



# Soil, Water and Groundwater Management Sub-Plan C2B

Line-wide Works Contract Sydney Metro City & Southwest

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## Document Approval

	SHEQ Manager	Project Director
Signature:		
27/09/2023	C. Godwin	A. Wullemin

## Details of Revision Amendments

### Document Control

The Project Director is responsible for ensuring that this Sub-Plan is reviewed and approved. The Environment and Sustainability Manager is responsible for updating this Sub-Plan to reflect changes to Environmental legal and other requirements, as required. A controlled version of this Sub-Plan will be available electronically at all Project locations.

### Amendments

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

### Revision Details

Revision	Date	Prepared by	Details
A	19/11/2019	V Tavares	Issued for review. This version of this Sub-Plan addresses compliance requirements under CSSI 7400 and CSSI 8256 Planning Approvals as per the Sydney Metro Staging reports.
B	17/12/2019	V Tavares	Updated to address comments from Sydney Metro, ER and stakeholder consultation.
0	13/02/2020	C Riley	Updated to address comments from DPE – For approval
1	23/06/2020	N Eisenlohr	Section 6 and tables updated to address EPL requirements for management of water
2	29/10/2020	K Truscott	Scheduled review Update to Section 2.2 Compliance Requirements
3	30/11/2021	T McCormick	Scheduled review Update to Section 6.1.3 Sediment Basins, 6.2.2 Water Treatment Plant Discharge Criteria; 6.4 Surface Water and Flooding Management; 6.9.6 Monitoring Frequency and Locations Table 17 & Table 18, 6.9.7 Water Treatment Plants
4	12/08/2022	K Truscott	Scheduled review Updates to Table 2 - Summary of LW Scope for Portions 2, 3 and 4, Section 2.2 Environmental Protection License, Section 6.2.1 Sediment Basin and/or Excavation Discharge, Table 18 – Surface water quality monitoring sites and locations (all sites not relevant to discharge by Systems Connect removed from table) and Table 19 – Coagulant /flocculation clarification water treatment Updates to Element 4 Project Specific Requirements
5	4/08/2023	C Carter	Scheduled review and update to address EPA licence variations Update to Section 6.9.6 - removal of wording around takeover of WTPs and sediment basins; Update to Section 6.9.7 – removal of references to Chatswood WTP; Update to Table 17 – removal of Chatswood WTP and sediment basin, removal of SMTF S open excavations and sediment basin, and removal of

			<p>Artarmon Substation open excavations from monitoring schedule;</p> <p>Update to Table 18 – Removal of CHW WTP from surface water quality monitoring sites and locations;</p> <p>Update to Table 19 – Removal of Chatswood, Martin place and Waterloo water treatment systems that are no longer used by Systems Connect. Update to include Marrickville's additional discharge Point 3;</p> <p>Spelling of "Manger" amended to "Manager" throughout the document.</p>
6	27/09/2023	T McCormick	<p>Update to address Sydney Metro and ER comments.</p> <p>Update to Section 1.5.1 – Staging Reports;</p> <p>Update to Section 1.5.2 – Interface;</p> <p>Update to Section 2.2.2 – reference EPL condition M2</p> <p>Update to Section 3.1 – "or delegate" included;</p> <p>Update to Section 4.1 – Industry removed from DPE;</p> <p>Update to Section 4.1.8 – updated to align with 6.4;</p> <p>Update to Section 4.2.3 Groundwater – portion 4</p> <p>Update to Section 4.2.9 – Contamination</p> <p>Update to Section 4.2.4 – Soil Salinity</p> <p>Update to Section 6.5 – Groundwater Management</p> <p>Update to Section 6.8 – Contamination</p> <p>Update to section 6.8.3 – Soil Salinity</p> <p>Inclusion of Section 6.11 – Settlement Monitoring</p> <p>Update to Table 5 – Inclusion of Sydney Steel Road and Blues Point Streetscaping scopes;</p> <p>Update to Table 7 – outcome of investigations included for Artarmon and Surry Hills</p> <p>Update to Table 14 – in line with EPL concentration limits</p> <p>Update to Table 16 – monitoring locations and EPL criteria updated;</p> <p>Update to Element 4 – reference to section 0 amended to section 6.9.1. FH2 and FH3 TSE handover status updated, E61 and E63 included</p> <p>Update to SWGMSP Compliance Matrix – E61 and E63</p>

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## SWGMS Compliance Matrix

Planning Approval SSI 7400		
No.	Requirement	Reference
C3	The following CEMP sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP sub-plan and be consistent with the CEMP and CEMP referred to in Condition C1 d) Soil and Water - DPI Water, Relevant Council(s), OEH, SES, NSW Fire and Rescue	This Sub-Plan Appendix C3 Agency Consultation
C4	The CEMP sub-plans must state how:	
(a)	the environmental performance outcomes identified in the EIS as amended by the documents listed in A1 will be achieved;	Section 1.3 Element 4: Project Specific Requirements
(b)	the mitigation measures identified in the EIS as amended by documents listed in A1 will be implemented;	Element 4: Project Specific Requirements
(c)	the relevant terms of this approval will be complied with; and	Element 4: Project Specific Requirements
(d)	issues requiring management during construction, as identified through ongoing environmental risk analysis, will be managed.	Section 6 Section 6.10
C5	The CEMP sub-plans must be developed in consultation with relevant government agencies. Where an agency(ies) request(s) is not included, the Proponent must provide the Secretary justification as to why. Details of all information requested by an agency to be included in a CEMP sub-plan as a result of consultation and copies of all correspondence from those agencies, must be provided with the relevant CEMP sub-plan.	Section 1.5.3 Appendix C3 Agency Consultation Records
C6	Any of the CEMP sub-plans may be submitted to the Secretary along with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before commencement of construction.	Section 1.5.3
C8	Construction must not commence until the CEMP and all CEMP sub-plans have been approved by the Secretary. The CEMP and CEMP sub-plans, as approved by the Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction. Where the CSSI is being staged, construction of that stage is not to commence until the relevant CEMP and sub-plans have been approved by the Secretary.	Section 1.5.3
C17	Where a relevant CEMP sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP sub-plan.	Section 6.9 Element 2
E61	The Proponent must install appropriate equipment to monitor areas in proximity to construction sites and the tunnel route during construction and for a period of not less than six (6) months after settlement has stabilised with particular reference to risk areas identified in the building and infrastructure condition surveys required by conditions E59 and E60 and/or the geotechnical analysis as required. If monitoring during construction indicates exceedance of the criteria, then all construction affecting settlement must cease immediately and must not resume until fully rectified or a revised method of construction is established that will ensure protection of affected buildings.	Section 6.11 Element 4
E63	The Proponent must monitor settlement for any period beyond the minimum timeframe requirements of condition E61 if directed so by the Independent Impact Assessment Panel following its review of the monitoring data from the period not less than six (6) months after settlement has stabilised, consistent with condition E61. The results of the monitoring must be made available to the Secretary on request.	Section 6.11 Element 4

Planning Approval SSI 8256		
No.	Requirement	Reference
C3	The CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP Sub-plan and be consistent with the CEMF and CEMP referred to in Condition C1: (b) Soil and Water	This Sub-Plan
C4	The CEMP Sub-plans must be prepared in accordance with the CEMF.	Element 4: Project Specific Requirements
C5	Details of all information requested by an agency to be included in a CEMP Sub-plan as a result of consultation, including copies of all correspondence from those agencies, must be provided with the relevant CEMP Sub-Plan	Appendix C3 Agency Consultation Records
C6	Any of the CEMP Sub-plans may be submitted along with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before Construction	Section 1.5.3
C7	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER must be implemented for the duration of Construction. Where Construction of the CSSI is staged, Construction of a stage must not commence until the CEMP and CEMP Sub-plans for that stage have been approved by the Planning Secretary.	Section 1.5.3
C15	Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 6.9 Element 2:
E39	An Unexpected Contaminated Land Procedure and Asbestos Finds Procedure must be prepared and must be followed should unexpected contaminated land or asbestos be excavated or otherwise discovered during Construction.	Appendix C2
E40	The Unexpected Contaminated Land Procedure and Asbestos Finds Procedure must be implemented throughout Construction.	Section 6



Construction Environmental Management Framework		
No.	Requirement	Reference
3.4 a	<p>Subject to Section 3.3(b) and Section 3.2(b) the Principal Contractor will prepare issue specific environmental sub plans to the CEMP and SMP which address each of the relevant environmental impacts at a particular site or stage of the project. Issue specific sub plans will include:</p> <ul style="list-style-type: none"> <li>ii. Groundwater management*</li> <li>x. Soil and water management</li> </ul> <p><i>*Sub-plans required are subject to table 5 of the respective staging report. Only a Procedure is required for groundwater management under both staging reports.</i></p>	This Sub-Plan
7.2 a	The following content may be provided within other sub plans such as the Soil and Water Management Plan and Flora and Fauna Management Plan.	This Sub-Plan
15.2a	Principal Contractors will develop and implement a Soil and Water Management Plan for their scope of works. The Soil and Water Management Plan will include as a minimum:	This Sub-Plan
(i)	The surface water and flooding mitigation measures as detailed in the environmental approval documentation;	Element 4: Project Specific Requirements
(ii)	Details of construction activities and their locations, which have the potential to impact on water courses, storage facilities, stormwater flows, and groundwater;	Section 4
(iii)	Surface water and ground water impact assessment criteria consistent with the principles of the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines;	Sections 2.4, 6.2.1, 6.5
(iv)	Management measures to be used to minimise surface and groundwater impacts, including identification of water treatment measures and discharge points, details of how spoil and fill material required by the SSI will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; salinity control measures and the consideration of flood events;	Section 6
(v)	A contingency plan, consistent with the Acid Sulphate Soils Manual (EPA 1998), to deal with the unexpected discovery of actual or potential acid sulphate soils, including procedures for the investigation, handling, treatment and management of such soils and water seepage;	Section 6.8.2
(vi)	Management measures for contaminated material (soils, water and building materials) and a contingency plan to be implemented in the case of unanticipated discovery of contaminated material, including asbestos, during construction;	Section 6.8 Appendix C2
(vii)	A description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, how the results of the monitoring would be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified;	Sections 6.9.1, 6.9.4, 6.9.6, 6.9.7, 6.9.8  Element 2:
(viii)	The requirements of any applicable EPL conditions;	Section 2.2 Element 4: Project Specific Requirements
(ix)	The responsibilities of key project personnel with respect to the implementation of the plan;	Section 3
(x)	Procedures for the development and implementation of Progressive Erosion and Sediment Control Plans;	Section 6.1
(xi)	Identification of locations where site specific Stormwater and Flooding Management Plans are required; and	Section 6.4
(xii)	Compliance record generation and management.	Element 2:

15.2b	Principal Contractors will develop and implement Progressive Erosion and Sediment Control Plans (ESCPs) for all active worksites in accordance with Managing Urban Stormwater: Soils & Construction Volume 1 (Landcom, 2004) (known as the "Blue Book"). The ESCPs will be approved by the Contractor's Environmental Manager (or delegate) prior to any works commencing (including vegetation clearing) on a particular site. Copies of the approved ESCP will be held by the relevant Contractor personnel including the Engineer and the Site Foreman.	Section 6.1
15.2c	ESCPs will detail all required erosion and sediment control measures for the particular site at the particular point in time and be progressively updated to reflect the current site conditions.  Any amendments to the ESCP will be approved by the Contractor's Environmental Manager (or delegate).	Section 6.1
15.2d	Principal Contractors will develop and implement Stormwater and Flooding Management Plans for the relevant construction sites. These plans will identify the appropriate design standard for flood mitigation based on the duration of construction, proposed activities and flood risks. The plan will develop procedures to ensure that threats to human safety and damage to infrastructure are not exacerbated during the construction period.	Section 6.4

Note: Additional relevant Construction Environmental Framework, Construction Environmental Management Framework, Planning Approval Conditions, and Revised Environmental Mitigation Measures are referenced in Element 4 – Project Specific Requirements.

## Glossary / Abbreviations

Abbreviations	Definition
AEP	Annual Exceedance Probability Event
ANZ	Australian and New Zealand
ANZECC	Australian and New Zealand Environment Conservation Council
Approved Plan	Means a plan approved in accordance with the Conditions of Approval for the Sydney Metro City and Southwest project.
ARI	Annual Recurrence Interval
ASS	Acid sulfate soils
Blue Book	A guide for local councils and the development industry on stormwater management, mainly erosion and sediment control during the construction-phase of urban development
BPS	Bulk Power Supply
C2S	Chatswood to Sydenham
CAP	Construction Area Plan
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
CIMIC	Construction Infrastructure Mining & Concessions
CLM Act	Contaminated Land Management Act 1997
CPESC	Certified Professional in Erosion and Sediment Control
CoA	Conditions of Approval as per State Significant Infrastructure Planning Approvals as issue by the NSW Department of Planning and Environment, relevant staging reports and as listed in Schedule E3 of the Line-wide Works Contract, (ITC 600)
CSSI 7400	Approval of application SSI 7400 provides for construction and operation of a metro line approximately 16.5 kilometers long (of which approximately 15.5 is in underground rail tunnels) between Chatswood and Sydenham (C2S) including construction of a tunnel under Sydney Harbour, links with the existing rail network, seven metro stations and associated ancillary infrastructure. The proposal is declared as Critical State Significant Infrastructure (CSSI)
CSSI 8256	Approval of application SSI 8256 provides for construction and operation of a metro line, approximately 13 kilometres long between Marrickville and Bankstown (S2B), including ten metro stations and associated infrastructure
DPI	Department of Primary Industries (including Agriculture NSW, Fisheries NSW and NSW Office of Water)
DPE	NSW Department of Planning & Environment
EIS	Environmental Impact Statement
EMS	Environmental Management System (integrated as part of the PMS)
Environment and Sustainability Policy	Statement by an organisation of its intention and principles for environmental and sustainability performance.
Environmental aspect	Defined by AS/NZS ISO 14001:2004 as an element of an organization's activities, products or services that can interact with the environment.
Environmental impact	Defined by AS/NZS ISO 14001:2004 as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.

Abbreviations	Definition
Environmental incident	An occurrence or set of circumstances, as a consequence of which pollution (air, water, noise, and land) or an adverse environmental impact has occurred or is likely to have occurred.
Environmental Issue	An occurrence or set of circumstances where Environmental Harm or Non-compliance could occur if not rectified.
Environmental Non-compliance	A breach of an Environmental Requirement originating from Planning Approvals, Environment Protection Licences, lease agreements, and other requirements documented in environmental management plans.
Environmental objective	Defined by AS/NZS ISO 14001:2004 as an overall environmental goal, consistent with the Environment Policy, that an organisation sets Line-wide to achieve.
Environmental target	Defined by AS/NZS ISO 14001:2004 as a detailed performance requirement, applicable to the organisation or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.
Environmental team	Members of the Continuum Alliance's staff including sub-contractors authorised by the Environmental Manager to work on environmental issues related to the Project
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
ER	The Environmental Representative for the CSSI(s).
ERP	Emergency Response Plan
ERSED	Erosion and Sediment
ESCP	Erosion and Sediment Control Plan
ESD	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).
Hold Point	Activities which are not to proceed without objective review and approval by the nominated authority.
IC	Independent Certifier
ISCA	Infrastructure Sustainability Council of Australia
LW	Line-wide (contract scope under ITC 0600)
NOW	(NSW) Office of Water
NTU	Nephelometric Turbidity Unit
OEH	(NSW) Office of Environment and Heritage
OOHW	Out of Hours Works
PFC	Perfluorinated Compounds
PMS	Project Management System
PoEO Act	Protection of the Environment Operations Act 1997
RAP	Remediation Action Plan
REMM	Revised Environmental Mitigation Measures
S2B	Sydenham to Bankstown

Abbreviations	Definition
SC Project Environmental Representative	Refers to Systems Connect Environment Manager or someone delegated by them to perform a task, release a hold point or approve a document
SEP	Site Environment Plan
SES	State Emergency Services
SM	Sydney Metro
SMCSW	Sydney Metro City & Southwest
SMEW	Southwest Metro Early Works
SMNW	Sydney Metro North West
SMTF	Sydney Metro Train Facility (formerly known as Rapid Transit Rail Facility)
SMTF South	Sydney Metro Train Facility South
SSI 5931	Approval of Application SSI 5931 provided for construction and operation of The Rapid Transit Rail Facility, now known as the Sydney Metro Train Facility (SMTF)
SWMS	Safe Work Method Statement
SWTC	Scope of works and technical criteria
T2M	Metron T2M, a joint venture between Arcadis Australia Pacific and Mott MacDonald Australia to deliver the T3 upgrade Bankstown line
TfNSW	Transport for New South Wales
TSE	Tunnel and Station Excavation Works for the Sydney Metro City & Southwest Project
TSS	Total Suspended Solids
UGL	UGL Engineering Pty Limited
VOC	Volatile Organic Compounds
WQMP	Water Quality Monitoring Program

## PART A - OVERVIEW

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### 1. Plan Overview

#### 1.1 Purpose

The purpose of the Soil, Water and Groundwater Management Sub-Plan (this Sub-Plan) is to describe how Systems Connect will minimise and manage impacts on soil, surface water and ground water throughout the delivery of the Sydney Metro City & Southwest (SMCSW) Line-wide (LW) Works between Chatswood and Bankstown (C2B). Line-wide also referred to as the project, will be delivered by Systems Connect (a CPB Contractors and UGL Engineering Joint Venture).

This Sub-Plan has been prepared to address the requirements of relevant Minister for Planning's Conditions of Approval (CoA), including CSSI 7400 and CSSI 8256, the Revised Environmental Mitigation Measures (REMMs), applicable legislation, the Environmental Impact Statements (EIS), contractual requirements including Schedule C1 Scope of Works and Technical Criteria (SWTC) of ITC 600, the Sydney Metro Construction Environment Management Framework (CEMF) and the LW Works' Environment Protection Licences. Further details about the above-mentioned compliance requirements are provided in section 2 and in the Construction Environmental Management Plan – C2B (SMCSWLWC-SYC-1NL-PM-PLN-000033).

#### 1.2 Background

The LW Works will potentially impact soil, surface water and groundwater during the civil construction works. These potential impacts will require management and mitigation in accordance with relevant state legislation and government policies.

- The EIS noted that given the relatively small areas of surface disturbance anticipated during construction, soil erosion would be adequately managed in accordance with proven standard mitigation measures. With respect to groundwater, the EIS also noted that the metro tunnels would be tanked (designed to inhibit the inflow of groundwater, typically using concrete lining and waterproofing membrane), so negligible change is expected to groundwater levels along the tunnel alignment after construction. In relation to contamination, the EIS stated that the Project will potentially encounter naturally occurring Acid Sulfate Soils and contamination from previous land uses.
- This Sub-Plan identifies potential soil, surface water and groundwater related impacts of the LW Works and sets out an integrated management framework to eliminate, manage, mitigate or minimise the potential impacts. A full overview of the existing environment is provided in Section 4.

#### 1.3 Objectives and Targets

Systems Connect's objectives for management of soil, surface water and groundwater during delivery of LW Works are aligned with those established through the EIS and those set out in the CEMF.

The environmental performance outcomes in relation to soil, water and groundwater identified in the EIS, as amended, are:

- The project would make good any impacts on groundwater users
- The project would avoid any damage to buildings from settlement
- Erosion and sediment controls during construction would be implemented in accordance with the Blue Book Volumes 1 and 2D (Landcom, 2004 and DECC, 2008)
- There would be no impacts on aquatic environments associated with the disturbance of acid sulfate soils during construction
- Any contamination on project sites would be remediated to suit future land use
- The project would protect or contribute to achieving the Water Quality Objectives, during construction or operation
- Construction water quality discharge would comply with the requirements of an environment protection licence issued to the project

- Changes to overland flow diversions during construction would meet the following criteria:
  - Not worsen existing flooding characteristics up to and including the 100-year annual recurrence interval event in the vicinity of the project
  - Dedicated evacuation routes would not be adversely impacted in flood events up to and including the probable maximum flood

The CEMF sets out the following management objectives:

- Reduce the potential for drawdown of surrounding groundwater resources
- Prevent the pollution of groundwater through appropriate controls
- Reduce the potential impacts on groundwater dependent ecosystems
- Minimise pollution of surface water through appropriate erosion and sediment control
- Maintain existing water quality of surrounding surface watercourses
- Source construction water from non-potable sources, where feasible and reasonable.

In line with the above objectives and based on the project requirements detailed in Section 2, the findings of project risk management processes and the potential impacts to the community, the following targets have been set. Any deviance from the targets will result in Project Management immediately implementing corrective actions.

Table 1 - LW targets for Soil, Water and Groundwater management

Metric/Measure	Objective	Timeframe	Accountability
Incidents of environmental harm as a result of discharge off site	Zero	At all times	Project Director
Achieve a reduction in water use across construction and operation compared to a business as usual base case.	10%	At all times	Project Director
Use of non-potable water during construction and operation	33%	At all times	Project Director
No complaints from the Regulators as a result of the works undertaken (related with soil, surface water or groundwater)	Zero Complaints	At all times	Project Director

## 1.4 Plan Structure

Plan Structure	Details
<b>Part A: Overview</b>	<p>This Part defines:</p> <p><b>Section 1</b> Purpose, Background, Objectives &amp; Targets, Applicability, Staging &amp; Interface, Agency Consultation, Revision &amp; Update, Related Documents</p> <p><b>Section 2</b> Legal and Other Requirements</p> <p><b>Section 3.</b> Roles and Responsibilities with regards to Soil, Surface Water and Groundwater Management</p> <p><b>Section 4.</b> Existing Environment</p> <p><b>Section 5.</b> Aspects and Impacts</p> <p><b>Section 6.</b> Soil, Surface Water and Groundwater Management Strategy</p>

Plan Structure	Details
<b>Part B: Implementation</b>	<p>This section outlines in detail the key processes and systems to support implementation of environmental management outcomes for the project:</p> <p>Element 1 Training</p> <p>Element 2 Monitoring and Reporting</p> <p>Element 3 Auditing, Review and Improvement</p> <p>Element 4 Project Specific Requirements</p>
<b>Part C: Appendices</b>	<p>C1 – Indicative Erosion and Sediment Control Plans</p> <p>C2.1 – Erosion and Sediment Control Management Procedure</p> <p>C2.2 – Water Management Procedure</p> <p>C2.3 – Unexpected Finds Soil Contamination and Asbestos</p> <p>C2.4 – Contingency Groundwater Monitoring and Management Procedure</p> <p>C2.5 – Spill Management Procedure</p> <p>C3 -- Consultation Records</p>

## 1.5 Plan Applicability, Staging and Interface

### 1.5.1 Staging

To address the staged nature of SMCSW project, Sydney Metro has developed two Staging Reports:

- Chatswood to Sydenham Staging Report (May 2021)
- Sydenham to Bankstown Upgrade Staging Report (June 2023).

The latest versions of the Staging Reports are available on the Sydney Metro Website Document Library.

Each Staging Report defines the Conditions of Approval (CoA), Revised Environmental Management Mitigation Measures (REMM's) and the Construction Environmental Management Framework (CEMF) requirements that are applicable to the Line-wide stage of works, with responsibility shared between Sydney Metro and Systems Connect as per the Deed. If a requirement is applicable or partially applicable, in the Staging Report and Deed, it is included in the Element 4: table of Project Specific Requirements and addressed in this Sub-Plan.

The EIS assessments addressed all potential project impacts at all Project stages, including impacts during tunnel and station excavation and construction, being completed by other contractors. These activities will be in varying stages of completion at each worksite, by the time LW scope of works commence at each location (in accordance with the Staging Reports).

### 1.5.2 Interface

This Sub-Plan is applied when Systems Connect is the Principal Contractor at any SMCSW site. When Systems Connect is not the Principal Contractor, elements of this Sub-Plan will be implemented by Systems Connect where reasonable and feasible, to mitigate any impacts on soil, surface water or groundwater and to prevent harm to the environment. In such cases, Systems Connect will conduct activities in accordance with the Principal Contractors' Regulatory and contractual obligations. Furthermore, Systems Connect will comply with the Principal Contractor's Soil, Water and Groundwater Management Plan and all Systems Connect relevant allocated Conditions of Approvals (CoA) and Revised Environmental Management Mitigation Measures (REMM's).



Systems Connect will liaise and work with other SMCSW delivery contractors to plan and carry out all works, aiming to achieve this objective and ensure any potential cumulative impacts are managed and harm to the environment does not occur.

### 1.5.3 Applicability

This Soil, Water and Groundwater Management Sub-Plan is applicable to Portions 2, 3 and 4 of LW, which includes all works associated with the corridor from Chatswood to Bankstown (C2B). It is not applicable to Portion 1, SMTF expansion works. The SMTF expansion works have a separate series of Construction Environmental Management Plans, approved under Planning Approval SSI 5931. An overview of LW scope and portions is provided in the CEMP C2B (SMCSWLWC-SYC-1NL-PM-PLN-000033).

Table 2 below provides a summary of the scope of works covered under each Portion.

*Table 2 - Summary of LW Scope for Portions 2, 3 and 4*

LW Portions	Scope
<b>Portion 2 – SMTF South (LW are Principal Contractor)</b>	<p>Construction of Sydney Metro Trains Facility South, in Marrickville, including:</p> <ul style="list-style-type: none"> <li>• Civil works</li> <li>• Track system comprising stabling, shunting and maintenance roads</li> <li>• Infrastructure maintenance facilities including a maintenance workshop, siding, materials storage facilities and parking</li> <li>• Train maintenance facilities</li> <li>• Overhead wiring for new track systems</li> <li>• Mechanical, hydraulic and electrical services for the facility</li> <li>• Administration buildings</li> <li>• Groundwater treatment plant</li> </ul>
<b>Portion 3 – Chatswood to Sydenham tunnels and stations works (LW are Principal Contractor for Northern Dive, Artarmon Substation, BPS routes, tunnels, Sydenham Station and a small area within Barangaroo site)</b>	<p>Tunnel and station works including the systems, services and building works within, and required for operation of the tunnels, Barangaroo crossover cavern, trackway and the Southern Dive.</p> <p>Open Northern Dive works including civil, structural and track systems work to incorporate SMCSW with SMNW systems.</p> <p>Construction of Artarmon bulk supply infeed substation.</p> <p>Bulk Power Supply works including cable routes of 33kV feeders from:</p> <ul style="list-style-type: none"> <li>• Ausgrid's Willoughby Sub-Transmission Substation to the Artarmon bulk supply infeed substation</li> <li>• Ausgrid's Surry Hills Sub-Transmission Substation to the bulk supply infeed substation within Waterloo Station</li> </ul>
<b>Portion 4 – Sydenham to Bankstown works (LW are Principal Contractors for Substation sites and BPS routes)</b>	<p>Bulk Power Supply works including cable routes of 33kV feeders from Ausgrid's Canterbury Sub-Transmission Substation to the Campsie bulk supply infeed substation.</p> <p>Southwest corridor power works from Sydenham to Bankstown, including:</p> <ul style="list-style-type: none"> <li>• a HV Reticulation System</li> <li>• a Traction Power System</li> <li>• a Power Control System</li> <li>• an Earthing and Bonding System, Electrolysis Control Measures and Lightning Protection</li> </ul>

### 1.6 Agency Consultation

Agencies to be consulted for this Sub-Plan, incorporating the Water Quality Monitoring Program, are as detailed in the table below:

Subject	Agency Consultation
Soil, Water and Groundwater Management Sub-Plan	DPI Water Office of Environment and Heritage (OEH) State Emergency Services (SES) NSW Fire and Rescue Department of Industry (DoI) Relevant Councils (Canterbury Bankstown, Inner West, City of Sydney, North Sydney and Willoughby Councils)
Water Quality Monitoring Program	EPA Relevant Councils (Canterbury Bankstown, Inner West, City of Sydney, North Sydney and Willoughby Councils)

Systems Connect has engaged with the above agencies in developing and finalising this Sub-Plan. Following finalisation, all the agencies were provided a copy of this Sub-Plan. An agency workshop was held on 6/11/2019, at which State government agencies that attended were provided with a project briefing and information on the management plan review and approval process. Local Councils were each provided a separate project briefing.

This sub-plan will be submitted to the Planning Secretary at least one month before commencement of construction, be approved prior to commencement of works and be implemented for the duration.

All comments received from agencies and Systems Connect's response to these comments are included in Appendix C3.

## 1.7 Revision and Update

The document review process ensures that environmental documentation including this Sub-Plan is updated as appropriate for the specific works that are occurring on-site. This includes the management review process described in Element 3.

This Sub-Plan was developed to address the soil, surface water and groundwater compliance requirements throughout LW scope of works and it will be updated as the project progresses through each Portion.

Amendments would typically include those that:

- are editorial in nature e.g. staff and agency/authority name changes
- do not increase the magnitude of impacts on the environment when considered individually or cumulatively
- do not compromise the ability of the Project to meet approval or legislative requirements
- do not result in new environmental impacts.

Details of the plan and procedure revisions that will occur to address Planning Approval compliance requirements, across the delivery of all portions of LW, are provided in the project CEMPs.

Minor amendments to the Soil, Water and Groundwater Management Sub-Plan will be submitted to the Environmental Representative (ER) and Sydney Metro for review and approval. Minor amendments would generally include changes to systems or processes.

Where the change will have the potential to result in an additional environmental or community impact that the ER cannot approve, then the plan would be submitted to DPE for review and approval.

Where necessary, amendments to this Sub-Plan will also be provided to relevant stakeholders for review and comment and/or forwarded for approval.

## 1.8 Related Documents

This document is a Sub-Plan of the Construction Environmental Management Plan - C2B (SMCSWLWC-SYC-1NL-PM-PLN-000033). Table 3 shows the interrelationships with other project plans and documents:

Table 3 - Interaction with other project documents

Document	Description
<b>Sustainability Management Plan (SMCSWLWC-SYC-1NL-PM-PLN-000024)</b>	Sets out the sustainability targets and management framework for LW including water balance assessment and water conservation and reuse requirements.
<b>Erosion and Sediment Control Plans</b>	Will be progressively developed for each LW worksite. ERSED Plans define all the site-specific requirements for managing erosion and sediment according to the Blue Book Volumes 1 and 2D (Landcom, 2004 and DECC, 2008).
<b>Waste, Recycling and Spoil Management Sub-Plan (SMCSWLWC-SYC-1NL-PM-PLN-000374)</b>	Details the management strategy for waste and spoil. Sets out the spoil sourcing and reuse strategy to be adopted during LW.
<b>Emergency Response Plan (SMCSWLWC-SYC-1NL-PM-PLN-000748)</b>	Details requirements for management of sites during a flood or significant storm event

## 2. Legal and Other Requirements

### 2.1 Legislation

Key legislation relevant to soil, water and groundwater management includes:

- Environmental Planning and Assessment Act 1979
- Contaminated Land Management Act 1997
- Protection of the Environment Operations Act 1997
- Water Management Act 2000

Refer to the Construction Environmental Management Plan – C2B (SMCSWLWC-SYC-1NL-PM-PLN-000033) for further details of the relevant legislation.

Section 120 of the *Protection of the Environment Operations Act 1997* states that it is illegal to pollute waters. Under the Act, 'water pollution' includes introducing litter, sediment, oil, grease, wash water, debris, and flammable liquids such as paint etc. into waters or placing such material where it is likely to be washed or blown into waters or the stormwater system or percolate into groundwater. All practicable steps should be taken to minimise the risk of pollution of waters.

The PoEO Act defines waters as the whole or any part of:

- Any river, stream, lake, lagoon, swamp, wetlands, unconfined surface water, natural or artificial watercourse, dam or tidal waters (including the sea), or
- Any water stored in artificial works, any water in water mains, water pipes or water channels, or any underground or artesian water.

### 2.2 Environment Protection Licence (EPL)

An Environment Protection Licence (EPL) for the LW Works has been issued under the PoEO Act. The EPL includes conditions applicable to soil and water management, which may be varied during construction, and which includes conditions covering:

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

Parts of LW Works will be conducted within the premises of existing EPL No. 12208 (Licensee; Sydney Trains). That EPL has the following conditions applicable to soil and water management:

- L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.
- O5.9 The licensee must, before undertaking any maintenance or construction activities, implement and maintain erosion and sediment control measures to prevent pollution of waters in accordance with Landcom's Soils and Construction: Managing Urban Stormwater 2004 – 'the Blue Book'.
- R2.1 Notifications of environmental harm must be made by telephoning the Environment Line service on 131 555.
- Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

The EPA issued EPL 21423 to the Project on 31 July 2020 for the scheduled activity “Railway activities - railway infrastructure construction”, which applies to certain prescribed premises between Chatswood Dive Site and Sydenham Dive Site. There are many conditions in the license which relate to soil and water management. The license should be referred to directly, due to the likelihood of numerous variations and to avoid potential inconsistency or error.

### 2.3 Project Compliance Requirements

All works to be delivered under LW have been assessed and approved via a number of applications under the Environmental Planning and Assessment Act 1979 (EP&A Act) and are classified as Critical State Significant Infrastructure:

- SSI 7400. Sydney Metro City & Southwest Chatswood to Sydenham and
- SSI 8256. Sydney Metro City & Southwest Sydenham to Bankstown.

Detailed environmental assessments have been carried out to gain the necessary Planning Approvals.

Element 4: Project Specific Requirements contains a summary of the key compliance requirements for soil, water and groundwater management which are applicable to the LW Works. This includes relevant Conditions of Approvals and associated mitigation measures to be implemented, as well as requirements under the Construction Environmental Management Framework (CEMF).

This plan will also deliver compliance with contractual requirements including Schedule C1 Scope of Works and Technical Criteria (SWTC) of ITC 600.

### 2.4 Guidelines and Standards

Guidelines and standards relating to the management of soil, surface water and ground water include:

- Landcom (2004). Managing Urban Stormwater: Soils and Construction. (Volume 1 of the ‘Blue Book’).
- DECC (2008). Managing Urban Stormwater: Soils and Construction. Volume 2D: Main Road Construction. (Volume 2D of the ‘Blue Book’).
- ANZECC (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality (collectively known as the ‘ANZECC Guidelines’).
- ANZECC (2000). Australian and New Zealand Guidelines for Water Quality Monitoring and Reporting (collectively known as the ‘ANZECC Guidelines’).
- ASSMAC (1998). Acid Sulfate Soil Manual. Acid Sulfate Soil Management Advisory Committee, NSW.

### 3. Roles and Responsibilities

#### 3.1 Systems Connect team

The roles and responsibilities of key Systems Connect personnel with respect to soil, water and groundwater are detailed in Table 4.

Table 4 - Key roles, authority and responsibility

Role	Authority and responsibility
<b>Project Director</b>	Managing the delivery of LW including overseeing planning approval and environmental management Authority to direct personnel and/or subcontractors to carry out actions to avoid or minimise unintended environmental impacts Act as the Contractor's Representative
<b>Environment and Sustainability Manager (or delegate)</b>	Oversee the implementation of all soil, water and groundwater management initiatives Prepare and implement this Sub-Plan Oversee monitoring, inspections and auditing
<b>Environmental Advisor</b>	Assist the Environment and Sustainability Manager in the day to day environmental management of LW
<b>Commercial Manager</b>	Ensure that relevant soil, water and groundwater management requirements are considered in procuring materials and services
<b>Design Team Manager</b>	Ensure relevant soil, water and groundwater management requirements are addressed in design development
<b>Construction Manager and delegates</b>	Manage the delivery of the construction process in relation to soil, water and groundwater management for their work activity in conjunction with the Project Environment and Sustainability Manager and Environment Coordinators Ensure compliance with this Sub-Plan and associated procedures.
<b>Sustainability Advisor/Coordinator</b>	Track and report soil, water and groundwater elements against sustainability targets
<b>Environment Coordinators</b>	Manage the on-ground application of soil, water and groundwater management measures during construction (e.g. dust suppression using water, application of dust suppressants, covering stockpiles) Monitor and report on soil, water and groundwater management during construction
<b>Superintendents</b>	Construction delivery in relation to environmental management and compliance in conjunction with the Project Environment and Sustainability Manager Authority to direct personnel and/or subcontractors to carry out actions to avoid or minimise unintended environmental impacts
<b>Project Managers Project Engineers Site Engineers Supervisors</b>	Implement and monitor onsite environmental management and compliance measures across all sites in conjunction with environmental coordinators Undertake site inspections
<b>Stakeholder and Community Relations Manager</b>	Assist in response to and management of complaints relating to soil, water and groundwater

Further details on roles and responsibilities are provided in the Construction Environment Management Plan - C2B (SMCSWLWC-SYC-1NL-PM-PLN-000033).

### 3.2 Soil Conservationist

A specialist soil conservationist is engaged to provide expert advice which has been incorporated into this Plan. They will continue to provide specialist advice and services in the development and implementation of this plan to ensure that impacts can be avoided, minimised or appropriately mitigated including:

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

### 3.3 Contamination Specialist

A consultancy specialising in the fields of contamination management and materials identification is engaged to undertake contamination assessments and provide advice on contamination management. They will also prepare Remediation Action Plans (RAP) and Acid Sulfate Soil Management Plans where required. This subject is also addressed in the Waste, Recycling and Spoil Management Sub-Plan (SMCSWLWC-SYC-1NL-PM-PLN-000374).

## 4. Existing Environment

This section provides an overview of the existing environment surrounding the LW C2B construction sites. As detailed in section 1.2 this information is based on the comprehensive assessment and analysis work performed for the EIS that cover LW scope. This section also draws on an understanding of the works by other SMCSW contractors, completed or to be completed prior to handover to Systems Connect. Considering the area covered by this project (C2B) the existing environment is described over two sections based on each Planning Approval:

- Chatswood to Sydenham
- Sydenham to Bankstown

### 4.1 Chatswood to Sydenham

#### 4.1.1 Soil Landscapes

The project is located within the Sydney Basin, a large depositional geological feature that spans from Batemans Bay to the south, Newcastle to the north and Lithgow to the west. The Sydney 1:100,000 Soil Landscape Mapping Series Sheet 9130 (Chapman and Murphy, 1989) identified a number of soils underlying the project area. Soil descriptions and associated constraints are included in Table 5 below.

It must be noted that all the LW sites would have already been modified by the previous contractors and as such, most of the constraints related with soil characteristics would have already been addressed prior to Systems Connect taking over. Table 5 also outlines extent of LW civil scope at each location that would require interaction with the pre-existing soil landscape.

Table 5 - Soil units underlying the project area

Soil Unit	Characteristics	Constraints	LW scope interaction
<b>Birrong</b> Around Marrickville dive site – southern	Deep (>250cm) yellow podzolic soils and yellow solodic soils on older alluvial terraces	Localised flooding High soil erosion hazard Saline subsoils Seasonal waterlogging Very low soil fertility	Site capped by previous contractor- Some (limited) excavation below engineered fill. Excavation required as part of the Sydney Steel Road scope of works.
<b>Blacktown</b> Around Chatswood, Crows Nest and Central Station	Shallow to moderately deep hard setting mottled texture contrast soils, red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines	Moderately reactive Highly plastic subsoil Low fertility and poor drainage	Piling and excavation within the rail corridor for retaining walls and the open dive construction.  In ground services – drainage and CSR routes to be constructed.  Approximately 5000m <sup>3</sup> material removed from Northern connection works.
<b>Deep Creek</b> Around Pitt Street and Central Stations	Deep (>200cm) podzols on well drained terraces, siliceous sands on current floodplain, and humus podzols in low lying areas	Flooding Extreme soil erosion hazard Sedimentation hazard Localised very low fertility Permanently high water tables	No interaction with natural ground.
<b>Lucas Heights</b> Around Martin Place and Central Stations	Moderately deep (50-150cm), hard setting yellow podzolic soils on outer edges of crests	Stony soil Low soil fertility Low available water capacity	No interaction with natural ground.



Soil Unit	Characteristics	Constraints	LW scope interaction
<b>Glenorie</b> Around Artarmon substation	Shallow to moderately deep red podzolic soils on crests, moderately deep red/brown podzolic soils on upper slopes, deep yellow podzolic soils on lower slopes and humic gleys, yellow podzolic soils and gleyed podzolic soils along drainage lines	High soil erosion hazard Localized impermeable highly plastic subsoil Moderately reactive	Limited excavation for footing of substation <1000m <sup>3</sup> spoil.
<b>Gymea</b> Around Barangaroo, Martin Place and Victoria Cross Stations, and Blues Point temporary site	Shallow to moderately deep yellow earths and earthy sands on crests and on the inside of benches	High soil erosion Rock outcrop Shallow highly permeable soil Very low soil fertility	No interaction with natural ground at Martin Place and Victoria Cross. There are no civil works or spoil handling being done by LW at Barangaroo. Excavation required as part of the Blues Point streetscaping scope of works.
<b>Disturbed Terrain</b> Around Barangaroo Station, Artarmon substation and Chatswood	The original soil has been removed, greatly disturbed or buried. Most of these have been levelled to slopes of <5%. Landfill includes soil, rock, building and waste material. The original vegetation has been completely cleared	Depends on the nature of fill material Potential for subsidence resulting in a mass movement hazard Soil impermeability leading to poor drainage and low fertility Care must be taken when these sites are developed	Limited excavation for footing of Artarmon substation <1000m <sup>3</sup> spoil. Limited civil excavation at Chatswood dive. There are no civil works or spoil handling being done by LW at Barangaroo.
<b>Hawkesbury</b> Around Blues Point temporary site	Shallow (<50 cm), discontinuous lithosols/siliceous sands associated with rock outcrops, earthy sands, yellow earths and some yellow podzolic soils on the inside of benches and along joints and fractures	Extreme soils erosion hazard Mass movement (rockfall) steep slopes Rock outcrop Shallow, stony, highly permeable soils with low fertility.	Excavation required as part of the Blues Point streetscaping scope of works.

#### 4.1.2 Geology

Seven regional geological units will be traversed along the project area from Chatswood to Sydenham. Table 6 below describes the regional geology along the Chatswood to Sydenham project alignment. Sediments within Sydney Harbour will not be encountered, as LW scope does not include Sydney Harbour ground improvements.

Table 6 - Regional geology along Chatswood to Sydenham project alignment

Geological Unit	Description
<b>Fill</b>	Reclaimed areas generally adjacent to Sydney Harbour and some parklands

Geological Unit	Description
<b>Holocene alluvium</b>	Normally consolidated sediments
<b>Pleistocene alluvium</b>	Over-consolidated sediments (often sandy clays)
<b>Residual soil</b>	Derived from completely weathered siltstone and sandstone
<b>Ashfield Shale</b>	Black to dark-grey shale and laminate
<b>Mittagong Formation</b>	Interbedded shale, laminate and medium-grained quartz sandstone
<b>Hawkesbury Sandstone</b>	Medium to coarse-grained quartz sandstone

Due to the generally low to very low permeability of shale, siltstone and sandstone, the majority of groundwater flow is transmitted through joints and fractures rather than via the porous nature of the material.

Systems Connect is unlikely to encounter all these geological units as there will be limited excavation required for the LW scope. Most of the sites would have already been pre-established by the tunnelling contractor.

#### 4.1.3 Groundwater

The groundwater level along most of the Chatswood to Sydenham portion is between 10 to 30 metres below ground level. Local shallow groundwater within residual soils is anticipated at two to five metres below ground level.

Groundwater in Sydney is typically high in iron, may contain manganese and/or contaminants, has a relatively high salinity and slightly acidic pH as detailed below:

- Salinity of groundwater within the Ashfield Shale ranges between 269 and 493 mg/L with pH ranging between 4.9 and 5.1.
- The groundwater within the Mittagong Formation has a salinity ranging between 265 and 350 mg/L with pH ranging between 4.7 and 5.6.
- Salinity of the groundwater within the Hawkesbury Sandstone ranges between 147 and 574 mg/L and has a near-neutral pH ranging between 5.2 and 6.8.

Due to the low permeability of the shale, siltstone and sandstone, there is limited groundwater use near the Chatswood to Sydenham project area. A search of the NSW Water Register identified four sites where there is an approval as Basic Rights to extract groundwater, and therefore do not require a Water Access Licence.

As noted in Table 5 above, LW will require limited excavation works between C2S, therefore anticipated impacts to the groundwater table are expected to be negligible. Table 7 provides detail of expected excavation depths and available groundwater data at each location.

*Table 7 - Details of excavation activities and depths*

Location	Details of Activities	Available Data
<b>Northern Connection (Provisional sum)</b>	Excavations required for drainage and Combined Services Route construction. Excavation depths up to 2.8m.  Pilling for the construction of a retaining wall, within the rail corridor near Mowbray road overbridge. Works will require excavations up to 6m deep.	BH21 (15m) – installed by Laing O'Rourke under the scope of Northern Corridor Works scope – near the construction area of LW retaining wall. Groundwater level encountered at 0.5m bgl.  The Hydrogeological Report, document Number SMCSWTSE-JPS-TPW-110003-00, indicates a predicted final groundwater level in range of RL 92.0m

Location	Details of Activities	Available Data
	Northern Connection dive will require excavations to a depth of 7.5m.	to 94.0m along the Northern Transfer Structure. The same report provides the initial head between RL. 95.0m to 96.0m.
<b>Northern Dive (Portion 3)</b>	Construction works within existing dive portal and on the surface surrounding the dive structure. Stormwater basin with a depth of approximately 1.2m.	The Hydrogeological Report, document Number SMCSWTSE-JPS-TPW-110003-00, indicates a predicted final groundwater level in range of RL 92.0m to 94.0m along the Northern Transfer Structure. The same report provides the initial head between RL. 95.0m to 96.0m.
<b>SMTF South (Portion 2)</b>	Civil works for installation of services and footings. – typical depth >2m below ground level. Max depth to 5m for service pits	Groundwater is reported by GHD in the boreholes SRT-BH90, SRT-BH91, SRT-BH092 and SRT-BH094 during drilling between RL 1.41m AHD and -2.98m AHD at the time of fieldwork. Based on the measured groundwater depths and subsurface profile, groundwater is reported in the residual soil stratigraphy. It should be noted that groundwater levels are likely to fluctuate with variations in climatic and site conditions.
<b>Artarmon Substation (Portion 3)</b>	The structure will be supported by concrete piles approx. 5-6m deep	Alliance Geotech reports that groundwater wasn't encountered to the depth of investigation, with the deepest borehole 11.7 m.
<b>Artarmon BPS route (Portion 3)</b>	Trenching to typically 1.5-2m for bulk power supply feeder from Willoughby substation to Artarmon substation.	Alliance Geotech reports that groundwater wasn't encountered across the five boreholes drilled but commented that seepage may occur at the highly weathered sandstone profile and along defects in the bedrock after adverse weather conditions.
<b>Surry Hills BPS route (Portion 3)</b>	Trenching to typically 1.5-2m for bulk power supply feeder from Surry Hills substation to Central Station.	Slight groundwater seepage is reported by Alliance Geotech (2020) within two of eleven boreholes, at BH4 at a depth of 1.7 m and within BH5 at a depth of 4 m. Seepage is generally expected to occur at interface of bedrock and residual soil and along defects in the bedrock following adverse weather conditions and during periods of heavy rain.

#### 4.1.4 Soil Salinity

Areas prone to salinity are usually at low positions in the landscape, such as footslopes, in valley floors, or at a break of slope. The Office of Environment and Heritage NSW Soil and Land Information System contains data points identifying evidence of soil salinity at areas which have been previously sampled. There was no evidence within this database to suggest soil salinity at any point along the C2S alignment. According to the Office of Environment and Heritage, urban salinity is of concern in Western Sydney however is not considered to be an issue for areas between Chatswood to Sydenham. As soil salinity is unlikely to be present along the C2S project alignment, salinity related impacts on groundwater resources and hydrology are not expected.

#### 4.1.5 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring sediments or soils that contain iron sulfides. Sulfuric acid is produced when the sulfide in soils is exposed to oxygen during excavation works or drainage. Areas that are swampy or prone to flooding have a higher probability of containing ASS.

Table 8 below identifies the probability for the presence of ASS between Chatswood to Sydenham.

LW scope of works does not include any ground disturbance within high probability areas of ASS identified below. Civil works at Marrickville are unlikely to disturb ASS.

*Table 8 - Probability for acid sulfate soils between Chatswood and Sydenham*

Locations	Probability for Acid Sulfate Soils
Chatswood to St Leonards	Low
St Leonards to North Sydney	Extremely low
Sydney Harbour to Barangaroo – only Cockle Bay, opposite Erskineville Street at Barangaroo, Lavender Bay and Darling Harbour.  Acid sulfate soils are not known to be present within areas within Sydney Harbour where ground improvement works may occur for the harbour crossing.	High – in specific areas identified  Low – in other areas in this location including Sydney Harbour
Barangaroo to Pitt Street	Extremely low
Pitt Street to Central Station	Low
Waterloo Station to Marrickville dive site (southern)	High

#### 4.1.6 Surface Water

There are two large water catchments within the Chatswood to Sydenham area – Sydney Harbour/ Parramatta River catchment, and Cooks River catchment. Within these two catchments there are five local watercourses that are located along the Chatswood to Sydenham project area. These local watercourses drain into Middle Harbour, Sydney Harbour and Botany Bay. Surface water catchments and watercourses are shown in Figure 1 below.

Much of the Sydney Harbour and Parramatta River catchment is urbanised, although significant areas of bushland remain, particularly within the Lane Cove, Garigal and Sydney Harbour national parks. Because of the extent of development, the waterways are affected by poor water quality and a changed flow regime. The waterways have been greatly modified, with creek systems extensively channelised or hard-edged with concrete. Wetlands have been destroyed or degraded and, where natural remnants of vegetation exist, they are often affected by weeds and rubbish.

Surface water is generally collected by developed stormwater networks which consist of road kerb and guttering, lined and unlined drainage channels, and sub-surface pit and pipe networks. The majority of the drainage systems are owned and maintained by the local council, a number of the larger trunk drainage systems are assets of Sydney Water.



Figure 1 - Surface water catchments and watercourses. (Source: Figure 21-1 of Sydney Metro City & Southwest EIS Chatswood to Sydenham).

#### 4.1.7 Water Quality

Due to the heavy urbanisation of watercourses within and near the project corridor, surface water quality is largely influenced by point source water pollution (e.g. from stormwater drains) and diffuse water pollution (e.g. from urban runoff that does not enter stormwater drains).

The NSW Department of Planning and Environment measures the recreational water quality of Sydney's harbours and surrounding beaches through the Beachwatch program. Rainfall data is used to predict the likelihood of bacterial contamination at sample sites. Relevant samples have been taken at various locations in Middle Harbour, Sydney Harbour and Botany Bay. The closest monitoring sites



to the project are Hayes Street Beach at North Sydney in Middle Harbour, Greenwich Baths in Sydney Harbour and Kyeemagh Baths at the mouth of the Cooks River in Port Botany.

The Water Quality and River Flow Objectives for the Sydney Harbour and Parramatta River catchment identify the whole project area within “waterways affected by urban development.” Under the Water Quality Objectives for watercourses so classified, the primary driver for turbidity is the maintenance of aquatic ecosystems. Ideally, turbidity should be between 6 and 50 NTU. Note that this does not set the limits for discharge from the project, but the overall target water quality within the waterways.

No watercourses will be directly impacted or modified by the LW Works in the C2S section.

#### 4.1.8 Flooding

Due to the highly urbanised drainage catchments surrounding the project area, flooding behaviour is expected to be largely controlled by the capacity of stormwater drainage systems and roadways that form overland flow paths. Existing flood behaviours for sites where Systems Connect will be principal contactor are described in Table 9 below.

*Table 9 - Description of existing flood behaviour*

Location	Description of Existing Flood Behaviour
Chatswood dive site (northern)	The Chatswood dive site is located near the top of the Scotts Creek and Flat Rock Creek drainage catchments. Localised flooding of the construction site and in the rail corridor has the potential to occur during high intensity rainfall events.
Artarmon substation	The site is located near the ridge between sub-catchments and would therefore not be affected by flooding. The main overland flow path near the site is on Reserve Road, which drains south before turning east along the northern side of the Gore Hill Freeway.
Marrickville dive site (southern)	The Marrickville dive site will be located in low-lying terrain where flooding occurs. Areas to the north and south of the existing rail lines drain towards the Marrickville dive site and Eastern Channel. The main overland flow path from the north is down Murray Street before floodwaters enter the upstream section of the Eastern Channel. Catchments from the south of the rail corridor drain via a number of culverts under the rail line into Eastern Channel. These culverts flow full in flood events with an average recurrence interval of two years or more, causing floodwaters to flow over the rail line near the Bedwin Road overbridge and Sydenham Station.

Detailed SEP and ESCPs will consider flood risks, obstruction of overland flow paths and limit the extent of flow diversion required. They will also consider how works would affect the existing stormwater network such that alternatives are in place prior to any disconnection or diversion of stormwater infrastructure.

Any events or incidents resulting from flooding will be managed in accordance with the Systems Connect Emergency Response Plan (SMCSWLWC-SYC-1NL-PM-PLN-000748). This identifies floods/heavy rain events as a hazard, with risk of flooding of areas within the Project footprint. Key prevention measures include:

- monitoring of weather and alerts
- inform staff working in flood plain area of flood risk
- set up compounds on higher ground - away from natural water courses.

Emergency Action Plans have been developed for foreseeable emergency situations (including flooding). The applicable Emergency Action Plan will be attached to the relevant Work Pack or Safe Work Method Statement and/or displayed on site noticeboards and highlighted in Project Inductions, in areas where flooding is a high risk, such as the Marrickville dive site.

#### 4.1.9 Contamination

The Contaminated Sites Register and Record of Notices under Section 58 of the CLM Act, identifies 11 registered sites within 500 m of the LW Works area that are either regulated or have been notified to the EPA. These sites are detailed in Table 10 below.

Table 10 - Registered contamination sites between Chatswood and Sydenham

Suburb	Site Address	Site Activity	Contamination Status	Location in Relation to the Project Area
<b>Chatswood dive site (northern)</b>				
Chatswood	607 Pacific Highway	Former Caltex Service Station	Contamination currently regulated under CLM Act	Within the Chatswood dive site footprint
Chatswood	572 Pacific Highway	Caltex Service Station	Under assessment	50m to the west of the Chatswood dive site footprint
<b>Blues Point temporary shaft</b>				
Lavender Bay	French Street	SRA Land	Regulation under CLM Act not required	About 400m north of the Blues Point temporary site
<b>Barangaroo Station</b>				
Millers Point	30-34 Hickson Road	Former AGL Gasworks	Regulation under CLM Act not required	Adjacent and to the south of Barangaroo Station footprint
Millers Point	36 Hickson Road	Former AGL Gasworks	Contamination currently regulated under CLM Act	Adjacent and to the south of Barangaroo Station footprint
Millers Point	38 Hickson Road	Former AGL Gasworks	Contamination currently managed via the planning process (EP&A Act)	Adjacent and to the south of Barangaroo Station footprint
Millers Point	Berths 5, 6 and 7 (already demolished and part Hickson Road)	Former AGL Gasworks	Contamination currently regulated under CLM Act	Adjacent and to the south of Barangaroo Station footprint
Millers Point	Road reserve fronting 30-38 Hickson Road	Former AGL Gasworks	Contamination currently regulated under CLM Act	Adjacent and to the south of Barangaroo Station footprint
Millers Point	4 Towns Place	Port Services (Moore's) Facility	Contamination currently regulated under POEO Act	About 200m north of Barangaroo Station
<b>Pitt Street Station</b>				
Sydney	447 Kent Street	Interpro House (OSP 46581)	Regulation under CLM Act not required	About 320m west of Pitt Street Station

Suburb	Site Address	Site Activity	Contamination Status	Location in Relation to the Project Area
<b>Waterloo Station</b>				
Waterloo	2 John Street	Other industry	Regulation under CLM Act not required	About 200m south of Waterloo Station

According with the EIS documentation, contaminants that could be encountered during excavation and other ground disturbing activities include contamination associated with:

- Leaks and spills from fuel storage infrastructure (hydrocarbons and heavy metals)
- Processing of heavy end hydrocarbons, heavy metals and metalloids
- Land reclamation and other uncontrolled fill material (metals, hydrocarbons, pesticides, PCB and asbestos)
- Demolition of buildings, such as asbestos
- Former and current industrial land uses (hydrocarbons, heavy metals and metalloids, solvents, phenolics, pesticides, heavy metals and metalloids and asbestos in soil)
- Existing railways and associated activities (metals, hydrocarbons, pesticides, nutrients, phenols, carbamates, pesticides, herbicides and asbestos in soils).

The likelihood of encountering a contaminated site during the delivery of Portions 2 and 3 is low. All the sites, including areas within the rail corridor, have already been disturbed and modified by other SMCSW contractors' works. Furthermore, LW scope of works includes limited ground disturbance at these sites.

There is potential for contaminated soil finds during delivery of LW. Any contamination encountered would be managed under the unexpected finds procedure, as detailed in Section 6.8.

## 4.2 Sydenham to Bankstown

### 4.2.1 Soil Landscape

The following soil types underlie the project area and are described in Table 5 above:

- Blacktown, mapped across most of the project area
- GyMEA, mapped as a larger patch between Canterbury and Dulwich Hill stations, and a smaller area between Dulwich Hill and Marrickville stations
- Glenorie, mapped north of Bankstown Station
- Birrong, mapped west of Cooks River, and local occurrences in Belmore and Wiley Park
- Disturbed Terrain, mapped west of Punchbowl Station.

Along and within 100 metres of the project area there is a substantial amount of fill material consisting of railway ballast, gravel, building debris, and excavated soil material. At the majority of the locations subject to the LW scope the soils have been significantly modified by previous activities.

### 4.2.2 Geology

The project area from Sydenham to Bankstown traverses the same geological units as the Chatswood to Sydenham portion, with the addition of:

- Bringelly Shale – siltstone and claystone interbedded with fine sandstone
- Minchinbury Sandstone – fine to medium sandstone, bedrock outcropping identified in vicinity of Wiley Park Station
- Dykes – volcanic intrusions located at Marrickville, Canterbury and Belmore.

It should be noted though that the S2B section of the project follows the existing rail alignment for the construction of all the traction substations. As such the LW Works are unlikely to intercept any of the above geological units.



#### 4.2.3 Groundwater

Groundwater levels in most of the Sydenham to Bankstown project area are between 2.3 metres below ground level and about 10.3 metres below ground level. Groundwater has been observed discharging from open cuttings along the rail corridor. A search of the NSW Water Register identified 17 groundwater boreholes located within 400 metres of the project area, most of which were registered as monitoring bores/wells.

The salinity of groundwater within the Quaternary alluvium is expected to vary, with higher salinity in the lower reaches of the Cooks River due to mixing and tidal influences.

The groundwater at deeper levels in the Mittagong Formation and Hawkesbury Sandstone is expected to have a lower salinity and low concentrations of dissolved metals and nutrients.

Environmental and geotechnical investigations have been completed at the five traction substations in the southwest corridor (Dulwich Hill, Canterbury, Campsie, Lakemba and Punchbowl). A total of 30 test pits or boreholes with depths ranging from 0.5 to 4.5 metres were undertaken across the five sites with no groundwater encountered. Perched water (aquifer that occurs above the water table) was encountered at Canterbury within BH2 at 1.3 metres.

Excavations for the installation of the Campsie BPS route will have a typical depth between 1.6 and 2.5m. Bored concrete piles for the conduit bridge structure crossing at Cup & Saucer Creek will have an approximate depth up to 3m. Geotechnical investigations have been completed for the BPS route by Alliance Geotechnical. BH1-12 spread across route had depths ranging from 1.5-2.5m and did not encounter groundwater. Adjacent to the bridge structure location, two boreholes were drilled. In BH101 groundwater was encountered at 2.3m, whereas BH102 groundwater was not encountered.

#### 4.2.4 Soil Salinity

Areas prone to salinity are usually located at low points in the landscape, such as footslopes, valley floors, or at breaks of slope. Potential saline soils are located west of Punchbowl Station, including:

- high salinity potential soils on either side of Stacey Street and north of Gordon Street
- moderate salinity potential soils between Punchbowl and Bankstown stations.

The remainder of the project area is not mapped as having salinity potential.

Punchbowl traction substation will be located between Punchbowl and Bankstown stations where there is a moderate soil salinity potential, according with the salinity potential mapping provided in the EIS (refer to Figure 2). As such, LW will undertake testing to confirm presence of salinity prior to ground disturbance. In cases where saline soils are encountered, they are to be managed in accordance with Site Investigations for Urban Salinity (DLWC, 2002) including applying the following mitigation measures:

- Minimising water infiltration
- Landscaping using native plants
- Retention (where practicable) of deep-rooted vegetation
- Minimising soil disturbance such as compaction, cut and fill

The Geotechnical Investigation Report – Punchbowl Substation (Alliance Geotechnical, 2020) included an investigation into the salinity of soils within the site footprint. The report confirmed the presence of moderate saline soils within one of the three borehole samples, with the other two samples reported as low saline soils. During construction LW will monitor for signs of salinity, such as waterlogged soil, salt crystals and increased soil erosion.

#### 4.2.5 Acid Sulfate Soils

As identified in the EIS, potential acid sulfate soils are located near the Cooks River at Canterbury, which is mapped as having a high likelihood of acid sulfate soils. Areas mapped with a low likelihood of acid sulfate soils are located between Canterbury and Campsie stations. Acid sulfate soils may also be encountered in areas mapped as 'disturbed terrain', including around Canterbury Station, and between Canterbury and Campsie stations.

There are no LW works requiring ground disturbance within the high probability acid sulfate areas mapped in the EIS, including the BPS route in Campsie. Figure 2 provides an overlay of the potential risk areas and the indicative location of the traction substations.

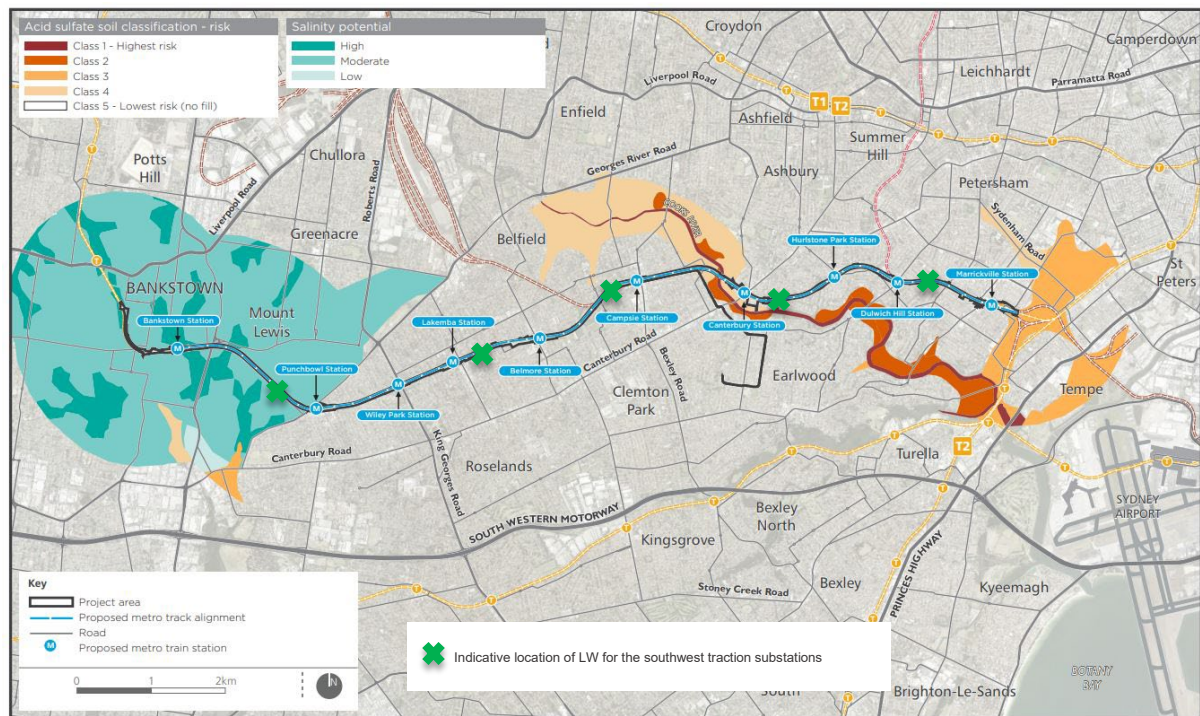


Figure 2 - Salinity Potential and Acid Sulfate Soil risk classification. (Source: Sydney Metro City and Southwest EIS Sydenham to Bankstown upgrade.)

#### 4.2.6 Surface Water

The majority of the area between Marrickville and Punchbowl stations is located in the Cooks River catchment. Between Punchbowl and Bankstown stations, the project area falls under Salt Pan Creek catchment, which is part of the Georges River catchment. Both catchments are highly urbanised which has impacted the quantity and speed of runoff within the catchments. Surface water catchments and watercourses along the S2B project alignment are shown in Figure 3 below.

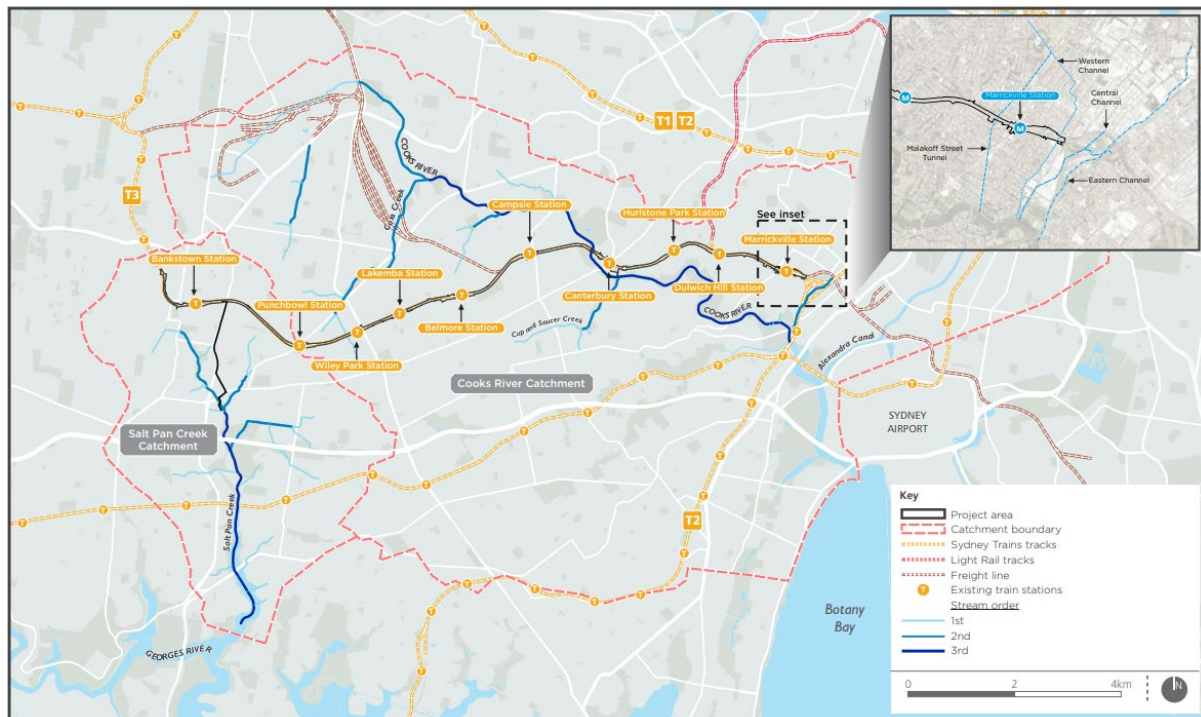


Figure 3 - Catchment areas and watercourse locations. (Source: Sydney Metro City and Southwest EIS Sydenham to Bankstown upgrade.)

The Cooks River catchment is located in the inner to middle south-western suburbs of Sydney and has an area of about 102 square kilometres. The river discharges into the north of Botany bay, near Sydney Airport. Cup and Saucer Creek is one of the major tributaries of Cooks River.

The Georges River catchment is located in the southern and western suburbs of Sydney and covers an area of about 960 square kilometres. The western portion of the project area drains into Salt Pan Creek, a major tributary of the Georges River. The catchment is relatively steep upstream of the project area, with surface water runoff managed by the existing stormwater drainage network.

It is noted that in accordance with REMM FHW7, works within or near watercourses (including the Cooks River) would be undertaken with consideration given to the NSW Office of Water's guidelines for controlled activities. This would be triggered at one location of the LW scope of works, for the construction of the cable bridge crossing Cup and Saucer Creek as part of the Campsie BPS route.

The Cup and Saucer Creek, along Pat O'Conner Reserve is formed by concrete channel walls on each bank. As such, in accordance with the guidelines for controlled activities, the riparian corridor (RC) and vegetated riparian zone (VRZ) extend 40m from each channel wall. It is noted that the area is highly disturbed and urbanised, mostly constituted of turf, with minimal remaining riparian vegetation in this area. There will be no impact to riparian vegetation as part of the works. The current preferred creek crossing design involves the use of prestressed concrete girders, which will eliminate the need for in-stream works in the culvert.

#### 4.2.7 Water Quality

Because of the heavily urbanised nature of the catchments, water quality is generally relatively poor, with stormwater runoff fouling the river systems with litter, petroleum derivatives, excess nutrients, and other pollutants. No existing water quality treatment measures within the project area were identified in the EIS research.

Water quality is measured on an ongoing basis for the wider Cooks River catchment as part of the Beachwatch programme. The most relevant monitoring point is at Kyeemagh Baths at the mouth of the Cooks River in Port Botany. Water quality within the Cooks River catchment is influenced by stormwater, illegal dumping, litter and sewage overflows contamination.



Systems Connect will manage any water discharges in accordance with any relevant EPL and as detailed in Section 6.2.

The Water Quality and River Flow Objectives for the Georges River catchment identify this area as a “waterway affected by urban development.” Under the Water Quality Objectives for watercourses so classified, the primary driver for turbidity is the maintenance of aquatic ecosystems. Ideally, turbidity should be between 6 and 50 NTU. Note that this does not set the limits for discharge from the project, but the overall target water quality within the waterways.

#### 4.2.8 Flooding

As stated above, the Cooks River and Salt Pan Creek catchments are both highly urbanised and dominated by impervious surfaces. These systems experience very low flows during dry periods and very high flows after storms.

The stormwater drainage network controls the stormwater flows for the smaller storm events throughout the project area, mainly from roads and urban areas. There are numerous stormwater drainage crossings beneath the rail corridor, including more than 40 drainage culverts that are larger than 450 millimetres in diameter. Existing drainage issues within the rail corridor are generally related to one or both of the following:

- Insufficient capacity within the surrounding local stormwater drainage network, which overflows into the rail corridor during flood events
- Lack of drainage infrastructure within the rail corridor to capture flows from external catchments – this is particularly the case where the ARTC freight tracks are located up-slope of the Sydney Trains tracks.

In the Cooks River catchment, the most flood affected part of the project area is near Marrickville Station. Marrickville oval is an important flood storage location, acting as a detention basin during flood events. McNeilly Park, to the west of Marrickville Station, also acts as a flood storage area during flood events. The existing rail corridor and surrounds near Marrickville Station are susceptible to flooding, with flooding predicted to occur in events as frequent as the 39 per cent AEP. Most of the rail corridor between Livingstone Road and Illawarra Road, and a section of corridor about 150 metres east of Marrickville Station, is identified as a high flood hazard area during the one per cent AEP event. Other areas in the catchment, such as a section of existing rail corridor east of Canterbury Station, is subject to flooding during the five per cent AEP event. Access routes around Marrickville Station would be flooded, including Railway Parade, Sydenham Road, Marrickville Road, Illawarra Road, Schwebel Street, and Arthur Street.

The following areas of the rail corridor within the Salt Pan Creek catchment have the potential for flooding:

- Rail corridor adjacent to Marion Street in Bankstown near the intersection with Bungalow Crescent – during a 63 per cent AEP event
- Local drainage network near the rail corridor on Olympic Parade and short sections of North Terrace and South Terrace in Bankstown – during a one per cent AEP event
- Downstream of the rail corridor – during an 18 per cent AEP event.

#### 4.2.9 Contamination

According with the EIS *no site listed on the EPA’s contaminated land register are located within 100 metres of the project area. However, three sites which have been notified to the EPA are located within 100 metres of the project area, as listed below:*

Table 11 - Registered contamination sites between Sydenham to Bankstown

Suburb	Site Address	Site Activity	Contamination Status	Location in Relation to the Project Area
Marrickville	Way Street	XPT Maintenance Facility, other industry	Regulation under CLM Act not required	East of the project area between Sydenham and Marrickville stations

Suburb	Site Address	Site Activity	Contamination Status	Location in Relation to the Project Area
Marrickville	2 Carrington Road	Unclassified	Regulation under CLM Act not required	Within the project area between Sydenham and Marrickville stations
Belmore	348 Burwood Road	Rail land, unclassified	Regulation under CLM Act not required	Within the project area between Sydenham and Marrickville stations

The preliminary environmental site assessment, conducted for the EIS, identified the potential risk of contamination along the project area. The assessment concluded that there is a risk of contamination along the length of the S2B project area, albeit a low to medium risk for the majority of the S2B project area, with potential contamination sources being historical rail activities, and commercial and residential land use in surrounding areas. Potential contaminants identified in low to medium risk areas included:

- Asbestos
- Hydrocarbons
- Heavy metals
- Herbicides

The EIS also notes two areas of medium to high risk of contamination within or adjacent to the LW footprint:

- Between Campsie and Belmore stations (triangular area within the rail corridor) – arsenic in ballast, asbestos, hydrocarbons, heavy metals (including in groundwater) and herbicides.
- Between Punchbowl and Bankstown stations (car park at North Terrace) – asbestos, hydrocarbons, heavy metals and herbicides.

Investigations to inform design and constructability will take place at the LW traction substation work sites to confirm the nature and extent of contamination and required management requirements.

Waste classifications undertaken at the LW traction substation sites identified asbestos contamination at:

- Dulwich Hill TSS
- Campsie TSS
- Punchbowl TSS

The asbestos contaminated soils were managed under the 'Unexpected Finds Soil Contamination and Asbestos (Appendix C2), and the material was disposed off-site to licensed waste facility.

## 5. Aspects and Impacts

The key aspects and potential impacts in relation to the overall management of soil, water and groundwater during the LW Works are listed in Table 12 below.

Table 12 - Summary of overall aspects and potential impacts

Aspect	Potential Impacts
Storage and use of chemicals near stormwater systems and waterways	<ul style="list-style-type: none"> <li>• Soil contamination as a result of a spill</li> <li>• Pollutants to wash into the stormwater system, then into/directly into receiving waters</li> </ul>
Sediment laden runoff during establishment of site compounds, excavation and trenching.	<ul style="list-style-type: none"> <li>• Sediment laden/contaminated runoff entering stormwater systems and/or directly into receiving waters, causing pollution.</li> </ul>
Material stockpiles	
Discharge of sediment laden water from wheel wash facilities	
Sewage overflows from compounds	
Groundwater inflows	<ul style="list-style-type: none"> <li>• Very limited potential for changes to the groundwater system and influences on groundwater users</li> <li>• Very limited potential for groundwater inflows during excavations to be greater than expected</li> </ul>
Dewatering of excavations and from groundwater inflows and stormwater	<ul style="list-style-type: none"> <li>• Turbid or saline water to enter stormwater systems and subsequently causing degradation of freshwater habitat and water quality</li> </ul>
Modifications to natural hydrology or water quality from excavations	<ul style="list-style-type: none"> <li>• Localised Pollution of stormwater systems and/or directly into receiving waters if appropriate mitigation or management measures are not adopted</li> <li>• No Potential for groundwater drawdown</li> </ul>
Sediment tracking onto public roads from vehicles leaving construction worksites	<ul style="list-style-type: none"> <li>• Sediment and gravel on roads</li> <li>• Sediment entering into stormwater systems and/or directly into receiving waters, causing pollution</li> </ul>
Dust blowing from the worksites or from vehicles during spoil removal	<ul style="list-style-type: none"> <li>• Pollution of waterways</li> </ul>
Floodwaters impacting on worksites	<ul style="list-style-type: none"> <li>• Contamination of floodwaters by sewerage, fuels and/or chemicals onsite</li> <li>• Potential for floodwaters to drain into works excavations</li> </ul>
Encountering contaminated material/water during LW	<ul style="list-style-type: none"> <li>• Delaying the works or requiring additional controls to be implemented.</li> </ul>
Incorrect reuse, disposal or management of contaminated soil	<ul style="list-style-type: none"> <li>• Spreading of contaminated material to land causing pollution.</li> </ul>
Concreting and grouting	<ul style="list-style-type: none"> <li>• Potential for water quality impacts on surface and ground water from concreting and grouting.</li> <li>• Potential for spills of excess or waste concrete</li> <li>• Potential for waste concrete to be discharged into stormwater systems.</li> </ul>
Construction or modification to stormwater systems	<ul style="list-style-type: none"> <li>• Potential for accidental discharge of sediment-laden runoff into stormwater systems.</li> </ul>

## 6. Management Strategy

Controls that are adequate to ensure compliance and to reduce risk to the lowest acceptable rating achievable will be implemented before any relevant works commence. Elimination of the hazard is the first preference of control, followed by engineering, then administrative controls. The management strategy applied on this project is detailed in the sections below.

The following procedures have also been developed to support soil, water and groundwater management processes during construction (refer to Appendix C2):

- Water Management (SMCSWLWC-SYC-1NL-EM-PRO-000384) – includes water treatment requirements for discharge and dewatering process.
- Spill Management (SMCSWLWC-SYC-1NL-EM-PRO-000387)
- Unexpected Finds Soil Contamination and Asbestos (SMCSWLWC-SYC-1NL-EM-PRO-000388)
- Erosion and Sediment Control Management (SMCSWLWC-SYC-1NL-EM-PRO-000390)
- Contingency Groundwater Monitoring and Management (SMCSWLWC-SYC-1NL-EM-PRO-000398)
- Spoil Classification Reuse and Recycling (SMCSWLWC-SYC-1NL-EM-PRO-000461).

### 6.1 Erosion and Sediment Control

#### 6.1.1 Erosion and Sediment Control Plans

Site-specific Erosion and Sediment Control Plans (ESCPs) will be progressively developed for each LW worksite. The Indicative Erosion and Sediment Control Strategy (detailed in the section below) will be used as a guide by the LW project team in developing and implementing ESCPs.

All ESCPs require sign-off by the Environment and Sustainability Manager (or delegate) prior to implementation. The Soil Conservationist will also conduct regular reviews, as required, of ESCPs to ensure they meet best practice (i.e. the NSW Blue Book). Any ESCPs developed and associated further revisions will be provided to the ER for information. An indicative ESCP has been provided in Appendix C1.

An Erosion and Sediment Control Management Procedure (SMCSWLWC-SYC-1NL-EM-PRO-000390) has been developed for LW Works (refer to Appendix C2) to guide the installation and adjustment of erosion and sediment controls on site.

Any exclusion zone requirements, to limit disturbance related to surface water, will be included in ESCPs. An exclusion zone will also be maintained around drainage lines on site.

Any areas disturbed during construction will be stabilised in accordance with the Blue Book or the final design, as soon as feasible.

ESCPs will be updated as works progress to ensure they are always relevant to on-ground activities. For minor changes, these can be notated onto the ESCP. Major changes to the type or nature of sediment controls or to stormwater runoff will warrant preparation of an updated ESCP. Any amendments of the ESCPs will be approved by the Environment and Sustainability Manager (or delegate).

Copies of the current ESCPs will be kept by Systems Connect for all active construction sites.

#### 6.1.2 Erosion and Sediment Control Strategy

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

- Clean water approaching the site from external catchments beyond the construction worksites will be managed via clean water drains and diversion berms to minimise run-on into the site. Impacts on adjacent land users will be considered to ensure that localised flooding or excessive run-on does not occur.
- Where sediment basins or sediment sumps cannot reasonably be constructed to the Blue Book requirements, undersized structures or alternatives (e.g. sediment fence) will be used, but with an enhanced focus on erosion control.

- Where possible, vegetation removed as part of the works will be mulched and reused on site for erosion and/or sediment control purposes.
- Stormwater flow velocities through work areas will be controlled using temporary berms or other suitable devices and water will be directed to appropriate locations.
- The spatial extent of exposed soils will be minimised, with no-go (exclusion) areas clearly marked on ESCPs, delineated and signposted.
- Temporary ground cover (e.g. geo-fabric, soil binder/stabiliser, hydro-mulch, other suitable products etc.) will be used to lock down high risk areas whenever significant rain is imminent.
- Rainfall forecasts will be actively monitored and used to trigger inspection and, where required, implementation of additional measures such as the application of soil binder.
- All channels along the Premises boundaries carrying clean water away from site are to drain either onto surrounding lands, into culverts or into existing drainage i.e. natural creeks or existing road drainage in accordance with the natural, pre-development drainage patterns.
- All exposed stockpiles will have sediment controls around their perimeter and be provided with adequate temporary cover if they will remain for more than 10 days. Stockpiles will be situated above the 20-year ARI flood level unless they are short-term (i.e. less than 10 days) and significant rainfall is not forecast.
- At vehicle egress points from LW worksites, washdown bays, rumble grids and/or stabilised laybacks or other solutions will be used to minimise the risk of sediment tracking onto public roads. Any tracked material will be cleaned from site egress points as soon as possible.
- All erosion and sediment controls will be inspected at least weekly, before a site closure of two days or more, and after rainfall exceeding 10 mm in 24 hours (if safe to do so). Maintenance will be carried out as required prior to the next forecast rainfall event.
- Concrete washout will be confined to designated washout bays.
- Sediment collected from sediment basins or other traps will be transported to nominated stockpile sites or removed offsite as required.
- Dust generation will be minimised using water carts, soil stabilisers, reduced traffic speeds and application of temporary ground covers as required.
- Any discharge points will include appropriate scour protection/dissipation.
- Any relevant guidance in the Managing Urban Stormwater Series must be considered when implementing erosion and sediment controls.

### 6.1.3 Sediment Basins

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

Where possible, any runoff contained in LW temporary basins would be used for dust suppression to maintain sufficient capacity in the basin. Where immediate emptying of the basin is required in anticipation of a rainfall event, water treatment will be undertaken to treat water to required standards for discharge to stormwater systems or waterways. Treatment will involve removal of coarse sediment, chemical flocculation and pH correction.

## 6.2 Discharge Criteria and Targets

### 6.2.1 Sediment Basin and/or Excavation Discharge

Surface water and ground water discharge criteria will be consistent with the EPL granted to Systems Connect and any applicable ANZECC Guidelines. Water quality criteria for discharging water off premises is detailed in Table 13.

Testing and where necessary, treatment of any construction water from sediment basins and/ or excavations will be undertaken in accordance with requirements established in the Water



Management Procedure (SMCSWLWC-SYC-1NL-EM-PRO-000384). Relevant EPL Conditions are also addressed in the Procedure and associated monitoring program (see Section 6.9).

Water will be sampled prior to any controlled discharges from the LW worksites to confirm that the discharge criteria, as per Table 13, is met prior to the discharge. Discharge of sediment basins and excavations will occur via a permit process as described in the Water Management Procedure.

As noted in Section 4.1.7, all waterways in the vicinity of the project are mapped as “waterways affected by urban development” and under the water quality objectives for such waterways in both the Sydney Harbour/Parramatta River and Georges River catchments, the protection of aquatic ecosystems is the dominant driver for water quality. Ideally, turbidity in lowland catchments should aim for 6 to 50 NTU.

Where prevailing turbidity is already achieved in a catchment, project discharges into that catchment should aim to ensure it is not adversely pushed outside the 6 to 50 NTU range.

Where prevailing turbidity is not already achieved in a catchment, project discharges should ensure they will not further adversely affect water quality.

Note that the 6 to 50 NTU range does not represent a target value for discharges from the project.

Existing water quality in catchments around the project is noted as being relatively poor following rainfall and is expected to be well outside the target range of 6 to 50 NTU. As such, project releases at or around 50 NTU are expected to be commensurate with the water quality objectives for these catchments.

The design rainfall event for the sediment basins is 38.8mm (85th percentile) or 29.7mm (80th Percentile). It is assumed that the basins will overflow in an event of more than 38.8mm/29.7mm over any 5 day event. It should also be noted that other types of sediment controls may also be overwhelmed during such an event and that repair work will be undertaken when it has been determined by the Site Supervisor that it is safe to do so.

*Table 13 – Surface Water Quality Criteria for discharging off premises*

Parameter	Measurement and Assessment			Discharge Criteria
	Percentile Concentration Limit	Sample Method & Frequency	Units	
<b>pH</b>	100	Probe/ grab sample Prior to discharge	pH	6.5-8.5
<b>Total Suspended Solids</b>	100	Probe/ grab sample Prior to discharge	mg/L	<50
<b>Oil and Grease</b>	100	Visual Prior to discharge	mg/L	<10 and no visible trace

### 6.2.2 Water Treatment Plant Discharge Criteria

The tunnels, station boxes, shaft and dive structures have been designed to minimise groundwater inflow. The minimal groundwater inflow into the tunnels will then be treated through water treatment plants and discharged offsite. As such, dewatering would be minimal and managed as part of the total tunnel water discharge.

Water quality is continuously monitored during the water treatment plant process prior to discharge to confirm that the discharge criteria as detailed in Table 14 are met. Discharges from water treatment plants will occur via a permit process as described in the Water Management Procedure. This process requires water testing to be conducted prior to discharge to ensure compliance with EPL criteria.

Table 14 Water treatment plant discharge criteria

Parameter	Measurement and Assessment			Discharge Criteria
	Percentile Concentration Limit	Sample Method & Frequency	Units	
<b>pH</b>	100	Continuous probe/ grab sample	pH	7-8.5
<b>Turbidity</b>	100	Continuous probe / grab sample	NTU	25
<b>Total Suspended Solids</b>	100	Continuous probe / grab sample	mg/L	<50 mg/L
<b>Nitrate</b>	100	Grab sample	mg/L	10.6
<b>Oil and Grease</b>	100	Visual Inspection	Visible	No visible oil and grease
<b>Copper</b>	100	Grab sample	mg/L	0.008
<b>Iron</b>	100	Grab sample	mg/L	0.3
<b>Nickel</b>	100	Grab sample	mg/L	0.007
<b>Zinc</b>	100	Grab sample	mg/L	0.021
<b>Ammonia</b>	100	Grab sample	mg/L	2.4

For operational water treatment plants, a monthly Discharge Permit is required in accordance with the Water Management Procedure. A Water Treatment Plant Daily Inspection Checklist is to be completed. The discharge parameters detailed in Table 14 are to be sampled monthly to comply EPL condition M2.

### 6.2.3 TSS and NTU Correlation

TSS is a dry weight measurement of particulate matter in the water column. Measuring TSS directly is a lengthy and involved process which can take from 6 to 24 hours by an approved laboratory to complete. This requires the water samples to be filtered and the resulting material to be dried and weighed. The process must be conducted under laboratory conditions and requires specialised equipment.

TSS is often used as a measurement for water quality as it provides a good correlation with environmental impact caused by particulate matter entering the water column on a range of different sites with different soil types. However, the delay in obtaining results means that the application of required mitigation is also delayed, potentially resulting in adverse environmental outcomes.

An alternative measure of water quality is turbidity, measured in Nephelometric Turbidity Units (NTU). Turbidity when compared to TSS does not always provide a good correlation with environmental impact as it is affected by individual soil type, dissolved substances (e.g. tannins), and is especially affected by dispersible soils. In contrast with TSS, NTU readings can be taken in the field in only 2-3 minutes thus reducing analysis time and increasing efficiency with which water can be discharged off-site making it a preferential method of testing in a dynamic construction environment.

Laboratory testing will be undertaken in conjunction with field testing initially, to establish the correlation between TSS and turbidity (NTU). The correlation between TSS and turbidity may be specific to one location only and there may be multiple correlations developed depending on the discharge locations. Once the statistical correlation is established NTU measurements will be undertaken to demonstrate that TSS is below the site discharge criteria.

To ensure the ongoing accuracy of the correlation between NTU and TSS, water samples will be collected quarterly containing sediment which displays the typical soil characteristics of that particular worksite (where possible). The samples will also be tested at a NATA accredited laboratory for both NTU and TSS under laboratory conditions.

### 6.3 Water Usage and Reuse

Systems Connect has established project targets to optimize water usage throughout LW, including:

- Achieve a reduction in water use of 10% across construction and operation compared to a business as usual base case.
- Demonstrate that at least 33% of water used during construction and operation is from non-potable sources.
- Use a maximum total construction water demand consisting of [preliminary target = 100,000] kL of water from potable sources and [preliminary target = 20,000] kL of water from non-potable sources.

Water balance modelling will be undertaken for both construction and operational phases of the project. The modelling will include, but not be limited to, the following activities:

- Civil excavation works including dust suppression
- Site maintenance including washdown
- Amenities at sites
- Tunnel dust suppression
- Fire suppression system commissioning
- Amenities in occupied buildings.

Further details are provided in the Sustainability Management Plan (SMCSWLWC-SYC-1NL-PM-PLN-000024). The project team is in the process of investigating possible initiatives at each site to achieve the targets listed above. Measures being considered to minimise water usage at each site include:

- Use water-efficient fixtures and fittings to reduce water usage from the demand side and increase self-sufficiency from non-potable water supplies. Site amenities would be fitted out with water-efficient fixtures and fittings in the showers, basins and waterless urinals, where practicable. External water fittings, such as hoses in wash-down areas, would be fitted with trigger nozzles.
- Use of non-potable water such as rainwater as a substitute for potable water. Construction water (surface and ground water) would be reused on site, where practicable, for construction management activities as a preference to off-site discharge (i.e. dust suppression). Rainwater can be harvested for toilet flushing, washdown activities and irrigation where appropriate.
- Use of smart metering to ensure accurate capture of water usage data.
- Implementation of temporary water treatment plants for use during construction.
- Treatments and reuse of tunnel stormwater at SMTF South as a backup non-potable water supply to rainwater tanks/basins, reducing reliance on mains water.
- Specifying drought-tolerant species in planting schedule in urban and landscape design.

### 6.4 Surface Water and Flooding Management

All tunnel and station excavation sites are affected by at least one source of flooding, which leads to flood protection being required at each site to prevent flooding of the running tunnels, station and shaft excavation sites. The flood protection strategy originally implemented by the TSE contractor has been modified by Systems Connect for the LW Works from C2S. At all sites where Systems Connect will become Principal Contactor, surface water control and/or diversion is currently sufficient to manage any potential flooding impacts. The Controlled Water Overflow Management Strategy (SMCSWTSE-JCG-TPW-EM-RPT-097233), developed by the TSE Contractor, has been adapted and implemented by Systems Connect. Refer to SMCSWLWC-SYC-CSW-EM-PLN-004408.

The existing rail corridor for S2B and surrounds near Marrickville Station are susceptible to flooding. ESCPs/SEPs have been developed for LW construction sites, where Systems Connect are the Principal Contractor. Site risk assessments will be conducted and mitigation measures for any identified flood risk will be incorporated in ESCPs/SEPs as required. LW will inherit sites for which modelling, and flood protection measures will have been done by others. Detailed ESCPs plans will consider flood risks, obstruction of overland flow paths and limit the extent of flow diversion required. They will also consider how works would affect the existing stormwater network such that alternatives are in place prior to any disconnection or diversion of stormwater infrastructure.

Any events or incidents resulting from flooding will be managed in accordance with the Systems Connect Emergency Response Plan (SMCSWLWC-SYC-1NL-PM-PLN-000748). This identifies floods/heavy rain events as a hazard, with risk of flooding of areas within the Project footprint. Key prevention measures include:

- monitoring of weather and alerts
- inform staff working in flood plain area of flood risk
- set up compounds on higher ground - away from natural water courses.

Emergency Action Plans have been developed for foreseeable emergency situations (including flooding). The applicable Emergency Action Plan will be attached to the relevant Work Pack or Safe Work Method Statement and/or displayed on site noticeboards and highlighted in Project Inductions, in areas where flooding is a high risk, such as the Marrickville dive site.

## 6.5 Groundwater Management

Construction activities for LW Portions 2, 3 and 4 are anticipated to have negligible impacts to the groundwater table and local groundwater hydrology, and will not occur in areas identified as 'likely' or 'potential' groundwater dependent ecosystems. Any potential impacts on groundwater will be considered and managed through each site Erosion and Sediment Control Plan.

Some groundwater seepage into excavations and tunnel work sites will occur and will be treated at the water treatment plant for discharge in accordance with EPL 21423 and be managed as detailed in the Contingency Groundwater Monitoring and Management Procedure (SMCSWLWC-SYC-1NL-EM-PRO-000398).

Groundwater seepage will be either reused on site; treated to meet ANZECC Guidelines criteria for the nearest water body and discharged (discharge criteria detailed in Section 6.2); or will be removed from site as liquid waste in accordance with the Waste Classification Guidelines (NSW EPA, 2014). Any discharge of water will also be undertaken in accordance with the applicable EPL.

## 6.6 Chemicals, Refuelling and Spill Management

Chemicals, hazardous substances and dangerous goods will be stored and used onsite in accordance with the procedures *Manage Hazardous Chemicals* (MSID-1518045957-58) and *Store and Dispense Fuel, Oil and Chemicals* (MSID-1518045957-188) and the following protocols:

- Hazardous substances will be stored onsite in lockable containers, in their original receptacles.
- All chemicals and fuels will be clearly labelled and will have Safety Data Sheets available nearby.
- All chemical storage facilities will be designed and constructed in accordance with:
  - all relevant Australian Standards
  - for liquids, a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund
  - Storing and Handling Liquids: Environmental Protection - Participants Manual
  - Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management - Part B Review of Best Practice and Regulation
  - storage locations for non-liquids must be identified, away from stormwater drains, easily accessible for maintenance and spill clean-up in the event of a rupture
  - bunding maintenance must be undertaken to ensure capacity is maintained

In the event of an inconsistency between the requirements the most stringent requirement will prevail to the extent of the inconsistency.

- Mobile bunds to be inspected after rain and where required dewatered in accordance with the Water Management Procedure.
- Storage and handling of flammable or combustible liquids will be in accordance with OEH guidelines for Bunding and Spill Management, as well as AS 1940-1993 – The Storage and Handling of Flammable and Combustible Liquids.
- An up-to-date register of hazardous substances will be kept onsite at all times.
- Hazardous substances will only be used onsite as required, in accordance with the manufacturer/supplier instructions. Use inside tunnels will be minimised as much as possible.
- Any substances with the potential to impact water quality will be assessed, to determine what environmental safeguards or procedures are required for that substance to minimise the risk of environmental harm.
- The use of any hazardous substance that could result in a spill will be undertaken away from drainage or stormwater lines and, wherever possible, within defined bunds.
- Any refueling on site shall be undertaken in designated areas only. Where this is not practicable i.e. large immobile plant, small equipment items such as pumps, small generators etc. refueling will be undertaken away from stormwater drains. A fully stocked spill kit will be on site during refueling.
- Spill kits will be available on site, in particular near batch plants, storage areas and main work areas.
- All spills or leakages will be immediately contained and cleaned up.
- Spills will be managed in accordance with the Spill Management Procedure (SMCSWLWC-SYC-1NL-EM-PRO-000387). The management of environmental incidents where material harm to the environment is caused or threatened will be managed in accordance with the Emergency Response Plan (SMCSWLWC-SYC-1NL-PM-PLN-000748).

## **6.7 Sewage Management**

Each major construction worksite will be connected to mains sewer. During site establishment temporary arrangements will entail use of temporary site ablution facilities with effluent tanks, if required. Details will be provided in the Site Environment Plans.

Systems Connect will obtain approval from Sydney Water to connect to sewer for any construction site where this is required.

## **6.8 Contamination Management**

As outlined in Section 4.1 and 4.2 contaminated soils are not expected to be encountered during the delivery of Portion 2 and 3 as previously described in Section 4.1.9.

As detailed in Section 4.2.9, there is potential for contaminated soils in the scope of Portion 4, . Subsequent waste classifications undertaken at the LW traction substation sites identified asbestos contamination at Dulwich Hill, Campsie and Punchbowl..

Any unexpected contaminated soils encountered during LW will continue to be managed as per the Unexpected Finds Soil Contamination and Asbestos (Appendix C2). The procedure includes provisions for the following:

- Induction and training
- Observations during excavation for:
  - Odorous or stained soil
  - Buried chemical drums or containers
  - High proportion of waste materials or building debris
  - Tarry or ashy material
  - Brightly or unusually coloured material

- Stopping work and notifying the site Environmental Representative when potential contamination is uncovered
- Contacting a contaminated land consultant to assess and, if required, to determine an appropriate management strategy.

If an unexpected find leads to detailed contamination assessments, all requirements specified in conditions E66, E67 and E68 will be implemented, as applicable.

In case any contaminated soil requires to be stockpiled on site, this will be done in a way that minimises the risk of contaminants reaching the water table as described in the Waste, Recycling and Spoil Management Plan (SMCSWLWC-SYC-1NL-PM-PLN-000372).

Hazardous materials surveys will be undertaken during detailed design for all proposed demolition activities, and for utility adjustments as required.

#### 6.8.1 Phase 2 Investigations

Systems Connect is procuring to engage specialist contamination specialists. The contamination specialists will prepare a specification to undertake further soil testing, designed to allow pre-classification of all excavated material (fill, soil and rock) for disposal or reuse purposes. This approach is robust and will ensure that contamination management requirements are understood before excavation commences. It is proposed that in most cases the analytical suites listed will apply to all samples analysed, but this will vary, particularly for Acid Sulfate Soil (ASS), volatile organic compounds (VOC), tributyltin and perfluorinated compounds (PFC).

In the event a Remediation Action Plan is required for a particular site, this will be developed in accordance with Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land (Department of Urban Affairs and Planning and Environment Protection Authority, 1998) and a NSW Environment Protection Authority Accredited site auditor will be engaged to audit the works.

The Waste, Recycling and Spoil Management Sub-Plan provides further details about the management of spoil, including stockpiling, spoil classification and management hierarchy and material tracking and records.

#### 6.8.2 Acid Sulfate Soils

As detailed in sections 4.1.5 and 4.2.5, high probability acid sulfate areas have not been identified in any sites where LW will require ground disturbance.

In the event that Acid Sulphate Soil (ASS) is encountered, this will be managed in accordance with the following documents:

- Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998)
- Waste Classification Guidelines - Part 4: Acid Sulfate Soils (EPA, 2014).
- Unexpected Finds Soil Contamination and Asbestos procedure (SMCSWLWC-SYC-1NL-EM-PRO-000388). This procedure outlines possible management strategies based on the assessment results, including:
  - Modifying the Project to avoid the area of ASS
  - Delineation and removal to a suitably licenced facility
  - Onsite treatment to neutralise the ASS, which could include the application of lime in accordance with recommendations of the specialist consultant
  - Reviewing erosion and sedimentation controls to minimise the potential for pollution to water

Potential acid sulfate soils have been identified in the area near the proposed cable bridge crossing Cup and Saucer Creek. Further testing will be undertaken by Systems Connect to confirm the existence of ASS in the area and details of required management strategy.

#### 6.8.3 Saline Soils

As detailed in Sections 4.1.4 and 4.2.4 and outlined within the EIS, only Punchbowl traction substation is located in an area identified as a moderate soil salinity potential. The Geotechnical Investigation Report – Punchbowl Substation (Alliance Geotechnical, 2020) included an investigation into the salinity of soils within the site footprint and the report confirmed the presence



of moderate saline soils within one of the three borehole samples, with the other two samples reported as low saline soils. As such, measures to manage saline soils were put in place to protect building materials, vegetation and landscaping in accordance with the Site Investigations for Urban Salinity (DLWC, 2002). These measures included:

- Minimising water infiltration
- Landscaping using native plants
- Retention (where practicable) of deep rooted vegetation
- Minimising soil disturbance such as compaction, cut and fill.

## 6.9 Water Quality Monitoring Program

### 6.9.1 Overview

Systems Connect will monitor the effectiveness of measures for managing soil, surface water and groundwater impacts during delivery of the LW Works. This will be achieved through implementation of a Water Quality Monitoring Program (WQMP) as detailed in this section, and regular inspections of control measures and their effectiveness as detailed in Element 2.

The detailed methodology provided below forms the WQMP to be implemented, to comply with Condition of Approval C9 (CSSI 7400) and C8 (CSSI 8256), as well as the associated Staging Reports.

As noted in Section 6.5 and the Staging Report, *negligible impact to groundwater is anticipated during the delivery of LWW scope, therefore a groundwater monitoring program has not been developed.*

The WQMP has been prepared under C9 (c) (CSSI 7400) & C8 (b) (CSSI 8256) in consultation with EPA and relevant Councils, and is incorporated into this Sub-Plan as per C17 (CSSI 7400) and C15 (CSSI 8256).

The Secretary's approval and ER endorsement of this WQMP will be sought as part of seeking approval and endorsement of this Sub-Plan.

The WQMP will be in place and implemented prior to any discharge off site and for the duration of the LW Works.

Results of the WQMP will be submitted to the Secretary and relevant regulatory agencies for information in the form of a Construction Monitoring Report, which will be submitted on a six-monthly basis from the commencement of construction (or as otherwise specified under an applicable EPL). This is in accordance with C16 (CSSI 7400) and C14 (CSSI 8256).

The WQMP addresses LW construction phase monitoring until handover to Sydney Metro. It is noted that monitoring being done by follow-on contractors will be detailed in their respective management plans and is outside the scope of the LW Works.

### 6.9.2 Monitoring Purpose, Objectives and Scope

As discussed in Sections 4.1.6 and 4.2.6, no watercourses will be directly impacted or modified by the LW Works. Treated construction water may be discharged into existing stormwater systems in accordance with the Water Management Procedure.

Systems Connect's focus in relation to water quality management during construction is on prevention of pollution – minimising the risk of polluted, sediment-laden or contaminated water leaving the premises, by implementing a comprehensive management and monitoring regime on site.

Surface water quality monitoring of the receiving environment prior to construction is highly unlikely to define suitable standards or benchmarks for water quality discharges from the LW Works given that:

- Waterways along the alignment are highly modified due to the urbanised nature of the surrounding area.
- Waterways detailed in Sections 4.1.6 and 4.2.6 along the alignment are typically 1-2 km away from the worksites and connected via stormwater systems.
- The stormwater system collects and transfers water from large urbanised catchment areas.

- Therefore, there is the potential for contaminants to enter the stormwater systems and subsequently the waterways from many different sources.
- Water quality in urban areas as occurs along the LW alignment is highly variable and changes according to prevailing weather patterns and day-to-day during rainfall.

Pre-construction monitoring data will be obtained from the previous principal contractor at each location where LW monitoring is required.

Surface water quality monitoring will be undertaken as follows:

- Construction – (Portion 3) – as applicable following receipt of EPL.

### 6.9.3 Available Baseline Data

Baseline data between C2S will be available from the TSE monitoring points which will be provided as part of the site handover. For the project areas between S2B, baseline data will be sourced from the SMEW contractor.

### 6.9.4 Construction Water Quality Monitoring

Water quality will be monitored to ensure discharge from the construction impact area is in accordance with regulatory guidelines and to identify potential non-compliances before they occur. Water quality monitoring will be undertaken in accordance with the Water Management Procedure.

Water quality monitoring will be undertaken for controlled discharges offsite to watercourses and stormwater drainage to ensure compliance with discharge criteria defined in Section 6.2. Monitoring and analysis of data will be carried out by a competent person. Evidence of competence must be retained. Results of water quality monitoring will be compiled in a Construction Monitoring Report, as defined under C16 (CSSI 7400) and C14 (CSSI 8256), and will be submitted to the Secretary and any other Agencies that request the report, for information, on a six monthly basis.

It is the accountability of the Environment and Sustainability Manager to ensure all monitoring is performed according to these requirements.

Construction water quality monitoring requirements will be updated to address the EPL Discharge Impact Assessment (undertaken over an agreed period following issue of the Project EPL) and to ensure compliance with POEO Act Section 120.

### 6.9.5 Monitoring Parameters

Systems Connect will monitor site water prior to any discharge from site as outlined in Section 6.2. This will ensure that any water discharged is compliant with the requirements and would not be impacting the water quality within the relevant catchments. Table 15 details the parameters to be tested when monitoring site water for discharge.

*Table 15 - Water Quality Criteria for discharging off premises*

Parameter	Measurement and Assessment			Discharge Criteria
	Percentile Concentration Limit	Sample Method & Frequency	Units	
<b>pH</b>	100	Probe/ grab sample Prior to discharge	pH	6.5-8.5
<b>Total Suspended Solids</b>	100	Probe/ grab sample Prior to discharge	mg/L	<50
<b>Oil and Grease</b>	100	Visual Prior to discharge	mg/L	<10 and no visible trace



Table 16 details the parameters to be tested when monitoring the waterways surrounding the Works. As outlined in Figure 4, if monitoring results exceed the 80th percentile of the baseline value, the Environment Coordinator will re-test within 5 days of receiving the results, to confirm the results and establish whether LW Work activities (i.e. those activities that discharge water as a result of LW Works) can be linked to the change in test results. This is a precautionary approach. Following this investigation, the Environment Coordinator may propose actions, as required. Note: trigger values may be updated during the life of the project due to the analysis of monitoring data, as per the ANZECC Guidelines

Table 16 Surface Water Quality Monitoring Parameters

Parameter	Sample Method	Analytical method	ANZECC <sup>1, 2</sup> Criteria (freshwater)	ANZECC <sup>1, 3</sup> Criteria (marine water) <sup>7</sup>	Trigger Values	Action
Temperature (°C)	Probe	Field Analysis	>80%ile <sup>4</sup> <20%ile <sup>4</sup>		Results are > than the baseline 80th percentile	Environment Coordinators to re-test to confirm results. Environment Coordinator is to undertake an inspection of the Works and propose actions where required Note: There is a delay in receiving the results from grab samples. Environment Coordinator to obtain further grab samples for testing to confirm results. Environment Coordinator to undertake an inspection once results received and establish what activities had been undertaken prior to the tests being undertaken and propose actions where required.
Dissolved Oxygen (%Sat)	Probe	Field Analysis	Lower Limit: 85 Upper Limit: 110	Lower Limit: 90 Upper Limit: 110		
Turbidity (NTU)	Probe	Field Analysis	6-50	0.5-10		
Oil and Grease	Visual analysis, then grab sample if required	Visual Assessment Lab Analysis	-	-	Visible oil and grease	
Conductivity (µS/cm) <sup>6</sup>	Grab Sample and Probe	Field Analysis Lab Analysis	125 – 2200	-	Results are > than the baseline 80th percentile	
Total Suspended Solids (TSS: mg/L)	Grab Sample	Lab Analysis	-	-		
Iron (mg/L)			0.3 <sup>5</sup>	-		
Manganese(mg/L)			1.7	0.8		
pH	Grab Sample and Probe	Field Analysis Lab Analysis	Lower Limit: 6.5 Upper Limit: 8.0	Lower Limit: 8.0 Upper Limit: 8.4		

Notes:

<sup>1</sup> 95% protection level – most commonly applied to ecosystems that could be classified as slightly too moderately disturbed.

<sup>2</sup> ANZECC (2000) guidelines for the protection of freshwater aquatic ecosystems

<sup>3</sup> ANZECC (2000) guidelines for the protection of marine aquatic ecosystems

<sup>4</sup> Default trigger value for each ecosystem-type

<sup>5</sup> There is insufficient data at this stage to derive a reliable value for iron. The current Canadian guideline has been used.

<sup>6</sup> Conductivity will not be tested at monitoring points at estuarine/marine catchments.

- No data available

<sup>7</sup> Applicable to monitoring locations SW-AC-01

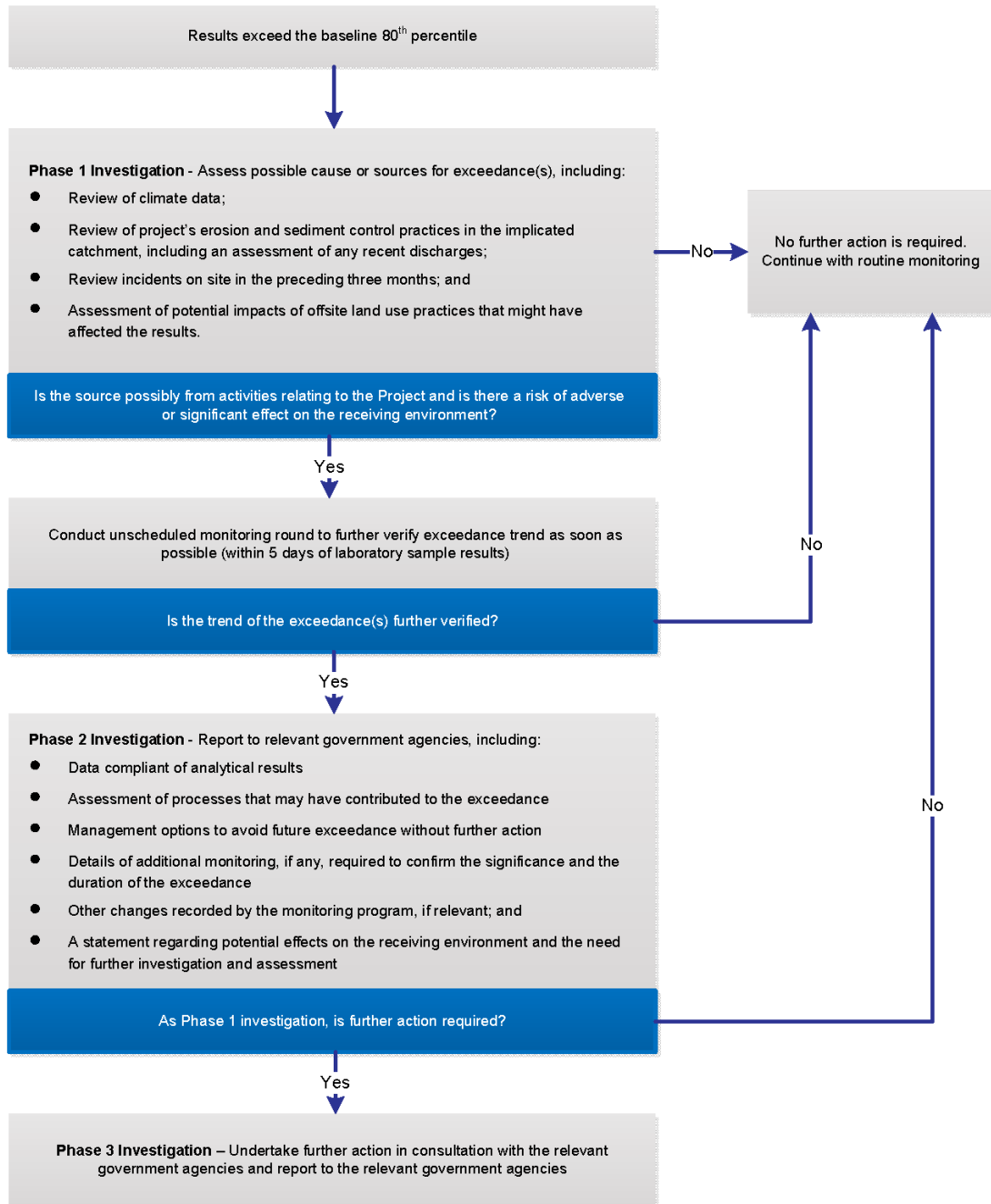


Figure 4 - Response action process for exceedances of surface water quality

#### 6.9.6 Monitoring Frequency and Locations

As described in Section 6.9.4, site water quality monitoring will be conducted for controlled discharges offsite to ensure that discharges from construction impact areas are in accordance with the water quality criteria. The frequency of offsite discharges and associated monitoring will be dependent upon rainfall events and degree of surface and groundwater inflows into tunnels and excavations.

The planned monitoring locations and monitoring schedule for site water quality, are set out in Table 17 below.

Table 17 – Site Water Quality Monitoring Schedule

Location / Work Site	Source of Offsite Discharges	Monitoring Schedule
Marrickville / Southern Dive	Water Treatment Plant	Monthly during discharges
Tunnels and station sites	Water treatment plants <sup>1</sup>	Monthly during discharges <sup>1</sup> Validation monitoring following the commencement of a new activity.
Artarmon BPS route	Open excavations	Prior to each dewatering
Surry Hills BPS route	Open excavations	Prior to each dewatering
Campsie BPS route	Open excavations	Prior to each dewatering
SW Corridor TSS sites	Open excavations	Prior to each dewatering

<sup>1</sup> Water treatment plants are positioned at stations and are operated by other SMC&S Contractors. The LW Contractor is not responsible for water quality or discharge from station sites.

Monitoring of receiving waters will occur three-monthly. The surface water quality monitoring sites are listed in Table 18 below. In addition, up to four wet weather monitoring events will be undertaken within a 12-month period. A wet weather event is when at least 38.8 mm of rain is received in the catchment in any 5-day period. For safety reasons sampling will not be undertaken during peak stormflows. Sampling will be completed when flows are reasonably constant and safe. Weather monitoring, as described in Section 6.9.9, will be conducted using data from the Sydney Observatory Hill weather station, accessed via the Bureau of Meteorology website (<http://www.bom.gov.au>). The Sydney Observatory Hill weather station is located approximately 200 metres from the Barangaroo Worksite, at the centre of the Project alignment, and provides weather updates every half hour.

Table 18 - Surface water quality monitoring sites and locations

Site ID	Site interaction	Relative location	Catchment	Sampling address	Easting	Northing	Type
SW-AC-01	Receiving waters from Chatswood to Marrickville tunnel alignment Monitoring location active while the Marrickville WTP is active and in SC control.	Downstream	Eastern Channel / Cooks River	Access via Coward Street, Mascot	331342	6244783	Marine

### 6.9.7 Water Treatment Plants

Water captured in the station boxes, shaft excavations and tunnels will be pumped to the water treatment plants located on the surface or within the station boxes. The type of water treatment plants use a coagulant/flocculation clarification system. The process for this type of plant is as follows:

- Untreated water tank
- Water screening and storage
- Chemical dosing for pH adjustment
- Clarification
- Media filtration
- Solids processing.

Details on the coagulant/flocculation clarification water treatment plants is provided in Table 19.

*Table 19 - Coagulant/ flocculation clarification water treatment*

Location / Work Site	WTP Processing Capacity (L/s)	Discharge Location	Notes
Victoria Cross	15	Local stormwater system Stormwater transferred to Milson Park, Sydney Harbour	Operated by Victoria Cross Station contractor.
Marrickville	30	Local stormwater system (Discharge Point 3 as per EPL 21423). Stormwater transferred to Alexandria Canal, Cooks River, Botany Bay	Operated by Line-wide. Will accept water from Systems Connect tunnel sumps between Chatswood and Marrickville.

The location of water treatment plant discharge points will be detailed on the relevant worksite Site Environment Plans.

Periodic validation will be required from the contractors operating the WTPs that accept and process water from Systems Connect work areas and construction activities. This is to ensure that discharge criteria outlined in Section 6.2 are being met. A Water Treatment Plant Daily Inspection Checklist is to be completed by Systems Connect at the WTPs operated by them.

At each water treatment plant under Systems Connect control, the discharge parameters detailed in Table 14 (pH, TSS, NTU) are to be sampled monthly. For any exceedances of discharge criteria

from water treatment plant sampling, the contingency management process in Figure 5 below should be implemented.

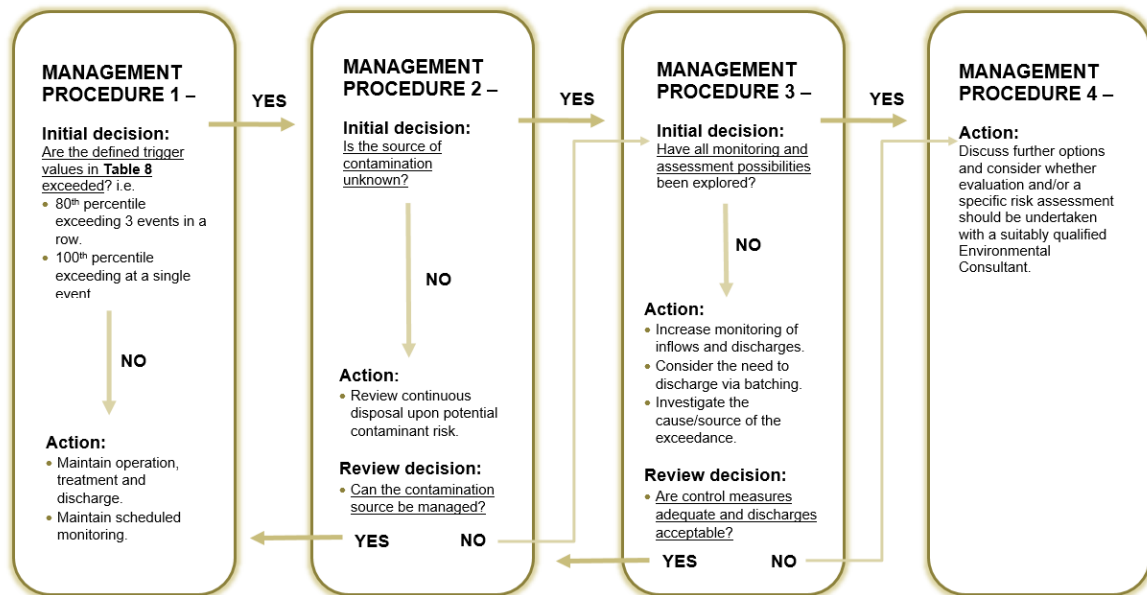


Figure 5: Contingency Management Process

#### 6.9.8 Adaptive Management

Water quality monitoring in any particular area/zone could be extended if potential impacts attributable to the LW Works are identified. Work methods and management practices will be assessed and revised or adapted when necessary. Potential mitigation measures could include (but not be limited to):

If water quality monitoring results indicate that discharge criteria are not being achieved or are otherwise unsatisfactory, then appropriate additional mitigation measures will be identified and implemented. These measures may include:

- Treatment of water as per Water Management Procedure (SMCSWLWC-SYC-1NL-EM-PRO-000384)
- Additional water treatment measures (e.g. settlement tanks, membrane filters)
- Additional, more frequent or extended water quality monitoring
- Inspection of work site to identify possible sources of excess sediment or other contaminants
- Inspection of ERSED and other environmental controls for condition, suitability, effectiveness and compliance with the applicable SEP and ESCP
- Repair, replace or reinstate any deficient ERSED controls
- Implement additional or enhanced ERSED controls where necessary, which may include:
  - Enhanced use of soil stabilisers to minimise erosion
  - Stabilisation of exposed ground and drainage channels by means of geofabric, crushed rock or hydroseeding
  - Water velocity control measures such as rock check dams or earth bunds
  - Additional sediment-trapping devices, such as double-layer barriers at drainage points
  - Stabilisation of vehicle and pedestrian routes with crushed rock, road base or spray seal
- Review construction practices and amend where necessary, such as management of stockpiles, ceasing activities during rain events, access road maintenance

- Investigation and advice from subject-matter experts such as and soil conservationist
- Review and update SEP and ESCP to include any additional or enhanced control measures
- Additional training and/or awareness for Systems Connect staff and sub-contractors

#### 6.9.9 Meteorological Monitoring

Meteorological data will be checked to assist with managing impacts and identify potential non-compliances.

Weather data including daily weather conditions and forecasts may be obtained from the Bureau of Meteorology website (<http://www.bom.gov.au/places/nsw>). In the absence of electronic meteorological information, the Site Supervisor, Site Engineers and Environmental Coordinator will monitor rainfall events on site.

The criteria for monitoring rain events and the associated response is provided in Table 20 below.

Table 20 - Meteorological monitoring program

Event	Criteria	Response
Rain event	>10mm in 24 hours	<ul style="list-style-type: none"> <li>• Inspect rumble grid and wheel-wash facilities</li> <li>• Inspect adjacent roads for signs of mud tracking</li> <li>• Inspect site sediment and erosion controls for effectiveness/maintenance</li> </ul>

#### 6.10 Ongoing Environmental Risk Identification and Management

The ongoing identification and management of environmental risks and opportunities is a key consideration during all project risk assessment activities and is fully described in Section 5.2 Environment Risk Management of the CEMP (SMCSWLWC-SYC-1NL-PM-PLN-000033).

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

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

- Construction Area Plan (CAP) Risk Assessments
- Work Pack Risk Assessments
- Safe Work Method Statements (SWMS), which also address environmental risks
- Pre-start Meetings.

#### 6.11 Settlement Monitoring

Settlement monitoring of buildings in close proximity to LW construction works will be undertaken if triggered by a building condition survey and/or a geotechnical report.

Settlement monitoring was only triggered during the construction of the Artarmon Traction Substation pile wall, adjacent to two existing commercial buildings. As such, survey/settlement monitoring was undertaken both during and post-construction of the pile wall. The measured displacements were deemed negligible and within acceptable criterion, with no further monitoring required.



## PART B - IMPLEMENTATION

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### Elements and Expectations

Part B of this Sub-Plan explains how potential soil, water and groundwater impacts during the LW Works will be minimised and managed. Compliance with all elements is required at all times to minimise the likelihood of causing unauthorised environmental harm and maximise the uptake of opportunities to reduce environmental impact.

Part B contains the following:

- **Environmental Elements and Expectations:** These describe what is required of Systems Connect to implement the objectives of the Environment and Sustainability Policy Statement:
  - **Element** – Key aspects for managing this function in delivering the LW Works
  - **Expectation** – The outcomes achieved as part of each Element.
- **Requirements:** These are the specific actions required to demonstrate compliance with the Elements and Expectations.
- 
- **Responsibility and Key Contributor:** Designation of responsibility for achieving compliance with the stated Expectation. Key contributors assist/contribute to achieving compliance.
- 
- **Deliverables:** Tangible outcomes produced to demonstrate compliance with the environmental Elements and Expectations.

## Element 1: Training

*Systems Connect will ensure that LW personnel can competently perform their duties and meet environmental obligations*

Expectations	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Deliverables
1.1 All personnel have completed an induction containing relevant environmental information before they are authorised to work on the Project	<p>Induction presentation will include:</p> <ul style="list-style-type: none"> <li>Legislative requirements (POEO Act, EPL etc.) including Section 120.</li> <li>Erosion and sedimentation control planning and hold points</li> <li>Duty to notify of environmental harm (or the potential for it) including chain of reporting.</li> <li>Spill containment and management procedure.</li> <li>Storage and use of hazardous substances.</li> <li>Water reuse and discharge procedure.</li> <li>Unexpected finds Soil Contamination and Asbestos procedure</li> <li>Maintenance of environmental controls (e.g. erosion and sediment controls).</li> </ul>	<p><b>Human Resources Manager</b></p> <p>Environment and Sustainability Manager</p> <p>Environmental Advisor</p> <p>Environmental Coordinators</p>	<p>Induction presentation</p> <p>Induction records</p>
1.2 Toolbox talks are used to reinforce key management requirements and lessons learnt	<p>Toolbox talks will be held regularly during site establishment and throughout construction. They will reinforce and reiterate information from inductions.</p> <p>Toolbox talks will be undertaken with key site people on the following procedures:</p> <ul style="list-style-type: none"> <li>Water Management</li> <li>Spill Management</li> <li>Unexpected Finds Soil Contamination and Asbestos</li> <li>Erosion and Sediment Control Management</li> <li>Contingency Groundwater Monitoring and Management</li> </ul>	<p><b>Environment and Sustainability Manager</b></p> <p>Site Supervisors</p> <p>Environmental Advisor</p> <p>Environmental Coordinators</p>	<p>Toolbox presentations</p> <p>Toolbox records</p>
1.3 Erosion and sediment control training for personnel responsible for the installation and maintenance of erosion and sediment controls	<p>Detailed training will be provided to key personnel regarding erosion and sediment control. This training will include:</p> <ul style="list-style-type: none"> <li>Legislation as it applies to erosion and sediment control.</li> <li>Basics of soil management, handling and stockpiling to minimise erosion.</li> <li>Sediment basin management and dewatering.</li> <li>Appropriate use, installation and maintenance of relevant erosion and sediment controls, such as silt fences.</li> <li>Effective site rehabilitation and stabilisation.</li> <li>Use of erosion control techniques such as geotextiles, organic fibre mats, mulches and soil polymer stabilisers.</li> <li>Monitoring of controls following rain events and maintenance as necessary, including removal of accumulated silt to maintain functionality of silt fences.</li> <li>Preparing, reading and interpreting Erosion and Sediment Control Plans.</li> </ul>	<p><b>Soil Conservationist</b></p> <p>Environment and Sustainability Manager</p> <p><b>Environmental Advisor</b></p> <p><b>Environmental Coordinators</b></p>	<p>Training packages and presentations</p> <p>Training records</p>

## Element 2: Monitoring and Reporting

*All staff, employees and subcontractors will actively drive compliant environmental performance of LW.*

Expectations	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Deliverables
2.1 Worksites are regularly inspected to ensure the adequacy of controls and compliance with the requirements of this Sub-Plan	<p>Systems Connect will regularly review the LW Works to ensure compliance with this Plan. A regular inspection program for soil and water will be conducted as follows:</p> <ul style="list-style-type: none"> <li>Details of daily inspections undertaken by the Site Supervisor will be logged in their respective site diaries.</li> <li>Weekly site inspections are to be conducted to monitor the condition, adequacy and effectiveness of ERSED and other control measures</li> <li>Site Inspections to be conducted following significant rainfall events (&gt; 10 mm / 24 hrs)</li> <li>Inspection reports will be documented in Systems Connect's electronic systems and made available to the ER upon request.</li> </ul> <p>The ER will monitor the implementation of this Sub-Plan and related documents such as ESCPs to ensure compliance with what is stated in the documents and the terms of the planning approvals. The ER will achieve this through:</p> <ul style="list-style-type: none"> <li>Regular inspections of active worksites</li> <li>Review of Systems Connect records such as water quality monitoring records.</li> </ul>	<p>Environment and Sustainability Manager</p> <p><b>Superintendents</b></p> <p><b>Site Supervisors</b></p> <p><b>Environmental Advisor</b></p> <p><b>Environmental Coordinators</b></p> <p>Environmental Representative</p>	<p>Environment and Sustainability Inspection Checklists</p> <p>Site Diary entries</p> <p>ER Reports</p>
2.2 Water quality monitoring	<p>Water quality monitoring will be undertaken for controlled discharges offsite to watercourses and stormwater drainage (Refer to Water Quality Monitoring Program and Water Management Procedure).</p>	<p>Environment and Sustainability Manager</p> <p><b>Environmental Advisor</b></p> <p><b>Environmental Coordinators</b></p> <p><b>Site Engineers and supervisors</b></p>	<p>Construction monitoring Program</p> <p>Procedure</p> <p>Monitoring Forms and Reports</p> <p>Permit to Dewater</p>
2.3 Water usage reporting	<p>Data of water usage and reuse on site will be collected to allow monthly reporting.</p>	<p>Environment and Sustainability Manager</p> <p><b>Environmental Advisor</b></p> <p><b>Environmental Coordinators</b></p>	<p>Monthly Sustainability Reports</p> <p>Monthly EMS reporting</p>

### Element 3: Auditing, Review and Improvement

*Systems Connect will continually improve its environmental systems and environmental performance by monitoring and reviewing their effectiveness.*

Expectations	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Deliverables
3.1 Audits are undertaken to ensure compliance with the requirements of this Sub-Plan	<p>Procedures for corrective actions are addressed in the Construction Environmental Management Plan - C2B (SMCSWLWC-SYC-1NL-PM-PLN-000033).</p> <p>Audits will be performed in accordance with the CEMP and this Sub-Plan. Associated documents or procedures will be updated if required.</p> <p>The ER may participate in or conduct audits to ensure the implementation of this Sub-Plan and related documents is compliant with what is stated in the documents and the terms of the planning approvals.</p>	<p><b>Environment and Sustainability Manager</b></p> <p>Environmental Advisor</p> <p>Environmental Coordinators</p> <p>Sustainability Manager</p> <p>Environmental Representative</p>	<p>Audit Reports</p> <p>Corrective Action Reports</p>
3.2 All non-compliances are reported and actioned	<p>A soil and water non-compliance can generally be defined as a failure to comply with the Project Planning Approval and/or the EPL.</p> <p>Where a non-compliance is raised as part of an audit or an incident or complaint investigation the audit, incident or complaint report may be used to close out the non-compliance and it is not necessary to raise a separate non-compliance reporting process.</p> <p>Corrective and Preventative Actions may also be raised in accordance with the Construction Environmental Management Plan - C2B (SMCSWLWC-SYC-1NL-PM-PLN-000033).</p>	<p><b>Environment and Sustainability Manager</b></p> <p>Sustainability Manager</p> <p>Environmental Advisor</p> <p>Environmental Coordinators</p>	<p>Audit Reports</p> <p>Corrective Action Reports</p>

## Element 4: Project Specific Requirements

### Planning Approval SSI 7400 – Applicable CoA to LW

Planning Approval SSI-7400 CoA				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
C9	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each Construction Monitoring Program to compare actual performance of construction of the CSSI against predicted performance. (c) Water Quality	Section 6.9	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	Prior to and during construction
C10	Each Construction Monitoring Program must provide:	Section 6.9	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	Prior to and during construction
a)	details of baseline data available;			
b)	details of baseline data to be obtained and when;			
c)	details of all monitoring of the project to be undertaken;			
d)	the parameters of the project to be monitored;			
e)	the frequency of monitoring to be undertaken			
f)	the location of monitoring			
g)	the reporting of monitoring results			
h)	procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and			
i)	any consultation to be undertaken in relation to the monitoring programs.			
C12	The Construction Monitoring Programs must be developed in consultation with relevant government agencies as identified in Condition C9 of this approval and must include, to the written satisfaction of the Secretary, information requested by an agency to be included in a Construction Monitoring Programs during such consultation. Details of all information requested by an agency including copies of all correspondence from those	Appendix C3	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	Prior to construction (With Sub Plan approval)

Planning Approval SSI-7400 CoA				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
C13	agencies, must be provided with the relevant Construction Monitoring Program.			
	The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Secretary for approval at least one (1) month before commencement of construction or within another timeframe agreed with the Secretary.	Section 6.9.1	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	One (1) month prior to commencement of construction
C14	Construction must not commence until the Secretary has approved all of the required Construction Monitoring Programs, and all relevant baseline data for the specific construction activity has been collected.	Section 6.9.3	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	Prior to construction
C15	The Construction Monitoring Programs, as approved by the Secretary including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Secretary, whichever is the greater.	Section 0	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	Prior to and during construction
C16	The results of the Construction Monitoring Programs must be submitted to the Secretary for information, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	Section 6.9.1 Section 6.9.4	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	During construction
C17	Where a relevant CEMP sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP sub-plan	Section 6.9.1	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	One (1) month prior to commencement of construction
E4	Dangerous goods, as defined by the Australian Dangerous Goods Code, must be stored and handled strictly in accordance with:	Section 6.6	<b>Construction Manager</b> Environment & Sustainability Manager	During construction
E4 a)	all relevant Australian Standards;	Section 6.6		
E4 b)	for liquids, a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund;	Section 6.6		
E4 c)	Storing and Handling Liquids: Environmental Protection – Participants Manual (Department of Environment and Climate Change, May 2007); and	Section 6.6		

Planning Approval SSI-7400 CoA				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
E4 d)	the Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management – Part B Review of Best Practice and Regulation (Department of Environment and Conservation (NSW), 2005).	Section 6.6		
E4	In the event of an inconsistency between the requirements listed from (a) to (d) above, the most stringent requirement shall prevail to the extent of the inconsistency.	Section 6.6		
E61	The Proponent must install appropriate equipment to monitor areas in proximity to construction sites and the tunnel route during construction and for a period of not less than six (6) months after settlement has stabilised with particular reference to risk areas identified in the building and infrastructure condition surveys required by conditions E59 and E60 and/or the geotechnical analysis as required. If monitoring during construction indicates exceedance of the criteria, then all construction affecting settlement must cease immediately and must not resume until fully rectified or a revised method of construction is established that will ensure protection of affected buildings.	Section 6.11	<b>Construction Manager</b> Environment Manager	During and post construction
E63	The Proponent must monitor settlement for any period beyond the minimum timeframe requirements of condition E61 if directed so by the Independent Impact Assessment Panel following its review of the monitoring data from the period not less than six (6) months after settlement has stabilised, consistent with condition E61. The results of the monitoring must be made available to the Secretary on request.	Section 6.11	<b>Construction Manager</b> Environment Manager	During and post construction
E65	All reasonably practicable erosion and sediment controls must be installed and appropriately maintained to minimise any water pollution. When implementing such controls, any relevant guidance in the Managing Urban Stormwater Series must be considered.	Section 6.1	<b>Construction Manager</b> Environment & Sustainability Manager	During construction
E66	A Site Contamination Report, documenting the outcomes of Phase 1 and Phase 2 contamination assessments of land upon which the CSSI is to be carried out, that is suspected to be, or known to be, contaminated must be prepared by a suitably qualified and experienced person in accordance with guidelines made or approved under the Contaminated Land Management Act 1997 (NSW).	Section 6.8	<b>Construction Manager</b> Environment & Sustainability Manager	During construction
E67	If a Site Contamination Report prepared under Condition E66 finds such land contains contamination, a site audit is required to determine the suitability of	Section 6.8	<b>Construction Manager</b>	During construction

Planning Approval SSI-7400 CoA				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
	a site for a specified use. If a site audit is required, a Site Audit Statement and Site Audit Report must be prepared by a NSW EPA Accredited Site Auditor. Contaminated land must not be used for the purpose approved under the terms of this approval until a Site Audit Statement is obtained that declares the land is suitable for that purpose and any conditions on the Site Audit Statement have been complied with.		Environment & Sustainability Manager	
E68	A copy of the Site Audit Statement and Site Audit Report must be submitted to the Secretary and Council for information no later than one (1) month before the commencement of operation.	Section 6.8	<b>Construction Manager</b> Environment & Sustainability Manager	During construction
E69	An Unexpected Contaminated Land and Asbestos Finds Procedure must be prepared and must be followed should unexpected contaminated land or asbestos be excavated or otherwise discovered during construction.	Section 6 Appendix C2	Environment & Sustainability Manager	During construction
E70	The Unexpected Contaminated Land and Asbestos Finds Procedure must be implemented throughout construction.	Section 6.8 Appendix C2	Construction Manager Environment & Sustainability Manager	During construction
E107	The CSSI must be constructed and operated so as to maintain the NSW Water Quality Objectives where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW Water Quality Objectives over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the NSW Water Quality Objectives, in which case those requirements must be complied with.	Section 6.2.1	Construction Manager Environment & Sustainability Manager	During construction
E108	Drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drainage swales and depressions must be undertaken in accordance with relevant guidelines and designed by a suitably qualified and experienced person.	The Cup and Saucer Creek crossing and drainage design is being undertaken by Systems Connect design team in accordance with SWTC.	Design Manager Construction Managers Environment & Sustainability Manager Environment Coordinators	During construction



## Planning Approval SSI 8256 – Applicable CoA to LW

Planning Approval SSI-8256 CoA				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
C8	The following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of Construction of the CSSI against the predicted performance. (b) Water Quality	Section 6.9	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	Prior to construction
C9	Each Construction Monitoring Program must provide:	Section 6.9	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	Prior to and during construction
a)	details of baseline data available;			
b)	details of baseline data to be obtained and when;			
c)	details of all monitoring of the project to be undertaken;			
d)	the parameters of the project to be monitored;			
e)	the frequency of monitoring to be undertaken;			
f)	the location of monitoring;			
g)	the reporting of monitoring results;			
h)	procedures to identify and implement additional mitigation measures where results of monitoring are unsatisfactory; and			
i)	any consultation to be undertaken in relation to the monitoring programs.			
C10	The Construction Monitoring Programs must be developed in consultation with relevant government agencies as identified in Condition C8 of this approval and must include reasonable information requested by an agency to be included in a Construction Monitoring Programs during such consultation. Details of all information requested by an agency including copies of all correspondence from those agencies, must be provided with the relevant Construction Monitoring Program.	Appendix C3	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	Prior to construction

Planning Approval SSI-8256 CoA				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
C11	C11 The Construction Monitoring Programs must be endorsed by the ER and then submitted to the Planning Secretary for approval at least one (1) month before the commencement of Construction	Section 6.9.1	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	One (1) Month Prior to Construction
C12	Construction must not commence until the Planning Secretary has approved all of the required Construction Monitoring Programs.	Section 6.9.3	<b>Environment &amp; Sustainability Manager</b>	Prior to construction
C13	The Construction Monitoring Programs, as approved by the Planning Secretary including any minor amendments approved by the ER must be implemented for the duration of Construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	Section 6.9.1	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	During construction
C14	The results of the Construction Monitoring Programs must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant Construction Monitoring Program.	Section 6.9.4	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	During construction
C15	Where a relevant CEMP sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP sub-plan	Section 6.9.1	<b>Environment &amp; Sustainability Manager</b> Environmental Advisors and Coordinators	One (1) month prior to commencement of construction
E38	All reasonably practicable erosion and sediment controls must be installed and appropriately maintained to minimise water pollution. When implementing such controls, any relevant guidance in the <i>Managing Urban Stormwater</i> series must be considered.	Section 6.1	<b>Construction Manager</b> Environment & Sustainability Manager	During construction
E39	An Unexpected Contaminated Land Procedure and Asbestos Finds Procedure must be prepared and must be followed should unexpected contaminated land or asbestos be excavated or otherwise discovered during Construction.	Section 6.8 Appendix C2	<b>Construction Manager</b> Environment & Sustainability Manager	During construction
E40	An Unexpected Contaminated Land Procedure and Asbestos Finds Procedure must be prepared and must implemented throughout construction.	Section 6.8 Appendix C2	Construction Manager <b>Environment &amp; Sustainability Manager</b>	During construction

Planning Approval SSI-8256 CoA				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
E41	Dangerous goods, as defined by the Australian Dangerous Goods Code, must be stored and handled strictly in accordance with:	Section 6.6	<b>Construction Manager</b> Environment & Sustainability Manager	During construction
E40 a)	All relevant Australian Standards;	Section 6.6		
E40 b)	For liquids, a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund; and	Section 6.6		
E40 c)	The Environment Protection Manual for Authorised Officers: Bunding and Spill Management technical bulletin (EPA, 1997).	Section 6.6		
E40	In the event of an inconsistency between the requirements listed from (a) to (c) above, the most stringent requirement shall prevail to the extent of the inconsistency.	Section 6.6		

#### Revised Environmental Mitigation Measures (SSI 7400) – Applicable to LW

Planning Approval SSI 7400 REMMs				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
SCW3	Erosion and sediment control measures would be implemented in accordance with Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) and Managing Urban Stormwater: Soils and Construction Volume 2 (Department of Environment and Climate Change, 2008a). Measures would be designed as a minimum for the 80th percentile; 5-day rainfall event.	Section 6.1	Construction Manager <b>Environment &amp; Sustainability Manager</b>	During construction
SCW4	Discharges from the construction water treatment plants would be monitored to ensure compliance with the discharge criteria in an environment protection licence issued to the project.	Section 6.9	<b>Environment &amp; Sustainability Manager</b>	During construction
FH2	The site layout and staging of construction at the Marrickville dive site would avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required	TSE contractor revised all drainage on the Marrickville site, prior to handover to LW. Construction staging will be considered in the development of ERSed plans to	Design Manager	Prior to construction

Planning Approval SSI 7400 REMMs				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
FH3		consider obstruction of overland flow paths and limit the extent of flow diversion required. Section 6.4		
	<p>Overland flow diversions during construction at the Marrickville dive site would meet the following criteria, where feasible and reasonable:</p> <p>Not worsen existing flooding characteristics up to and including the 100 year annual recurrence interval event in the vicinity of the project</p> <p>Dedicated evacuation routes would not be adversely impacted in flood events up to and including the probable maximum flood. This may include the requirement for changes to existing arrangements for flood warning systems and signage.</p> <p>Construction planning for the Marrickville dive site would be carried out in consultation with the State Emergency Services and Marrickville Inner West Council.</p> <p>Not worsen is defined as:</p> <p>A maximum increase flood levels of 50mm in a 100 year Average Recurrence Interval flood event</p> <p>A maximum increase in time of inundation of one hour in a 100 year Average Recurrence Interval flood event</p> <p>No increase in the potential for soil erosion and scouring from any increase in flow velocity in a 100 year Average Recurrence Interval flood event.</p>	<p>TSE contractor revised all drainage on the Marrickville site, prior to handover to LW. Construction staging will be considered in the development of ERSED plans to consider obstruction of overland flow paths and limit the extent of flow diversion required.</p> <p>Section 6.4</p>	Design Manager	Prior to construction
FH4	Where feasible and reasonable, detailed design would result in no net increase in stormwater runoff rates in all storm events unless it can be demonstrated that increased runoff rates as a result of the project would not increase downstream flood risk.	Addressed in applicable design package	Design Manager	Desing and During construction
FH5	Where space permits, on-site detention of stormwater would be introduced where stormwater runoff rates are increased. Where there is insufficient space for the provision of on-site detention, the upgrade of downstream infrastructure would be implemented where feasible and reasonable.	Addressed in applicable design package	Design Manager	Design and During construction
FH10	During detailed design, project infrastructure would be designed to meet the following criteria, where feasible and reasonable: Locate station and service entrances to underground stations above the greater of the 100 year annual recurrence interval flood level plus 500mm or the probable maximum flood level Provide site surface grading and drainage collection systems at the Chatswood and Marrickville dive structures to manage the risk of local	Addressed in applicable design package	Design Manager	Design During construction

Planning Approval SSI 7400 REMMs				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
	catchment and overland flooding for events up to and including the probable maximum flood event. Locate aboveground rail system facilities (such as traction power supply sub stations) at least above the 100 year annual recurrence interval flood level plus 500mm. Protect facilities that are identified as being critical to emergency response operations from the probable maximum flood level.			

#### Revised Environmental Mitigation Measures (SSI 8256) – Applicable to LW

Planning Approval SSI 8256 REMMs				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
SC1	Erosion and sediment control measures would be implemented in accordance with Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) and Managing Urban Stormwater: Soils and Construction Volume 2A (DECC, 2008). Measures would be designed as a minimum for the 80th percentile, five day rainfall event.	Section 6.1	<b>Construction Manager</b> Environment & Sustainability Manager	During construction
SC2	Prior to ground disturbance in high probability acid sulfate areas, testing would be carried out to determine the presence of acid sulfate soils. If acid sulfate soils are encountered, they would be managed in accordance with the Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998) and the Waste Classification Guidelines - Part 4: Acid Sulfate Soils (EPA, 2014).	Section 4.2.5 & 6.8.2 As LW's current scope does not include work within high probability ASS areas, this REMM is not relevant to the LW scope. If LW's scope changes, Systems Connect will reassess the relevance of this REMM and update this Plan as required.	<b>Environment &amp; Sustainability Manager</b> <b>Design Manager</b>	Design and During construction
SC3	Prior to ground disturbance in areas of potential soil salinity, testing would be carried out to confirm the presence of saline soils. If saline soils are encountered, they would be managed in accordance with Site Investigations for Urban Salinity (DLWC, 2002).	Section 4.2.4 & 6.8.3	<b>Environment &amp; Sustainability Manager</b> Design Manager	Prior to and During construction
SC4	WorkCover dangerous goods searches would be carried out for properties that have potential contamination near Belmore Station, to provide additional site characterisation and identify the risk of contamination in these areas.	It is noted that this REMM is only relevant to works within the Belmore Station area. As LW's current scope does not include work within this area, this REMM is not relevant to the LW scope. If LW's scope		

Planning Approval SSI 8256 REMMs				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
		changes, Systems Connect will reassess the relevance of this REMM and update this Plan as required.		
SC5	Prior to ground disturbance, a detailed contamination assessment would be undertaken in areas with a medium to high risk of contamination, to confirm the nature and extent of contamination, specific requirements for further investigation and remediation, and/or management requirements of any contamination.	Section 4.2.9 & 6.8	<b>Environment &amp; Sustainability Manager</b> <b>Design Manager</b>	Prior to construction
SC6	Hazardous materials surveys would be undertaken during detailed design for all proposed demolition activities, and for utility adjustments as required.	Section 6.8	Environment & Sustainability Manager Design Manager	Prior to construction
SC7	In the event a Remediation Action Plan is required, it would be developed in accordance with Managing Land Contamination: Planning Guidelines SEPP 55 – Remediation of Land (Department of Urban Affairs and Planning and Environment Protection Authority, 1998) and a NSW Environment Protection Authority Accredited site auditor would be engaged to audit the works.	Section 6.8.1	<b>Environment &amp; Sustainability Manager</b> <b>Design Manager</b>	Prior to construction
SC8	In the event that indicators of contamination are encountered during construction (such as odours or visually contaminated materials), work in the area would cease, and the finds would be managed in accordance with the unexpected contamination finds procedure.	Section 6.8 Appendix C2	Construction Manager Environment & Sustainability Manager <b>Site Supervisors</b> <b>Project Engineers</b> <b>Environmental Advisors and Coordinators</b>	During construction
FHW5	Detailed construction planning would consider flood risk for all compounds and work sites. This would include identification of measures to not worsen existing flooding characteristics. Not worsen is defined as: a maximum increase in flood levels of 50 mm in a one per cent AEP event a maximum increase in time of inundation of one hour in a one per cent AEP event no increase in the potential for soil erosion and scouring from any increase in flow velocity in a one per cent AEP flood event.	Section 6.4	<b>Construction Manager</b> Environment & Sustainability Manager Design Manager	Prior to construction

Planning Approval SSI 8256 REMMs				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
FHW6	The site layout and staging of construction activities would: avoid or minimise obstruction of overland flow paths and limit the extent of flow diversion required consider how works would affect the existing stormwater network such that alternatives are in place prior to any disconnection or diversion of stormwater infrastructure.	Section 6.4	<b>Environment &amp; Sustainability Manager</b> Design Team Manager	Prior to construction
FHW7	Works within or near watercourses (including the Cooks River) would be undertaken with consideration given to the NSW Office of Water's guidelines for controlled activities.	Section 4.2.6	<b>Construction Manager</b> Environment & Sustainability Manager Site Supervisors Project Engineers Environmental Advisors and Coordinators	During construction
FHW8	Erosion and sediment mitigation measures would be installed and maintained for the duration of the construction period.	Section 6.1	<b>Environmental Advisors and Coordinators</b> Site Supervisors Project Engineers	During construction
FHW10	Discharges from construction water treatment devices would be monitored to ensure compliance with the discharge criteria in the environment protection licence.	Section 6.1.3 & 6.2	Environmental Advisors and Coordinators Site Supervisors Project Engineers	During construction

### Construction Environmental Management Framework (2017)

Construction Environmental Management Framework – Sydney Metro City & Southwest (2017)				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
7.1a	The following groundwater management objectives will apply to the construction of the project:	Section 1.3		



Construction Environmental Management Framework – Sydney Metro City & Southwest (2017)				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
(i)	Reduce the potential for drawdown of surrounding groundwater resources;	Section 1.3	<b>Environment &amp; Sustainability Manager</b> <b>Design Manager</b>	Prior to and during construction
(ii)	Prevent the pollution of groundwater through appropriate controls;	Section 1.3		
(iii)	Reduce the potential impacts on groundwater dependent ecosystems.	Section 1.3		
7.3a	Examples of groundwater mitigation measures include:	Section 6.5	Construction Manager <b>Environment &amp; Sustainability Manager</b> Design Manager	Prior to and during construction
(i)	Implementing all feasible and reasonable measures to limit groundwater inflows to stations and crossovers; and	Section 6.5		
(ii)	Undertaking groundwater monitoring during construction (levels and quality) in areas identified as 'likely' and 'potential' groundwater dependent ecosystems.	Section 6.5		
15.1a	The following soil and water management objectives will apply to construction:	Section 1.3	<b>Construction Manager</b> Environment & Sustainability Manager Environmental Advisors and Coordinators	During construction
(i)	Minimise pollution of surface water through appropriate erosion and sediment control;	Section 1.3		
(ii)	Maintain existing water quality of surrounding surface watercourses; and	Section 1.3		
(iii)	Source construction water from non-potable sources, where feasible and reasonable.	Section 1.3		
15.2e	Principal Contractors will undertake the following soil and water monitoring as a minimum:	Element 2:	Environment & Sustainability Manager Construction Manager <b>Environmental Advisors and Coordinators</b>	During construction
(i)	Weekly inspections of the erosion and sediment control measures. Issues identified would be rectified as soon as practicable;	Element 2:		
(ii)	Additional inspections will be undertaken following significant rainfall events (greater than 20 mm in 24 hours); and	Element 2:		
(iii)	All water will be tested (and treated if required) prior to discharge from the site in order to determine compliance with the parameters of the EPL. No water will be discharged from the site without written approval of the Contractor's Environmental Manager (or delegate). This is to form a HOLD POINT.	Section 6.2 Water Management Procedure - Appendix C2 CEMP – Section 5.3		
15.2f	The following compliance records will be kept by the Principal Contractors:	Refer to each specific requirement below		During construction

# Construction Environmental Management Framework – Sydney Metro City & Southwest (2017)

No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
(i)	Copies of current ESCPs for all active construction sites;	Section 6.1.1	Environment & Sustainability Manager <b>Environmental Advisors and Coordinators</b>	
(ii)	Records of soil and water inspections undertaken;	Element 2:		
(iii)	Records of testing of any water prior to discharge; and	Element 2:		
(iv)	Records of the release of the hold point to discharge water from the construction site to the receiving environment.	Element 2:		
15.2g	The following water resources management objectives will apply to the construction of the project:	Refer to each specific requirement below	<b>Construction Manager</b> <b>Design Team Manager</b> <b>Environment &amp; Sustainability Manager</b>	Prior to and during construction
(i)	Minimise demand for, and use of potable water;	Section 6.3		
(ii)	Maximise opportunities for water re-use from captured stormwater, wastewater and groundwater;	Section 6.1.3 & 6.3		
(iii)	Examples of measures to minimise potable water consumption include: Water efficient controls, fixtures and fittings in temporary facilities; Collecting, treating and reusing water generated in tunnelling operations, concrete batching and casting facility processes; Using recycled water or treated water from onsite sources in the formulation of concrete; Harvesting and reusing rainwater from roofs of temporary facilities; Using water from recycled water networks; Collecting, treating and reusing groundwater and stormwater; Using water efficient construction methods and equipment; and Providing designated sealed areas for equipment wash down.	Section 6.3		
15.3a	Examples of surface water and flooding mitigation measures include:	Refer to each specific requirement below	Construction Manager Environment & Sustainability Manager Site Supervisors <b>Environmental Advisors and Coordinators</b>	During construction
(i)	Clean water will be diverted around disturbed site areas, stockpiles and contaminated areas;	Section 6.1.2		
(ii)	Control measures will be installed downstream of works, stockpiles and other disturbed areas;	Section 6.1.2		
(iii)	Exposed surfaces will be minimised, and stabilised / revegetated as soon feasible and reasonable upon completion of construction;	Section 6.1.2		
(iv)	Dangerous good and hazardous materials storage will be within bunded areas with a capacity of 110 per cent of the maximum single stored volume; and	Section 6.6		

Construction Environmental Management Framework – Sydney Metro City & Southwest (2017)				
No.	Requirement	How we will meet the Expectations (minimum requirements)	Responsibility Key Contributor	Timing
(v)	Spill kits will be provided at the batch plants, storage areas and main work sites.	Section 6.6		

## **PART C – APPENDIXES**

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### **Appendix C1 – Indicative Erosion and Sediment Control Plan**

INSTRUCTIONS

BACKGROUND

The details shown on this Progressive Erosion and Sediment Control Plan (ESCP) are construction stage erosion and sediment control requirements only relevant to Stages 1, 2 and 3 of works only for this project. Erosion and sediment controls for all other stages of works are not included within this plan. Progressive ESCPs will be required for future stages. Note that this is not a rehabilitation plan and does not cover recommendations or measures for long term stabilisation or erosion control. A rehabilitation plan must be completed (by others) for this project.

This Progressive Erosion and Sediment Control Plan (ESCP) has been prepared in accordance with best-practice principles, generally following the guidelines contained in the Blue Book Volume 1.

EROSION HAZARD ASSESSMENT:

- RUSLE: A = R x K x LS x P x C
- A = soil loss (tonnes per hectare per year)
  - R = rainfall erosivity (3,700 for this site based on R-factor maps from the Blue Book – Appendix B)
  - K = soil erodibility (0.0552 – based on a K of 0.046 for Gynea Soil Landscape multiplied by a factor of 1.2 to account for dispersible soils)
  - LS = slope length and gradient (1.75 for road works (40m, 10%) and 3.82 for reserve works (40m, 18%))
  - P = soil conservation practices (1.3 adopted for the disturbed areas of this site, assuming compacted ground)
  - C = ground cover (1.0 adopted for the disturbed areas of this site, assuming no cover).

At this site, RUSLE has been calculated as approx. 464 t/ha/yr (Soil Loss Class 4; moderate erosion hazard) for the Stages 1 and 2 works (road area) and approx. 1.013 t/ha/yr (Soil Loss Class 6; very high erosion hazard) for Stage 3 works (reserve area).

SEDIMENT CONTROL DESIGN STANDARD STAGES 1 AND 2 WORKS – ROAD AREA

The total site area for these works is less than 2,500m<sup>2</sup> and therefore a sediment basin assessment would typically not be required. However, due to the sensitivity of this site and the very high erosion hazard, a sediment basin assessment has been undertaken.

Based on the requirements in Blue Book, sediment basins are required if the total soil loss exceeds 200 t/yr. The road works are to be spilt into six (6) stages (Stage 1 (A, B and C) and Stage 2 (A, B and C)), with only one area to be active at any one time. Therefore, the maximum amount of disturbance is expected to be no more than 0.03 ha at any one time.

Based on the above, the potential soil loss for each stage is approx. 14 t/yr for the road works area. Therefore a sediment basin is not required as the potential catchment soil loss is <200 t/yr.

STAGE 3 WORKS – RESERVE AREA

The total site area for these works is less than 2,500m<sup>2</sup> and therefore a sediment basin assessment would typically not be required. However, due to the sensitivity of this site and the very high erosion hazard, a sediment basin assessment has been undertaken.

Based on the requirements in Blue Book, sediment basins are required if the total soil loss exceeds 200 t/yr. Stage 3 works (reserve area) comprise of a single disturbed catchment of approximately 0.06 ha.

Based on the above, the potential soil loss for Stage 3 works is approx. 61 t/yr for the reserve works area. Therefore a sediment basin is not required as the potential catchment soil loss is <200 t/yr.

REQUIREMENTS AND DESIGN ASSUMPTIONS

- IFD: 2yr, 6hr storm = 11.7mm/hr producing an R-factor of 2,950. The R-factor of 3,700 (from Appendix A of the Blue Book) has been adopted as the more conservative value.
- Assumed soil hydrological group: D (high runoff, low permeability).
- Sediment design rainfall depth: 5-day 90th percentile rainfall depth = 59.6mm. This is based off the rainfall depth provided within the Blue Book for Mosman.
- Volumetric runoff coefficient: 0.69.
- C10 runoff coefficient = 0.74.

INSTRUCTIONS – GENERAL

Install erosion and sediment controls as noted on this ESCP and in the order outlined below for each area/stage of works. Ensure the necessary erosion and sediment controls are in place prior to any ground disturbance or construction works for each area/stage of works. Note that minor disturbance is permitted in order to install the erosion and sediment controls but it is to be kept to a minimum.

- Minimise disturbance to only what is required for safe and efficient construction.
- Stage disturbance to ensure that only one area of works is active at any one time (i.e. if Stage 1 – a is active, Stages 1 (b and c), 2 (a, b and c) and 3 are to be undisturbed).
  - Refer to ESCP102 for erosion and sediment control measures associated with Stages 1 and 2 and ESCP103 for erosion and sediment control measures associated with Stage 3 works.
- Maintain a stabilised site access point off Blues Point Road in the location shown as a sealed/paved surface – keep clean at all times.
- Install a sediment sump in the location shown on ESCP103.
- Ensure the outer/perimeter sediment controls (bunds, sediment fence and coir log sediment controls) are in place around the entire lower perimeter of the works and following the details provided on ESCP102–103. Also refer to Blue Book Standard Drawing SD 6–8 and IECA Standard Drawing FR-01 on ESCP104 & 105 respectively (these perimeter sediment controls must remain in place until all upslope works are complete and all areas have been rehabilitated and are stable).
- The pump system and holding tank is to be implemented and functioning. Refer to ESCP102–103 for location and details (also refer to the ‘Sumps, Holding Tank and De-watering’ notes below).
- Establish bunded stockpile area/s in accordance with Blue Book Standard Drawing SD 4–1 for the temporary placement of soil material (where necessary). Also refer to the ‘Stockpiling’ notes below and to ESCP102–103 for additional requirements.
- Maintain a sealed/paved surface (existing or new surface) in a stable and clean condition for the access way and site compound areas.
- Once earthworks in each area have been completed, surfaces are to be progressively stabilised/rehabilitated before moving onto the next stage of works. Permanent stabilisation is to be in accordance with engineering details (by other).
- Exposed surfaces are to be temporarily covered prior to forecast rainfall (>50% chance of 2mm or more in 24 hours) with geofabric, black plastic, jute matting or similar until permanent rehabilitation can be undertaken. Permanent stabilisation to be undertaken as soon as practical/feasible.

The following erosion and sediment controls are to be implemented at all times when necessary as the works progress:

- During works if significant rainfall (>5mm) is forecast, all exposed surfaces are to be temporarily stabilised with a soil binder (e.g. Vital Stonewall) geofabric, black plastic or similar.
- Undertake dust suppression as required to minimise the risk of dust rise from the site.
- All stockpiles must be covered at all times when not in use with geofabric or black plastic. Therefore, the normal requirement (as shown on SD 4–1) of achieving a C-factor of 0.1 within 10 days does not apply – stockpiles will be covered immediately following use, prior to rainfall and site closure.
- All vehicles exiting the site are to be hosed down as required to minimise materials/sediments being tracked onto the streets. Ensure runoff water is directed into a sediment sump or equivalent to minimise the risk of dirty water egress.
- Slope lengths across all disturbed surfaces are to be maintained at maximum 10m intervals during rainfall. Provide slope breaks as coir log (SD FR-01) or sand bag bunds, earth banks (SD 5–5) or similar prior to rainfall (>50% chance of rainfall >2mm) and site closure to achieve this. Note that slope breaks are not required to be in place during active works when it is not raining.
- All excess spoil is to be removed from site and taken to an approved disposal/stockpiling facility.
- Treatment of dirty water is to be carried out as necessary in accordance with the ‘Sumps, Holding Tank and De-watering’ notes.
- Sealed/paved surfaces (existing or new surfaces) are to be maintained in a stable and clean condition for the access way and site compound areas at all times.
- Monitoring, maintenance and inspections are to be carried out regularly as required, in accordance with the ‘Site Inspection, Monitoring and Maintenance’ notes. where necessary controls are to be maintained/modified to address any concerns.
- Undertake progressive stabilisation/rehabilitation of lands as soon as practical/feasible after final earthworks are complete in each area in accordance the engineering stabilisation/landscaping plans (rather than waiting until the completion of all works).
- As surfaces are stabilised/rehabilitated and permanent drainage measures are installed, temporary erosion and sediment control structures and water management structures can be removed (e.g. sediment fences and sumps).

SUMPS, HOLDING TANK AND DE-WATERING

- All onsite surface water runoff is to be directed into the sump and then pumped continuously into the holding tank.
- Based on Stages 1 (A, B & C) and 2 (A, B & C) (as shown on ESCP102) the minimum required volume to be available within the holding tank(s) during each stage of works is 17,880 L (0.03 ha x 59.6 mm

- (5-day 90th percentile rainfall depth)
- As much as possible the holding tank is to be de-watered immediately following rainfall to restore holding capacity. The holding tank is to be emptied via a water cart (or similar) and the water taken to a suitable offsite treatment facility for management. Alternatively, if approval is granted water can be discharged as trade waste to sewer.
- During rainfall once the holding tank is reaching near 75% capacity, the tank is to be emptied via a water cart.
- The pump and holding tank are to be monitored at all times to minimise the chance of any overtopping occurring.
- This treatment system is to be maintained for as long as possible until all upslope surfaces have been rehabilitated and are stable.
- Water within the holding tank can be used for dust-suppression or construction purposes without treatment as long as it will drain back into the sediment capture system.

STOCKPILING

- As much as possible stockpiling will not occur onsite.
- Soil for rehabilitation will only be brought onto site immediately prior to spreading it over completed surfaces and laying turf.
- All excess spoil is to be removed from site and taken to an approved disposal/stockpiling facility.
- However, if short term stockpiling must occur onsite it is to be stored within a designated bunded stockpiling area established in accordance with SD 4–1 and the details shown on ESCP102–103.
- All stockpiles must be covered at all times when not in use with geofabric or black plastic. Therefore, the normal requirement (as shown on SD 4–1) of achieving a C-factor of 0.1 within 10 days does not apply – stockpiles will be covered immediately following use, prior to rainfall and site closure.

SITE INSPECTION, MONITORING AND MAINTENANCE

- Regular site inspections are to be conducted by the site environment manager (or their representative) and records of all such inspections are to be made available upon inspection. Inspections are to be undertaken:
  - At least weekly during normal construction hours, and
  - Prior to forecast rainfall (>50% chance of 2mm or more in 24 hours); and
  - Daily during rain events (if safe to do so); and
  - Within 24 hours of the cessation of a rain event that causes runoff (if safe to do so).
- Additional erosion and sediment controls will be installed as necessary to ensure environmental protection.
- Sediment or rocks tracked from the site will be removed from public roads as soon as possible (e.g. with street sweepers).
- After rainfall, sediment accumulated in trapping devices (e.g. sediment control bund) will be removed to a secure location where it can't wash or blow offsite (preferably to an active stockpile).
- Weather conditions will be monitored onsite and daily rainfall will be recorded.
- Safe storage areas for wastes, fuels, excess concrete and other potential contaminants are to be delineated by the site manager.

REV	DATE	DES.	DRN.	APP.	REVISION DETAILS	DRAWING STATUS		North	CLIENT			PO Box 1098, Bowral, NSW 2576 Suites 7 & 8, 68-70 Station Street Bowral NSW 2576. (t) 02 4862 1633 (f) 02 4862 3088 email: reception@seec.com.au  WWW.SEEC.COM.AU	PROJECT TITLE	DRAWING TITLE			
						DESIGN BY	L.O.							EROSION AND SEDIMENT CONTROL			
						DRAWN BY	L.O.							BACKGROUND AND STAGING			
						FINAL APPROVAL	A.T.							INSTRUCTIONS – SHEET 1 OF 5			
						SCALE: (on A3 Original)	N/A										
03	09/08/22	L.O.	L.O.	A.T.	AMENDED TO INCLUDE STAGE 3 WORKS	FINAL								PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
02	20/07/22	L.O.	L.O.	A.T.	FINAL ISSUE									19000212	P04	ESCP101	03
01	19/07/22	L.O.	L.O.	A.T.	AMENDED TO REFLECT CLIENT COMMENTS – ISSUED FOR REVIEW												
00	11/07/22	A.T.	A.T.	A.T.	FINAL ISSUE												
A	01/04/22	A.T.	A.T.	A.M.	DRAFT ISSUE – FOR CONSULTATION												

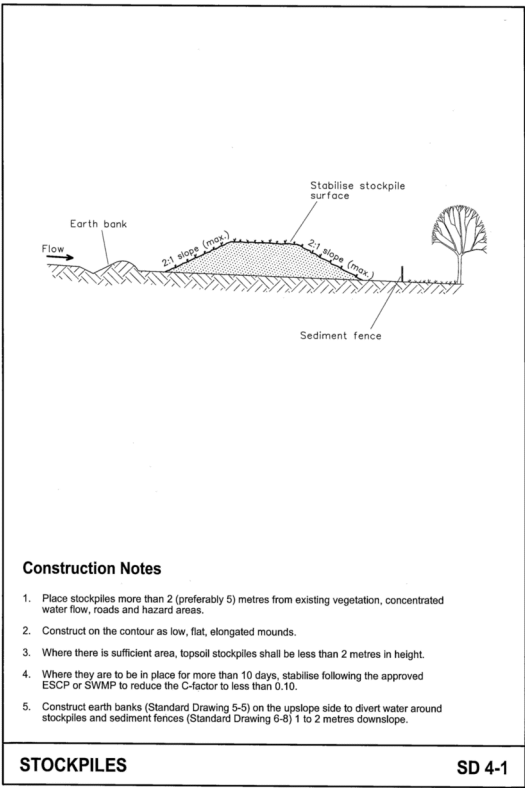






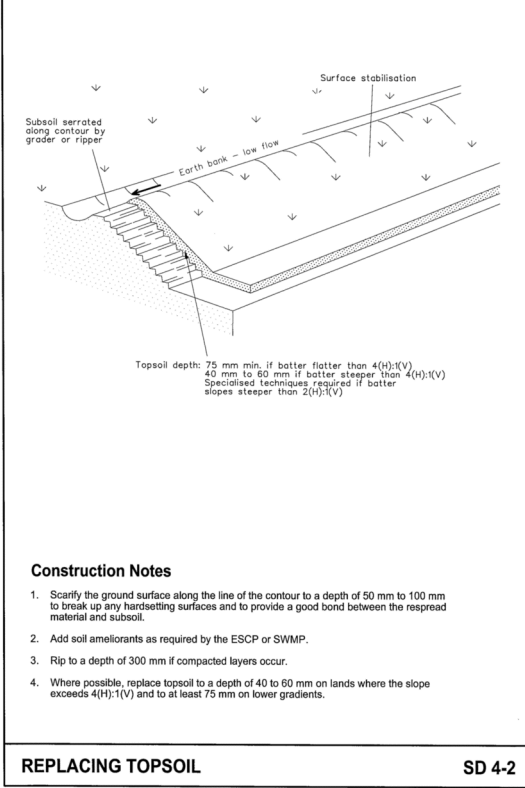
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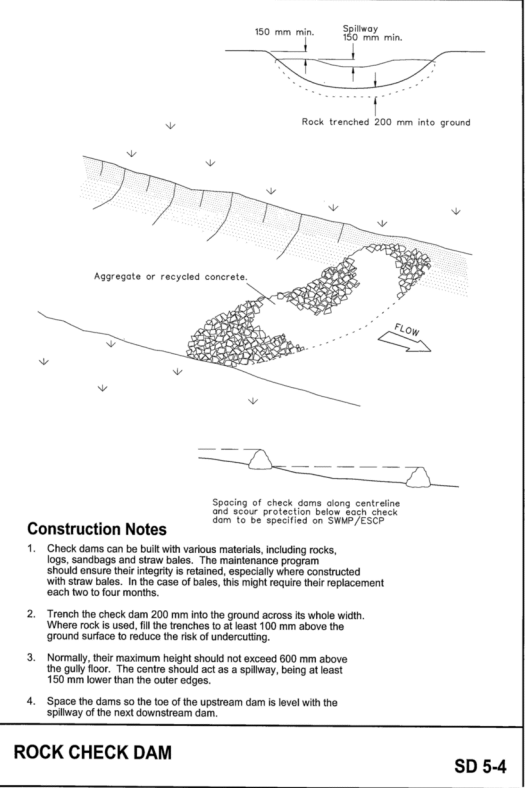
- Construction Notes**
1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
  2. Construct on the contour as low, flat, elongated mounds.
  3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
  4. Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
  5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

**STOCKPILES** **SD 4-1**



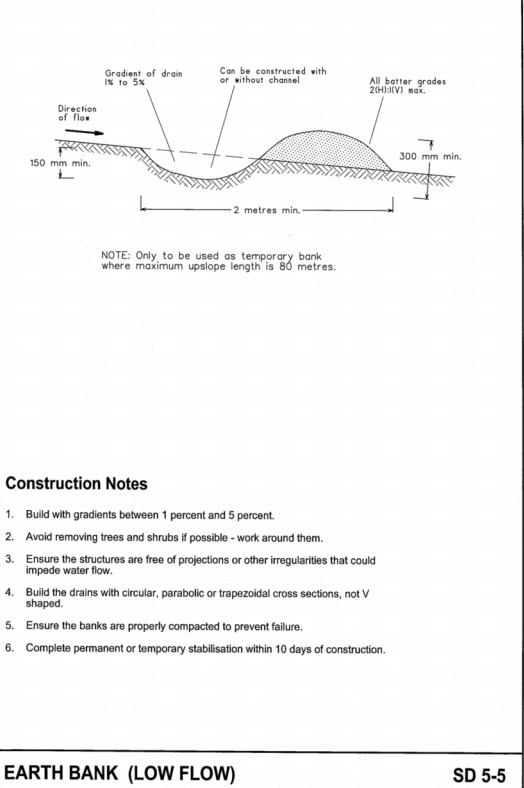
- Construction Notes**
1. Scarify the ground surface along the line of the contour to a depth of 50 mm to 100 mm to break up any hardsetting surfaces and to provide a good bond between the respread material and subsoil.
  2. Add soil ameliorants as required by the ESCP or SWMP.
  3. Rip to a depth of 300 mm if compacted layers occur.
  4. Where possible, replace topsoil to a depth of 40 to 60 mm on lands where the slope exceeds 4(H):1(V) and to at least 75 mm on lower gradients.

**REPLACING TOPSOIL** **SD 4-2**



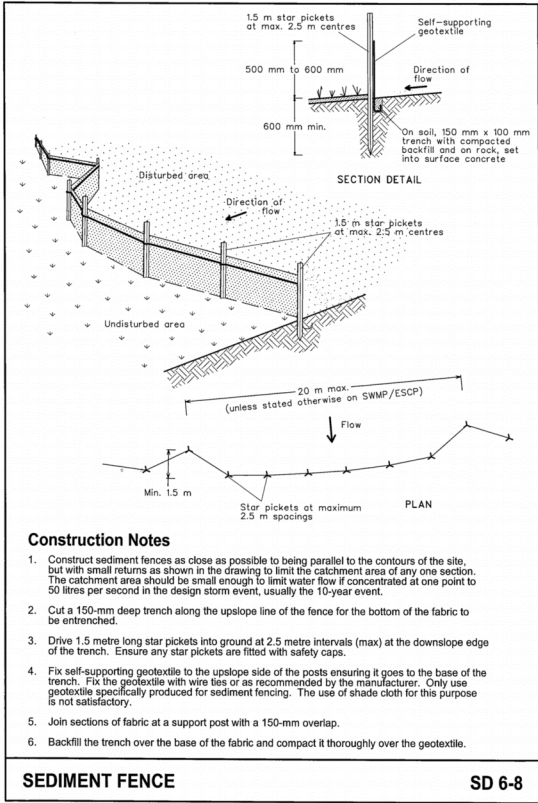
- Construction Notes**
1. Check dams can be built with various materials, including rocks, logs, sandbags and straw bales. The maintenance program should ensure their integrity is retained, especially where constructed with straw bales. In the case of bales, this might require their replacement each two to four months.
  2. Trench the check dam 200 mm into the ground across its whole width. Where rock is used, fill the trenches to at least 100 mm above the ground surface to reduce the risk of undercutting.
  3. Normally, their maximum height should not exceed 600 mm above the gully floor. The centre should act as a spillway, being at least 150 mm lower than the outer edges.
  4. Space the dams so the top of the upstream dam is level with the spillway of the next downstream dam.

**ROCK CHECK DAM** **SD 5-4**



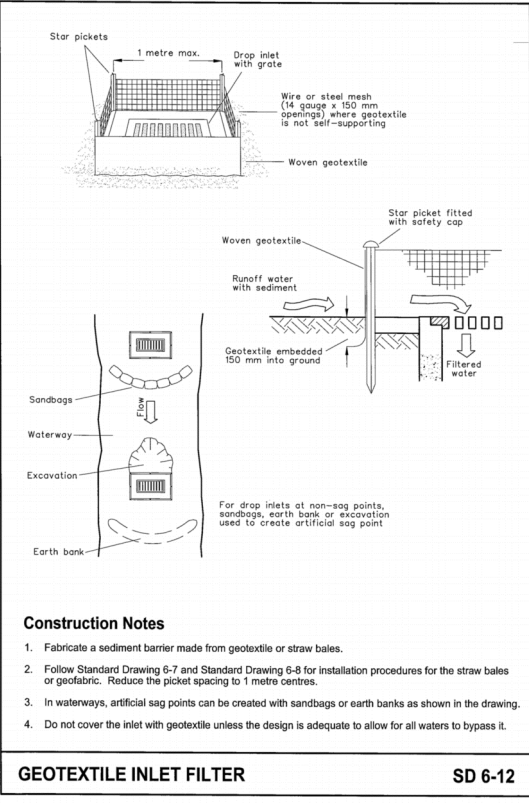
- Construction Notes**
1. Build with gradients between 1 percent and 5 percent.
  2. Avoid removing trees and shrubs if possible - work around them.
  3. Ensure the structures are free of projections or other irregularities that could impede water flow.
  4. Build the drains with circular, parabolic or trapezoidal cross sections, not V shaped.
  5. Ensure the banks are properly compacted to prevent failure.
  6. Complete permanent or temporary stabilisation within 10 days of construction.

**EARTH BANK (LOW FLOW)** **SD 5-5**



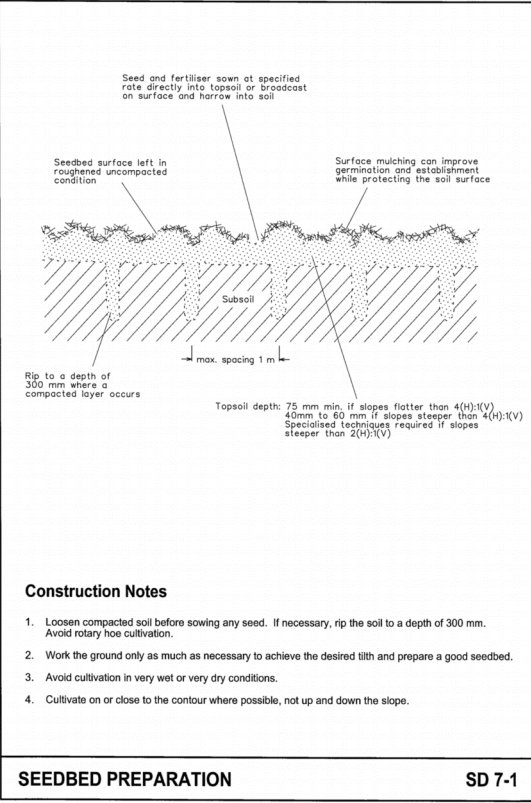
- Construction Notes**
1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
  2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
  3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
  4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
  5. Join sections of fabric at a support post with a 150-mm overlap.
  6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

**SEDIMENT FENCE** **SD 6-8**



- Construction Notes**
1. Fabricate a sediment barrier made from geotextile or straw bales.
  2. Follow Standard Drawing 6-7 and Standard Drawing 6-8 for installation procedures for the straw bales or geotextile. Reduce the picket spacing to 1 metre centres.
  3. In waterways, artificial sag points can be created with sandbags or earth banks as shown in the drawing.
  4. Do not cover the inlet with geotextile unless the design is adequate to allow for all waters to bypass it.

**GEOTEXTILE INLET FILTER** **SD 6-12**



- Construction Notes**
1. Loosen compacted soil before sowing any seed. If necessary, rip the soil to a depth of 300 mm. Avoid rotary hoe cultivation.
  2. Work the ground only as much as necessary to achieve the desired till and prepare a good seedbed.
  3. Avoid cultivation in very wet or very dry conditions.
  4. Cultivate on or close to the contour where possible, not up and down the slope.

**SEEDBED PREPARATION** **SD 7-1**

STANDARD DRAWINGS SD 4-1, 4-2, 5-4, 5-5, 6-8, 6-12 AND 7-1 ARE FROM LANDCOM (2004)

REV	DATE	DES.	DRN.	APP.	REVISION DETAILS	DRAWING STATUS	North	CLIENT	PROJECT TITLE	DRAWING TITLE
						DESIGN BY DRAWN BY FINAL APPROVAL				EROSION AND SEDIMENT CONTROL BLUE BOOK STANDARD DRAWINGS SHEET 4 OF 5
03	09/08/22	L.O.	L.O.	A.T.	AMENDED TO INCLUDE STAGE 3 WORKS	SCALE: (on A3 Original)				
02	20/07/22	L.O.	L.O.	A.T.	FINAL ISSUE	N/A				
01	19/07/22	L.O.	L.O.	A.T.	AMENDED TO REFLECT CLIENT COMMENTS – ISSUED FOR REVIEW					
00	11/07/22	A.T.	A.T.	A.T.	FINAL ISSUE					
A	01/04/22	A.T.	A.T.	A.M.	DRAFT ISSUE – FOR CONSULTATION					

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PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
19000212	P04	ESCP104	03



THE FOLLOWING A GENERAL  
INSTALLATION REQUIREMENTS.  
OPERATORS SHOULD OBTAIN  
INSTALLATION INSTRUCTIONS FROM  
THE GULLY BAG MANUFACTURER OR  
DISTRIBUTER.

1. WHEN THE UP-SLOPE DRAINAGE AREA HAS BEEN STABILISED, REMOVE ALL MATERIALS INCLUDED DEPOSITED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.



Drawn:	Date:		
GMW	Dec-09	Gully Filter Bag	GB-01

Collected sediment

Fibre rolls recessed  
50 to 75 mm in clayey soils,  
or 75 to 125 mm in sandy soils

**Figure 1 - Typical installation of fibre rolls**

Drawn: GMW	Date: Apr-10	Fibre Rolls	FR-01
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REV	DATE	DES.	DRN.	APP.	REVISION DETAILS	DRAWING STATUS	
						DESIGN BY	L.O.
						DRAWN BY	L.O.
						FINAL APPROVAL	A.T.
03	09/08/22	L.O.	L.O.	A.T.	AMENDED TO INCLUDE STAGE 3 WORKS	<b>SCALE:</b> (on A3 Original) <div style="float: right; font-size: 2em; margin-top: 10px;">N/A</div>	
02	20/07/22	L.O.	L.O.	A.T.	FINAL ISSUE		
01	19/07/22	L.O.	L.O.	A.T.	AMENDED TO REFLECT CLIENT COMMENTS – ISSUED FOR REVIEW		
00	11/07/22	A.T.	A.T.	A.T.	FINAL ISSUE		
A	01/04/22	A.T.	A.T.	A.M.	DRAFT ISSUE – FOR CONSULTATION	<div style="font-size: 3em; text-align: center;">FINAL</div>	



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LINE-WIDE WORKS  
BLUES POINT ROAD  
ROAD WORKS  
NORTH SYDNEY

DRAWING TITLE  
EROSION AND SEDIMENT CONTROL  
IECA STANDARD DRAWINGS  
SHEET 5 OF 5

PROJECT NO.	SUB-PR NO.	DRAWING NO.	REV
19000212	P04	ESCP105	03

## **Appendix C2 – Procedures**

**Water Management Procedure**

**Spill Management Procedure**

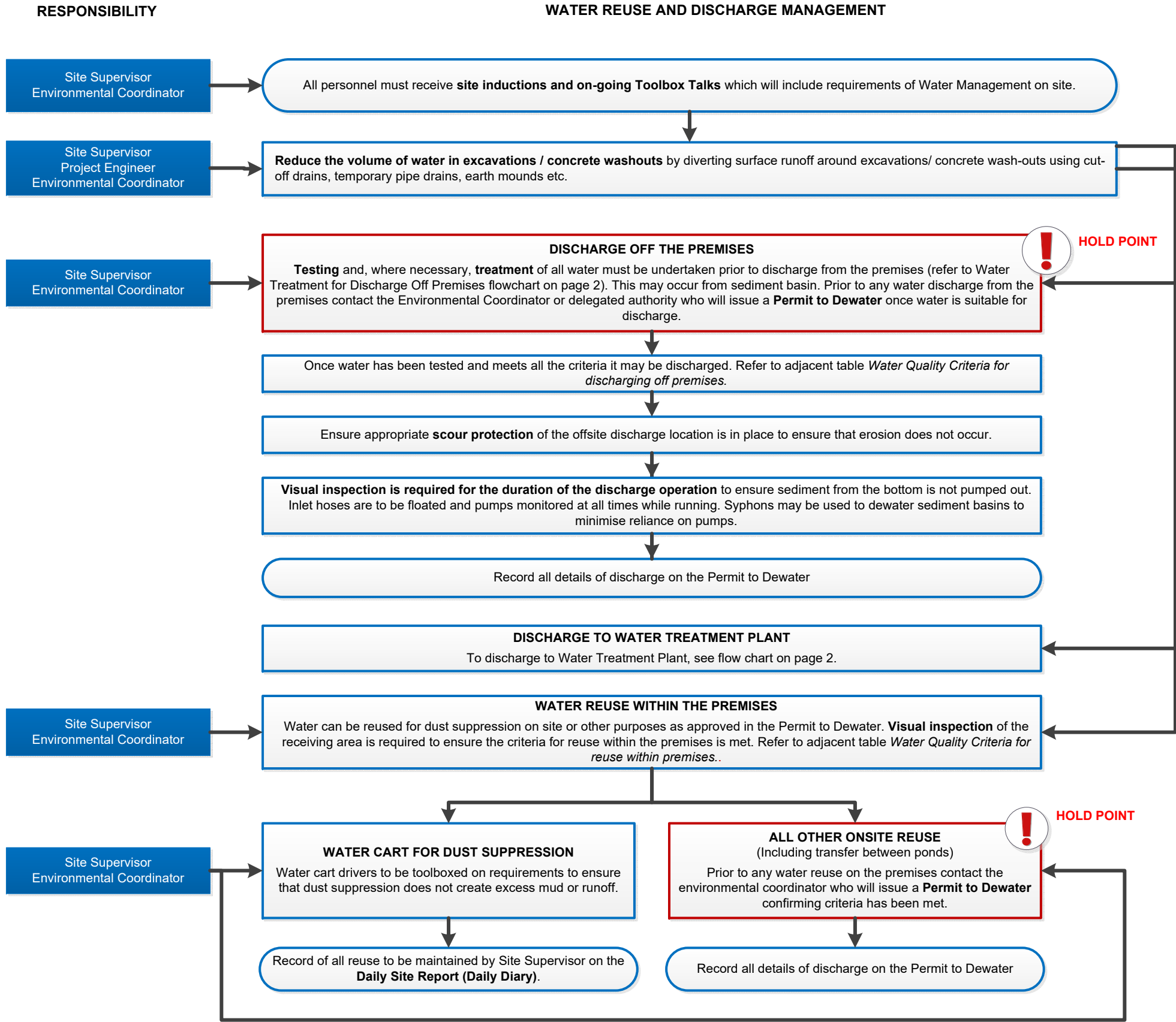
**Unexpected Finds Soil Contamination and Asbestos Procedure**

**Erosion and Sediment Control Management Procedure**

**Contingency Groundwater Monitoring and Management Procedure**

**Spoil Classification Reuse and Recycling Procedure**

WATER MANAGEMENT PROCEDURE



**NOTES**

**Note:**  
Sediment Basins. Basin design is based on a 5-day rainfall depth (mm) for 85th percentile. Should rainfall received within a 5 day period exceed 36 mm, it is expected that sediment basins may discharge naturally over their spillway without an opportunity to flocculate and test basins for TSS, pH or the presence of oil and grease. It should also be noted that other types of erosion controls may also fail during such an event and that repair work will be undertaken when it has been determined by the Site Supervisor that it is safe to do so.

**Safety Requirements**

- Always wear appropriate PPE (refer to Work Pack and SWMS)
- Always ensure personal safety when sampling (refer to Work Pack).
- Avoid eye and skin contact with material sampled.
- DO NOT breathe gases or aerosols formed from sampled material or associated preservatives in sample bottles.
- Maintain high standards of personal hygiene when sampling, DO NOT eat or smoke when sampling and ALWAYS wash hands following sampling.
- Do not enter sediment basins during sampling.

**Monitoring**

- Water quality monitoring and visual inspection as per permit and discharge requirements
- Regular inspection of controls and discharge points are required prior to and during discharge
- Inspection of receiving areas prior to discharge

**Recording**

- Records of water quality analysis on permits
- Records of water reuse
- Records of inspections including site inspections, on going monitoring of discharge and site diaries
- Records of tool box talks

Water Quality Criteria for discharging off premises:	
Parameter and Criteria	Sampling Method
TSS (<50mg/L)	Sampling and laboratory testing and/ or multi-probe
pH (6.5 -8.5)	Multi-probe
Oil and Grease (< 10mg/L and no visible trace)	Sampling and visual Inspection
Water Quality Criteria for reuse within the premises:	
Parameter and Criteria	Sampling Method
Oil and Grease (none visible)	Visual Inspection
No potential for water to leave the premises	Visual Inspection
No surface runoff will be generated from the reuse (reuse includes dust suppression, watering retained vegetation etc.)	Visual Inspection
No potential for water to reach any watercourse	Visual Inspection
Concrete Washout Water only no visible fines (in addition to criteria above)	Visual Inspection
If transporting water to sediment basins, the sediment basin must not be overfilled	Visual Inspection

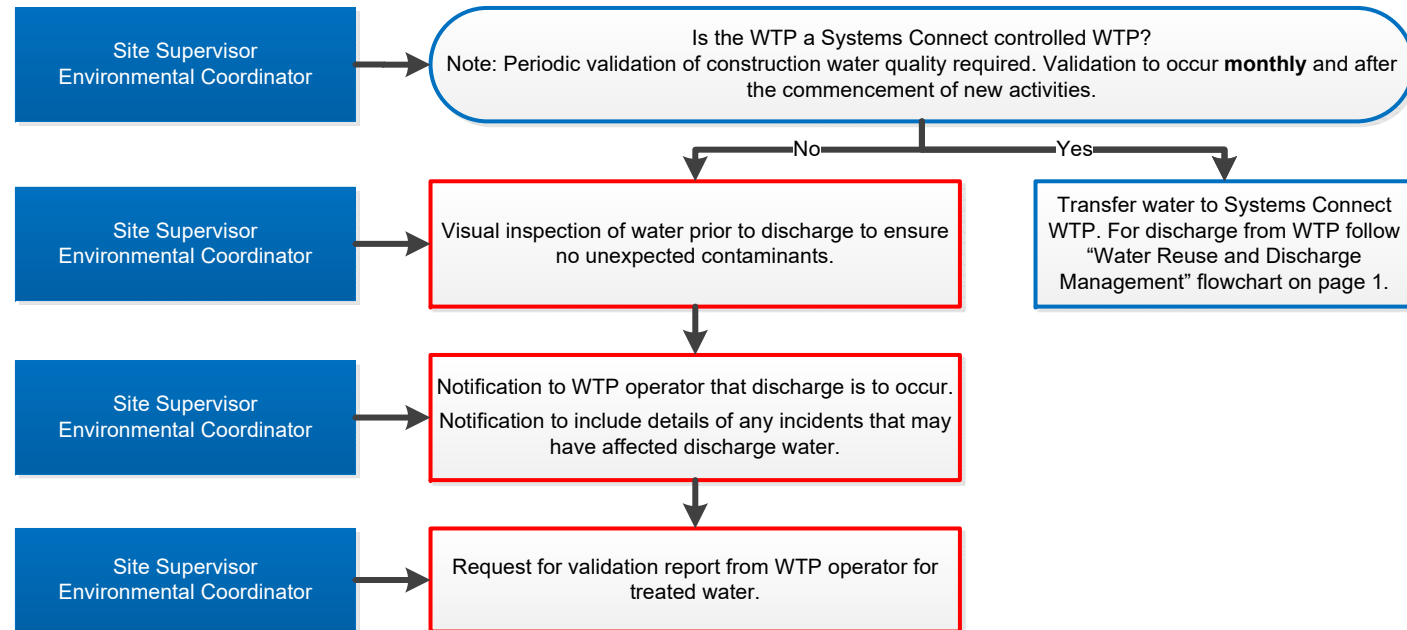


# WATER MANAGEMENT PROCEDURE



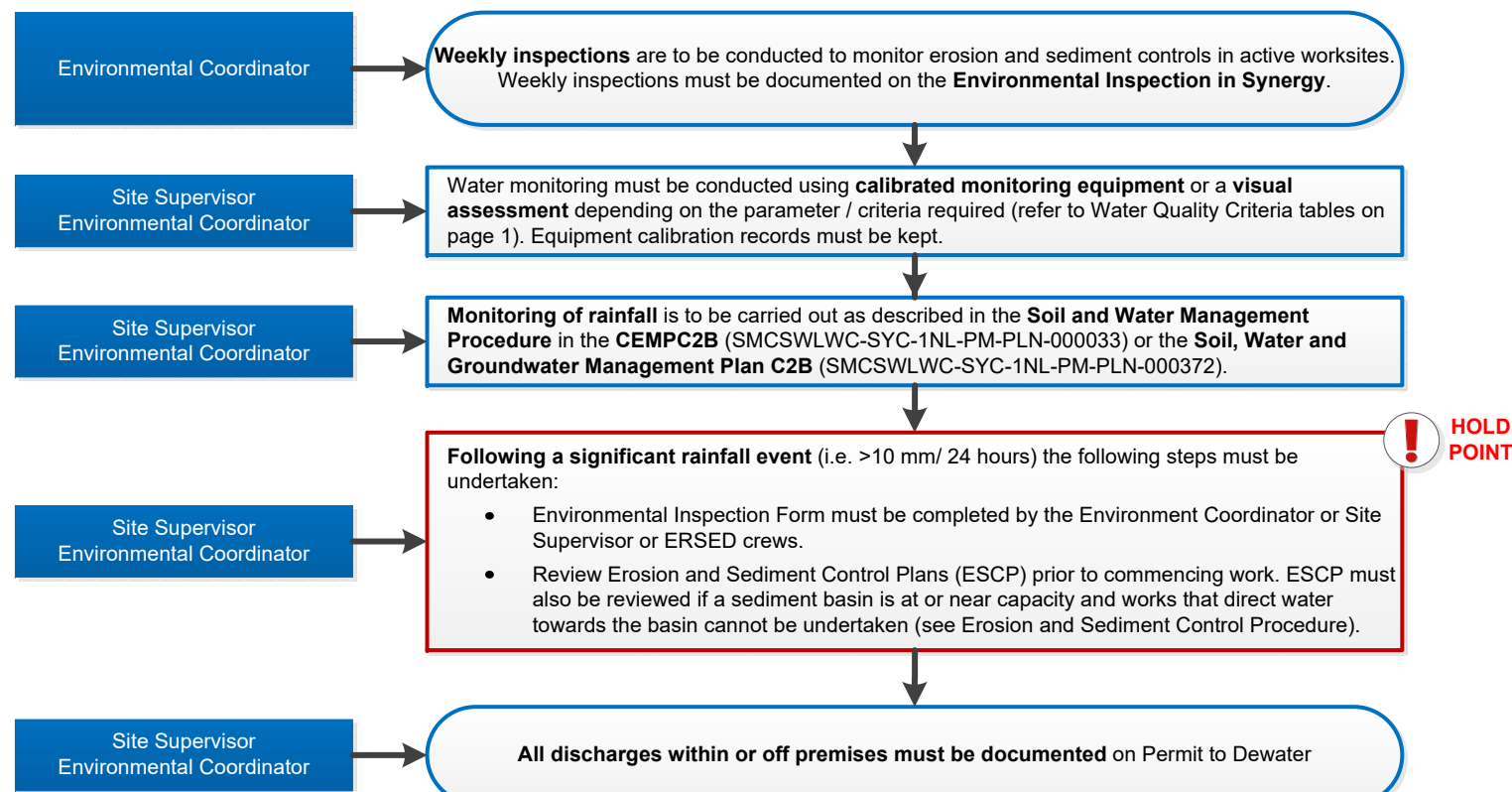
## RESPONSIBILITY

## WATER DISCHARGE TO WATER TREATMENT PLANT



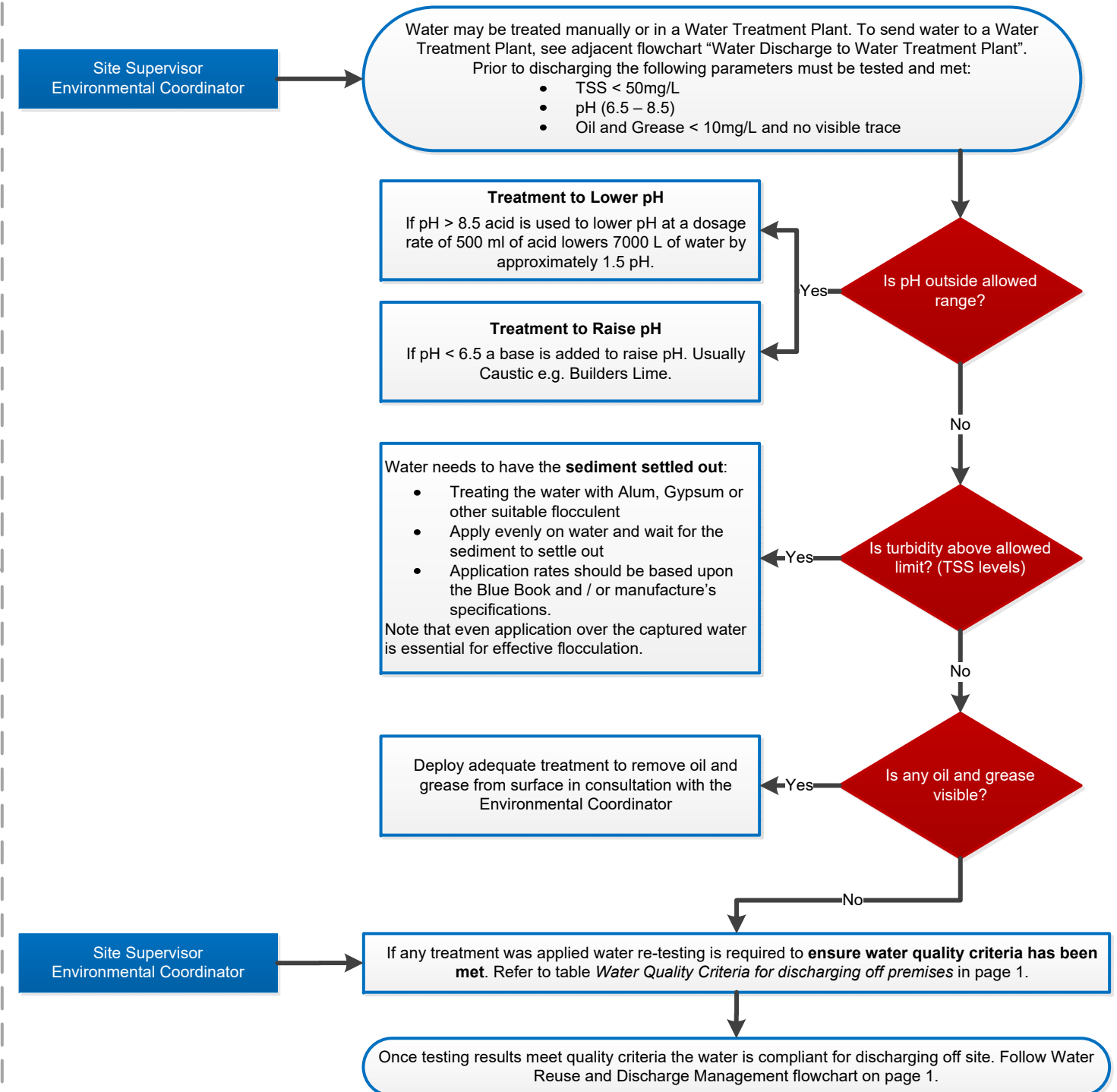
## RESPONSIBILITY

## WATER MONITORING AND SEDIMENT CONTROL ACTIONS

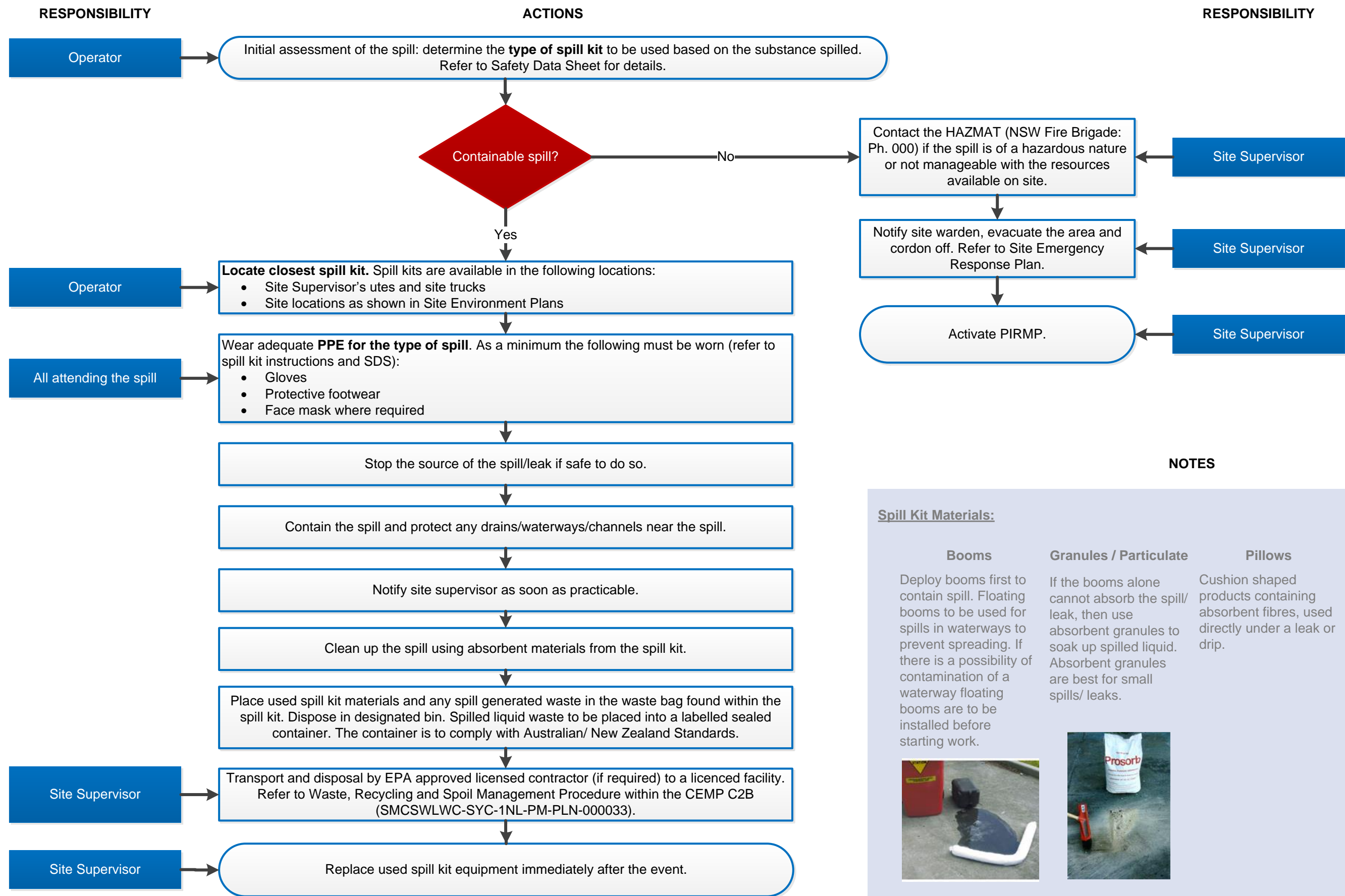


## RESPONSIBILITY

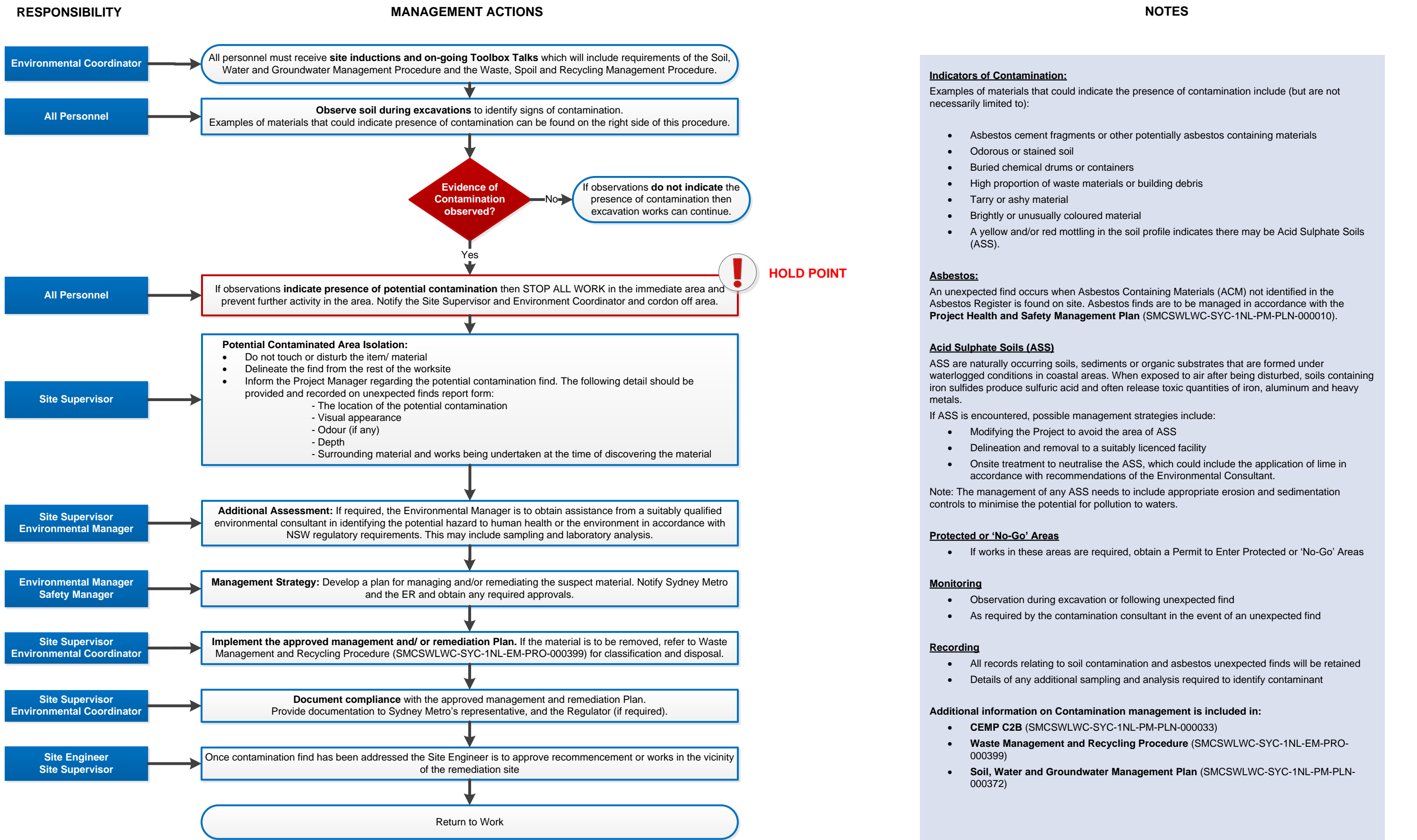
## WATER TREATMENT FOR DISCHARGE OFF PREMISES ACTIONS



# SPILL MANAGEMENT PROCEDURE

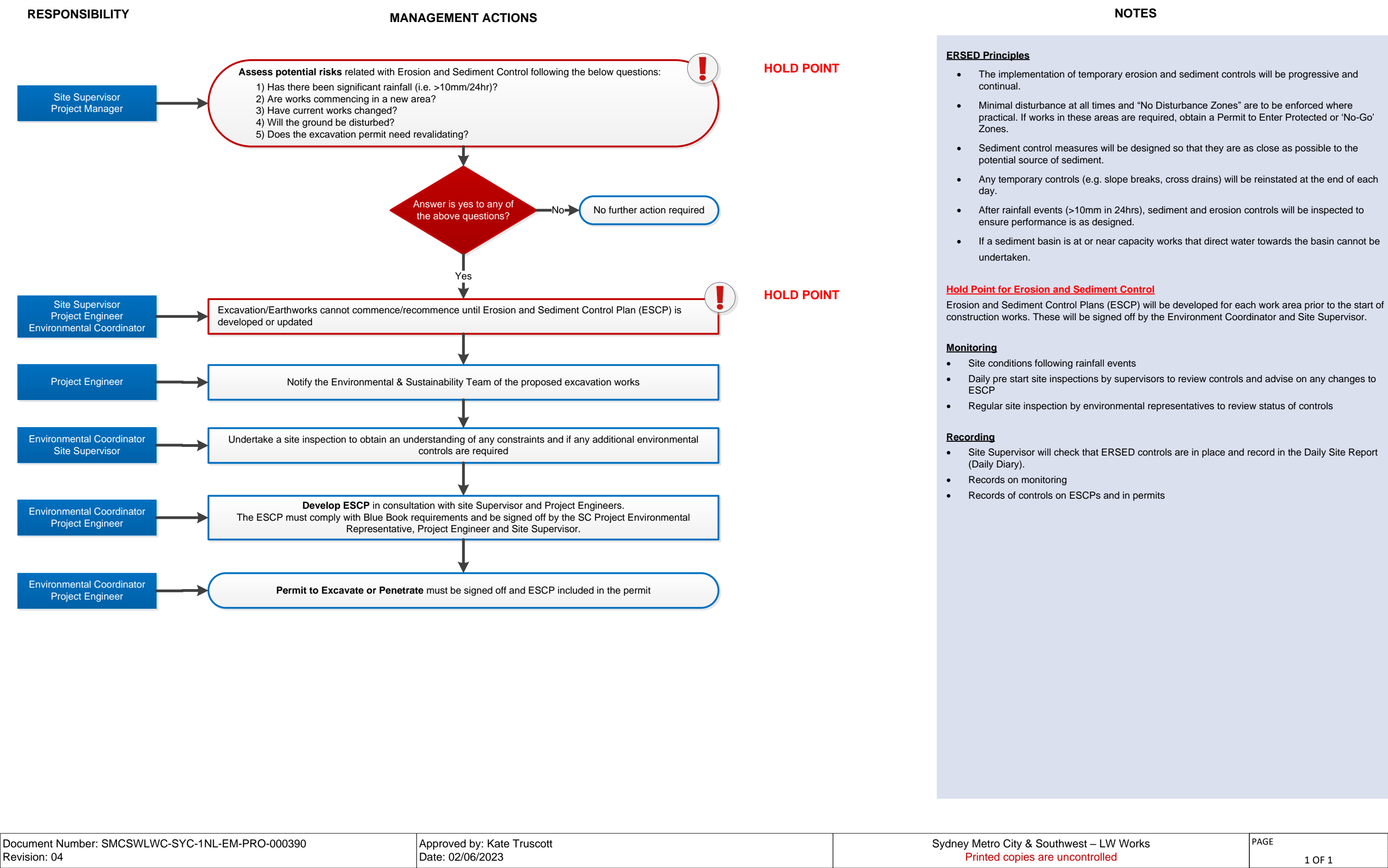


# UNEXPECTED FINDS SOIL CONTAMINATION AND ASBESTOS PROCEDURE

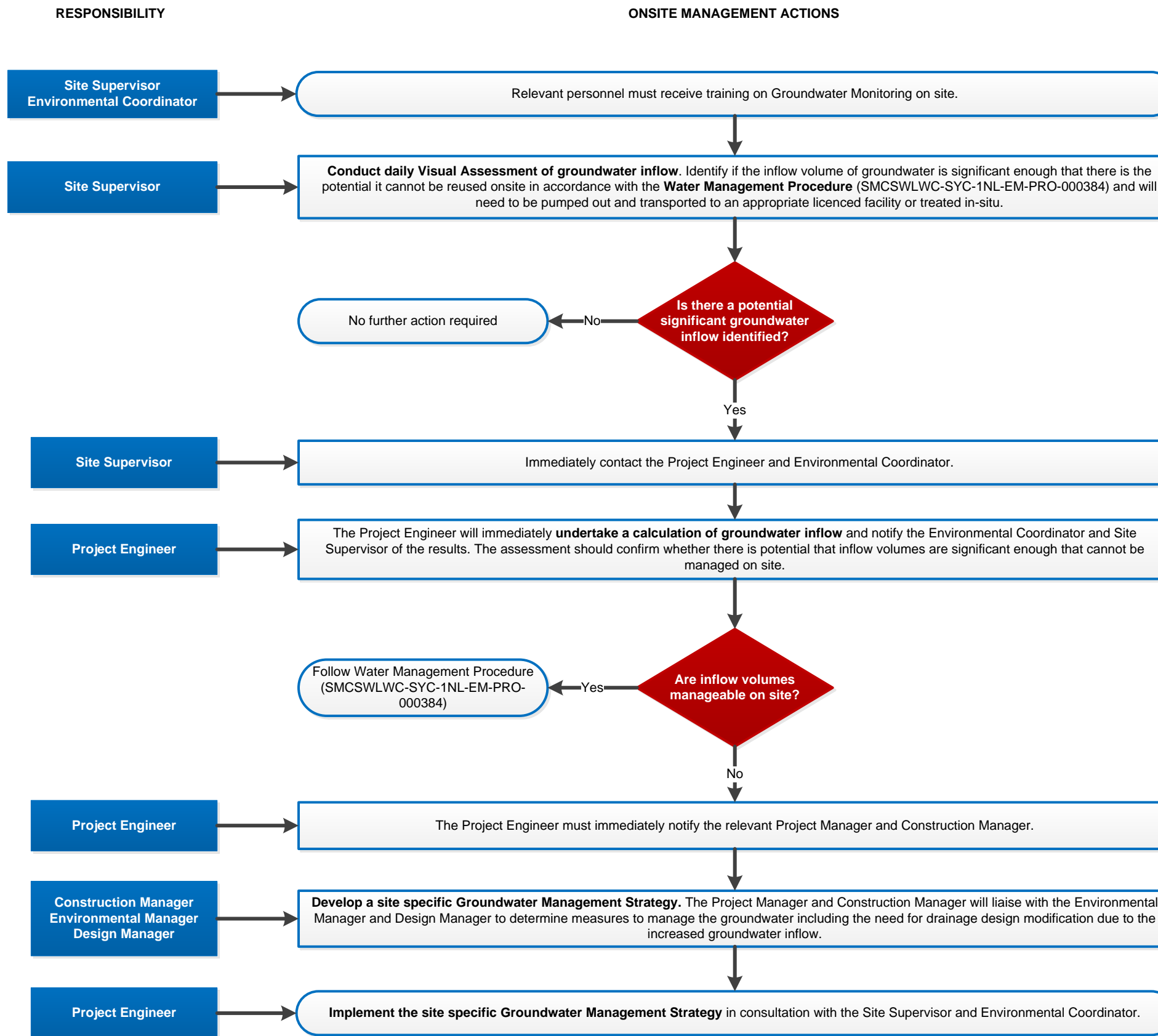




EROSION AND SEDIMENT CONTROL MANAGEMENT PROCEDURE



# CONTINGENCY GROUNDWATER MONITORING AND MANAGEMENT PROCEDURE



## NOTES

### Notes:

- Where water salinity is found to be too high for discharge to creeks, brackish water reverse osmosis would be undertaken.
- Dissolved iron would typically be removed from discharge water by oxidising the Ferric ion (Fe3+) to Ferrous (Fe2+) which enables precipitation and physical removal.
- Water turbidity would typically be treated by settling / filters.
- Iron reducing bacteria in discharge water would be typically treated by biocide dosing.

### Monitoring

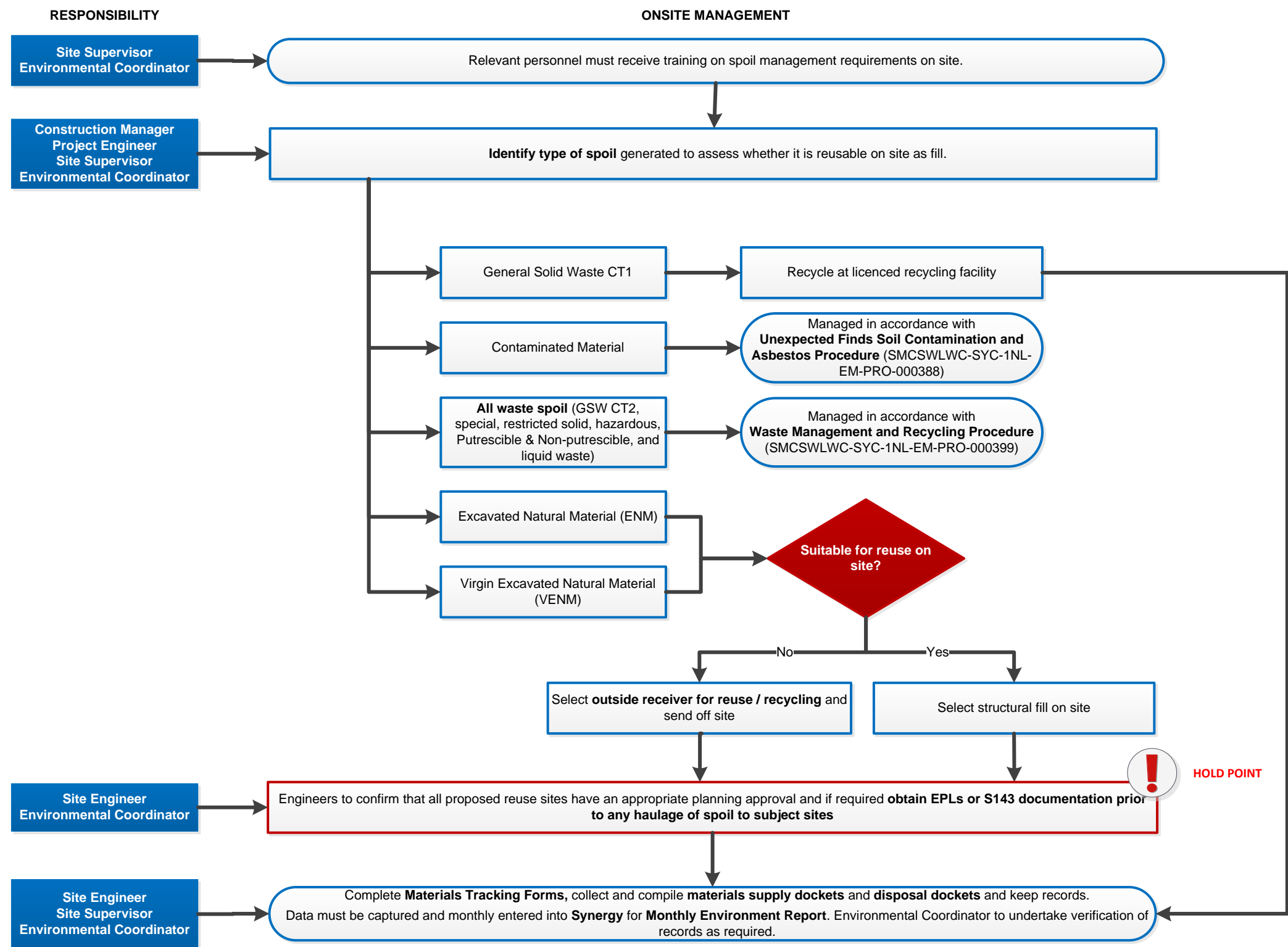
- Visual assessment of actual or potential groundwater inflow
- Dewatering volumes monitored as per Water Management Procedure (SMCSWLWC-SYC-1NL-EM-PRO-000384)

### Recording

- Records of visual inspections in site diaries and Environmental Inspection Checklists
- Records of flow rates and modelling
- Records of any disposal off site

- For Additional information on the requirements for management of ground water refer to the Soil, Water and Groundwater Management Sub-Plan - C2B (SMCSWLWC-SYC-1NL-PM-PLN-000372) or the CEMP C2B (SMCSWLWC-SYC-1NL-PM-PLN-000033).

# SPOIL CLASSIFICATION, REUSE AND RECYCLING PROCEDURE



## Notes:

Where ENM or VENM does not meet criteria for a specific use it may be used as General Fill. ENM or VENM that meets criteria for a specific use but is surplus to requirements may also be used as General Fill.

ENM reuse offsite is subject to the requirements of "The excavated natural material exemption 2014" under the provisions of the Protection of the Environment Operations (Waste) Regulation 2014 – General Exemption under Part 9, Clause 91 and 92.

VENM reuse is subject to the sampling, testing and certification requirements of the receiving site or facility.

## Protected or 'No-Go' Areas

If works in these areas are required, obtain a Permit to Enter Protected or 'No-Go' Areas

## Appendix C3 – Agency Consultation Records

**Document Title: Soil, Water and Groundwater Management Sub-Plan - C2B Rev 0**

Stakeholder	Raised By/Contact	Date	Comment No.	Document reference	Topic	Stakeholder consultation / comment	Project team response	Amendment made, Y/N?	Section	Closed Out
Inner West Council	Alistair Hyde Page	5/12/2019	6		Contamination	Who were the Contamination Specialists engaged to prepare the contamination management, RAP and Acid Sulfate Soil Management Plans?	An appropriately qualified Contamination Consultant will be engaged by the Project.	N	N/A	Y
Inner West Council	Alistair Hyde Page	5/12/2019	7	Appendix C2	Unexpected finds / groundwater monitoring	Will Unexpected Finds and Groundwater Monitoring results be communicated with the Council?	Unexpected finds and groundwater monitoring results will be administered in accordance with the process set out in the Plan and to address any regulatory requirements. <b>Note:</b> Current design indicated that there will be limited interaction with groundwater and there will not be a need to undertake groundwater monitoring.	N	N/A	Y
Inner West Council	Alistair Hyde Page	5/12/2019	8	Appendix C2	Spoil Reuse	Will any spoil reuse or recycling be communicated with Council?	Spoil reuse and recycling would only be communicated to council if reuse involved use of council land (not likely).	N	N/A	Y
Inner West Council	Natalie Pelleri	10/12/2019	15	Section 1.3	Objectives and Targets	1.3 Objectives and Targets should include objectives about water sensitive urban design principles, e.g.:- utilise green infrastructure to reduce pollutants entering- Incorporate 'third pipes' and associated infrastructure for the re-use of grey water for all non-potable water uses- maximise onsite perviousness to allow infiltrationTargets need to include Botany Bay Water Quality Improvement Plan targets for TSS, TN and TP	Water sensitive urban design principles, such as green infrastructure, "third pipes" and maximising perviousness may be considered in the design, not set as targets for construction works. Design requirements for the project have been set by the Scope of Works and Technical Criteria (i.e. the Contract) and in order to achieve the ANZECC Guidelines and to maintain the NSW Water Quality Objectives.Discharge limits for specific pollutants such as TSS are based on ANZECC Guidelines and to achieve compliance with the POEO Act and in accordance with EPLs (when obtained in due course). TN and TP are not pollutants expected to be generated by LW Works. Discharge limits are described in Section 6.2.	N	N/A	Y

Document Title: Soil, Water and Groundwater Management Sub-Plan - C2B Rev 0

Stakeholder	Raised By/Contact	Date	Comment No.	Document reference	Topic	Stakeholder consultation / comment	Project team response	Amendment made, Y/N?	Section	Closed Out
							Stakeholder response to Systems Connect response: "Thanks very much for getting touch to discuss the comments. I have read over the responses and am happy with the content" Natalie Pelleri Inner West Council 20/12/2020			
Inner West Council	Natalie Pelleri	10/12/2019	16	Element 1	Training	1.1 Should include Botany Bay Water Quality Improvement Plan targets and background about local catchments and waterways.	<p>Training for construction management of soil and water is based on prevention of pollution and as such does not include specific targets. Targets such as those referenced in the Water Quality Improvement Plan would be addressed in design reports (as applicable). For your reference CSSI CoA E107 requires that: <i>The CSSI must be constructed and operated so as to maintain the NSW Water Quality Objectives where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW Water Quality Objectives over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the NSW Water Quality Objectives, in which case those requirements must be complied with.</i></p> <p>Stakeholder response to Systems Connect response: "Thanks very much for getting touch to discuss the comments. I have read over the responses and am happy with the content" Natalie Pelleri Inner West Council 20/12/2020</p>	N	N/A	Y

**Document Title: Soil, Water and Groundwater Management Sub-Plan - C2B Rev 0**

Stakeholder	Raised By/Contact	Date	Comment No.	Document reference	Topic	Stakeholder consultation / comment	Project team response	Amendment made, Y/N?	Section	Closed Out
Inner West Council	Natalie Pelleri	10/12/2019	17		Potable Water	Show evidence of proposed methods for reducing reliance on potable water during construction.	<p>The Project has contractual targets to reduce water use by 10% from a base case and demonstrate at least 33% of water used is from non-potable sources (this is captured in Section 1.3 Objectives and Targets). These targets are assessed and captured under the ISCA IS rating scheme and evidence submitted to ISCA. Identification of water saving initiatives is currently ongoing with construction teams. Detailed methods for reducing reliance on potable water during construction are provided in Section 6.3 Water Usage and Reuse.</p> <p>Stakeholder response to Systems Connect response: "Thanks very much for getting touch to discuss the comments. I have read over the responses and am happy with the content" Natalie Pelleri Inner West Council 20/12/2020</p>	N	N/A	Y
City of Canterbury Bankstown	Alvin Fung	4/12/2019	N/A	N/A	N/A	We have reviewed and have no further comments on the following plans: Construction Soil and Water Management Plan (SW&GMP)	Noted	N/A	N/A	N/A
City of Sydney	Elise Webster	N/A	N/A	N/A	N/A	<p>19/11/2019 - Initial submission of SWGMP to City of Sydney Council.</p> <p>2/12/2019 - Elise expressed that if SC does not hear from CoS by due date, then assume that no comments have been made.</p> <p>17/12/2019 - No response received to date.</p> <p>12/02/2020 - MB has sent follow up email to EW from City of Sydney Council.</p> <p>Note: Project briefing held at Council offices 18/04/2019.</p>	No response received as at 12/02/2020	N/A	N/A	N/A



Document Title: Soil, Water and Groundwater Management Sub-Plan - C2B Rev 0

Stakeholder	Raised By/Contact	Date	Comment No.	Document reference	Topic	Stakeholder consultation / comment	Project team response	Amendment made, Y/N?	Section	Closed Out
Willoughby Council	Gordon Farrelly	N/A	N/A	N/A	N/A	19/11/2019 - Initial submission of SWGMP to Willoughby Council.2/12/2019 - AT made follow up call to GF. No response, voicemail indicated that GF was on leave until tomorrow (3/12/2019). Message was left.3/12/2019 - AT made another follow up call to GF. No response, message was left.9/12/2019 - MB called GF to discuss requirement of project to seek consultation on management sub-plans.10/12/2019 - MB emailed GF confirming discussion from yesterday, reminding GF that Systems Connect is targeting feedback from all sub-plans to be received by COB 17/12/2019.10/12/2019 - Gordon passed on plans to others in council that he considers best suited to review and provide feedback. He advised these council members that comments are to be sent directly to MB.17/12/2019 - No response to date.12/02/2020 - MB has sent follow up email to GF from Willoughby Council.	No response received as at 12/02/2020	N/A	N/A	N/A
North Sydney Council	Gavin McConnell	N/A	N/A	N/A	N/A	19/11/2019 - Initial submission of SWGMP to North Sydney Council. 2/12/2019 - Follow up call made by AT. GM believes that there will be minimal impacts, thus they aren't too bothered. They will provide feedback in a couple days. 17/12/2019 - GM responded to initial submission noting that there are no identified objections to the proposed plans and mitigation measures. GM advised that there should be an ongoing dialogue to convey concerns raised and to initiate measures to address concerns as warranted. It was also noted that any surface works, traffic impacts or other discernible impacts should be carried out in a manner that minimises such impacts. 17/12/2019 - MB responded to GM to note and address comments. 17/12/2019 - GM accepted MB response.	Noted	N/A	N/A	N/A

**Document Title: Soil, Water and Groundwater Management Sub-Plan - C2B Rev 0**

Stakeholder	Raised By/Contact	Date	Comment No.	Document reference	Topic	Stakeholder consultation / comment	Project team response	Amendment made, Y/N?	Section	Closed Out
NSW Department of Industry	Ellie Randall	N/A	N/A	N/A	N/A	1/11/2019 - Ellie Randall declined invitation to Stakeholder Consultation briefing held on 6/11/2019.19/11/2019 - Sent originally to Ryan Shepherd. Ryan had responded by instructing MB to send to Ellie Randall. Plan was then sent to Ellie Randall on 20/11/2019. No response since. No contact number was given for Ellie Randall, only email. Have tried to get hold of contact number, no response.12/02/2020 - MB has sent a follow up email to Ellie Randall from DoI. Note: Did not attend Project Regulatory Stakeholder briefing held 06/11/19. Two representatives from DPI Fisheries did attend the briefing.	No response received as at 12/02/2020	N/A	N/A	<b>N/A</b>
EPA*	Claire Miles	23/12/2019	N/A	N/A	N/A	<p>SWGMP was issued to EPA on 19/11/2019. Note: Did not attend Project Regulatory Stakeholder briefing held 06/11/19. Follow-up email sent on 18/12/2019.</p> <p>23/12/2019 - CM from EPA responded via email.</p> <p>CM advised that it is not EPA policy to approve or endorse management plans. The EPA's role is to set environmental objectives/requirements for environmental management, rather than being directly involved in the development of strategies to achieve those objectives/requirements.</p> <p>You may however wish to submit the NVMP and SWGM Sub Plan, or parts thereof, as supporting information for any future applications for an Environment Protection Licence (EPL) that may be required.</p>	Noted	N/A	N/A	<b>N/A</b>

Document Title: Soil, Water and Groundwater Management Sub-Plan - C2B Rev 0

Stakeholder	Raised By/Contact	Date	Comment No.	Document reference	Topic	Stakeholder consultation / comment	Project team response	Amendment made, Y/N?	Section	Closed Out
Natural Resources Access Regulator (DPI Water)	Ryan Shepherd/ Alison Collaros	N/A	N/A	N/A	N/A	21/10/2019 - Initial phone call to Ryan Shepherd to invite him to Stakeholder Consultation workshop. RS is on leave until tomorrow.22/10/2019 - Follow up email sent to Ryan regarding workshop. 23/10/2019 - RS advised he no longer works in this area and to contact Alison Collaros at alison.collaros@nrar.nsw.gov.au28/10/2019 - Initial invitation sent to regulatory stakeholders for the Stakeholder Consultation workshop.1/11/2019 - AC declined invitation to workshop.19/11/2019 - Plan sent to Allison Collaros.17/12/2019 - No response to date. 12/02/2020 - MB has sent follow up email to AC from DPI Water.	No response received as at 12/02/2020	N/A	N/A	N/A
NSW Fire and Rescue	<a href="mailto:firesafety@fire.nsw.gov.au">firesafety@fire.nsw.gov.au</a>	N/A	N/A	N/A	N/A	1/11/2019 - Email sent to NSW Fire and Rescue to invite them to the Regulatory Stakeholder Consultation workshop. 4/11/2019 - NSW Fire and Rescue admin forwarded request to John Hawes and David Absalom. JH responded advising that Fire Safety will not be sending a representative, but local Zone Management can attend. 6/11/2019 - NSW Fire and Resuce representative Graeme Turnbull attended stakeholder workshop. 19/11/2019 - Initial submission of SWGMP to NSW Fire and Rescue. 5/12/2019 - Follow-up email sent to NSW Fire and Rescue . Was contacted by admin, who advised the due to state of emergency, the Project probably won't get a response. No direct contact number could be given for Graeme Turnbull or others. Email has been sent to GT. Have tried to source GT's number internally through SC, however, was unsuccessful.	No response received as at 12/02/2020	N/A	N/A	N/A

Stakeholder	Raised By/Contact	Date	Comment No.	Document reference	Topic	Stakeholder consultation / comment	Project team response	Amendment made, Y/N?	Section	Closed Out
Office of Environment and Heritage (OEH) Soil & Water	Greg Davis	N/A	N/A	N/A	N/A	21/10/2019 - AT phoned GD and other stakeholders to verbally invite them to the Stakeholder Consultation Briefing and to ask for a preferred date (1st Nov or 6th nov). GD verbally confirmed he would be able to attend.22/10/2019 - Invitation to Stakeholder Consultation workshop was sent out to all relevant Systems Connect and Sydney Metro staff and all regulatory stakeholder (excluding councils), which is to occur on 6/11/2019.22/10/2019 - GD accepted the invitation and requested if this related to Metro West Project (clarification was sent to GD).25/10/2019 - GD advised that no one from his office will be attending the meeting at this stage and declined invitation.19/11/2019 - Submission of SWGMP to OEH.17/12/2019 - No response to date. 12/02/2020 - MB has sent follow up email to GD from OEH (Soil and Water).	No response received as at 12/02/2020	N/A	N/A	N/A
State Emergency Service*	Daniel Kenner/ Allison Slaxman/ Amy Lovesey	19/12/2019	N/A	N/A	N/A	11/12/2019 - Contacted SES 138 737 and asked to be passed onto Daniel Kenner (not in role anymore). Daniel sent contact for Allison Slaxman, she will have someone review before end of next week - plan sent to Allison today. Message bounced back. Reattempt tomorrow. 13/12/2019 - Message still bouncing back despite discussing with Allison over the phone. Plan has been sent to mtz.ops@ses.nsw.gov.au as requested by Allison. 19/12/2019 - Email from Amy Lovesey was sent to AT confirming SES have no comments on the plan.	Noted	N/A	N/A	N/A

Note: Revision C updates are coloured beige.  
Stakeholder with an asterisk\* identifies that this response was received between re-issue to Sydney Metro and submission to DPE for approval.

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Tristan McCormick  
Environmental Advisor  
Line Wide Works Project  
Systems Connect  
Level 3, 116 Miller Street  
NORTH Sydney NSW 2060.

3 October 2023

Ref: 170108(m) SWGMSP C2B Rev 5 & 6

Dear Tristan

**RE: Approval of Minor Amendments to Soil, Water and Groundwater Management Sub-Plan C2B Revisions 5 and 6**

Thank you for providing, for Environmental Representative (ER) review and approval in accordance with MCoA A24(j) of SSI 15\_7400 and MCoA A26 (i) of SSI 8256, the amended Soil, Water and Groundwater Management Sub-Plan C2B (SWGMSP) titled *Soil, Water and Groundwater Management Sub-Plan C2B*, Document No SMCSWLWC-SYC-1NL-PM-PLN-000372 Revisions 5 and 6 dated 04/08/2023 and 27/09/2023.

As an approved ER for the Sydney Metro City Southwest Project, I have reviewed the following proposed minor amendments, as a consequence of the scheduled review of the plan and procedures. The following sections/tables of the SWGMSP are being amended under this RfMA:

- a) Minor updates to address SM/ER comments on scheduled review, update to address EPA licence variations, typos and DPIE references to DPE (refer associated comments register)
- b) Update to Section 1.5.1 - Staging Reports
- c) Update to Section 1.5.2 – Interface
- d) Update to Section 3.1 (Table 4) – Inclusion of “or delegate”
- e) Update to Section 4.1.8 (Flooding) – updated to align with Section 6.4
- f) Update to Section 4.2.3 (Groundwater) - Updated investigations completed
- g) Update to Section 4.2.4 (Soil Salinity) – Updated soil testing completed
- h) Update to Section 4.2.9 (Contamination) – Updated waste classification
- i) Update to Section 6.2.2 – Reference to EPL condition M2 included and Table 14 updated in line with EPL concentration limits and
- j) Update to Section 6.5 – Groundwater Management
- k) Update to Section 6.8 (Contamination Management) and Section 6.8.3 (Saline Soils)

- l) Update to Section 6.9.6 (Monitoring Frequency and Location) and Table 17 - removal of wording around takeover of WTPs; removal of Chatswood WTP and sediment basin; removal of SMTF S open excavations and sediment basin and removal of Artarmon Substation open excavations from monitoring schedule;
- m) Update to Tables 16 and 18 – Monitoring locations, EPL criteria and removal of CHW WTP from surface water quality monitoring sites and locations;
- n) Update to Table 19 – Removal of Chatswood, Martin Place and Waterloo water treatment systems that are no longer used by SC. Updated to include Marrickville’s Discharge Point 3
- o) Inclusion of Section 6.11 – Settlement Monitoring
- p) Update to Table 5 – Inclusion of Sydney Steel Road and Blues Point Streetscaping scope
- q) Update to Table 7 – Outcome of investigations included for Artarmon and Surry Hills
- r) Update to Element 4 - REMMs FH2 and FH3 TSE handover status updated, and MCoAs E61 and E63 included
- s) Update to SWGMSP Compliance Matrix – inclusion of MCoA E61 and E63

In my opinion, the proposed changes are minor amendments as defined in Section 1.5 of the Construction Environmental Management Plan – C2B. On this basis, I approve the amended *Soil, Water and Groundwater Management Sub-Plan C2B* Revision 6 (dated 27 September 2023) for implementation.

Yours sincerely



Swathi Gowda  
Environmental Representative – Sydney Metro, City and South West