Australian Government

**Department of Infrastructure, Transport,
Regional Development, Communications and the Arts**

Cath Snelgrove
Director Environment
Sydney Metro
PO Box K659
Haymarket NSW 1240

Dear Ms Snelgrove

[redacted]

I write to notify you that, in accordance with Condition 39 of the Airport Plan, I have today approved the Construction (Rail) Plan and nine CEMPs submitted by Sydney Metro on 13 July 2023, namely:

- Noise and Vibration CEMP
- Biodiversity CEMP
- Soil and Water CEMP
- Traffic and Access CEMP
- Air Quality CEMP
- Aboriginal Cultural Heritage CEMP
- European and Other Heritage CEMP
- Waste and Resources CEMP
- Visual and Landscape CEMP

The requirements set out with the original notice of approval of the nine CEMPs continue to apply to the revised approved CEMPs. Sydney Metro is required:

a. To take reasonable steps to ensure that each person involved in carrying out a development that is part of the Rail Development is informed of, and complies with, the CEMP (Condition 45(3) of the Airport Plan).

b. To maintain accurate records demonstrating implementation of, and compliance with, the approved CEMPs, and other applicable conditions contained in Section 3.11.6 of the Airport Plan. Records must be made available to the Infrastructure Department on request (Condition 46 of the Airport Plan).

c. To publish information in a report about its compliance with the conditions set out in section 3.11.6 of the Airport Plan (Rail Conditions) and its implementation of the approved CEMPs (Condition 47 of the Airport Plan).

d. To ensure that an independent audit of its compliance with the conditions set out in section 3.11.6 (except Condition 44), and condition 46 of the Airport Plan (Rail Conditions) is conducted, by an approved independent auditor, in respect of the 12-month period commencing with commencement of Rail Construction Works. The independent audit report must be submitted to the Infrastructure Department, with a copy provided to the Environment Department, within six months of the end of the period in respect of which the audit was conducted (Condition 48 of the Airport Plan).

e. To ensure that any Rail Development is not carried out inconsistently with any of the approved Rail CEMPs (Condition 39 of the Airport Plan).

f. Unless otherwise agreed by an Approver, to publish the approved plans on its website (Condition 50 of the Airport Plan).

If you have any queries in relation to this letter, please do not hesitate to contact me.

Yours sincerely

David Jansen
Assistant Secretary
Western Sydney Airport Regulatory Policy Branch

14 August 2023

Sydney Metro Western Sydney Airport
Soil and Water Construction Environmental Management Plan

Sydney Metro Integrated Management System (IMS)

Applicable to:	Airport Rail Development
Document Owner:	Sydney Metro
System Owner:	-
Status:	Final
Version:	Rev06
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Review date:	-

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Figures

Tables

Document Control

Title	Sydney Metro Western Sydney Airport Soil and Water Construction Environmental Management Plan
Document No/Ref	SM-21-00033458

Version Control

Revision	Date	Description
01	**18 March 2021**	Draft for Tender
02	**11 August 2021**	Draft for WSA
03	**1 November 2021**	Issued for DITRDC
04	**22 January 2022**	Final for DITRDC
05	**18 February 2022**	Final
06	**11 July 2023**	Draft for WSA Review
06	**13 July 2023**	Issued for DITRDC

Terms and Definitions

Terms	Definitions
The Act	Airports Act 1996 (Cth) (Airports Act)
AEPR	Airports (Environment Protection) Regulations 1997
AEW	Advanced and Enabling Works
Airport	Western Sydney International (Nancy-Bird Walton) Airport (WSI) located at the Airport Site. Note: The Airport is referred to in the Act as Sydney West Airport and is commonly known as Western Sydney International (Nancy-Bird Walton) Airport
Airport Lease	An airport lease for the Airport granted under section 13 of the Act
Airport Lessee Company	The company that is granted a lease over the Airport Site
Airport Plan	Means the September 2021 approved Airport Plan which includes the Variation for the SM - WSA Rail Development on the WSI airport and which otherwise means airport plan for the Airport Site as determined by the Infrastructure Minister under section 96B of the Act in December 2016 as varied from time to time in accordance with the Airports Act.
AS	Australian Standard
BTEX	Benzene, toluene, ethylbenzene, xylene (BTEX);
CCS	Community Communication Strategy
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
CIZ	Construction Impact Zone
CNVS	Construction Noise and Vibration Standard
CoA	Conditions of Approval
CSSI	Critical State Significant Infrastructure
CTR	Compliance Tracking Review
Cwth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment (Cwth)
DITRDC	Department of Infrastructure, Transport, Regional Development and Communications
DPIE	Department of Planning, Industry and Environment
ECM	Environmental Control Map
ECZ	Environmental Control Zone
EESG	NSW Environment, Energy and Science Group (formerly OEH)
EIN	Environmental Improvement Notice
EIS	Environmental Impact Statement
EP&A Act	Environment Planning and Assessment Act 1979 (NSW)
EPA	NSW Environment Protection Authority
EPBC Act	Environment Protection and Conservation Act 1999 (Cwth)
EPL	Environment Protection Licence under the POEO Act
EPO	Environmental Performance Outcome
ER	Environmental Representative
ESCP	Erosion and sediment control plan

Terms	Definitions
EWMS	Environmental Works Method Statement
E&SMS	Environment and Sustainability Management System
FAW	Finalisation Auxiliary Works
ICNG	Interim Construction Noise Guideline
IMS	Sydney Metro Integrated Management System
Infrastructure Department	The department responsible for administering the Act, currently the Australian Government Department of Infrastructure, Transport Regional Development and Communications (DITRDC)
ISO	International Standardization Organisation
KPI	Key Performance Indicator
OCCS	Overarching Community Communication Strategy
OCPs	Organochlorine pesticides • persistent, bio-accumulative pesticides including DDT, dieldrin, heptachlor and chlordane
OEH	NSW Office of Environment and Heritage (formerly DECC)
OOHW	Out-of-Hour Works
PAHs	Trace phenols and polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PFAS	Per- and Poly- fluoroalkyl substances
PFOS	Perfluorooctyl Sulfonate
PIRMP	Pollution Incident Response Management Plan
Planning Secretary	The Secretary of the Department of Planning, Industry and Environment
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
Preparatory Activities	Preparatory Activities mean the following: a. day to day site and property management activities; b. site investigations, surveys (including dilapidation surveys), monitoring, and related works (e.g. geotechnical or other investigative drilling, excavation, or salvage); c. establishing construction work sites, site offices, plant and equipment, and related site mobilisation activities (including access points, access tracks and other minor access works, and safety and security measures such as fencing but excluding bulk earthworks); d. enabling preparatory activities such as: i. demolition or relocation of existing structures (including buildings, services, utilities and roads); ii. the disinterment of human remains located in grave sites identified in the European and other heritage technical report in volume 4 of the EIS; and iii. application of environmental impact mitigation measures; and e. any other activities which an Approver determines are Preparatory Activities for this definition
Project	The Sydney Metro Western Sydney Airport Construction and operation as approved by the EPBC and Airport Plan as the Action or Rail Development within the Rail Construction Impact Zone on-airport, being the WSI airport, in agreeance with the Deed between SM - WSA and WSA Co.

Terms	Definitions
Proponent	The person or organisation identified as the proponent in Schedule 1 of the planning approval. In this case Sydney Metro Authority
RAP	Remediation Action Plan
REMM	Revised Environmental Mitigation Measure
SBT	Station Box and Tunnelling Works
SCAW	Surface Civil & Alignment Works
SCO	Sydney Coordination Office
Site Occupier	Site Occupier means: (a) before an Airport Lease is granted – the Commonwealth; and Note: Where a condition specifies an activity to be carried out by the Commonwealth, the Infrastructure Department will be responsible for carrying out the activity on behalf of the Commonwealth (unless stated otherwise). (b) after an Airport Lease is granted – the ALC.
SM	Sydney Metro
SM WSA EIA	SM - WSA EIS Appendix J: EPBC Act Draft Environmental Impact Assessment of On-airport proposed action (EPBC 2019/8541)
SMP	Sustainability Management Plan
SPIR	Submissions and Preferred Infrastructure Report
SSI	State Significant Infrastructure
SSTOM	Stations Systems, Trains, Operations & Maintenance
SWCEMP	Soil and Water Construction Environmental Management Plan
SWMS	Safe Works Method Statement
TfNSW	Transport for New South Wales
TRH	Total recoverable hydrocarbons
VOCs	Volatile organic compounds
WFDIP	Workforce Development and Industry Participation Plan
WSA	Western Sydney Airport Co (ACN 618 989 272), the entity responsible for constructing and operating the Airport in accordance with the Airport Plan. For the purposes of the Airports Act 1996 (Cth), WSA is the “airport-lessee company” for WSI
WSI airport	Western Sydney International (Nancy-Bird Walton) (WSI) Airport

1. Introduction

1.1. Sydney Metro

Sydney Metro is Australia's biggest public transport project. Services between Rouse Hill and Chatswood started in May 2019 on the new stand-alone metro railway system. The Sydney Metro network and program of work includes the Metro North West Line (which opened in May 2019), Sydney Metro City & Southwest (which is currently under construction and due to open in 2024), Sydney Metro West (with construction due to start in 2020) and Sydney Metro – Western Sydney Airport (SM – WSA) (Project). Potential future extensions to Schofields/Tallawong in Rouse Hill in the north and to Macarthur in the south are under consideration and are being safeguarded but do not form part of the project.

The project is shown in Figure 1-1 and 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) (**WSI airport**) and the growing region.

The Project is being delivered under the Western Sydney City Deal, a partnership between the NSW Government, Australian Government and eight councils of the Western Parkland City. The NSW and Australian Governments have a shared objective of having the rail line operational when WSI airport is planned to open for passenger services.

The new railway line will service Greater Western Sydney and the new WSI airport. It will become the transport spine for the Western Parkland City's growth for generations to come, connecting communities and travellers with the rest of Sydney's public transport system with a fast, safe and easy metro service. The Project will link residential areas with job hubs from St Marys through to the new airport and the Western Sydney Aerotropolis.

It will provide a major economic stimulus for Western Sydney, supporting more than 14,000 jobs during construction for the NSW and national economies, including more than 250 new apprenticeships. The project comprises components that are located outside WSI airport (off-airport) and components that are located within WSI airport (on-airport).

The approval process for the off-airport and on-airport components of the project are different and are outlined below. One outcome of the on-airport approval is that a condition of working on the WSI airport site will require the Sydney Metro Western Sydney Airport project to produce and have approved, a series of Construction Environmental Management Plans (CEMP) prior to the SM - WSA commencing construction on-airport. This Soil and Water CEMP (SWCEMP) is one of a series of nine CEMPs for the Railway project which will be consistent with the WSI airport CEMPs and address all on-airport environmental components of the Project.

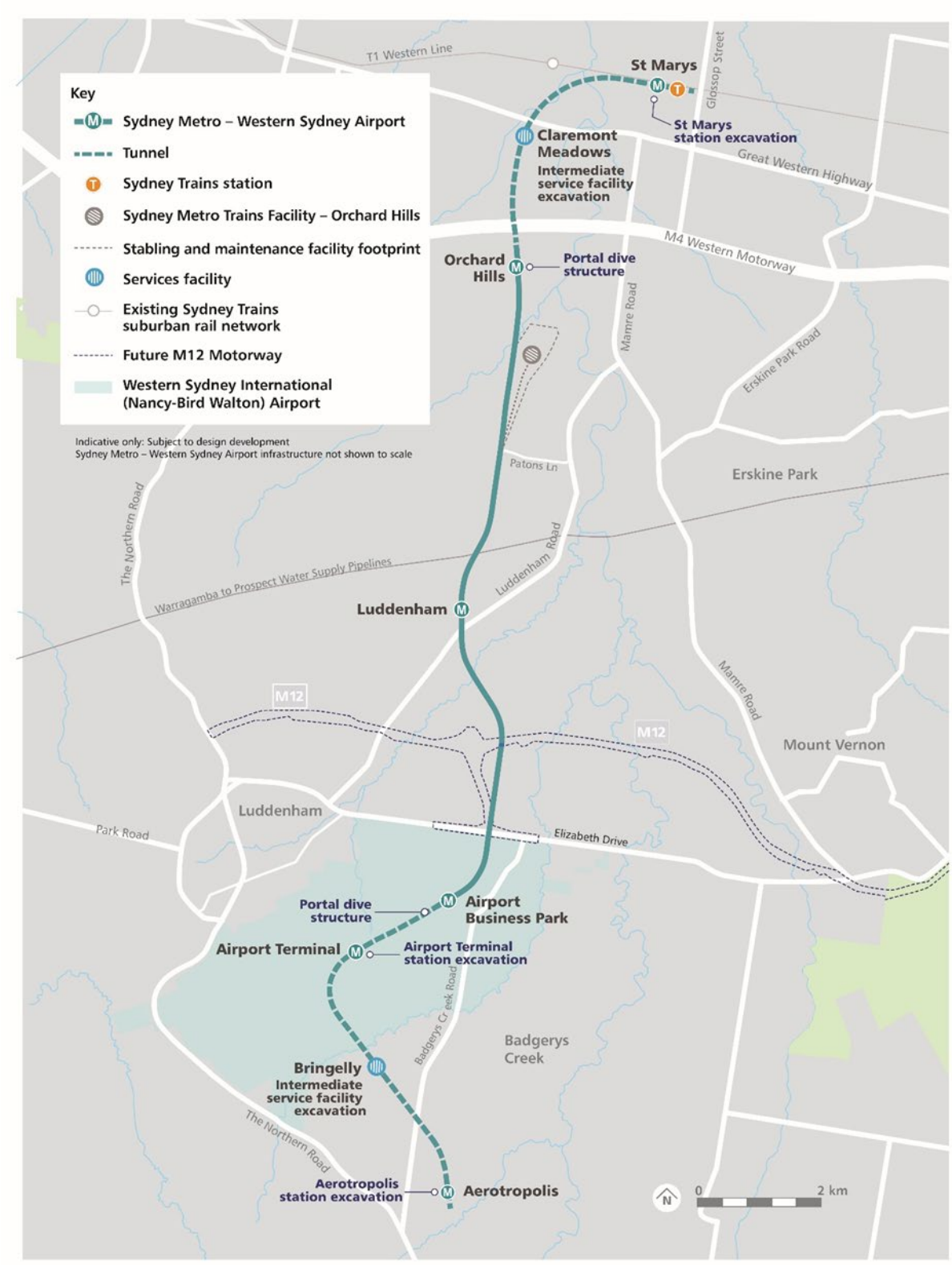

Figure 1-1 Sydney Metro Western Sydney Airport alignment

1.2. Sydney Metro Western Sydney Airport

The Airport Plan sets out the vision for the development and operation of WSI airport and provides authorisation for Stage 1 of the airport as well as the SM - WSA Project. The construction of Stage 1 of the airport is expected to be completed to enable operations to commence in 2026 and will comprise a single runway, a terminal and other relevant facilities to accommodate around 10 million passengers annually as well as air freight traffic. Rail access to WSI airport will contribute to the success of the airport and the Western Parkland City, as it will facilitate passengers' and workers' journeys, reduce road congestion and support the economic viability of the airport.

The SM - WSA project is proposed to enter the airport site from the north and will include stations at the Airport Business Park and the Airport Terminal. The rail line will travel through the airport, before exiting the airport site beneath Badgerys Creek in the southeast of the airport site. Sydney Metro has been, and will continue, working closely with WSI airport to ensure design development and Construction (Rail) Planning of the project is coordinated with the construction and operation of WSI airport.

1.3. Background/ Context

The Airport Plan for the Western Sydney International was determined in December 2016, following preparation and exhibition of an Environmental Impact Statement, and incorporates the conditions specified by the Commonwealth Environment Minister. The delivery of the Project on the WSI airport site has been authorised through a variation of the Airport Plan by the Commonwealth Infrastructure Minister, taking into account advice from the Commonwealth Environment Minister.

In September 2019, the Commonwealth Infrastructure Minister referred the On-airport components of the Project to the Commonwealth Environment Minister. In December 2019, the delegate of the Commonwealth Environment Minister decided that advice is required under section 160 of the EPBC Act as the proposed action is likely to have a significant impact on the environment and will require further assessment (EPBC 2019/8541).

The following documents were prepared as part of the SM - WSA EIS, to respond to the Request for Further Information, and were published, in accordance with the Direction to Publish, from 21 October to 18 November 2020:

- SM - WSA EPBC Act Final Environmental Impact Assessment of on-airport proposed action (EPBC 2019/8541)
- SM - WSA EIS Technical Paper 3: Biodiversity Development Assessment Report
- SM - WSA EIS Appendix F: Construction Environmental Management Framework.

An EPBC Act Final Environmental Impact Assessment of on-airport proposed action (EPBC 2019/8541) and an updated Biodiversity Development Assessment Report were approved by the Commonwealth Department of Agriculture, Water and the Environment (DAWE) and formed part of the conditions of the Airport Plan Variation which was lodged with the Department of Infrastructure, Transport, Regional Development and Communications (DITRDC) and approved by the Commonwealth Environment Minister on 15 September 2021.

This Sydney Metro Soil and Water Construction Environmental Management Plan (Soil and Water CEMP) (this Plan) has been prepared to satisfy the requirements of the Soil and water CEMP set out in the Conditions for the Project of the Western Sydney International (Nancy-Bird Walton) (WSI) Airport detailed in Section 3.11.6 of the Airport Plan.

Condition 39 (2(c)) of the Airport Plan requires that a Sydney Metro Soil and Water CEMP be approved under the Airport Plan prior to the commencement of Main Construction Works.

This SWCEMP provides the management approach and requirements for managing soil and water related matters during construction of the Project. This Plan forms one of nine CEMPs which are collectively covered by the Sydney Metro Construction Environmental Management Framework (SM CEMF) as well as the Western Sydney Airport Site Environmental Management Framework (WSA SEMF). To ensure the environmental resources, responsibilities and management measures are implemented during the construction activities, both the SM CEMF and WSA SEMF will be included within the Sydney Metro Construction (Rail) Plan.

The implementation of the Sydney Metro Construction (Rail) Plan and the CEMF are aligned with Project level management plans including the Community and Stakeholder Engagement Plan and the Sustainability Plan as illustrated in Figure 1-2.

The Sydney Metro Construction (Rail) Plan, including the SM CEMF and nine CEMPs provide the environmental management approach and requirements and therefore should not be read in isolation to each other due to interconnecting management outcomes and objectives. Specifically, for the Soil and Water CEMP, it is considered that the following management plan linkages can be made:

- Aboriginal Cultural Heritage CEMP – The management of soil should be undertaken in alignment with the Aboriginal Cultural Heritage CEMP.
- Air Quality CEMP – It is considered that the management of air quality, dust control, is closely aligned with the outcomes and management objectives of this Soil and Water CEMP. Water application to the ground's surface for the purpose of dust suppression will need to be undertaken in accordance with this Soil and Water CEMP.
- Biodiversity CEMP – The management of surface water runoff is imperative to the management and protection of down-gradient receiving waters. The water quality monitoring program and set criteria has been designed to ensure the monitoring of any down-gradient water quality impacts which may have the potential to impact of aquatic fauna.
- Waste and Resources CEMP – Water storage for its application for soil compaction and dust suppression forms a major component of the Project construction. Water is considered a valuable resource and where possible, the project will strive to maximise the reuse captured / stored water as opposed to drawing on groundwater and potable water sources. In addition, any contaminated or unsuitable soil generated as a result of the works will need to be managed and disposed of in accordance with the Waste and Resources CEMP.

Sustainability Plan– Water is considered a valuable resource. Where possible, the project will maximise the reuse of stored water on site as opposed to drawing on groundwater and potable (municipal) supply sources. In addition, the project works will aim towards maximising the reuse and recycling of material / spoil on site and minimise the need for off-site disposal. Where relevant, linkages to other CEMPs and management objectives have been included in the risk assessment and the environmental control measures, Section 6.6 and Section 7 respectively.

Table 1-1 highlights relationships and linkages of this Soil and Water CEMP with other CEMPs and management plans, including key cross-referencing to Airport Plan and EIA requirements.

Table 1-1 Soil and Water CEMP relationship with other CEMP documentation

EMP	Airport Plan (3.11.6)	SM - WSA EIATable 8-1: On-airport environmental management framework requirements and Table 8-2 Performance outcomes	SM - WSA EIA Table 8-3: Mitigation measures
Aboriginal Cultural heritage	39 2(f)	CEMF5	AH8
Air quality	39 2(e)	CEMF10	AQ1-3
Biodiversity	39 2(b)	CEMF6	FF1, FF3, FF5 FF6 FF9-11
Community Communications Strategy	40	N/A	N/A
European and other heritage	39 2(g)	CEMF5	NAH9
Noise and vibration	39 2(a)	CEMF4	NV1
Soil and water	39 2(c)	CEMF3 CEMF8	HYD1 WQ1-2 GW4-6 SC1,5-9, 11 HR1,3
Sustainability plan	41	N/A	SUS1-3 GHG1
Traffic and access	39 2(d)	CTMF	T1,3 ,4,6
Visual landscape	39 2(i)	CEMF7	LV1-3
Waste and resources	39 2(h)	CEMF9 CEMF11	WR1-3

Key
Moderate to high relevance to this CEMP
Some relevance to this CEMP

1.4. Document purpose

The purpose of this plan is to provide the foundation for the management of soil and water quality impacts in accordance with best practice and legal requirements (including environmental mitigation measures, controls, monitoring and reporting) during the construction phase of the Project based on the assessment undertaken as part of the EIA.

This Plan details the soil and water quality management requirements that must be satisfied to demonstrate compliance with Condition 8 of Section 3.11.2 and 39 (2) of Section 3.11.6 of the Airport Plan for the construction of the Project on WSI airport.

Tables 1.1 and 1.2 of Section 2 of the CEMF identifies key NSW and Commonwealth environmental legislative requirements and their application to SM - WSA construction works, current as at the date of this document. However, these are not totally inclusive and as such Sydney Metro and its Contractors must regularly review their legislative and other requirements. Mitigation measures (specific to soil and water) required to satisfy these requirements are derived from the EIA and through risk assessment processes (refer Section 6.6) and included within this CEMP (refer Section 7).

Implementation of these measures is ensured through monitoring, training and competence, inspection, audit and report actions detailed in Sections 9 and 10, with the responsibilities for implementation identified in Section 8. Continual improvement processes in relation to compliance with regulatory requirements are detailed in the CEMF section 3.18.
In summary, this plan sets out to achieve the following:

- Provision of details for the management and mitigation measures to be implemented, including timing and responsibilities;
- Ensuring the commitments of the Conditions (as set out in the Airport Plan) are met and satisfied by both Sydney Metro and contractors;
- Provision of process for monitoring implementation, reporting, and auditing of soil and water quality related management and compliance related issues;
- Commitment to meeting the requirements of AS/NZS ISO 14001: 2016 Environmental Management Systems, including the need for continual improvement;
- Provision of a process to be implemented for the management of complaints, for stakeholder engagement, and for the management of emerging environmental issues as they arise; and
- Provision of a system including procedures, plans and documentation for implementation by Sydney Metro personnel and contractors to enable Project completion in accordance with the environmental requirements.

Effective implementation of this plan will assist Sydney Metro and relevant contractors to achieve compliance with necessary environmental regulatory and policy requirements in a systematic manner with an outcome of continual environmental management performance.

1.5. Consistency

A major requirement of these plans is for Sydney Metro to maintain consistency with the already approved WSA CEMPs. This consistency requirement results in SM not needing to undertake consultation as is the requirement of WSA for their plans.

SM approached the development of these plans to meet the requirements of the Airport Plan, ensure compliance with Tables 8-1, 8-2 and 8-3 of the EPBC 2019/8541 and remain consistent with the WSA CEMPs.

SM have achieved this consistency through the following:

- Consistent format
- Consistent language
- Consistent existing environment with the addition of the SM – WSA RCIZ existing environment
- Consistent aspects and impacts but removing those not applicable and adding specific SM – WSA aspects and impacts
- Consistent risk assessment but removing those not applicable and adding specific SM – WSA risks
- Consistent mitigation measures but removing those not applicable and adding SM – WSA specific mitigation measures

- Consistent monitoring with the addition of any SM – WSA specific monitoring requirements
- Consistent auditing and reporting
- References to SEMF replaced with consistent CEMF requirements.

1.6. Sydney Metro Environmental Management System overview

Sydney Metro co-operates in general accordance with AS/NZS ISO 14001:2016 – Environmental management systems. A copy of the Sydney Metro environmental policy is provided in Appendix A of the CEMF.

The Project will be undertaken in accordance with the Construction (Rail) Plan including the CEMF and the associated CEMPs (including this Plan).
The CEMF forms an appendix to the Construction (Rail) Plan and is the overarching environmental plan for the implementation of the nine CEMPs. It provides a structured and systematic approach to environmental management and provides an expectation and guidance with regards to environmental management for the overall construction of the Stage 1 Development.

The structure of the environmental management system for the Project is shown in Figure 1-2.

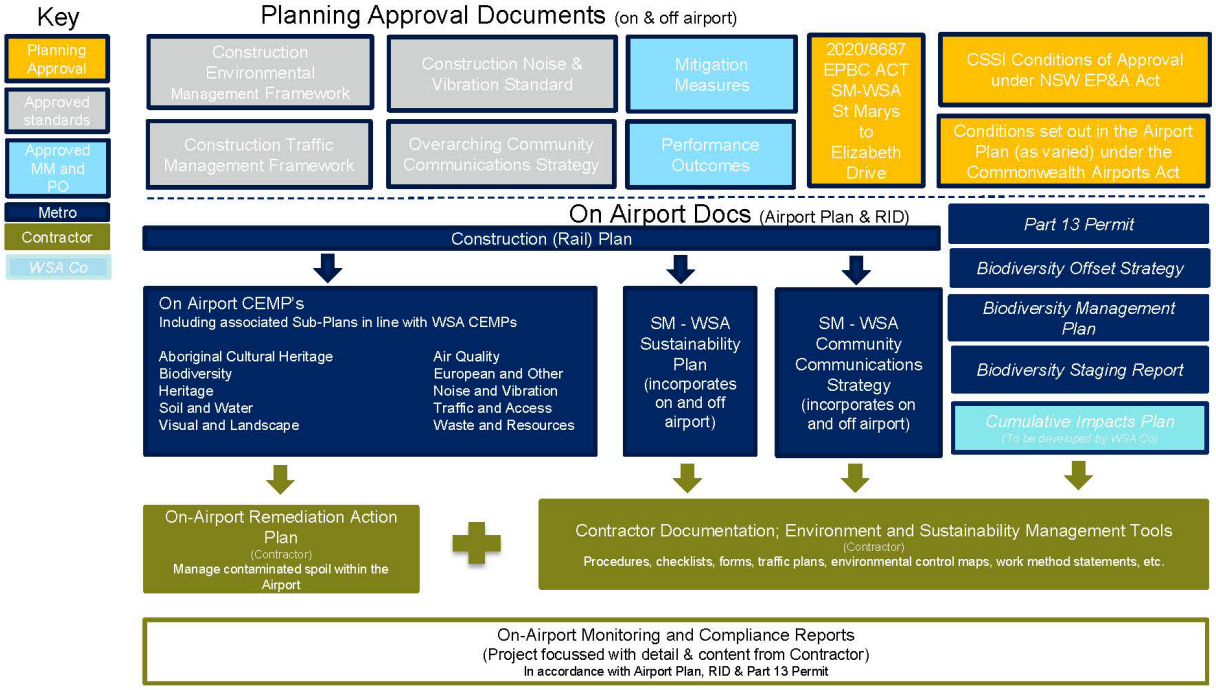

Figure 1-2 SM - WSA Environmental Management System and CEMP context

1.7. Consultation requirements of this plan

There is no direct consultation condition requirement for the Project, under the Airport Plan (September 2021). No consultation has yet been completed during the development of this CEMP. However, WSA completed consultation for the development of their WSA SWCEMP update of Revision 0 and 1 in 2018, Revision 2 in 2019 and Revision 3 in 2021 of this document.

Consultation will continue with agencies, councils and other relevant stakeholders throughout the Project. The outcomes of this consultation will be documented in subsequent revisions of the relevant CEMPs, with details of such consultation included in the applicable document.

1.8. Certification and approval

This Soil and Water CEMP has been reviewed and approved for issue by the SM - WSA Environment Manager prior to submission to Department of Infrastructure, Transport, Regional Development and Communications (Infrastructure Department).

1.9. Distribution

All Sydney Metro personnel and contractors will have access to this SWCEMP via the project document control management system. Unless otherwise agreed by the Approver, the Approved Plan must be published on Sydney Metro's website within one month of being approved and be available until the end of the Construction Period. An electronic copy can be found on the Project website.

This document is uncontrolled when printed. One controlled hard copy will be maintained by the quality manager at the project office

2. Scope of works

2.1. Overall Project scope

The Sydney Metro Construction (Rail) Plan details the construction staging of the Airport Project.

The delivery of the Project will be through a packaging strategy with a wide variety of package sizes, risk profiles and contracting entities. Each package will have different levels of environmental risk and environmental obligations, depending on the scope of works, location of works and sensitivity of the receiving environment and cultural heritage issues and relevant statutory requirements and obligations.
The packages have been divided into:

- AEW – Advanced and Enabling Works
- SCAW Surface Civil and Alignment Works
- SBT – Station Boxes and Tunnelling
- SSTOM – Stations Systems, Trains, Operations & Maintenance

The On-Airport Railway Development of the Project comprises the following key features as described in the Sydney Metro Construction (Rail) Plan (which is consistent with the Airport Plan Variation and EIA Chapter 4):

- Around two kilometres of surface rail alignment within Western Sydney International (SCAW)
- Around 3.3 kilometres of twin rail tunnels (including tunnel portal) within Western Sydney International (SBT)
- Around three kilometres of twin rail tunnels between Western Sydney International and the Aerotropolis Station (SBT)
- Two new metro stations, Airport Business Park Station and Airport Terminal Station (STOM);
- All operational systems and infrastructure (SSTOM)
- A rail segment factory comprising a concrete batch plant and stockpile area (SBT, SCAW and SSTOM)
- A spoil stockpile area (SBT and SCAW)

Details of the Project construction activities, staging and programming including the phases of works is described in the Sydney Metro Construction (Rail) Plan (2021) as required by the Airport Plan Variation.

The proposed construction activities that will be undertaken for the Project include:

- preparatory activities (AEW)
- main construction works including:
    - tunnelling and associated works (SBT)
    - corridor and associated works (SCAW)
    - stations and associated works (SSTOM)
- rail systems fitout (SSTOM)
- activities required for tunnel and viaduct segment manufacture and storage and temporary haulage roads (SBT and SCAW)

- finishing works and testing and commissioning (FAW)

The Project will also include the potential permanent placement of spoil at two sites to support the development of future stages of the airport. The Rail Construction Impact Zone (CIZ) including the construction footprint and key construction sites proposed for use during the construction of the Project are shown in Figure 2-1. This figure also indicates the Western Sydney International Stage 1 CIZ and the Environmental Conservation Zone within Western Sydney International.

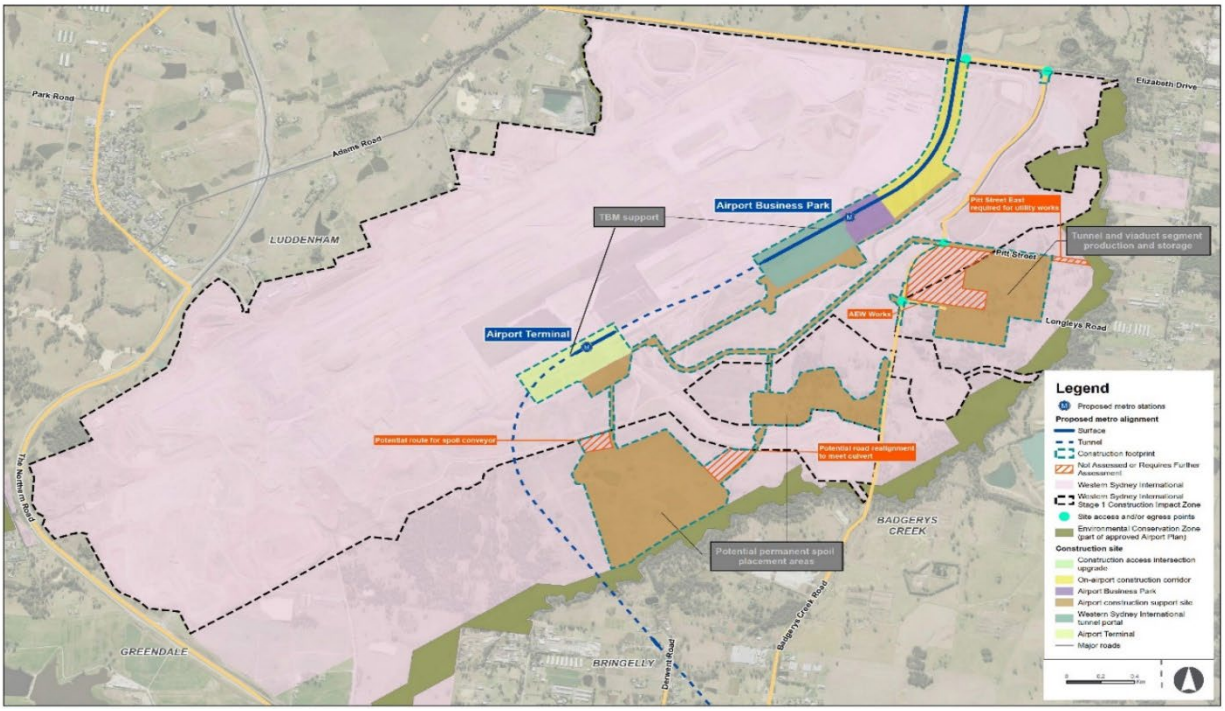

Figure 2-1 Construction footprint and key construction sites

It is anticipated that the Project construction works will commence in 2021 and take about five years to complete, subject to planning approval. The Operational Sydney Metro opening is anticipated to align with the opening of passenger services for Western Sydney International in 2026. An indicative main construction program for the project is shown in **Figure 2-2.**

Construction Activities			Overview of Program																					
			2021				2022				2023				2024				2025				2026			
	Start	Finish	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Enabling Work	25-Jan-21	19-Sep-22																								
SBT Enabling Works	27-Apr-22	23-Jan-23																								
SBT Station & Tunnel Portal Excavation	23-Jun-22	17-Jun-23																								
SBT Tunnel Construction	20-Apr-23	20-Dec-24																								
SCAW Surface work	14-Feb-23	19-Jun-24																								
SCAW Station works	14-Feb-23	13-Jul-23																								
SSTOM Station Construction and fitout	17-Jul-23	29-Aug-25																								
SSTOM Rail System fitout	18-Jun-24	3-Oct-25																								
SSTOM Systems Testing and commisioning (incl integrated)	31-Jan-25	15-Dec-26																								

Figure 2-2 Indicative main construction program for the project

2.2. Preparatory activities

Preparatory activities for the proposed action are required to establish key construction sites and facilitate construction activities.

The majority of the preparatory activities are expected to commence in advance of main construction works, while some preparatory activities will continue concurrently with the main construction works. Preparatory activities will include:

- detailed site investigations and subsequent clearance works (DSI includes a review of further available information);
- provision of construction haul roads;
- relocating, adjusting and protecting utilities and services affected by the proposed action;
- supplying power, water and other utilities to construction sites and other areas within the construction footprint;
- vegetation clearance (as permitted); and
- establishment of construction sites.

2.3. Construction sites

The Project's construction activities will be carried out within and to the south-west of the WSI airport Stage 1 CIZ. The indicative works at proposed construction sites required for the construction of the Project are shown in Figure 2-3. The use of these sites will be confirmed by the construction contractor(s) (when appointed) in consultation with Western Sydney Airport.

Location	Preparatory activities	TBM launch	TBM support	TBM retrieval	Spoil handling and removal	Roadheader launch/support	Ancillary facility construction	Stabling and maintenance facility construction	Major earthworks	Bridge and viaduct construction	General civil works	Concrete batch plant	Equipment and material laydown	Rail system fitout	Site offices and worker amenities	Water treatment plant	Potential acoustic shed	Vehicle parking
On-airport																		
On-airport construction corridor	✓				✓		✓		✓	✓	✓		✓	✓	✓			✓
Airport Business Park	✓				✓		✓		✓		✓		✓	✓	✓			✓
Western Sydney International tunnel portal	✓	✓	✓		✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓
Airport Terminal	✓		✓		✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓
Airport construction support site	✓				✓				✓		✓	✓	✓	✓	✓			✓

Figure 2-3 Indicative construction activities at proposed action construction sites

Note: TBM retrieval will occur outside the proposed action at the Aerotropolis station site

3. Objectives and targets

3.1. Objectives

The key objective of this SWCEMP is to ensure that impacts associated with soil and water quality are managed to within permitted criteria as far as practicable and to ensure that best practice controls and procedures are implemented. As per the SM-WSA CEMF, this SWCEMP will detail the SM-WSA soil and water management objectives and be consistent with the WSA Soil and Water CEMP, including all appendices.

To achieve this objective, the following will be undertaken:

- Ensure appropriate treatment of water prior to off-site discharge or disposal;
- Minimise the risk of pollution incidents from the construction of the Project;
- Minimise pollution of surface water through appropriate erosion and sediment control;
- Minimise the export of sediment from the airport site;
- Minimise leaks and spills from construction activities;
- Maintain existing water quality of surrounding surface watercourses;
- Source construction water from non-potable sources, where feasible and reasonable;
- Protect the quantity and quality of groundwater;
- Minimise potable water use during construction;
- Ensure appropriate treatment of any contaminants identified throughout construction;
- Ensure appropriate measures are implemented to achieve consistency with the WSA SWCEMP requirements and Tables 8-1, 8-2 and 8-3 of the SM - WSA EIA; and
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3 of this Plan.

3.2. Targets and performance criteria

Performance criteria specific to soil and water have been established for the management of soil and water impacts during the construction phase of the works which have been, in part, derived from the performance criteria identified in the EIA, Table 28-6 are outlined in Table 3-1.

Table 3-1 Soil and water targets and performance criteria

Aspects	Target / Performance criteria	Document Reference
Environmental management compliance	Compliance with the requirements and mitigation measures set out in this Soil and Water CEMP	• CEMP compliance audits (refer Section 10) • Site environmental inspection checklist
Environmental management compliance Airports (Environment Protection) Regulations 1997	Compliance with the performance criteria in this CEMP which have been developed taking into account the general duty not to pollute under the AEPRs (Reg 4.01) and the related limits.	• CEMP compliance audits (refer Section 10) Site environmental inspection checklist AEPRs

Erosion and sedimentation	Establishment and maintenance of erosion and sedimentation controls in accordance with the NSW Blue Book (NSW Government, 2018) and the current soil and water conditions.	• Site environmental inspection checklist • Contractor erosion and sedimentation control plans (as referenced / included in the EWMS and ECMs)
Water quality	Compliance with the water quality monitoring requirements of this Soil and Water CEMP, including the monitoring frequency and criteria.	• Water quality monitoring records • CEMP compliance audits (refer to Section 10)
Contamination disposal	Disposal of any material from site in accordance with the NSW EPA Waste Classification Guidelines (2014).	• Soil testing / classification data • Water testing / classification data • Waste classification certificates

The above targets in Table 3-1 have been set to provide a benchmark performance objective to which Sydney Metro will endeavour to achieve. Failure to achieve the targets will not necessarily be considered a non-conformance, however, will prompt internal review of environmental management and assessment of potential improvement opportunities.

4. Legal and other requirements

Relevant environmental legislation and other requirements are identified below

4.1. Relevant legislation and guidelines

As WSI airport is to be developed under the Airport Plan (September, 2021) determined under the Airports Act, some state laws will not be applicable to the Project (s112 of this Act). Where state law is applicable, this plan will set out the relevant applicable state legislation and requirements and demonstrate how compliance with those laws including obtaining relevant permits will be achieved. Where state laws are not applicable, there may nonetheless be a requirement to have regard to those laws, for example, through mitigation measures to be incorporated in CEMPs to satisfy conditions under the Airport Plan.

4.2. Legislation

Legislation and regulations and their relevance to soil and water quality and this Plan are summarised in Table 4-1.

Table 4-1 Principal legislation and relevance

Legislation or regulation	Relevance	CEMP compliance provisions
Commonwealth		
Airports Act 1996 (Airports Act)	The Act and Airports Regulations set out the framework for the regulation and management of activities at airports that could have potential to cause environmental harm. This includes offences related to environmental harm, environmental management standards, monitoring and incident response requirements. The Airport Plan prepared under the Act covers a number of environmental matters and, in particular, details specific measures to be carried out for the purposes of preventing, controlling or reducing the environmental impact associated with the airport. Criminal offences are applicable if these measures are not complied with.	This CEMP forms part of the overall environmental management system which has as a target, full compliance with the Airport Plan.
Airports (Environment Protection) Regulations 1997 (AEPR)	Imposes a general duty to prevent or minimise environmental pollution once an airport lease is granted. Promotes improved environmental management practices at airports. Includes provisions setting out definitions, acceptable limits and objectives for water (and air quality), as well as monitoring and reporting requirements.	Refer to commentary on Airport Plan above. Section 6 – Soil and Water aspects and Impacts Section 10 – Inspection, monitoring, auditing and reporting
Airports (Building Control) Regulations 1996	Any conditions imposed on the ABC and ALC on their consents must be satisfied by the applicant. These conditions are additional to any requirements identified under the CEMPs	Section 7 – Environmental Control Measures Section 10 – Inspection, monitoring, auditing and reporting

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Provides for the protection of matters of national environmental significance including species, populations, communities and their habitat that could be impacted by contamination or pollution.	Section 7 – Environmental Control Measures Biodiversity CEMP
Environment Protection and Biodiversity Conservation Regulation 2000 (as amended) (EPBC Regulation)	Provides for the protection of world heritage sites (including the Gondwana Rainforests) and wetlands of international importance (i.e. Ramsar sites).	Section 7 – Environmental Control Measures European and Other Heritage CEMP
Work Health and Safety Act 2011 (NSW) and Work Health and Safety Act 2011 (Cth)	Provides a general overview of how to make workplaces safe and healthy. The Act outlines WSA's legal responsibilities and duties as an employer and business owner with regards to work health and safety.	Section 10 – Inspection, Monitoring, auditing and reporting WSA RAP 2019
Work Health and Safety Regulations 2017 (NSW) and Work Health and Safety Regulations 2011 (Cth)	The Regulations set out the standards that WSA need to meet for specific hazards and risks, such as noise, machinery, and manual handling. The Regulations also set out the licenses that may be required for specific activities, the records you need to keep, and the reports you need to make. Specific to this Soil and Water CEMP, Chapter 8 of the Regulations provide specific requirements with regards to the management of asbestos containing materials.	Section 10 – Inspection, monitoring, auditing and reporting WSA RAP 2019
NSW		
Environmental Planning and Assessment Act 1979 (EP&A Act)	Objects of the Act include the encouragement of proper management and conservation of natural and artificial resources and the promotion of the orderly and economic use and development of land in NSW. The EP&A Act also provides for the making of environmental planning instruments including State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs), which include land use controls, such as development standards applicable to the land within the area covered by each instrument.	This Project has been authorised under the Airports Act; however, a range of matters arising from the EP&A Act have been considered. Section 7 – Environmental Control Measures
Water Act 1912 (Water Act)	Provides for the protection of groundwater in the few areas in NSW where water-sharing plans have not come into effect.	Section 7 – Environmental Control Measures
Protection of the Environment Operations Act 1997 (POEO Act) and the Protection of the Environment Operations (General) Regulation 2009	Establishes the process for issuing environmental protection licences (EPL) for certain scheduled activities - For the works covered by this CEMP (as detailed in Table 5), the need to obtain an EPL has not been identified, however, it may apply to future works. Places responsibility on the part of developers to	Section 7 – Environmental Control Measures

(POEO (General) Regulations)	prevent water pollution while also controlling waste during construction. Defines water and land pollution and the circumstances when pollution has been caused.	
Protection of the Environment Operations (Waste) Regulation 2014	Establishes the process for issuing environmental protection licences (EPL) for certain scheduled activities - For the works covered by this CEMP (as detailed in Table 5), the need to obtain an EPL has not been identified, however, it may apply to future works. Places responsibility on the part of developers to prevent water pollution while also controlling waste during construction.	Section 7 – Environmental Control Measures
Soil Conservation Act 1938	Establishes controls to prevent soil erosion and land degradation.	Section 7 – Environmental Control Measures Air Quality CEMP (for the management of dust generation and associated soil erosion prevention measures)
Fisheries Management Act 1994	Provides for the conservation of fish stocks, habitat, threatened fish species, populations and communities. Promotes ecologically sustainable development. Promotes commercial and recreational fishing and aquaculture. Promotes the sharing of fishery resources. Provides for social and economic benefits for the wider community in terms of fish management.	Section 7 – Environmental Control Measures Biodiversity CEMP
Contaminated Land Management Act 1997	Provides for the investigation and remediation of contaminated land considered to pose a significant risk to human health or the environment.	Section 7 – Environmental Control Measures
Water Management Act 2000	Provides for the protection, enhancement and restoration of water sources and ecosystems, ecological processes and biological diversity.	Section 7 – Environmental Control Measures
The Water Management (General) Regulation 2011 or the NSW Aquifer Interference Policy	Defines the conditions where 'aquifer interference approval' is needed and clarifies the difference between 'minimal impacts' and major 'dewatering' activities.	Biodiversity CEMP
Pesticides Act 1999	Promotes the protection of human health, the environment, property and trade in relation to the use of pesticides, having regard to the principles of ecologically sustainable development within the meaning of the Protection of the Environment Administration Act 1991; Aims to minimise risks to human health, the environment, property and trade; Promotes collaborative and integrated policies in relation to the use of pesticides,	Section 7 – Environmental Control Measures Section 10 - Inspection, monitoring, auditing and reporting

	Establishes a legislative framework to regulate the use of pesticides.	
Draft State Environmental Planning Policy for Strategic Conservation Planning (Applicable to off airport land only)	An Explanation of Intended Effect was on exhibition between 26 August 2020 and 2 November 2020. The purpose of the SEPP is to meet requirements for	Section 7 – Environmental Control Measures Section 8 – Biodiversity Management
State Environmental Planning Policy (Western Sydney Aerotropolis) 2020 (Aerotropolis SEPP)	The Aerotropolis SEPP was made in accordance with division 3.3 of the EP&A Act and provides planning controls for development within the Western Sydney Aerotropolis. The Aerotropolis SEPP overrides any LEP provisions that apply to that land.	Section 7 – Environmental Control Measures Section 8 – Biodiversity Management
Liverpool Local Environmental Plan 2008 (Liverpool LEP)	The Liverpool LEP provides local environmental planning controls and standards for land in the Liverpool LGA in accordance with the relevant standard environmental planning instrument under section 33A section 3.20 of the EPA Act.	Section 7 – Environmental Control Measures Section 8 – Biodiversity Management
Penrith Local Environmental Plan 2010 (Penrith LEP)	The Penrith LEP provides local environmental planning controls and standards for land in the Penrith LGA in accordance with the relevant standard environmental planning instrument under section 33A3.20 of the EPA Act.	Section 7 – Environmental Control Measures Section 8 – Biodiversity Management

4.3. Guidelines and standards

Guidelines and standards that are relevant to soil and water quality management and this plan are summarised in Table 4-2.

Table 4-2 Relevant guidelines and standards

Guidelines and standards
Acid Sulfate Soil and Rock – Victorian EPA Publication 655.1 – July 2009
Acid Sultfate Soil Manual (ASSMAC 1998)
AS/NZS ISO 14001:2016 Environmental management systems – Requirements with guidance for use
Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000 Guidelines)
The Heads of EPAs Australia and New Zealand (HEPA), PFAS National Environmental Management Plan, January 2020.
Commonwealth Environmental Management Guidance on Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA), Draft - October 2016
Contaminated Land Management - Guidelines for the NSW Site Auditor Scheme, 3rd edition (EPA 2017)
DEC: Environmental Compliance Report Liquid Chemical Storage, Handling and Spill Management Part B Review of Best Practice and Regulation November 2005
Department of Environment and Conservation (DEC): Storage and Handling Liquids: Environmental Protection Participant's Manual May 2007
Department of Infrastructure, Planning and Natural Resources (DIPNR), 2003. Roads and Salinity Guideline
Department of Land and Water Conservation (DLWC), 1998. Constructed Wetlands Manual

Fairfull, S. and Witheridge, G. (2003) Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings. NSW Fisheries
Guidelines for assessing former orchards and market gardens (DEC 2005)
Guidelines for consultants reporting on contaminated sites (OEH 2011)
Guidelines for the assessment and management of groundwater contamination (DEC 2007)
Guidelines on the duty to report contamination under the Contaminated Land Management Act 1997 (EPA 2015)
Liverpool Local Environmental Plan 2008 (NSW)
Managing Urban Stormwater: Soils and Construction. Landcom, (4th Edition) March 2004 (reprinted 2006) (the “Blue Book”). Volume 1 and Volume 2
National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended)
National Environment Protection (National Pollution Inventory) Measure 1998 (as amended)
National Water Quality Management Strategy
NSW EPA, 1995. Sampling design guidelines (EPA 1995)
NSW EPA, 2003. Guidelines for the vertical mixing of soil on former broad-acre agricultural land
NSW EPA, 2014. Waste classification guidelines.
NSW EPA, 2016. Addendum to the Waste Classification Guidelines (2014) Part 1: Classifying Waste, October 2016 (PFAS solid waste criteria).
NSW Fisheries, November 2003, Policy and Guidelines for Fish Friendly Waterway Crossings
NSW Water Quality Objectives
Penrith Local Environmental Plan 2010 (NSW)
Safe Work Australia Model Code of Practice: How to Safely Remove Asbestos (April 2016)
State Environmental Planning Policy No 52—Farm Dams and Other Works in Land and Water Management Plan Areas (NSW)
State Environmental Planning Policy No 55—Remediation of Land (NSW)
State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 (NSW)
The Heads of EPAs Australia and New Zealand (HEPA), PFAS National Environmental Management Plan, January 2018.
Volume 2A Installation of Services (DECCW 2008)
Volume 2C Unsealed Roads (DECCW 2008)
Volume 2D Main Roads Construction (DECCW 2008)
WorkCover NSW Guidelines for managing asbestos in or on soil (March 2014)
Western Sydney Aerotropolis Development Control Plan 2020 Phase 1

4.4. Approvals and other specifications

- Functional Specifications;
- Sydney Metro Western Sydney Airport Plan(2016);

- Western Sydney Airport Environmental Impact Statement;
- WSA Remediation Action Plan (2019;
- Sydney Metro Sustainability Plan;
- Sydney Metro Community and Stakeholder Engagement Plan;
- Sydney Metro Construction (Rail) Plan; and
- Construction Environmental Management Framework.

4.5. Airport Plan Conditions

Conditions of Approval relevant to biodiversity management during construction are provided in Table 4-3. Compliance with the Airport Plan conditions is a statutory requirement and as such, failure to comply may constitute a criminal offence liable to criminal prosecution under the Airports Act.

Table 4-3 Conditions of Approval relevant to soil and water quality management

Condition no.	Condition	Timing	Responsibility	Reference within this CEMP
39.1	The rail authority must not: (a) Commence Rail Construction Works until each and all of the CEMPs specified in paragraph (2) have been prepared and approved in accordance with this condition; or b) Carry out any Rail Development inconsistently with any of the approved Rail CEMPs.	Prior to Construction Works	Sydney Metro	Sections 6, 7,9 and 10
39.2	The Rail Authority must prepare and submit to an Approver for approval; (2) (c) a Soil and Water CEMP in relation to the carrying out of the Rail Development.	Prior to Construction Works	Sydney Metro	This document (Soil and Water CEMP)
39.3	The criteria for approval of each of the Rail CEMPs are that an Approver is satisfied that (a) The CEMP complies with the mitigation measures and other requirements set out in Table 8-1 and Table 8-3 of the EIA which are relevant to that CEMP; and (b) The Rail Authority, in preparing the CEMP has taken into account any performance outcomes specified in Table 8-2 of the EIA relevant to the CEMP; and (c) the CEMP is otherwise appropriate	Prior to Construction Works	Sydney Metro	This document (Soil and Water CEMP) Table 4.5
39.4	The Rail Authority must ensure that: (a) a Rail CEMP is to the extent possible, consistent with a CEMP of the Site Occupier; and (b) no Rail CEMP is inconsistent with the approved Construction (Rail) Plan.	CEMP preparation	Sydney Metro	Section 1.3 Section 4.6 Section 7

Condition no.	Condition	Timing	Responsibility	Reference within this CEMP
42.4	(4) Each of the Rail Authority and the ALC must not act inconsistently with the approved Cumulative Impacts Plan.	Construction	WSA / Sydney Metro	Section 7 Table 7-1.
45.3	The Rail Authority must take reasonable steps to ensure that: (a) each person involved in carrying out a development which is part of the Rail Development: (i) is informed of the conditions that are relevant to the carrying out of the Rail Development; and (ii) in carrying out the Rail Development, complies with those conditions as if they applied to the person in the same way as they apply to the Rail Authority; and (b) each person involved in operating a development described in section 3.10 of Part 3 of the Airport Plan: (i) is informed of the conditions that are relevant to the operation of the development; and (ii) in operating the development, complies with those conditions as if they applied to the person in the same way as they apply to the Rail Authority.	Prior to construction	Sydney Metro	Section 10.8
46	Site Occupier and Plan Owner to maintain records about compliance with conditions Each Site Occupier, the Rail Authority and each Plan Owner must maintain accurate records which demonstrate its compliance with the conditions, including measures taken to implement the Approved Plans, and must make the records available upon request to the Infrastructure Department.	During construction	Sydney Metro	Section 10
47.4	Unless otherwise agreed in writing by an Approver, the Rail Authority must prepare a report addressing its compliance with each condition set out in section 3.11.6, including implementation of any Approved Plan, in respect of: (a) the 12-month period commencing with the commencement of Rail Construction Works; and (b) each subsequent 12-month period until the end of the Rail	During construction	Sydney Metro	Section 10.5

Condition no.	Condition	Timing	Responsibility	Reference within this CEMP
	Construction Period; and (c) any period between the commencement of Rail Construction Works and the end of the Rail Construction Period that is not covered by paragraph (a) or (b).			
47.5	Unless otherwise agreed in writing by an Approver, the Rail Authority must publish each report prepared under subcondition (4) on its website within three months of the end of the period in respect of which the report was prepared. Documentary evidence providing proof of the date of publication must be provided to the Infrastructure Department at the same time as each report is published (with a copy to be provided to the Environment Department). Each report must remain on the Rail Authority's website for a minimum of 12 months (beginning on the date of publication).	During construction	Sydney Metro	Section 10.5
48.4	The Rail Authority must ensure that an independent audit of its compliance with the conditions set out in section 3.11.6 (except condition 44) is conducted in respect of the 12-month period commencing with the commencement of Rail Construction Works.	During construction	Sydney Metro	Section 10.5
48.5	The Rail Authority must ensure that an independent audit of its compliance with condition 46 is conducted in respect of the 12-month period from commencement of Rail Operations.	During construction	Sydney Metro	Section 10.5
48.6	The Rail Authority must submit the report of each audit conducted under subcondition (4) or (5) to an Approver (with a copy to the Environment Department) within six months of the end of the period in respect of which the audit was conducted. For each audit, the independent auditor must be approved by an Approver prior to the commencement of the audit. Audit criteria must be agreed by an Approver and the report of the audit must address the criteria to the satisfaction of an Approver.	During construction	Sydney Metro	Section 10.5
49.1	Variation of Approved Plans The Plan Owner may seek approval for a variation of an Approved Plan by submitting to an Approver a version of the plan with the proposed variation clearly marked in it (varied plan).	During construction	Sydney Metro	Section 10.2
49.2	The criteria for approval of the varied plan are the same as those in the Approval Condition, but only to the extent that they are relevant to the	During construction	Sydney Metro	Section 10.5

Condition no.	Condition	Timing	Responsibility	Reference within this CEMP
	proposed variation.			
49.3	If an Approver approves a varied plan prepared under subcondition (1) or paragraph (5)(b), or the Infrastructure Minister varies an Approved Plan under paragraph (5)(a), then, from the date when it is approved or varied (as the case may be), the plan as varied is taken to be the Approved Plan for the purposes of the conditions.	During construction	Sydney Metro	Section 10.5
49.6	The Infrastructure Minister may: (a) vary an Approved Plan; or (b) request in writing that the Plan Owner prepare and seek approval for a specified variation of an Approved Plan in accordance with subcondition (1), if the Infrastructure Minister believes on reasonable grounds that: (c) a condition has been contravened and the nature of the contravention is relevant to the subject matter of the Approved Plan; and (d) the variation or the request for a specified variation (as the case may be) will address the contravention.	During construction	Sydney Metro	Section 10.5
49.7	The Plan Owner must comply with a request made by the Infrastructure Minister in accordance with subcondition (5) within three months of the date of the request.	During construction	Sydney Metro	Section 10.5
49.9	Within two months of the grant of an Airport Lease, the ALC must prepare and submit for approval, in accordance with subcondition (1), a variation of each plan that was approved under a condition before the lease was granted, and for which the ALC is the Plan Owner, to reflect the change in Site Occupier resulting from the grant of the Airport Lease.	During construction	Sydney Metro	Section 10.5
50.1	Publication of Approved Plans Unless otherwise agreed in writing by an Approver, the Plan Owner must publish all Approved Plans on its website.	During construction	Sydney Metro	Section 10.5
50.2	Each Approved Plan must be published on the Plan Owner's website within one month of being approved and remain so published: (a) for CEMPs – until the end of the Airport Construction Period or Rail Construction Period as relevant; (d) the Rail OEMP; (e) the Community Communications Strategy – on commencement and each time there is a variation to the Strategy; and	During construction	Sydney Metro	Section 10.5

Condition no.	Condition	Timing	Responsibility	Reference within this CEMP
	(f) for all other plans – until there is a Master plan for the Airport.			

4.6. Environmental Impact Requirements

4.6.1. WSA EIS requirements

The requirements of soil and water management to be taken into account and addressed during the construction phase of the Project on the Stage 1 area are included in the WSA EIS, specifically Table 28-4. In line with the requirement of the SM - WSA CEMPs to be consistent with the WSA CEMPs, Sydney Metro have ensured that the implementation, risk assessment, management measures, monitoring, auditing, reporting and responsibility for soil and water management by the SM Rail development is aligned with the applicable requirements of the WSA.

4.6.2. SM - WSA EIA requirements

The requirements of soil and water management to be taken into account and addressed during the construction phase of the Project are included in Section 8 of the SM - WSA EIA, in particular Tables 8-1, CEMF 3 and 8. A summary of these requirements and how they have been addressed in this SWCEMP is presented in Table 4-5.

Table 4-4 Summary of soil and water quality management requirements from the SM - WSA EIA

EIA Reference	Topic	Summary	Where referenced
Table 8-1 CEMF 3	Framework requirements.	The on-airport Soil and Water CEMP will detail the Sydney Metro – Western Sydney Airport groundwater management objectives, including: • reduce the potential for drawdown of surrounding groundwater resources • prevent the pollution of groundwater through appropriate controls and • reduce the potential impacts of groundwater dependent ecosystems.	Section 7 - Environmental control measures Section 6.4.2.5 GDE
		The on-airport Soil and Water CEMP will be consistent with the Western Sydney Airport Soil and Water CEMP, including all appendices (and sub plans) to the CEMP.	This document has been developed using the WSA CEMP
		Groundwater management of on-airport works will be implemented through the groundwater management plan approved as part of the on-airport Soil and Water CEMP. The groundwater quality criteria will be in accordance with Appendix G of the Western Sydney Airport Soil and Water CEMP.	Appendix E Groundwater quality criteria
		The on-airport Soil and Water CEMP (with the groundwater management plan) will include the following groundwater mitigation measures:	Note
		• implement all feasible and reasonable measures to limit groundwater inflows to stations and crossovers	Section 6.1.4 Section 7 Environmental control measures
		• undertake groundwater monitoring (in terms of levels and quality) during construction in areas	Section 9.4 – Groundwater

EIA Reference	Topic	Summary	Where referenced
		identified as 'likely' and 'potential' groundwater dependent ecosystems.	monitoring program
Table 8-1 CEMF 8	Framework requirements.	The on-airport Soil and Water CEMP will detail all the Sydney Metro – Western Sydney Airport soil and water management objectives, including: • minimise pollution of surface water through appropriate erosion and sediment control; • minimise leaks and spills from construction activities • maintain existing water quality of surrounding surface watercourses and • source construction water from non-potable sources, where feasible and reasonable.	Section 7 - Environmental control measures Section 8.1 Water Usage Sustainability Management Plan
		The on-airport Soil and Water CEMP will be consistent with the Western Sydney Airport Soil and Water CEMP, including all appendices (and sub plans) to the CEMP. The plan will include as a minimum:	This document has been developed using the WSA CEMP Section 3 – Objectives and targets
		• soil and water mitigation measures	Section 7 - Environmental control measures
		• details of construction activities and their locations, which have the potential to impact on water courses, storage facilities, stormwater flows, and groundwater	Section 6 – Impacts and risk assessment Section 6.6 Risk assessment Figure 2-1 Project layout
		• surface water and ground water impact assessment criteria consistent with the Airports (Environment Protection) Regulations 1997 (with due consideration of the ANZECC guidelines)	Section 6 - Soil and water aspects and impacts
		• management measures to be used to minimise surface and groundwater impacts, including identification of water treatment measures and discharge points, details of how spoil and fill material required by the project will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; salinity control measures and the consideration of flood events	Section 7 - Environmental control measures
		• a contingency plan, consistent with the NSW Acid Sulphate Soils Manual (EPA 1998), to deal with the unexpected discovery of actual or potential acid sulphate soils and procedures for the investigation, handling, treatment and management of such soils and water seepage	Section 6.6 Risk assessment
		• management measures for contaminated material (soils, water and building materials) and a contingency plan to be implemented in the case of unanticipated discovery of contaminated material, including asbestos, during construction	Section 7 - Environmental control measures

EIA Reference	Topic	Summary	Where referenced
		• a description of how the effectiveness of these actions and measures will be monitored during the proposed works, clearly indicating how often this monitoring will be undertaken, the locations where monitoring will take place, how the results of the monitoring will be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified	Section 10.4 – Groundwater monitoring program
		procedures for the development and implementation of progressive Erosion and Sediment Control Plans (ESCPs) in accordance with Managing Urban Stormwater: Soils & Construction Volume 1 (Landcom, 2004) (known as the “Blue Book”). ESCPs will detail all required erosion and sediment control measures for the particular site at the particular point in time and be progressively updated to reflect the current site conditions. Any amendments to the ESCP will be approved by the Contractor’s Environmental Manager (or delegate)	Section 7 - Environmental control measures Appendix A
		• identification of locations where site specific Stormwater and Flooding Management Plans are required. Stormwater and Flooding Management Plans will be developed and implemented for the relevant construction sites. These plans will identify the appropriate design standard for flood mitigation based on the duration of construction, proposed activities and flood risks. The plan will develop procedures to ensure that threats to human safety and damage to infrastructure are not exacerbated during the construction period.	While mitigation measures have been developed to address stormwater and flooding management, the site specific plans will be developed by the Contractors on finalisation of scope and design.
		compliance record generation and management, including: - weekly inspections of the erosion and sediment control measures. Issues identified would be rectified as soon as practicable - additional inspections will be undertaken following significant rainfall events (greater than 20 mm in 24 hours) and - all water will be tested (and treated if required) prior to discharge from the site in order to determine compliance with the appropriate approvals and licencing. No water will be discharged from the site without written approval of the Contractor’s Environmental Manager (or delegate). This is to form a HOLD POINT.	Section 10.2 Soil and Water monitoring Section 10.5 Reporting
		The on-airport Soil and Water CEMP would include the following soil and water quality mitigation measures:	

EIA Reference	Topic	Summary	Where referenced
		clean water will be diverted around disturbed site areas, stockpiles and contaminated areas	Section 7 - Environmental control measures
		control measures will be installed downstream of works, stockpiles and other disturbed areas	Section 7 - Environmental control measures
		exposed surfaces will be minimised, and stabilised/revegetated as soon feasible and reasonable upon completion of construction	Section 7 - Environmental control measures
		dangerous good and hazardous materials storage will be within bunded areas with a capacity of 110 per cent of the maximum single stored volume	Section 7 - Environmental control measures
		• chemicals will be stored and handled in accordance with relevant Australian standards such as: - AS 1940-2004 The storage and handling of flammable and combustible liquids - AS/NZS 4452:1997 The storage and handling of toxic substances - AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods - AS/NZS 1547:2012 On-site domestic wastewater management	Section 7 - Environmental control measures
		spill kits will be provided at the batch plants, storage areas and main work sites	Section 7 - Environmental control measures
		• a protocol will be developed and implemented to respond to and remedy leaks or spills • a remedial action plan and unexpected finds protocol would be established to facilitate the quarantining, isolation and remediation of contamination identified throughout the construction programme. Any asbestos identified on site would be managed in accordance with applicable regulatory requirements.	Section 7 - Environmental control measures
Table 8-2	Flooding, Hydrology and Water Quality	Land and property beyond the construction footprint would not be impacted by construction for the 0.5 Exceedances per Year (EY) storm event	Section 7 - Environmental control measures
		No aspect of construction to materially adversely affect existing water quality 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))	Section 7 - Environmental control measures
		No material change to channel shape within the construction footprint for the 0.5 EY storm event for streams classified first order and higher	Section 7 - Environmental control measures
		Water discharged from the project, including runoff from hardstand areas, surface and ground water storages would:	Section 7 - Environmental control measures

EIA Reference	Topic	Summary	Where referenced
		• 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)	
	Groundwater and Geology	Groundwater availability and quality for water supply and environmental benefit (e.g. groundwater dependent ecosystems) is not affected beyond the requirements outlined in the NSW Aquifer Interference Policy	Section 7 - Environmental control measures
		Contamination risks to human health and ecological receivers are minimised through effective management of existing contaminated land	Section 7 - Environmental control measures
Table 8-3 Flooding, hydrology and water quality - construction	HYD1	Construction planning would consider flood related mitigation, including:	Section 7 - Environmental control measures
		• staging construction works to reduce the duration of works within the floodplain	Section 7 - Environmental control measures
		• daily and continuous monitoring of weather forecasts and storm events, rainfall levels and water levels in key watercourses to identify potential flooding events and related flood emergency response	Section 7 - Environmental control measures
		• provide flood-proofing to excavations at risk of flooding during construction, where reasonable and feasible, such as raised entry into shafts and/or pump-out facilities to minimise ingress of floodwaters into shafts and the dive structure	Section 7 - Environmental control measures
		• review of site layout and staging of construction works to avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required	Section 7 - Environmental control measures
	WQ1	A surface water quality monitoring program would be implemented to monitor water quality during construction. The program would be developed in consultation with (as relevant) Western Sydney Airport, NSW Environment Protection Authority, relevant sections of Department of Planning, Industry and Environment and relevant local councils. The program would consider monitoring being undertaken as part of other infrastructure projects such as the M12 Motorway and Western Sydney International. On-airport, the water quality monitoring program would ensure that works meet the requirements under Schedule 2 of the Airports (Environment	Section 7 - Environmental control measures

EIA Reference	Topic	Summary	Where referenced
		Protection) Regulations 1997. The program would monitor all construction discharge locations	
	WQ2	Water treatment plants would be designed to ensure that wastewater is treated to a level that is compliant with the ANZECC/ARMCANZ (2000), ANZG (2018) and draft ANZG (2020) default guidelines for 95 per cent species protection and 99 per cent species protection level for toxicants that bioaccumulate unless other discharge criteria are agreed with relevant authorities	Section 7 - Environmental control measures
	GW4	Consultation with Western Sydney Airport will be on-going in respect to the construction programs for both projects to understand the potential for ground movement impacts to proposed buildings and structures	Section 7 - Environmental control measures
	GW5	Detailed hydrogeological and geotechnical models for the project would be developed and progressively updated during design and construction	Section 7 - Environmental control measures
		These models would:	Section 7 - Environmental control measures
		• be informed by the results of groundwater monitoring undertaken before and during construction	Section 7 - Environmental control measures
		• identify predicted changes to groundwater levels, including at nearby water supply works and at groundwater dependent ecosystems or other sensitive groundwater receptors	Section 7 - Environmental control measures
		Where changes to groundwater levels are predicted at nearby water supply works, groundwater dependent ecosystems or other sensitive groundwater receivers, an appropriate groundwater monitoring program would be developed and implemented	Section 7 - Environmental control measures
		Where changes to groundwater level are close to the ground surface, dryland salinity monitoring would be implemented to allow for management of any identified impacts	Section 7 - Environmental control measures
		The groundwater monitoring program would	Section 7 -

EIA Reference	Topic	Summary	Where referenced
		aim to confirm no adverse impacts on the receiver during construction or to effectively manage any impacts with the implementation of appropriate mitigation measures. Monitoring at any specific location would be subject to the status of the water supply work and agreement with the landowner	Environmental control measures
	GW6	A Groundwater Management Plan would be prepared and implemented. The plan must include the following trigger-action-response measures in relation to groundwater levels in areas identified as subject to potential drawdown (at groundwater dependent ecosystems or other sensitive receivers) but outside the construction footprint and Western Sydney International Stage 1 Construction Impact Zone:	Section 7 - Environmental control measures
		a. target criteria, set with reference to relevant standards and site specific parameters;	Section 7 - Environmental control measures
		b. trigger values and corresponding corrective actions to prevent recurring or long-term exceedance of the target criteria described in (a); and	Section 7 - Environmental control measures
		c. corrective actions to compensate for any recurring or long-term exceedance of the target criteria described in (a)	Section 7 - Environmental control measures
		Response measures may include	Section 7 - Environmental control measures
		• targeted ground improvement and grouting to limit groundwater inflows into station excavations, tunnels and cross-passage to reduce groundwater drawdown	Section 7 - Environmental control measures
		• design of undrained temporary retention systems to minimise groundwater inflow into station excavations and reduce groundwater drawdown	Section 7 - Environmental control measures
		• supplementing groundwater supply at affected groundwater dependent ecosystems or watercourses	Section 7 - Environmental control measures
		• make good provisions for groundwater supply wells impacted	Section 7 - Environmental control

EIA Reference	Topic	Summary	Where referenced
		by changes in groundwater level or quality	measures
Table 8-3 Soils and contamination - construction	SC1	The Soil and Water Management Plan would incorporate the following measures: • for low risk areas of environmental concern, worker health and safety measures, waste management and tracking for contamination would be outlined	Section 7 - Environmental control measures
		• for medium and high risk areas of environmental concern, detailed site inspections and review of further available information would be undertaken prior to the start of construction	Section 7 - Environmental control measures
	SC5	An unexpected finds procedure would be developed and implemented as part of the project Soil and Water Management Plan, outlining a set of potential contamination issues which could be encountered, and detailing the corrective actions to be implemented. The unexpected finds procedure would include a process for chemical and asbestos contamination and would generally include: • cessation of works within the affected area until inspection of the suspected contamination by a qualified contaminated lands consultant (verification by a certified contaminated land practitioner) • collection of soil samples for chemical or asbestos analysis based on observations • assessment of results against applicable land use or waste classification criteria in accordance with NSW Environment Protection Authority statutory guidelines • management of the contamination in accordance with NSW Environment Protection Authority statutory guidelines The unexpected finds procedure for on-airport construction would be consistent with the Western Sydney Airport unexpected finds procedure detailed in the Soil and Water Construction Environmental	Section 7 - Environmental control measures

EIA Reference	Topic	Summary	Where referenced
		Management Plan (Western Sydney Airport, 2021g)	
	SC6	Post construction, an inspection of construction, stockpiling and laydown sites and soil validation of redundant sedimentation/water quality basins would be undertaken to assess if further investigation and remediation is required. Investigation and remediation (if required) would be undertaken in accordance with a project specific Remediation Action Plan that would be consistent with the *Western Sydney Airport Remediation Action Plan (2019) (on-airport).* All inspections, investigations and remediation would be undertaken by a qualified contaminated lands consultant (verified by a certified contaminated land practitioner)	Section 7 - Environmental control measures
	SC7	Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the actual presence of acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the *Acid Sulfate Soil Manual* (Acid Sulfate Soil Management Advisory Committee, 1998)	Section 7 - Environmental control measures
	SC8	Prior to ground disturbance in high probability salinity areas testing would be carried out to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or would be managed in accordance with *Book 4 Dryland Salinity: Productive Use of Saline Land and Water* (NSW DECC 2008). Erosion controls would be implemented in accordance with the *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004)	Section 7 - Environmental control measures
	SC9	Targeted groundwater investigations would be undertaken prior to construction to identify high salinity areas at risk from rising groundwater. Where high saline areas (>1000 µS/cm) are identified, measures such as planting, regenerating and maintaining native vegetation and good ground cover in recharge, transmission and discharge zones would be implemented where possible	Section 7 - Environmental control measures
	SC11	For works within Western Sydney International: • a review of further available information	Section 7 - Environmental control measures

EIA Reference	Topic	Summary	Where referenced
		from Western Sydney Airport would be undertaken prior to the commencement of construction, which may include review of investigations, the *Western Sydney Airport Remediation Action Plan* and validation reports • any remediation works (for contamination encountered by Sydney Metro that has not been remediated by WSA) would be undertaken in accordance with the Sydney Metro Remediation Action Plan, developed in a manner consistent with the *Western Sydney Airport Remediation Action Plan* (Department of Infrastructure and Regional Development, 2019) to the extent practicable	

5. Existing environment

The following information is primarily summarised from Chapter 17 -Topography, geology and soils and Chapter 18 - Surface and groundwater of the WSA EIS Volume 2A and Chapters 14 - Flooding, hydrology and water quality; 15 - Groundwater and geology; 16 - Soils and contamination of the SM - WSA EIA.

In addition, some background information has been obtained from two site contamination investigations completed in 2016 as follows:

- Preliminary (Phase 1) Contaminated Assessment Report, Proposed Western Sydney Airport (GHD 2016a)
- Detailed Site Contaminated Investigation, Proposed Western Sydney Airport (GHD 2016b)

For the purpose of this CEMP, it is considered that any receiving water and soil are sensitive receivers and should be managed accordingly (refer to Sections 6 and 7 regarding environmental management).

For the purpose of the Works covered by this SWCEMP, the existing environment described herein is considered consistent and acceptable for consideration in the risk assessment process and the identification of suitable environmental mitigation measures and controls. Refer to Section 7 for environmental mitigation measures and controls for the management of impacts.

5.1. Soil

5.1.1. Topography

The Airport Site is located in an area of elevated ridge systems dividing the Nepean River and South Creek catchments. Prior to construction, the site was characterised by rolling landscapes typical of Bringelly Shale. The site featured a prominent ridge in the west, reaching an elevation of about 120 metres Australian Height Datum (mAHD), and smaller ridge lines in the vicinity with elevations of about 100 metres AHD.

The broad topography of the Airport Site generally sloped away from the ridges in the west, with elevations generally between 40 metres mAHD and 90 metres mAHD, with the lower elevations toward Badgerys Creek.

Following bulk earthworks, the majority of the Stage 1 CIZ will be generally level (excluding drains and basins) with a surface elevation of around 90 mAHD at the western end of the runway down to 75 mAHD at the eastern end. The area to be occupied by the terminal has an elevation of around 80 mAHD.

5.1.2. Geology

The dominant geology formations beneath the Airport Site are Bringelly Shale, the Luddenham Dyke and alluvium.

Bringelly Shale is a Triassic geological unit mainly comprising claystone and siltstone, with some areas of sandstone. This unit underlies most of the Airport Site. Bringelly Shale is the top unit of the Wianamatta Group and is about 150 metres thick beneath the Airport Site, along with some overlying weathered material.

Luddenham Dyke is a Jurassic groundmass of olivine basalt, analcite, augite, feldspar and magnetite in the west of the Airport Site. The dyke outcrops towards the peak of the ridge in the west of the Airport Site.

Alluvium at the Airport Site comprises of Quaternary sedimentary deposits along Cosgroves Creek and Badgerys Creek. These sedimentary deposits can be up to five metres thick and are made up of fine sands, silts and clays with some areas of gravelly clay.

5.1.3. Soil attributes

Soil types
Geotechnical investigations at the Airport Site indicated surficial silt and/or clay topsoils overlying firm residual clays from the weathering of Bringelly Shale, with areas of alluvial gravels, sands, silt and clays associated with Badgerys Creek, Soils at the Airport Site have also been classified as Kurosols, which occur over the majority of the Airport Site, and Hydrosols in the vicinity of Badgerys Creek. Kurosols are characterised by a strong texture contrast between their A horizons (topsoils) and their strongly acid B horizons (subsoils). Hydrosols are characterised by prolonged periods of saturation.

While parts of the Airport Site have been used for agricultural activities, the site is not mapped as biophysical strategic agricultural land.

Saline soils
Soil salinity mapping of Western Sydney indicates moderate salinity potential. Additionally, there are some localised areas of high salinity potential associated with Oaky Creek in the central portion and Badgerys Creek and drainage lines to the south and west of the Airport Site.

Soil samples from the geotechnical investigations returned relatively low salinity levels, between 120 and 384 mg/L. Any further soil salinity sampling will be considered further as part of the requirements for waste management, in particular the monitoring and analysis of waste materials to be taken off-site in accordance with the Sydney Metro Waste and Resources CEMP.

Acid sulfate soils
Acid sulfate soils are not expected at the Airport Site given that it is not a coastal location and has an elevation ranging between 40 and 120 metres AHD. Field testing during the geotechnical investigation indicated that isolated acid sulfate soil may be present, but not to an extent requiring measures for acid sulfate soil management. However, the airport environment may contain potential isolated areas of inland ASS which have not been previously identified. Inland ASS form within saline waterlogged soils with high quantities of organic matter. These may occur in dams, drainage channels, riparian zones and wetlands.

5.1.4. Contaminated land

A range of contaminants associated with prior land uses may be present at the Airport Site. Previous and current land uses that may potentially result in contamination include agriculture, light commercial and building demolition works.

A review of the contamination register administered by the Infrastructure Department, historic aerial photos, and subsequent inspection of the Airport Site identified further evidence of potential contamination. Evidence included:

- Chemical storage tanks and drums;
- Rubbish dumping;
- Stockpiled demolition waste;
- Fibre cement sheeting;
- Hydrocarbon stains; and
- Stockpiled fill materials of unknown origin.

Contaminants associated with this evidence include fuels, lubricants, solvents, acids, asbestos, heavy metals, ash, herbicides, pesticides and pathogens. About half the properties were considered to present at least moderate risk of contamination. Historic demolition sites, stockpiled demolition waste and fill material of unknown origin indicated potential for asbestos to be present. Elevated levels of copper, nickel and zinc were also identified across the Airport Site. In general, these levels were considered attributable to natural background conditions. Surface water and groundwater sampling also returned elevated concentrations of metals attributable to natural background conditions.

5.1.4.1. Existing contamination sources

Preliminary site investigations (Department of Infrastructure and Regional Development, 2016c) identified extensive waste dumping and stockpiling as the main source of potential contamination. Potential sources of contaminants mainly relate to past use of fuels, oils, hazardous building materials, pesticides and waste burial and dumping. The main contaminants of concern related to these activities are heavy metals, TRH, BTEX, PAHs, PCBs, OCPs and asbestos.

Asbestos has previously been detected in areas of WSI airport (Department of Infrastructure and Regional Development, 2016c and 2019). The asbestos was mainly identified in shallow soils and stockpiles sourced from the demolition of buildings containing asbestos and waste dumping.

Remediation of soils impacted by asbestos and other contaminants within the WSI airport Stage 1 Construction Impact Zone, as described in the Western Sydney Airport Remediation Action Plan (RAP) (Department of Infrastructure and Regional Development, 2019), is anticipated to be complete prior to the proposed action commencing.

However, given that the project would involve construction activities and construction depths that may vary from those associated with WSI airport, Sydney Metro's principal contractor would develop a project-specific Remediation Action Plan (Sydney Metro Remediation Action Plan).

The Sydney Metro Remediation Action Plan would be prepared in a manner consistent with the Western Sydney Airport Remediation Action Plan (Department of Infrastructure and Regional Development, 2019) to the extent practicable, and would be applied to any contamination encountered by Sydney Metro that has not been remediated by Western Sydney Airport.

In non-remediated areas, such as areas outside the WSI airport Stage 1 Construction Impact Zone, areas not yet remediated or areas where asbestos has been capped and contained, there is a risk of construction workers being potentially exposed to asbestos fibres via disturbance of asbestos in soils and transport via wind, erosion and spoil transport.

In previous investigations undertaken within the airport site (Department of Infrastructure and Regional Development, 2016c), there were two high-risk areas for potential chemical contamination (i.e. non-asbestos contamination) identified. These locations are within the construction footprint of the proposed action, specifically the tunnel and viaduct segment

production and storage facility. Based on the previous investigations, the likelihood of chemical contamination presenting an unacceptable risk to ecological and human receivers was considered low. Potential chemical contamination, if encountered, is expected to be in isolated areas.

A preliminary conceptual site model and risk ranking was completed in the context of the construction footprint associated with the proposed action and is presented in Appendix D of Sydney Metro (2020g). The updated risk ranking relating to the construction footprint is summarised in Table 5-1.

Table 5-1 On-airport potential contamination impacts and risk rating

Construction site	Potential contamination	Overall risk ranking
On-airport construction corridor	Primarily asbestos contamination in soil with potential isolated areas of chemical contamination from past agricultural and light industrial land uses. The proposed action construction footprint would likely be remediated during WSI airport Stage 1 works prior to proposed action construction. Some areas may contain capped contamination or subject to management plans where there is still a potential for contamination to remain in-situ and might be disturbed during construction.	Medium
Airport Business Park Station		Medium
Airport Terminal Station		Medium
WSI airport tunnel portal		Medium
Airport construction support site (outside the WSI airport Stage 1 Construction Impact Zone)	Primarily asbestos contamination in soil with potential isolated areas of chemical contamination from past agricultural and light industrial land uses.	Medium

Management of contaminated soils could result in other potential environmental impacts if transported off-site to be disposed at an appropriately licensed facility. These potential impacts may be reduced by containment or beneficial reuse under a resource recovery exemption. See Section 7.10 for further discussion of waste management.

5.1.5. PFAS monitoring/ testing requirements

Based on the findings of previous investigations (GHD 2016a, and 2016b), the key sources of potential contamination identified at the site were generally associated with agricultural land use, land filling, uncontrolled dumping of waste, fuel storage, market gardening storage of abandoned vehicles and demolition of rural/residential buildings.

As per the Remediation Action Plan (RAP) 2019 soil samples collected from the site confirm presence of the following contamination:

- Asbestos fragments;
- Fibrous asbestos; and

- Localised hotspots of petroleum hydrocarbons and heavy metal contamination in in soils (generally near roadways).

The potential for per- and polyfluoroalkyl substances (PFAS) and PFOS (Perfluorooctyl Sulfonate) is relatively low given the prior use of the Airport Site. As per EIS mitigation measure SW14 the risk posed by PFAS has been assessed on this project, however, consistent with condition 8(6), ongoing monitoring of PFAS will be undertaken by:

- Testing for PFAS in groundwater, as per the Ground Water Monitoring program (Section 10)
- Testing in surface water, and;
- Material to be removed from site, or to be used within the site, near roadways will be sampled for PFAS before reuse/export is authorised.

The PFAS monitoring and testing requirements in this SWCEMP will be updated if there is an increase in levels found in groundwater, soil or surface water onsite. PFAS testing will be undertaken as per the relative guidance levels in the PFAS National Environmental Management Plan, January 2018, as per the groundwater monitoring program detailed in Section 10.

5.1.5.1. WSA Remediation of Stage 1 CIZ

Remediation of the contamination is required to ensure that the Airport site is made suitable for use as an airport. The 'Western Sydney Airport Remediation Action Plan' prepared by GHD Pty Ltd (the RAP) sets out the remediation and validation works required to be undertaken to address the contamination to ensure that Airport site is remediated to the required level for purpose as an airport. The RAP enables the achievement of site suitability via the mechanisms of capping, containment and long-term management.

The remediation and validation works are being completed during the earthworks stages, being early earthworks and the bulk earthworks packages. Follow on package of works may need to do additional works and is dependent on the completed works by bulk earthworks contractor and the development of the airport layout and design.

The works already completed through the various earthworks packages has resulted in the contamination being identified and successfully remediated either via excavation for placement to a single permanently design containment cell, located in the north-western area of the Airport site, or retained under a suitable capping layers in accordance with the RAP.

Given the works already completed on the Airport site, the risk of future active remediation works being required is negligible. Management of this residual risk is through the implementation of an unexpected finds procedure and an imported materials validation procedure. Both of these are consistent with the requirements of the RAP.

5.2. Surface water and groundwater

5.2.1. Climate and rainfall

The Airport Site hosts an automatic weather station operated by the Bureau of Meteorology. Average annual rainfall at the Airport Site is 676.6 millimetres (mm). There is a strong seasonal variation in temperature at Badgerys Creek. During data collection, January was found to be the hottest month while June and July the coldest, as shown below in Table 5-2.

The rainfall data collected during the EIS indicates that February is the wettest month, with an average rainfall of 114 millimetres while July is the driest, with an average rainfall of 30 mm. In 2019, the average rainfall in February is 342 millimetres while July is still the driest.

In the EIS and 2019, the annual average relative humidity reading at Badgerys Creek was 73%. The month with the highest relative humidity on average was June, at 79%. September and October had the lowest relative humidity.

Table 5-2 Existing on-airport flooding environment (rainfall)

Statistic	J	F	M	A	M	J	J	A	S	O	N	D
Mean monthly rainfall (mm) a	76	95	83	48	36	61	23	35	33	54	69	56
Highest monthly rainfall (mm) a	192	342	285	253	156	250	72	231	82	182	173	131
Lowest monthly rainfall (mm) a	1	13	21	2	2	2	0.4	1	1	0.4	8	0.0
Highest daily rainfall (mm) a	138	107	68	84	54	109	28	70	51	63	63	65
Evaporation (mm) b	173	128	116	76	50	38	38	56	75	120	146	154

Note: * All data has been rounded to the nearest decimal point (except for July, October and December *Lowest monthly rainfall*).

a. Data from Bureau of Meteorology automatic weather station

b. Data from Bureau of Meteorology Parramatta weather station, as the nearest representative location with available evaporation data

Weather statistics continue to be monitored and recorded from the on-site weather station. All weather monitoring data is automatically recorded and stored electronically on a cloud-based system for future reference if required. The maintenance of weather station data will continue throughout the duration of the construction phase of the project.

5.2.2. Catchments

The Airport Site lies in the east of the Hawkesbury-Nepean catchment, which covers an area of 21,400 square kilometres. The Hawkesbury-Nepean catchment is characterised by meandering watercourses and is highly disturbed by clearing and urbanisation. The proposed project activities lie entirely within the South Creek Catchment, in the upper reaches of the Badgerys Creek, Cosgroves Creek, and Oaky Creek catchments. A western section of the airport site lies within Duncans Creek catchment (see figure 5-1).

All of the Airport Site sub-catchments drain to the Hawkesbury-Nepean system downstream of Lake Burragorang. Most of the Airport Site drains to South Creek, which then flows to the Hawkesbury River. South Creek has a sub-catchment area of 414 square kilometres with headwaters located near Narellan to the south of the Airport Site. The south-western corner of the Airport Site drains to Duncans Creek, which then flows to the Nepean River.

Land uses within the Airport Site were predominantly agricultural (85 per cent), with smaller areas of rural residential (10 per cent), forest (four per cent) and horticulture (one per cent).

5.2.3. Watercourses

The Airport Site contains around 64 kilometres of watercourses and drainage lines. The major watercourses include Badgerys Creek, Oaky Creek and Cosgroves Creek in the South Creek Catchment and Duncans Creek, which is a tributary of the Nepean River. Bank erosion and head cut are evident at Badgerys Creek and Cosgroves Creek, despite these watercourses also having well vegetated riparian zones.

Badgerys Creek has its headwaters in the vicinity of Findley Road, Bringelly, approximately two kilometres south of the Airport Site and continues downstream until its confluence with South Creek. It flows in a north to north-east direction and forms the south-eastern boundary of the Airport Site as far as Elizabeth Drive. Ecologically sensitive riparian vegetation is located along sections of Badgerys Creek.

Following completion of WSA Stage 1 works, drainage infrastructure will have replaced the majority of natural water courses and drainage lines, however these will still flow to the major water courses noted above in events exceeding the design criteria. Figure 5-1 provides an overview of the pre-construction catchments and the catchments within the Stage 1 area following construction and their relationship to the local watercourses.

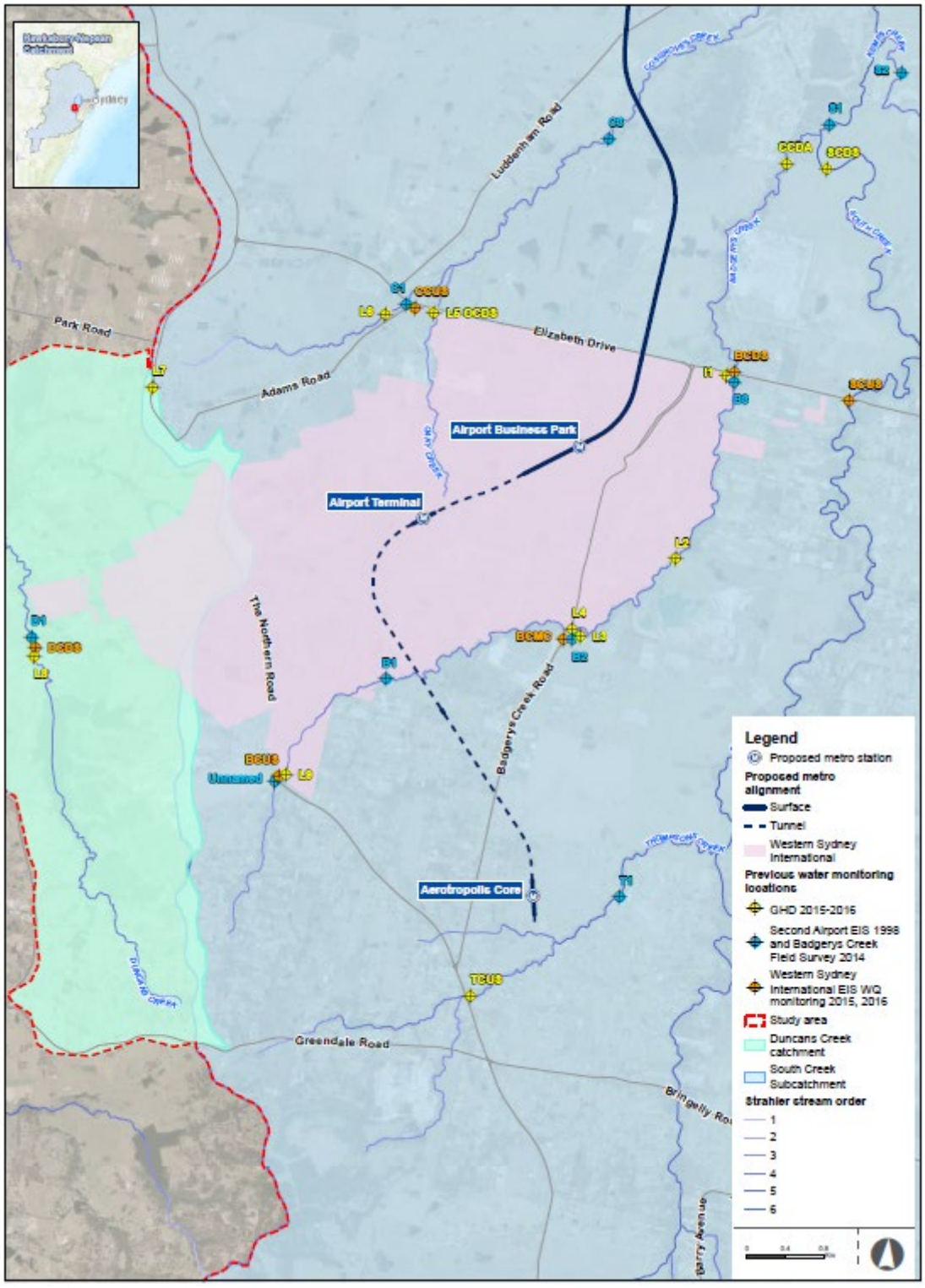

Figure 5-1 Catchments, watercourses and monitoring locations within the study area

5.2.4. Flooding

The floodplain is more extensive on the western bank of Badgerys Creek than on the eastern bank due to the wider and flatter floodplain at the Airport Site. Existing surface water flows at the

Airport Site during one-year average reoccurring interval (ARI) and 100-year ARI storms were simulated in hydrologic and hydraulic models.

In the one-year ARI event, flooding is mostly confined to main watercourse channels and dams, while overbank flooding is expected in a 100-year ARI event. The existing flooding environment is described in Table 5-3 and the one per cent Annual Exceedance Probability (AEP) event is shown in Figure 5-2. This understanding of flood behaviour is based on the modelling completed for the Western Sydney Airport - Environmental Impact Statement and the project, and assumes the WSI airport Stage 1 construction works are underway. The flood model was undertaken for the project as a whole, with applicable results for the on-airport environment detailed below. The one per cent AEP flood event is appropriate because it can be directly related to other flood planning controls.

Further information on the existing flooding environment is provided in the SM-WSA EIS (2019) Section 4.2.2 of Technical Paper 6 (Flooding, hydrology and water quality) and flooding figures for all flooding events are provided in Appendix C of Technical Paper 6 (Flooding, hydrology and water quality).

Table 5-3 Existing on-airport flooding environment

Flood aspect	Existing environment
Peak flood level	For the 0.2 exceedances per year (EY) event, the overland flows paths have depths of less than 0.1 metres, with isolated areas of 0.5 metres at the basins throughout the site. The main Badgerys Creek channel is predicted to have depths of around one metre. For the one per cent AEP event, overland flow paths are still shallow and close to 0.1 metres deep; however, the basin depths are over 0.5 metres. The main Badgerys Creek channel is predicted to have flood depths over one metre. In the probable maximum flood (PMF) event, all flood liable land is inundated by more than one metre, as predicted by the flood models.
Peak flood velocity	For the 0.2 EY event, the overland flow paths and Badgerys Creek floodplain have flood velocities generally less than 0.5 metres per second. The main channel is predicted to have flood velocities of up to one metre per second. For the one per cent AEP event flood velocities are similar to the 0.2 EY event for the overland flows paths and floodplain and are up to two metres per second in the main channel. For the PMF event, some of the upper reaches of the overland flow paths still have peak velocities of 0.5 metres per second, but the remainder of the floodplain has velocities between 0.5 and one metre per second, with up to two metres per second in the main channel.
Flood duration	The main Badgerys Creek channel has a duration of inundation between 18 and 24 hours for the full range of flood events, with the overland flow paths being less than six hours. The detention basins are predicted to have durations between 12 and 24 hours.
Flood hazard	Flood prone areas are generally classified as H1 and are safe for people, vehicles and buildings with the exception of the basins where the deep water results in higher hazard and would be unsafe for people and vehicles in some areas (generally H3 with some basins classified as H4).

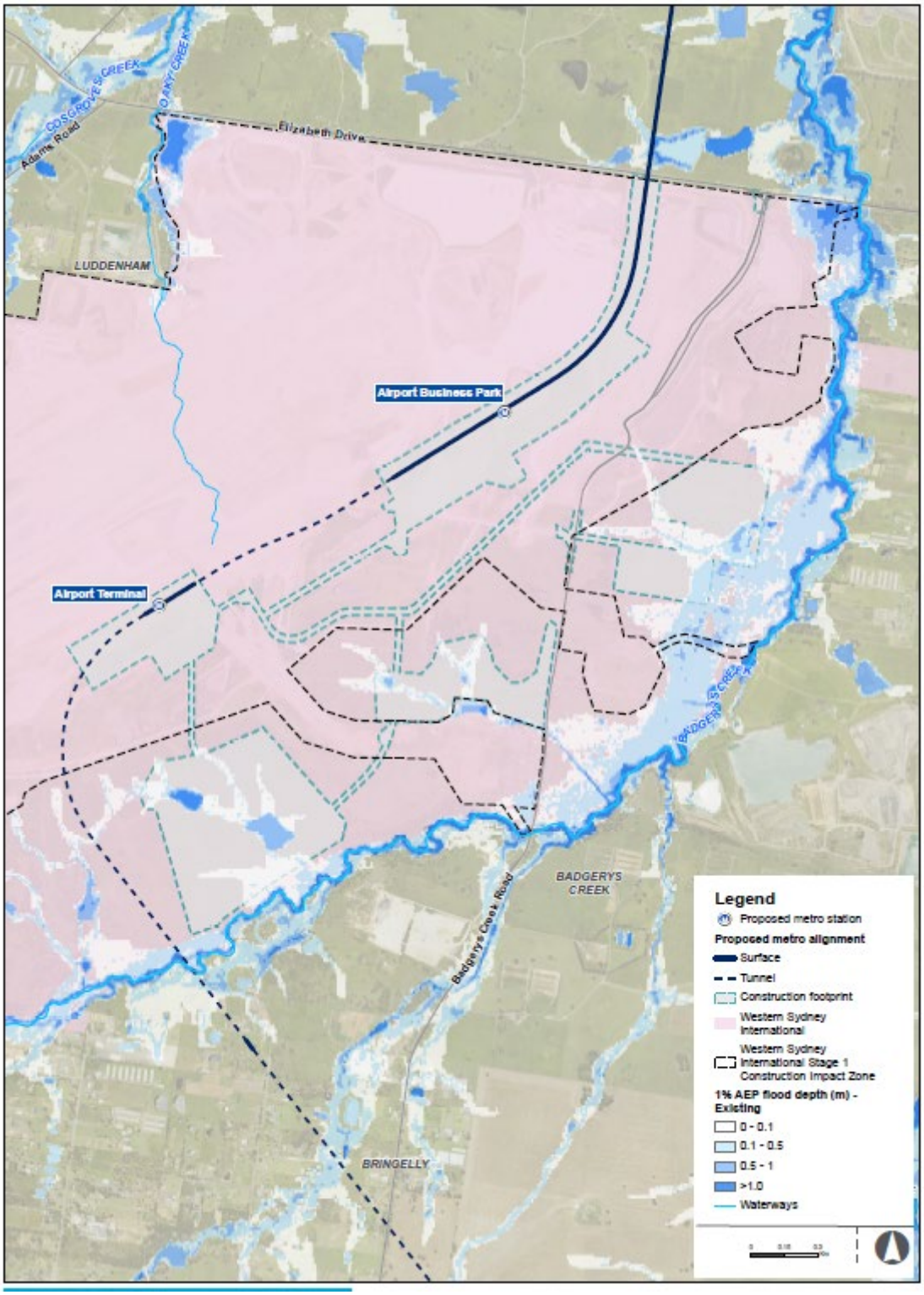

Figure 5-2 Existing modelled peak flood levels- one% AEP even across the airport site

The station boxes and Surface Civil and Alignment Works (SCAW) will sit within the bulk earthworks footprint and will utilise the stormwater drainage design swales as constructed by the BEC contractor. Intermediate stormwater controls will be designed and constructed within the station boxes and SCAW works zone in accordance with the Blue Book for 1 in 10 year rain

event, although given these works are outside of the 1 in 100 year flood zone, the risk profile for flooding impact is low.
During construction, site-specific management measures will be implemented to avoid or control/mitigate risk and ensure that appropriate response procedures are in place. This will include minimising flood risk by storing flood-sensitive materials and infrastructure outside of the 100-year flood zone, locating stockpiles and fuel storage areas outside the 100 year flood level (SW-48 and 49, Table 7.1).
The project will monitor rainfall and weather forecasts with reference to conditions that will trigger high rain events for both preparation of site for erosion and sedimentation mitigation, and potential for flooding in high rainfall events. Flood mitigation will include:

- Daily weather observations;
- Securing the site and materials;
- Ongoing monitoring and dewatering of basins to maintain onsite detention;
- Safe procedures for moving flood-sensitive equipment and materials away from areas near creeks, and out of the 100-year ARI;
- Actions to mitigate any adverse impact of flooding on neighbouring properties of the site;
- Relocating moveable plant to higher ground; and
- Emergency Response Plan to manage flood risk for the full range of flooding up to the probable maximum flood, including an evacuation procedure for compound staff.

5.2.5. Surface water quality

Water quality modelling and monitoring of existing surface water quality was undertaken at upstream, downstream and major outflow locations in and around the Airport Site as part of the environmental assessment for the WSA EIS and in subsequent monitoring. The results indicated that the water quality is generally poor and that the nutrient loads are generally well above both the AEPR accepted limits and the default values in the ANZECC guidelines. The data suggest that the surface water background concentrations were generally above the ANZECC freshwater criteria with exceedances detected for the following analytes/ parameters:

- Chromium
- Copper
- Zinc
- Total Nitrogen
- Nitrate
- Phosphorus
- Iron

Turbidity and total suspended solids were found to be within acceptable levels, while dissolved oxygen levels were found to be relatively low. Conductivity levels were high and above those for typical lowland rivers. Some exceedances of chromium, copper and zinc were also detected.

Overall, both the Airport Site and downstream catchments are degraded, particularly in terms of nutrients which is representative of a catchment that has been disturbed by agricultural and other rural development. The existing water quality does not typically satisfy the AEPR limits or default ANZECC guideline criteria for the protection of aquatic ecosystems, primary and secondary contact recreation, as well as irrigation water use for food and non-food crops.

5.2.6. Groundwater

Groundwater monitoring was undertaken as part of the environmental impact assessment completed for the EIS in addition to ongoing monitoring completed post-EIS up until the present. The obtained data indicates that groundwater at the Airport Site is generally of a relatively poor quality with limited beneficial use or environmental value. The aquifers at the Airport Site include:

- An unconfined aquifer in the shallow alluvium of the main watercourses at the Airport Site;
- An intermittent aquifer in weathered clays overlying the Bringelly Shale;
- A confined aquifer within the Bringelly Shale; and
- A confined aquifer within the Hawkesbury Sandstone.

The variations in depths to groundwater, described in Table 5-4, indicates low potential for connectivity between groundwater aquifers.

Table 5-4 measured depths of the various aquifers at the Airport site

Groundwater	Measured depths
Within the alluvium	0.7 metres – 4.7 metres
Within weathered clays overlying Bringelly Shale	2.4 metres – 4 metres
Within Bringelly Shale	3.0 metres – 11.7 metres
Within Hawkesbury Sandstone	100 metres below ground level

There are in excess of 42 registered groundwater bores within five kilometres of the site centre.

Overall, the available data suggest that groundwater is sparsely used, with only 12 bores for domestic, stock, industrial, farming and irrigation purposes. It is noted that all of these bores are generally screened at significant depth and are expected predominantly to intersect the underlying Hawkesbury Sandstone.

Historical groundwater monitoring data suggest that the groundwater quality has background concentrations of lead, zinc and copper consistently above the selected ANZECC (2000) freshwater criteria. Total nitrogen and phosphorous concentrations were all above freshwater criteria for lowland rivers with some exceedances of the irrigation criteria. Isolated samples had concentrations of nitrate above ANZECC (2000) freshwater criteria. Concentrations of sulphate above human health drinking criteria are present at several locations across the site.

This water quality data obtained suggests that only deeper groundwater in the Hawkesbury Sandstone is suitable for the uses outlined above and that shallow groundwater in the Bringelly Shale is unsuitable for beneficial domestic, stock, irrigation and industrial water use purposes.

Based on the available groundwater quality data, the groundwater assessment included as part of the EIS concluded that:

- The groundwater in the area of the Airport Site has low beneficial use potential for stock and potable purposes;
- The groundwater contributions to surface water are expected to represent a small part of the overall surface water flows in the area; and
- In terms of groundwater management during construction of the proposed airport, salinity, metals (particularly cadmium, copper, lead and zinc), sulphate, total nitrogen and

phosphorous may require further consideration if discharge to surface water is being considered.

6. Soil and water aspects and impacts

6.1. Construction activities

Construction activities that may affect soil and water quality include:

- Topsoil stripping and soil disturbance;
- Vegetation clearing;
- Bulk earthworks;
- Tunnelling and dewatering;
- Concrete batch plant and pre-fabrication facilities;
- Deep excavations;
- Road construction and other civil works;
- Storage of fuels and chemicals, refuelling;
- Stockpiling of materials;
- Permanent placement of spoil material;
- Water use;
- Use of vehicles, plant and machinery on site;
- Site demobilisation and landscaping works.

6.2. Soil impacts

6.2.1. Topography and geology

The earthwork activities have changed the topography of the Airport Site from rolling landscapes to a built environment with some landscaping. The earthworks have impacted the upper geological units of the Bringelly Shale, Luddenham Dyke and alluvium down to approximately 30 metres depth. Following bulk earthworks, the elevation of the airport site within the construction impact zone would be generally level with elevations between approximately 50 and 100 metres AHD, with no major embankments.

6.2.2. Soil erosion and degradation

The deep excavations and tunnelling activities will produce excess spoil which will be transported from the station boxes to the permanent spoil emplacement area. This material will be tested prior to placement and will be managed in stockpiles so as to manage degradation and weathering. Topsoil will also be stockpiled in the areas around the permanent spoil area and fabrication yard..

The majority of excavated material will be Bringelly shale.

If improperly managed, topsoil stockpiles will not only present an erosion hazard but will also potentially lose their chemical and physical fertility over time. There is the potential that exposed soils and other unconsolidated materials, such as spoil, sand and other aggregates could be transported from the construction sites into surrounding waterways via stormwater runoff. Erosion controls would be implemented and managed in accordance with *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004).

6.2.3. Land contamination

Construction of the Project has the potential to interact with existing sources of potential contamination. Construction will also involve the storage, treatment and/or handling of fuel, sewage and other potential contaminants.

Although unlikely, the accidental release or mobilisation of contaminants has the potential to affect human health and the environment through contact with pathogens (such as sewage), inhalation (such as asbestos or chemical vapours), or mobilisation to surface waters and bioaccumulation. These events will be managed in the first instance through implementation of applicable Australian Standards for the storage and handling of hazardous materials. In the unlikely event of a significant leak of spill or contaminants, remediation will be implemented as soon as practicable.

Surface works and deep excavations will involve the management of asbestos contamination in accordance with the RAP. The RAP enables the achievement of site suitability via the mechanism of capping, containment and long-term management. This includes opportunities for asbestos material to be retained in situ where it is observed at depth or placed in areas that require filling to achieve final levels. Included in the decision-making process is the end land use for the airport site such as air side and land side locations as well as geotechnical properties of the material.

If unexpected finds of contamination are encountered during construction activities, the Unexpected Finds Protocol (WSA00-WSA-00000-EN-PRO-000001) applies. The assessment criteria for onsite reuse and validation are outlined in detail in the RAP.

The RAP provides alternative options for the management of asbestos based on end-use consideration. These other options include visual clearance by a Licensed Asbestos Assessor (LAA) and excavation and validation. Where capping and containment or certified clearance by a LAA of asbestos impacted soils occurs, the associated soils are to be managed under a Long-Term Environmental Management Plan (LTEMP). However, where the excavation and validation of asbestos impacted soils occurs, no further controls will be required in respect of asbestos in these areas and future potential exposure to residual contamination managed via an Unexpected Finds Protocol as part of the site LTEMP.

The revised management strategy applies to areas of known contaminated soils at the site including surface soils, subsurface soils, and existing stockpiles, as well as to other potential contaminated-soils that may be encountered during construction of the Project. In addition to this there may be unexpected finds of contamination (other than asbestos) encountered during construction activities. The unexpected finds procedure is outlined further in Appendix C of Technical Paper 6 (Flooding, hydrology, and water quality). The assessment criteria for onsite reuse and validation is outlined in detail in the RAP.

6.3. Surface water impacts

6.3.1. Acid sulfate soils

Excavation of ASS could potentially occur around the Badgerys Creek and Oakey Creek riparian zones associated with parts of the Airport construction support site, on-airport construction

corridor, Airport Terminal and Airport Business Park construction sites. If ASS are present, they are not expected to occur in large quantities and potential impacts would be expected to be localised if encountered.

If ASS are disturbed, runoff from excavated soils can potentially be acidic and leach iron, aluminium and other heavy metals. These heavy metals and acids can leach into soil and groundwater, and impacted runoff can enter waterways and have negative impacts on water quality and aquatic ecosystems. Prior to ground disturbance in areas of potential ASS, testing would be carried out to determine the actual presence of ASS. If ASS are encountered, they would be managed in accordance with the *Acid Sulfate Soil Manual* (Acid Sulfate Soil Management Advisory Committee, 1998).

6.3.2. Flooding

Construction of the proposed action has the potential to temporarily impact the local flooding regime and to be temporarily impacted by flooding events.

Potential impacts on the local flooding regime include:

- temporary blockage of flow paths causing changes to flood levels beyond the construction footprint due to stockpiling, location of construction works or equipment and fencing
- temporary increased flow rates in receiving drainage lines downstream of the construction footprint due to vegetation clearing and increased hardstand areas
- temporary changes to flow paths downstream of the construction footprint due to construction of culverts, construction of civil works, permanent and temporary roads.

The likelihood and magnitude of potential risks would vary depending on the stage of construction and timing of high rainfall events. Flood events during construction have the potential to temporarily impact construction sites for the proposed action and construction activities.

The construction flooding assessment considers the flooding extent for a five per cent AEP flood event as shown in Figure 5-2.

The proposed action is in tunnel through WSI airport from around 400 metres southwest of Airport Business Park Station and is generally located away from flood prone land. Areas with the greatest potential for on-airport flood impacts during construction would be focused around the tunnel and viaduct segment production and storage facility and the potential permanent spoil placement areas (see Hydrology section below). The tunnel and viaduct segment production and storage facility would be located just outside the five per cent AEP flood extent.

Some areas near the potential permanent fill placement area to the west are identified as being newly inundated due to the redistributing overland flows away from the existing flow path with introduction of the permanent fill. However, flood depths in a one per cent AEP event including climate change remain below 200 mm in the newly inundated areas and therefore within the project flood impact criteria. These areas are within land that forms part of the Environment Conservation Zone for WSI airport, bordering the existing Badgerys Creek flood extent, and as such flood impacts are considered to be minor.

The potential permanent spoil placement area to the west is located across a main overland flow path through WSI airport to Badgerys Creek, causing changes to flood behaviour in Badgerys Creek through redistribution of floodwaters. Flood compatible design would need to be

demonstrated for this potential permanent spoil placement area to ensure compliance with applicable land use criteria.

The potential permanent spoil placement area to the east is located across two minor overland flow paths that combine beyond this spoil placement area and discharge into Badgerys Creek. There is unlikely to be any change in flow distribution into Badgerys Creek due to this potential permanent spoil placement area. Flood compatible design would need to demonstrate adequate conveyance of diverted overflows from the dam adjacent to this potential permanent spoil placement area to ensure compliance with applicable land use criteria.

The stations and associated construction sites are located outside flood prone land and therefore there would be no flooding impacts at the stations.

6.3.3. Hydrology

Construction activities in and around waterways may have a potential short-term impact on the hydrology of Badgerys Creek and overland flow paths within the on-airport environment. Potential impacts could include:

- changes in low flow channel shape due to temporary works changing local runoff behaviour
- increased sedimentation due to clearing the site for construction
- loss of riparian vegetation and aquatic vegetation during construction which may increase the vulnerability of the channel to erosion
- removal of local levee banks or existing flood control works or farm dams which would change flood behaviour and therefore change flows in the channel.

Construction of a temporary and permanent power supply route would require crossing of Badgerys Creek. It is proposed that horizontal directional drilling would be carried out to install the cables underground. This would avoid potential impacts to riparian vegetation associated with the Environmental Conservation Zone, water quality and geomorphology.

The introduction of the potential permanent spoil placement area to the west would involve the diversion of overland flow paths and removal of farm dams, as well as the introduction of on-site detention basins. It may also result in a change to the location at which overland flows currently discharge into Badgerys Creek, which has the potential for scour. The potential permanent spoil placement area to the east would involve diversion of the overflow from the farm dam into the creek on the southern border of this spoil placement area. Appropriate management of the diversions would minimise these potential impacts. Once the proposed action is completed, the operation and management of the potential permanent spoil placement areas would be the responsibility of Western Sydney Airport.

With the application of appropriate management measures, potential impacts are considered to be minor.

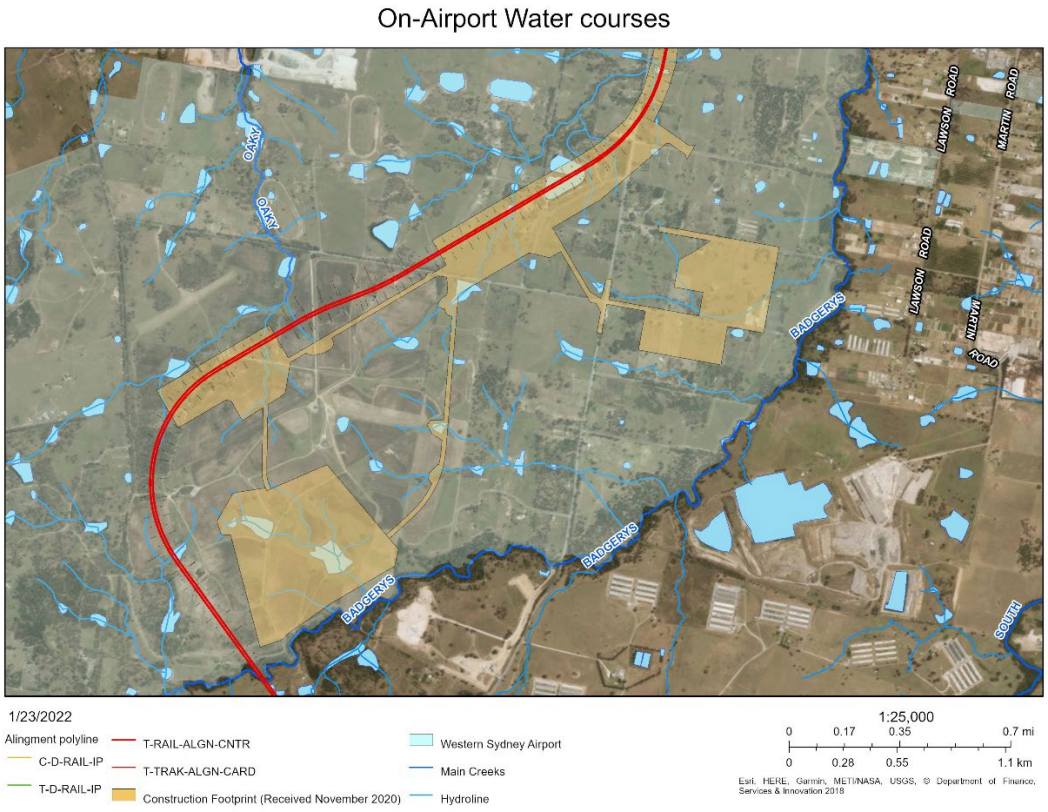

Figure 6-1 On-airport support sites in relation to water courses and storages across the airport site

6.3.4. Water quality

The construction of the proposed action has the potential to temporarily impact on and further degrade the water quality of the waterways within the study area and areas downstream if not properly managed. Potential water quality impacts are presented in Table 6-1.

Table 6-1 Potential surface water quality impacts for key construction

Construction activity	Assessment
Earthworks	Earthworks would be required as part of the construction of the proposed action and would include excavation for station sites and tunnelling activities. Earthworks would increase the amount of disturbed and exposed soil present in the environment, which may potentially temporarily impact the surface water quality of the environment through: • changes to surface water runoff or evaporation due to clearing vegetation coverage. This may increase runoff volumes in the short or long term, or both • increased surface water runoff due to soil stabilisation earthworks. Soil stabilisation may result in a change to the permeability of the natural soils • increased turbidity, lowered dissolved oxygen levels and increased nutrients in waterways • reduction in channel habitat as a result of sediment transport and deposition.
Stockpiling and spoil handling	Stockpiling of earthwork materials poses a potential temporary risk to water quality in receiving environments through the increased likelihood of movement of sediment.

Construction activity	Assessment
	Stockpiling of mulched vegetation from clearing of trees and shrubs poses a risk of tannins leaching into watercourses (which can impact a range of water quality parameters), and increased loads of organics in watercourses.
Operation of construction equipment and vehicles	The operation of construction equipment may result in the temporary release of contaminants into nearby waterways as a result of: • refuelling, maintenance and washdown • spills and failure of machinery.

Key construction activities with the potential for water quality impacts would include:

- temporary spoil stockpiling materials handling
- spoil placement within the potential permanent spoil placement areas
- earthworks at the potential permanent spoil placement areas, station construction sites, the WSI airport tunnel portal and the on-airport construction corridor
- operation of construction equipment and vehicles
- potential discharge from construction water treatment plants
- activities at the tunnel and viaduct segment production and storage facility including concrete batching.

On-airport construction water discharge points would be required for both the Airport Terminal and WSI airport tunnel portal construction sites and would likely be directly into a major drainage swale being delivered as part of the WSI airport project. Specific discharge locations would be confirmed during design development and Construction (Rail) Planning in consultation with Western Sydney Airport. Indicative treated groundwater discharge volumes for each of the two sites has been estimated to be up to around 10 litres per second.

The potential permanent spoil placement areas form part of the airport construction support site. The exact location for placement of the spoil would be confirmed during design development in consultation with Western Sydney Airport. The areas would be located outside the Environmental Conservation Zone located along Badgerys Creek. The implementation of soil and water mitigation and management measures at potential permanent spoil placement areas would mitigate and manage potential impacts to the water quality of receiving environments, and would ensure the risk of runoff of pollutants and sediments into Badgerys Creek would be minor.

Potential impacts would be managed through the implementation of mitigation measures which have been developed to be consistent with the construction environmental management requirements of the WSI airport Stage 1 project (refer to Chapter 8 (Environmental management and mitigation) for further detail). With the application of these mitigation measures, the risk of water quality impacts from the construction of the proposed action is anticipated to be low.

6.4. Groundwater and Geology

6.4.1. Potential impacts

This section presents the potential impacts of the proposed action on the groundwater and geological environment that may occur during construction.
Potential impacts on the groundwater environment during the construction phase include:

- impacts on groundwater dependent ecosystems, water supply wells, creeks or other environmental receptors resulting from changes to groundwater level or flow. Further discussion on GDEs, including mapped GDEs, is provided in Section 7.3.
- impacts on groundwater quality due to contamination from release of chemicals used during construction activity and potential impacts on other connected environmental receptors
- impacts on groundwater quality due to exposure, storage and leaching of saline soils along the alignment
- impacts on buildings and infrastructure from surface settlement related to groundwater drawdown or ground settlement from excavation during construction.

Hydrogeological conditions at elements of the proposed action which are likely to interact with the groundwater environment are presented in Table 6-2.

Table 6-2 Hydrogeological conditions at proposed action elements

Location /structure	Hydrogeological units	Anticipated groundwater level (metres below existing ground level)1	Approximate depth below groundwater level (m)
WSI airport tunnel portal	Residual soil Bringelly Shale	0.5 to 3	0 to 20
Airport Terminal Station	Residual soil Bringelly Shale	0.5 to 3.5	15 to 19
WSI airport to Bringelly tunnel	Bringelly Shale	1 to 9	Up to 28

Note: Groundwater depths based on existing ground levels

6.4.2. Changes to groundwater level

6.4.2.1. Rail tunnels

Changes in groundwater level as a result of tunnel and cross passage excavation during construction are likely to be of short duration and unlikely to lead to a material change in groundwater levels.

Groundwater inflow may occur during construction in the short period between excavation at the tunnel face and installation of the tunnel lining. Once the lining is in place, the tunnel would be effectively waterproofed and groundwater inflow would cease.

Groundwater inflow to cross passage excavations could occur since they are constructed using traditional mining excavation methods. However, efforts to minimise groundwater inflow such as ground improvement are usually undertaken prior to excavation, to minimise the volume of groundwater entering the tunnel cross-passages.
The magnitude of groundwater level change during excavation is expected to be small given that inflows would be localised and of short duration, and excavation would be within the Bringelly Shale, which has a low hydraulic conductivity.

6.4.2.2. WSI airport tunnel portal

Groundwater inflows at the WSI airport tunnel portal would occur during construction as the excavation would take place within a drained (untanked) retaining wall. This would lead to

potential changes to groundwater levels in the surrounding shale and residual soil. The temporary changes to groundwater level would occur over the course of construction until the permanent watertight portal structure is in place.

The predicted changes to groundwater level during the construction phase is presented in Figure 6-1. Drawdown at the excavation is expected to be close to the base of the excavation. However, since the excavation is deeper to the west, greater drawdown and inflow would be expected in that area. The assessment indicates that the one metre drawdown contour would extend to about 285 metres from the excavation. This extent is unlikely to occur across the entire length of the tunnel portal since there would be less drawdown in shallower areas. However, for the purposes of reporting, it is assumed that this drawdown occurs uniformly across the length of the structure.

6.4.2.3. Airport Terminal Station

Groundwater inflows at Airport Terminal Station would occur during construction as the excavation would take place within a drained (untanked) retaining wall. This would lead to potential changes to groundwater levels in the surrounding shale and residual soil. The temporary changes to groundwater level would occur over the course of construction until the permanent watertight station structure is in place.

At the Airport Terminal Station, modelling results indicate that that the one metre drawdown contour would extend to around 270 metres from the excavation face (refer to Figure 6-1).

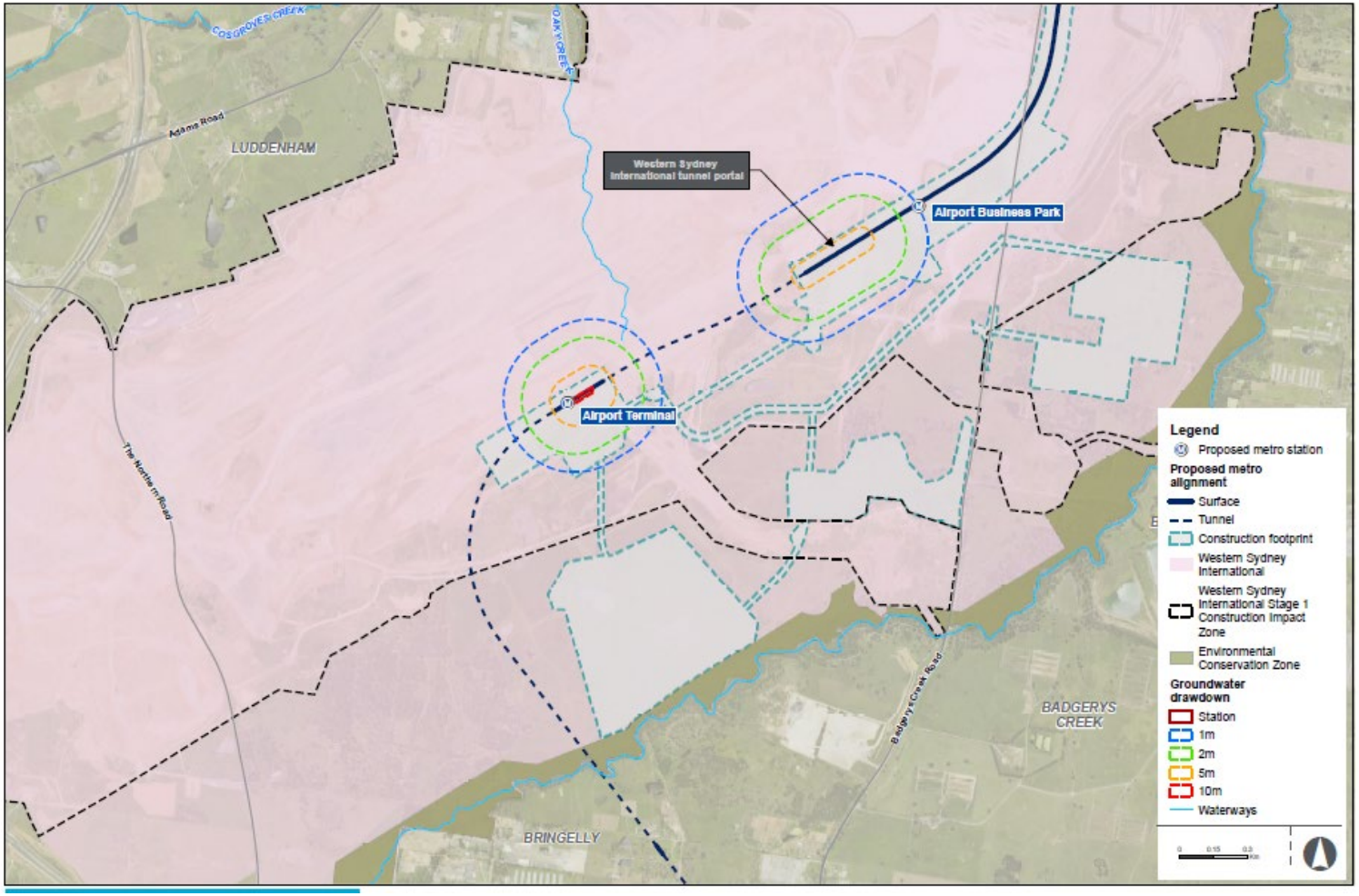

Figure 6-2 Predicted changes in groundwater level for during construction for the airport environment

6.4.2.4. Changes to groundwater recharge

Groundwater recharge is the proportion of rainfall that makes its way into an aquifer system, as a result of infiltration through unsaturated soils. The principal mode of recharge to groundwater systems is through rainfall. Changes to recharge from the surface can cause changes in groundwater level in the underlying system.

Changes to recharge during construction are likely to occur principally because of:

- introduction and construction of engineered fill, paved surfaces and site facilities preventing rainfall from infiltrating the ground, leading to a reduction in groundwater recharge
- surface runoff on construction areas being captured by drainage systems, as opposed to infiltrating the ground, leading to a reduction in recharge
- sedimentation basins used during construction acting as local points of increased recharge.

The effect of the reduction in direct recharge to groundwater levels across the construction footprint is anticipated to be minor due to the limited scale of the proposed action and its footprint (compared to the size of the catchment) and the existing low recharge within the study area due to the low hydraulic conductivity of the residual clay soils and Bringelly Shale bedrock. In addition, large potential permanent spoil placement areas for excavated spoil material would be stored within WSI airport which could reduce groundwater recharge into the underlying ground.

As the spoil placement areas would be permanent, its effect on groundwater recharge would continue into the operational phases of the proposed action. However, given the existing low permeability residual soils and low recharge rates present across the majority of WSI airport, it is unlikely that this would have a significant impact on recharge rates and underlying groundwater levels.

6.4.2.5. Potential impact on groundwater dependant ecosystems

The WSI airport Stage 1 Construction Impact Zone would be cleared before or during construction of the proposed action, removing the potential for occurrence of GDEs. Groundwater drawdown outside the WSI airport Stage 1 Construction Impact Zone is considered unlikely due to the undrained tunnel design and construction method and given that proposed excavation areas (WSI airport tunnel portal and Airport Terminal Station) are over 400 metres away from any potential GDEs.

Condition 8.4 of the Airport Plan states that groundwater monitoring would be undertaken for the *Soil and Water Construction Environmental Management Plan* (Western Sydney Airport, 2019g) which must include monitoring points adjacent to woodlands in areas outside of the WSI airport Stage 1 Construction Impact Zone (but within the airport). This measure is intended to monitor changes at groundwater dependent vegetation as a result of construction of the airport site.

Groundwater drawdown is not expected to impact the GDEs located within the Project study area.

6.4.2.6. Potential impact on groundwater users

No groundwater supply wells have been identified within WSI airport and therefore existing groundwater users would therefore not be affected by the proposed action. No impacts to

existing groundwater supply wells are predicted as a result of changes to groundwater level or flows at the airport site.

6.4.2.7. Potential impacts from ground movement

A preliminary assessment of potential ground movement impacts due to construction of WSI airport to Bringelly tunnel within the airport site has been carried out. This assessment considered ground movements resulting from tunnelling works, excavation for cut and cover stations including retention systems and temporary groundwater drawdown. The surface environment within the airport site is assumed to have been cleared and not contain any remaining buildings or structures.

The preliminary assessment assumes that ground movements arising from the proposed action would occur prior to construction of the Airport Terminal building and associated civil works at the airport.

6.4.2.8. Tunnel construction movement

For the WSI airport to Bringelly tunnel, the maximum predicted ground movement associated with construction of the twin tunnels within the airport site is expected to be in the range of 5 and 10. Where the tunnels interface with the WSI airport tunnel portal and the Airport Terminal Station ground movement at the surface is expected to be higher.

The maximum predicted ground surface movements from the excavation of mined tunnels (cross passages) within the airport site is less than five millimetres.

6.4.2.9. Combined ground movements

Table 6-3 below summarises the predicted combined ground movements from tunnel excavation and excavation of cut and cover stations, inclusive of groundwater drawdown. It should be noted that the combined ground movements would not be uniform across the excavation.

Table 6-3 Summary of predicted combined ground movement

Location	Indicative maximum excavation depth (m)	Indicative range of predicted ground movement (mm)	Indicative range of predicted ground surface slope (V:H)
Western Sydney International tunnel portal	About 5 to 20	5 to 30	1:500 to 1:2,000
Airport Terminal Station	About 25	25 to 60	1:200 to 1:2,000

Building, road infrastructure and utility impacts

The airport site is under construction and has been cleared of all buildings or structures. There are no existing roads or utility assets within the airport site that would be potentially be impacted by ground movement impacts associated with the proposed action.

Consultation with Western Sydney Airport will be on-going in respect to the construction programs for both projects to understand the potential for ground movement impacts to proposed buildings and structures.

6.4.2.10. Potential impacts on groundwater quality

The potential risks to groundwater quality during construction would include:

- hydrocarbon (or other chemical) contamination from potential fuel and chemical spills during construction, leading to contamination of groundwater
- infiltration of contaminated surface water runoff at discharge basins
- release of saline groundwater seepage from excavations during construction into the environment (including impacting on shallow, better quality soil groundwater)
- mobilisation of existing groundwater contamination due to dewatering, groundwater ingress to excavations or because of altered groundwater flow directions due to construction activity
- leaching of saline, acidic or contaminated water from soil stockpiles into the groundwater environment.

Groundwater ingress into excavations for stations or other cuttings would be captured, treated and then reused for construction activity where possible. Where reuse of the groundwater is not possible, the water would be discharged from the sites via construction water quality treatment plants. Water captured during tunnelling would be treated and recirculated to the cutting face or used for dust suppression purposes.. The potential permanent spoil placement areas at WSI airport may potentially lead to an increased risk of generating saline runoff and leachate with resultant impacts on groundwater.

The overall potential risk of impacts on groundwater quality remain low due to:

- the low permeability soil cover, limiting the risk of infiltration of water into the ground
- the limited environmental value of the groundwater at the site
- the low likelihood of existing chemical contamination at WSI airport (refer to Section 6.4.2.10).

The proposed action would also include the provision of water treatment plants to treat any contaminated groundwater intercepted during construction before discharge to ensure that works meet the requirements under Schedule 2 of the Airports (Environment Protection) Regulations 1997.

6.4.2.11. Potential impacts to creeks and wetlands

Groundwater drawdown at creek lines is not expected to occur during the construction phase of the proposed action. Due to the significant earthworks being undertaken at the WSI airport site, there are not anticipated to be any impacts on artificial wetlands, since the Stage 1 site would be fully redeveloped.

6.4.2.12. Estimated construction groundwater take

Predicted groundwater inflows for the on-airport environment are provided in Table 6-4. The total estimated construction inflow rate is likely to be a conservative estimate and may be substantially lower in practice.

Table 6-4 Estimated maximum construction groundwater inflows

Project element	Predicted average groundwater inflow (kL/d)	Predicted maximum groundwater inflow (kL/d)
Western Sydney International tunnel portal	30	53
Airport Terminal Station	44	88
Western Sydney International to Bringelly tunnel (within Western Sydney International)	4	62
Total	**78**	**203**

Notes:
1. The combined predicted inflow may not occur due to staged construction.
2. The maximum inflow is likely to be of short duration and unlikely to occur concurrently across the project

6.4.2.13. Total project groundwater take

The total estimated water take for the project (combining on-airport and off-airport components) during construction is about 240 mega litres per year compared to the long-term average annual extraction limit of 45,915 mega litres per year in the water sharing plan for the Sydney Basin Metropolitan Region Groundwater Sources (NSW, 2015).

The results indicate that there is sufficient groundwater available from a licensing perspective for the maximum estimated construction inflow. This water take represents less than one per cent of the extraction limit for the Sydney Basin.

The Sustainability Plan for the project includes the objective of maximising opportunities for the re-use of non-potable water sources during construction including water from groundwater inflows during tunnelling and excavations.

6.5. Cumulative impacts (WSA)

The EIS assessed the cumulative impacts of the development in relation to soil and water. Under current available climate change predictions for the region, a decrease in rainfall is predicted during spring, at least in the near future. A decrease in rainfall has the potential for a range of impacts on the surface water environment, including drying of creeks and associated impacts on stream health and ecology. The basins have been designed for existing climatic conditions and have the effect of creating a minor decrease in flows to the downstream creeks (refer to EIS Section 6.1.1 and 6.2.1). If rainfall, and resulting runoff, to the basins decreases in the future, together with a general decrease in rainfall in the wider catchment, the airport site impacts on surface water runoff could be exacerbated. This may also compound the impacts of changes in rainfall seasonality and intensity locally.

The EIS predicts that summer rainfall will increase in the future and it is possible that the intensity of flood producing rainfall events will likewise increase in the future. The detailed design of the basins result in no increase in flooding downstream as noted in the EIS. The future impact of changes to summer rainfall in the area is not predicted to be any worse as a result of the proposed airport. The exception is the reach on Oaky Creek downstream of the airport site where the proposed airport tends to increase flood levels.

The potential increased localised flows at discharge points do have the potential to cause erosion and scour at basin outlets which can be managed with mitigation measures, refer Section 7. On the airport site, the flood immunity of any runways and associated infrastructure could be reduced in the future as a result of increases in the magnitude of flood events.

The design makes provision for this through the sizing of stormwater infrastructure on the airport site for no overflow considering the present day 100 year event flow plus an increase of 30 per cent in intensity to account for the possible future effects of climate change. Cumulative impacts are therefore expected to be minimal on downstream environments in the case of an increase in rainfall intensity.

WSA's ongoing works will include the delivery of an increasing number of concurrent packages. Accordingly, and with respect to soil and water management, it is necessary to consider the cumulative impact of interfacing construction packages to ensure that effective mitigation measures are identified and implemented.

To achieve this, WSA will facilitate regular cross package planning meetings with all active Contractors. The purpose of these forums will be to identify when and where concurrent water management activities may occur such that the cumulative impact of these works can be assessed and where possible mitigated or avoided. These forums would also involve look ahead planning sessions to highlight potential pending weather conditions that may require specific management measures.

In addition, the WSA Dewatering Permit dictates that downstream impacts to interfacing work packages are considered and discussed with WSA prior to approval. This may result in staggered or programmed releases of water depending upon conditions, status of overland flow paths and receiving waters as well as downstream basin capacity.

A targeted WSA and Contractor inspection programs will also be scheduled to assess the effectives of controls and the potential need to increase or augment mitigations measures to manage potential cumulative impacts. Particularly following significant rain events, these inspections may also involve cross package participation by Contractor environment/construction teams to assist in a whole of catchment understanding of overland flows paths and downstream impacts.

For Sydney Metro works, a separate Cumulative Impact Plan (CIP) has been developed to allow for effective planning and management of soil and water impacts from rail and airport construction activities. Refer to the CIP (WSA00-WSA-00400-EN-PLN-000013) for more details

6.6. Risk assessment

A risk assessment has been undertaken as part of the review and development of this CEMP and in accordance with Environmental Aspects, Impact and Risk Procedure (Chapter 26 in the EIS). The parts of the overall risk assessment relevant to soil and water which have been extracted and summarised in Table 6-5 apply to all phases of works that the Construction (Rail) Plan authorises.

The identification of construction activities and associated impacts that could eventuate during construction of the Project is central to the selection of appropriate environmental safeguards. Additionally the requirement to comply with the AEPR in regards to pollution of surface waters needs to be incorporated into that risk process. In this instance, for all applicable risks, the associated mitigation measures (SW_11 and SW_22) from Table 7-1 have been included in the relevant risk rows.

The risk management process involved an assessment of all specific Project activities/aspects in or near environmentally sensitive areas and resulted in the development of a list of environmental risks (effects and impacts) and a corresponding risk mitigation strategy and risk ranking.

The identification of risks included a review of the works, and review of the environmental risks identified by the EIS. The mitigation measures in the risk assessment are in-line with the EIS mitigation measures in Section 7 of this CEMP, Table 6.5 as well as the SM - WSA risk assessment in Chapter 26 of the SM - WSA EIS.

6.6.1. Risk Assessment process

The following tables outline the risk assessment process using 3 steps to identify the appropriate management measures required. Table 6-1 is used to determine the likelihood that the aspect will have an impact on the environment. Table 6-2 is used to determine the potential consequence rating of the risk identified.

From these two tables, a risk rating can then be assigned using Figure 6-1 to determine the potential severity of the risk and the appropriate management response as per Table 6-4.

Table 6-5 Likelihood descriptor

Rating	Likelihood	Description
A	Rare / improbable	• The event may only occur in exceptional circumstances.
B	Unlikely / remote	• The event may occur at some time (about once every five years).
C	Possible	• The event is likely to occur at some time (about once every year).
D	Likely	• The event will probably occur in most circumstances (at least once every six months).
E	Almost certain	• The event is expected to occur in most circumstances (at least once every month).

Table 6-6 Consequence descriptor

Rating	Consequence (impact)	Description
1	Insignificant/ Negligible (1-3)	• Short-term disturbance with minor environmental release or damage that is non-reportable. • No impact outside site boundary. • No community complaints or media reports.
2	Minor/low (4-10)	• Minor violation of regulation or guideline with minimal damage to the environment and small clean-up. • Immediately contained on site. • Local government action, minor community complaints. • Potential or actual breach of legislation.
3	Moderate (11-15)	• Violation of regulation or guideline with moderate temporary damage to the environment and significant clean-up costs. • Release of pollution off site. • Detrimental media reports, community concerns and complaints.
4	Major / High (16-22)	• Major environmental damage with potentially permanent consequences. • Release of pollution off site. Significant loss of environmental resources. • Detrimental media reports in the national or state media, organised community concern. • High likelihood of fine or court action.

Rating	Consequence (impact)	Description
5	Catastrophic / Priority (23-25)	• Long-term environmental harm. • Permanent irreparable damage to the environment. • Sustained detrimental state and national media reports. Sustained community outrage. • Penalty Infringement Notice/court action.

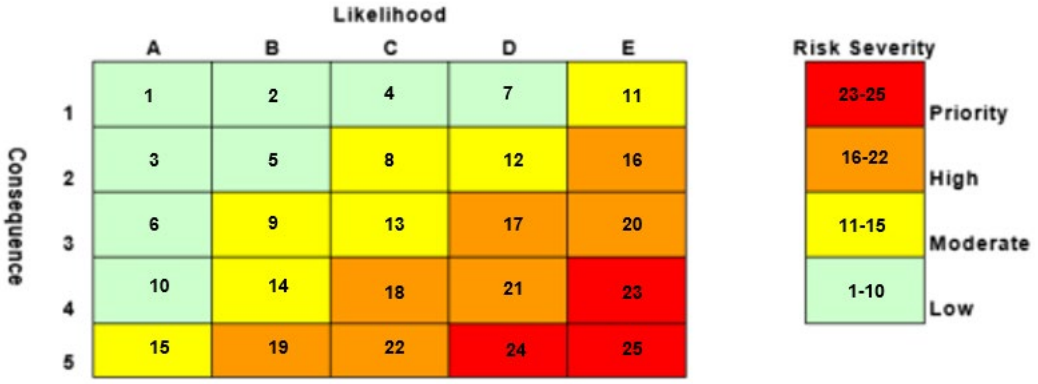

Figure 6-1 Risk severity ranking

Table 6-7 Risk severity and management response

Risk severity	Management response
Priority	• Immediate and detailed management action required. (e.g. stop or change activity)
High	• Priority management action warranted
Moderate	• Management action warranted
Low	• Management action should be considered, particularly for low-level impacts that nevertheless occur on a continual basis

Table 6-8 Soil and water risk assessment

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
01	Site establishment	Site and delivery vehicles travelling on unsealed roads	Sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	C4 (Sig)	SW_11 SW_22 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • \Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • Environmental Control Map (ECM)
02			Sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	C4 (Sig)	SW_11 SW_22 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
03		Erosion and sedimentation of site	Erosion and sedimentation	Offsite sediment discharge/pollution to waterways,	C4 (SIg)	SW_11 SW_22	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP, Air Quality CEMP

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
		compound areas		ecological areas, local drainage		SW_31 SW_32 SW_33 SW_34 SW_35 SW_36		• EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
04		Erosion and sedimentation of project areas	Ground disturbance	Unnecessary disturbance of areas not requiring construction causing erosion and sedimentation issues to waterways, ecological areas, local drainage	C4 (Sig)	SW_11 SW_22 SW_40	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
05	Utility works	Potholing and trenching	Sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	B2 (Low)	SW_11 SW_22 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36	B2 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
					C4 (Sig)	SW_11 SW_22 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36	C2 (Mod)	• ECM
06	Earthworks and Construction	Topsoil stripping / clearing and grubbing	Sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage				• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Aboriginal Cultural Heritage CEMP (in particular, the Topsoil Management Protocol) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
07	Earthworks Construction (continued)	Excavation	Sedimentation	Build up of water in excavations causing runoff to site / offsite areas	B2 (Low)	Ground water MM (SW_15-23) SW_11 SW_22 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36	B2 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
08		Excavation (Cont.)	Ground water	Intercepting ground water causing sediment runoff to waterways, ecological areas, local drainage	C2 (Mod)	Ground water MM SW_11 SW_22 (SW_17-25)	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
09	Earthworks and Construction (continued)	Stockpiling materials	Erosion and sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	C3 (Sig)	SW_11 SW_22 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36 SW_37 SW_38		• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
10		Constructing waterway	Sedimentation	Sediment discharge to creeks / erosion of	C3 (Sig)	SW_11 SW_22	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs)

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
		crossings		crossing platform		SW_31 SW_32 SW_33 SW_34 SW_35 SW_36		• Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
11		Piling	Groundwater	Intercepting ground water leading to offsite sediment discharge	C2 (Mod)	Ground water MM (SW_17-25)	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
12	Earthworks and Construction (continued)	Permanent Spoil placement	Erosion and sedimentation and potential damage to ECZ	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	C3 (Mod)	SW_13 SW_24 SW_31 SW_32 SW_33 SW_34 SW_35	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
						SW_36 SW_37 SW_38		• Complaints Procedure • Induction • ECM
13	Earthworks and Construction (continued)	Cut and fill (rail)	Erosion and sedimentation	Offsite sediment discharge/ pollution to waterways, ecological areas local drainage	Low	SW_11 SW_22 SC1	Low	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • ECM • EWMS
14	Culvert construction	Culvert excavation	Sedimentation	Sediment discharge to creeks / offsite	C4 (Sig)	Ground water MM (SW_15-23) SW_11 SW_22 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
15	Concrete works including precast facility	Drainage	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	B3 (Mod)	SW_11 SW_22 SW_31 SW_32 SW_33	B2 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
						SW_34 SW_35 SW_36		• Traffic and Access CEMP • Complaints Procedure • Induction • ECM
16		Concrete pours	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	B3 (Mod)	SW_11 SW_22 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36	B2 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • Environmental Control Map (ECM)
17	Concrete works including precast facility (cont.)	Concrete batching plant	Water discharge	Offsite concrete runoff/ pH rise to waterways, ecological areas and local drainage	Low	WQ1	Low	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • EWMS • Complaints Procedure • Induction • ECM
18	Waste storage at Precast	Concrete washouts	Pollution to waterways /	Offsite concrete runoff /pH rise to	B3 (Mod)	SW_11 SW_22	B2 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) \

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
	yards		ecological areas	waterways, ecological areas, local drainage		SW_31 SW_32 SW_33 SW_34 SW_35 SW_36		• Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
19		Temporary waste storage	Excess waste generation	Improper storage of waste concrete causing excess material waste (cross contamination of soils)	B3 (Mod)	SW_26 SW_27 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36	B2 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
20	Contaminated material works (Remediation)	Excavation	Asbestos	Cross contamination of surrounding areas	C4 (Sig)	SW_24 SW_25	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
								• Complaints Procedure • Induction • ECM
21				Improper validation of contaminated/ remediated areas	C4 (Sig)	SW_24 SW_25	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
22	Contaminated material works (Remediation) (cont.)	Excavation (Continued)	Acid Sulphate Soils	Cross contamination of surrounding areas	B2 (Low)	SW_24 SW_25	B1 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
23				Improper validation of	B2	SW_24	B1 (Low)	• Soil and Water CEMP (in particular GWMP,

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
				contaminated/ remediated areas	(Low)	SW_25		CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
24		Excavation (continued)	PFOS/PFAS	Cross contamination of surrounding areas	B2 (Low)	SW_14 SW_24 SW_25	B1 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
25				Improper validation of contaminated/ remediated areas	B2 (Low)	SW_14 SW_24 Testing as per Appendix D and this Soil	B1 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
						and Water CEMP		• Traffic and Access CEMP • Complaints Procedure • Induction • ECM
26	Site water management including precast yards, permanent stockpile locations and laydowns	Dewatering	Sedimentation	Incorrect treatment and discharge of sediment basins	C4 (Sig)	SW_33	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction ℜ ECM
27		Dewatering (Cont.)	Sedimentation	Incorrect treatment and discharge of sediment traps and excavations throughout site	C4 (Mod)	SW_31 SW_32 SW_33 SW_34 SW_35 SW_36	C2 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
28	Road paving	Milling and	Erosion and	Offsite sediment	C3	SW_11	C2 (Low)	• Soil and Water CEMP (in particular GWMP,

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
	activities	excavation of road surfaces	sedimentation	discharge/pollution to waterways, ecological areas, local drainage	(Sig)	SW_22 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36		CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
29	Road paving activities	Asphalt works	Contamination	runoff to surrounding areas from asphalt if laid in intermittent weather	C3 (Sig)	SW_13	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
30	Chemical use	Storage of chemicals	Contamination	Site and surrounding area contamination due to chemical runoff	B3 (Mod)	SW_13 Chemical storage MM (SW_44-SW_48)	B2 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
								• Traffic and Access CEMP • Complaints Procedure • Induction • ECM
31	Chemical use (continued)	General use of chemicals onsite	Contamination	Site and surrounding area contamination due to chemical runoff	B3 (Mod)	SW_13 Chemical storage MM (SW_44-SW_50)	B2 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
32	General	Plant and machinery	Flooding	Construction activities are inundated with flood waters resulting in isolation of plant and machinery and potential for chemical release into waters	C3 (Sig)	SW_11 SW_22 SW_51 SW_52 SW_53 SW_54	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • WSA Emergency and Incident Response Procedure
33	Tunnelling Operations	Tunnel Boring Machine (TBM)	Groundwater, surface water	Groundwater pollution, land slides	Low	WQ1 GW5	Low	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs)

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
		launch, tunnelling production, cross passage works, stub tunnel excavation	discharge			GW6 SC1		• EWMS • Complaints Procedure • Induction • ECM
34		Construction of tunnel portal	Groundwater impacts, surface water discharge	Groundwater pollution, landslides, water discharge off site	Low	WQ1 GW5 GW6 SC1	Low	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • EWMS • Complaints Procedure • Induction • ECM
35	Ground stabilisation	Ground stabilisation	Erosion and sedimentation	Groundwater pollution, landslides, erosion and sediment travelling off site	Low	WQ1 GW5 GW6 SC1	Low	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • EWMS • Complaints Procedure • Induction • ECM

1 Refer to Table 7-1 for mitigation measures and controls
2 Derived from risk assessment process detailed in the SEMF Appendix G

7. Environmental Control Measures

Mitigation and management measures that will be implemented during construction are detailed in Table 7-1 and are consistent with those provided in Table 11 of the WSA SWCEMP (2021), as per the Airport Plan as well as Section 8-1, Table 8-2 and Table 8-3 of SM - WSA EIA. The relevant control measures will be included in the site-specific Environmental Work Method Statement (EWMS) and Environmental Control Map (ECM) – refer to Section 3.6 of the CEMF for further detail.

For monitoring of the implementation of control measures, refer to Section 10.

Table 7-1 Soil and water environmental control measures

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
AEW: Access and Enabling Works SCAW: Surface Civil & Alignment SBT: Station Box Tunnels SSTOM: Stations Systems, Trains, Operations & Maintenance All Contractors: AEW, SCAW, SBT, STOM and other contractors as delegated by Sydney Metro WSA					
SURFACE WATER MANAGEMENT					
SW_01	As part of the detailed design process for the Stage 1 Development, a surface water management system will be developed. Development of a surface water management system for the Airport Site may involve a progressive process of design and implementation covering both the construction and operational phases. This may include the implementation of temporary system elements specifically for the construction phase. The system will include:	Pre-construction / Construction	To be developed by the SCAW and SBT Design Team as per SW_01 and will include SW_02, SW_03, SW_04, SW_05, SW_06, SW_07, SW_08, SW_09, SW_10. This document will be implemented under the supervision of the construction and environmental management teams. The design should take in to consideration the requirements and recommendations for site drainage works of the guidelines in Managing Urban Stormwater: Soils and Construction published by the New South Wales Government (commonly known as the "Blue Book").	SCAW and SBT Design Teams All Contractors	WSA EIS Table 28-7

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
AEW: Access and Enabling Works SCAW: Surface Civil & Alignment SBT: Station Box Tunnels SSTOM: Stations Systems, Trains, Operations & Maintenance All Contractors: AEW, SCAW, SBT, STOM and other contractors as delegated by Sydney Metro WSA					
SW_02	A detailed design of basins and channels to capture the majority of runoff, including during construction;	Pre-construction / Construction	Design will be completed as per SW_01 Construction sediment basin design capacities are calculated using the Blue Book RUSLE equation for the 80th Percentile 5-Day rain event (27.6mm) refer Blue Book Table 6.3a. All water flow will be directed around disturbed site areas, stockpiles and contaminated areas so as to prevent the management of additional water and potential ERSED issues across disturbed areas. Additional water retention and erosion and sediment controls will be implemented throughout the catchment in accordance with the ESCP to protect project assets and completed construction works. Any water treatment plants will be designed according to ANZECC/ARMCANZ (2000), ANZG (2018) and draft ANZG (2020) default guidelines. The ESCP is to be developed in consultation with a Soil Conservationist.	SCAW and SBT Design teams	WSA EIS Table 28-5 SM - WSA EIA Table 8-3 FF1 FF5
SW_03	Refined drainage system design performance standards to optimise capacity and release timing, mimicking natural flows as far as practicable. This is to be undertaken during the design refinement process, from concept to detailed design.	Pre-construction / Construction	As above	SCAW and SBT Design teams	WSA EIS Table 28-5 SM - WSA EIA Table 8-3 WQ1 – WQ8

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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SW_04	Separate bio-retention basins to provide additional treatment for low flows and separation of these features from the drainage system to protect contained water during flood events; Where there is insufficient space for the provision of on-site detention, the upgrade of downstream infrastructure would be implemented where feasible and reasonable	Pre-construction / Construction	As above	SCAW and SBT Design teams	WSA EIS Table 28-5 SM - WSA EIA Table 8-3 WQ1 – WQ8
SW_05	Pollutant traps to prevent debris and other coarse material entering the drainage system;	Pre-construction / Construction	As above	SCAW, SBT and SSTOM Design teams	WSA EIS Table 28-5 SM - WSA EIA Table 8-3 WQ1 – WQ8
SW_06	Stabilisation structures at outlets to include rock check dams at regular intervals along channels and energy dissipaters at basin outlets;	Pre-construction / Construction	As above	SCAW, SBT and SSTOM Design teams	WSA EIS Table 28-5 SM - WSA EIA Table 8-3 WQ1 – WQ8
SW_07	Capacity for containment of accidental leaks or spills in the drainage system at maintenance areas, fuel farms or other areas where fuels or chemicals are stored or handled in accordance with Australian standards;	Pre-construction / Construction	As above	SCAW, SBT and SSTOM Design teams	WSA EIS Table 28-5 SM - WSA EIA Table 8-3

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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					WQ1 – WQ8
SW_08	Measures to address impacts on downstream and upstream uses, including sensitive environmental values;	Pre-construction / Construction	As above	SCAW, SBT and SSTOM Design teams	WSA EIS Table 28-7
SW_09	Measures to address impacts on downstream and upstream uses, including sensitive environmental values;	Pre-construction / Construction	As above	SCAW, SBT and SSTOM Design teams	WSA EIS Table 28-7
SW_10	Measures to address impacts on downstream and upstream uses, including Volumes and sources of construction water; and	Pre-construction / Construction	As above	SCAW, SBT and SSTOM Design teams	Good practice
SW_11	Processes for treatment and discharge of any water from site and associated monitoring, reporting and regulatory approval requirements	Pre-construction / Construction	As above Any water treatment plants will be designed according to ANZECC/ARMCANZ (2000), ANZG (2018) and draft ANZG (2020) default guidelines.	SCAW, SBT and SSTOM Design teams	Good practice
DEVELOPMENT OF LOCAL STANDARDS					

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
AEW: Access and Enabling Works SCAW: Surface Civil & Alignment SBT: Station Box Tunnels SSTOM: Stations Systems, Trains, Operations & Maintenance All Contractors: AEW, SCAW, SBT, STOM and other contractors as delegated by Sydney Metro WSA					
SW_12	Processes for treatment and discharge of any water from site and associated monitoring, reporting and regulatory approval requirements	Pre-construction / Construction	As above WSUD requirements will be addressed when planning discharge and water treatment. Water discharge points will be monitored as per Section 8.	SCAW and SBT Design teams	Good practice
SW_13	Local standards for water quality may be developed under the AEPR, with due consideration to the Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000) and the results of baseline water quality monitoring taking place for a minimum of 24 months prior to the commencement of Main Construction Works.	Pre-construction/ Construction	May be undertaken as per SW_11 but will not be undertaken if AEPR duty in Reg 4.01 can be satisfied based on the measures in this plan. SM – WSA has committed to 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)	SCAW, SBT and SSTOM with SM Environment Manager	Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000) SM-WSA EIA Table 8-2

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
AEW: Access and Enabling Works SCAW: Surface Civil & Alignment SBT: Station Box Tunnels SSTOM: Stations Systems, Trains, Operations & Maintenance All Contractors: AEW, SCAW, SBT, STOM and other contractors as delegated by Sydney Metro WSA					
SW_14	ESCPs will be reviewed by the Project Soil Conservationist or a Certified Professional in Erosion and Sediment Control (CPESC) for all works involving soil disturbance unless the Airport Environment Officer agrees that soil and water risks do not warrant this. ESCPs will be prepared in accordance with the 'NSW OEH Blue Book – Managing urban stormwater: soils and construction'.	Prior to works involving soil disturbance	To be implemented in accordance with the described mitigation measure and the CEMF. ESCPs will developed for each catchment and implemented across the Project where there is a risk of erosion and sediment loss. Construction sediment basin design capacities are calculated using the Blue Book RUSLE equation for the 80th Percentile 5-Day rain event (27.6mm) refer Blue Book Table 6.3a. Additional water retention and erosion and sediment controls will be implemented throughout the catchment in accordance with the ESCP to protect project assets and completed construction works. The ESCP is to be developed in consultation with a Soil Conservationist.	All Contractors – Project Soil Conservationist, and environment team.	Good practice WSA EIS Table 28-7
SPILL RESPONSE					
SW_15	A protocol will be developed and implemented to respond to and remedy leaks or spills.	Construction	An emergency spill response procedure is to be developed by the Contractor. The requirements of the procedure are included in inductions undertaken by all staff, workers and visitors before attending the site.	All Contractors – Environment Manager	WSA EIS Table 28-7

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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SW_16	The risk posed by PFAS contamination will be identified and if necessary, the Contractor environmental management plan is to include soil, groundwater and surface water PFAS contamination monitoring requirements, testing and disposal procedures consistent with relevant Commonwealth environmental management guidance on PFOS and PFOA as prepared by the Environment Department.	Pre-construction Construction	To be implemented in accordance with the described mitigation measure and Section 5.1.5 and Section 10.2 of this plan.	All Contractors – Environment Manager	Condition 8(6) and 34
GROUNDWATER MANAGEMENT					
SW_17	A groundwater management plan is to be developed and implemented identifying:	Prior to Main Construction Works	The bulk earthworks will have two impacts on the groundwater system: In cut areas, the shallow alluvium soils and associated aquifer will be removed by the excavation In fill areas, the alluvium soils and associated aquifer will be buried by the fill. A groundwater management plan will only be developed and implemented should groundwater be encountered/used. If required, the groundwater management plan is to be prepared and implemented in accordance with the described mitigation measure prior to SBT commencing, refer Section 9.4 detailing the management measures to be implemented Where changes to groundwater level are close	SBT Environment Manager and Design Manager.	Condition 8(4) and 8(5)
SW_18	Details of work that intercepts groundwater or requires groundwater extraction;				

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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SW_19	An assessment of aquifer impacts resulting from groundwater interception or extraction;		to the ground surface, dryland salinity monitoring would be implemented to allow for management of any identified impacts		
SW_20	Extraction methodology and management measures for discharge; and				
SW_21	Groundwater monitoring and inspection programs.				
GROUNDWATER INFLOWS					
SW_22	To mitigate the impacts associated with groundwater inflows to excavations including stations and crossovers the following measures will be implemented:	N/A	Groundwater improvements are usually undertaken prior to excavation, to minimise the volume of groundwater entering the tunnel cross-passages.	SBT	WSA EIS Table 28-7 SM – WSA EIA Table 8-3 SC9 WQ3
SW_23	Groundwater inflows including to stations and crossovers will be reused or released with appropriate treatment;	Construction	Will be undertaken as per SW_21 under supervision of the construction and environmental management teams.	SBT environment and construction team	WSA EIS Table 28-7
SW_24	Where groundwater from excavations including stations and crossovers is released to surface waters, treatment will be undertaken to bring water pollution below the accepted limits set out in the AEPR or any local standards; and	Pre-Construction and Construction	Will be undertaken as per SW_22 under supervision of the construction and environmental management teams. Refer to section 9.3.3 for discharge criteria. WSUD requirements will be addressed when planning discharge and water treatment.	SBT environment and construction team	WSA EIS Table 28-7 SM – WSA EIA Table 8-3 SC9 WQ3

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
AEW: Access and Enabling Works SCAW: Surface Civil & Alignment SBT: Station Box Tunnels SSTOM: Stations Systems, Trains, Operations & Maintenance All Contractors: AEW, SCAW, SBT, STOM and other contractors as delegated by Sydney Metro WSA					
SW_25	Corrective measures will be developed and implemented to supplement groundwater supplies in the unlikely event of impacts to dependent vegetation or watercourses due to drawdown across excavations including stations and crossovers.	Construction	Will be undertaken as per SW_23 under supervision of the construction and environmental management teams. Refer section 9.4		WSA EIS Table 28-7
LAND CONTAMINATION					
SW_26	A remedial action plan and unexpected finds protocol will be established as a contingency to facilitate the quarantining, isolation and remediation of contamination identified throughout the construction program.	Prior to Main Construction Works and implemented during construction	A remedial action plan is to be developed by the Contractor and unexpected finds protocol is shown in Appendix C. Remediation works will be undertaken in accordance with the Sydney Metro Remediation Action Plan, developed in a manner consistent with the Western Sydney Airport Remediation Action Plan (Department of Infrastructure and Regional Development, 2019) to the extent practicable. These should be discussed during the compulsory induction undertaken by all staff, workers and visitors before attending the site. A review will be made of investigations, the Western Sydney Airport Remediation Action Plan and validation reports prior to commencement of construction. The UFP will deal with worker health and safety measures, waste management and tracking for contamination	All Contractors – all staff including site supervisors, environment team and construction team.	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 SC5 SC11 CEMF 8

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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SW_27	Any asbestos identified on site will be managed in accordance with applicable regulatory requirements.	Construction	The unexpected finds protocol outlines the process of dealing with unexpected asbestos finds. This will be followed and reported upon occurrence in accordance with applicable regulatory requirements.	All Contractors– all staff including site supervisors, occupational hygienist, safety team and construction team.	SM - WSA EIA Table 8-3 SC5
SW_28	Any material requiring off-site disposal shall be done in accordance with the Waste and Resources CEMP.	Construction	To be implemented in accordance with the described mitigation measure. Refer to Waste and Resources CEMP for further detail.	All Contractors – Site supervisors & Engineers.	Waste and resources CEMP (WSA EIS Table 28-17) - Good practice SM - WSA EIA Table 8-3 WR1 – WR4 HR3 HR5
SW_29	Waste classification details for any waste material removed from site shall be documented and maintained on project records (in accordance with the NSW Waste Classification Guidelines, 2014).	Construction	To be implemented in accordance with the described mitigation measure. Refer to Waste and Resources CEMP for further detail. The WR CEMP addresses worker health and safety measures, waste management and tracking for contamination.	All Contractors – Site supervisors & Engineers.	Waste and resources CEMP (WSA EIS Table 28-17) - Good practice SM - WSA EIA Table 8-3 WR1 – WR4 HR3 HR5
EROSION AND SEDIMENTATION					

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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SW_30	Impacts associated with erosion and sediment will be mitigated through:	Note	NA	NA	NA
SW_31	Implementation of ESCPs;	Construction	ESCPs will be implemented progressively by the contractor prior to the next stage of works. Environmental site inspections would be undertaken by the Contractor Environment Manager (or delegate) on a weekly basis to evaluate the effectiveness of environmental controls implemented by the contractor.	All Contractors – Environment team, Site Supervisors and Engineers.	Good practice Table 8-3
SW_32	Installing a site drainage system prior to commencement of Bulk Earthworks;	Construction	To be implemented in accordance with the described mitigation measure. Drainage design must be undertaken in accordance with Australian Rainfall and Runoff, 2016 and the Australian National Committee on Large Dams (ANCOLD) and NSW Dams Safety Committee (DSC) guidelines must be used in the design and construction of the flood detention basins and water quality basins	All Contractors – Site supervisors & engineers.	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 WQ3 WQ6
SW_33	Minimising the surface area disturbed at any one time by, where practical, staging construction works and stabilising soils with vegetation or appropriate cover materials;	Construction	Will be undertaken as per SW_31. Exposed surfaces will be minimised, and stabilised/revegetated as soon feasible and reasonable upon completion of construction. This may be temporary initially to be completed by the SSTOM contractor as part of the landscape plan. Mitigation measure WR_06 of Waste and Resources CEMP notes that mulch will be utilised onsite for environmental controls and ground stabilisation.	All Contractors – Site superintendent, supervisors and engineers.	WSA EIS Table 28-7 SM - WSA EIS Table 8-1 CEMF8 Table 8-3 FF1

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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SW_34	Establishing erosion and sediment controls in accordance with the 'NSW OEH Blue Book – Managing urban stormwater: soils and construction';	Construction	To be implemented in accordance with the described mitigation measure. This will include	All Contractors – Site supervisors & environment team.	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 WQ2 –WQ7
SW_35	Providing intermediate sediment retention basins within the construction impact zone to provide additional treatment prior to completion of the airport's site drainage system. Specific erosion control measures will be developed for the management of highly erodible soils such as those anticipated in the Luddenham and South Creek soil landscapes;	Pre-construction/ Construction	To be implemented in accordance with the described mitigation measure. Refer to SW_01 & SW_02 for further detail.	SCAW, SSTOM - Design Team	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 WQ2 –WQ7
SW_36	Mulching cleared vegetation for use in erosion control at construction sites;	Construction	Will be undertaken as per SW_34. Mitigation measure WR_06 of Waste and Resources CEMP also notes that mulch will be utilised onsite for environmental controls and ground stabilisation.	SCAW, SBT – Site supervisors, engineers and environment team.	WSA EIS Table 28-7
SW_37	Covering and stabilising soil stockpiles with vegetation or mulch;	Construction	Will be undertaken as per SW_35. Mitigation measure WR_06 of Waste and Resources CEMP also notes that mulch will be utilised onsite for environmental controls and ground stabilisation.	SCAW, SBT – Site supervisors, engineers and environment team.	WSA EIS Table 28-7

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SW_38	Stockpiling topsoil at a maximum height of two metres, where practicable; and	Construction	Will be undertaken as per SW_36. Environmental site inspections will be undertaken by the WSA Environment Manager (or delegate) on a weekly basis to evaluate the effectiveness of environmental controls implemented by the contractor.	SCAW, SBT – Site supervisors.	WSA EIS Table 28-7
SW_39	Distributing and seeding topsoil over landscaped areas at the completion of Bulk Earthworks and ensuring batter slope gradients and surface treatments have been designed to minimise erosion risk.	Construction	Will be undertaken as per SW_37 under supervision of the construction and environmental management teams.	SCAW, SBT – Site supervisors, engineers and environment team.	WSA EIS Table 28-7 EIA Table 8-3 WQ2
SW_40	New water way crossings or upgrades of existing crossings, if required on the airport site, must be designed and constructed to minimise potential impacts on riparian and aquatic habitats and fish passage.	Construction	To be implemented in accordance with the described mitigation measure.	SCAW Contractor – Site supervisors, engineers and environment team.	WSA EIS, Section 16.7.2 Mitigation and management of impacts
PROGRAMMING					
SW_41	Construction programming will allow for progressive rehabilitation of disturbed areas will be undertaken to minimise soils exposure and the potential for dust generation, erosion and sedimentation, and visual impacts.	Pre-construction/ construction	To be implemented in accordance with the described mitigation measure.	SCAW, SSTOM – Site supervisors, engineers and environment team.	Good practice
LEAKS OR SPILLS OF FUEL OR OTHER CHEMICALS					

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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SW_42	To minimise the risk of leaks or spills the following mitigation measures will be put in place:	Note	NA	NA	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 CEMF8
SW_43	Maintenance areas, fuel farms and other areas where fuels or chemicals are stored or handled will be bunded to contain any accidental spills or leaks;	Construction	Will be undertaken as per the described mitigation measure. Bunds will be designed to a capacity of 110 percent of the maximum single stored volume Environmental site inspections will be undertaken by the Contractor and SM Environment Manager (or delegate) on a weekly basis to evaluate the effectiveness of environmental controls implemented by the contractor	All Contractors – workshop foreman and site supervisors.	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 CEMF8
SW_44	Fuel and other chemicals will be stored and handled in accordance with relevant Australian standards such as:	Construction	Australian standards listed will be considered when storing fuel and other chemicals. Site inspections will be undertaken by the Contractor and SM Environment Manager (or delegate) on a weekly basis to evaluate the effectiveness of environmental controls implemented by the contractor	All Contractors – site supervisors	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 CEMF8
SW_45	AS 1940-2004 The storage and handling of flammable and combustible liquids;	Construction	Refer to SW_41	All Contractors – site supervisors	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 CEMF8

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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SW_46	AS/NSZ 4452:1997 The storage and handling of toxic substances;	Construction	Refer to SW_41	All Contractors – site supervisors	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 CEMF8
SW_47	AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods; and	Construction	Refer to SW_41	All Contractors – site supervisors	WSA EIA Table 28-7 SM - WSA EIS Table 8-3 CEMF8
SW_48	AS/NZS 1547:2012 On-site domestic wastewater management.	Construction	Refer to SW_41	All Contractors – site supervisors	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 CEMF8
SW_49	Spill kits will be provided at the batch plants, storage areas and main work sites and a protocol will be developed and implemented to respond to and remedy leaks or spills	Construction	All sites with chemicals and/ or hydrocarbons will be set up with bunds and spill kits appropriate for the type and scale at the site. They will be used as per the protocol which will be presented to all workers during inductions	All Contractors – site supervisors	EIA Table 8-3 CEMF8
FLOOD MANAGEMENT					

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
AEW: Access and Enabling Works SCAW: Surface Civil & Alignment SBT: Station Box Tunnels SSTOM: Stations Systems, Trains, Operations & Maintenance All Contractors: AEW, SCAW, SBT, STOM and other contractors as delegated by Sydney Metro WSA					
SW_50	The flood model for the project would be updated with regard to flood modelling undertaken for the South Creek Sector Review (anticipated to be released in 2020). The updated flood modelling would be used to inform design development	Construction	Where applicable for earthworks, the Contractor will use the updated flood modelling developed by the Principal when working in the South Creek Sector. Any modifications from the review will need to be integrated into design and work practices.	SBT SCAW	EIA Table 8-3 HYD3
SW_51	Flood compatible design would need to be demonstrated for the permanent spoil placement areas to ensure compliance with applicable land use criteria and address erosion and sediment risks to ECZ; leaching to underlying soil and/or groundwater	Construction	Prior to material being stockpiled at either of the Permanent stockpile areas, a flood compatible design needs to be developed and approved by the Principal.	SBT SCAW	EIA Table 8-3 HYD5
SW_52	Weather forecast and monitoring is to be undertaken daily as part of the pre-start meeting and the day's activities are to be modified if and as required.	Construction	Will be undertaken as per SW_47.	All Contractors – Site supervisors and environment team.	Good practice SM - WSA EIA Table 8-3 HYD1
SW_53	In the event that rain forecast is likely to exceed 20mm in any 24-hour period, work activities are to be re-assessed and if deemed necessary (i.e., in the event of prolonged rainfall and actual or potential for rising creek levels), any plant and machinery (and moveable items) are to be relocated to an area outside of the 100-year ARI area (refer to Section 6.3.2) and away from any watercourse.	Construction	Will be undertaken as per SW_48 under the supervision of the construction and environmental management teams.	All Contractors – Site supervisors and environment team	Good practice SM - WSA EIA Table 8-3 HYD1

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SW_ 54	Where possible, temporary stockpiles and plant and equipment storage are to remain outside of the area identified as being within the 100-year ARI (refer to Figure 6). If required, a flood marker is to be installed on site to indicate the 100-year ARI extent.	Construction	Will be undertaken as per SW_53 under the supervision of the construction and environmental management teams.	All Contractors – Site supervisors and environment team	Good practice SM - WSA EIA Table 8-3 HYD1
SW_55	If flooding occurs on the site, the WSA Emergency Plan and/or Contractor Emergency Plan is to be implemented.	Construction	Will be undertaken as per SW_54. The applicable Emergency Plan will be discussed during the inductions undertaken by all staff, workers and visitors before attending the site.	SCAW, SSTOM Contractors within the CIZ – all personnel under the direction of the site supervisors WSA for areas outside the CIZ	Good practice SM - WSA EIA Table 8-3 HYD1
SW_56	Provide flood-proofing to excavations at risk of flooding during construction, where reasonable and feasible, such as raised entry into shafts and/or pump-out facilities to minimise ingress of floodwaters into shafts and the dive structure	Construction	In response to the flood models, as per SW_50. Any modifications from the review of the models will need to be integrated into design and work practices including shaft design and pump-out facilities..	SBT and SSTOM contractors.	Table 8-3 HYD1
WATER TREATMENT FACILITY OPERATION					

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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SW_57	The treated water irrigation scheme will be designed and operated in accordance with the risk framework and management principles contained in the National Guidelines on Water Recycling (EPHC 2006) and Environmental guidelines: Use of effluent by irrigation (DEC 2004).	Construction Operation	The water treatment plants will be designed according to ANZECC/ARMCANZ (2000), ANZG (2018) and draft ANZG (2020) default guidelines. The Water Treatment Plant Operational Management Plan has been prepared. WTP will be operated in accordance with the relevant guideline. The project treated water irrigation scheme will be designed by others in future work phases. WSUD requirements will be addressed when planning discharge and water treatment.	SBT, SSTOM	WSA EIS Table 28-30
SW_58	An unexpected finds procedure would be developed and implemented as part of the project Soil and Water Management Plan, outlining a set of potential contamination issues which could be encountered, and detailing the corrective actions to be implemented. The unexpected finds procedure would include a process for chemical and asbestos contamination and would generally include: · cessation of works within the affected area until inspection of the suspected contamination by a qualified contaminated lands consultant (verification by a certified contaminated land practitioner) · collection of soil samples for chemical or asbestos analysis based on observations · assessment of results against applicable land use or waste classification criteria in accordance with NSW Environment Protection Authority statutory	Prior to Main Construction Works and implemented during construction	A remedial action plan and unexpected finds protocol are to be developed by the Contractor. These should be discussed during the compulsory induction undertaken by all staff, workers and visitors before attending the site.	All Contractors – all staff including site supervisors, environment team and construction team.	WSA EIS Table 28-7 SM - WSA EIA Table 8-3 CEMF8 SC5

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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	guidelines management of the contamination in accordance with NSW Environment Protection Authority statutory guidelines The unexpected finds procedure for on-airport construction would be consistent with the Western Sydney Airport unexpected finds procedure detailed in the Soil and Water Construction Environmental Management Plan (Western Sydney Airport, 2019g)				
SW_59	Post construction, an inspection of construction, stockpiling and laydown sites and soil validation of redundant sedimentation/water quality basins would be undertaken to assess if further investigation and remediation is required. Investigation and remediation (if required) would be undertaken in accordance with the Soil and Water Management Plan (off-airport) and a project specific Remediation Action Plan that would be consistent with the Western Sydney Airport Remediation Action Plan (2019) (on-airport). All inspections, investigations and remediation would be undertaken by a qualified contaminated lands consultant (verified by a certified contaminated land practitioner)	Post-construction	Environmental site inspections will be undertaken by the Contractor Environment Manager (or delegate) on a weekly basis to evaluate the effectiveness of environmental controls implemented by the contractor.	SCAW, SSTOM – Environment Manager and Design Manager.	SM - WSA EIA Table 8-3 SC6
SW_60	Prior to ground disturbance in areas of potential acid sulfate soil occurrence, testing would be carried out to determine the actual presence of acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998)	Pre-construction	A testing regime will be determined by the Contractor prior to disturbance. Results from this will determine the management requirements in accordance with the ASSM. The program will need to be approved by the Principal.	SCAW, SBT – Environment Manager and Design Manager.	SM - WSA EIA Table 8-3 SC7

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SW_61	Prior to ground disturbance in high probability salinity areas testing would be carried out to determine the presence of saline soils. If salinity is encountered, excavated soils would not be reused or would be managed in accordance with Book 4 Dryland Salinity: Productive Use of Saline Land and Water (NSW DECC 2008). Erosion controls would be implemented in accordance with the Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004)	Pre-construction	A testing regime will be determined by the Contractor prior to disturbance. Results from this will determine the management requirements in accordance with the Book 4 Dryland Salinity. The program will need to be approved by the Principal.	SBT, SSTOM – Environment Manager and Design Manager.	SM - WSA EIA Table 8-3 SC8
DEWATERING					
SW_62	All dewatering activities off site must be undertaken in accordance with the WSA Dewatering Permit to Dewater and be approved by WSA. Where this release of water occurs across package boundaries coordination with applicable interface Contractors and WSA must occur.	Construction	Will be undertaken as per SW_57 to allow a coordinated release of water, effective sediment basin management and to mitigate potential Cumulative Impacts. This will also apply for wet weather and dam dewatering activities – WSA approved dewatering permit and hold point.	All Contractors	Good Practice
EARTHWORKS					

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
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SW_63	All excavation works are to include the unexpected finds protocol requirements as part of the excavation permit process.	Construction	Excavation permit to include the unexpected finds protocol requirements. The Land Disturbance Permit is applicable to areas where in-situ topsoil has not been removed (i.e. areas where topsoil has not been stripped). All excavated material is to be tracked.	All Contractors	RAP EIS
SPOIL AND FILL MANAGEMENT					
SW_64	Implement management measures to minimise surface and groundwater impacts, including identification of water treatment measures and discharge points, details of how spoil and fill material required by the project will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; salinity control measures and the consideration of flood events	Pre-Construction and Construction	SM-WSA will utilise the existing monitoring points as established by WSA and will install additional monitoring points where those WSA points do need meet the requirements of managing spoil and fill stockpile locations chosen by SM-WSA contractors. Sections 8-10 below outline management and monitoring practices in detail.	All Contractors	Table 8-1 CEMF8:

8. Soil and Water Management

8.1. Water Usage

Water will be utilised during construction for soil conditioning, dust suppression, concrete batching supply and other construction activities.

An estimated 524 ML of water is anticipated to support the Project including earthworks and concrete batching for concrete tunnel, bridge and viaduct segments. A large quantum of this water usage will be for the supply and operation of the onsite concrete batching facility. Concrete batching water supply will be flocculated or filtered in large holding tanks, recycled and reused where possible.

Non-potable water sources will be primarily be used to meet this requirement. However, potable water may be required to be supplied from existing assets operated by Sydney Water. Non-potable water sources will include stormwater runoff captured in sediment dams or existing farm dams.
Groundwater is not currently proposed to be utilised as a water source.

8.2. Surface Water Management

Surface water management across the project is a critical environmental aspect and demands defined and
prescriptive measures to ensure ongoing compliance. This is particularly important where water management is required between package interfaces., To this end, a number of processes and mitigation measures have been adopted to drive effective management of surface water. These have been outlined in sections below and align with the following principles:

The allocation of point source water discharge locations to drainage receptors will be determined by the progressive status of site wide catchment boundaries and truck drainage systems;

- Consideration of each Contractor management impacts including the relevant catchment areas (size and work status) and associated receiving basins;
- The need for collaborative management of package interfaces;
- The management of large downstream receiving basins are specifically allocated to relevant Contractors in contract requirements; and
- Internal and external site access requirements and constrains.
- Contractors must comply with the Environmental Control Measures in Section 7 and the following requirements:
- the management of all surface and construction water;
- the release of water across Site boundaries in coordination with applicable Project Contractors as per the
- Master Interface Principles Deed Poll;
- compliance with Environmental Work Method Statements, Environmental Control Maps, contract and the Dewatering Permit process; and
- preparation of Contractor’s ESCPs in accordance the NSW OEH Blue Book – Managing Urban Stormwater: soils and construction, by an appropriately certified professional.

8.2.1. Environmental Work Method Statements

Environmental Work Method Statements (EWMS) detail specific construction methodology and environmental mitigation and management measures for a high-risk activity,

This includes the processes associated with surface water management and prescriptive measures for dewatering activities including those across site boundaries where a specific EWMS is prescribed in the works contract. EWMS must be approved by SM - WSA prior to implementation.

8.2.2. Environmental Control Maps

Environmental Control Maps (ECMs) identify the location of physical protection measures, work method controls and monitoring requirements to minimise the impact of activities on the environment.
The mitigation measures included in this CEMPs and other plans should be included on ECMs. Project contract requirement's includes provisions for the dewatering process in contractor's ECM's (including mechanisms for water management across each project contractor's site boundary. An example of an ECM can be found in Appendix A.

8.2.3. 8.2.3 Dewatering Permit

The Dewatering Permit applies to any offsite discharge, pumping to land in Stage 2 areas and movement across construction work package boundaries. This permit ensures that CEMP water quality requirements are met prior to the discharge of any water from a package boundary and will be used as a HOLD POINT prior to any discharge occurring. This process ensures the requirement to complete monitoring at all construction discharge locations.

The permit as a HOLD POINT is required to be approved by WSA Environment Manager (or nominated delegate) before water release. Accordingly, this permit acts as a control point and allows SM - WSA and Contractors to collaborate with adjacent Contractors such that cooperative inter package water processes are implemented. The requirement for inter package collaboration is further enforced through the Master Interface Deed Poll.

8.2.4. 8.2.4 Rain Event Management

The surface water management processes outlined above will be particularly critical during and following
significant rain events when water is ponding across worksites. In these circumstances WSA and Contractors will implement the following:

- Facilitate and participate in regular and event specific inter package planning meetings, including significant rain event look ahead;
- Pre event inspections to ensure maximum basin capacity and effective ERSED controls prior to pending potential rain events;
- Coordination of water management controls during significant events to ensure safe worksites and mitigate potential flooding impacts;
- WSA facilitation of post event water management meetings to agree on water release strategies within and between packages;
- Post event water quality testing of surface water prior to submission of Permits to Dewater to WSA for approval; and

- WSA facilitation of Dewatering Permits between packages to ensure effective catchment management especially regarding downstream basin management and as per agreed post event strategies.

The implementation of the above requirements will ensure that, whilst water management is a Contractor
responsibility, the process for the management of water post significant rain events will be facilitated by WSA and controlled Dewatering Permits and described in EWMS.

The importance of a collaborative approach to cross package water management is prescribed in Master
Interface Principles Deed Poll.

8.3. Erosion and sedimentation control procedure

The construction of surface infrastructure will require the removal of vegetation and disturbance of soils. This disturbance is expected to occur for a period of up to twelve months during the initial stage of the project. Erosion and sediment controls are proposed to limit the generation of sediment and manage sediment laden runoff from construction areas.

Erosion and Sediment Control Plans (ESCPs) will be developed and implemented as progressive ESCPs in accordance with Managing Urban Stormwater: Soils & Construction Volume 1 (Landcom, 2004) (known as the “Blue Book”). They will be reviewed by Certified Professionals in Erosion and Sediment Control (CPESC) or a person with suitable equivalent experience who will provide the assurance of plan effectiveness to achieve the desired water quality objectives. Furthermore, due to the location and nature of the work a progressive approach will be adopted to ESCPs to ensure they are achieving the required objectives.

The management strategies for the Project are detailed below:

- • provide quality training and education;
- • engage and employ experienced personnel;
- • assess the project and plan for erosion and sediment control;
- • minimise the extent and duration of disturbance;
- • monitor weather conditions and modify work programs accordingly
- • control stormwater flows onto, through and from the site;
- • minimise soil erosion;
- • maximise sediment retention on the site;
- • promptly stabilise disturbed areas;
- • inspect regularly and maintain controls in working order;
- • monitor the site and respond appropriately;
- • prepare and maintain documents;
- • report outcomes and impacts.

8.4. Spill Prevention and Response

All Contractors must prepare an emergency spill response procedure. This procedure must be developed in accordance with this SW CEMP and the Emergency Spill Response Procedure

referenced in this plan. In addition, all Project Contractors must comply with the requirements below:

- plan and execute their activities, to minimise the possibility of pollution on the project site and adjoining areas by chemicals, dangerous goods and other potential contaminants.
- comply with the requirements of:
    - relevant Laws and Australian Standards; and
    - EPA “Bunding and Spill Management Guidelines” contained within EPA “Environmental Protection
- Manual for Authorised Officers”.
- not refuel or maintain plant and equipment, mix cutting oil with bitumen, or carry out any other activity (including wash down) which may result in spillage of a chemical, fuel or lubricant at any location which drains directly to waters (including sediment basins) or environmentally sensitive areas, without appropriate temporary bunding or oil / water separator being provided, where appropriate. Contractor must not leave refuelling operations unattended.
- keep adequate quantities of suitable material readily available to counteract spillage. All project contractors must clean up all chemical spills immediately.
- where the spills or leaks generates impact to soil materials, each contractor will be responsible for all costs associated with determining treatment or disposal options.

8.5. Soil Management

All project contractors must ensure that materials to be imported onto the site (including across project contractor’s site boundary) must satisfy the imported material management requirements included in Section 6.5 of the Waste and Resources CEMP.

All project contractors must maintain an imported material tracking register, to record the type, amount and location of material/waste imported, reused, recycled, stockpiled and disposed of (including for Temporary Works).

9. Environmental roles and responsibilities

The key environmental management roles and responsibilities for the construction phase of the work are detailed in Section 3.15 of the CEMF.

Specific responsibilities for the implementation of environmental controls are detailed in Section 7 of this Plan.

Contractors Soil Conservationist
The Principal Contractor will be required to engage a Project Soil Conservationist who will be consulted throughout construction to provide advice on erosion and sediment control design, installation, maintenance and the development of Progressive Erosion and Sediment Control Plans. Sydney Metro will ensure enough resources are allocated on an ongoing basis to ensure effective implementation by both Sydney Metro and the responsible contractors.

WSA Water Consultant
The appointed environmental water consultant undertakes water monitoring as per the requirements of the CEMP including provision of reports comparing results against the Project guideline values. The monitoring and assessment include groundwater elevation data.

The roles and responsibilities for the management of asbestos as required by the RAP is detailed in Table 9-1.

Table 9-1 Roles and responsibilities for the management of asbestos

Roles	Responsibilities	Prep Activities	SCAW	Material Import	SBT
Contractors (SCAW and SBT)	Responsible for undertaking the remediation works as defined in the RAP and securing all relevant approvals required to undertake the works.	x	x		x
Licenced Asbestos Assessor	Engaged by the Contractor. Competent and experienced in identifying asbestos in accordance with the requirements of SafeWork Australia (2016). They will work closely with the Remediation Contractor and the Environmental Advisor and will be responsible for undertaking air monitoring, risk assessment and issue of clearance certificates for visual presence of asbestos on surfaces as part of the validation works for the site.	x	x		x
Hygienist	Engaged by the Contractor to monitor air quality, WHS requirements and completes an assessment of the overall condition of the asbestos, where fibres could be inhaled in by workers, where asbestos is likely to crumble and become airborne and if they can be disturbed.	x	x		x

Site Auditor	Accredited by the NSW EPA and will undertake an independent non-statutory review of all relevant environmental reports prepared for the remediation of the site. The Site Auditor will prepare a Site Audit Report (SAR) and Site Audit Statement (SAS) confirming the suitability of the site for its intended use.	x	x	x	x
Environmental Advisor	Suitably qualified and competent environmental consultant who has specific demonstrated experience in the type of remediation set out in this RAP. Their role is to provide independent, technical advice, direction and validation of the remediation and to document that all remediation works undertaken at the site are conducted to the satisfaction of SM-WSA and the Site Auditor.	x	x	x	x
SM - WSA Environment Team	Overall responsibility for environmental management and remediation of the site.	x	x	x	x
SM - WSA /ALC	Approves the location is suitable for the placement of material based on the land use	x	x		x

10. Inspection, monitoring, auditing and reporting

Monitoring, inspection and auditing will be undertaken to measure effectiveness and facilitate continuous improvement of soil and water quality management.

Refer to section 3.16 of the CEMF for general environmental monitoring, inspection and auditing requirements.

A summary of the environmental inspection, monitoring and auditing requirements is provided below, with details of how they apply to soil and water management where applicable.

10.1. Environmental inspections

10.1.1. Sydney Metro environmental inspections

Environmental site inspections at active, exposed work sites will be undertaken by the environmental team on a weekly basis to evaluate the effectiveness of environmental controls implemented by the contractor.
The weekly site inspection is to include a visual check of general construction activities and any soil and water quality mitigation measures and or controls including but not limited to the following:

- Observations and evaluation of the effectiveness of erosion and sediment controls measures
- Observation of dust generation from specific construction activities including those from vehicle tracking and excavation works;
- Periodic inspections by the Principal Contractor's Environmental Manager (or delegate) to verify the adequacy of all environmental mitigation measures. This will be documented in a formal inspection record.
- Adherence to the designated traffic access and transport routes (this may include observation from strategic locations); and
- Ensuring that all vehicle movements (including contractors and sub-contractors) are compliant with the approved routes.
- The findings of the Sydney Metro site environmental inspection will be recorded on a Sydney Metro Site Environmental Inspection Checklist with an accompanying photographic style inspection report.

The findings of the Sydney Metro site environmental inspection will be recorded on a Sydney Metro Site Environmental Inspection Checklist with an accompanying photographic style inspection report.

10.1.2. Contractor environmental inspections

The Contractor's Environmental Manager and/or Environmental Coordinators will undertake regular site inspections in accordance with the Contractor Environmental Management Framework to monitor compliance with this plan at active, exposed work sites.

Inspection results will be recorded, and the inspection log made available upon request. Any improvement opportunities or non-conformances will be reported in the monthly report and

discussed at the Environmental Coordination meeting. All non-conformances will be managed as per Section 3.17 in the CEMF.

More frequent site inspections by the site environmental coordinator will be conducted onsite when activities with greater risk of impacting the soil and water conditions of the area are underway. Any exceedance of soil and water quality criteria will be reported in the monthly report and discussed at the Environmental Coordination meeting and appropriate remedial action will be taken.

The Contractor's Environmental Manager and/or Environmental Coordinators will undertake inspections in accordance with the Contractor Environmental Management Framework. This will include weekly and post rainfall (>10mm in a 24-hour period) inspections of the work sites to evaluate the effectiveness of environmental controls. The Contractor's Environmental Coordinators will record inspection findings on an inspection checklist form.

If any maintenance and/or deficiencies in environmental controls or in the standard of environmental performance are observed, they will be recorded on the checklist form. Records will also include details of any maintenance required, the nature of the deficiency, any actions required and an implementation priority.

10.1.3. Pre-start inspection

Prior to the commencement of works on each shift, an informal inspection will be carried out by the relevant contractor and will include a check of relevant environmental controls and resources required to ensure effective operation and maintenance. This is to include an inspection of relevant soil and water quality management mitigation measures and controls where applicable. Works are not to commence unless inspections are found to be satisfactory.
The foreman will undertake the pre-work inspections.

10.2. Soil and water monitoring

General environmental monitoring requirements are set out in the AEPR (and within Section 3.16 of the CEMF) and include the following:

- Monitoring must take place under the direction of an appropriately qualified person; and
- The results of the monitoring must be kept in a written record.

These water quality monitoring are in compliance with Schedule 2 of the Airports (Environment Protection) Regulations 1997. Specific soil and water quality monitoring requirements, including timing and responsibilities, are included in Table 10-1.

Table 10-1 Soil and water quality monitoring requirements

Reference	Requirement	Timing	Responsibility
SW_M_01	The most suitable surface and groundwater monitoring locations have been determined by WSA in consultation with the NSW EPA and relevant local councils, including monitoring locations adjacent to woodland areas and outside of the construction impact zone (but within the Airport Site);	Pre-construction and during construction	WSA where WSA monitoring data is being used otherwise Sydney Metro and Contractor Environment Manager

SW_M_02	Regular site inspections will be conducted to monitor the effectiveness of the soil and water management controls. Inspection results will be recorded, and the inspection log made available to the Infrastructure Department upon request;	During construction	WSA where WSA monitoring data is being used otherwise Sydney Metro and Contractor Environment Manager
SW_M_03	The frequency of site inspections will be increased during and immediately after wet weather (considered >20mm in any 24-hour period) when there is a higher potential for the off-site transport of sediment from the Airport Site;	During construction	Sydney Metro and Contractor Environment Manager
SW_M_04	Groundwater elevation monitoring will be conducted to detect potential impacts to base flow in the vicinity of potentially sensitive creeks or groundwater dependent vegetation, other groundwater users, as well as ground settlement impacts on surrounding properties and infrastructure. Monitoring will be undertaken quarterly through construction up to a minimum period of three years after the completion of the Project development and until any identified impacts stabilise;	During construction	WSA where WSA monitoring data is being used otherwise Sydney Metro and Contractor Environment Manager
SW_M_05	Groundwater quality monitoring of alluvial and Bringelly Shale aquifers will be conducted at major infrastructure locations, down gradient from those locations and in the vicinity of groundwater dependent vegetation or watercourses, other groundwater users, as well as ground settlement impacts on surrounding properties and infrastructure. Monitoring will initially be undertaken quarterly and adjusted as appropriate; and	During construction	WSA where WSA monitoring data is being used otherwise Sydney Metro and Contractor Environment Manager
SW_M_06	Monthly surface water quality monitoring will be conducted to monitor performance of the drainage system. This monitoring will occur once the surface water drainage system is in place and take place at basin outflows and during selected upstream and downstream conditions. Monitoring at all construction discharge locations will also occur as per discharge requirements.	During construction	WSA where WSA monitoring data is being used otherwise Sydney Metro and Contractor Environment Manager

Where a non-conformance is detected, or monitoring results are outside of the expected range, a review of the processes and results will be completed. Where a non-conformance is identified, the process described in the CEMF (Section 3.17) will be implemented.

10.2.1. Contractor wet weather and additional monitoring

Monitoring would be undertaken for wet weather events in excess of 20 mm (within a 24-hour period) as described in Table 10-1. Additional water quality monitoring may be undertaken during high-risk construction activities, such as installation or removal of temporary waterway crossings or in response to an incident, enquiry or complaint.

In the case of wet weather or additional monitoring, where there is a variance greater than 20% between upstream and downstream further analysis and/or investigation will be performed to determine if the changes in water quality relate to construction activities. Monitoring parameters and subsequent trigger levels for incident response monitoring may differ depending on the incident type, and guidance may be obtained from an appropriately qualified independent industry professional.

10.3. Project-wide surface water quality monitoring

The following sections detail both, a Project-wide surface monitoring program (Project surface monitoring program) by WSA, in addition to targeted water quality monitoring program by each SM – WSA contractor associated with specific construction activities, including those covered by this CEMP (Refer to Table 10-2). Where it is appropriate to utilise the existing monitoring program undertaken by WSA, SM – WSA will utilise their monitoring data. Where SM – WSA contractors require additional monitoring points for both GW and SW, then the Contractors will install and manage all monitoring points.

Calibration of all monitoring equipment will be undertaken in accordance with the relevant manufacturer's specification prior to first usage. All calibration records will be retained on site, including calibration certification (where undertaken by a third-party) and any other pre and post calibration records.

Where current water quality monitoring sites and monitoring network are in adequate for the SM – WSA scopes for the precast yards and the permanent spoil stockpile placements, the SM – WSA contractor will include additional monitoring. Monitoring currently undertaken by WSA confirms existing mitigation measures are adequate.

Prior to commencing work in the permanent stockpile placement areas, SM – WSA contractor will install additional upstream and downstream monitoring.

10.3.1. Current Project surface water quality monitoring, sampling and reporting

Monitoring locations

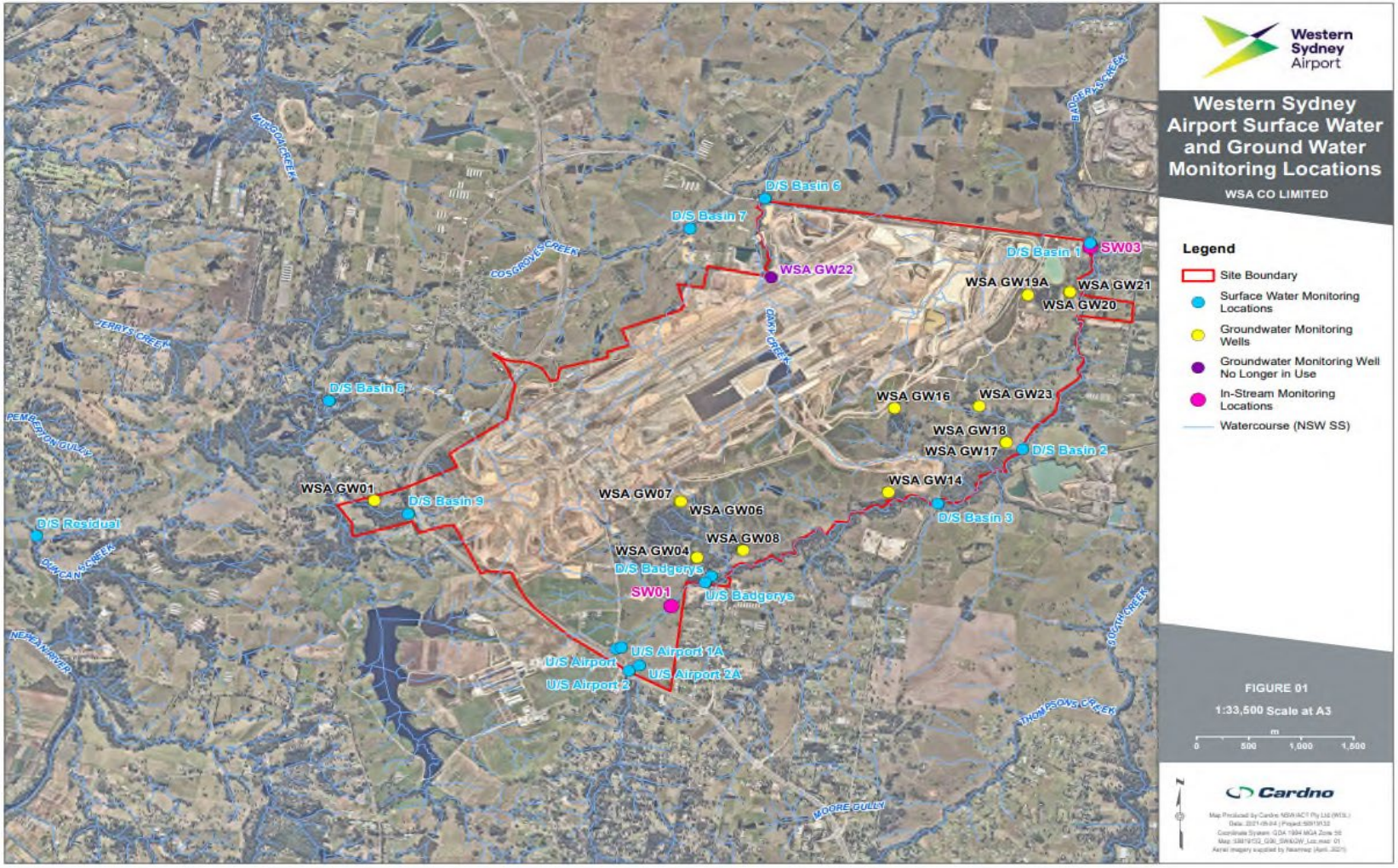
The Project surface water monitoring program by Sydney Metro will utilise a series of ten pre-selected surface water monitoring location points as detailed in Table 10-2 and presented in Figure 10-1. These locations are currently used by the WSA Stage 1 Project Airport Site and enable a consistent approach moving forward, allowing for ease of comparison and interpretation against historical data. The Project will not necessarily use all of these sites due to their proximity to or from works.

Table 10-2 Surface water quality monitoring locations

Name	Receiving water	Latitude (°N)	Longitude (°E)	Street address	Description
D/S Basin 1	Badgerys Creek	-33.873794	150.754716	1727-1447 Elizabeth Drive	This site is located off Elizabeth Drive with a road bridge at the sampling site. The surrounding area is mainly pasture.

D/S Basin 2	Badgerys Creek	-33.893885	150.747222	76 Fuller Street.	To access this site, park at the end of Fuller Street (the road gate needs to be unlocked) and walk through a paddock to reach the creek.
D/S Basin 3 New	Badgerys Creek	-33.898961	150.738342	679 Badgerys Creek Road	This site is located off Badgerys Creek Road with a road bridge running over the Creek. The surrounding area is pasture/ mixed native-exotic forest.
D/S Basin 6	Oaky Creek	-33.869251	150.721278	2111 Elizabeth Drive	This site is located off Elizabeth Drive with a road bridge at the sampling site. The surrounding area is mainly pasture with a few homes.
D/S Basin 7	Cosgrove Creek Tributary	-33.872049	150.713461	223 Adams Road.	D/S Basin 7 is located off Adams Road, with a small road bridge at site. Access is off road bridge.
D/S Basin 8	Tributary	-33.887897	150.675722	336 Willowdene Avenue	This site is located off Willowdene Ave, access from road bridge at site.
D/S Basin 9	Duncan's Creek	-33.898923	150.683626	Lot 32 392 Willowdene Avenue	This site is located off Willowdene Ave.
D/S Residual	Duncan's Creek	-33.900330	150.645150	527 Greendale Road	The site is located off Greendale Road with a road bridge present at site. Access down to the creek is difficult; the alternative is to stand on the roadside on a narrow bridge, which is unsafe in a 70-80 km speed zone with blind corners in both directions.
U/S Airport 1a	Badgerys Creek headwaters	33.912156	150.705256	1675 The Northern Road	The site is located off the Northern Road – downstream of road realignment works. (Location is downstream and on the same drainage line as previous U/S Airport sample location).
U/S Airport 2a	Badgerys Creek headwaters	33.913962	150.707133	1655 The Northern Road	The site is located off The Northern Road opposite a fertiliser company. (Location is downstream and on the same drainage line as previous U/S Airport 2 sample location)

Figure 10-1 Stage 1 Development surface water and groundwater monitoring locations



10.3.1.1. Monitoring

Monitoring and sampling will be undertaken by a consultant on a monthly basis on behalf of Sydney Metro. Both in situ sampling and 'ex situ' sampling (collecting 'grab' samples) for laboratory analyses, will be conducted. Observations on visual assessments will be recorded on a water quality monitoring form at the time of the sampling event.

10.3.1.2. Sampling

In situ sampling - In situ measurements of water quality parameters are essential to determine site conditions that can vary dramatically, or frequently, in waterbodies. In situ monitoring will be conducted (where possible) from locations away from the water's edge, and in areas where water is sufficiently deep. Using a calibrated portable water quality monitoring probe / meter the following parameters will be recorded:

- Temperature (°C);
- Conductivity (µS/cm);
- Turbidity (NTU);
- pH (pH units); and
- Dissolved Oxygen (mg/L and % saturation);

Grab Samples - Samples will be collected from discrete locations at each site as detailed in Table 10-4 in appropriate bottles as provided by the relevant NATA accredited laboratory. All sampling equipment will be decontaminated between each site as required. The collected samples will be transported to the NATA accredited laboratory as soon as possible with adequate ice supplies included in the transportation container to ensure the samples remain cool. All sample batches submitted to the laboratory will be accompanied by a Chain-of-Custody form, a copy of which will be saved and maintained on project records. All analysis will be undertaken as per the instruction on the Chain-of-custody form in accordance with the required standards and procedures as per NATA requirements.

All sampling and preservation techniques will be in accordance with the Australian Standards for water quality sampling (AS/NZS 5667.1:1998).

10.3.1.3. Reporting

The WSA Water consultant will provide reports and recommendations accordingly. The reports will be reviewed by the SM-WSA Environment Manager (or delegate). The Sydney Metro monthly report will include details of monitoring completed during the month. The detail included in the monthly report will be the following as a minimum:

- Date and time of the sampling event;
- Description of the weather and any potential influencing conditions;
- Description of the monitoring location of the sampling event at the time of the sampling observations regarding the condition of the waterway and associated water levels and water flow (if any);
- A summary of all monitoring and sampling results; and
- Interpretation of the results and comparison against the relevant criteria (refer to Section 10.3.3), including identification of any water quality exceedances and potential sources of the exceedance.

10.3.2. Contractor surface water quality monitoring and reporting

10.3.2.1. Monitoring

The monitoring plans by each contractor will be appropriate to the level of risk associated with the scope of activities and be prepared in accordance with the legislation and guidelines identified in Section 4. Each contractor should develop a monitoring and inspection procedure. Monitoring and inspections from the Contractor will include, but not be limited to:

- Up and downstream of the work site water quality monitoring at nominated locations;
- Where relevant monitor adjacent to woodlands at representative locations to the work
- Groundwater monitoring, both level and quality at nominated locations;
- Construction water quality prior to discharge (e.g., sediment basin, excavation etc); and
- Weekly and post rainfall inspections to evaluate the effectiveness of erosion and sediment controls measures.

The type, timing, frequency, assessment criteria and associated reporting requirements are detailed in the plan. The plan includes detailed inspection criteria such as:

- Monitoring locations;
- What is to be monitored;
- Type of monitoring; and
- Frequency of monitoring.

10.3.2.2. Reporting

The Contractor will be responsible for reporting monthly to Sydney Metro on the results of the water quality monitoring undertaken during the reporting period.
The monthly Contractor's water quality monitoring report will include the following as a minimum:

- Date and time of the sampling event;
- Description of the weather and any potential influencing conditions;
- Description of the monitoring location of the sampling event at the time of the sampling observations regarding the condition of the waterway and associated water levels and water flow (if any);
- A summary of all monitoring and sampling results; and
- Interpretation of the results and comparison against the relevant criteria (refer to Section 9.6).

Sydney Metro will utilise the relevant information from the any water quality monitoring and reporting undertaken by the contractor to inform the monthly report compiled for the Project surface water quality monitoring and reporting.

10.3.3. Surface water quality limits

10.3.3.1. AEPR water quality limits

The Airports Act specifies offences relating to environmental harm, environmental management standards, and monitoring and incident response requirements, including in relation to water pollution. Standards in relation to water pollution include water quality criteria such as oxygen content, pH, salinity and turbidity.
Part 4 of the AEPR imposes a duty on the operator of an undertaking to at an airport to take all reasonable and practicable measures:

- (a) to prevent the generation of pollution from the undertaking; or

- (b) if prevention is not reasonable or practicable—to minimise the generation of pollution from the undertaking.

Both the Airport Plan conditions and Part 6 of the AEPR address monitoring of pollution levels. The AEPR requires that testing be undertaken by laboratory analysis accredited by the NATA. Schedule 2 of AEPR sets out acceptable limits for water pollution which are assumed to satisfy the general duty not to pollute. Key parameters from these acceptable limits, considered applicable to the construction Phase of the Project have been extracted and provided in Table 10-3. Refer to the AEPR for a complete list of the acceptable limits for water quality.

Table 10-3 Key water quality parameters under the AEPR

Parameter	Criteria
Total phosphorus	<0.1 mg/L *
Total nitrogen (TN)	<0.1 mg/L *
Dissolved oxygen (DO)	80% of average level for a normal 24 hr period or > 6mg/L
Total suspended solids (TSS)	Change not more that 10% from seasonal mean or; visual clarity within the euphotic zone is reduced by more than 10% from the seasonal mean
pH	6.5-9.0
Salinity	>1000mg/L or an increase of >5%

*It should be noted that these regulations are approximately five times more stringent than the current Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000) (ANZECC guidelines) for total phosphorus and total nitrogen (EIS, 2016).

10.3.3.2. Construction water quality discharge criteria

In consideration of the AEPR, the background water quality as presented in the WSA SWCEMP (refer to Table 10-3) and the existing water quality at the Airport Site (as presented in Table 10-7), Sydney Metro, has adopted the following construction water discharge criteria as presented in Table 10-5 during the construction phase of the Stage 1 Development. The criteria selected are representative of the potential contaminants that may result from construction activities. The earthworks contractors are required to meet the discharge criteria included in Table 10-5 prior to discharge to receiving waters.

Site waters, including sediment basins, will not be discharged until the relevant criteria as detailed in Table 10-5 have been reached, observed by the Contractors Environmental Team. An on-site discharge permit is issued by the Contractor's Environment manager verifying the water quality where water is discharged within the airport site and acting as a HOLD POINT prior to any dewatering to be approved by WSA.

Where water is to be discharged off-site, e.g., Badgerys Creek, the Sydney Metro Environment Manager must approve the Dewatering Permit. Pumping overnight may be approved based on review for potential change in water quality / receiving environment via completion of a risk assessment. In addition to requirements for water quality this Permit requires Contractors to consider potential cumulative downstream impacts from and to interfacing packages.

An EWMS will be developed and implemented by the SM-WSA Contractors to detail the dewatering and sampling methodology. Prior to off-site discharge occurring the timing will consider that works should not adversely affect upstream or downstream sensitive environmental values or properties, where possible.

Table 10-4 Construction water quality discharge criteria

Parameter	Criteria	Sampling method	Analytical method
Receiving water within the Airport Site (AEPR)			
pH	6.5-9.0	Probe of Grab Sample	Field analysis and confirmed as required with laboratory assessment
Total suspended solids (TSS)	Not more than 10% from the existing level in the receiver water	Grab sample	Field analysis and confirmed as required with laboratory assessment
DO (%sat)	80% of level in the receiving water or> 6mg/L	Grab Sample (Probe)	Field analysis and confirmed as required with laboratory assessment
DO (mg/L)		Grab Sample (probe)	Field analysis and confirmed as required with laboratory assessment
Receiving water outside the Airport Site (ANZECC)			
Oil and Grease	No visible	Visual assessment for oil sheen	Field analysis and confirmed as required with laboratory assessment
pH	6.5-9.0	Probe of Grab Sample	Field analysis and confirmed as required with laboratory assessment
Turbidity *	6-50 NTU	Probe of Grab Sample	Field analysis and confirmed as required with laboratory assessment
DO (%sat)	>80%	Grab Sample (Probe)	Field analysis and confirmed as required with laboratory assessment
DO (mg/L)	>6	Grab Sample (probe)	Field analysis and confirmed as required with laboratory assessment
Oil and Grease	No visible	Visual assessment for oil sheen	Field analysis and confirmed as required with laboratory assessment

*Based on monthly water quality monitoring data obtained during 2015 and 2016 at various locations around the airport site, consisting of more than 80 samples for each parameter.

10.3.4. Airport Stage 1 site water quality

The WSA EIS referenced water quality criteria that was based on the existing water quality developed during the study period from 2015 to 2016. In addition, further water quality assessment has continued since the development of the EIS between 2016 - 2018. The results of the water quality monitoring have provided information about the existing background levels. The water quality is considered in the EIS as being degraded due to the previous land uses. This has particularly resulted in elevated levels of Total Nitrogen and Total Phosphorous.

Table 10-5 Summary of the background water quality at the Airport site

Guideline / source	Total suspended Solids (mg/L)	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)
Background water quality criteria[1]	23.2	0.92	6.2
ANZECC Guidelines Default Trigger Levels	40	0.05	0.5
AEPR Limits	Change not more than 10% from seasonal mean	0.01	0.1

1 Based on monthly water quality monitoring data obtained during 2015 and 2016 at various locations around the airport site, consisting of more than 80 samples for each parameter.

10.3.5. Receiving water quality targets

The criteria that were used to assess the condition of the water quality during the EIS and subsequent monitoring is provided in Table 10-6. The targets were based on the AEPR and ANZECC guidelines and will continue to be referenced during the Stage 1 Development monthly water quality program to determine potential construction impacts.

The monthly report will include a comparison of the receiving water quality against the target provided in Table 10-7 and any exceedance will be discussed further in the report with regards to consideration of upstream and downstream water quality and the likely source of any exceedances. Appropriate action will be taken to mitigate against future exceedances where appropriate.

Following twelve months of implementation and monitoring against the water quality targets of receiving waters (as presented in Table 10-7), and every twelve months thereafter, SM - WSA will undertake a review process of the criteria to refine the criteria to accurately reflect actual conditions and in an effort to demonstrate a process of continual improvement.

Table 10-6 Receiving water quality target

Analyte	Assessment Guideline	Assessment guideline source*
pH (in situ)	6.5-9.0	AEPR
Conductivity (µS/cm)	125-2,200	ANZECC
DO (%sat)	80% of average level for a normal 24 hr period or >6 mg/L	AEPR
DO (mg/L) >6 mg/L		

Turbidity (NTU)[1]	6-50	ANZECC
Faecal Coliforms (CFU/100mL)	150	AEPR
SS (mg/L)	6	
		ANZECC
NOx (mg/L)	0.04	
TKN (mg/L)	N/A	-
TN (mg/L)	0.1	
TP (mg/L)	0.01	
Chlorophyll-a (mg/m³)	2	AEPR
Arsenic (mg/L)	0.05	
Cadmium (mg/L)	0.0002	
Chromium (mg/L)	0.01	
Copper (mg/L)	0.002	
Lead (mg/L)	0.001	
Nickel (mg/L)	0.015	
		AEPR
Zinc (mg/L)	0.005	
Mercury (mg/L)	0.0001	
TPH C6 – C9 fraction (µg/L)	150	
TPH > C9 fraction (µg/L)	600	
per- and poly-fluoroalkyl substances		NEMP Fresh Water Aquatic Ecosystem - 99% species protection target
	9ug/L	

In the absence of criteria from the Airports (Environmental Protection) Regulations 1997, criteria were sourced from the ANZECC (2000) Freshwater Guidelines

1 Note: Turbidity in lowland rivers can be extremely variable. Values at the low end of the range would be found in rivers flowing through well vegetated catchments and at low flows. Values at the high end of the range would be found in rivers draining slightly disturbed catchments and in many rivers at high flows.

10.4. Groundwater monitoring program

The groundwater monitoring program aims to confirm no adverse impacts on the receiver during construction and to effectively manage any impacts with the implementation of appropriate mitigation measures. Monitoring at any specific location would be subject to the status of the water supply work and agreement with the landowner The following sections detail the Development groundwater monitoring program

10.4.1. Ground water monitoring, sampling and reporting

In order to be consistent with the WSA SWCEMP, SM-WSA will utilise the WSA groundwater monitoring points adjacent to woodlands in areas outside the Construction Impact Zone (but within the Airport Site). This measure is intended to implement a groundwater monitoring network in relation to likely groundwater dependent vegetation and thereby monitor changes at groundwater

dependent vegetation as a result of construction on the airport site. SM – WSA will also install four monitoring bores within the Project alignment to monitor quality and movement of groundwater.

The Soil and Water CEMP must also include soil, groundwater and surface water PFAS contamination monitoring requirements, testing and disposal procedures appropriate to the risk posed by any contamination, and consistent with relevant Commonwealth environmental management guidance on PFOS and PFOA as prepared by the Environment Department.

With the arrival of the Project Main Contractors for SBT, further investigation into Groundwater and the requirement for an expanded groundwater monitoring program will be assessed.

10.4.1.1. Monitoring locations

The groundwater monitoring program utilises 14 of the existing network of 15 groundwater monitoring wells that were installed during the baseline groundwater monitoring program. The location of the groundwater monitoring locations is shown in Figure 10-1 and are summarised in Table 10-7.

Table 10-7 Groundwater monitoring locations and well details

Well ID (Refer to Figure 9)	Installation date	Data Logger	Location Easting	Location Northing	Well Depth (mbtoc)	Well screen (mbgl)
GW01	21/12/2016	LT	285489	6246780	10.80	7 – 10
GW04	14/12/2016	-	288574	6246161	20.87	17 – 20
GW05	14/12/2016	LT	288574	6246161	10.76	7 – 10
GW06	13/12/2016	LT	288413	6246761	20.35	17 – 20
GW07	13/12/2016	LT	288413	6246761	10.27	7 – 10
GW08	15/12/2016	LT	289013	6246245	10.67	7 – 10
GW14	15/12/2016	-	290400	6246870	10.75	7 – 10
GW 16	15/12/2016	-	290461	6247764	10.77	7 – 10
GW 17	19/12/2016	LT, B	291523	6247399	21.85	17 – 20
GW18	19/12/2016	LT	291523	6247399	10.81	7 – 10
GW19	21/12/2016	LT	291738	6248976	10.81	7 – 10
GW20	20/12/2016	-	292130	6249000	20.83	17 – 20
GW21	20/12/2016	-	292130	6249000	10.84	7 – 10
GW22	21/12/2016	-	289283	6249162	10.65	7 – 10
GW23	16/12/2016	-	291265	6247780	10.82	7 – 10

LT= Level and Temperature Logger
B= Barometric Pressure Logger

Table 10-7 above includes indication of which groundwater wells have electronic logging instrumentation installed. SM – WSA will also install four additional monitoring bores within the Project alignment to monitor quality and movement of groundwater. With the arrival of the Project Main Contractors for SBT, further investigation into Groundwater and the requirement for an

expanded groundwater monitoring program will be assessed as interception of groundwater is likely. The SM – WSA monitoring bores will be located around the on-airport tunnels.

Monitoring and sampling

Manual monitoring and sampling of the groundwater wells will be undertaken on a quarterly basis (i.e., every three months) by the SM-WSA contractors. A groundwater sample will be obtained every quarter by a low-flow pump as per Water Sampling Guideline for the purposes of laboratory analysis including the following analytes:

- Nitrogen (speciated) and total phosphorus;
- Dissolved metals (field filtered As, Cd, Cr, Cu, Ni, Pb, Zn and Hg);
- Total recoverable hydrocarbons (TRH);
- Trace phenols and polycyclic aromatic hydrocarbons (PAHs);
- Benzene, toluene, ethylbenzene, xylene (BTEX);
- Volatile organic compounds (VOCs); and
- PFAS In-situ groundwater field parameters will be checked and recorded including the following:
- pH;
- Temperature (o C);
- Electrical conductivity (uS/cm); Dissolved oxygen (mg/L); and
- Oxidation reduction potential (mV)

Ground water

The assessment criteria adopted for the monitoring program was derived from the potential receptors identified by the WSA groundwater assessment. These include:

- Beneficial use capacity of groundwater and surface water quality;
- Potential recreational users of groundwater and surface water (farm dams and creeks);
- Use of groundwater and surface water for stock watering;
- Aquatic ecosystems located in creeks and farm dams; and
- Groundwater in and around groundwater dependent vegetation.

The adopted assessment criteria adopted by the SM – WSA to assess impacts to these potential receptors is to be developed by the Contractor based on the Project scope.

Analytical trigger values

The adopted groundwater quality criteria as developed above will be utilised as the trigger values for the purpose of this CEMP and associated soil and water management. Where background concentrations exceed adopted criteria, laboratory concentrations should be assessed in the context of those background concentrations. Exceedances will be assessed using statistical interrogation.

Groundwater trigger- action-response measures

The Airport Plan Condition 8(5) is satisfied through simple compliance arrangements that are suitable for specific activities required for this phase of works. More detailed trigger-action-response measures will be implemented for subsequent phases of works that have the potential to alter groundwater conditions.

The proposed trigger value for standing groundwater shall be a trend over a continuous three-month period, and overall change by 20% when compared to baseline data accounting for seasonal fluctuations to groundwater levels. Site specific parameters will be considered by Contractors in accordance with Section 7 of this CEMP and Section 4.4 in the CEMF.

The EIS identified that the bulk earthworks phase is unlikely to significantly impact on groundwater recharge, therefore given the unlikely impact of the works, the proposed approach is considered appropriate. However, in the event that there is a significant change, specialist advice would be obtained and these trigger values may be refined such that they specifically nominate seasonal upper and lower boundaries for the key groundwater monitoring points as nominated in Table 10-7.

Corrective actions

Corrective actions to compensate for any reoccurring or long-term exceedances of the above target criteria will be managed through the unexpected find procedure to confirm if the exceedance is accurate, undertake a review of the work activities and confirm if any impacts on the vegetation or the environment has resulted. Any exceedances and its mitigation strategies will be discussed with the Environment Department and the Infrastructure Department. After agreement on corrective actions, implementation of control measures will be undertaken.

Where groundwater monitoring results exceed the adopted criteria and/or are above the results established during the baseline assessment, the following actions would occur:

- Interrogation of dataset by Sydney Metro in consultation with the site Contractor and a review of construction activities that are likely to cause impact to groundwater;
- Review of sample collection and QA/QC procedures to assess data quality to confirm the data is representative of site conditions;
- Re-sampling of groundwater if required to confirm results;
- Sydney Metro to notify Infrastructure Department if considered a notifiable event (in accordance with Section 9.6);
- Review of on-site activities by the Contractor(s) which may have contributed to exceedance;
- Assess the need for corrective measures or options to mitigate impacts in consultation with Infrastructure Department and groundwater consultant (if required); and
- Implementation of control measures.

Reporting

A quarterly groundwater monitoring report will be compiled based on the above groundwater monitoring activities. The reports will be reviewed by the Sydney Metro Environment Manager and any potential exceedances (as noted in the report) will be reported to Infrastructure Department and managed accordingly. As a minimum, the quarterly monthly groundwater monitoring report will include the following:

- Date, location (well) and time of the sampling event;
- Description of the weather and any potential influencing conditions;
- Factual reporting including lab results and groundwater elevation plots; and

Interpretation of the results and comparison against the relevant criteria (refer to Section 9.4.2), including identification of any water quality exceedances and potential sources of the exceedance.

10.5. Environmental reporting

General environmental reporting requirements are detailed in Section 3.18 of the CEMF. In addition, a summary of reporting requirements required under this Soil and Water CEMP (including environmental reporting requirements under the Airport Plan specific to this Soil and Water CEMP) is provided in Table 10-8.

Table 10-8 Soil and water quality

Action	Scope	Timing / Frequency	Responsibility
Annual reporting	Unless otherwise agreed by an Approver, an annual report will be prepared in relation to compliance with the SWCEMP. In accordance with Condition 49 (5), Metro will publish each of the annual reports on its website within three months of the end of the period in respect of which the report was prepared, with evidence providing proof of the date of publication to the Infrastructure Department with a copy to the Environment Department. The report must remain on the website for a period of at least 12 months. This reporting would also meet the requirements of AEPR 6.05 which requires the report going to the ALC.	Annually	SM with input from All Contractors
Monthly compliance reporting	Undertaking monitoring as required by the relevant contractor CEMP. Provide Metro with a monthly summary of all soil and water monitoring undertaken and advise of compliance with criteria	Monthly	All Contractors
Complaints reporting	Recording of complaints and stakeholder interactions	As required	SM Environment Manager SM Community and Stakeholder Manager All Contractors
Recording in a log book which is part of the Environmental Site Register any exceptional incidents (required under the 6.02(3) of the AEPR)	Record any exceptional incidents that cause excessive pollution of receiving waters and the action taken to resolve the situation	As required	All
Shut-down inspections	Inspection of contractor works including status of environmental controls prior to shut-down of site for an extended period (i.e. more than 2 days)	Prior to site shut-down	All Contractor
General environmental inspection	Inspection of environmental management controls on site and sighting of site documentation as required by the contractor's CEMP	At least weekly	SM

General environmental inspection	Inspection of environmental management controls and site documentation for contractor works (as required by the contractor's CEMP).	As per Contractor environmental management system (at least weekly)	Contractor
Post-rainfall inspection	Inspection of environmental controls following a rainfall event exceeding 10 mm in any 24-hour period.	Within 24 hours of the rainfall event (excluding Sunday's and Public Holidays)	Contractor
Reporting pollution incidents (required under the Airport Act)	Report pollution incidents resulting in offsite impacts to the NSW Environment Protection Authority – refer to WSA Environmental Non-conformance Classification and Reporting Procedure	As required	All
Pollution and or excessive noise reporting	In accordance with the AEPR, WSA must give an airport environment officer for the airport, within 14 days, a written report if monitoring results indicate pollution, or excessive noise, occurring as a result of the undertaking of the works associated with the Stage 1 development. The trigger for a 'pollution event' as per the Airports (Environment Protection) Regulations 1997 is provided in the relevant schedules of the AEPR.	As required	SM
Reporting of non-conformances and improvement opportunities	The management and reporting requirements of environmental non-conformances and improvement opportunities will be in accordance with Section 3.17 of the CEMF.	As required	SM All Contractors

10.6. Environmental auditing

Refer to Section 3.16 of the CEMF for environmental auditing requirements, including internal audits, independent audits and audits to be undertaken by contractors.

Auditing and subsequent reporting will be undertaken annually to ensure compliance with:

- this SWCEMP;
- Airport Plan Conditions of Approval
    - Condition 40.4, 40.5, 40.6 Independent audits about compliance with conditions.

Sydney Metro will also undertake periodic audits of the Principal Contractor's Environment and Sustainability Management Systems (E&SMS) and compliance with the environmental aspects of contract documentation, including this SWCEMP.

On-airport works approved under the Airport Plan will be subject to environmental audits and compliance audits, noting unscheduled audits may also be undertaken. The environmental audits would audit the environmental systems and on-site performance of the on-airport works of SM - WSA and be undertaken on a 6 monthly basis.

10.7. Environmental compliance tracking

In accordance with Condition 49 of the Airport Plan, a Compliance Tracking Program will be developed for the Project and is to be developed by the Contractor and submitted to Metro on a regular basis. The Compliance Tracking Program will allow the Contractor to track compliance

status with the conditions of the Airport Plan (and any other approval requirements) and will allow the Contractor to demonstrate measures taken to implement the Approved Plan.
The Compliance Tracking Program will be used as a tool to inform the annual report developed by Metro and made available to the Infrastructure Department upon request as required. Refer to Section 3 of the CEMF for further details regarding the requirements of the Contractor to maintain and implement Compliance Tracking.

10.8. Competence, training and awareness

To ensure this SWCEMP is effectively implemented, each level of management is responsible for ensuring that all personnel reporting to them are aware of the requirements within. The contractor will need to co-ordinate with the Sydney Metro Environment Manager who will liaise with WSA Co to ensure they receive the necessary and relevant environmental training in conjunction with other training and development activities.

All competence, training and awareness requirements will be implemented as detailed in Section 3.11 of the CEMF. A summary of these requirements is provided in the following sections.

11. Communications and complaint management

All communications and complaints management will be implemented and managed in accordance with Section 4 of the CEMF.

11.1. Review and improvement

11.1.1. Continuous improvement

Continuous improvement of this plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement. This process is detailed in Section 3.18 of the CEMF.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance;
- Determine the cause or causes of non-conformances and deficiencies;
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies;
- Verify the effectiveness of the corrective and preventative actions;
- Document any changes in procedures resulting from process improvement; and
- Make comparisons with objectives and targets.

11.1.2. Change management

Further refinements to the Project may result from detailed design refinement or changes identified during the construction phase of the works. Any design changes or changes in scope of works will be communicated to the SM - WSA Environmental Manager.

SM - WSA would be responsible for assessing any potential inconsistencies with the Airport Plan and formally seeking approval from the Infrastructure Minister for any project modifications as required, prior to commencement of the scope of works in question.

11.1.3. Variation of approved

SM - WSA will seek approval for variation of an Approved Plan from the Infrastructure Minister or an SES Officer (SES employee under the *Public Service Act 1999*) in the Infrastructure Department by submitting a version of the plan with the proposed variation clearly marked. All variations to an Approved Plan must be approved in accordance with Condition 51 of the Airport Plan. As each package of work is developed the CEMF and associated CEMPs documents will be reviewed and where applicable updated to ensure the environmental aspects of the work package are managed. Where necessary the document will be updated and submitted for approval in accordance with the Airport Plan prior to the work commencing. A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure, including update of the publicly available copy of the document on the Project website.

The Infrastructure Minister or an SES Officer in the Infrastructure Department may vary an Approved Plan or request SM - WSA prepare and seek approval for a specified variation if

the Infrastructure Minister or an SES Officer in the Infrastructure Department believes on reasonable grounds that:

- A Condition of Approval has been contravened and the nature of the contravention is relevant to the subject matter of the Approved Plan;
- The variation will address the contravention; and
- SM - WSA will comply with any such request within three months.

11.2. Review of approved plans

Sydney Metro will review each approved plan at least every five years (from the date of approval) as required by the Airport Plan. A review will also be completed annually to ensure that it continues to meet the approval criteria. Details of the review will be included in the annual report (refer to Section 3.18 of the CEMF). If the review identifies areas where the plan does not continue to meet the approval criteria for that plan, a variation to the approved plan will be prepared and submitted for approval. Once the reviewed plan is approved by the Approver, this reviewed plan will be the Approved Plan.

Sydney Metro may initiate reviews of Approved Plans at other times in response to improvement opportunities, non-conformances, and changes to scope of work or construction methodology or alterations to legal or contractual requirements.

If there is a material change to a WSA CEMP which impacts on an area of the Rail RCZI, then SM - WSA will review their CEMPs to reflect that change addressed by the WSA review.

Any changes identified and implemented through the variation and review process identified above will be communicated to relevant contractors through re-issue of the revised Sydney Metro Approved Plan and subsequent training and awareness (refer to Section 3.4 of the CEMF).

A formal review of the management systems by the Principal Contractor's Senior Management Team will also occur on an annual basis, as a minimum. This review shall generate actions for the continual improvement of the systems and supporting management plans.

11.3. Environmental incidents and complaints management

The management and reporting of environmental incidents shall be undertaken by the appropriate person as detailed in Section 3.18 of the CEMF.
All communications and complaints management will be implemented and managed in accordance with Section 4.2 and 4.3 of the CEMF and the Community Communications Strategy.

12. References

Department of Infrastructure and Transport (2013). *A Study of Wilton and RAAF Base Richmond for Civil Aviation Operations,* http://westernsydneyairport.gov.au/scopingstudy/index.aspx

Commonwealth Department of Infrastructure and Regional Development, 2016. *Airport Plan* (*December 2016)*

Commonwealth Department of Infrastructure and Regional Development, 2016. *Western Sydney Airport Environmental Impact Statement, 2016*

GHD (2016a), Preliminary (Phase 1) Contaminated Assessment Report, Proposed Western Sydney Airport, ref. 2124265.208989, February 2016

GHD (2016b), Detailed Site Contaminated Investigation, Proposed Western Sydney Airport, ref. 2124265.212332, February 2016

GHD (2016c), Western Sydney Airport Remediation Action Plan, ref. 2126850, February 2016.

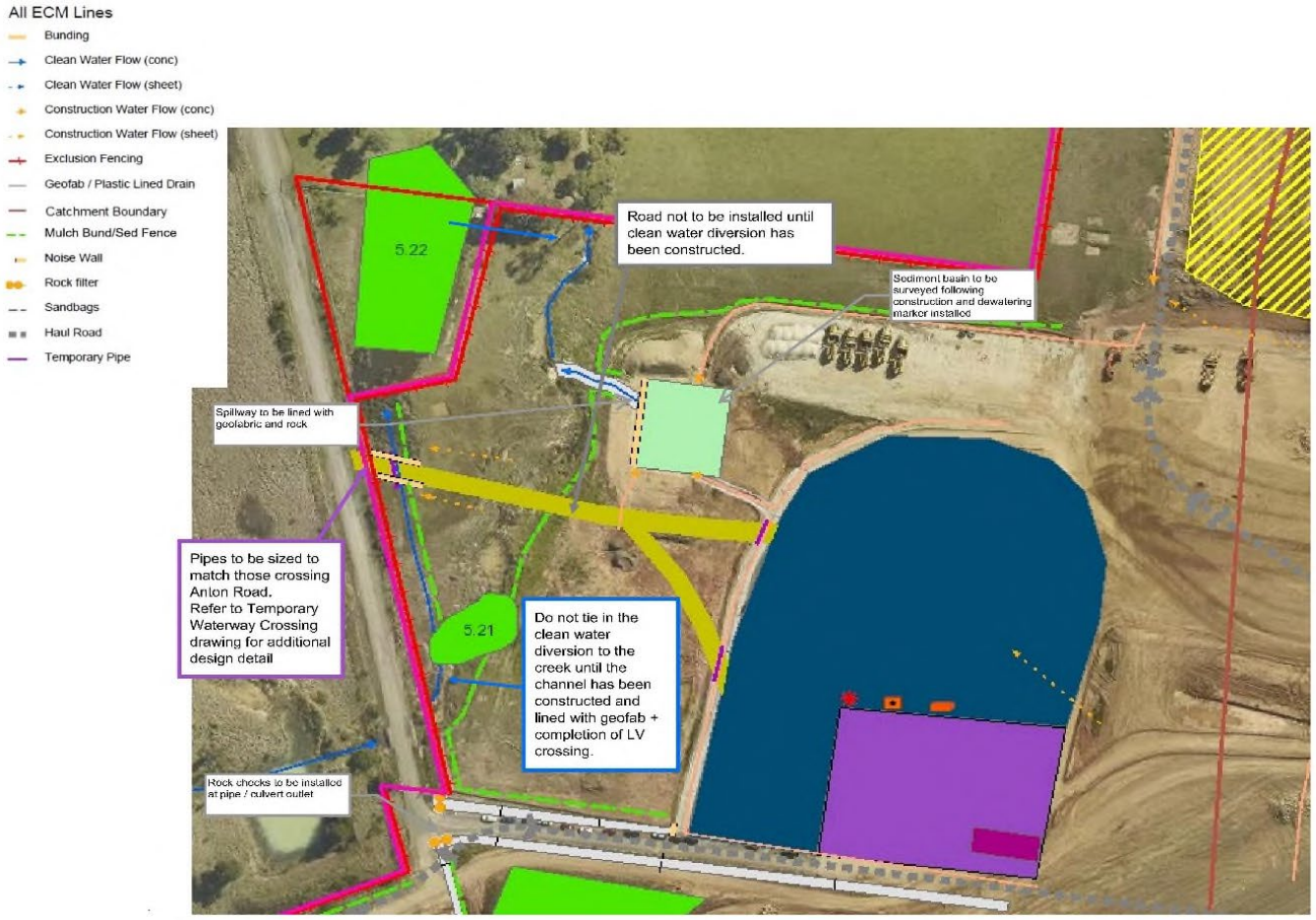
GHD (2019), *Western Sydney Airport Remediation Action Plan*, ref. 2126850, June 2019 (WSA00-WSA-00400-EN-PLN-000001).

NSW Government, 2004. Managing Urban Stormwater: Soils and Construction Volume 1 (Blue Book).

Standards Australia 2001. Australian and New Zealand environmental management international standard (AS/NZS ISO 1400

Design Lot 450 - Water Quality Assessment Report - Bulk Earthworks - WSA10-CPBLLBE-01000-DR-RPT- 450001

Appendix A – Example erosion and sediment control plan



Appendix B – Emergency spill response procedure

Background

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

Purpose

The primary purpose of the plan is to identify and manage the risk of pollution incidents, plan the project response to pollution incidents and to facilitate coordination with the relevant response agencies.

The objectives of the plan are to:

- minimise and control the risk of a pollution incident at the premises through the early identification of risksand the development of planned actions to minimise and manage those risks; and
- ensure timely communication about pollution incidents by SM - WSA Environment Manager to the WSA Environment Manager and AEO construction personnel, Infrastructure Department, and relevant response agencies/authorities.

Scope

This ESRP for the Project covers pollution incidents that cause actual or potential material harm to the environment and/or human health.

The specific work activities covered by this ESPR is included in Construction Plan Section 2 and Section 6. As required under the SEMF (Section 4.4), prior to commencement of works on site, the contractor is required to prepare and implement appropriate environmental management plans including *Environmental Work Method Statement* (EWMS) and *Environmental Control Maps* (ECMs) which include as a minimum the following details:

- the project office;
- the location of potential pollutant storage (bunded chemical storage); and
- emergency access routes.

Legislation

Key environmental legislation relating to pollution incident response management includes:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Protection of the Environment Operations Act 1997* (POEO Act);
- *Protection of the Environment Operations (General) Regulation 2009*; and
- Protection of the Environment Operations (General) Amendment (Pollution Incident Response Management Plans) Regulation 2012.

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

- Construction planning including environmental risk assessments,
- Implementation and maintenance of identified control measures,
- Compliance with legislative and regulatory requirements,
- Implementation of, and compliance with, requirements of the project CEMP and associated sub-plans;

and

- Implementation and compliance with the requirements of this plan.

Control Measures

Pre-emptive control measures rest with thorough planning of construction activities and the involvement of key personnel in that planning process. The CEMF requires that and ECM is developed for all activities/location and an EWMS prepared for all activities that carry an inherent level of environmental risk or community interest. All method statements will be prepared to identify risks, ensure sound environmental practices are implemented, and to minimise the risk of environmental incidents or system failures. They will specify actionsto be undertaken to ensure compliance with the project approval and CEMP and will draw on the mitigation measures detailed in the specific sub plans detailed in appendices of the CEMP.

Preparedness

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

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

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

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

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

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

Incident Procedure

Immediate Response

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

Immediate Notification

Personnel onsite to immediately contact their supervisor who then will notify the SM - WSA Environment Managerand WSA Construction Manager.

Classify Incident

Using the classifications listed above, the SM - WSA Environment Manager will assess the incident to determine if it has or is threatening to cause material environmental harm.

Notify Incident

The SM - WSA Environment Manager will notify relevant stakeholders if the incident causes or threatens to causematerial harm to the environment immediately to the following as appropriate:

- WSA Environment Manager
- Commonwealth Department of the Environment and Energy and Commonwealth Department of Infrastructure, Regional Development and Cities;
- Airport Environment Officer
- Other government agencies that may include:
- NSW EPA;
- Ministry of Health (via the Public Health Unit)
- Work Cover Authority and Comcare;
- Local Authority (i.e., council) if the EPA is not the appropriate authority; and
- Fire and Rescue NSW

Ensure all components of the incident have been addressed and corrective actions implemented. SM - WSAEnvironmental Advisor should be consulted to determine if validation sampling is required and the appropriate level of waste characterisation testing prior to offsite disposal.

The SM - WSA Environment Manager must report the incident through the internal systems, requiring an incidentreport form to be completed with a copy provided to the SM - WSA Construction Manager and any relevant Contractors.

The SM - WSA Environment Manager shall undertake an incident investigation assisted by the SM - WSA ConstructionManager and relevant Contractors.

Incident Notification

The Contractor Environmental Manager (or equivalent) will notify the SM - WSA Environment Manager who will notify the relevant stakeholders/authorities including the AEO and WSA Environment Manager. The following organisations may be notified if the incident 'causes or threatens to cause material harm to the environment':

- Commonwealth Department of the Environment and Energy and Commonwealth Department of Infrastructure Regional Development and Cities;

- NSW EPA;
- Ministry of Health (via the Public Health Unit)
- Work Cover Authority and Comcare;
- Local Authority (i.e., council) if the EPA is not the appropriate authority; and
- Fire and Rescue NSW

The information that will be reported is:

- time, date, location and likely duration of incident;
- location of place where incident is occurring or likely to occur;
- type of incident (e.g., chemical spill, water pollution etc.);
- extent of incident (e.g., magnitude of spill, area covered etc.); and
- action taken or proposed to be taken to deal with the incident and any resulting pollution or threatenedpollution.

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

Incident Notification

Position	Responsibility	Contact	Contact Details
Contractor Environmental Manager	24hr availability for activating Emergency Spill ResponseProcedure (ESRP). Notifying SM - WSA Environment Manager	TBA	TBA
Contractor Community Relations Manager	Notifying community, key stakeholders, coordinating media communications.	TBA	TBA
Contractor Project Director	Notifying SM - WSA	TBA	TBA
Contractor Construction Manager	Notifying Project Director. Managing Incident as per ESRP.	TBA	TBA
Contractor General Superintendent (or – Early Earthworks	Notifying Construction Manager. Notifying Area Manager. Coordinating incident response Liaising with emergency response organisations. Provision of labour, equipment or support to the Environmental Staff and emergency response organisations as requested.	TBA	TBA

SM - WSA Co Environment Manager	Notify the WSA Co Environment Manager	TBA	TBA
WSA Co Environment Manager	Notify the AEO and Infrastructure Department	TBA	TBA
Commonwealth Department of the Environment and Energy	-	-	
NSW EPA	-	-	
Fire and Rescue NSW	-	-	
NSW Health	-	-	
Work Cover NSW	-	-	
Liverpool City Council	-	-	

Appendix C – Unexpected contamination find protocol

Unexpected contamination find protocol

Purpose and Scope

This Procedure details the actions to be taken when unexpected contaminated soil/material or water is encountered during construction activities. Other areas of known contamination on the site are to be managed in accordance with the Remediation Action Plan, GHD 2019.

This Procedure is applicable to all activities conducted by construction personnel that have the potential to uncover or encounter contaminated soil/material or water which may be identified due to suspected contaminating odours, visual staining (unusual discolouration) or other foreign material which may indicate thepotential for contamination.

Process

Potential contamination encountered during construction

If any potential contaminated soil/material or water is encountered during construction (e.g., strange soil colours or odours), the following must occur:

- STOP ALL WORK in the immediate / affected area and cordon off the surrounding area to prevent anyinadvertent access;
- Immediately notify the Environment Manager (EM);
- The EM will take the lead in relation to the management of the find and notify the Safety Manager (SM)accordingly;
- Wash self or other persons if contact is made with contaminated materials; and
- Recommence works in an alternate area where practicable

Potential asbestos encountered during construction

Should potential asbestos be uncovered the following actions must be implemented:

- STOP ALL WORK in the immediate / affected area and cordon off the surrounding area to prevent any inadvertent access;
- Contact the project Occupational Hygienist to investigate the find and provide preliminary identification; and
- If the material is confirmed as asbestos through preliminary identification, the Occupational Hygienist willdirect the implementation of specific controls based on the nature and the quantity of the find, this may include:
  - In the case of larger discrete units of bonded asbestos, remove the asbestos and immediately surrounding contaminated material and dispose offsite.
  - In the case of non-bonded asbestos, the material and surrounding soil matrix (to a distance as directed by the Occupational Hygienist) will be removed and disposed offsite.
  - In the case of multiple small asbestos fragments, the material may be tested (either in situ, or as part of a stockpile of material from the area which has been identified to be potentially contaminated, as directed by the Occupational Hygienist) for waste classification purposes and/or potential re-use onsite.

PASS encountered during construction

Should potential PASS be uncovered the following actions must be implemented:

- STOP ALL WORK in the immediate / affected area and cordon off the surrounding area to prevent any inadvertent access;
- Contact the project Occupational Hygienist to investigate the find and provide preliminary identification; and
- If the material is confirmed as ASS through preliminary identification, the Occupational Hygienist will direct the implementation of specific controls based on the nature and the quantity of the find, this may include:
  - In the case of larger discrete units of ASS, remove the asbestos and immediately surrounding contaminated material and dispose offsite.
  - In the case of non-bonded asbestos, the material and surrounding soil matrix (to a distance as directed by the Occupational Hygienist) will be removed and disposed offsite.
  - In the case of multiple small asbestos fragments, the material may be tested (either in situ, or as part of a stockpile of material from the area which has been identified to be potentially contaminated, as directed by the Occupational Hygienist) for waste classification purposes and/or potential re-use onsite.

Personal Protective Equipment

Prior to any contamination investigation / management, appropriate personal protective equipment (PPE) is tobe worn as per the relevant Safety Data Sheet(s) (SDS).

This may include, but not be limited to:

- Eye goggles;
- Face mask;
- Rubber boots;
- Rubber gloves; and
- Tyvec Suits.

Undertake a site/area contamination investigation

The EM is to assess the situation. Samples will be collected (where safe to do so) and analysed to determineif contamination is present. Advice from a suitably qualified contamination specialist may be requested basedon the level and extent of the contamination in the area of the find.

The AEO (in consultation with specialists) will determine the appropriate management measures to be implemented. This may include treatment with onsite reuse / capping, or offsite disposal.

Works will be completed following the guidance of the Contamination Specialist.

Both options will require laboratory analysis of the contamination and reference against the relevant guidelines(NEPM for onsite management and NSW EPA 2014 and NSW 2016 Addendum).

Offsite disposal will be tracked by the Environmental Team with details recorded in the Waste Register.

The contamination specialist is to provide a validation report following the removal or remediation of the contamination discovered.

Notification and Reporting

The EM is to notify of all contamination immediately via phone (or other) to the Airport Environment Officer (AEO) in the first instance and additionally complete incident reporting in accordance with the SEMF. Any other (i.e., external) notification must be undertaken by the EM in accordance with the SEMF

and other applicable legislation. Emergency Services will be contacted in the event of safety concerns in accordance with the Project Safety Management Plan.

Recommence Works

The EM (for all contamination other than asbestos) will advise when works can commence again in that area once it is determined that no further action is required, i.e., the contamination has been removed or a management process has been established. In the case of asbestos contamination, the appointed Occupational Hygienist will provide an Onsite Inspection Clearance Certificate (where asbestos remains but has been 'made safe' so that adjacent works can continue) or An Asbestos Materials Clearance Report (whenall asbestos has been removed and has been verified by the Occupational Hygienist) when works may recommence, as described in the *Asbestos Management Plan.*

Documentation

- Contamination Validation Report/ Testing Results;
- Waste Disposal Records (as applicable);
- Onsite Asbestos Clearance Inspection Report;
- Asbestos Materials Inspection Report;
- Asbestos Materials Clearance Report;
- Waste Analysis and Classification Report;
- Analytical Soil Test Report; and Analytical Asbestos Report

Appendix D – Example Soil and Water Monitoring and Inspection

Monitoring and Inspection

Introduction

As per the EIS soil and water Mitigation measure, SW_01, a Surface Water Management Plan is required to involve a progressive process of design and implementation covering both the construction and operational phases. This Construction Phase Soil and Water Monitoring and Inspection Procedure (CPSWMP) details themethodology for soil and water quality monitoring on the Stage 1 Development.

There are interrelationships with this CPSWMP and the project CEMPs and sub-plans that provide additional information on environmental management relating to soil and water monitoring and inspections. These plansand procedures include:

Soil and Water Construction Environment Management Plan: Overarching methodology describing soil and water risks and management on the project.

Erosion and Sedimentation Control Plans – Appendix B of the Soil and Water CEMP – These plans specifythe surface water controls and site methodology to manage erosion and sedimentation on the Project. These plans are updated throughout construction to remain relevant for specific site circumstances.

Emergency Spill Response Procedure – Appendix C of the Soil and Water CEMP. This procedure details how spills on the project are responded too, reported, and prevented from reoccurring.

Objectives

The key objectives of the CPSWMP are to ensure that impacts associated with soil and water quality are managed to within permitted criteria as far as practicable and to ensure that best practice controls and procedures are implemented.

To achieve this, the following will be undertaken:

- Ensure appropriate treatment of water prior to off-site discharge or disposal;
- Minimise the risk of pollution incidents from construction;
- Minimise the export of sediment from the airport site; and
- Sample site surface water to detect effectiveness of controls.

Potential Construction Impacts

Construction activities that may affect water quality include:

- Removal of vegetation adjacent to waterways and ephemeral drainage lines especially at Link road, the precast yards and the permanent stockpile placement areas;
- Clearing of vegetation;
- Concreting works especially at the precast yards;
- Exposure and mobilisation of exposed soils during construction such as from Link Road, precast yard and permanent spoil stockpile placement areas cleared areas and stockpiles;
- Fuel, chemicals, oils, grease, and petroleum hydrocarbon spills from construction machinery directlypolluting waterways and soils;
- Earthworks and associated inadequate management of runoff, improper sediment controls

from the construction site;

- Excavation and exposure of Acid Sulphate Soils (ASS) to the air (oxidising conditions) resulting inpotential for acidic runoff to receiving waterways; and
- Exposure of per- and polyfluoroalkyl substances (PFAS) resulting in mobilisation to

waterways.Potential construction related water quality impacts could include:

- Degraded water quality including lower Dissolved Oxygen (DO) levels, increased nutrients (Nitrogen,Phosphorous), increased turbidity, and altered pH;
- Increased sedimentation smothering aquatic life and affecting aquatic ecosystems;
- Increased levels of nutrients, metals, and other pollutants, transported via sediment and runoff to receivingwaterways;
- Spills of concrete during concrete pours at the precast yards especially, directly or indirectly polluting receiving waterways;
- Contamination from site compounds, chemical storage areas and wash-down locations;
- Increased levels of litter from construction activities polluting receiving waterways;
- Contamination of receiving waterways as a result of disturbance of contaminated land;
- Acid runoff from disturbance of acid sulfate soil during construction;
- Tannin leachate from cleared/mulched vegetation;
- Scour around pipe outlets; and
- Increase in creek bank instability due to removal of vegetation or excavation.

Appendix E – Groundwater quality criteria

Analyte	Criteria		
	ANCECC 2000 – Lowland Rivers (NSW Rivers)	ANCECC 2000 FW 95%	Airports (1997) Fresh Water
Nitrogen (Total)	0.6 mg/L	-	0.1 mg/L
Ammonia as N	0.03 mg/L	0.9 mg/L	-
Nitrate as N	-	7.2 mg/L	-
Dissolved Metals (filtered):			
Arsenic	-	0.013 mg/L	0.05 mg/L
Cadmium	-	0.0002 mg/L	0.0002 mg/L
Chromium (III + IV)	-	0.001 mg/L	0.01 mg/L
Copper	-	0.0014 mg/L	0.002 mg/L
Nickel	-	0.011 mg/L	0.015 mg/L
Lead	-	0.0034 mg/L	0.001 mg/L
Zinc	-	0.008 mg/L	0.005 mg/L
Mercury	-	0.0006 mg/L	0.0001 mg/L
Total recoverable hydrocarbons (TRH) - C10-C36	-	-	600 ug/L
Phenols	-	320 ug/L	50 ug/L
polycyclic aromatic hydrocarbons (PAHs)	-	-	3 ug/L
BTEX			
Benzene	-	950 ug/L	300 ug/L
Toluene	-	-	300 ug/L
Ethylbenzene	-	-	140 ug/L
Xylene (o)	-	350 ug/L	-

Appendix F – Groundwater Management Plan

Sydney Metro Western Sydney Airport Groundwater Management Plan

Sydney Metro Integrated Management System (IMS)

Applicable to:	Airport Rail Development
Document Owner:	Sydney Metro
System Owner:	-
Status:	Draft
Version:	Rev01
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Figures

Tables

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Version Control

Revision	Date	Description
01	**1 November 2021**	Issued for DITRDC

Terms and Definitions

Terms	Definitions
AEPR	Airports (Environment Protection) Regulations 1997
AEW	Advanced and Enabling Works
Airport	Western Sydney International (Nancy-Bird Walton) Airport (WSI) located at the Airport Site. Note: The Airport is referred to in the Act as Sydney West Airport and is commonly known as Western Sydney International (Nancy-Bird Walton) Airport
Airport Lease	An airport lease for the Airport granted under section 13 of the Act
Airport Lessee Company	The company that is granted a lease over the Airport Site
Airport Plan	Means the September 2021 approved Airport Plan which includes the Variation for the SM - WSA Rail Development on the WSI airport and which otherwise means airport plan for the Airport Site as determined by the Infrastructure Minister under section 96B of the Act in December 2016 as varied from time to time in accordance with the Airports Act.
AS	Australian Standard
BTEX	Benzene, toluene, ethylbenzene, xylene (BTEX);
CCS	Community Communication Strategy
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
CIZ	Construction Impact Zone
CNVS	Construction Noise and Vibration Standard
CoA	Conditions of Approval
CSSI	Critical State Significant Infrastructure
CTR	Compliance Tracking Review
Cwth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment (Cwth)
DITRDC	Department of Infrastructure, Transport, Regional Development and Communications
DPIE	Department of Planning, Industry and Environment
ECM	Environmental Control Map
EESG	NSW Environment, Energy and Science Group (formerly OEH)
EIN	Environmental Improvement Notice
EIS	Environmental Impact Statement
EP&A Act	Environment Planning and Assessment Act 1979 (NSW)
EPA	NSW Environment Protection Authority
EPBC Act	Environment Protection and Conservation Act 1999 (Cwth)
EPL	Environment Protection Licence under the POEO Act
EPO	Environmental Performance Outcome
ER	Environmental Representative
ESCP	Erosion and sediment control plan
EWMS	Environmental Works Method Statement
E&SMS	Environment and Sustainability Management System

Terms	Definitions
FAW	Finalisation Auxiliary Works
ICNG	Interim Construction Noise Guideline
IMS	Sydney Metro Integrated Management System
Infrastructure Department	The department responsible for administering the Act, currently the Australian Government Department of Infrastructure, Transport Regional Development and Communications (DITRDC)
ISO	International Standardization Organisation
KPI	Key Performance Indicator
OCCS	Overarching Community Communication Strategy
OCPs	Organochlorine pesticides • persistent, bio-accumulative pesticides including DDT, dieldrin, heptachlor and chlordane
OEH	NSW Office of Environment and Heritage (formerly DECC)
OOHW	Out-of-Hour Works
PAHs	Trace phenols and polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PFAS	Per- and Poly- fluoroalkyl substances
PFOS	Perfluorooctyl Sulfonate
PIRMP	Pollution Incident Response Management Plan
Planning Secretary	The Secretary of the Department of Planning, Industry and Environment
POEO Act	Protection of the Environment Operations Act 1997 (NSW)
Preparatory Activities	Preparatory Activities mean the following: a. day to day site and property management activities; b. site investigations, surveys (including dilapidation surveys), monitoring, and related works (e.g. geotechnical or other investigative drilling, excavation, or salvage); c. establishing construction work sites, site offices, plant and equipment, and related site mobilisation activities (including access points, access tracks and other minor access works, and safety and security measures such as fencing but excluding bulk earthworks); d. enabling preparatory activities such as: i. demolition or relocation of existing structures (including buildings, services, utilities and roads); ii. the disinterment of human remains located in grave sites identified in the European and other heritage technical report in volume 4 of the EIS; and iii. application of environmental impact mitigation measures; and e. any other activities which an Approver determines are Preparatory Activities for this definition
Project	The Sydney Metro Western Sydney Airport Construction and operation as approved by the EPBC and Airport Plan as the Action or Rail Development within the Rail Construction Impact Zone on-airport, being the WSI airport, in agreeance with the Deed between SM - WSA and WSA Co.
Proponent	The person or organisation identified as the proponent in Schedule 1 of the planning approval. In this case Sydney Metro Authority
RAP	Remediation Action Plan

Terms	Definitions
REMM	Revised Environmental Mitigation Measure
SBT	Station Box and Tunnelling Works
SCAW	Surface Civil & Alignment Works
SCO	Sydney Coordination Office
Site Occupier	Site Occupier means: (a) before an Airport Lease is granted – the Commonwealth; and Note: Where a condition specifies an activity to be carried out by the Commonwealth, the Infrastructure Department will be responsible for carrying out the activity on behalf of the Commonwealth (unless stated otherwise). (b) after an Airport Lease is granted – the ALC.
SM	Sydney Metro
SM WSA EIA	SM - WSA EIS Appendix J: EPBC Act Draft Environmental Impact Assessment of On-airport proposed action (EPBC 2019/8541)
SMP	Sustainability Management Plan
SPIR	Submissions and Preferred Infrastructure Report
SSI	State Significant Infrastructure
SSTOM	Stations Systems, Trains, Operations & Maintenance
SWCEMP	Soil and Water Construction Environmental Management Plan
SWMS	Safe Works Method Statement
TfNSW	Transport for New South Wales
TRH	Total recoverable hydrocarbons
VOCs	Volatile organic compounds
WFDIP	Workforce Development and Industry Participation Plan
WSA	Western Sydney Airport Co (ACN 618 989 272), the entity responsible for constructing and operating the Airport in accordance with the Airport Plan. For the purposes of the Airports Act 1996 (Cth), WSA is the “airport-lessee company” for WSI
WSI airport	Western Sydney International (Nancy-Bird Walton) (WSI) Airport

13. Introduction

13.1. Plan

This Groundwater Management Plan (GMP) has been developed as a sub plan to the Sydney Metro Soil and Water Construction Environmental Management Plan (Soil and Water CEMP) (this Plan) to satisfy the requirements of the Soil and water CEMP set out in the Conditions for the Airport Rail Development of the Western Sydney International (Nancy-Bird Walton) (WSI) Airport detailed in Section 3.11.6 of the Airport Plan.

Condition 39 (3(a)) of the Airport Plan requires that a the Rail Authority, in preparing the CEMP has taken into account any performance outcomes specified in Table 8-2 of the EIA which are relevant to that CEMP.

This GMP provides the management approach and requirements for managing groundwater related matters during construction of the Airport Rail Development, particularly during the Station Boxes and Tunnelling (SBT) works.

13.2. Document purpose

The purpose of this plan is to provide the foundation for the management of ground water quality impacts in accordance with best practice and legal requirements (including environmental mitigation measures, controls, monitoring and reporting) during the construction phase of the Project based on the assessment undertaken as part of the EIA.

Effective implementation of this plan will assist Sydney Metro and relevant contractors to achieve compliance with necessary environmental regulatory and policy requirements in a systematic manner with an outcome of continual environmental management performance.

13.3. Certification and approval

This GMP has been reviewed and approved for issue by the SM - WSA Environment Manager prior to submission to Department of Infrastructure, Transport, Regional Development and Communications (Infrastructure Department).

13.4. Distribution

All Sydney Metro personnel and contractors will have access to this GMP via the project document control management system. Unless otherwise agreed by the Approver, the Approved Plan must be published on Sydney Metro's website within one month of being approved and be available until the end of the Construction Period. An electronic copy can be found on the Project website.

This document is uncontrolled when printed. One controlled hard copy will be maintained by the quality manager at the project office

14. Scope of works

14.1. Scope to impact Groundwater

A preliminary assessment of potential ground movement impacts due to construction of Western Sydney International to Bringelly tunnel within the airport site has been carried out. This assessment considered ground movements resulting from tunnelling works, excavation for cut and cover stations including retention systems and temporary groundwater drawdown. The surface environment within the airport site is assumed to have been cleared and not contain any remaining buildings or structures.

The preliminary assessment assumes that ground movements arising from the proposed action would occur prior to construction of the Airport Terminal building and associated civil works at the airport.Rail tunnels

Changes in groundwater level as a result of tunnel and cross passage excavation during construction are likely to be of short duration and unlikely to lead to a material change in groundwater levels.

Groundwater inflow may occur during construction in the short period between excavation at the tunnel face and installation of the tunnel lining. Once the lining is in place, the tunnel would be effectively waterproofed and groundwater inflow would cease.

Groundwater inflow to cross passage excavations could occur since they are constructed using traditional mining excavation methods. However, efforts to minimise groundwater inflow such as ground improvement are usually undertaken prior to excavation, to minimise the volume of groundwater entering the tunnel cross-passages.

The magnitude of groundwater level change during excavation is expected to be small given that inflows would be localised and of short duration, and excavation would be within the Bringelly Shale, which has a low hydraulic conductivity.

14.1.1. Western Sydney International tunnel portal

Groundwater inflows at the Western Sydney International tunnel portal would occur during construction as the excavation would take place within a drained (untanked) retaining wall. This would lead to potential changes to groundwater levels in the surrounding shale and residual soil. The temporary changes to groundwater level would occur over the course of construction until the permanent watertight portal structure is in place.

Drawdown at the excavation is expected to be close to the base of the excavation. However, since the excavation is deeper to the west, greater drawdown and inflow would be expected in that area. The assessment indicates that the one metre drawdown contour would continue to about 285 metres from the excavation. This extent is unlikely to occur across the entire length of the tunnel portal since there would be less drawdown in shallower areas. However, for the purposes of reporting, it is assumed that this drawdown occurs uniformly across the length of the structure.

14.1.2. Airport Terminal Station

Groundwater inflows at Airport Terminal Station would occur during construction as the excavation would take place within a drained (untanked) retaining wall. This would lead to potential changes to groundwater levels in the surrounding shale and residual soil. The temporary changes to groundwater level would occur over the course of construction until the permanent watertight station structure is in place.

At the Airport Terminal Station, modelling results indicate that that the one metre drawdown contour would extend to around 270 metres from the excavation face.

15. Objectives and targets

15.1. Objectives

In accordance with the CEMF the objectives of this Plan are:

- Reduce the potential for drawdown of surrounding groundwater resources
- Prevent the pollution of groundwater through appropriate controls
- Reduce the potential impacts on groundwater dependant ecosystems
-

To achieve this objective, the following will be undertaken:

- Ensure appropriate treatment of water prior to off-site discharge or disposal;
- Minimise the risk of pollution incidents from the construction of the Project;
- Minimise leaks and spills from construction activities;
- Protect the quantity and quality of groundwater;
- Minimise potable water use during construction;
- Ensure appropriate treatment of any contaminants identified throughout construction;
- Ensure appropriate measures are implemented to achieve consistency with the WSA SWCEMP requirements and Tables 8-1, 8-2 and 8-3 of the SM - WSA EIA; and
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3 of this Plan.

15.2. Targets and performance criteria

Performance criteria specific to soil and water have been established for the management of soil and water impacts during the construction phase of the works which have been, in part, derived from the performance criteria identified in the EIA, Table 28-6 are outlined in Table 3-1.

Table 3-1 Soil and water targets and performance criteria

Aspects	Target / Performance criteria	Document Reference
Environmental management compliance	Compliance with the requirements and mitigation measures set out in this Groundwater Management Plan	CEMP compliance audits (refer Section 10) Site environmental inspection checklist
Environmental management compliance Airports (Environment Protection) Regulations 1997	Compliance with the performance criteria in this CEMP which have been developed taking into account the general duty not to pollute under the AEPRs (Reg 4.01) and the related limits.	CEMP compliance audits (refer Section 10) Site environmental inspection checklist AEPRs
Water quality	Compliance with the water quality monitoring requirements of this Soil and Water CEMP, including the monitoring frequency and criteria.	Water quality monitoring records CEMP compliance audits (refer to Section 10)
Contamination disposal	Disposal of any material from site in accordance with the NSW EPA Waste Classification Guidelines (2014).	Soil testing / classification data Water testing / classification data Waste classification certificates

The above targets in Table 3-1 have been set to provide a benchmark performance objective to which Sydney Metro will endeavour to achieve. Failure to achieve the targets will not be considered a non-conformance, however, will prompt internal review of environmental management and assessment of potential improvement opportunities.

16. Legal and other requirements

Relevant environmental legislation and other requirements are identified below

16.1. Relevant legislation and guidelines

As WSI airport is to be developed under the Airport Plan (September, 2021) determined under the Airports Act, some state laws will not be applicable to the Project (s112 of this Act). Where state law is applicable, this plan will set out the relevant applicable state legislation and requirements and demonstrate how compliance with those laws including obtaining relevant permits will be achieved. Where state laws are not applicable, there may nonetheless be a requirement to have regard to those laws, for example, through mitigation measures to be incorporated in CEMPs to satisfy conditions under the Airport Plan.

16.2. Legislation

16.2.1. Licences and permits

The relevant legislation, policies and assessment guidelines considered in the preparation of the groundwater and geology impact assessment are listed below:

- Airports Act
- Airports (Environment Protection) Regulations
- EPBC Act

16.2.2. Guidelines and standards

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

- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ 2000);
- *Australian Drinking Water Guidelines* (Natural Resource Management Ministerial Council (NRMMC), 2011);
- *Groundwater Dependent Ecosystems Risk Assessment Guidelines* (NOW 2012d);
- NSW State *Groundwater Quantity Management Policy* (2001 (unpublished));
- NSW State *Groundwater Quality Protection Policy* (DLWC 1998);
- NSW State *Groundwater Dependent Ecosystem Policy* (DLWC 2002);
- Australian *Groundwater Modelling Guidelines* (National Water Commission 2012);
- *National Water Quality Management Strategy Guidelines for Groundwater Quality Protection in Australia* (NWQMS 2013);
- Department of Primary Industries *Guidelines for Controlled Activities* (2012);
- *Approved Methods for the Sampling and Analysis of Water Pollutants in NSW* – March 2004.

16.2.3. Approvals and other specifications

- Functional Specifications;
- Sydney Metro Western Sydney Airport Plan(2016);
- Western Sydney Airport Environmental Impact Statement;
- WSA Remediation Action Plan (2019;
- Sydney Metro Sustainability Plan;
- Sydney Metro Community and Stakeholder Engagement Plan;
- Sydney Metro Construction (Rail) Plan; and
- Construction Environmental Management Framework.

16.3. Environmental Impact Requirements

16.3.1. SM - WSA EIA requirements

The requirements of ground water management to be taken into account and addressed during the construction phase of the Project are included in Section 8 of the SM - WSA EIA, in particular Tables 8-1, CEMF 3 and 8. A summary of these requirements and how they have been addressed in this SWCEMP is presented in Table 4-5.

Table 4-1 Summary of groundwater requirements from the SM - WSA EIA

EIA Reference	Topic	Summary	Where referenced
Table 8-1 CEMF 3	Framework requirements.	The on-airport Soil and Water CEMP will detail the Sydney Metro – Western Sydney Airport groundwater management objectives, including: • reduce the potential for drawdown of surrounding groundwater resources • prevent the pollution of groundwater through appropriate controls and • reduce the potential impacts of groundwater dependent ecosystems. The on-airport Soil and Water CEMP would be consistent with the Western Sydney Airport Soil and Water CEMP, including all appendices (and sub plans) to the CEMP. Groundwater management of on-airport works would be implemented through the groundwater management plan approved as part of the on-airport Soil and Water CEMP. The groundwater quality criteria would be in accordance with Appendix G of the Western Sydney Airport Soil and Water CEMP. The on-airport Soil and Water CEMP (with the groundwater management plan) would include the following groundwater mitigation measures: • implement all feasible and reasonable measures to limit groundwater inflows to stations and crossovers • undertake groundwater monitoring (in terms of levels and quality) during construction in areas identified as 'likely' and 'potential' groundwater dependent ecosystems.	Section 7 - Environmental control measures Section 6.4.2.5 GDE
	Framework requirements.	The on-airport Soil and Water CEMP would detail the Sydney Metro – Western Sydney Airport groundwater management objectives, including: • reduce the potential for drawdown of surrounding groundwater resources • prevent the pollution of groundwater through appropriate controls and • reduce the potential impacts of groundwater dependent ecosystems.	Section – Targets and Objectives

EIA Reference	Topic	Summary	Where referenced
Table 8-1 CEMF8	Framework requirements	The on-airport Soil and Water CEMP would be consistent with the Western Sydney Airport Soil and Water CEMP, including all appendices (and sub plans) to the CEMP. The plan would include as a minimum:	
	Framework requirements	• details of construction activities and their locations, which have the potential to impact on water courses, storage facilities, stormwater flows, and groundwater	Section 6 Aspects and Impacts
	Framework requirements	• surface water and ground water impact assessment criteria consistent with the Airports (Environment Protection) Regulations 1997 (with due consideration of the ANZECC guidelines)	Section 6 – Aspects and Impacts
	Framework requirements	• management measures to be used to minimise surface and groundwater impacts, including: • identification of water treatment measures and discharge points,	Section 7 – Environmental Control Measures
	Framework requirements	• a description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, how the results of the monitoring would be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified	Section – Groundwater monitoring
Table 8-2	Project Performance Outcomes	Groundwater availability and quality for water supply and environmental benefit (e.g. groundwater dependent ecosystems) is not affected beyond the requirements outlined in the NSW Aquifer Interference Policy	Section 7 – Environmental Control Measures
Table 8-3 Table 8-3	GW4	Consultation with Western Sydney Airport will be on-going in respect to the construction programs for both projects to understand the potential for ground movement impacts to proposed buildings and • structures	Section 10 Monitoring and Reporting
	GW5	Detailed hydrogeological and geotechnical models for the project would be developed and progressively updated during design and construction These models would:	At design stage
		be informed by the results of groundwater monitoring undertaken before and during construction	At design stage
		identify predicted changes to groundwater levels, including at nearby water supply works and at groundwater dependent ecosystems or other sensitive groundwater receptors	At design stage

EIA Reference	Topic	Summary	Where referenced
		• Where changes to groundwater levels are predicted at nearby water supply works, groundwater dependent ecosystems or other sensitive groundwater receivers, an appropriate groundwater monitoring program would be developed and implemented	Section 10 – Monitoring and Reporting
		• Where changes to groundwater level are close to the ground surface, dryland salinity monitoring would be implemented to allow for management of any identified impacts	Section 10 – Monitoring and Reporting
		The groundwater monitoring program would aim to confirm no adverse impacts on the receiver during construction or to effectively manage any impacts with the implementation of appropriate mitigation measures	Section 10 – Monitoring and Reporting
		Monitoring at any specific location would be subject to the status of the water supply work and agreement with the landowner	Section 10 – Monitoring and Reporting
	GW6	A Groundwater Management Plan would be prepared and implemented.	This plan
		The plan must include the following trigger-action- response measures in relation to groundwater levels in areas identified as subject to potential drawdown (at groundwater dependent ecosystems or other sensitive receivers) but outside the construction footprint and Western Sydney International Stage 1 Construction Impact Zone:	Section 10.2.6- Groundwater TARP Section 7 – Environmental Control Measures
		a. target criteria, set with reference to relevant standards and site specific parameters;	Section 10.2.6- Groundwater TARP Section 7 – Environmental Control Measures
		a. trigger values and corresponding corrective actions to prevent recurring or long-term exceedance of the target criteria described in (a); and	Section 10.2.6- Groundwater TARP Section 7 – Environmental Control Measures
		b. corrective actions to compensate for any recurring or long-term exceedance of the target criteria described in (a)	Section 10.2.6- Groundwater TARP Section 7 – Environmental Control Measures
		Response measures may include:	Section 10.2.6- Groundwater TARP Section 7 – Environmental Control Measures
		• targeted ground improvement and grouting to limit groundwater inflows into station excavations, tunnels and cross-passage to reduce groundwater drawdown	Section 10.2.6- Groundwater TARP Section 7 – Environmental Control Measures

EIA Reference	Topic	Summary	Where referenced
		• design of undrained temporary retention systems to minimise groundwater inflow into station excavations and reduce groundwater drawdown	Section 10.2.6- Groundwater TARP Section 7 – Environmental Control Measures
		• supplementing groundwater supply at affected groundwater dependent ecosystems or watercourses	Section 10.2.6- Groundwater TARP Section 7 – Environmental Control Measures
		make good provisions for groundwater supply wells impacted by changes in groundwater level or quality	Section 10.2.6- Groundwater TARP Section 7 – Environmental Control Measures
	SC9	Targeted groundwater investigations would be undertaken prior to construction to identify high salinity areas at risk from rising groundwater. Where high saline areas (>1000 µS/cm) are identified, measures such as planting, regenerating and maintaining native vegetation and good ground cover in recharge, transmission and discharge zones would be implemented where possible	Section 10 – Monitoring and Reporting

17. Groundwater

Groundwater monitoring was undertaken as part of the environmental impact assessment completed for the EIS in addition to ongoing monitoring completed post-EIS up until the present. The obtained data indicates that groundwater at the Airport Site is generally of a relatively poor quality with limited beneficial use or environmental value. The aquifers at the Airport Site include:

- An unconfined aquifer in shallow alluvium of the main watercourses at the Airport Site;
- An intermittent aquifer in weathered clays overlying the Bringelly Shale;
- A confined aquifer within the Bringelly Shale; and
- A confined aquifer within the Hawkesbury Sandstone.

The variations in depths to groundwater, described in Table 5-4, indicates low potential for connectivity between groundwater aquifers.

Table 5-1 measured depths of the various aquifers at the Airport site

Groundwater	Measured depths
Within the alluvium	0.7 metres – 4.7 metres
Within weathered clays overlying Bringelly Shale	2.4 metres – 4 metres
Within Bringelly Shale	3.0 metres – 11.7 metres
Within Hawkesbury Sandstone	100 metres below ground level

There are in excess of 42 registered groundwater bores within five kilometres of the site centre.

Overall, the available data suggest that groundwater is sparsely used, with only 12 bores for domestic, stock, industrial, farming and irrigation purposes. It is noted that all of these bores are generally screened at significant depth and are expected predominantly to intersect the underlying Hawkesbury Sandstone.

Historical groundwater monitoring data suggest that the groundwater quality has background concentrations of lead, zinc and copper consistently above the selected ANZECC (2000) freshwater criteria. Total nitrogen and phosphorous concentrations were all above freshwater criteria for lowland rivers with some exceedances of the irrigation criteria. Isolated samples had concentrations of nitrate above ANZECC (2000) freshwater criteria. Concentrations of sulphate above human health drinking criteria are present at several locations across the site.

This water quality data obtained suggests that only deeper groundwater in the Hawkesbury Sandstone is suitable for the uses outlined above and that shallow groundwater in the Bringelly Shale is unsuitable for beneficial domestic, stock, irrigation and industrial water use purposes.

Based on the available groundwater quality data, the groundwater assessment included as part of the EIS concluded that:

- The groundwater in the area of the Airport Site has low beneficial use potential for stock and potable purposes;
- The groundwater contributions to surface water are expected to represent a small part of the overall surface water flows in the area; and
- In terms of groundwater management during construction of the proposed airport, salinity, metals (particularly cadmium, copper, lead and zinc), sulphate, total nitrogen and phosphorous may require further consideration if discharge to surface water is being considered.

18. Aspects and impacts

18.1. Overview

To limit potential groundwater inflows and groundwater drawdown, the metro tunnels would be tanked (designed to prevent the inflow of groundwater, typically using concrete lining and waterproofing membranes). Similarly, the cross passages and the station caverns would be tanked. As a result, limited change is expected to groundwater levels.

During construction, groundwater drawdown may occur:

- at locations with drained excavations, such as Western Sydney International tunnel portal and Airport Terminal Station.

These excavations would allow groundwater ingress to occur which would result in a lowering of the groundwater levels in the adjacent soils and bedrock. Water levels at those locations which were drained during construction would recover during the operational phase.

- Long term changes in water levels are anticipated to be relatively small and within the range of seasonal and long-term groundwater fluctuation, and localised around the structures.

Detailed hydrogeological and geotechnical models would be developed and progressively updated during design development and groundwater monitoring would be carried out to confirm the predictions.

The airport site is under construction and has been cleared of all buildings or structures. There are no existing roads or utility assets within the airport site that would be potentially be impacted by ground movement impacts associated with the proposed action.

Consultation with Western Sydney Airport will be on-going in respect to the construction programs for both projects to understand the potential for ground movement impacts to proposed buildings and structures.

18.2. Construction activities

Construction activities that may affect ground water quality include:

- Tunnelling and dewatering;
- Deep excavations.

18.3. Groundwater and Geology

18.3.1. Potential impacts

This section presents the potential impacts of the proposed action on the groundwater and geological environment that may occur during construction.
Potential impacts on the groundwater environment during the construction phase include:

- impacts on groundwater dependent ecosystems, water supply wells, creeks or other environmental receptors resulting from changes to groundwater level or flow. Further discussion on GDEs, including mapped GDEs, is provided in Section 7.3.
- impacts on groundwater quality due to contamination from release of chemicals used during construction activity and potential impacts on other connected environmental receptors
- impacts on groundwater quality due to exposure, storage and leaching of saline soils along the alignment
- impacts on buildings and infrastructure from surface settlement related to groundwater drawdown or ground settlement from excavation during construction.

Hydrogeological conditions at elements of the proposed action which are likely to interact with the groundwater environment are presented in Table 6-2.

Table 6-1 Hydrogeological conditions at proposed action elements

Location /structure	Hydrogeological units	Anticipated groundwater level (metres below existing ground level)1	Approximate depth below groundwater level (m)
WSI airport tunnel portal	Residual soil Bringelly Shale	0.5 to 3	0 to 20
Airport Terminal Station	Residual soil Bringelly Shale	0.5 to 3.5	15 to 19
WSI airport to Bringelly tunnel	Bringelly Shale	1 to 9	Up to 28

Note: Groundwater depths based on existing ground levels

18.3.2. Changes to groundwater level

18.3.2.1. Rail tunnels

Changes in groundwater level as a result of tunnel and cross passage excavation during construction are likely to be of short duration and unlikely to lead to a material change in groundwater levels.

Groundwater inflow may occur during construction in the short period between excavation at the tunnel face and installation of the tunnel lining. Once the lining is in place, the tunnel would be effectively waterproofed and groundwater inflow would cease.

Groundwater inflow to cross passage excavations could occur since they are constructed using traditional mining excavation methods. However, efforts to minimise groundwater inflow such as ground improvement are usually undertaken prior to excavation, to minimise the volume of groundwater entering the tunnel cross-passages.
The magnitude of groundwater level change during excavation is expected to be small given that inflows would be localised and of short duration, and excavation would be within the Bringelly Shale, which has a low hydraulic conductivity.

18.3.2.2. WSI airport tunnel portal

Groundwater inflows at the WSI airport tunnel portal would occur during construction as the excavation would take place within a drained (untanked) retaining wall. This would lead to potential changes to groundwater levels in the surrounding shale and residual soil. The temporary changes to groundwater level would occur over the course of construction until the permanent watertight portal structure is in place.

The predicted changes to groundwater level during the construction phase is presented in Figure 6-1. Drawdown at the excavation is expected to be close to the base of the excavation. However, since the excavation is deeper to the west, greater drawdown and inflow would be expected in that area. The assessment indicates that the one metre drawdown contour would extend to about 285 metres from the excavation. This extent is unlikely to occur across the entire length of the tunnel portal since there would be less drawdown in shallower areas. However, for the purposes of reporting, it is assumed that this drawdown occurs uniformly across the length of the structure.

18.3.2.3. Airport Terminal Station

Groundwater inflows at Airport Terminal Station would occur during construction as the excavation would take place within a drained (untanked) retaining wall. This would lead to potential changes to groundwater levels in the surrounding shale and residual soil. The temporary changes to groundwater level would occur over the course of construction until the permanent watertight station structure is in place.

At the Airport Terminal Station, modelling results indicate that that the one metre drawdown contour would extend to around 270 metres from the excavation face (refer to Figure 6-1).

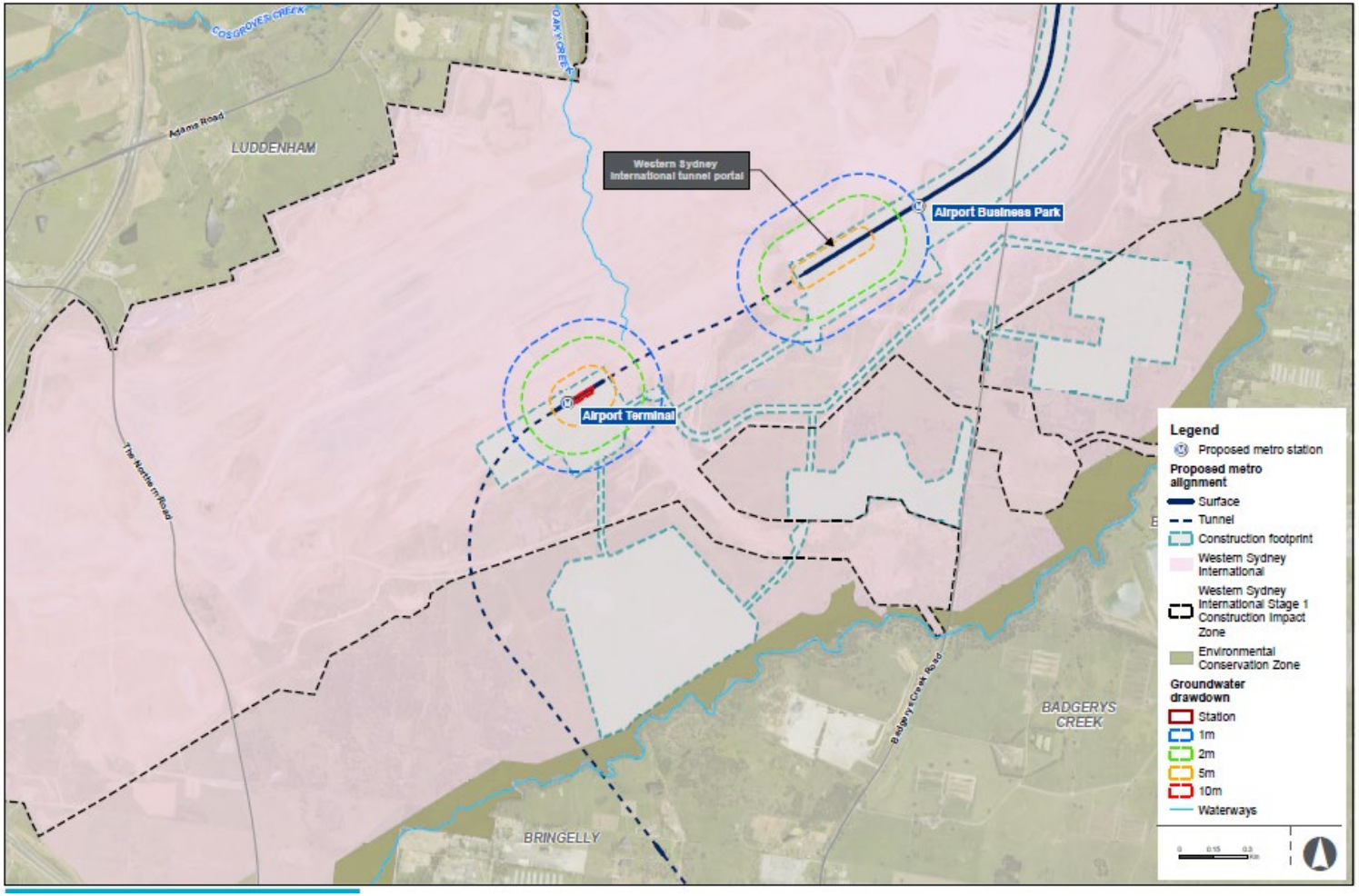


Figure 6-1 Predicted changes in groundwater level for during construction for the airport environment

18.3.2.4. Changes to groundwater recharge

Groundwater recharge is the proportion of rainfall that makes its way into an aquifer system, as a result of infiltration through unsaturated soils. The principal mode of recharge to groundwater systems is through rainfall. Changes to recharge from the surface can cause changes in groundwater level in the underlying system.

Changes to recharge during construction are likely to occur principally because of:

- introduction and construction of engineered fill, paved surfaces and site facilities preventing rainfall from infiltrating the ground, leading to a reduction in groundwater recharge
- surface runoff on construction areas being captured by drainage systems, as opposed to infiltrating the ground, leading to a reduction in recharge
- sedimentation basins used during construction acting as local points of increased recharge.

The effect of the reduction in direct recharge to groundwater levels across the construction footprint is anticipated to be minor due to the limited scale of the proposed action and its footprint (compared to the size of the catchment) and the existing low recharge within the study area due to the low hydraulic conductivity of the residual clay soils and Bringelly Shale bedrock. In addition, large potential permanent spoil placement areas for excavated spoil material would be stored within WSI airport which could reduce groundwater recharge into the underlying ground.

As the spoil placement areas would be permanent, its effect on groundwater recharge would continue into the operational phases of the proposed action. However, given the existing low permeability residual soils and low recharge rates present across the majority of WSI airport, it is unlikely that this would have a significant impact on recharge rates and underlying groundwater levels.

18.3.2.5. Potential impact on groundwater dependant ecosystems

The WSI airport Stage 1 Construction Impact Zone would be cleared before or during construction of the proposed action, removing the potential for occurrence of GDEs. Groundwater drawdown outside the WSI airport Stage 1 Construction Impact Zone is considered unlikely due to the undrained tunnel design and construction method and given that proposed excavation areas (WSI airport tunnel portal and Airport Terminal Station) are over 400 metres away from any potential GDEs.

Condition 8.4 of the Airport Plan states that groundwater monitoring would be undertaken for the *Soil and Water Construction Environmental Management Plan* (Western Sydney Airport, 2019g) which must include monitoring points adjacent to woodlands in areas outside of the WSI airport Stage 1 Construction Impact Zone (but within the airport). This measure is intended to monitor changes at groundwater dependent vegetation as a result of construction of the airport site.

Groundwater drawdown is not expected to impact the GDEs located within the on-airport Rail Development study area.

18.3.2.6. Potential impact on groundwater users

No groundwater supply wells have been identified within WSI airport and therefore existing groundwater users would therefore not be affected by the proposed action. No impacts to

existing groundwater supply wells are predicted as a result of changes to groundwater level or flows at the airport site.

18.3.2.7. Potential impacts on groundwater quality

The potential risks to groundwater quality during construction would include:

- hydrocarbon (or other chemical) contamination from potential fuel and chemical spills during construction, leading to contamination of groundwater
- infiltration of contaminated surface water runoff at discharge basins
- release of saline groundwater seepage from excavations during construction into the environment (including impacting on shallow, better quality soil groundwater)
- mobilisation of existing groundwater contamination due to dewatering, groundwater ingress to excavations or because of altered groundwater flow directions due to construction activity
- leaching of saline, acidic or contaminated water from soil stockpiles into the groundwater environment.

Groundwater ingress into excavations for stations or other cuttings would be captured, treated and then reused for construction activity where possible. Where reuse of the groundwater is not possible, the water would be discharged from the sites via construction water quality treatment plants. Water captured during tunnelling would be treated and recirculated to the cutting face or used for dust suppression purposes.. The potential permanent spoil placement areas at WSI airport may potentially lead to an increased risk of generating saline runoff and leachate with resultant impacts on groundwater.

The overall potential risk of impacts on groundwater quality remain low due to:

- the low permeability soil cover, limiting the risk of infiltration of water into the ground
- the limited environmental value of the groundwater at the site
- the low likelihood of existing chemical contamination at WSI airport (refer to Section 6.4.2.10).

The proposed action would also include the provision of water treatment plants to treat any contaminated groundwater intercepted during construction before discharge to ensure that works meet the requirements under Schedule 2 of the Airports (Environment Protection) Regulations 1997.

18.3.2.8. Potential impacts to creeks and wetlands

Groundwater drawdown at creek lines is not expected to occur during the construction phase of the proposed action. Due to the significant earthworks being undertaken at the WSI airport site, there are not anticipated to be any impacts on artificial wetlands, since the Stage 1 site would be fully redeveloped.

18.3.2.9. Estimated construction groundwater take

Predicted groundwater inflows for the on-airport environment are provided in Table 6-4. The total estimated construction inflow rate is likely to be a conservative estimate and may be substantially lower in practice.

Table 6-2 Estimated maximum construction groundwater inflows

Project element	Predicted average groundwater inflow (kL/d)	Predicted maximum groundwater inflow (kL/d)
Western Sydney International tunnel portal	30	53
Airport Terminal Station	44	88
Western Sydney International to Bringelly tunnel (within Western Sydney International)	4	62
Total	**78**	**203**

Notes:

3. The combined predicted inflow may not occur due to staged construction.
4. The maximum inflow is likely to be of short duration and unlikely to occur concurrently across the project

18.3.2.10. Total project groundwater take

The total estimated water take for the project (combining on-airport and off-airport components) during construction is about 240 mega litres per year compared to the long-term average annual extraction limit of 45,915 mega litres per year in the water sharing plan for the Sydney Basin Metropolitan Region Groundwater Sources (NSW, 2015).

The results indicate that there is sufficient groundwater available from a licensing perspective for the maximum estimated construction inflow. This water take represents less than one per cent of the extraction limit for the Sydney Basin.

The Sustainability Plan for the project includes the objective of maximising opportunities for the re-use of non-potable water sources during construction including water from groundwater inflows during tunnelling and excavations.

18.4. Risk assessment

A risk assessment has been undertaken as part of the review and development of this CEMP and in accordance with Environmental Aspects, Impact and Risk Procedure (Chapter 26 in the EIS). The parts of the overall risk assessment relevant to soil and water which have been extracted and summarised in Table 6-5 apply to all phases of works that the Construction (Rail) Plan authorises.

The identification of construction activities and associated impacts that could eventuate during construction of the Project is central to the selection of appropriate environmental safeguards.

The risk management process involved an assessment of all specific Project activities/aspects in or near environmentally sensitive areas and resulted in the development of a list of environmental risks (effects and impacts) and a corresponding risk mitigation strategy and risk ranking.

The identification of risks included a review of the works, and review of the environmental risks identified by the EIS. The mitigation measures in the risk assessment are in-line with the EIS mitigation measures in Section 7 of this CEMP, Table 6.5 as well as the SM - WSA risk assessment in Chapter 26 of the SM - WSA EIS.

Table 6-3 Ground water risk assessment

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
01	Earthworks (Construction)	Excavation	Ground water	Intercepting ground water causing sediment runoff to waterways, ecological areas, local drainage	C2 (Mod)	Ground water MM (SW_15-23)	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
02		Piling	Groundwater	Intercepting ground water leading to offsite sediment discharge	C2 (Mod)	Ground water MM (SW_15-23)	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
03	Contaminated material works (Remediation)	Excavation	Asbestos	Cross contamination of surrounding areas	C4 (Sig)	SW_24 SW_25	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
								• Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
04				Improper validation of contaminated/ remediated areas	C4 (Sig)	SW_24 SW_25	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
05	Contaminated material works (Remediation) (cont.)	Excavation (Continued)	Acid Sulphate Soils	Cross contamination of surrounding areas	B2 (Low)	SW_24 SW_25	B1 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
								• Induction • ECM
06				Improper validation of contaminated/ remediated areas	B2 (Low)	SW_24 SW_25	B1 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
07		Excavation (continued)	PFOS/PFAS	Cross contamination of surrounding areas	B2 (Low)	SW_14 SW_24 SW_25	B1 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
08				Improper validation of contaminated/	B2 (Low)	SW_14 SW_24	B1 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs)

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
				remediated areas		Testing as per Appendix D and this Soil and Water CEMP		• Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction • ECM
09	Site water management	Dewatering	Sedimentation	Incorrect treatment and discharge of sediment basins	C4 (Sig)	SW_33	C2 (Mod)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure • Induction ℜ ECM
10		Dewatering (Cont.)	Sedimentation	Incorrect treatment and discharge of sediment traps and excavations throughout site	C4 (Mod)	SW_29 SW_30 SW_31 SW_32	C2 (Low)	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • Waste and Resources CEMP • Air Quality CEMP • EWMS • Traffic and Access CEMP • Complaints Procedure

Ref	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level [2] pre-mitigation	Mitigation measure [1]	Risk level [2] post-mitigation	Management tools
								• Induction • ECM
11	Tunnelling Operations	Tunnel Boring Machine (TBM) launch, tunnelling production, cross passage works, stub tunnel excavation	Groundwater, surface water discharge	Groundwater pollution, land slides	Low	WQ1 GW5 GW6 SC1	Low	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • EWMS • Complaints Procedure • Induction • ECM
12		Construction of tunnel portal	Groundwater impacts, surface water discharge	Groundwater pollution, landslides, water discharge off site	Low	WQ1 GW5 GW6 SC1	Low	• Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) • EWMS • Complaints Procedure • Induction • ECM

1 Refer to Table 7-1 for mitigation measures and controls

2 Derived from risk assessment process detailed in Section 6

19. Environmental Control Measures

Mitigation and management measures that will be implemented during construction are detailed in Table 7-1 and are consistent with those provided in Table 11 of the WSA SWCEMP (2021), as per the Airport Plan as well as Section 8-1, Table 8-2 and Table 8-3 of SM - WSA EIA. The relevant control measures will be included in the site-specific Environmental Work Method Statement (EWMS) and Environmental Control Map (ECM) – refer to Section 3.6 of the CEMF for further detail.

For monitoring of the implementation of control measures, refer to Section 10.

Table 7-1 Soil and water environmental control measures

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
AEW: Access and Enabling Works SCAW: Surface Civil & Alignment SBT: Station Box Tunnels SSTOM: Stations Systems, Trains, Operations & Maintenance All Contractors: AEW, SCAW, SBT, STOM and other contractors as delegated by Sydney Metro WSA					
SURFACE WATER MANAGEMENT					
GROUNDWATER MANAGEMENT					
GW_01	A groundwater management plan is to be developed and implemented identifying:	Prior to Main Construction Works	The bulk earthworks will have two impacts on the groundwater system: • In cut areas, the shallow alluvium soils	SBT Environment Manager and Design Manager.	Condition 8(4) and 8(5) EIA Table 8-3 GW6

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
AEW: Access and Enabling Works SCAW: Surface Civil & Alignment SBT: Station Box Tunnels SSTOM: Stations Systems, Trains, Operations & Maintenance All Contractors: AEW, SCAW, SBT, STOM and other contractors as delegated by Sydney Metro WSA					
SURFACE WATER MANAGEMENT					
GW_02	Details of work that intercepts groundwater or requires groundwater extraction;		and associated aquifer will be removed by the excavation • In fill areas, the alluvium soils and associated aquifer will be buried by the fill. A groundwater management plan has been developed and will be implemented should groundwater be encountered/used. The groundwater management plan has been prepared and implemented in accordance with the described mitigation measure prior to SBT commencing, refer Section 9.4 detailing the management measures to be implemented		
GW_03	An assessment of aquifer impacts resulting from groundwater interception or extraction;		Where changes to groundwater level are close to the ground surface, dryland salinity monitoring would be implemented to allow for management of any identified impacts. A TARP has been prepared to address changes in GW level or water quality. In the case of these changes, the following approaches may be taken: • Targeted ground improvement and grouting to limit groundwater inflows into station excavations, tunnels and cross-passage to reduce groundwater drawdown • Design of undrained temporary retention systems to minimise groundwater inflow		
GW_04	Extraction methodology and management measures for discharge; and				
GW_05	Groundwater monitoring and inspection programs.				

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
AEW: Access and Enabling Works SCAW: Surface Civil & Alignment SBT: Station Box Tunnels SSTOM: Stations Systems, Trains, Operations & Maintenance All Contractors: AEW, SCAW, SBT, STOM and other contractors as delegated by Sydney Metro WSA					
SURFACE WATER MANAGEMENT					
			into station excavations and reduce groundwater drawdown • Supplementing groundwater supply at affected groundwater dependent ecosystems or watercourses		
GROUNDWATER INFLOWS					
SW_06	To mitigate the impacts associated with groundwater inflows the following measures will be implemented:	N/A	Note.	SBT	N/A
SW_07	Groundwater inflows will be reused or released with appropriate treatment;	Construction	Will be undertaken as per SW_21 under supervision of the construction and environmental management teams.	SBT environment and construction team	WSA EIS Table 28-7
SW_08	Where groundwater is released to surface waters, treatment will be undertaken to bring water pollution below the accepted limits set out in the AEPR or any local standards; and	Pre-Construction and Construction	Will be undertaken as per SW_22 under supervision of the construction and environmental management teams. Refer to section 9.3.3 for discharge criteria. WSUD requirements will be addressed when planning discharge and water treatment.	SBT environment and construction team	WSA EIS Table 28-7 SM – WSA EIA Table 8-3 SC9 WQ3
SW_09	Corrective measures will be developed and implemented to supplement groundwater supplies in the unlikely event of impacts to dependent vegetation or watercourses.	Construction	Will be undertaken as per SW_23 under supervision of the construction and environmental management teams. Refer section 9.4		WSA EIS Table 28-7
WATER TREATMENT FACILITY OPERATION					

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
AEW: Access and Enabling Works SCAW: Surface Civil & Alignment SBT: Station Box Tunnels SSTOM: Stations Systems, Trains, Operations & Maintenance All Contractors: AEW, SCAW, SBT, STOM and other contractors as delegated by Sydney Metro WSA					
SURFACE WATER MANAGEMENT					
GW_10	The treated water irrigation scheme will be designed and operated in accordance with the risk framework and management principles contained in the National Guidelines on Water Recycling (EPHC 2006) and Environmental guidelines: Use of effluent by irrigation (DEC 2004).	Construction Operation	The Water Treatment Plant Operational Management Plan has been prepared. WTP will be operated in accordance with the relevant guideline. The project treated water irrigation scheme will be designed by others in future work phases. WSUD requirements will be addressed when planning discharge and water treatment.	SBT, SSTOM	WSA EIS Table 28-30
DEWATERING					
GW_11	All dewatering activities off site must be undertaken in accordance with the WSA Dewatering Permit to Dewater and be approved by SM - WSA. Where this release of water occurs across package boundaries coordination with applicable interface Contractors and WSA must occur.	Construction	Will be undertaken as per SW_52 to allow a coordinated release of water, effective sediment basin management and to mitigate potential Cumulative Impacts.	All Contractors	Good Practice

20. Environmental Control Measures

20.1. Groundwater Prevention and Treatment

The proposed tunnels and tunnel portal would be designed to minimise water ingress. Appropriate drainage systems would collect runoff from the open sections of the tunnel portal and groundwater seepage into the tunnel and direct it to the tunnel low points. The water would be treated to a standard suitable for discharge into the surrounding drainage network.

20.2. Treated water discharge

The excavation of the tunnels and Airport Terminal Station and shaft are likely to intercept groundwater, resulting in the need to capture, treat and reuse or discharge water. Treated water would be re-circulated to the tunnel cutting face and used for surface dust suppression.

Treated water that cannot be recirculated would be discharged from the sites via construction water treatment plants. The reuse of treated water would be maximised during the construction works. Where surplus treated water needs to be discharged from the sites, subject to the relevant performance outcomes, it may be discharged to Badgerys Creek via Western Sydney International swale.

Other reuse options including Sydney Water trade waste agreement(s) and use of treated water at Western Sydney International and other nearby projects (such as the future M12 Motorway) would be investigated during construction planning.

Table 8-1 Treated water discharge from construction water treatment plants

Location	Discharge point	Indicative discharge volume when discharging (litres per second)
Western Sydney International tunnel portal	Badgerys Creek via Western Sydney International swale	10
Airport Terminal	Badgerys Creek via Western Sydney International swale	10

The tunnels would be lined with pre-cast concrete segments to ensure the long-term life of the tunnels and to minimise groundwater ingress. The tunnels would provide space for the trains and tracks, and for other equipment and services including rail signalling, controls and communication, overhead traction power, fresh air ventilation, fire and life safety systems, lighting and drainage.

20.3. Dewatering Permit

The Dewatering Permit applies to any offsite discharge, pumping to land in Stage 2 areas and movement across construction work package boundaries. This permit ensures that CEMP water quality requirements are met prior to the discharge of any water from a package boundary and will be used as a HOLD POINT prior to any discharge occurring.

The permit as a HOLD POINT is required to be approved by SM - WSA Environment Manager (or nominated delegate) before water release. Accordingly, this permit acts as a control point and allows SM - WSA and Contractors to collaborate with adjacent Contractors such that

cooperative inter package water processes are implemented. The requirement for inter package collaboration is further enforced through the Master Interface Deed Poll.

20.4. Spill Prevention and Response

All Contractors must prepare an emergency spill response procedure. This procedure must be developed in accordance with this SW CEMP and the Emergency Spill Response Procedure referenced in this plan. In addition, all Project Contractors must comply with the requirements below:

- plan and execute their activities, to minimise the possibility of pollution on the project site and adjoining areas by chemicals, dangerous goods and other potential contaminants.
- comply with the requirements of:
    - relevant Laws and Australian Standards; and
    - EPA “Bunding and Spill Management Guidelines” contained within EPA “Environmental Protection
- Manual for Authorised Officers”.
- not refuel or maintain plant and equipment, mix cutting oil with bitumen, or carry out any other activity (including wash down) which may result in spillage of a chemical, fuel or lubricant at any location which drains directly to waters (including sediment basins) or environmentally sensitive areas, without appropriate temporary bunding or oil / water separator being provided, where appropriate. Contractor must not leave refuelling operations unattended.
- keep adequate quantities of suitable material readily available to counteract spillage. All project contractors must clean up all chemical spills immediately.
- where the spills or leaks generates impact to soil materials, each contractor will be responsible for all costs associated with determining treatment or disposal options.

21. Environmental roles and responsibilities

The key environmental management roles and responsibilities for the construction phase of the work are detailed in Section 3.15 of the CEMF.

Specific responsibilities for the implementation of environmental controls are detailed in Section 7 of this Plan.

SM - WSA Water Consultant
The appointed environmental water consultant undertakes water monitoring as per the requirements of the CEMP including provision of reports comparing results against the Project guideline values. The monitoring and assessment include groundwater elevation data.

22. Monitoring and reporting

22.1. Groundwater monitoring

General environmental monitoring requirements are set out in the AEPR (and within Section 3.16 of the CEMF) and include the following:

- Monitoring must take place under the direction of an appropriately qualified person; and
- The results of the monitoring must be kept in a written record.

Specific groundwater quality monitoring requirements, including timing and responsibilities, are included in Table 10-1.

Table 10-1 Ground water quality monitoring requirements

Reference	Requirement	Timing	Responsibility
GW_M_01	The most suitable surface and groundwater monitoring locations have been determined by WSA in consultation with the NSW EPA and relevant local councils, including monitoring locations adjacent to woodland areas and outside of the construction impact zone (but within the Airport Site);	Pre-construction and during construction	Sydney Metro and Contractor Environment Manager
GW_M_02	Groundwater elevation monitoring will be conducted to detect potential impacts to base flow in the vicinity of potentially sensitive creeks or groundwater dependent vegetation. Monitoring will be undertaken quarterly through construction up to a minimum period of three years after the completion of the Project development and until any identified impacts stabilise;	During construction	Sydney Metro and Contractor Environment Manager
SW_M_03	Groundwater quality monitoring of alluvial and Bringelly Shale aquifers will be conducted at major infrastructure locations, down gradient from those locations and in the vicinity of groundwater dependent vegetation or watercourses. Monitoring will initially be undertaken quarterly and adjusted as appropriate; and	During construction	Sydney Metro and Contractor Environment Manager
SW_M_04	Monthly surface water quality monitoring will be conducted to monitor performance of the drainage system. This monitoring will occur once the surface water drainage system is in place and take place at basin outflows and during selected upstream and downstream conditions.	During construction	Sydney Metro and Contractor Environment Manager

Where a non-conformance is detected, or monitoring results are outside of the expected range, a review of the processes and results will be completed. Where a non-conformance is identified, the process described in the CEMF (Section 3.17) will be implemented.

22.2. Groundwater monitoring program

The following sections detail the Development groundwater monitoring program.

22.2.1. Ground water monitoring, sampling and reporting

In order to be consistent with the WSA SWCEMP, SM-WSA will utilise the WSA groundwater monitoring points adjacent to woodlands in areas outside the Construction Impact Zone (but within the Airport Site). This measure is intended to implement a groundwater monitoring network in relation to likely groundwater dependent vegetation and thereby monitor changes at groundwater dependent vegetation as a result of construction on the airport site. SM – WSA will also install four monitoring bores within the Project alignment to monitor quality and movement of groundwater.

With the arrival of the Project Main Contractors for SBT, further investigation into Groundwater and the requirement for an expanded groundwater monitoring program will be assessed as interception of groundwater is likely.

22.2.2. Indicative expanded SM – WSA Ground water program

Monitoring of groundwater for the SBT contractor could include:

- Visual observation of the station box groundwater sump will be undertaken by the Site Supervisor on a weekly basis or following a change in site conditions that may contribute to an increase in groundwater ingress e.g. significant rainfall, excavation that intersects with groundwater etc. Any change will be recorded by the Site Supervisor and further investigation completed as required.

- Weekly Environmental site inspections (to be undertaken by the Environment & Sustainability Manager / Coordinator, Site Supervisor and nominated Site and Project Engineers) to include review of groundwater management.

- Water quality sampling from the WTP for physical and chemical parameters to confirm the Project water quality objectives (App A – WSA Groundwater quality criteria) are being achieved as required by the Project Approvals. Laboratory samples will be sent to a NATA accredited laboratory. Parameters will be confirmed during the commissioning of the WTP which will occur once access to the site is granted by Sydney Metro. Appendix A provides details of the preliminary parameters for the assessment of water quality.

- The WTP monitors pH and turbidity continuously. A manual sample of discharge water will be collected weekly to confirm the parameters established for the site are within the acceptable range. Following commissioning, laboratory samples of discharge water will be collected on a quarterly basis or when construction activities change that have the potential to impact on water quality. The results will be compared with the NSW water quality objectives established for the site, refer Appendix C. This analysis will confirm that the water discharged has not resulted in pollution of water as required by Section 120 of the POEO Act 1997

- Groundwater levels will be monitored using the existing piezometers installed on the site by the Sydney Metro and WSA Contractors. The monitoring will determine any potential for damage to occur as a result of settlement and be completed by the engineering team in accordance with the Geotechnical Instrumentation and Monitoring Specification (SMCSWSWL-WSP- SWL-GE-REP-00004) which is summarised in Appendix B. In the event that lowering of the water table is observed, further mitigation measures will be implemented as outlined in Appendix B - TARP.

- Periodic joint Environment Inspections will be carried out and attended by representatives of the Environment and Sustainability Team, Environmental Representative, and representatives from Sydney Metro. In the event of unanticipated discovery of contaminated material, including asbestos, the Contamination & Asbestos Finds Procedure

Inspection reports will be prepared following site inspections to document any relevant observations.

22.2.2.1. Monitoring locations

The groundwater monitoring program utilises 14 of the existing network of 15 groundwater monitoring wells that were installed during the baseline groundwater monitoring program. The location of the groundwater monitoring locations is shown in Figure 10-1 and are summarised in Table 10-7.

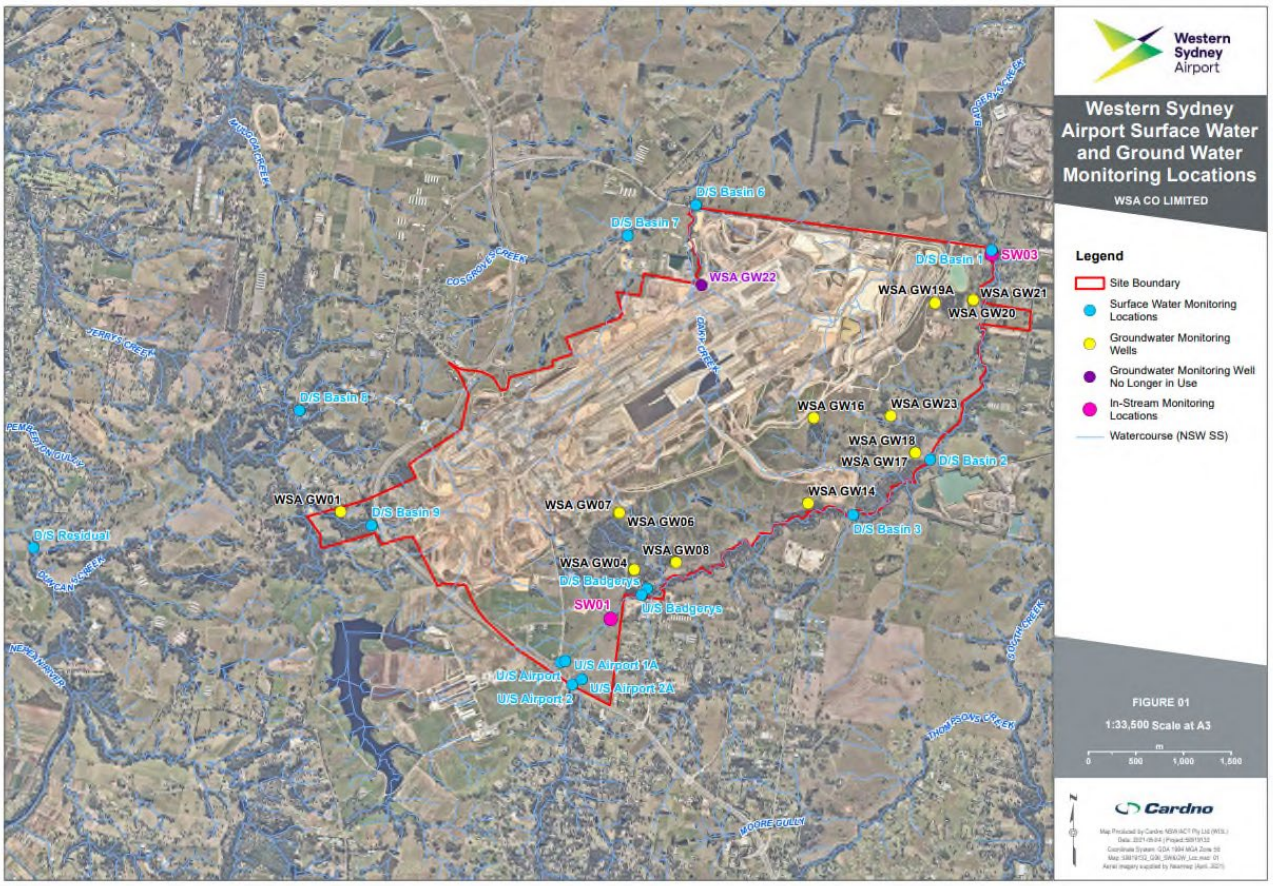
Table 10-2 Groundwater monitoring locations and well details

Well ID (Refer to Figure 9)	Installation date	Data Logger	Location Easting	Location Northing	Well Depth (mbtoc)	Well screen (mbgl)
GW01	21/12/2016	LT	285489	6246780	10.80	7 – 10
GW04	14/12/2016	-	288574	6246161	20.87	17 – 20
GW05	14/12/2016	LT	288574	6246161	10.76	7 – 10
GW06	13/12/2016	LT	288413	6246761	20.35	17 – 20
GW07	13/12/2016	LT	288413	6246761	10.27	7 – 10
GW08	15/12/2016	LT	289013	6246245	10.67	7 – 10
GW14	15/12/2016	-	290400	6246870	10.75	7 – 10
GW 16	15/12/2016	-	290461	6247764	10.77	7 – 10
GW 17	19/12/2016	LT, B	291523	6247399	21.85	17 – 20
GW18	19/12/2016	LT	291523	6247399	10.81	7 – 10
GW19	21/12/2016	LT	291738	6248976	10.81	7 – 10
GW20	20/12/2016	-	292130	6249000	20.83	17 – 20
GW21	20/12/2016	-	292130	6249000	10.84	7 – 10
GW22	21/12/2016	-	289283	6249162	10.65	7 – 10
GW23	16/12/2016	-	291265	6247780	10.82	7 – 10

LT= Level and Temperature Logger
B= Barometric Pressure Logger

Table 10-7 above includes indication of which groundwater wells have electronic logging instrumentation installed. The SM – WSA monitoring bores will be located around the on-airport tunnels.

Figure 10-1 Stage 1 Development surface water and groundwater monitoring locations



22.2.3. Monitoring and sampling

Under the current regime on site, SM – WSA will address monitoring as per the current WSA regime which is manual monitoring and sampling of the groundwater wells will be undertaken on a quarterly basis (i.e., every three months) by the SM-WSA contractors. In the case of SM – WSA SBT this will likely change to monthly monitoring. A groundwater sample will be obtained every quarter (monthly) by a low-flow pump as per Water Sampling Guideline for the purposes of laboratory analysis including the following analytes:

- Nitrogen (speciated) and total phosphorus;
- Dissolved metals (field filtered As, Cd, Cr, Cu, Ni, Pb, Zn and Hg);
- Total recoverable hydrocarbons (TRH);
- Trace phenols and polycyclic aromatic hydrocarbons (PAHs);
- Benzene, toluene, ethylbenzene, xylene (BTEX);
- Volatile organic compounds (VOCs); and
- PFAS In-situ groundwater field parameters will be checked and recorded including the following:
- pH;
- Temperature (o C);
- Electrical conductivity (uS/cm); Dissolved oxygen (mg/L); and
- Oxidation reduction potential (mV)

22.2.4. Ground water quality criteria

Analyte	Criteria		
	ANCECC 2000 – Lowland Rivers (NSW Rivers)	ANCECC 2000 FW 95%	Airports (1997) Fresh Water
Nitrogen (Total)	0.6 mg/L	-	0.1 mg/L
Ammonia as N	0.03 mg/L	0.9 mg/L	-
Nitrate as N	-	7.2 mg/L	-
Dissolved Metals (filtered):			
Arsenic	-	0.013 mg/L	0.05 mg/L
Cadmium	-	0.0002 mg/L	0.0002 mg/L
Chromium (III + IV)	-	0.001 mg/L	0.01 mg/L
Copper	-	0.0014 mg/L	0.002 mg/L
Nickel	-	0.011 mg/L	0.015 mg/L
Lead	-	0.0034 mg/L	0.001 mg/L
Zinc	-	0.008 mg/L	0.005 mg/L
Mercury	-	0.0006 mg/L	0.0001 mg/L
Total recoverable hydrocarbons (TRH) - C10-C36	-	-	600 ug/L
Phenols	-	320 ug/L	50 ug/L
polycyclic aromatic hydrocarbons (PAHs)	-	-	3 ug/L
BTEX			
Benzene	-	950 ug/L	300 ug/L
Toluene	-	-	300 ug/L
Ethylbenzene	-	-	140 ug/L
Xylene (o)	-	350 ug/L	-

Table 10-3 Groundwater quality criteria as per WSA and SM – WSA approval requirements

The assessment criteria adopted for the monitoring program was derived from the potential receptors identified by the WSA groundwater assessment. These include:

- Beneficial use capacity of groundwater and surface water quality;
- Potential recreational users of groundwater and surface water (farm dams and creeks);
- Use of groundwater and surface water for stock watering;
- Aquatic ecosystems located in creeks and farm dams; and
- Groundwater in and around groundwater dependent vegetation.

The adopted assessment criteria adopted by the SM – WSA to assess impacts to these potential receptors is to be developed by the Contractor based on the Project scope.

22.2.5. Analytical trigger values

The adopted groundwater quality criteria as developed above will be utilised as the trigger values for the purpose of this CEMP and associated soil and water management. Where background concentrations exceed adopted criteria, laboratory concentrations should be

assessed in the context of those background concentrations. Exceedances will be assessed using statistical interrogation.

22.2.6. Groundwater trigger- action-response measures

The WSA Airport Plan Condition is satisfied through the above simple compliance arrangements that are suitable for specific current activities required for WSA works. More detailed trigger-action-response measures will be implemented for SM – WSA works such as SBT which are likely to have to have the potential to alter groundwater conditions.

The proposed trigger value for standing groundwater shall be a trend over a continuous three-month period, and overall change by 20% when compared to baseline data accounting for seasonal fluctuations to groundwater levels. Site specific parameters will be considered by Contractors in accordance with Section 7 of this CEMP and Section 4.4 in the CEMF.

In the event that there is a significant change, specialist advice would be obtained and these trigger values may be refined such that they specifically nominate seasonal upper and lower boundaries for the key groundwater monitoring points as nominated in Table 10-7.

In these circumstances SM – WSA will develop a TARP to respond to these changes. An indicative TARP is shown in Appendix A.

22.2.7. Corrective actions

Corrective actions to compensate for any reoccurring or long-term exceedances of the above target criteria will be managed through the unexpected find procedure to confirm if the exceedance is accurate, undertake a review of the work activities and confirm if any impacts on the vegetation or the environment has resulted. Any exceedances and its mitigation strategies will be discussed with the Environment Department and the Infrastructure Department. After agreement on corrective actions, implementation of control measures will be undertaken.

Where groundwater monitoring results exceed the adopted criteria and/or are above the results established during the baseline assessment, the following actions would occur:

- Interrogation of dataset by Sydney Metro in consultation with the site Contractor and a review of construction activities that are likely to cause impact to groundwater;
- Review of sample collection and QA/QC procedures to assess data quality to confirm the data is representative of site conditions;
- Re-sampling of groundwater if required to confirm results;
- Sydney Metro to notify Infrastructure Department if considered a notifiable event (in accordance with Section 9.6);
- Review of on-site activities by the Contractor(s) which may have contributed to exceedance;
- Assess the need for corrective measures or options to mitigate impacts in consultation with Infrastructure Department and groundwater consultant (if required); and
- Implementation of control measures.

In accordance with the requirements of the REMMs, response measures for project activities may include:

- Targeted ground improvement and grouting to limit groundwater inflows into station excavations, tunnels and cross-passage to reduce groundwater drawdown
- Design of undrained temporary retention systems to minimise groundwater inflow into station excavations and reduce groundwater drawdown
- Supplementing groundwater supply at affected groundwater dependent ecosystems or watercourses

22.3. Environmental reporting

A quarterly groundwater monitoring report will be compiled based on the above groundwater monitoring activities. The reports will be reviewed by the Sydney Metro Environment Manager and any potential exceedances (as noted in the report) will be reported to Infrastructure Department and managed accordingly. As a minimum, the quarterly monthly groundwater monitoring report will include the following:

- Date, location (well) and time of the sampling event;
- Description of the weather and any potential influencing conditions;
- Factual reporting including lab results and groundwater elevation plots; and

Interpretation of the results and comparison against the relevant criteria, including identification of any water quality exceedances and potential sources of the exceedance.

22.4. Environmental incidents and complaints management

The management and reporting of environmental incidents shall be undertaken by the appropriate person as detailed in Section 3.18 of the CEMF.
All communications and complaints management will be implemented and managed in accordance with Section 4.2 and 4.3 of the CEMF and the Community Communications Strategy.

23. References

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GHD (2016c), Western Sydney Airport Remediation Action Plan, ref. 2126850, February 2016.

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NSW Government, 2004. Managing Urban Stormwater: Soils and Construction Volume 1 (Blue Book).

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Appendix A – Example Trigger Action Response Plan