b>Total Nitrogen (TN)</b>	0.5 mg/L
<b>Oxides of Nitrogen (NOx)</b>	0.04 mg/L
<b>Ammonia</b>	0.02 mg/L
<b>Dissolved Oxygen</b>	85% - 110%
<b>Turbidity</b>	6 – 50 NTU
<b>pH</b>	6–5 - 8
<b>Salinity</b>	125 – 2200 µS/cm
<b>Oils, petroleum, and hydrocarbons</b>	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.



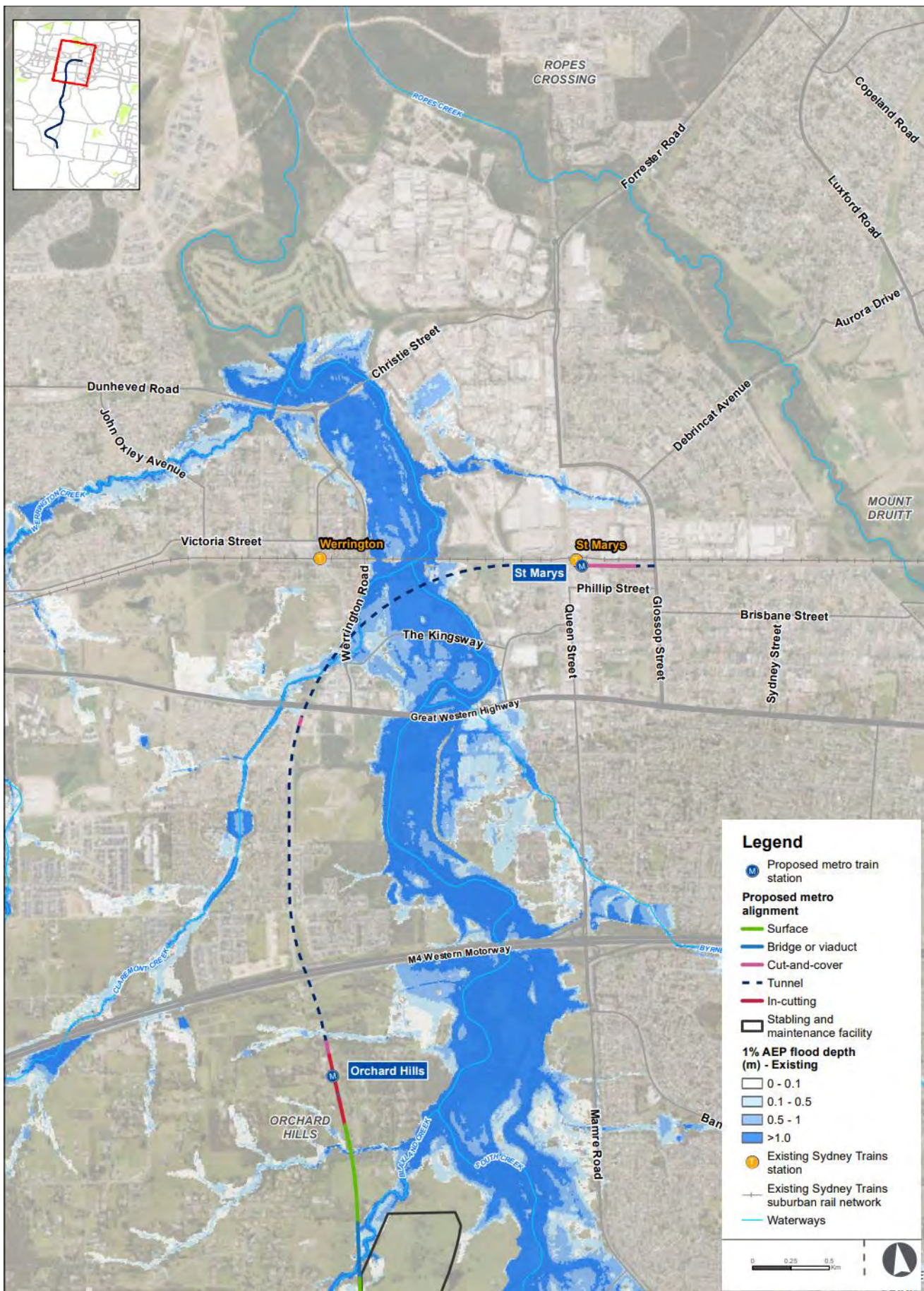


FIGURE 5 1% AEP BLAXLAND CREEK



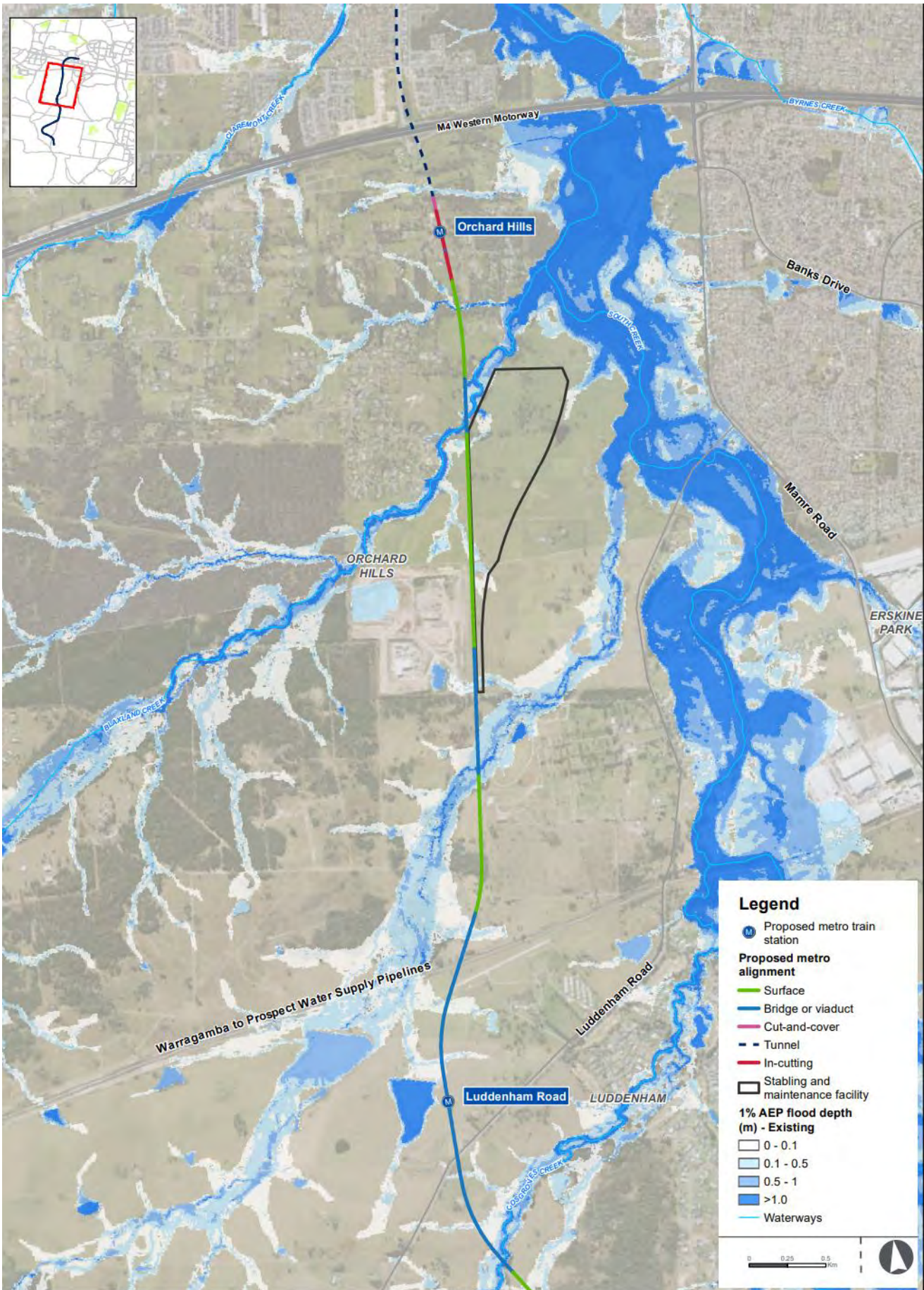


FIGURE 6 1% AEP AT SOUTH CREEK



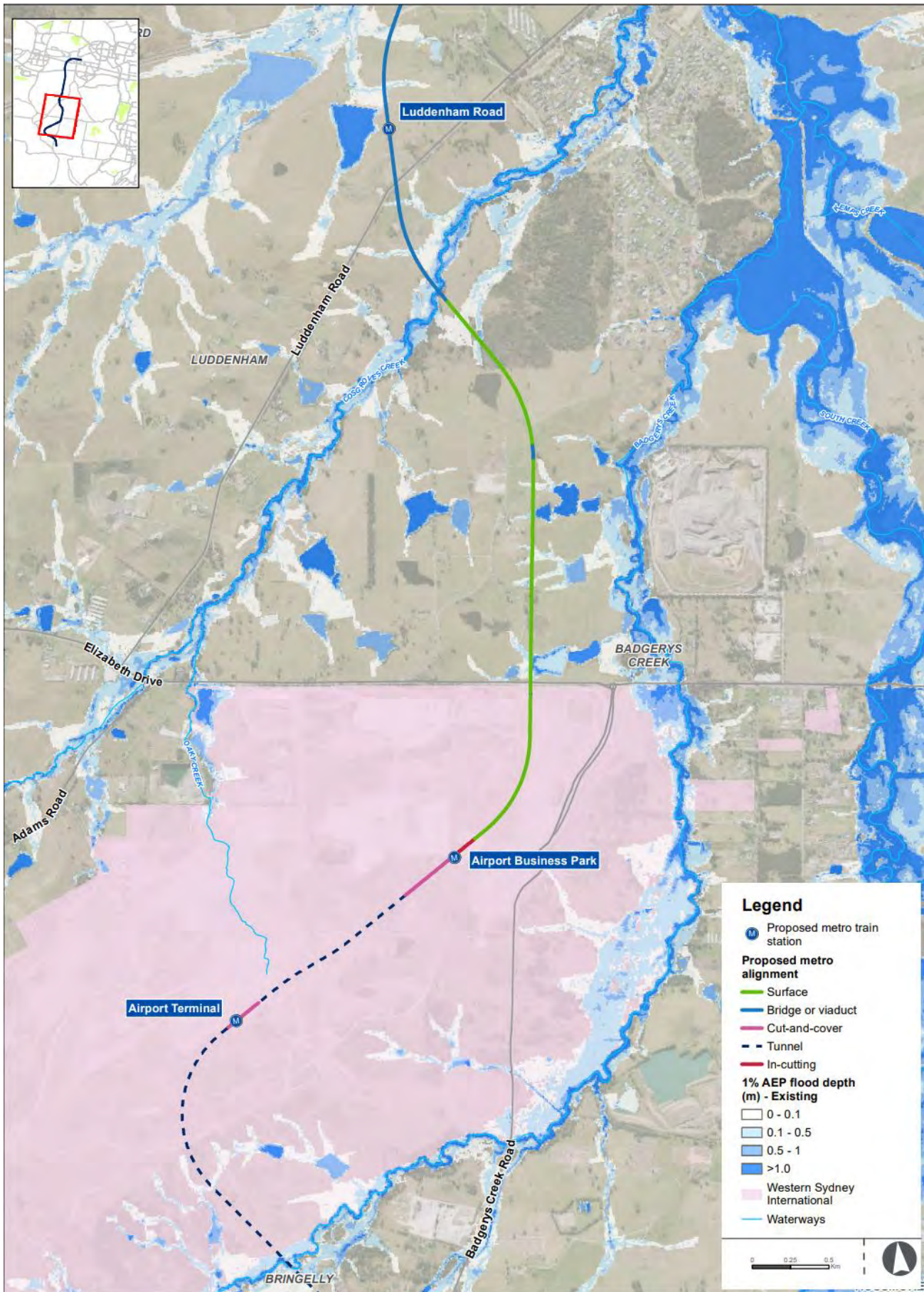


FIGURE 7 1% AEP AT COSGROVES CREEK



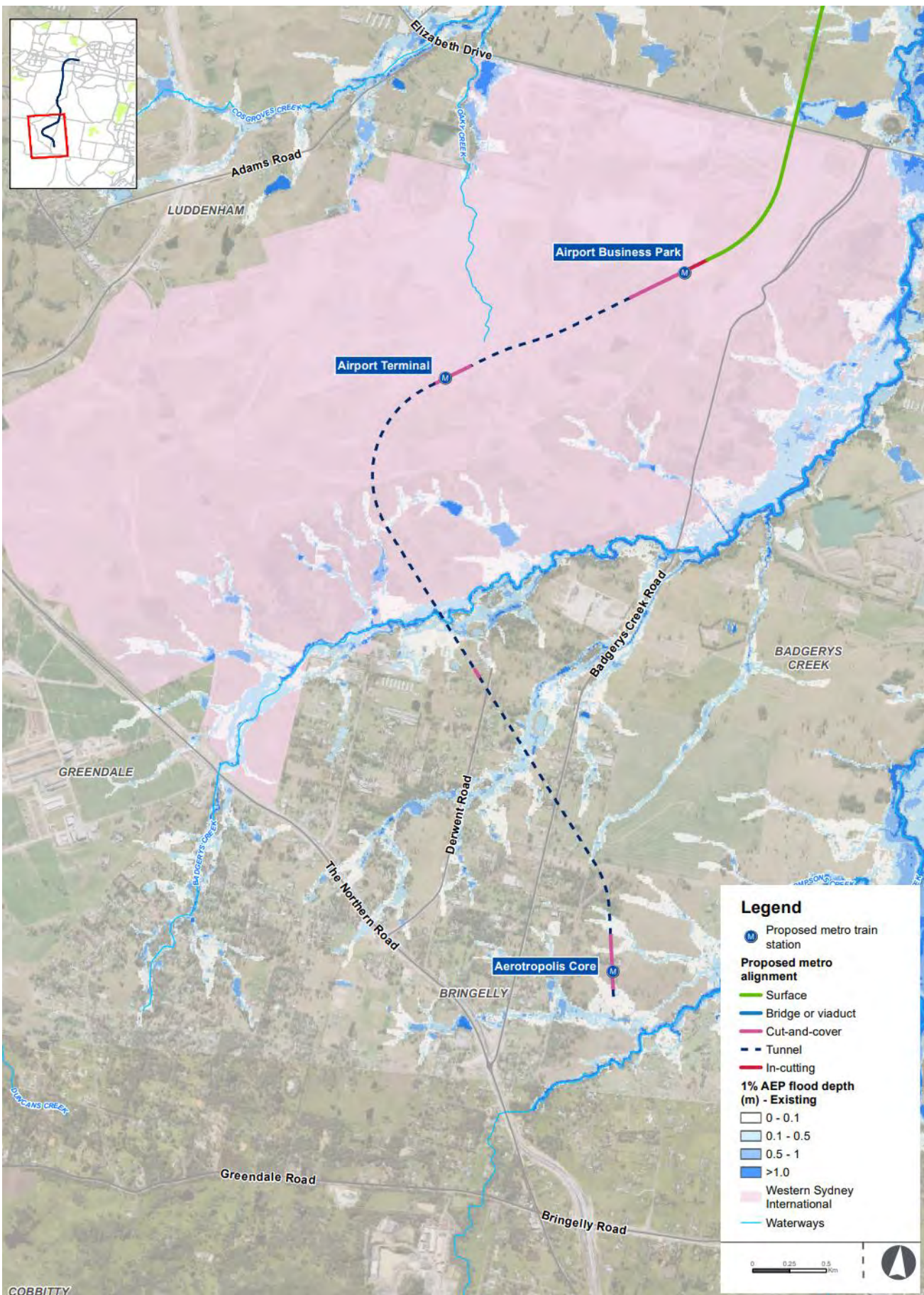


FIGURE 8 1% AEP BADGERYS CREEK



### 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.

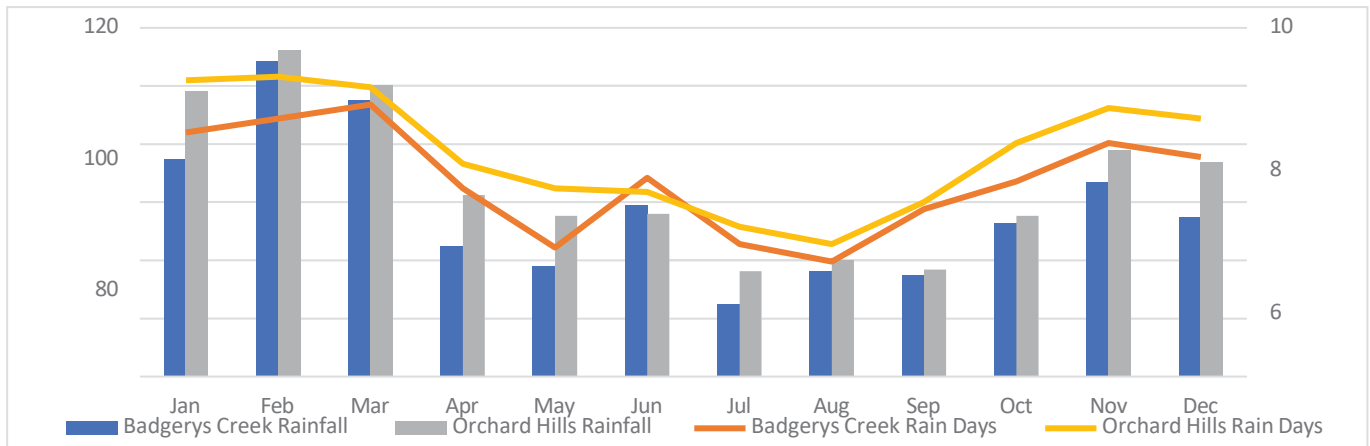


FIGURE 9 HISTORIC RAINFALL DATA FOR BADGERYS CREEK AND ORCHARD HILLS

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
<b>Mean Max Temperature (oC)</b>	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
<b>Mean Min Temperature (oC)</b>	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
<b>Mean Rainfall (mm)</b>	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
<b>Mean rain days (&gt;1mm)</b>	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
<b>Mean 9am wind speed (km/hr)</b>	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
<b>Mean Max Temperature (oC)</b>	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
<b>Mean Min Temperature (oC)</b>	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
<b>Mean Rainfall (mm)</b>	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
<b>Mean rain days (&gt;1mm)</b>	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
<b>Mean 9am wind speed (km/hr)</b>	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
<b>Storage and use of chemicals near stormwater systems and waterways</b>	Soil contamination as a result of a spill Pollutants to wash into the stormwater system, then into/directly into receiving waters
<b>Clearing and grubbing</b>	Increased sediment load in run off impacting aquatic fauna and flora. Spills of fuel/hydraulic fluids impacting soil and water quality
<b>Material stockpiles</b>	Sedimentation and air quality impacts potential due to improper stabilisation of material stockpiles
<b>Wheel wash facilities</b>	Sedimentation and potential for turbid water to runoff site due to improper management of wheel washing facilities
<b>Dewatering of excavations</b>	Turbid, saline or contaminated water to enter stormwater systems and subsequently causing degradation of freshwater habitat and water quality
<b>Modifications to natural hydrology or water quality from earthworks activities</b>	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
<b>Working within riparian corridor</b>	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
<b>Sediment tracking onto public roads from vehicles leaving construction worksites</b>	Sediment and gravel on roads Sediment entering into stormwater systems and/or directly into receiving waters, causing pollution
<b>Dust blowing from the worksites or from vehicles during spoil removal</b>	Air quality impacts to nearby residents
<b>Floodwaters impacting on worksites</b>	Contamination of floodwaters by sewerage, fuels and/or chemicals Potential for floodwaters to drain into works excavations
<b>Encountering contaminated material/water during SSTOM (existing and unknown)</b>	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
<b>Incorrect reuse, disposal, or management of contaminated soil</b>	Spreading of contaminated material to land causing pollution Impacts to human health and environment Risk of not meeting required land use suitability
<b>Concreting and grouting</b>	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
<b>Construction or modification to stormwater systems</b>	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.

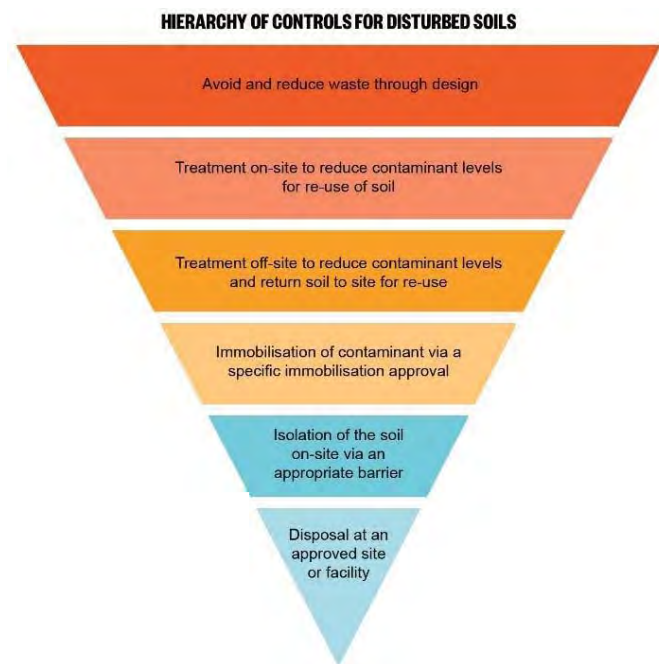


FIGURE 10 HIERARCHY OF CONTROLS FOR DISTURBED SOILS

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 the 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 Work Packs 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.
pH	pH	6.5 – 8.5	Probe or grab sample	
Turbidity	Nephelometric Turbidity Units	50	Probe or grab sample	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.

## 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.

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

### 6.3.1 Discharge Criteria and Targets

A Discharge Impact Assessment (DIA) will be prepared prior for any WTP or sediment basin where discharge to the environment is required. The DIA 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). DIA's will be prepared progressively in line with the handover of works areas from prior work contractors.

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).

A Water Pollution Impact Assessment would be prepared to meet the requirements of CoA E130 and be provided to EPA to inform the variation of the EPL.

## 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 Emergency Response Plan

Any events or incidents resulting from flooding will be managed in accordance with the Parklife Metro D&C Emergency Response Plan (ERP). The ERP 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 identified 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 date of stockpiling 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 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 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 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 Water Management Procedure
- 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 waterways. A fully stocked spill kit will be on site during refuelling
- Spill kits will be available on site, 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, provided in Appendix D
- Where possible, equipment working over water will have sheathed hydraulic hoses and use biodegradable oil.



## 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.

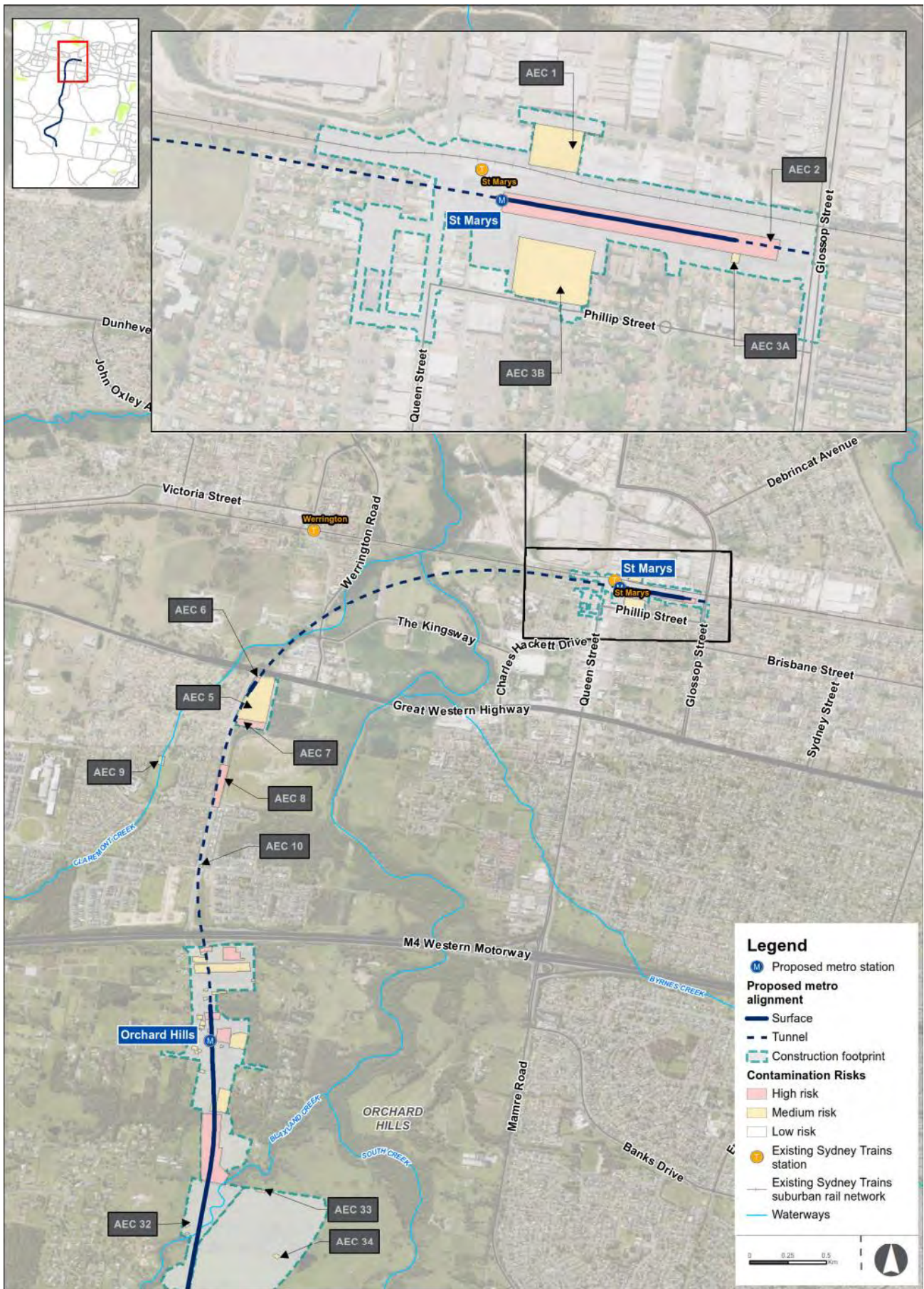


FIGURE 11 AECs – ST MARYS TO ORCHARD HILLS



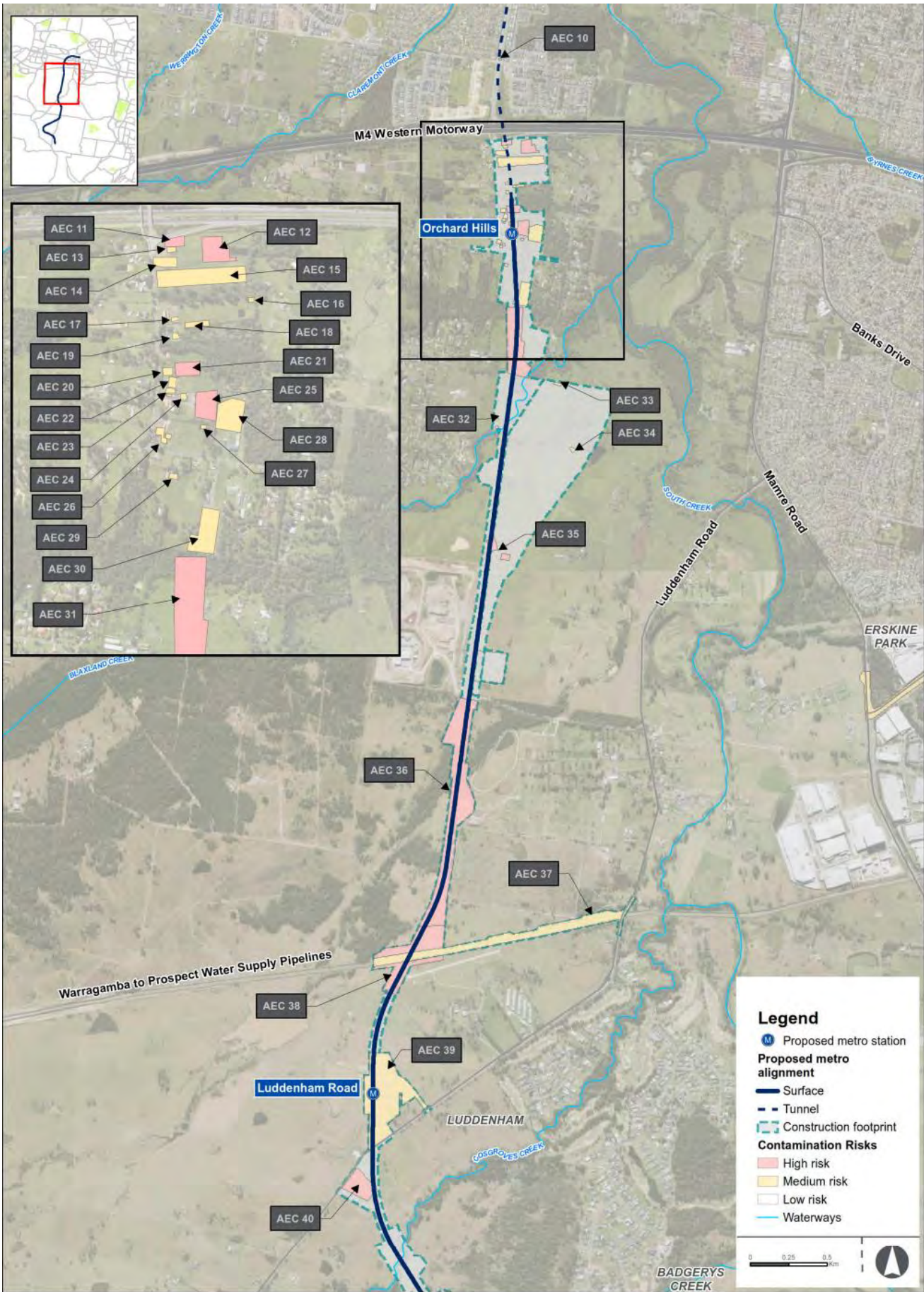


FIGURE 12 AECs – ORCHARD HILLS TO LUDDENHAM



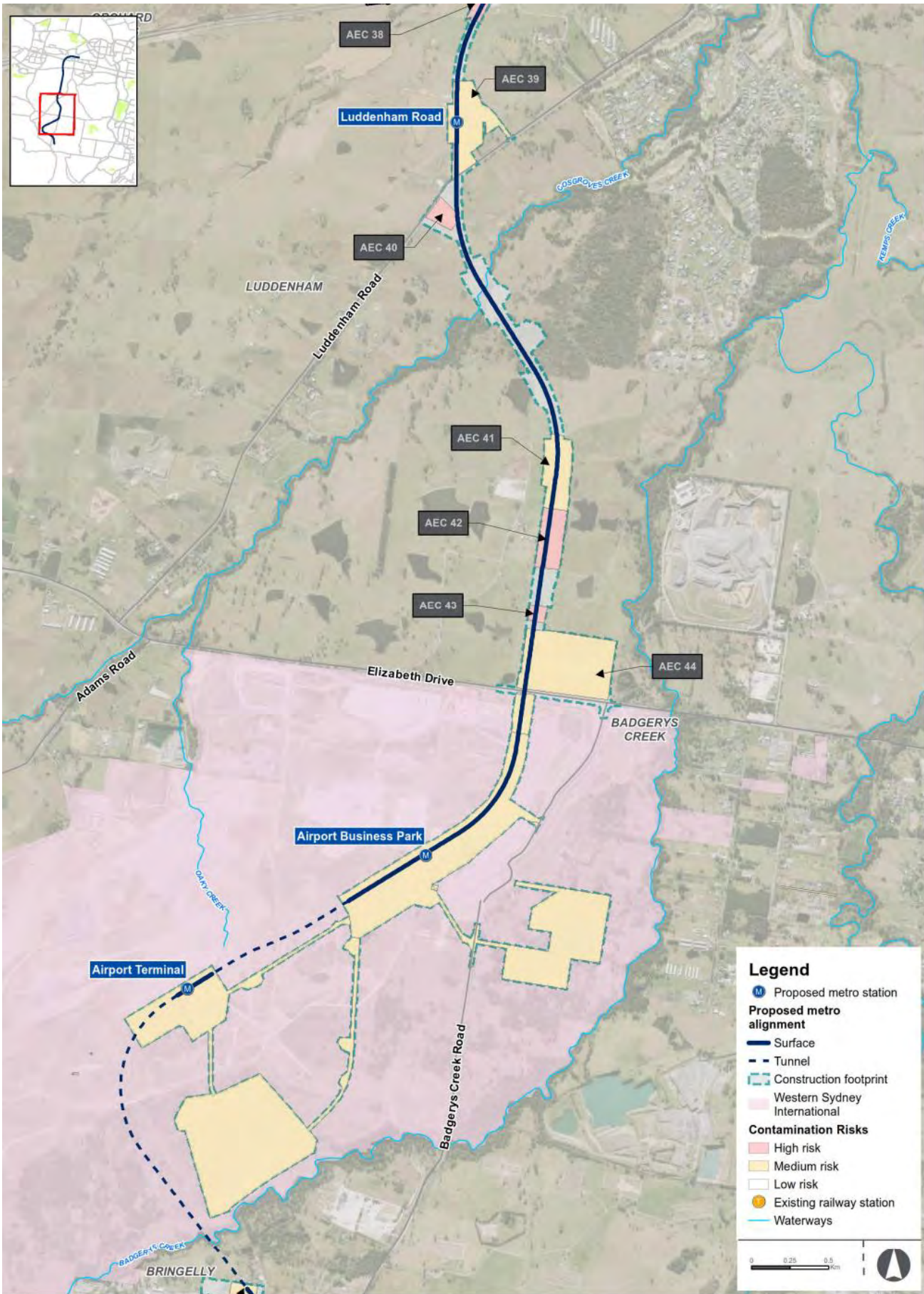


FIGURE 13 AECs - LUDDENHAM TO BADGERYS CREEK



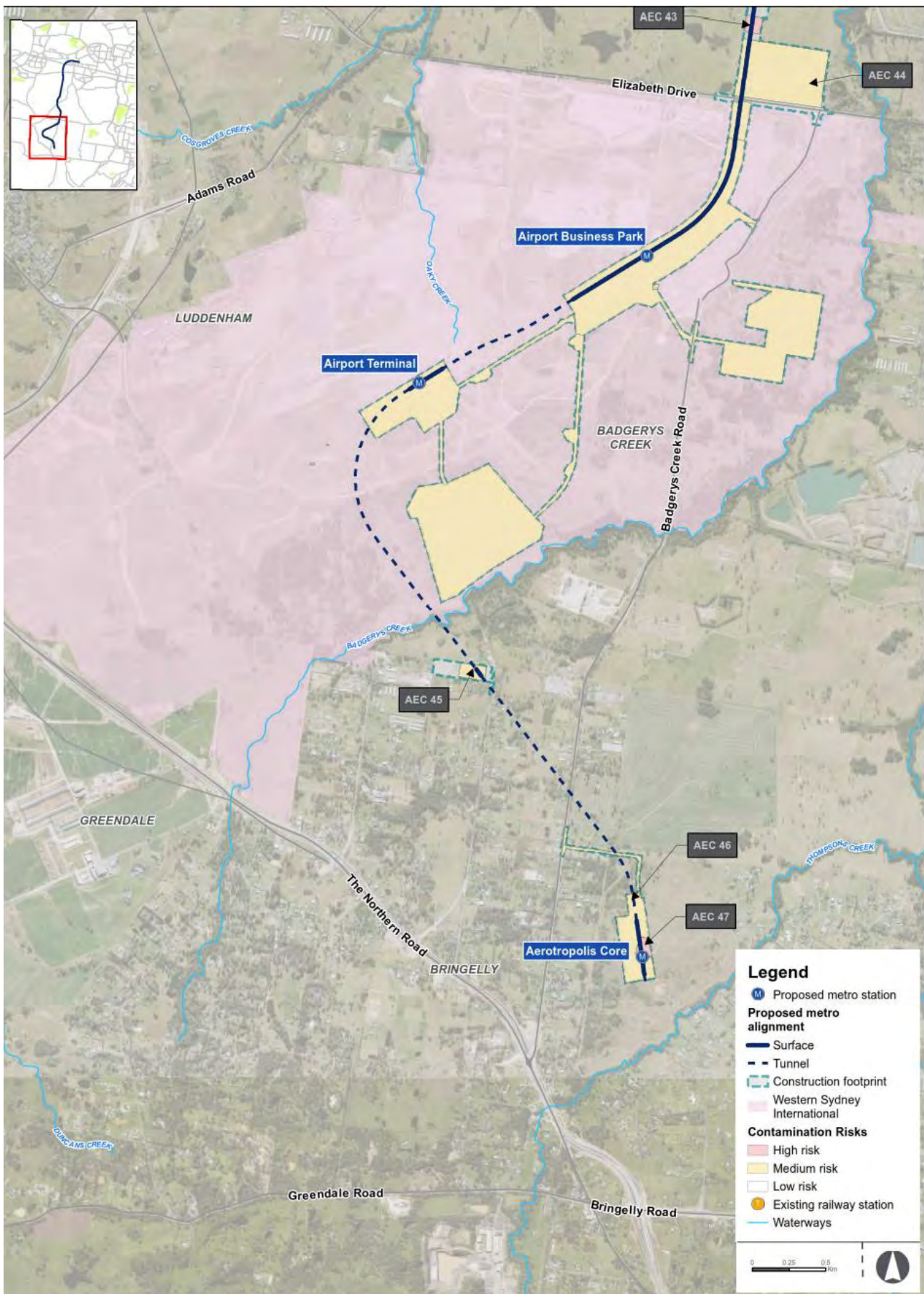


FIGURE 14 AECs BADGERYS CREEK TO AEROTROPOLIS



## 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 indicate 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
<b>Water Quality</b>			
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 banded 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
<b>Contamination</b>			
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
CL_M3	Ensure contaminated land is managed, stockpiled, reused and/or disposed of as per the RAP	Condition E93	Site Supervisor



ID	Control	Source or Requirement	Accountability
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
<b>Soil Conservation</b>			
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 and date of stockpiling, 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 will be implemented during construction to monitor the extent and nature of potential impacts to the groundwater level and quality during SSTOM Works.

It is noted that the risk of impacts to groundwater quality and drawdown is most likely during construction of earlier stages of the Project, including station box excavation and tunnelling (SBT Works), and therefore is not considered a high risk in relation to 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
<b>Rain Event</b>	>20mm in 24 hours	<ul style="list-style-type: none"> <li>Inspect rumble grid and wheel-wash facilities.</li> <li>Inspect adjacent roads for signs of mud tracking.</li> <li>Inspect site erosion and sediment controls for effectiveness/maintenance</li> </ul>

### 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
<b>Project Director</b>	<ul style="list-style-type: none"> <li>Managing the delivery of SSTOM Works including overseeing planning approval, environmental management and act as the Contractor's Representative</li> <li>Authority to direct personnel and/or subcontractors to carry out actions to avoid or minimise unintended environmental impacts.</li> </ul>
<b>Environmental Manager</b>	<ul style="list-style-type: none"> <li>Oversee the implementation of all soil and water management initiatives.</li> <li>Prepare and implement this Sub-plan.</li> <li>Oversee monitoring, inspections and auditing.</li> <li>Have the ability to stop works on environmental grounds.</li> <li>Report any incidents or non-compliances to Sydney Metro and the ER</li> </ul>
<b>Environmental Advisor / Coordinator</b>	<ul style="list-style-type: none"> <li>Assist the Environmental Manager in the day-to-day environmental management of SSTOM.</li> <li>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).</li> <li>Monitor and report on soil and water management during construction.</li> <li>Have the ability to stop works on environmental grounds.</li> </ul>
<b>Commercial Manager</b>	<ul style="list-style-type: none"> <li>Ensure that relevant soil and water management requirements are considered in procuring materials and services.</li> </ul>
<b>Senior Engineering Manager</b>	<ul style="list-style-type: none"> <li>Ensure relevant soil and water management requirements are addressed in design development.</li> </ul>
<b>Construction Manager and delegates</b>	<ul style="list-style-type: none"> <li>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</li> <li>Ensure compliance with this Sub-plan and associated procedures.</li> </ul>
<b>Sustainability Manager/ Coordinator</b>	<ul style="list-style-type: none"> <li>Track and report soil and water elements against sustainability targets.</li> </ul>
<b>Superintendents/ Site Supervisors</b>	<ul style="list-style-type: none"> <li>Construction delivery in relation to environmental management and compliance in conjunction with the Environmental Manager.</li> <li>Authority to direct personnel and/or subcontractors to carry out actions to avoid or minimize unintended environmental impacts.</li> </ul>
<b>Project Manager Civil/Structures Project Engineers Site Engineers Supervisors</b>	<ul style="list-style-type: none"> <li>Implement and monitor onsite environmental management and compliance measures across all sites in conjunction with environmental coordinators.</li> <li>Undertake site inspections.</li> </ul>
<b>Stakeholder and Community Engagement Manager</b>	<ul style="list-style-type: none"> <li>Assist in response to and management of complaints relating to soil and water</li> </ul>



## 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 Water Discharge and Reuse Procedure
- 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.