Western Sydney Airport

Soil and Water
Construction Environmental Management Plan

October 2021

Western Sydney Airport

PAN 21.002

Document Control

File Name	Document Name	Revision
WSA00-WSA-00400-EN-PLN-000004	WSA Soil and Water CEMP	3

Revision History

Revision	Date	Description	Author	Reviewer
0	24/09/2018	Approved	WSA	S Reynolds
0.1	09/11/2018	Draft updated to include Experience Centre and Site Office and Material Importation	WSA	S Reynolds
0.2	23/11/2018	Draft updated to address comments on the Experience Centre and Site Office phase and Material Importation phase	WSA	S Reynolds
0.3	07/12/2018	Draft updated to address comments on the Experience Centre and Site Office phase and Material Importation phase	WSA	S Reynolds
0.4	12/12/2018	For approval	WSA	S Reynolds
1	14/12/18	Revision update to include the Experience Centre and Site Office phase and Material Importation phase	WSA	S Reynolds
1.1	30/08/2019	Revision update to include new structure for the SEMF and the CEMPs as well as new scope of works.	WSA	J Blake
1.2a	02/09/2019	Issued to Bulk Earthworks Contractor	WSA	S Bellido
1.2b	20/09/2019	Updated for Bulk Earthworks	CPBLLJV	J Wiggers de Vries
1.3	30/09/2019	Issued to WSU and Stakeholders	WSA	S Bellido
1.4	15/11/2019	Updated to address comments and outcome of annual review	WSA	S Reynolds
1.5	06/12/2019	Minor update	WSA	S Bellido
1.5a	10/06/2019	For Approval	WSA	S Reynolds
2.0	18/12/2019	Approved	WSA	S Reynolds
2.1	02/06/2021	Issued to Terminal Contractor	WSA	S Bellido
2.2	18/06/21	Updated for Terminal and Specialty Services works	MPX	I Lima
2.3	16/07/2021	Issued to MTIP and Stakeholders	WSA	S Bellido
2.4	22/09/2021	For Approval	WSA	S Bellido
3	28/10/2021	Approved	WSA	L Laughton

Plan Authorisation

Position	Name	Signature	Date
Environment Manager	L Laughton		28/10/2021

Glossary and Definitions

Item	Definition
The Act	*Airports Act 1996* (Cth) (Airports Act)
AEPR	*Airports (Environment Protection) Regulations 1997*
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 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 Act.
Airport Site	The site for Sydney West Airport as defined by the Act.
Ancillary Developments	An 'ancillary development' as set out in section 96L of the Act
BoM	Bureau of Meteorology
Bulk Earthworks	The large scale earthworks required to flatten the Stage 1 area in preparation for further construction works as described in section 6 of the Construction Plan
CEMP	Construction Environmental Management Plan
Conditions	A condition set out in Part 3 of the Airport Plan in accordance with section 96C of the Act
Construction Impact Zone	The part or parts of the Airport Site or an Associated Site on which Main Construction Works are planned to occur, as detailed in the Construction Plan approved in accordance with Condition 1.
CSEP	Community and Stakeholder Engagement Plan
DoEE	Australian Government Department of the Environment and Energy
DPI	Department of Primary Industries (including Agriculture NSW, Fisheries NSW and NSW Office of Water)
Ecological sustainable development	Using, conserving and enhancing the community's resources so that the ecological processes on which life depends are maintained and the total quality of life now and in the future, can be increased (Council of Australian Governments, 1992).
EEW	The Phase of the Stage 1 Development that involves early earthworks as described in section 6 of the Construction Plan
Environment Minister	The Minister responsible for the EPBC Act
Environmental Impact Statement	The environmental impact statement prepared in relation to the Airport under the EPBC Act
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)

Item	Definition
ESA	Environmentally Sensitive Area
EWMS	Environmental Work Method Statement
Infrastructure Department	The department responsible for administering the Act, currently the Australian Government Department of Infrastructure, Transport Regional Development and Communications (DITRDC)
ISO 14001	AS/NZS ISO 14001:2016– Environmental Management Systems
LDP	Land Disturbance Permit
Main Construction Works	Substantial physical works on a particular part of the Airport Site (including large scale vegetation clearance, bulk earthworks and the carrying out of other physical works, and the erection of buildings and structures) described in Part 3 of the Airport Plan, other than TransGrid Relocation Works or Preparatory Activities.
Non-conformance	Failure to conform to the requirements of the SEMF or supporting documentation.
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	Western Sydney Airport – Stage 1 development
Stage 1 Development	The Developments described in Part 3 of the Airport Plan and the Airport CIZ
SEMF	Site Environmental Management Framework
SES Officer	An SES employee under the *Public Service Act 1999* (Cth)
Sydney West Airport	The Airport. Note: this is the name used in the Act. The Airport is also commonly known as Western Sydney Airport
Terminal and Specialty Services Works	Terminal and Specialty (TSS) Works, inclusive of; • Domestic and International Passenger Terminal (MAP10) • Fixed Link Bridges • Airside Apron • Landside Carparks, Internal Roads and Landscaping • Aviation Fuel Lines and Ring Main Reticulation • TER – Technical Equipment Room

Item	Definition
WSI	Western Sydney International (Nancy-Bird Walton) Airport .The Airport. Note: Under the Act the Airport is referred to as Sydney West Airport
WSA	WSA Co Limited (ACN 618 989 272), the entity responsible for constructing and operating the Airport in accordance with the Airport Plan. For the purposes of the Act, WSA is the "airport-lessee company" for WSI

Acronyms and abbreviations

Item	Definition
AEPR	Airports (Environment Protection) Regulations 1997
AHD	Australian Height Datum
ARI	Average Reoccurring Interval
AS	Australian Standard
BEC	Bulk Earthworks Contract
CEMP	Construction Environmental Management Plan
DO	Dissolved Oxygen
ECM	Environmental Control Map
EEW	Early Earthworks Contractor
EPBC	Environment Protection and Biodiversity Conservation Act 1999
EIS	Environmental Impact Statement
EPA	NSW Environment Protection Authority
EWMS	Environmental Work Method Statement
ISO 14001	AS/NZS ISO 14001:2016 – Environmental Management Systems
km	kilometres
LAA	Licensed Asbestos Assessor
LTEMP	Long Term Environmental Management Plan
m, m^2 and m^3	Metres, square metres and cubic metres
MI	Material Importation
ML and ML/d	Megalitres and megalitres per day
NTU	Turbidity units
PFAS	Polyfluoroalkyl Substance
PFOS	Perfluorooctane Sulfonate
RAP	Remediation Action Plan
SEMF	Site Environmental Management Framework. The SEMF is contained within the Construction Plan (included as Appendix 2).
TN	Total nitrogen
TSS	Total Suspended Solids
WSIA	Western Sydney International (Nancy-Bird Walton) Airport

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Appendix A Example erosion and sediment control plan
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1. Introduction

1.1. Background/Context

This WSA 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 Stage 1 Development of the Western Sydney International (Nancy Bird Walton) Airport (WSI) detailed in Section 3.10.2 of the Airport Plan. Specifically, Section 3.10.2 Condition 8(1) of the Airport Plan requires that a WSA Soil and Water CEMP be approved under the Airport Plan prior to the commencement of Main Construction Works under the Airport Plan.

This Soil and Water CEMP provides the management approach and requirements (including environmental mitigation measures, controls, monitoring and reporting) for soil and water during construction of the Stage 1 Development. This plan forms one of nine CEMPs which are collectively covered by the WSA Site Environmental Management Framework (SEMF). To ensure the environmental resources, responsibilities and management measures are implemented during the construction activities, the SEMF is contained within the Construction Plan (included as Appendix 2). The implementation of the Construction Plan and the SEMF are aligned with other Project level management plans including the Community and Stakeholder Engagement Plan and the Sustainability Plan as illustrated in Figure 1.

The Construction Plan including the SEMF and the 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, the Topsoil Management Protocol which has been developed to manage any areas with a high potential for surface artefacts.
- Air Quality CEMP – It is considered that the management of air quality and dust control are 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 Stage 1 Development 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. This linkage with the WSA Sustainability Plan extends to IS Rating discharge credit – Land Conservation of on-site Resource Lan-2, Land Contamination and Remediation Lan-3 and Land Flooding Design Lan-4, where compliance with this CEMP will ensure the project will meet credit requirements.

Where relevant, linkages to other CEMPs and management objectives have been included in the risk assessment and the environmental control measures, in Section 6.6 and Section 7 respectively.

Table 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 EIS requirements.

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

CEMP or plan	Airport Plan Condition (3.10.2)	EIS Chapter 28 Table: Management area	EIS Chapter 28 Table: Mitigation measures
Aboriginal Cultural Heritage	11	28-12	28-13
Air Quality	10	28-10	28-11
Biodiversity (this plan)	7	28-04	28-05
Community and Stakeholder Engagement Plan	15	28-20	28-21
European and other Heritage	12	28-14	28-15
Noise and Vibration	6	28-02	28-03
Soil and Water	8	28-06	28-07
Sustainability Plan	29	28-37	28-38
Traffic and Access	9	28-08	28-09
Visual and Landscape	14	28-18	28-19
Waste and Resources	13	28-16	28-17

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

The review and document control process for this plan are described further in Section 10 of the SEMF. The context of this plan in relation to the WSA environmental management system is presented in Figure 1.

1.2. 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 Stage 1 Development based on the assessment undertaken as part of the EIS.

This Plan details the soil and water quality management requirements that must be satisfied to demonstrate compliance with Condition 8 of Section 3.10.2 of the Airport Plan for the construction of the Stage 1 development of Western Sydney International.

Legal and other requirements are identified and maintained in a register within the SEMF (refer SEMF Appendix L). Mitigation measures (specific to soil and water) required to satisfy these requirements are derived from the EIS 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 SEMF Section 10.

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 WSA Co 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 WSA personnel and contractors to enable Project completion in accordance with the environmental requirements.

Effective implementation of this plan will assist WSA 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.

1.3. WSA environmental management system overview

WSA operates in general accordance with AS/NZS ISO 14001:2016 – Environmental management systems. A copy of the WSA environmental policy is provided in Appendix H of the SEMF.

The Stage 1 Development will be undertaken in accordance with the Construction Plan including the SEMF and the associated CEMPs (including this Plan).

The SEMF forms an appendix to the Construction 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.

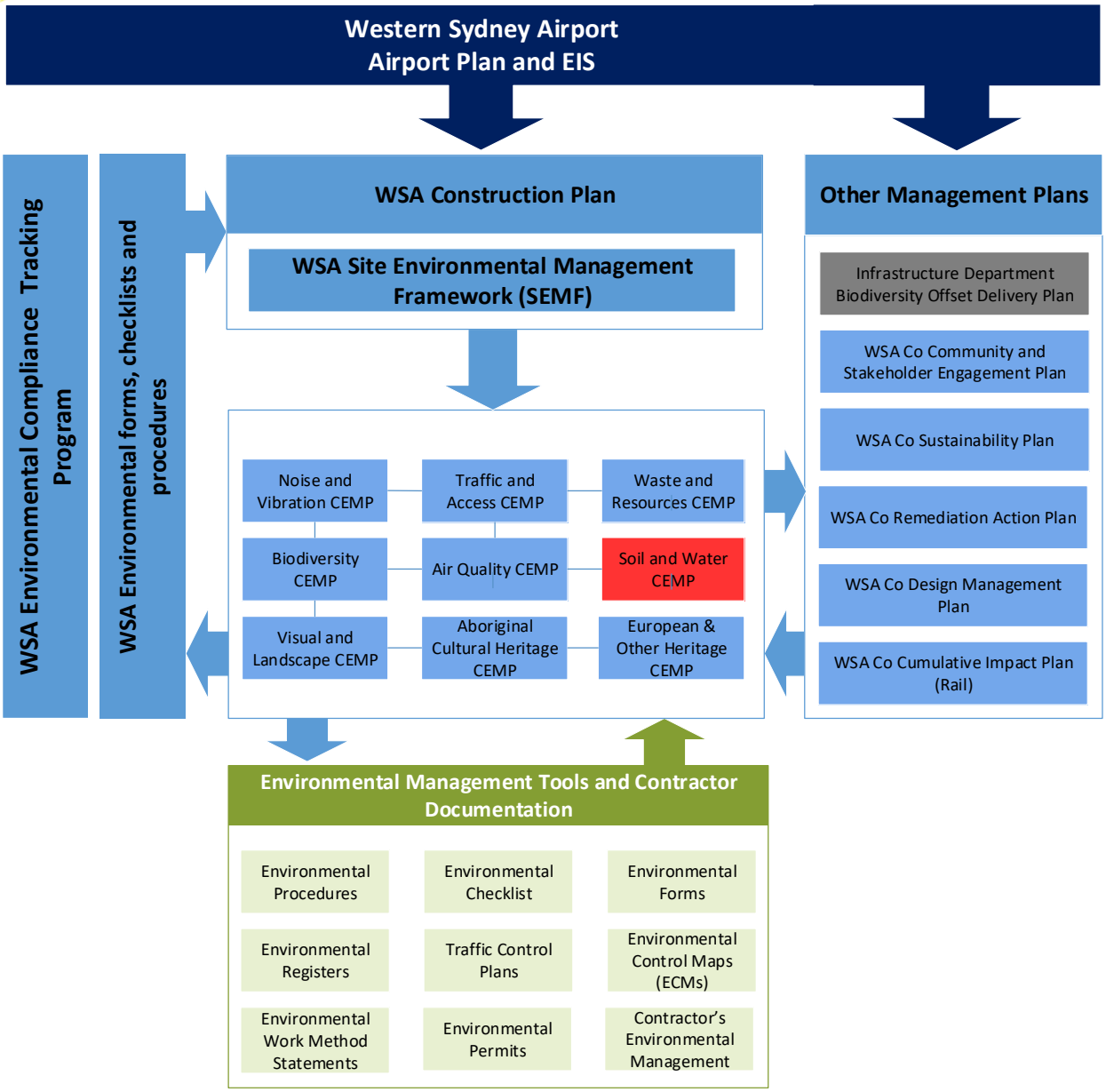


Figure 1: WSA Environmental Management System and CEMP context

1.4. Consultation requirements of this plan

Airport Plan Condition 35 outlines the consultation requirements during the preparation of the CEMP documentation and requires consultation with any NSW Government agencies as specified by the NSW Department of Premier and Cabinet as well as the Department for Planning, Industry and Environment for specific CEMPs. NSW Government agencies specified by Department of Premier and Cabinet for consultation for this Soil and Water CEMP, include the NSW Environment Protection Authority (EPA) and the NSW Department of Primary Industry - Water (DPI Water).

Further, Airport Plan Condition 8(3) requires that this CEMP has taken into account Table 28-6 of the EIS which states the CEMP should also be prepared in consultation with the NSW Environment Protection Authority and relevant local councils.

In addition to the above consultation requirements, the Soil and Water CEMP was also developed in consultation with the Airport Environment Officer (AEO). The focus of the consultation was primarily with regards to the water quality monitoring requirements and the applicable water quality criteria.

Consultation has been completed during the development of this CEMP during the review and update of Revision 0 and 1 in 2018 and Revision 2 in 2019 of this document. A summary of the stakeholder and government authority consultation completed and used to inform the review and finalisation of Revision 3 is presented in Table 2.

Consultation will continue with agencies, councils and other relevant stakeholders throughout the Project where there is a change to a CEMP. 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.

1.5. Consultation to inform Revision 3

A consultation plan outlining the process for engaging with stakeholders was prepared by the WSA Community and Engagement team. The plan and a scoping document outlining the works in the Construction Plan and potential modification of the CEMPs was provided to the stakeholders as required by the Airport Plan Conditions.

Details of the construction phases were described in the correspondence to provide context to the stakeholders on the level of impact that would result from the next phase of construction activities. Following the Terminal Contract award, the CEMPs were updated to reflect the next stage of construction. Stakeholders were invited to attend a site visit and briefing presentation on 15th July 2021 to assist the stakeholders to understand the size and scale of the site elements. The visit scheduled for 15th July 2021 did not take place due to COVID-19 restrictions and the briefing presentation was via videoconference. On 16th July 2021, stakeholders were provided with the nine draft CEMPs to review and were requested to provide comment. A summary of the consultation is provided in Table 2.

Table 2: Soil and Water CEMP consultation summary

Activity	Date	Invitees	Summary
Consultation Summary			
Briefing presentation for stakeholders (via videoconference)	15 July 2021	• Liverpool City Council • Penrith City Council • NSW Health • NSW Aboriginal Affairs and Heritage • TfNSW • Sydney Metro • Infrastructure Department • Department of Agriculture, Water and the Environment • NSW Environment Protection Agency • South Western Sydney Local Health District • NSW Ambulance • Rural Fire Service • NSW Government Architect • Traffic Management Centre • Wester Parkland City Authority • Greater Sydney Commission • Department of Planning, Industry and Environment • Western Sydney Planning Partnership	As part of the continuous improvement of the consultation process, a site visit and briefing presentation for stakeholders was organised. The visit scheduled for 15th July 2021 did not take place due to COVID-19 restrictions and the briefing presentation was via videoconference. It is a useful element to assist stakeholders to understand size and scale and also have discussions related to site elements as they are seen during the site visit.
CEMPs provided to stakeholders for comment	16 July 2021		

1.6. Certification and approval

This Soil and Water CEMP has been reviewed and approved for issue by the WSA Co Environment Manager prior to submission to the Department of Infrastructure, Transport, Regional Development and Communications (Infrastructure Department). The CEMP is sent to the Infrastructure Department for approval as per the EIS requirement in Table 7.

1.7. Distribution

All WSA personnel and contractors will have access to this Soil and Water CEMP via the Project document control management system. The Approved Plan must be published on WSA'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 - https://westernsydney.com.au

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

The Construction Plan details the construction staging of the Stage 1 Development.

The delivery of the Stage 1 Development 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.

Stage 1 Development of the Project comprises the following key features:

- Site preparation
- Utilities
- Ancillary developments
- Terminal
- Airside precinct
- Ground transport
- Other building activities
- Aviation support facilities

Details of the Project construction activities, staging and programming including the phases of works are described in Section 5 of the Construction Plan (WSA00-WSA-00000-CN-PLN-000001) as required by the Airport Plan Condition 1(5).

This Plan applies to all phases of works as described in Section 6 of the Construction Plan.

A variation to this Plan will be submitted before work other than Preparatory Activities is undertaken on any other phases of the Project.

3. Objectives and targets

3.1. Objectives

The key objective of this Soil and Water CEMP 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.

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 Stage 1 Development
- Minimise the export of sediment from the airport site
- 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 address the management and mitigation measures detailed in Table 28-6 and Table 28-7 in Chapter 28 of the EIS
- 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 EIS, Table 28-6 are outlined in Table 3.

Table 3: Soil and water targets and performance criteria

Aspect	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	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 AERPs
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 have been set to provide a benchmark performance objective to which WSA Co 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.

4. Legal and other requirements

Relevant environmental legislation and other requirements are identified below.

4.1. Relevant legislation and guidelines

As Western Sydney International is to be developed under the Airport Plan 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 biodiversity and this Plan are summarised in Table 4.

Table 4: 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 WSA Co 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

Legislation or regulation	Relevance	CEMP compliance provisions
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
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 (POEO (General) Regulations)	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. Defines water and land pollution and the circumstances when pollution has been caused.	Section 7 – Environmental Control Measures
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
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 standard environmental planning instrument under ~~section 33A~~ section 3.20 of the EPA Act.	Section 7 – Environmental Control Measures

Legislation or regulation	Relevance	CEMP compliance provisions
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 standard environmental planning instrument under section ~~33A~~3.20 of the EPA Act.	Section 7 – Environmental Control Measures
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.	Extraction of water from aquifers is not currently anticipated. Cuttings are not anticipated to be at depths that will interact with aquifers. Biodiversity CEMP

Legislation or regulation	Relevance	CEMP compliance provisions
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, Establishes a legislative framework to regulate the use of pesticides.	Section 7 – Environmental Control Measures Section10 - Inspection, monitoring, auditing and reporting
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

4.3. Guidelines and standards

Guidelines and standards that are relevant to soil and water quality management and this plan are summarised in Table 5.

Table 5: Relevant guidelines and standards

Guidelines and standards
• Acid Sulfate Soil and Rock – Victorian EPA Publication 655.1 – July 2009
• Acid Sulfate 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

Guidelines and standards
• 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)
• 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
• 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;

- Western Sydney Airport Plan;
- Western Sydney Airport Environmental Impact Statement
- WSA Remediation Action Plan (2019);
- WSA Sustainability Plan;
- WSA Community and Stakeholder Engagement Plan; and
- WSA Construction Plan, including the SEMF.

4.5. Airport Plan Conditions

Conditions relevant to soil and water quality management during construction are provided in Table 6.

Table 6: Conditions of Approval relevant to soil and water quality management

Condition No.	Condition	Timing	Responsibility	Document reference
1.4	The Site Occupier must ensure that no CEMP is inconsistent with the approved Construction Plan	Ongoing	WSA	This document (Soil and Water CEMP) and the WSA Construction Plan
1.5	The approved Construction Plan may provide for Main Construction Works to be carried out in phases that commence at different times for different parts of the Airport Site or an Associated Site. If it does, the Site Occupier may prepare a CEMP in relation to one or more phases, and the criteria for approval of such a CEMP are taken to exclude any matter irrelevant to the phases for which approval is sought. A variation of the CEMP must be submitted for approval in accordance with condition 41 (Variation of Approved Plans) prior to commencement of any new phase.	Ongoing	WSA	This document (Soil and Water CEMP) and the WSA Construction Plan
5.3	In carrying out a Preparatory Activity, the Site Occupier must not act inconsistently with any approved CEMP or the approved Construction Plan.	Ongoing	WSA	WSA Construction Plan (Appendix 2)
8.1	The Site Occupier must not: Commence Main Construction Works until a *Soil and water CEMP* has been prepared and approved in accordance with this condition; or Carry out any development described in Part 3 of the Airport Plan inconsistently with the approved Soil and Water CEMP	Prior to Main Construction Works	WSA	This document (Soil and Water CEMP)
8.2	The Site Occupier must: Prepare, and Submit to an Approver for approval;	Prior to Main Construction Works	WSA	This document (Soil and Water CEMP)

Condition No.	Condition	Timing	Responsibility	Document reference
	a Soil and Water CEMP in relation to the carrying out of the developments described in Part 3 of the Airport Plan.			
8.3	The criteria for approval of the Soil and Water CEMP are that an Approver is satisfied that: a) in preparing the Soil and Water CEMP, the Site Occupier has taken into account Table 28-6 in Chapter 28 of the EIS; and b) the Soil and Water CEMP complies with Table 28-7 in Chapter 28 of the EIS and is otherwise appropriate.	Prior to Main Construction Works	Approver	Sections 4.4 – Approvals and other specifications Section 7 – Environmental Control Measures
8.4	The groundwater monitoring to be undertaken for the Soil and Water CEMP must include groundwater monitoring points adjacent to woodlands in areas outside the Construction Impact Zone (but within the Airport Site). Note: This measure is intended to implement a groundwater monitoring network in relation to likely groundwater dependent vegetation.	Prior to Main Construction Works	WSA	Section 9.4 – Groundwater monitoring program
8.5	The Soil and Water CEMP must include the following trigger-action-response measures in relation to groundwater levels in areas outside the Construction Impact Zone (but within the Airport Site): a) target criteria, set with reference to relevant standards and site-specific parameters; b) trigger values and corresponding corrective actions to prevent recurring or long-term exceedance of the target criteria described in (a); and c) corrective actions to compensate for any recurring or long-term exceedance of the target criteria described in (a). d) Note: Exceedance in this context should be understood to mean either elevated or depressed groundwater levels, with reference to an acceptable bandwidth.	Prior to Main Construction Works	WSA	Section 10.4.2 – Groundwater Criteria
8.6	The Soil and Water CEMP must 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.	Prior to Main Construction Works	WSA	Section 10.4.3 – PFAS Monitoring, and Testing
34.1	A person carrying out or operating an aspect of the Stage 1 Development must not act inconsistently with:	During construction	WSA	Section 9 – Inspection, Monitoring, Auditing and Reporting

Condition No.	Condition	Timing	Responsibility	Document reference
	a) National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended); b) Australian and New Zealand Guidelines for Fresh and Marine Water Quality (under the National Water Quality Management Strategy) including the draft default guideline values for perfluorooctanoic acid (PFOS) and perfluorooctane sulfonic acid (PFOA) in freshwater as applied by the state government; and c) relevant Commonwealth environmental management guidance on PFOS and PFOA.			Section 10.4.3 – PFAS Monitoring, and Testing
35	An Approver must not approve a plan referred to in Chapter 28 of the EIS unless he or she is satisfied that the Plan Owner: (a) in preparing the plan, has: i) consulted with any NSW Government agencies specified by the NSW Department of Premier and Cabinet; and ii) in the case of the … Soil and Water CEMP …, also consulted the Environment Department and OEH; and (b) has provided: i) the Approver; and ii) each consulted agency, with an explanation of how any responses have been addressed.	Ongoing	Approver	This document (Soil and Water CEMP) Section 1.4 - Consultation requirements of this plan
45 to 50	Set out requirements in relation to informing other parties of conditions, keeping records, publishing reports, independent audits, variation to approved plans and publication of approved plans.	Ongoing	WSA and Approver	This document (Soil and Water CEMP) Section 10.6 – Environmental Reporting SEMF
42	Cumulative Impacts Plan (1) The Rail Authority must not commence Rail Construction Works until a Cumulative Impacts Plan has been approved in accordance with this condition. (2) The ALC must: (a) prepare; and (b) submit to an Approver for approval; a Cumulative Impacts Plan in relation to cumulative impacts arising from the concurrent construction of the Airport Stage 1 Development and the Rail Development. (3) The criteria for approval of the Cumulative Impacts Plan are that an Approver is satisfied that the Cumulative Impacts Plan: (a) sets out:	Prior to rail construction works occurring	WSA and the Approver	Cumulative Impacts Plan (Rail) - WSA00-WSA-00400-EN-PLN-000013

Condition No.	Condition	Timing	Responsibility	Document reference
	(i) co-ordination and consultation requirements between the following stakeholders as relevant to manage the interface of projects under construction at the same time: the ALC, the Rail Authority, Transport for NSW, Western Parkland City Authority, Sydney Water, emergency service providers and utility providers; (ii) the responsibility for management of the impacts set out in the Cumulative Impacts Plan; (iii) the relevant environmental management framework relating to construction of the Airport Stage 1 Development and the Rail Development; and (iv) the process for proactively identifying and managing cumulative impacts; (b) has been prepared in consultation with the Rail Authority; and (c) is otherwise appropriate. (4) Each of the Rail Authority and the ALC must not act inconsistently with the approved Cumulative Impacts Plan.			

4.6. Environmental Impact Statement requirements

The requirements of soil and water management to be taken into account and addressed during the construction phase of the Stage 1 Development are included in the EIS, specifically Table 28-6. A summary of these requirements and how they have been addressed in this Soil and Water CEMP is presented in Table 7.

Table 7: Summary of biodiversity management requirements

EIS Reference	Topic	Summary	Soil and Water CEMP Reference
Table 28-6	Performance criteria	The performance criteria for the Soil and Water CEMP would include: • Compliance with the approved Soil and Water CEMP; • Compliance with the water pollution and soil pollution accepted limits outlined in the AEPR, including any local standards approved under the AEPR; and • Establishment of erosion and sedimentation controls in line with 'NSW OEH Blue Book - Managing urban stormwater: soils and construction' at the start of construction and progressively as construction progresses.	Section 3 – Objectives and targets
Table 28-6	Implementation framework	A Soil and Water CEMP will be approved prior to commencement of Main Construction Works for the proposed airport. The Soil and Water CEMP will collate measures to mitigate and manage potential impacts to the receiving environment and will include cross-references to other environmental management plans where relevant. The Soil and Water CEMP will as a minimum: • Detail the management and mitigation measures to be implemented, including those outlined in Table 28-7	Section 7- Environmental control measures
		• Describe the process for managing complaints, stakeholder engagement, and emerging environmental management issues as they arise	Section 10.8 – Environmental Incidents and complaints management
		• Specify the process for monitoring implementation reporting and auditing	Section 10 - Inspection, monitoring, auditing and reporting
		• Identify details of the party responsible for implementing the Soil and Water management CEMP.	Section 9 – Environmental roles and responsibilities
Table 28-6	Monitoring	General monitoring requirements are set out under the AEPR. These include that: • Monitoring must take place under direction of an appropriately qualified person; and • The results for the monitoring must be kept in a written record.	Section 10 - inspection, monitoring auditing and reporting
		Additional monitoring requirements include that:	-
		The most suitable surface and groundwater monitoring locations will be determined in consultation with NSW EPA and relevant local councils.	Section 10 - inspection, monitoring auditing and reporting

EIS Reference	Topic	Summary	Soil and Water CEMP Reference
		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 Department of Infrastructure and Regional Development upon request.	Section 10 - inspection, monitoring auditing and reporting
		The frequency of site inspections will be increased during and immediately after wet weather when there is a higher potential for the off-site transport of sediment from the airport site.	Section 10.1 - Environmental inspections
		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 completion of the Stage 1 development and until any identified impacts stabilise.	Section 10 - inspection, monitoring auditing and reporting
		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.	Section 10 - inspection, monitoring auditing and reporting
		Monthly surface water quality monitoring will be conducted to monitor performance of the drainage system. The monitoring will occur once the surface water drainage system is in place and take place at basin outflow and during selected upstream and downstream conditions.	Section 10 - inspection, monitoring auditing and reporting
Table 28-6	Auditing and reporting	General reporting requirements are set out under AEPR. In addition, an annual report will be prepared and submitted to the Secretary of the Department of Infrastructure and Regional Development in relation to compliance with *Soil and water management CEMP* for the period until the airport commences operations.	Section 10.6 - Environmental reporting
		Additional auditing and reporting measures that will be implemented will include:	-
		• Recording in a log book any exceptional incidents that cause excessive pollution of receiving waters and the action taken to resolve the situation; and	Section 10.8 – Environmental incidents and complaints management
		• Reporting pollution incidents resulting in offsite impacts to the NSW Environment Protection Authority	Section 10.8 – Environmental incidents and complaints management

EIS Reference	Topic	Summary	Soil and Water CEMP Reference
		The Community and Stakeholder Engagement Plan provides for the development of a complaints log and includes specific measures for how complaints will be managed.	Section 10.8 – Environmental incidents and complaints management
		Details regarding the required environmental management and mitigation controls associated with the management of soil and water. Including the following: • Surface water management system • Development of local standards • Erosion and sedimentation • Leaks and spills of fuel or other chemicals • Groundwater inflows • Land contamination	Section 7 - Environmental control measures
Table 28-6	Responsibility	Responsibilities include:	-
		The Soil and Water CEMP will be prepared in consultation with the NSW Environment Protection Authority and relevant local councils	Section 1.4 - Consultation requirements of this plan
		The Soil and Water CEMP will be submitted for approval to the Infrastructure Minister or an SES Officer in the Infrastructure Department	Section 1.6 – Certification and approval
		The design and construct (D&C) contractor will be responsible for implementing site specific environmental procedures and work method statements applicable to the proposed woks in accordance with the requirements of the Soil and Water CEMP	Section 1.2 – Purpose Section 9 – Environmental roles and responsibilities SEMF Section 4 – Roles and Responsibilities
		The airport environment officer will be responsible for day to day regulatory oversight of the AEPR compliance at the airport after an airport lease is granted	Section 9 – Environmental Roles and responsibilities SEMF Section 4 – Roles and Responsibilities

5. Existing environment

The following information is primarily summarised from Chapter 17 -Topography, geology and soils and Chapter 18 - Surface and groundwater of the EIS Volume 2A. 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 phase of Main Construction Works covered by this CEMP, 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 - for details with regards to environmental mitigation measures and controls for the management of impacts refer to Section 7.

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 mAHD. The broad topography of the Airport Site generally sloped away from the ridges in the west, with elevations generally between 40 mAHD and 90 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 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 WSA 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.

5.1.4. Contaminated land

The Airport Site has been historically occupied for a variety of land uses, ranging from market gardens, residential to light commercial and industrial uses. Contamination is present as a result of these land uses with the primary contaminant of concern being asbestos (primarily bonded asbestos containing material (ACM) and some limited areas of fibrous asbestos and/or asbestos fines (AF/FA)) in surface and near surface soils. In addition, small isolated areas of chemical contamination such as hydrocarbons and heavy metals have been identified in surface and sub-surface soils. Contamination has been identified to be limited to surface and sub-surface soils with elevated concentrations of heavy metals in surface water and groundwater attributable to natural background conditions.

Remediation of the contamination was 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 made suitable. 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. For the EIS, average measures were taken from 1998 to 2015 which are shown in Table 8 and have been crossed checked against 2019 measurements. Average annual rainfall at the Airport Site is 676.6 millimetres (mm).

Table 8: Average monthly rainfall at the Airport Site*

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

Climate and rainfall data have been updated since the EIS development. There is a strong seasonal variation in temperature at Badgerys Creek. During the data collection and review period for the EIS and in 2019, January was the hottest month while June and July were the coldest months as presented below in Table 10.

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 month, with an average rainfall of 30 millimetres. In 2019, the average rainfall in February is 342 millimetres while July remains the driest month.

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

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. All of the Airport Site subcatchments drain to the Hawkesbury-Nepean system downstream of Lake Burragorang.

Prior to construction, most of the Airport Site drained to South Creek via Oaky Creek, Cosgrove Creek and Badgerys 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. Following construction, these conditions will generally be replicated.

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).

Figure 2 provides an overview of the local and site catchments.

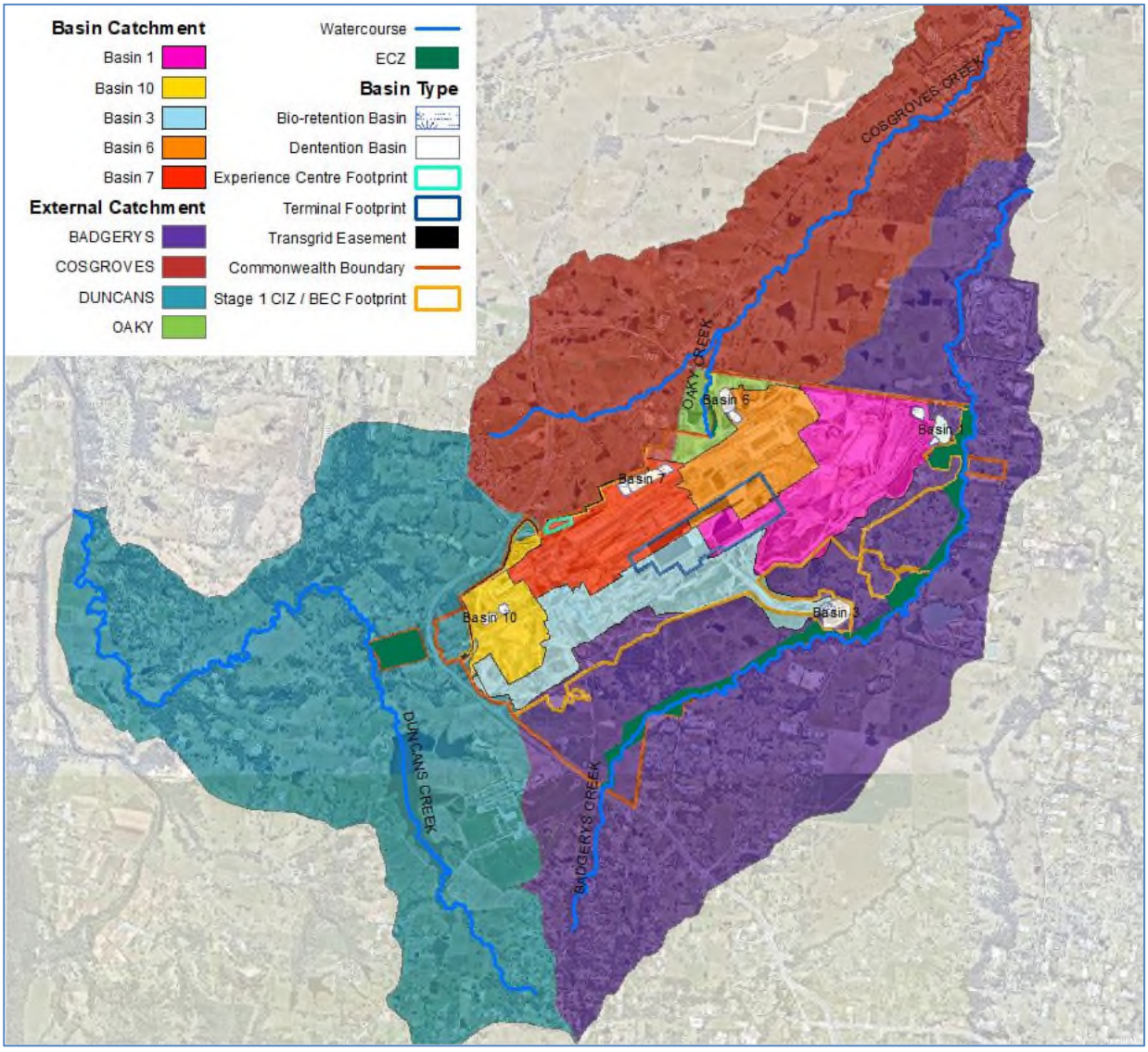


Figure 2: Local hydrological catchments

5.2.3. Watercourses

Prior to commencement of construction, the Airport Site contained 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 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 2 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.

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. Refer to Figure 3 for the extent and degree of flooding in a 100-year ARI associated with Badgerys Creek and Cosgroves Creek, which indicates only a minor encroachment into the Early Earthworks footprint, restricted to a small area in the north-east of the site and a small portion near Basin 3. The Experience Centre and Site Office area, the Material Importation area, and the Terminal and Specialty Services Works area are not impacted by flooding as indicated in Figure 3.

Figure 3: Existing flood depths – 100-year ARI, Badgerys and Cosgroves Creeks

The relative catchment area impacted by the BEC, and the associated increase in hardstand area, has the potential to increase downstream flows and flood levels., This will ultimately result in changes to the flood depths compared to those shown, however this has been contemplated in the design, which includes designed retention and detention basins to ensure no adverse flood impacts are experienced on downstream properties.

For the Bulk Earthworks, the drainage design considers the cost benefit of the various drainage elements while addressing potential project risks, durability, performance, operational issues and safety as well as community expectations in relation to the environmental impacts of the project, specifically water quality management and flooding. The drainage design provides the required flood immunity to the airport runways, taxiways and other airport works as identified by EIS. Impacts have been assessed for the 1% AEP.

The Terminal and Speciality Services Works sit within the bulk earthworks footprint and will utilise the stormwater drainage design swales as constructed by the BEC contractor.

The Stormwater system will be designed and constructed within the Terminal and Specialty Services works zone in accordance with adopted parameters to tie into the overall site stormwater system, 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 as shown in Figure 3 for example, locating stockpiles and fuel storage areas outside the 100 year flood level.

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 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
- Total nitrogen
- Iron
- Copper
- Nitrate
- Zinc
- Phosphorous

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 9, indicates low potential for connectivity between groundwater aquifers.

Table 9: 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. The location of these groundwater receptors in Figure 4.

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.

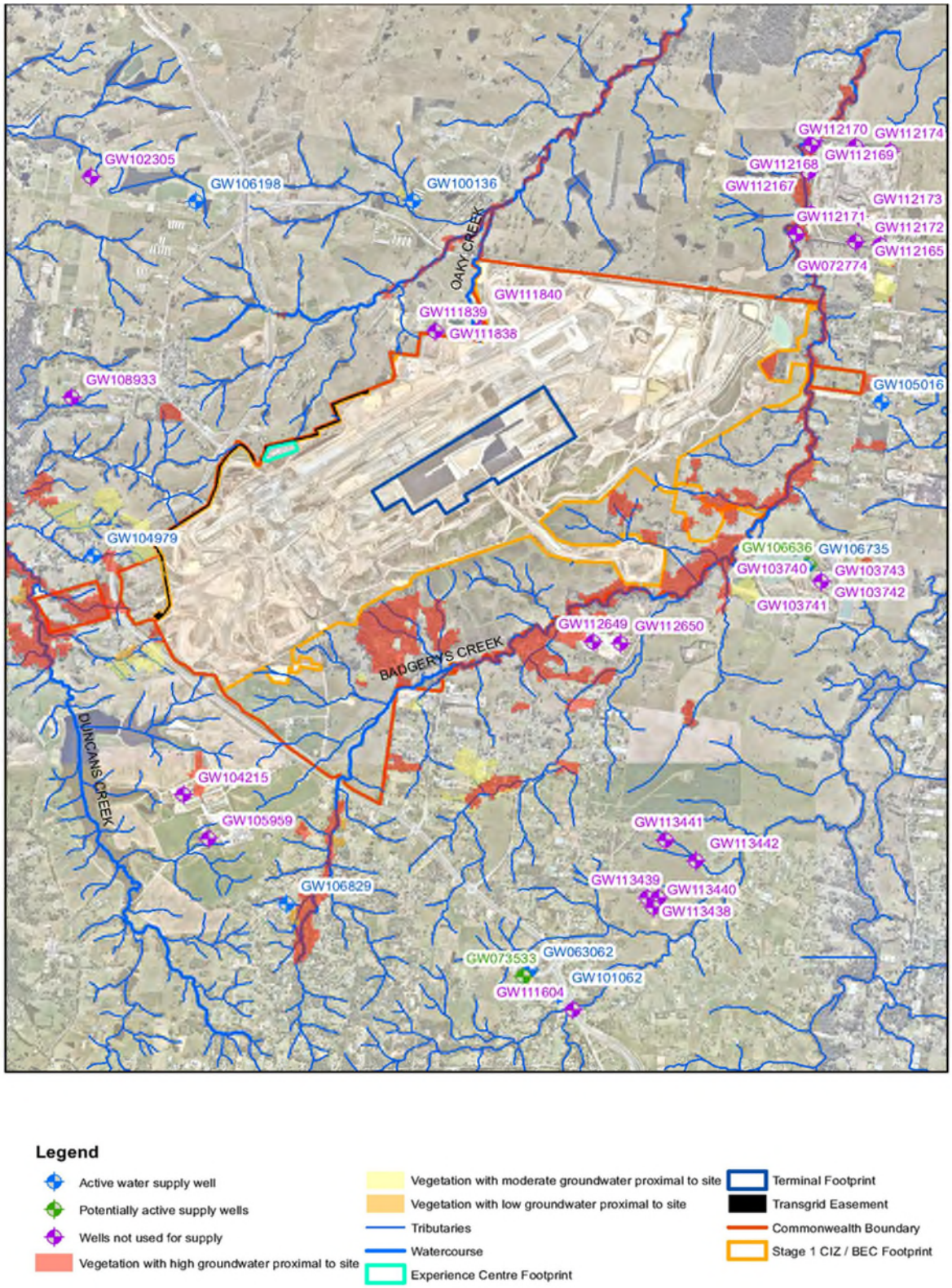


Figure 4: Groundwater receptors

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;
- Road construction and other civil works;
- Foundation piling
- Concrete batching plant supply and operation
- Storage of fuels and chemicals, refuelling;
- Stockpiling of materials;
- 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 will change the topography of the Airport Site from rolling landscapes to a built environment with some landscaping. The earthworks will affect 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.

Follow on contractors such as the terminal and specialty services works will only contribute to minor topography changes to achieve the necessary reduced levels required to meet the terminal building design heights.

Refer to the Construction Plan (Section 6) for further details on the scope of work for bulk earthworks that may affect the upper units of the Bringelly Shale as described above.

6.2.2. Soil erosion and degradation

The Bulk Earthworks involves the excavation of approximately 26 million cubic metres of material including about 1.9 million cubic metres of topsoil within the construction impact zone.

Topsoil was stockpiled while the remaining excavated material was distributed within the construction impact zone. As cut and fill requirements are expected to be equal, most soil material remained at the Airport Site and will not generally be moved further than two kilometres. Note, for details for the management and implementation of the Topsoil Protocol, refer to the Aboriginal Cultural Heritage CEMP.

Clearing and Bulk Earthworks have temporarily increased the area of exposed soil at the Airport Site, ultimately increasing the risk of erosion. The majority of Bulk Earthworks occurred in the Blacktown and South Creek soil landscapes. The Blacktown soil landscapes have a slight to moderate erosion potential for non-concentrated flows. The South Creek soil landscapes, and some subsoils in the Blacktown soil landscape, have higher erosion potential.

For the Terminal and Specialty Services Works, the majority of areas will be handed over by the BEC Contractor with a crushed sandstone capping layer and/or a spray seal bituminous binder that will provide protection from soil erosion and degradation. The Terminal and Specialty Services Works contractor will temporarily expose the terminal apron in preparation for pavement and concreting works, and similarly temporarily expose public domain areas in preparation for final landscaping and vegetation works.

For the aviation fuel ring main, excavation trenching works have been staged to minimise the extent of open excavation and exposure of subgrade soil material. Upon completion of fuel pipework installation, services trenches will be backfilled, compacted and revegetation of topsoil will take place as soon as possible.

If improperly managed, topsoil stockpiles will not only present an erosion hazard but will also potentially lose their chemical and physical fertility over time.

6.2.3. Land contamination

Construction of the Stage 1 Development 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.

Bulk Earthworks 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 WSI.

6.3. Surface water impacts

Site preparation and construction will transform approximately 60 per cent of the Airport Site from a rolling grassy and vegetated landscape to essentially a built landscape with some landscaping. These changes will alter the catchment areas within the Airport Site and the permeability of the ground surface, altering the duration, volume and velocity of surface water flow from this site.

Following the bulk earthworks, the site has been recontoured with the construction of sediment basins and swales, designed for an 80th Percentile 5-Day rain event (27.6mm). The recontouring creates areas of reduced flow velocities for surface water flow. Vegetation over the recontoured bulk earthworks areas will also facilitate reduced flow velocities and increased infiltration. During construction of the Terminal and Specialty Services Works, surface water will generally fall and runoff into these sediment basins and swales constructed by the BEC contractor.

The Terminal and Speciality Services Works sit within the bulk earthworks footprint and will utilise the stormwater drainage design swales and sediment basins as constructed by the BEC contractor. Intermediate stormwater and sediment erosion controls will be designed and constructed in accordance with the Blue Book to ensure that surface water will fall and runoff into these swales and sediment basins of the wider WSA Airport site. The Bulk Earthworks program has involved the removal of one kilometre of minor watercourses within the

construction impact zone, the majority being drainage lines and valley fills with less defined channels. In addition, all farm dams of varying sizes will be removed as part of the Bulk Earthworks project. Construction will also change the topography and permeability of sub-catchment areas at the Airport Site, affecting flows in receiving watercourses upstream and downstream of the Airport Site. These changes will occur progressively during construction.

6.3.1. Flooding

Construction of the Stage 1 Development will modify drainage direction and overland flow paths, changing the nature of flooding on the Airport Site. As construction progresses and the impervious area expands, the volume of runoff from the Airport Site will also increase.

The Terminal and Specialty Services works are occurring generally on recontoured land as a result of the bulk earthworks, that has reduced the potential flood impact.

There is a high likelihood of large rainfall events during construction. This has the potential to disrupt construction activities due to flooding and waterlogged soils, as well as the potential for downstream flooding. Detention basins have been established at the commencement of the construction program to mitigate the increase in runoff, reducing offsite impacts of surface water flows. See further detail in Section 8.

6.3.2. Surface water quality

These conditions will present a risk of erosion and associated surface water quality impacts. Bulk Earthworks did not occur within 300 metres of Cosgroves Creek or 880 metres of Duncans Creek. Bulk Earthworks are required to occur adjacent to Badgerys Creek. Refer to Section 7 for details of the management measures.

The design capacity and placement of detention basins will ensure that all drainage water from disturbed areas will be captured prior to discharge. The water management system will include the main detention basins supplemented by a series of interim sediment basins and control measures within the immediate work area. The water management system will have the effect of improving the quality of the surface water prior to release to receiving waters by allowing sediment to settle within the basins.

Construction of the Bulk Earthworks and the Terminal and Speciality Services works will also involve the use of a range of fuels and chemicals. These substances may be released to the environmental in the event of a mishap during refuelling, maintenance or general storage or handling.

6.4. Groundwater impacts

6.4.1. Groundwater recharge

As stated in the EIS, groundwater recharge may be affected by compaction and the establishment of impermeable surfaces across the Airport Site during construction. Re-profiling the land has potentially lead to a temporary increase in rainfall recharge during Bulk Earthworks, as the fill is likely to have a higher overall permeability than the historic site conditions. However, as construction of the Terminal and Specialty Services works progresses, the proportion of paved surfaces will have increased, reducing recharge to below existing conditions.

Overall, minimal change to local groundwater recharge will be expected as the existing shale derived clay soils have low permeability resulting in most of the rainfall at the site being released as stormwater runoff rather than infiltrating to groundwater. As stated in the EIS it is not expected that a reduction in recharge will affect any sensitive ecological receptors or beneficial uses of the groundwater system.

6.4.2. Groundwater drawdown

The EIS considered the potential for groundwater drawdown at the Airport Site. The EIS stated that drawdown is anticipated as a result of Airport Site re-profiling and dewatering of excavation beneath the water table. The extensive re-profiling had the potential to result in a lowering of groundwater elevations in areas that historically have higher topographic elevation. It is also expected to result in reduced groundwater flow rates and reduced discharge to surrounding surface features. However, the re-profiling and construction will not result in

dewatering of the groundwater system below the level of the surrounding creeks and there will be no potential for creeks to dry up due to groundwater drawdown.

Establishment of basements and foundation piling in the terminal complex as part of the Stage 1 Development may intercept the underlying shale aquifers and require dewatering and management throughout construction. Where required, water encountered will be treated through onsite sediment basins and tanks prior to release. As per Section 18.5.4.2 of the EIS due to low inherent hydraulic conductivities of the geology in these areas, it can be expected that seepage volumes will be relatively small.

6.4.3. Groundwater quality

Potential groundwater quality risks include isolated spills and incidents occurring during construction, and diffuse impacts associated with general construction activities such as the use of machinery. Contaminants of primary concern are usually hydrocarbons; however, other chemicals such as herbicides, pesticides and fertiliser may also be used during construction. Impacts may result from the infiltration of pollutants through the ground surface or through dirty water retention facilities (such as temporary sediment basins) to the underlying groundwater systems.

Groundwater seepage into excavations for building basements will need to be managed by pumping seepage to stormwater management facilities or other suitable treatment systems. Chemicals of concern in groundwater seepage include:

- Total dissolved solids;
- Metals;
- Total nitrogen;
- Phosphorus; and
- Sulphate.

Groundwater present in the shallow geology has been identified to have high salinity values. The excavation of this material for infilling could permit the release of additional salts into groundwater. This will only occur where increased recharge occurs to fill areas, and where a shallow groundwater table develops in the fill material.

6.5. Cross-Packages impacts

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 program 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 (Appendix G of the SEMF). The parts of the overall risk assessment relevant to Biodiversity have been extracted and summarised in Table 10 applies to all phases of works that the Construction 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 10.

Table 10: Soil and water risk assessment

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
1	BEC	Site establishment and operation during construction	Site and delivery vehicles travelling on unsealed roads	Sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	Med (17)	SW_29 SW_30 SW_31 SW_32 SW_33 SW_34	Med (13)	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	BEC			Sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	Med (17)	SW_29 SW_30 SW_31 SW_32 SW_33 SW_34	Med (13)	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
3	BEC		Erosion and sedimentation of site compound areas	Erosion and sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	Med (17)	SW_29 SW_30 SW_31 SW_32 SW_33 SW_34	Med (13)	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	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
4	BEC	Site establishment (continued)	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	Med (17)	SW_38	Med (13)	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
5	BEC	Utility works	Potholing and trenching	Sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	Low (5)	SW_29 SW_30 SW_31 SW_32 SW_33 SW_34	Very Low (3)	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
6	BEC	Earthworks and Construction	Topsoil stripping / clearing, grubbing and Land recontouring	Sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	Med (17)	SW_29 SW_30 SW_31 SW_32 SW_33 SW_34	Low (9)	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

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
7	BEC	Earthworks Construction (continued)	Excavation	Sedimentation	Build up of water in excavations causing runoff to site / offsite areas	Low (5)	Ground water MM (SW15-23) SW_29 SW_30 SW_31 SW_32 SW_33 SW_34	Very Low (3)	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
8	BEC		Excavation (Cont.)	Ground water	Intercepting ground water causing sediment runoff to waterways, ecological areas, local drainage	Low (6)	Ground water MM (SW15-23)	Low (6)	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
9	BEC	Earthworks and Construction (continued)	Stockpiling materials	Erosion and sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	Med (13)	SW_29 SW_30 SW_31 SW_32 SW_33 SW_34 SW_35 SW_36	Low (9)	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	BEC		Constructing waterway crossings	Sedimentation	Sediment discharge to creeks / erosion of crossing platform	Med (13)	SW_29 SW_30 SW_31 SW_32 SW_33 SW_34	Low (9)	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	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
12	BEC	Culvert construction	Culvert excavation	Sedimentation	Sediment discharge to creeks / offsite	Med (17)	Ground water MM SW_15-23 SW_29 SW_30 SW_31 SW_32 SW_33 SW_34	Low (9)	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
13	BEC	Concrete works	Drainage	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	Low (8)	SW_29 SW_30 SW_31 SW_32 SW_33 SW_34	Low (5)	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
14	BEC		Concrete pours	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	Low (8)	SW_29 SW_30 SW_31 SW_32 SW_33 SW_34	Low (5)	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	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
15	BEC	Waste storage	Concrete washouts	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	Low (8)	SW_29 SW_30 SW_32 SW_33 SW_34	Low (5)	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
16	BEC		Temporary waste storage	Excess waste generation	Improper storage of waste concrete causing excess material waste (cross contamination of soils)	Low (8)	SW_26 SW_27 SW_29 SW_30 SW_32 SW_33 SW_34	Low (5)	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
17	B	Contaminated material works (Remediation)	Excavation	Asbestos	Cross contamination of surrounding areas	Med (13)	SW24 SW_25	Low (9)	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	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure [1]	Risk level post-mitigation	Management tools
18	BEC	Contaminated material works (Remediation)	Excavation	Asbestos	Improper validation of contaminated/ remediated areas	Med (18)	SW24 SW_25	Med (14)	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
19	BEC		Excavation (continued)	Acid Sulphate Soils	Cross contamination of surrounding areas	Low (5)	SW2_24 SW_25	Very Low (3)	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	BEC	Contaminated material works (Remediation) (continued)			Improper validation of contaminated/ remediated areas	Low (5)	SW_24 SW_25	Very Low (3)	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	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure [1]	Risk level post-mitigation	Management tools
21	BEC	Contaminated material works (Remediation) (continued)		PFOS/PFAS	Cross contamination of surrounding areas	Low (5)	SW_14 SW_24 SW_25	Very Low (3)	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	BEC		Excavation (continued)		Improper validation of contaminated/ remediated areas	Low (5)	SW_14 SW_24 Testing as per Appendix D and this Soil and Water CEMP	Very Low (3)	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	BEC	Site water management	Dewatering	Sedimentation	Incorrect treatment and discharge of sediment basins	Med (17)	SW_33	Low (9)	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	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
24	BEC			Sedimentation	Incorrect treatment and discharge of sediment traps and excavations throughout site	Med (17)	SW_29 SW_30 SW_31 SW_32	Low (9)	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	BEC	Road paving activities	Milling and excavation of road surfaces	Erosion and sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	Med (13)	SW_29 SW_30 SW_31 SW_32	Low (9)	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
26	BEC	Road paving activities	Asphalt works	Contamination	runoff to surrounding areas from asphalt if laid in intermittent weather	Med (13)	SW_13	Low (9)	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
27	BEC	Chemical use	Storage of chemicals	Contamination	Site and surrounding area contamination due to chemical runoff	Low (8)	SW_13 Chemical storage MM (SW_40-SW_46	Low (5)	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	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
28	BEC	Chemical use (continued)	General use of chemicals onsite	Contamination	Site and surrounding area contamination due to chemical runoff	Low (8)	SW_13 Chemical storage MM (SW_40-SW_46)	Low (5)	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
29	BEC	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	Med (13)	SW_47 SW_48 SW_49 SW_50	Low (9)	Soil and Water CEMP (in particular GWMP, CPSWMP, ESCPs) WSA Emergency and Incident Response Procedure
30	BEC	Water treatment facility operation	Operation of facility	Sewage discharge/ overflow	Soil pollution	Low (9)	SW_51	Low (6)	Soil and Water CEMP ECM WSA Emergency and Incident Response Procedure
31	Terminal	Terminal Construction Works - Typical	General education	Site requirements	Failure to follow site protocols	Low (9)	SW_13	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
32	Terminal	Terminal Construction Works - Typical	Incidents (spills, site contamination)	Site requirements	Failure to report issues and incidents	Medium (18)	SW_13	Medium (14)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
33	Terminal	Terminal Construction Works - Typical	Operation of Mobile Plant and Equipment	Contamination	Chemical/oil leaks from the Mobile Plant and Equipment	Low (9)	SW_13	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
34	Terminal	Terminal Construction Works - Typical	Site and delivery vehicles travelling on unsealed roads	Sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	Low (9)	SW_12 SW_29 SW_31 SW_32	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
35	Terminal	Terminal Construction Works - Typical	Dewater Site	Sedimentation	Incorrect treatment and discharge of sediment basins	High (21)	SW_52	Medium (14)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
36	Terminal	Terminal Construction Works - Typical	Flood event	Contamination	Flood occurs within the chemical storage / plant parking zones and water is contaminated	High (21)	SW_47 SW_48 SW_49	Medium (14)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
37	Terminal	Terminal Construction Works - Typical	Dewater Site	Sedimentation	Incorrect treatment and discharge of sediment traps and excavations throughout site	High (21)	SW_52	Medium (14)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
38	Terminal	Terminal Construction Works - Typical	Water treatment facility operation	Sewage discharge/ overflow	Soil pollution	Low (9)	SW_46	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
39	Terminal	Terminal Construction Works - Typical	Storage of hazardous Chemical / Materials / Fuels	Contamination	Site and surrounding area contamination due to chemical runoff	High (21)	SW_41 SW_42 SW_43 SW_44 SW_45 SW_46	Medium (14)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
40	Terminal	Terminal Construction Works - Typical	Use of hazardous Chemical / Materials / Fuels	Contamination	Site and surrounding area contamination due to chemical runoff	Low (9)	SW_41 SW_42 SW_43 SW_44 SW_45 SW_46	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
41	Terminal	Terminal Construction Works - Typical	Erosion and sedimentation of project areas	Erosion and sedimentation	Unnecessary disturbance of areas not requiring construction causing erosion and sedimentation issues to waterways, ecological areas, local drainage	Low (9)	SW_12SW_29SW_31SW_32	Low (6)	Soil and water CEMPWaste and Resources CEMP Air Quality CEMPTraffic CEMP EWMS InductionComplaints Procedures ESCPs ECM
42	Terminal	Terminal Construction Works - Typical	Erosion and sedimentation of project areas	Erosion and sedimentation	Disturbance and deterioration of erosion and sedimentation controls	Low (9)	SW_12 SW_29 SW_31 SW_32	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
43	Terminal	Terminal Construction Works - Typical	Trade Waste Water washout	Pollution to waterways / ecological areas	Offsite discharge/pollution to waterways, ecological areas, local drainage	Medium (17)	SW_52	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
44	Terminal	Terminal Site Establishment	Minor investigation geotechnical test pits	Sedimentation	Offsite discharge/pollution to waterways, ecological areas, local drainage	Medium (17)	SW_12 SW_29 SW_31 SW_32	Low (9)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
45	Terminal	Detailed Civil works	Detailed excavation including Trenching, footings and in ground tanks	Sedimentation	Offsite discharge/pollution to waterways, ecological areas, local drainage	Low (9)	SW_12 SW_29 SW_31 SW_32	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
46	Terminal		Detailed excavation including Trenching, footings and in ground tanks	Sedimentation	Build up of water in excavations causing runoff to site / offsite areas	Low (9)	SW_12 SW_29 SW_31 SW_32	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
47	Terminal	Detailed Civil works	Stockpiling materials from auger works	Erosion and sedimentation	Offsite discharge/pollution to waterways, ecological areas, local drainage	Low (9)	SW_12 SW_29 SW_31 SW_32	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
48	Terminal	Detailed Civil works	Storage of Fuels	Contamination	Site and surrounding area contamination due to chemical runoff	High (21)	SW_41 SW_42 SW_43 SW_44 SW_45 SW_46	Medium (14)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
49	Terminal	Detailed Civil works	Use of fuels / Refuelling activities	Contamination	Site and surrounding area contamination due to chemical runoff	Medium (18)	SW_41SW_42SW_43SW_44SW_45SW_46	Medium (14)	Soil and water CEMPWaste and Resources CEMP Air Quality CEMPTraffic CEMP EWMS InductionComplaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
50	Terminal	Detailed Civil works	Material Storage / stockpiling activities	Erosion and sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	Low (9)	SW_12 SW_29 SW_31 SW_32	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
51	Terminal	Detailed Civil works	Incidents (spills, site contamination) occurs on soil under the RAP	Site requirements	Spill occurs and there is soil contamination under the RAP	Medium (18)	SW_42	Medium (14)	Soil and water CEMP RAP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
52	Terminal	Detailed Civil works	Piling activities	Soil Contamination under the RAP	Spoil from piling fill mixes with the VENM	Medium (13)	SW_53	Low (9)	Soil and water CEMP RAP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
53	Terminal	Detailed Civil works	Concrete Activities - Drainage	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	Low (9)	SW_52	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
54	Terminal	Detailed Civil works	Concrete Pours	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	Medium (13)	SW_52	Low (9)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
55	Terminal	Detailed Civil works	Concrete Washout	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	Low (9)	SW_41	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
56	Terminal	Installation of Aviation Fuel Ring Main	Detailed excavation	Sedimentation	Offsite discharge/pollution to waterways, ecological areas, local drainage	Low (9)	SW_12 SW_29 SW_31 SW_32	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
57	Terminal	Installation of Aviation Fuel Ring Main	Detailed excavation	Sedimentation	Build up of water in excavations causing runoff to site / offsite areas	Low (9)	SW_12 SW_29 SW_31 SW_32	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
58	Terminal	Installation of Aviation Fuel Ring Main	Use of fuels	Contamination	Site and surrounding area contamination due to chemical runoff	Medium (13)	SW_41 SW_42 SW_43 SW_44 SW_45 SW_46	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
59	Terminal	Installation of Aviation Fuel Ring Main	Material Storage / stockpiling activities	Erosion and sedimentation	Offsite discharge/pollution to waterways, ecological areas, local drainage	Low (9)	SW_12 SW_49	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
60	Terminal	Structure - Terminal & TER Buildings	Concrete Pours	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	Low (9)	SW_13	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
61	Terminal	Structure - Terminal & TER Buildings	Concrete Washout	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	Low (9)	SW_13	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
62	Terminal	Structure - Terminal & TER Buildings	Concrete pumps/trucks	Pollution to waterways / ecological areas	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	Low (9)	SW_13	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
63	Terminal	Fit out works	Storage Membrane	Contamination	Site and surrounding area contamination due to chemical runoff	Low (9)	SW_41 SW_42 SW_43 SW_44 SW_45 SW_46	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
64	Terminal	Fit out works	Painters washout	Contamination	Offsite concrete runoff /pH rise to waterways, ecological areas, local drainage	Low (9)	SW_52	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
65	Terminal	External Works	Milling and excavation of road surfaces	Erosion and sedimentation	Offsite sediment discharge/pollution to waterways, ecological areas, local drainage	Low (9)	SW_12SW_29SW_31SW_32	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMPTraffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
66	Terminal	External Works	Asphalt works	Contamination	runoff to surrounding areas from asphalt if laid in intermittent weather	Low (9)	SW_13	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM
67	Terminal	External Works	Concrete Batching Plant	Contamination	runoff to surrounding areas from concrete batching plant	Low (9)	SW_13	Low (6)	Soil and water CEMP Waste and Resources CEMP Air Quality CEMP Traffic CEMP EWMS Induction Complaints Procedures ESCPs ECM

Ref	Package	Activity	Construction Aspect	Environmental Aspect	Potential Impact	Risk level pre-mitigation	Mitigation measure	Risk level post-mitigation	Management tools
68	Sitewide	Inter package water management	All packages	Pollution to waterways	Offsite discharge/pollution to waterways, ecological areas, local drainage	Medium (13)	SW_01 SW_29 SW_31 SW_47 SW_50 SW_52	Low (6)	Soil and water CEMP Waste and Resources CEMP EWMS Induction ESCPs ECM Permits to dewater
69	Sitewide	Rain event management	All packages	Site inundation	Build-up of water in excavations causing runoff to site / offsite areas	Medium (13)	SW_01 SW_29 SW_31 SW_47 SW_50 SW_52	Low (6)	Soil and water CEMP Waste and Resources CEMP EWMS Induction Complaints Procedures ESCPs ECM Permits to dewater

7. Environmental control measures

Mitigation and management measures that will be implemented during construction are detailed in Table 11and are consistent with those provided in Tables 28-6 and 28-7 in Chapter 28 of the EIS, as per Condition 10 (Section 3.10.2) of the Airport Plan. Operational mitigation and management measures relevant to the construction phase from Table 28-29 and 28-30 of Chapter 28 of the EIS have also been provided below. The relevant control measures will be included in the site-specific Environmental Work Method Statement (EWMS) and Environmental Control Map (ECM) – refer to the SEMF for further detail. For monitoring of the implementation of control measures, refer to Section 9.

Table 11: Soil and water environmental control measures

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
EE: Early Earthworks BEC: Bulk Earthworks Contract MI: Material Importation All Contractors: BEC, , MI, Terminal and other contractors as delegated by 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.	Pre-construction / Construction	Design Completed. The detailed design demonstrated a water quality treatment train has been designed so that water discharged from site meets both quality and quantity requirements. The water quality treatment train includes, but is not limited, to On-Site Detention Basins, bio-swales, and bioretention basins Management measures SW_01 and will include SW_02, SW_03, SW_04, SW_05, SW_06, SW_07, SW_08, SW_09, SW_10 have been adopted within the design. The design took into 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”).	BEC Design team	EIS Table 28-7

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
EE: Early Earthworks BEC: Bulk Earthworks Contract MI: Material Importation All Contractors: BEC, , MI, Terminal and other contractors as delegated by WSA					
SW_02	A detailed design of basins and channels to capture the majority of runoff, including during construction;	Pre-construction / Construction	Design 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. 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.	BEC Design team BEC	EIS Table 28-7
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	BEC Design team	EIS Table 28-7
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;	Pre-construction / Construction	As above	BEC Design team	EIS Table 28-7
SW_05	Pollutant traps to prevent debris and other coarse material entering the drainage system;	Pre-construction / Construction	As above	All Contractors	EIS Table 28-7
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	BEC Design team	EIS Table 28-7
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	All Contractors	EIS Table 28-7
SW_08	Measures to address impacts on downstream and upstream uses, including sensitive environmental values;	Pre-construction / Construction	As above	BEC Design team	EIS Table 28-7
SW_09	Volumes and sources of construction water; and	Pre-construction / Construction	As above	All Contractors	Good practice

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
EE: Early Earthworks BEC: Bulk Earthworks Contract MI: Material Importation All Contractors: BEC, , MI, Terminal and other contractors as delegated by WSA					
SW_10	Processes for treatment and discharge of any water from site and associated monitoring, reporting and regulatory approval requirements	Pre-construction / Construction	As above	All Contractors	Good practice
DEVELOPMENT OF LOCAL STANDARDS					
SW_11	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.	WSA - Environment Manager	N/A
EROSION AND SEDIMENTATION					
SW_12	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 Section 4 of the SEMF. 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. An example of an ESCP can be found in Appendix A.	All Contractors – Project Soil Conservationist, and WSA environment team.	Good practice EIS Table 28-7
SPILL RESPONSE					
SW_13	A protocol will be developed and implemented to respond to and remedy leaks or spills.	Construction	The WSA emergency spill response procedure is included as Appendix Q of the SEMF. The requirements of the procedure is included in inductions undertaken by all staff, workers and visitors before attending the site.	All Contractors Environment Manager	EIS Table 28-7

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
EE: Early Earthworks BEC: Bulk Earthworks Contract MI: Material Importation All Contractors: BEC, , MI, Terminal and other contractors as delegated by WSA					
PFAS					
SW_14	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 9.2 of this plan.	All Contractors Environment Manager	Condition 8(6) and 34
GROUNDWATER MANAGEMENT					
SW_15	A groundwater management plan is to be developed and implemented identifying:	Prior to Main Construction Works	The bulk earthworks had the potential to 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 BEC commencing, refer Section 9.4 detailing the management measures to be implemented	BEC, Environment Manager and Design Manager.	Condition 8(4) and 8(5)
SW_16	Details of work that intercepts groundwater or requires groundwater extraction;				
SW_17	An assessment of aquifer impacts resulting from groundwater interception or extraction;				
SW_18	Extraction methodology and management measures for discharge; and				
SW_19	Groundwater monitoring and inspection programs.				
GROUNDWATER INFLOWS					
SW_20	To mitigate the impacts associated with groundwater inflows the following measures will be implemented:	N/A	Note.	BEC, Site supervisor, environment team and construction team	EIS Table 28-7
SW_21	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.		EIS Table 28-7

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
EE: Early Earthworks BEC: Bulk Earthworks Contract MI: Material Importation All Contractors: BEC, , MI, Terminal and other contractors as delegated by WSA					
SW_22	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	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.		EIS Table 28-7
SW_23	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		EIS Table 28-7
LAND CONTAMINATION					
SW_24	A remedial action plan and unexpected finds protocol will be established 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 and unexpected finds protocol (Appendix I of the SEMF) have been established. 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.	EIS Table 28-7
SW_25	Any asbestos identified on site will be managed in accordance with applicable regulatory requirements.	Construction	The unexpected finds protocol (Appendix I of the SEMF) 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.	
SW_26	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 (EIS Table 28-17) Good practice
SW_27	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.	All Contractors – Site supervisors & Engineers.	Waste and resources CEMP (EIS Table 28-17) Good practice
EROSION AND SEDIMENTATION					
SW_28	Impacts associated with erosion and sediment will be mitigated through:	Note	NA	NA	NA

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
EE: Early Earthworks BEC: Bulk Earthworks Contract MI: Material Importation All Contractors: BEC, , MI, Terminal and other contractors as delegated by WSA					
SW_29	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 WSA Environment Manager (or delegate) on a weekly basis to evaluate the effectiveness of environmental controls implemented by the contractor. An example of an ESCP can be found in Appendix A.	All Contractors – Environment team, Site Supervisors and Engineers. WSA - Environment Manager (or delegate)	Good practice
SW_30	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.	EIS Table 28-7
SW_31	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. 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.	EIS Table 28-7
SW_32	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.	All Contractors – Site supervisors & environment team.	EIS Table 28-7
SW_33	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.	BEC - Design Team	EIS Table 28-7
SW_34	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.	All Contractors, Site supervisors, engineers and environment team.	EIS Table 28-7

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
EE: Early Earthworks BEC: Bulk Earthworks Contract MI: Material Importation All Contractors: BEC, , MI, Terminal and other contractors as delegated by WSA					
SW_35	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.	All Contractors, Site supervisors, engineers and environment team.	EIS Table 28-7
SW_36	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.	All Contractors – Site supervisors.	EIS Table 28-7
SW_37	Distributing and seeding topsoil over landscaped areas at the completion of Bulk Earthworks.	Construction	Will be undertaken as per SW_37 under supervision of the construction and environmental management teams.	BEC, Site supervisors, engineers and environment team.	EIS Table 28-7
SW_38	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.	All Contractors – Site supervisors, engineers and environment team.	EIS, Section 16.7.2 Mitigation and management of impacts
PROGRAMMING					
SW_39	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.	All Contractors, Site supervisors, engineers and environment team.	Good practice
LEAKS OR SPILLS OF FUEL OR OTHER CHEMICALS					
SW_40	To minimise the risk of leaks or spills the following mitigation measures will be put in place:	Note	The WSA emergency spill response procedure is included as Appendix Q of the SEMF	NA	EIS Table 28-7

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
EE: Early Earthworks BEC: Bulk Earthworks Contract MI: Material Importation All Contractors: BEC, , MI, Terminal and other contractors as delegated by WSA					
SW_41	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. 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. The WSA emergency spill response procedure is included as Appendix Q of the SEMF.	All Contractors – workshop foreman and site supervisors.	EIS Table 28-7
SW_42	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. 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	All Contractors – site supervisors	EIS Table 28-7
SW_43	AS 1940-2004 The storage and handling of flammable and combustible liquids;	Construction	Refer to SW_41	All Contractors – site supervisors	EIS Table 28-7
SW_44	AS/NSZ 4452:1997 The storage and handling of toxic substances;	Construction	Refer to SW_41	All Contractors – site supervisors	EIS Table 28-7
SW_45	AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods; and	Construction	Refer to SW_41	All Contractors – site supervisors	EIS Table 28-7
SW_46	AS/NZS 1547:2012 On-site domestic wastewater management.	Construction	Refer to SW_41	All Contractors – site supervisors	EIS Table 28-7
FLOOD MANAGEMENT					
SW_47	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

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
EE: Early Earthworks BEC: Bulk Earthworks Contract MI: Material Importation All Contractors: BEC, , MI, Terminal and other contractors as delegated by WSA					
SW_48	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
SW_49	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_49 under the supervision of the construction and environmental management teams.	All Contractors – Site supervisors and environment team	Good practice
SW_ 50	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_50. The applicable Emergency Plan will be discussed during the inductions undertaken by all staff, workers and visitors before attending the site.	All Contractors within the CIZ – all personnel under the direction of the site supervisors WSA for areas outside the CIZ	Good practice
WATER TREATMENT FACILITY OPERATION					
SW_51	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).	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.	WSA	Table 28-30
DEWATERING					
SW-52	All dewatering activities off site must be undertaken in accordance with the WSA Dewatering Permit 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_52 to allow a coordinated release of water, effective sediment basin management and to mitigate potential Cumulative Impacts.	All Contractors	Good Practice

Ref	Mitigation measure	When to implement	How to implement	Responsibility for Implementation	Reference
EE: Early Earthworks BEC: Bulk Earthworks Contract MI: Material Importation All Contractors: BEC, , MI, Terminal and other contractors as delegated by WSA					
EARTHWORKS					
SW-53	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

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.

Approximately 2 ML of water per day is required to support the Stage 1 Bulk Earthworks.

An estimated 165 ML of water is anticipated to support the Terminal and Specialty Services works. 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 trunk 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 activities,

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 WSA prior to implementation.

Details of the EWMS requirements can be found in Section 4.2.4 of the SEMF.

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 ECMs 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. 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.

The permit 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 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.

The Dewatering Permit form can be found in Appendix B of the SEMF.

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 lookaheads;
- 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.

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

8.3. Spill Prevention and Response

All Contractors must prepare an emergency spill response procedure in accordance with this Soil and Water CEMP for soil and water management and the WSA Emergency Spill Response Procedure in Appendix Q of the SEMF. 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 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.

8.4. 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 imported and stockpiled and waste, reused, recycled, 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 4.4 of the SEMF. Specific responsibilities for the implementation of environmental controls are detailed in Section 7 of this Plan. WSA will ensure enough resources are allocated on an ongoing basis to ensure effective implementation by both WSA and the responsible contractors.

The roles and responsibilities for the management of asbestos as required by the RAP is detailed in the Waste and Resources CEMP.

Contractors Soil Conservationist

All Contractors are 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

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 includes groundwater elevation data.

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.

General environmental monitoring, inspection and auditing requirements are summarised in Table 19 of the SEMF.

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. WSA 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.

The findings of the WSA site environmental inspection will be recorded on a WSA Site Environmental Inspection Checklist included as Appendix K of the SEMF with an accompanying photographic style inspection report.

10.1.2. Contractor environmental inspections

Regular site inspections will be undertaken to monitor compliance with this plan at active, exposed work sites. Inspection results will be recorded, and the inspection log made available to Infrastructure Department upon request. 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.

More frequent site inspections by the person accountable for soil and water quality issues will be conducted onsite when activities with a high potential to cause erosion are being carried out.

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 Table 28-6 of the EIS) 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 soil and water quality monitoring requirements, including timing and responsibilities, are included in Table 12.

Table 12: Soil and water quality monitoring requirements

Reference	Requirement	Timing	Responsibility
SW_M_01	The most suitable surface and groundwater monitoring locations have been determined 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 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	All Contractors
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	All Contractors
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. Monitoring will be undertaken quarterly through construction up to a minimum period of three years after the completion of the Stage 1 development and until any identified impacts stabilise;	During construction	WSA 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. Monitoring will initially be undertaken quarterly and adjusted as appropriate; and	During construction	WSA 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.	During construction	WSA (Stage 1 Development surface monitoring program) All Contractors (monitoring for work activities)

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 SEMF (Section 8.1) 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 12. 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 program

The following sections detail both, a Project-wide surface monitoring program (Stage 1 Development surface monitoring program) by WSA, in addition to targeted water quality monitoring program by each contractor associated with specific construction activities, including those covered by this CEMP (Refer to Table 14).

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.

Water quality monitoring sites and monitoring network are adequate for the current bulk earthworks. Monitoring has been undertaken confirming existing mitigation measures are adequate.

10.3.1. Stage 1 Development surface water quality monitoring, sampling and reporting

Monitoring locations

The Stage 1 Development surface water monitoring program by WSA will utilise a series of ten pre-selected surface water monitoring location points as detailed in Table 13 and presented in Figure 5. These locations are generally based off the previously used monitoring locations for the background / baseline monitoring undertaken for the Airport Site and enable a consistent approach moving forward, allowing for ease of comparison and interpretation against historical data. There have been slight adjustments to the position of the upstream locations due to the change in alignment of The Northern Road, however these remain on the same drainage lines / water bodies.

Table 13: 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.

Name	Receiving water	Latitude (□N)	Longitude (□E)	Street address	Description
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 Northern Road opposite a fertiliser company (Location is downstream and on the same drainage line as previous U/S Airport 2 sample location)

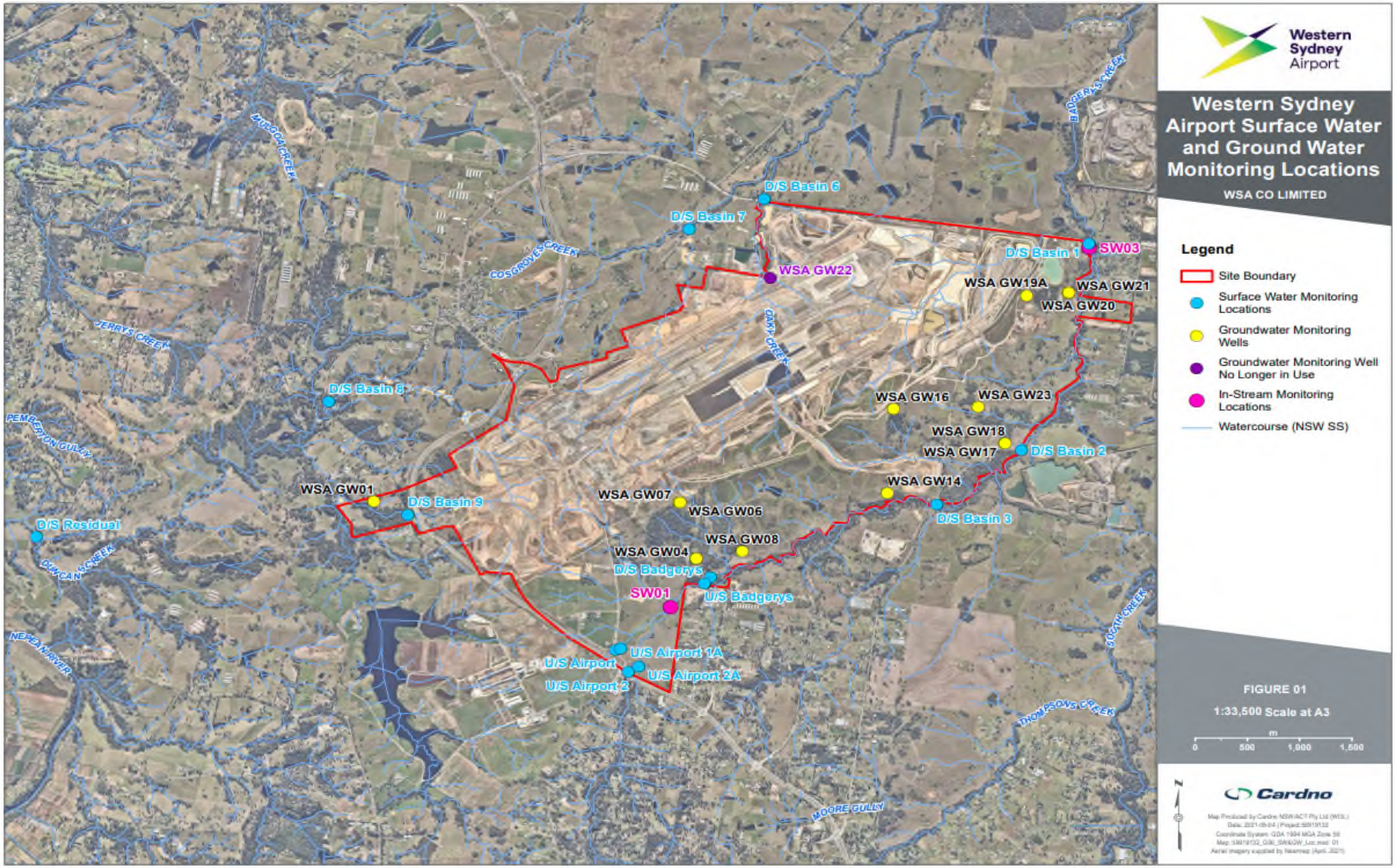


Figure 5: Stage 1 Development surface water and groundwater monitoring locations

Monitoring

Monitoring and sampling will be undertaken by a consultant on a monthly basis on behalf of WSA. 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.

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 15 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).

Reporting

The WSA Water consultant provides reports and recommendations accordingly. The reports will be reviewed by the WSA Environment Manager (or delegate). The WSA 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 9.3.3), including identification of any water quality exceedances and potential sources of the exceedance.

10.3.2. Contractor surface water quality monitoring and reporting

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 may include:

- 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 to be detailed in the plan. The plan will include detailed inspection criteria such as:

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

Reporting

The Contractor will be responsible for reporting monthly to WSA 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).

WSA 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 Stage 1 Development surface water quality monitoring and reporting.

10.3.3. Surface water quality limits

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:

- to prevent the generation of pollution from the undertaking; or
- 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 Stage 1 development have been extracted and provided in Table 14. Refer to the AEPR for a complete list of the acceptable limits for water quality.

Table 14: Key water quality parameters under the AEPR

Parameter	Criteria
Total Phosphorous	< 0.01 mg/L*
Total nitrogen (TN)	< 0.1 mg/L*
Dissolved oxygen (DO)	80% of average level for a normal 24 hr period or > 6 mg/L
Total suspended solids (TSS)	Change not more than 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	> 1000 mg/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).

Construction water quality discharge criteria

In consideration of the AEPR, the background water quality as presented in the EIS (refer to Table 15) and the existing water quality at the Airport Site (as presented in Table 18), WSA, following consultation with the AEO, has adopted the following construction water discharge criteria as presented in Table 16 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 15 prior to discharge to receiving waters.

Site waters, including sediment basins, will not be discharged until the relevant criteria as detailed in Table 16 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. Where water is to be discharged off-site, e.g. Badgerys Creek, the WSA 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 EEW and BEC 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 15: Construction water quality discharge criteria

Parameter	Criteria	Sampling method	Analytical method
Receiving water within the Airport Site (AEPR)			
pH	6.5 –9.0	Probe or 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 > 6 mg/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
Oil and Grease	No visible	Visual assessment for oil sheen	Field analysis and confirmed as required with laboratory assessment
Receiving water outside the Airport Site (ANZECC)			
pH	6.5 –8.5	Probe or Grab Sample	Field analysis and confirmed as required with laboratory assessment

Parameter	Criteria	Sampling method	Analytical method
Turbidity[1]	6- 50 NTU	Probe or 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

* 10% of the receiver gives flexibility around internal water movements. If a set limit is preferred, then the offsite criteria could be applied.

[1] 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.

10.3.4. Airport Site water quality

The 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 16 provides a summary of the background water quality at the Airport site

Table 16: Airport Site Background water quality criteria

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 17. 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.

Table 17: Airport Site Background water quality criteria

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

Analyte	Assessment Guideline	Assessment guideline source*
SS (mg/L)	6	ANZECC
NOx (mg/L)	0.04	
TKN (mg/L)	N/A	-
TN (mg/L)	0.1	AEPR
TP (mg/L)	0.01	
Chlorophyll-a (mg/m^3)	2	
Arsenic (mg/L)	0.05	
Cadmium (mg/L)	0.0002	
Chromium (mg/L)	0.01	AEPR
Copper (mg/L)	0.002	
Lead (mg/L)	0.001	
Nickel (mg/L)	0.015	
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	220µg/L (PFOA) and 0.13µg/L (PFOS)	NEMP Fresh Water Aquatic Ecosystem - 95% species protection target

* 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.

The WSA monthly report will include a comparison of the receiving water quality against the target provided in Table 18 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 18), and every twelve months thereafter, 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.

10.3.6. Batch plant waste water management

Water generated from batching affected by surface water flow will be in a closed loop and either reused in the batching process or disposed of the WSA site.

Following treatment, the water will be tested against the water testing criteria in Table 15 and subject to the results complying with the relevant criteria, the water will be:

- Pumped into the water storage tanks at the pug mill and reused in the process; or
- Used as dust suppression around the site including stockpiles; or
- Discharged to the receiving environment

Dirty water that has contacted particulate materials and contain suspended solids is to be tested prior to “Each discharge event” into the contractor’s stormwater system as part of the water discharge system.

If batch plant water is not able to be treated, the water will be removed from the site.

10.4. Stage 1 Development Groundwater monitoring program

The following sections detail the Stage 1 Development groundwater monitoring program by WSA.

10.4.1. Groundwater monitoring, sampling and reporting

Monitoring Locations

The groundwater monitoring program currently utilises 14 of the 15 groundwater monitoring wells that were installed during the baseline groundwater monitoring program. The location of the groundwater monitoring locations is shown in Figure 5 and are summarised in Table 18. Due to a clash with the earthworks footprint, GW22 has temporarily been decommissioned and will need to be relocated following completion of BEC works in that area. GW19 has been relocated to within the EZC and is now designated as GW19a

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.

Table 18 below includes indication of which groundwater wells have electronic logging instrumentation installed.

Table 18: Airport Site monitoring locations

Well ID (Refer to Figure 5)	Installation date	Data Logger	Location Easting	Location Northing	Well Depth (mbtoc)	Well screen (mbgl)
GW01	21/12/2016	LT	285489	6246780	10.74	7 – 10
GW04	14/12/2016	-	288574	6246161	20.94	17 – 20
GW05	14/12/2016	LT	288574	6246161	10.75	7 – 10
GW06	13/12/2016	LT	288413	6246761	20..38	17 – 20
GW07	13/12/2016	LT	288413	6246761	10.24	7 – 10
GW08	15/12/2016	LT	289013	6246245	10.67	7 – 10
GW14	15/12/2016	-	290400	6246870	10.69	7 – 10
GW 16	15/12/2016	-	290461	6247764	10.77	7 – 10
GW 17	19/12/2016	LT, B	291523	6247399	18.04	17 – 20
GW18	19/12/2016	LT	291523	6247399	10.81	7 – 10
GW19a	21/12/2016	LT	291765	6248969	10.77	7 – 10
GW20	20/12/2016	-	292130	6249000	20.80	17 – 20
GW21	20/12/2016	-	292130	6249000	10.84	7 – 10
GW22*	21/12/2016	Temporarily Decommissioned	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
* GW22 has been temporarily decommissioned until after completion of the BEC works

Monitoring and Sampling

Manual monitoring and sampling of the groundwater wells will be undertaken on a quarterly basis (i.e. every three months).

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)

Groundwater criteria

The assessment criteria adopted for the monitoring program was derived from the potential receptors identified in the EIS 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 to assess impacts to these potential receptors is presented in Appendix B.

Analytical trigger values

The adopted groundwater quality criteria (Appendix B) 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 SEMF.

The EIS identified that the bulk earthworks and terminal and specialty services construction phases were 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 13.

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 exceedance 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 (refer Appendix B) and/or are above the results established during the baseline assessment, the following actions would occur:

- Interrogation of dataset by WSA 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;
- WSA 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 by the WSA Water Consultant based on the above groundwater monitoring activities. The reports will be reviewed by the WSA Environment Manager or delegate, 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.

10.4.2. Contractor's groundwater monitoring, sampling and reporting

The BEC and Terminal and Specialty Services Works Contractor are not currently proposing to extract groundwater. This section of the plan will be updated if groundwater extraction is later deemed necessary by the contractor.

The contractor will consider standard techniques in case of finding ground water as per mitigation measure SW_15 in Table 11 and the EIS.

10.4.3. 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 RAP 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 (Perfluorooctane 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 9
- 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 Soil and Water CEMP 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 9.

10.5. Environmental auditing

Refer to Section 9 of the SEMF for environmental auditing requirements, including internal WSA audits, independent audits and audits to be undertaken by contractors.

10.6. Environmental reporting

General environmental reporting requirements are detailed in Section 9.3 of the SEMF. 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 19.

Table 19: Soil and water quality reporting

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 Soil and Water CEMP. In accordance with Condition 39 (2), WSA 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.	Annually	WSA
Monthly compliance reporting	Undertaking monitoring as required by the relevant contractor CEMP. Provide WSA 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	WSA Environment Manager WSA 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 AEPR 6.03 including 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	WSA
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

Action	Scope	Timing / Frequency	Responsibility
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 (refer to **Error! Reference source not found.** for a copy of the AEPR acceptable limits for water quality).	As required	WSA
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 8 & 9 of the SEMF.	As required	WSA All Contractors
Reporting and tracking of material	A material tracking report must be prepared which records: • the location, quantity and timing of material placed into stockpiles areas, • the movement of materials within site • materials imported onto the site; and • any material disposed off site. Relevant evidence to support the material importation and placement will also be provided. E.g. tickets	Monthly	Contractor

10.7. Review of approved plans

WSA 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 9.3 of the SEMF). 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.

WSA 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.

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 WSA Approved Plan and subsequent training and awareness (refer to refer to Section 4 of the SEMF).

10.8. Environmental Incidents and complaints management

The management and reporting of environmental incidents shall be undertaken by the appropriate person as detailed in Section 7 of the SEMF.

All communications and complaints management will be implemented and managed in accordance with Section 8 of the SEMF and the Community and Stakeholder Engagement Plan.

11. Competence, training and awareness

To ensure this Soil and Water CEMP is effectively implemented, each level of management is responsible for ensuring that all personnel reporting to them are aware of the requirements within. The WSA Environment Manager will coordinate 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 6 of the SEMF.

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).

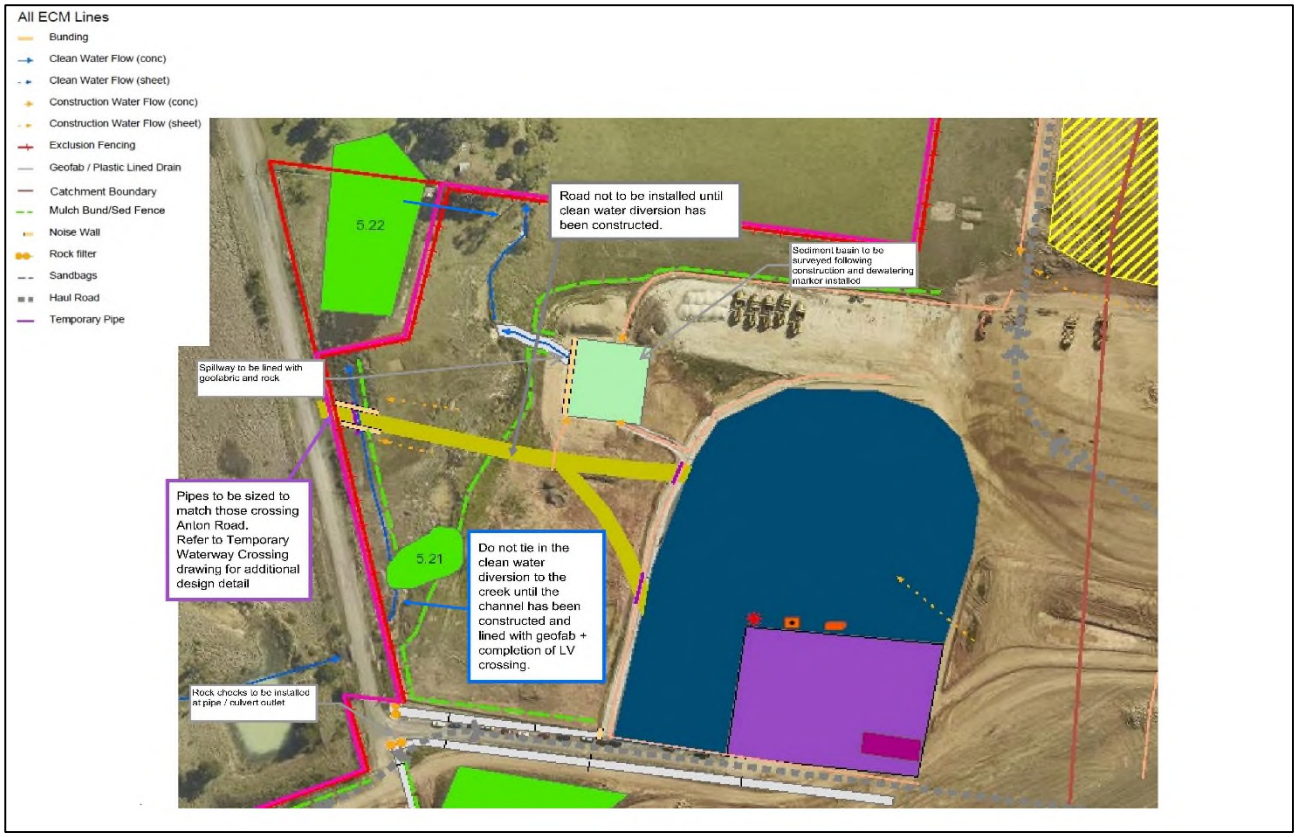
NSW Government, 2004. Managing Urban Stormwater: Soils and Construction Volume 1 (Blue Book).

Standards Australia 2001. Australian and New Zealand environmental management international standard (AS/NZS ISO 14001)

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

Groundwater quality criteria

Assessment Criteria	ANZG 2018/ANZECC 2000/Lowland Rivers	Airports Regulations 1997 - Freshwater
Total Nitrogen	0.35 mg/L	0.1 mg/L
Nitrate (as N)	3.5 mg/L	-
Ammonia (as N) (pH 7)	2.18 mg/L	0.02 mg/L
Arsenic	0.013mg/L	0.05 mg/L
Cadmium	0.002 mg/L	0.002 mg/L
Chromium	3.3 µg/L	0.001 mg/L
Copper	0.0014 mg/L	0.002 mg/L
Lead	0.0034 mg/L	0.001 mg/L
Mercury	0.06 µg/L	0.001 mg/L
Nickel	0.011 mg/L	0.015 mg/L
Zinc	0.008 mg/L	0.005 mg/L
Benzene	950 µg/L	300 µg/L
Toluene	180 µg/L	300 µg/L
Ethylbenzene	80 µg/L	140 µg/L
Xylene (m & p)	75 µg/L	-
Xylene (o)	350 µg/L	-
TRH C6-C9	7 µg/L	150 µg/L
TRH total (C10-C36)	7 µg/L	600 µg/L
per- and poly-fluoroalkyl substances	220 µg/L (PFOA) and 0.13µg/L (PFOS)	-