Appendix B5 SGWPW-JHSW-NWW-PM-PLN-000520 Contaminated Aquatic Sediments in Alexandra Canal Management Sub Plan SSI 9737

Sydney Gateway Road Project January 2022

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SYDNEY GATEWAY

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- Appendix B Construction staging information (preliminary only)
- Appendix C Site Auditor Interim Audit Advice
- Appendix D EWMS and Environmental Control Plan



Document control

Approval and authorisation

Title	Contaminated Aquatic Sediments in Alexandra Canal Management Sub Plan
Endorsed by Environment Representative	Cameron Weller Hutchison Weller Pty Ltd
Signed	
Dated	27/01/2022
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1	Transport for New South Wales	
2	Independent Verifier	
3	Environmental Representative	
4	Project Director	
5	Environment and Sustainability Manager	
6	Quality Manager	



Glossary/ Abbreviations

Abbreviations	Expanded text
ASS	Acid Sulfate Soils
СЕМР	Construction Environmental Management Plan
СоА	Conditions of Approval
CASACMP	Contaminated Aquatic Sediments in Alexandra Canal Management Sub Plan
CSSI	Critical State Significant Infrastructure
DBG	Densely Graded Base
DGVs	Default Guideline Values
DPIE	NSW Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
ENM	Excavated Natural Material
EPL	Environmental Protection License
EPA	NSW Environment Protection Authority
EWMS	Environmental Work Method Statements
JHSWJV	John Holland Seymour Whyte Joint Venture
MDP	Major Development Plan
РАН	Polycyclic Aromatic Hydrocarbons
РСВ	Polychlorinated Biphenyls
PFAS	Per- and Polyfluoroalkyl Substances
SWTC	Scope of Works and Technical Criteria
SWMP	Soil and Water Management Sub Plan
TfNSW	Transport for NSW (formerly Roads and Maritime Services)
TSS	Total Suspended Solids
UMMs	Updated Mitigation Measures
VENM	Virgin Excavated Natural Material

1 Introduction

1.1 Context

This Contaminated Aquatic Sediments in Alexandra Canal Management Sub Plan (CASACMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for Design and Construction of Sydney Gateway Project (the Project).

This Plan has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the environmental management measures listed in the Project's combined Environmental Impact Statement (EIS) / Major Development Plan (MDP), Updated Mitigation Measures (UMMs) from the Response to Submissions Report and all applicable legislation and Transport for New South Wales (TfNSW) requirements.

Prior to carrying out any works or activities that would disturb the bed sediments of Alexandra Canal, NSW EPA requires a written plan to be prepared and submitted for EPA's approval, outlining how disturbance of bed sediments and migration of contaminated sediments will be minimised. This plan meets the purposes of the written plan required under Remediation Order (23004; Refer Appendix A) and will be submitted to NSW EPA on behalf of Sydney Water, for NSW EPA's approval.

Note – this Plan has been developed specifically for works and impacts occurring within NSW State land under approval SSI 9737, which is administered by the NSW Department of Planning, Industry and Environment (DPIE).

1.2 Environmental management systems overview

The environmental management system overview is described in Section 1.5 of the CEMP. The environmental management system also incorporates the project specific CEMP and sub-plans, strategies, procedures and environmental work method statements (EWMS). The environmental management system clearly identifies required environmental management actions for implementation by John Holland Seymour Whyte Joint Venture (JHSWJV) personnel and contractors.

1.3 Background

1.3.1 Background

Transport for NSW (TfNSW) have gained approval to deliver a high capacity road connection linking the Sydney motorway network at St Peters interchange with Sydney Airport's domestic and international terminals and the Port Botany Precinct. The Project is located on both State and Commonwealth land.

For areas on State land, the Project was declared to be critical State significant infrastructure (CSSI) under the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) and was approved by the NSW Minister for Planning and Public Spaces on 27 August 2020.

Commonwealth approval under the *Airports Act 1996* (the *Airports Act*) was granted by the Australian Minister for Infrastructure, Transport and Regional Development on 23 September 2020.

John Holland Seymour White Joint Venture (JHSWJV) have been contracted by Transport for New South Wales (TfNSW) for the Design and Construction of the Project.

1.3.2 Project Objectives

The primary objective of the Project is to support sustainable growth in the economy and cater for projected increases in passengers and freight demand. This will be achieved by improving



connectivity between the regional growth and freight distribution centres in western Sydney and the Sydney Airport and Port Botany area. The objectives of the Project are to:

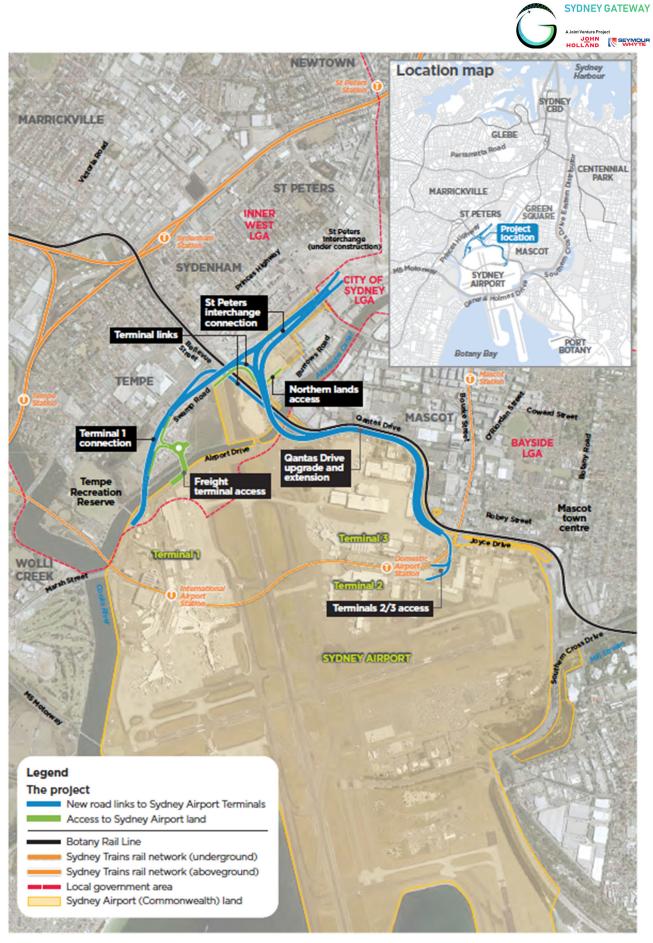
- Improve connectivity to Sydney Airport terminals by providing high capacity direct road connections that cater for forecast growth in passenger and air freight volumes.
- Support the efficient distribution of freight to and from Sydney Airport and Port Botany to logistic centres in Western Sydney.
- Improve the liveability of Mascot town centre by reducing congestion and heavy vehicle movements on the local road network.

1.3.3 Detailed Description

The Project is located about eight kilometres south of the Sydney Central Business District, in the suburbs of Tempe, St Peters and Mascot. It sits within the boundaries of the Inner West, City of Sydney and Bayside local government areas.

The key features of the Project are illustrated in Figure 1-1, which include:

- Road links to provide access between the Sydney motorway network and Sydney Airport's terminals, consisting of the following components:
 - St Peters interchange connection a new elevated section of road extending from St Peters interchange to the Botany Rail Line, including an overpass over Canal Road.
 - Terminal 1 connection a new section of road connecting Terminal 1 with the St Peters interchange connection, including a bridge over Alexandra Canal and an overpass over the Botany Rail Line.
 - Qantas Drive upgrade and extension widening and upgrading Qantas Drive to connect Terminals 2/3 with the St Peters interchange connection, including a high-level bridge over Alexandra Canal.
- Terminal links two new sections of road connecting Terminal 1 and Terminals 2/3, including a bridge over Alexandra Canal.
- Terminals 2/3 access a new elevated viaduct and overpass connecting Terminals 2/3 with the upgraded Qantas Drive.
- Road links to provide access to Sydney Airport land:
 - A new section of road and an overpass connecting Sydney Airport's northern lands on either side of the Botany Rail line (the northern lands access)
 - A new section of road, including a signalised intersection with the Terminal 1 connection and a bridge, connecting Sydney Airport's existing and proposed freight facilities on either side of Alexandra Canal (the freight terminal access)
- An active transport link, about 3 kilometres long and located along the western side of Alexandra Canal and section along Qantas Drive, to maintain connections between Sydney Airport, Mascot and the Sydney central business district.
- Intersection upgrades and/or modifications.
- Construction of operational ancillary infrastructure including maintenance bays, new and upgraded drainage infrastructure, signage and lighting, retaining walls, noise barriers, flood mitigation basin, emplacement mounds, utility works and landscaping.





A Joint Venture Project

2 Purpose and objectives

2.1 Purpose

The purpose of this Plan is to describe how JHSW JV proposes to manage work in the Alexandra Canal and to ensure, in accordance with remediation order (Ref 23004), disturbance to the bed sediments is minimised.

2.2 Scope

The Project has been designed to minimise disturbance of the Alexandra Canal bed sediments, wherever possible. New stormwater drainage and construction of the bridge abutments associated with the Project will connect into Alexandra Canal. This Plan provides the mitigation measures and management techniques to be implemented in order to maintain compliance. The management and monitoring of surface water is detailed in the Soil and Water Management Sub Plan with site specific details (including preparation of erosion and sediment control plans and environmental work method statements) to be implemented for these works in the Canal to minimise disturbance of bed sediments.Waste removal associated with the works in and adjacent to the Canal (including removal of contaminated aquatic sediment) will be managed in accordance with the Construction Waste Management Plan prepared in accordance with the Environment Protection Licence (EPL) # 21524.

If Acid Sulphate Soils (ASS) are encountered these will be managed in accordance with the ASS Management Plan included in the SWMP.

2.3 Objectives

The key objective of this Plan is ensure all requirements relevant to works within Alexandra Canal are captured, scheduled and assigned responsibility as outlined in:

- The combined EIS / MDP prepared for the Sydney Gateway Project.
- Conditions of Approval for SSI 9737 issued by the Minister for Planning and Public Spaces (NSW) on 27 August 2020.
- UMMs detailed in the Response to Submissions Report.
- Roads and Maritime specifications G36, G38 and G40.
- The Project's Environmental Protection Licence (EPL # 21524).
- Relevant legislation and other requirements described in **Section 3.1** of this Plan.
- The objectives and actions required by the remediation order (Ref. 23004) that applies to the Alexandra Canal (**Appendix A**).

2.4 Targets and performance outcomes

The following targets have been established for the management of works within Alexandra Canal during the delivery of the Project. To achieve this outcome, JHSWJV will meet the targets as outlined below:

- Compliance with the relevant legislative requirements, CoA and UMM.
- Meet EPL requirements.
- Provide training in the form of inductions to relevant Project personnel relating to works in Alexandra Canal, before they begin work on site.



- Ensure compliance with remediation order (Ref. 23004) that applies to the Alexandra Canal.
- Minimise the potential for generation of ASS and therefore minimise the potential creation of sulfuric acid as a product of ASS.

The performance outcomes relevant to contaminated aquatic sediments in Alexandra Canal (as identified in Chapter 27.4 Compilation of performance outcomes of the EIS/MDP) are detailed in Table 2-1.

Table 2-1 – Environmental performance targets and outcomes

No.	Performance Outcomes	Where addressed
1	Existing contamination is managed in accordance with relevant regulatory requirements.	This Plan has been developed to comply with the requirements in the remediation order for the Alexandra Canal to ensure disturbance to the contaminated bed sediments from construction is minimised.



3 Environmental requirements

3.1 Relevant legislation and guidelines

3.1.1 Legislation

All legislation relevant to this Plan is included in Table 3-1 below. It should also be noted that the remediation order was issued under the *Contaminated Land Management Act* 1997.

Act	Requirement	Reference
Protection of the Environment Operations Act 1997	<i>Environment</i> <i>Operations Act</i> <i>authority of a licence or regulation.</i> (However it is not a land pollution offence to place virgin excavated natural	
Protection of the Environment Operations Act 1997	A person who pollutes any waters is guilty of an offence	S120
Contaminated Land Management Act 1997	 Notify the EPA if: Contaminants exceed thresholds contained in guidelines or the regulations where contamination has entered or will foreseeably enter neighbouring land, the atmosphere, groundwater or surface water Contaminants in soil are equal to or exceed guideline levels with respect to the current or approved use of the land. Contamination meets other criteria that may be prescribed by the regulations. 	S60
Contaminated Land Management Act 1997	A remediation order (number 23004) was issued by the NSW EPA to Sydney Water on 10 May 2004.	Refer to Section 4.2.1 below for details

3.1.2 Guidelines and standards

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

- Acid Sulfate Soil Manual (ASSMAC 1998).
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (2004).
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018).
- Guidelines for Consultants reporting on contaminated Land: Contaminated land guidelines (NSW EPA 2020)

- Guidelines for Controlled Activities on Waterfront Land Riparian corridors (Department of Industry, 2012).
- Guidelines for Instream Works on Waterfront Land (Department of Primary Industries, Office of Water, 2012).
- Guidelines for Watercourse Crossings on Waterfront Land (Department of Primary Industries, Office of Water, 2012).
- Guidelines for Outlet Structures on Waterfront Land (Department of Primary Industries, Office of Water, 2012)
- Guidelines for Laying Pipes and Cables in Watercourses on Waterfront Land (Department of Primary Industries, Office of Water, 2012).
- Managing Urban Stormwater: Soils and Construction. Landcom, (4th Edition) March 2004 (reprinted 2006) (the "Blue Book"). Volume 1 and Volume 2.
- National Acid Sulfate Soils Guidance (DAWE 2018)
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (amended 2013).
- PFAS National Environmental Management Plan (HEPA 2020).
- Roads and Maritime QA Specification G36 Environmental Protection (Management System).
- Roads and Maritime QA Specification G38 Soil and Water Management (Soil and Water Management Plan).

3.2 Water Quality trigger values for Alexandra Canal

The ANZG (2018) guidelines adopt a risk-based approach that uses trigger values that can be modified to be applicable to regional, local or site-specific guidelines. The trigger values are the criteria used for concentrations that, if exceeded, would indicate a potential environmental problem, and so 'trigger' a management response. **Table 3-2** below provides indicative site-specific water quality trigger values for Alexandra Canal for short term monitoring. These values will be used for monitoring as detailed in Section 7.3 of this Plan and are based upon the baseline water quality monitoring completed for the EIS/MDP and Submissions Report.

Pollutants	Unit	Trigger Value
Aluminium (Filtered)	μg/L	27.4
Arsenic (Filtered) #	μg/L	30
Barium++	mg/L	2
Boron+	μg/L	5,100
Cadmium (Filtered)*	μg/L	36
Chromium (CrVI) (Filtered)*	μg/L	85
Copper (Filtered)*	μg/L	8
Cobalt (Filtered)	μg/L	150
Iron (Filtered)	μg/L	48.8
Lead (Filtered)*	μg/L	4.4
Manganese (Filtered)	μg/L	20.26
Mercury (Filtered)**	μg/L	0.40

Table 3-2 Water quality trigger values for Alexandra Canal



Pollutanto	Unit	
Pollutants		Trigger Value
Nickel (Filtered)*	μg/L	560
Zinc (Filtered)*	μg/L	55.6
pH (Lab)*	pH units	7.0-8.5
Total Suspended Solids (TSS)	mg/L	15.2
Turbidity	NTU	11.48
Bicarbonate Alkalinity as CaCO ₃	mg/L	124
Ammonia (as total ammonia NH₃-N)	mg/L	1.7
Nitrate (as N) [#]	mg/L	10
Nitrite (as N) #	mg/L	0.10
Total Nitrogen (as N)	mg/L	0.90
Total Phosphorus (as P)	mg/L	0.07
PFOA^	µg/L	220
PFOS^	μg/L	0.13
TPH – C6-C9 fractions+++	µg/L	150
TPH – Mineral Oil (>C9 fractions)+++	μg/L	600
F2- Naphthalene	mg/L	120
Ethylbenzene	μg/L	250
Total Xylenes +	μg/L	625
p- Xylene +	μg/L	200
m- Xylene +	μg/L	75
o- Xylene +	μg/L	350
Naphthalene +	µg/L	70
Anthracene +	μg/L	0.4
Phenanthrene +	µg/L	2
Fluoranthene +	µg/L	1.4
Benzo (a) pyrene +	μg/L	0.2

Notes:

The above table, sourced from Appendix E of the Response to Submissions Report, contains pollutants that have not been detected in the surface or groundwater monitoring but which are potential contaminants of concern if detected in future monitoring data. Trigger values for all watercourses should be revised as future monitoring data is collected.

*80th percentile site monitoring value is lower than 80% protection level for aquatic ecosystems

**Bioaccumulative toxin 95% protection level was above the 80th percentile monitoring value

[#] No separate aquatic ecosystems values available and ANZG (2018) default trigger values are higher than 80th percentile value so ANZG (2018) default trigger values is adopted

[^]No values recommended in ANZG (2018) as they are under development, values adopted from the PFAS National Environmental Management Plan 2.0 (2020) instead

+Low reliability trigger values from ANZG (2018) adopted

++Australian Drinking Water Guidelines (NHMRC, 2018) trigger value adopted in absence of value available from ANZG (2018)

+++Airports (Environment Protection) Regulations 1997 freshwater trigger values adopted in absence of values available from ANZG (2018) and monitoring data.



3.3 Conditions of Approval – SSI 9737

The Conditions of Approval (CoA) relevant to this Plan are listed in **Table 3-3** below. A cross reference is also included to indicate where the condition is addressed in this Plan or other Project management documents.

Table 3-3 Conditions of Approval relevant to the CASAC

Source	Requirement	How addressed
CoA C5(d)	The following CEMP sub-plans must be prepared in consultation with the relevant agencies identified for each CEMP sub-plan. Details of all information requested by an agency during consultation must be included in the relevant CEMP sub-plan, including copies of all correspondence from those agencies.	Details on consultation associated with this Plan are provided in Section 3.5
	Required CEMP sub-plan Relevant agencies to be consulted for each CEMP sub-plan	
	(d) Contaminated aquatic sediments Sydney Water in Alexandra Canal	
CoA C6	The CEMP sub-plans must state how:	
	(a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;	The performance measures are detailed in Section 2.4 of this Plan.
	(b) the mitigation measures identified in the documents listed in Condition A1 will be implemented;	Mitigation measures are detailed in Section 6 of this Plan.
	(c) the relevant terms of this approval will be complied with; and	Section 3 outlines the relevant conditions for this Plan.
	(d) issues requiring management during construction, as identified through ongoing environmental risk analysis, will be managed.	Potential construction works are identified in Section 5 of this Plan and mitigation measures are detailed in Section 6 of this Plan. Ongoing risk assessment will be



Source	Requirement	How addressed
		undertaken as identified in Section 5 of this Plan.
CoA C8	The Contaminated Aquatic Sediments in Alexandra Canal CEMP sub-plan must: (a) detail how work in Alexandra Canal will be managed;	Preliminary design and construction information is contained within Appendix B of this Plan. Management measures associated with these works are included in Section 6.
	(b) be in accordance with the Remediation Order (Ref. 23004) that applies to the Canal; and	A copy of the Remediation Order is provide din Appendix A of this Plan and is discussed in Section 4.2.1. A compliance table as also been included in Section 4.2.1
	(c) include evidence than an accredited EPA Site Auditor has reviewed the sub-plan and has issued an interim audit advice or a Section B Site Audit Statement regarding the appropriateness of the sub-plan.	The Interim Audit Advice is contained within Appendix C of this Plan.
CoA C9	Any variations to the Landfill Leachate, Gas and Odour CEMP sub-plan and Contaminated Aquatic Sediments in Alexandra Canal CEMP sub-plan must be approved in writing by the EPA accredited Site Auditor and evidence of the approval submitted to the Planning Secretary for information with the amended sub-plan.	The process of updates and amendments to this Plan area detailed in Section 8.2
CoA E98	New or modified drainage outlets to Alexandra Canal must be designed, in consultation with Sydney Water, to minimise the potential for scour and mobilisation of bed sediments in accordance with the requirements of Remediation Order (Ref 23004),	Consultation with Sydney Water (including on the design) is detailed in Section 3.5 of this Plan.
		Preliminary design information is contained within Appendix B of this Plan for context only, and the Final Design / AFC will be as agreed with Sydney Water under their approval process.



3.4 Other requirements relevant to the development of this Plan

Other requirements detailed in the EIS/MDP, Updated Mitigation Measures (UMMs) from the Submissions Report and relevant TfNSW Specifications (G36, 38 and 40) are detailed in **Table 3-4** below. This includes reference to where the condition is addressed in this Plan or other Project management documents.

Source	Requirement	How addressed
UMM – SW3	Appropriate treatment measures, including water sensitive urban design, will be considered in the detailed design with the aim of improving water quality within Alexandra Canal and/or achieving the targets outlined in the Botany Bay and Catchment Water Quality Improvement Plan (Sydney Metropolitan Catchment Management Authority, 2011)	The bridge designs are considered as part of the Place, Design and Landscape Plan in accordance with CoA E76.
UMM – CS11	A plan of management will be developed in accordance with the remediation order and implemented to manage work within Alexandra Canal and minimise the disturbance and migration of contaminated sediments. The plan will identify specific methodologies to minimise disturbance and dispersion of potentially contaminated sediments.	This Plan has been developed to comply with this requirement Section 3.5 of this Plan details the consultation required for this Plan.
UMM SW2	Discharge outlets will be designed with appropriate energy dissipation and scour protection measures to minimise the potential for scour. Scour protection will be developed in consultation with relevant stakeholders, including Sydney Water.	The drainage design reports for the Project consider use of scour protection for permanent works. Designs for the modified drainage outlets to Alexandra Canal and for construction of the bridge abutments are currently being developed (preliminary information is provided in Appendix B for context only).
DPI, 2012	All works within or adjacent to waterways should be managed in accordance with the DPI's guidelines for Controlled Activities on Waterfront Land.	The relevance of this guideline is covered in Sections 3 & 6 of this Plan.

Table 3-4 Other environmental requirements relevant to this Plan



3.5 Consultation

This Plan has been provided to Sydney Water for review and comment in accordance with CoA C5(d) and will also be provided to the EPA Accredited Site Auditor for review with a request to subsequently issue an interim audit advice confirming the suitability of the proposed controls as well as the appropriateness of the plan in accordance with CoA C8. Once the interim audit advice is received, the Plan will be provided to the ER for endorsement and DPIE for approval in accordance with the requirements of CoA C3 of the Planning Approval.

Separately, the Remediation Order (Ref 23004), held by Sydney Water, requires EPA's approval of a written plan directed at minimising the disturbance and migration of contaminated sediments at the site. For the purposes of complying with this requirement, this Plan will be submitted to the EPA for approval under the Remediation Order.

Designs for the modified drainage outlets to Alexandra Canal and for construction of the bridge abutments are currently being developed (preliminary information is provided in **Appendix B** for context only). These will be submitted to Sydney Water for review and approval in accordance with the Building Over and Adjacent Submissions. The design incorporates design criteria and measures required to minimise the potential for scour and mobilisation of bed sediments in accordance with the requirements of remediation order (CoA E98).

The relevant design packages include the drainage designs; bridge and road works packages for works over Alexandra Canal, and temporary works packages for the drainage outlets and piling platforms.



4 Existing environment

4.1 Background

The Alexandra Canal was constructed through dredging and canalisation of Sheas Creek, which formed a natural tributary to the Cooks River. It is owned and operated by Sydney Water Corporation and is listed on the State Heritage Register.

The Alexandra Canal is approximately 4 kilometres long from Huntley Street to Cooks River, and approximately 40-60 metres wide and an average of 3 metres deep along its length. The canal discharges into the Cooks River near the north-western corner of Sydney Airport, which then discharges into Botany Bay to the west of Sydney Airport. The tides in Alexandra Canal and the Cooks River estuary are semi-diurnal, characterised by two low tide and two high tide conditions per day.

Alexandra Canal has been subject to discharge and runoff from the numerous industries and other land uses located along the canal since the late 1800s. This has led to the bed sediments of the canal being highly contaminated.

4.2 Contamination

4.2.1 Remediation Order

The Alexandra Canal was declared a remediation site (number 21008) on 25 August 2000 by the NSW EPA, due to bed sediments being contaminated with organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and metals. A remediation order (number 23004) was issued by the NSW EPA to Sydney Water on 10 May 2004. The following primary chemicals of concern within the bed sediments of Alexandra Canal have been identified:

- Asbestos
- Metals
- Nitrogen species
- Organotin compounds
- PAH
- PCBs
- Pesticides
- Petroleum hydrocarbons
- PFAS
- pH

The remediation order (number 23004) in **Appendix A**, states that "any works or activities on the bed sediments of the site [Alexandra Canal] that would result in the disturbance, or further disturbance, of the bed sediments" except as provided by the order.

The remediation order states that works disturbing the bed sediments require a plan to be submitted to the NSW EPA for approval prior to commencement of the works and plans for investigation or remediation must be prepared in accordance with the Guidelines for *Consultants reporting on contaminated Land: Contaminated land guidelines*, which revokes the 2011 edition of the Guidelines for Consultants Reporting on Contaminated Sites.

The order applies to the bed sediments of the Alexandra Canal between Huntley Street, Alexandria and the junction of the Cooks River at Mascot. Any works or activities subject of an approved plan must be performed in accordance with the approved plan. Table 4-1 outlines the key requirements of the remediation order and how these will be addressed for the Project.



Table 4-1 Remediation order requirements

No	Action required by the remediation order	How addressed for the Project
1	Sydney Water must refrain from carrying out, or from causing, permitting or allowing its agents, contractors, licensees or lessees from carrying out, any works or activities on the bed sediments of the site that would result in the disturbance, or further disturbance, of the bed sediments except as provided by this Order. Examples of the types of works or activities that may come within the scope of this Order include construction and maintenance work relating to dredging activities or boating facilities (such as piers, wharves, slipways or marinas).	This Plan has been prepared for the Project to permit the drainage outlet works and bridge works to be undertaken in proximity to the Canal. No works that have the potential to disturb bed sediments will be undertaken until this Plan is approved (as noted below).
2	Prior to the conduct of works or activities coming within the terms of requirement 1, Sydney Water must prepare and submit for the EPA's approval a written plan directed at minimising the disturbance and migration of contaminated sediments at the site. The EPA may approve the plan or aspects of the plan as submitted or approve the plan subject to a requirement that additional mitigation measures must be implemented. This provision is waived for emergency works that are required to protect the safety or property of persons involved in the emergency (e.g. repairs to collapsed canal wall during flood). In this case the EPA must be notified of the situation and the actions being undertaken.	This Plan has been prepared to comply with this requirement. This Plan is being prepared in consultation with Sydney Water and the EPA, as well as the EPA accredited Site Auditor in accordance with the requirements of the Planning Approval Conditions C5, C6, C8 and C9. This Plan, once finalised following consultation, will be approved by the EPA Accredited Site Auditor prior to submission to the EPA for approval. This Plan was also be submitted for endorsement by the ER and approval from DPIE prior to works commencing, in accordance with the Planning Approval.
3	Any works or activities the subject of an approved plan must be performed in accordance with the plan.	Once the Plan is approved (refer to Point 2 above), this Plan will be implemented throughout the works.
4	The plan submitted to the EPA for its approval must be prepared in accordance with the EPA publication titled Guidelines for Consultants Reporting on Contaminated Sites, dated November 997, as it relates to investigation and or remedial action plans.	This Plan has been prepared in accordance with this guideline as noted in Sections 1.1 and 3.1.2 of this Plan.



No	Action required by the remediation order	How addressed for the Project
5	Sydney Water must also, as far as reasonable, ensure that other persons who may carry out works or activities on the bed sediments of the site are made aware of this Order and are advised not to do anything inconsistent with the Order. Without limiting what Sydney Water is required to do to comply with this requirement, it must	(a) JHSW Community & Stakeholder Team will ensure appropriate notifications are in place to the community and stakeholders in advance of the works commencing adjacent to the Canal.
	a) develop and implement an information campaign to alert people near the site to the requirements of this Order;	(b) Signage will be reviewed and, where required, signage similar to
	 b) erect signs along the length of the canal at 1 kilometre intervals to alert users of the canal about the requirements of this Order; 	existing will be implemented prior to works commencing. The existing signage is shown below:
	c) liaise with and provide information to relevant councils about the requirements of this Order.	(c) The Project works are within the Inner West Council area and regular updates will be provided to
		Council throughout the works (including provision of community and stakeholder notifications).
6	A copy of the documentation recording the information campaign must be provided to the EPA by (date to be inserted).	A copy of all notifications relevant to the works adjacent to the Canal will be provided to EPA.

4.2.2 Recent sediment investigation

An investigation into the bed sediments along Alexandra Canal was undertaken during the development of the EIS / MDP, which involved the collection of bed sediment and surface water samples from Alexandra Canal at 12 locations.

Samples were analysed for heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg and Zn), total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphorus pesticides (OPPs), polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs) dioxins, furans, PFAS and asbestos.

Elutriate testing was performed for ammonia, heavy metals, PAHs, Phenols, OCP and PCB to assess the concentrations of contaminants that could potentially be released from the sediments during dredging and disposal of the sediments.

A summary of the investigation is presented in Technical Working Paper 5 in the EIS / MDP.

Observations of potential contamination were recorded during the sediment sampling, with hydrocarbon odours recorded at 10 locations ranging in intensity from moderate to strong. A hydrocarbon sheen was also recorded at seven of the locations. Surface water was observed to be clear with no turbidity and no odour noted at all 12 locations.

Laboratory chemical testing undertaken as part of the sediment investigation found that:



- Asbestos was detected in 13 of the sediment samples collected.
- Concentrations of metals, TPH, PAH, PCBs and pesticides in sediment exceeded the ecological criteria.
- Concentrations of zinc exceeding the ecological marine criteria were reported in all surface water samples except SW11_2. One exceedance of copper was also reported at SW8_1.
- Elutriate results for ammonia, lead and zinc exceeded the ecological marine criteria.
- Organotin compounds including tributyltin, monobutyltin and dibutyltin were detected above the laboratory limit of reporting. Organotin waste materials are subject to a chemical control order (CCO) created under Part 3, Division 5 of the *Environmentally Hazardous Chemicals Act 1985*.
- PFAS compounds were detected above the laboratory limit of reporting, however concentrations were below the adopted guidelines values.
- PFAS concentrations reported during traditional analysis were below the laboratory limit of reporting. Total Oxidisable Precursor Assay (TOPA) analysis reported PFAS concentrations above the laboratory limit of reporting (0.01 µg/L) at six locations.
- The action criteria for acid sulfate soils was exceeded at eight locations.

4.2.3 Surface water investigation

Investigation into water quality within the Alexandra Canal was undertaken as part of the EIS. Surface water was sampled at a total of eight (8) locations (SW1-SW8), including six (6) locations (SW1-SW6) in the Alexandra Canal. These locations are shown in **Figure 4-1**.



Figure 4-1 WSP-GHD (2020b) Surface water monitoring locations



Detail on the observations from surface water sampling in the Alexandra Canal are presented in **Section 4.7.2.1** of the EIS. Overall, it was found that sampling points within the Cooks River and Alexandra Canal (SW1 to SW8) frequently exceeded ANZECC (2000) / ANZG (2018) guideline values for sulfate, total dissolved solids, total suspended solids, chloride, total nitrogen, aluminium, iron, manganese, zinc and ammonia.

The key statistics for turbidity and TSS recorded at SW1-SW6 in Alexandra Canal under baseline conditions are presented in **Table 4-2** (below). The results show that median turbidity and TSS were generally below the trigger criteria whilst 80th percentile and maximum values exceeded the trigger values at all locations.

Parameter	SW1	SW2	SW3	SW4	SW5	SW6	Trigger	
Turbidity – NTU	Turbidity – NTU							
Turbidity – Median	3.6	3.3	4.0	3.2	2.2	2.2		
Turbidity – 80 th Percentile	14.74	11.04	13.84	15.78	15.8	13.72	11.48	
Turbidity – Maximum	21.2	20.5	22.4	22.2	27.9	44.2		
TSS – mg/L								
TSS – Median	12.0	10.0	13.0	13.0	10.0	8.0		
TSS – 80 th Percentile	16.6	13.8	20.4	16.6	14.8	15.2	15.2	
TSS – Maximum	33.0	24.0	25.0	21.0	26.0	47.0		

Table 4-2 Key statistics SW1-SW6 turbidity and TSS Alexandra Canal

The results from surface water sampling show that baseline conditions within the Alexandra Canal may generally not achieve the identified trigger values for TSS and turbidity. The baseline range and variability have been considered in developing this Plan for Alexandra Canal.



5 **Construction activities and potential impacts**

The Project activities with the potential to disturb the contaminated aquatic sediments in Alexandra Canal include discharge of water to the canal and construction works inside the canal, on the canal wall or adjacent to the canal, which are required for the installation of new stormwater drainage structures or construction of the bridges. These activities are outlined in this section of the Plan.

Where disturbance of sediments is unavoidable, management to prevent adverse water quality impacts to the surrounding environment is required. Notice to, and approval from, Sydney Water and the EPA is required. The mitigation measures to manage contaminated bed sediments during construction would need to address:

- Preventing the dispersion of turbid plumes potentially containing elevated levels of chemicals of potential concern into Alexandra Canal
- Preventing the generation of ASS and therefore minimising the potential creation of sulfuric acid as a product of ASS.

The measures to minimise and manage disturbance to sediments are detailed in Section 6 of this Plan. Works will also be carried out in accordance with the guidelines included in Section 3.1.2.

5.1 Construction activities

There are approximately 10 stormwater outlets to be upgraded or installed in Alexandra Canal as part of the Project stormwater drainage system (**Figure 5-1**). The new stormwater drainage outlets below the high-water mark will be constructed by first constructing coffer dams around the outlet locations. The indicative locations where coffer dams are proposed to be installed are presented in **Figures 5-1** to **5-3** (below). These figures also show the location of the drainage outlets and bridge locations. For drainage above the high-water mark, silt curtains will be installed around the outlet area.

The coffer dams will be constructed by installing interlinked sheet piling into the bed and banks to create a box around the outlet location. The water inside the coffer dam will then be pumped out to create a dry area in which to construct the stormwater outlets without further sediment disturbance, noting that dewatering is expected to be an ongoing activity (possibly daily depending on flows) Table 7-1 in Section 7.3 below details the monitoring requirements during coffer dam dewatering. The strips of canal wall above and below water level would have to be removed to allow the sheet piling through the bank. Additional excavation of the bank material (below the canal walls) might be required if there is refusal of sheet piles. Key construction activities that may result in disturbance to the contaminated aquatic sediments include:

- Permanent structure installation:
 - Drainage outlets in Alexandra Canal wall: activities consist of demolition of existing outlets and replacement with new outlets, repair of canal walls adjacent to outlets, installation of rip rap, flow controls and other drainage features.
 - Bridges over Alexandra Canal: bridge structures (i.e. abutments, foundation, piers and supports) adjacent to the canal.
- Temporary structure installation (to be removed upon completion):
 - Sheet-pile coffer dams inside Alexandra Canal: coffer dams will be constructed around the permanent structures to allow construction activities to be undertaken without further disturbance to the canal sediments.
 - work platform for the bridge abutment construction. This will involve placement of rip rap rock contained within geotextile fabric. Densely Graded Base (DGB) may be used to form the work surface (or other suitable material which is either Excavated Natural



Material (ENM) or Virgin Excavated Natural Material (VENM). Imported material will be undertaken in accordance with the the EPL.

- Water treatment plant discharge into the Canal as approved under Condition P1.2 of the EPL.
- Temporary piling for the active transport link (ATL) temporary diversion. This will involve installation of eight (8) steel screw piles of 273mm diameter. Note- piling will be completed from the land side without any plant/equipment directly in the Canal. Refer to Figure 5-4 for the proposed location.

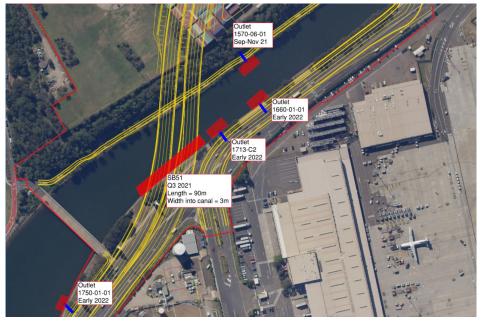


Figure 5-1 Indicative location of the coffer dams and construction works (1 of 3)

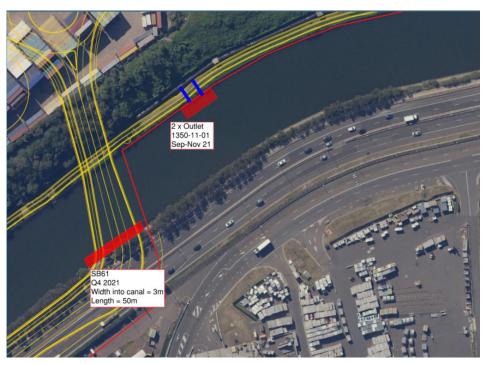


Figure 5-2 Indicative location of the coffer dams and construction works (2 of 3)



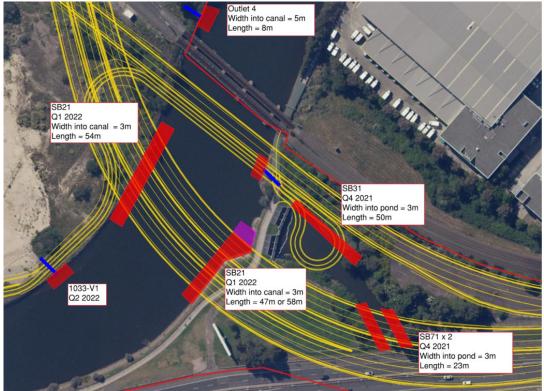


Figure 5-3 Indicative location of the coffer dams and construction works (3 of 3)

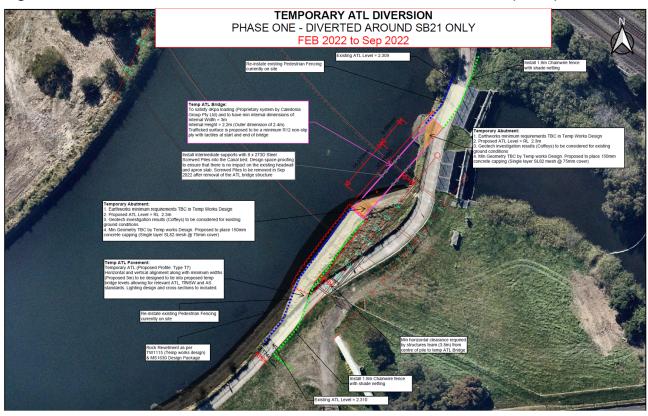


Figure 5-4 Proposed location of temporary piling for ATL diversion



5.2 Potential impacts

The potential for contaminated aquatic sediments to impact water quality in the Alexandra Canal is dependent on multiple independent and associated factors including:

- area of disturbance
- physical properties of sediments that may be disturbed
- chemical properties of sediments that may be disturbed, and
- construction methodology (including duration) and environmental control measures

The potential impacts associated with construction activities, if left unmanaged, include:

- Disturbance of sediments during discharge of water to the canal.
- Disturbance of sediments during installation and removal of working platforms and coffer dams, resulting in the mobilisation of sediments into the water column, causing localised impacts to water quality.
- Dewatering and excavation within coffer dams exposing sediments to atmosphere resulting in the exposure of Acid Sulfate Soil (ASS) and generation of acidic leachate and contaminated water.
- Mobilisation of sediments at outlet locations during construction as a result of high energy stormwater discharges through outlets.
- Discharge of leachate during construction of the drainage outlets due to penetration of the bentonite wall.
- Disturbance of soil / sediments during riparian vegetation removal, if required, in areas outside of coffer dams.

These potential impacts may result in risks to human health and aquatic ecology if not properly managed, including:

- Increased harm caused to the aquatic ecosystems that is in contact with the sediments and/or contaminated water.
- Increased risks to human health as a result of consumption of contaminated fish.
- Increased mobilisation of contaminated sediments resulting in increased and dispersal of existing contamination.
- ASS generation

The risks above will be managed during construction as detailed in Section 6 and will be revised through ongoing environmental risk analysis and review.



6 Construction methodology and environmental control measures

6.1 Design considerations

The Project's permanent and temporary structures have been designed to minimise disturbance to the bed sediments. To ensure the best environmental outcomes this has included consideration of tidal influence and variation in flow velocities. The design of temporary and permanent outlets into the canal are being designed with appropriate energy dissipation and scour protection measures to minimise the potential for scour and disturbances to the canal sediments. **Appendix B** includes preliminary design drawings and documents to provide an overview of the planned works.

The construction methodology and staging has been designed to, as far as practical, avoid the disturbance to Alexandra Canal. For example, the structural supports and foundations associated with the bridge crossings have been positioned outside of the canal walls. However, disturbance to the canal is inevitable for constructing drainage outlets and also provision of construction areas to build the bridges.

6.2 Temporary Works- Coffer Dams, Working Platforms and Screw Piles

Coffer dams are the proposed construction method which minimises disturbance to the Canal sediments where works are being undertaken below the high-water mark. They will isolate construction impacts to the area within the coffer dam and minimise further sediment disturbance or contamination mobilisation to the rest of the Canal. **Figure 6-1** provides a conceptual site model for how coffer dams will be the effective construction method, and **Figures 5-1**, **5-2** and **5-3** shows their indicative location in this Project.

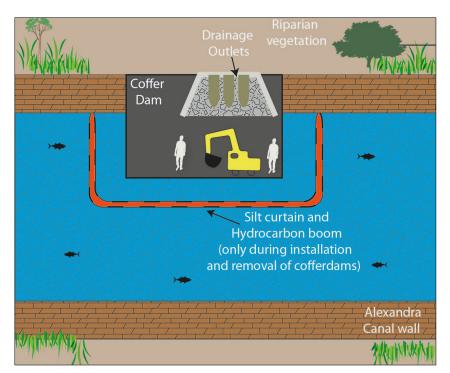


Figure 6-1 Conceptual site model

The coffer dams will be installed to provide a physical barrier between the construction site and the canal. Water inside the coffer dam will be removed for the preparation and commencement of



construction activities. The water from within the coffer dam will be pumped out directly into the canal (within the silt curtain). It is anticipated that installing and removing the coffer dams has the potential to disturb sediments within the canal bed, and therefore, EWMS will be prepared prior to installation and removal. An EWMS and Environmental Control Plan for these works is provided in Appendix D.

There are some areas where the working area adjacent to the Canal is limited and working platforms for piling for the bridge abutment construction will be required. In these areas coffer dams will be replaced with rip rap rock contained within geotextile fabric. The rocks will be carefully placed and wrapped in geotextile fabric to create a working platform within the edge of the canal. The only exception to this is the temporary piling for the ATL diversion where the piling platform is able to be established on the area adjacent to the Canal without the need for a rock working platform. Refer to Figure 5-4 for an indicative layout.

These activities will potentially cause localised sediment plumes with subsequent mobilisation of contamination and further travel downstream of the canal. These potential effects would be significantly minimised by executing the following measures during work platform and coffer dam installation and removal:

- Plan for installation of and removal of all temporary works to be carried out in consideration of meteorological conditions including tides, weather and wind (for example- not during or immediately following high rainfall events where flows in the canal may be elevated). Works will be managed to minimise the duration of contamination dispersion in the canal, as far as reasonably practical.
- Install pollution control measures / facilities. A double silt curtain is proposed to be installed around the coffer dams and /or working platforms. This will be installed with consideration of tidal conditions to minimise the disturbance of sediments during installation. Silt curtains/barriers will disrupt the water flow and allow the suspended sediment to resettle. The purpose of the 'double' layer is to ensure that investigations can immediately be undertaken in the event of any sediment escape between the first and second curtains and still prevents mobilisation of sediments outside of the second curtain. The information provided in Appendix E shows an example of the double silt curtain and it's effectiveness. In the case of any incident, these barriers provide a noticeable visual contrast between the trapped turbid water and the rest of canal water outside which is easily noticeable for construction crews to undertake incident corrective action.
- Undertake regular inspection and monitoring program to ensure compliance (refer to Section 7.3 for details).
- Removal of sediment laden construction materials which have the potential to contain contaminated sediment will be managed in accordance with the Construction Waste Management Plan prepared in accordance with the EPL and taken to a facility lawfully able to accept the waste.

6.3 Acid Sulphate Soil Management

Generation of ASS as a result of dewatering of the boxed area and exposure of the sediments to the atmosphere will need to be managed throughout the works. A site assessment and soil testing for potential ASS will be carried out in compliance with the SWMP and prior to any excavation or disturbance to the canal bed material. Should the material be found to be ASS generating, further treatment or remediation will be decided as per the SWMP.

Dewatering and exposure of sediments to atmosphere may result in Acid Sulfate Soil (ASS) and generation of acidic leachate. Dewatering and discharge of potential acidic leachates will be conducted in compliance with the SWMP following all the applicable control measures. An Acid Sulphate Soil Management Plan has been developed and is included in the Soil and Water Management Sub Plan.



6.4 Vegetation removal

Riparian habitats containing rooted vegetation are mostly outside the Alexandra Canal wetted perimeter. Clearing activities for vegetation will not further expose / disturb the canal bed sediments. It is envisaged that majority of vegetation removal will be at the top of the banks. It is expected that any vegetation removed in these locations will be removed as contaminated material (on the basis that the sediment on the base of the plants etc will be contaminated and also may be removed as part of potential bank removal works in some areas) unless the vegetation can be cut off at seabed level/roots remain in place (ie only if there is no contaminated sediments attached). Revegetation and stabilisation is detailed in the design (including examples provided in Appendix B of the Plan) including placement of low saltmarsh species and grasses.

6.5 Discharge into the Canal

There are several elements of the Project works which have the potential to discharge water into Alexandra Canal throughout construction as detailed below.

Discharges will occur:

- Through the existing drainage outlets into the surface water of the Canal for the purposes of clean water diversion only. Any surface water runoff around work areas will be managed through installation of erosion and sediment controls detailed in the Erosion and Sediment Control Plan(s).
- Through new outlets constructed as part of the Project, again for clean water diversion. In addition, adequate dissipation controls (such as scour protection or flow reduction) are integrated into the designs of the new outlet to minimise disturbance of contaminated sediments. It is noted that approval of the drainage design is subject to Sydney Water approvals process prior to commencement of construction.

In addition, temporary discharge, such as from the Water Treatment Plant, may also occur in accordance with the requirements of the EPL. These discharges will be in accordance with the trigger values in the EPL and in accordance with CoA E93.

Additionally, the initial and ongoing dewatering in the coffer dam will discharge water to the canal; and adequate measures will be undertaken to minimise disturbance to sediments (e.g. reduce discharge flow rate or using floating pipes for discharge on the surface level). This dewatering will occur within the silt curtain and monitoring will be undertaken as detailed in Section 7.3 of this Plan.

There is also the potential for leachate to enter the canal during drainage outlet construction. There are several drainage outlets which penetrate the top of the bentonite wall and the staging and management of these works to avoid potential leachate into the canal is critical. The management of these works will include:

- Providing a casing around the drainage pipeline and the bentonite wall to seal the area as quickly as possible;
- Managing the excavation in stages so as to ensure sufficient and ongoing dewatering capacity. Detailed staging will be required for each drainage outlet and will be detailed in the Activity Method Statement (AMS) as well as a specific EWMS. The staging will consider the excavation closest to the bentonite wall occurring later in the construction phase so we to minimise the extent and duration of any leachate management.
- The groundwater and potential leachate will be removed via either pipework or tanker truck and appropriately disposed of to either the Leachate Treatment Plant or to an approved liquid waste facility. A dewatering permit will be in place for these works to ensure the movement of water within the excavation area is appropriately managed.

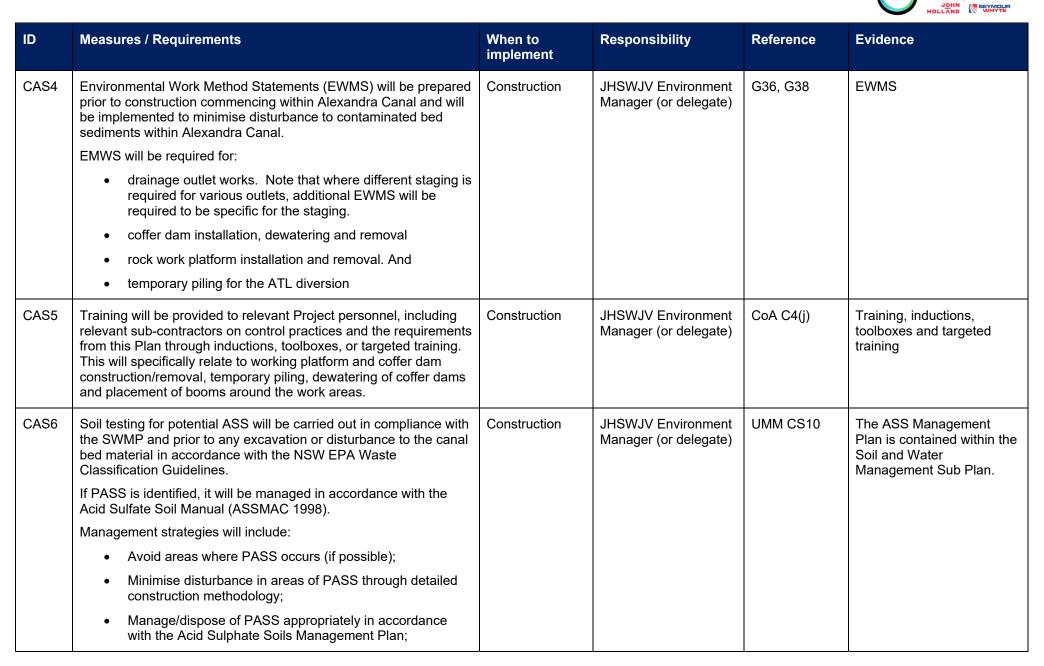


The measures and requirements to meet the objectives of this Plan and to address potential impacts from contaminated aquatic sediments in Alexandra Canal are outlined in **Table 6-1**. **Figure 6-2** also provides a process flow diagram for the required measures during construction to manage potential disturbances to the canal sediments.



Table 6-1 Management and mitigation measures applicable to contaminated aquatic sediments in Alexandra Canal

ID	Measures / Requirements	When to implement	Responsibility	Reference	Evidence
CAS1	Undertake construction in accordance with this approved Plan (once approved).	Pre-construction	JHSWJV Environment Manager (or delegate)	CS11	ER site inspection reports Weekly environment inspections Compliance tracking program
CAS2	Undertake construction in accordance with the approved design (i.e. as approved by Sydney Water). (Preliminary design information provided in Appendix B for context). This will also include the placement of coffer dams and rock platforms.	Construction	Construction Team	This Plan	AFC Design and Independent Verifier records Environmental inspection records
CAS3	Undertake surface water quality monitoring at the commencement and completion of construction that has the potential to disturb contaminated bed sediments within Alexandra Canal, and weekly during disturbance. The monitoring program included in Section 7.3 of this Plan must be implemented, with results of monitoring provided to the EPA if required by the EPL or approval of this Plan.	Construction	JHSWJV Environment Manager (or delegate)	UMM SW6	Section 7.3 of this Plan details monitoring required. Compliance tracking program Water quality monitoring program and records Environmental inspection records



SYDNEY GATEWAY

Joint Venture Project



ID	Measures / Requirements	When to implement	Responsibility	Reference	Evidence
CAS7	Prior to commencing the installation and removal of coffer dams or rock work platforms, consideration of meteorological conditions must be undertaken. This includes potential rainfall, wind and tides.	Construction	Construction Team	This report	Project construction schedule BOM reports/ Site records
CAS8	Installation of a double layer silt curtain will be completed prior to the installation of sheet pile coffer dams (before commencing construction of stormwater outlets and bridges) or working platforms (for bridge abutment works) or temporary piling (for the ATL diversion)	Construction	JHSWJV Project Manager (or delegate)	This report	Preliminary design information is provided in Appendix B. The approved design will be implemented throughout the works. Construction staging drawings /AMS/ EWMS ER Inspection Records/ JHSW inspection records Environmental compliance records
CAS9	Installation of hydrocarbon booms will be undertaken around the coffer dams and piling during construction and decommissioning . In addition, appropriate land based and marine based spill response materials will be available on the site to ensure any spills can be appropriately managed throughout the works. Any incidents will be notified in accordance with the JHSW incident reporting procedure.	Construction	Site Foreman / Engineer/ Environment Manager	This report	EWMS(s) ER Inspection Records/ JHSW inspection records Environmental compliance records Incident reporting procedures and forms.
CAS11	The staging of drainage outlet works needs to consider the potential for leachate dewatering in excavations as a result of penetration of the bentonite wall. Detailed construction staging through the EWMS must be completed prior to the commencement of drainage works. In addition, any dewatering (or transfer of leachate/ground water to a water treatment plant) must be approved through the Dewatering Permit prior to dewatering commencing.	Construction	Construction Team	This report	EWMS AMS Dewatering Permit Environmental compliance records

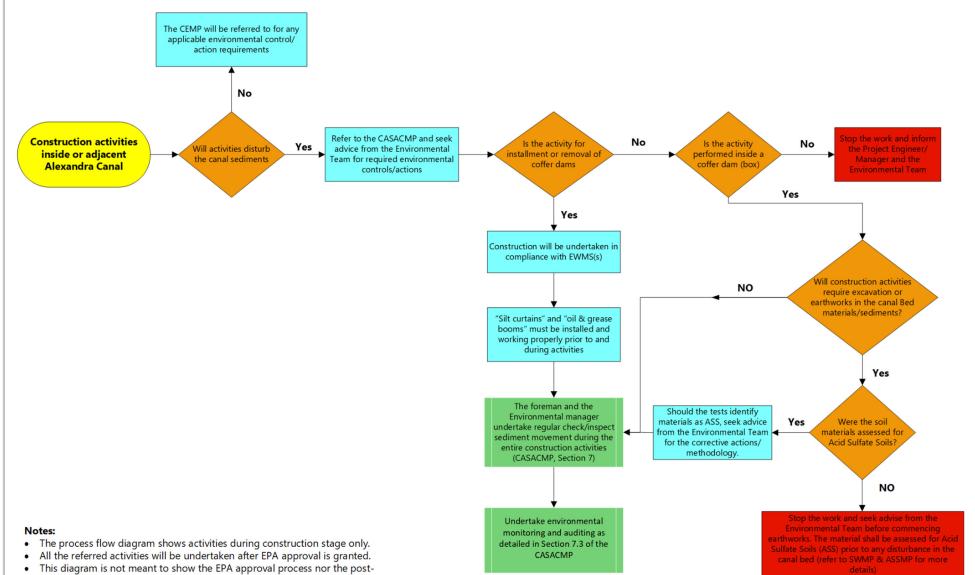


ID	Measures / Requirements	When to implement	Responsibility	Reference	Evidence
CAS12	Riparian vegetation clearing: Any vegetation removal inside coffer dams will be conducted in accordance with the Flora & Fauna Management Sub Plan. Vegetation removal within areas not protected by coffer dams are unlikely; however, should it be required, vegetation will be cut as close to the base as possible, leaving the roots in place will eliminate disturbance of sediments.	Construction	JHSWJV Environment Manager (or delegate)	This report	Flora & Fauna Management Sub Plan Environmental compliance records/ Environmental inspection records Consultation records
CAS13	Implement the monitoring program as detailed in Section 7.3 of this Plan to ensure that the surface water quality within Alexandra Canal is monitored throughout the works that have the potential to disturb bed sediments in the Canal	Construction	JHSWJV Environment Manager (or delegate)	This Report	Monitoring Records
CAS14	All works within or adjacent to waterways will be managed in accordance with the DPI's guidelines for Controlled Activities on Waterfront Land, including:	Construction	Construction Team	DPI, 2012	Preliminary design information is included in Appendix B
	 Minimize construction footprints and proposed extent of disturbance to soil and vegetation within the watercourse or waterfront land 				Construction staging and methods/AMS EWMS
	Accommodate natural watercourse functions				Environmental inspection
	 Provide any necessary scour protection, such as rock riprap and vegetation. 				records
	If cutting into banks, protect cuttings against scour.				
	 Discharge from an outlet should not cause bed or bank instability 				
	Point outlet structure and direct discharge downstream				
	 Bridge piers or foundations should not be located within the main channel of the watercourse. 				
	 Monitor and maintain all in-stream works until suitably stabilised. 				



ID	Measures / Requirements	When to implement	Responsibility	Reference	Evidence
	Stabilise and rehabilitate all disturbed areas to adequately restore the integrity of the riparian corridor				





This diagram is not meant to show the EPA approval proce approval compliance process.

Figure 6-2 Construction management process flow diagram for disturbance to contaminated aquatic sedimentation in Alexandra Canal

SGWPW-JHSW-NWW-PM-PLN-000520

Additive Project

7 Compliance management

7.1 Roles and responsibilities

The JHSWJV Project Team's organisational structure and overall roles and responsibilities are outlined in **Section 3.3** of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in **Section 6** of this Plan.

7.2 Training

All employees, contractors and utility staff working on site will undergo site induction training relating to overall environmental management. The induction training will address elements related to management of works within Alexandra Canal including:

- Requirements of this Plan.
- Applicable and relevant legislative requirements.
- Roles and responsibilities for contaminated aquatic sediments in Alexandra Canal.
- Typical construction activities that may impact contaminated aquatic sediments in Alexandra Canal and associated environmental mitigation and management measures.

Targeted training in the form of toolbox talks or specific training may also be provided to personnel with a key role in managing works within Alexandra Canal. Examples of training topics could include:

- Impacts to the environment and surrounding community.
- Mitigation measures to minimise impacts from working with contaminated aquatic sediments in Alexandra Canal.

Further details about staff induction and training are outlined in Section 3.5 of the CEMP.

7.3 Monitoring and inspection

In accordance with UMM SW6, a water quality monitoring program will be developed and implemented as part of the SWMP, which includes monitoring locations within Alexandra Canal. By extension of this water quality monitoring program in the SWMP, monitoring of water quality will be undertaken during any works within Alexandra Canal, as described in **Table 7-1**. The locations of the fixed monitoring points (ie SW2, SW6 and SW8) are shown in Figure 7-1 below.

Environmental monitoring is proposed to be undertaken during the ebb tide only so as to provide a consistent measure of water quality within the Alexandra Canal, and provide a means to assess the effects of construction activities through a comparison of water quality upstream of the sediment disturbance zone with water quality downstream of the sediment disturbance zone.

Water quality will also be compared against baseline conditions to assess whether disturbances result in water quality impacts significantly outside of the observed baseline variation. Significance of variation will be assessed using standard statistical methods for comparisons of non-parametric data (e.g. Kruskal-Wallis test / Mann-Whitney U test), nominally measured where the *p* value is less than 0.05.



Table 7-1Monitoring program during construction in Alexandra Canal

Sampling ID	Sampling location	Monitoring parameters	Timing and Frequency				
During construction of permanent structures within coffer dams (Ebb Tide)							
TBD (in proximity to the work site)	Alexandra Canal – downstream of construction site	Physio-chemical parameters ¹	 Once, at the start and completion of construction, and Weekly, during construction 				
SW2	Alexandra Canal – upstream of proposed road and rail bridge	Physio-chemical parameters ¹					
SW6	Alexandra Canal – before the confluence with Cooks River	Physio-chemical parameters ¹					
SW8	Cooks River – South of Marsh Street	Physio-chemical parameters ¹					
During coffer dams' and temporary piling installation and removal (Ebb Tide)							
TBD (in proximity to the work site)	Alexandra Canal – downstream of construction site	 Physio-chemical parameters¹ Sampling and laboratory analysis² 	 Physio-Chemical Parameters: Once, at the start and completion of installation / removal activities 				
SW2	Alexandra Canal – upstream of proposed road and rail bridge	Physio-chemical parameters ¹	 Daily during construction of the coffer dams Daily during dewatering of coffer dam areas or as otherwise required 				
SW6	Alexandra Canal – before the confluence with Cooks River	Physio-chemical parameters ¹	by the EPL Sampling and laboratory analysis:				
SW8	Cooks River – South of Marsh Street	 Physio-chemical parameters¹ Sampling and laboratory analysis² 	 Once, at the start and completion of installation/removal activities As otherwise required by the EPL 				
In the event of an	incident occurrence (E	bb Tide)					
TBD (in proximity to the work site)	Alexandra Canal – downstream of construction site	 Physio-chemical parameters¹ Sampling and laboratory analysis² 	 Physio-Chemical Parameters: Immediately (within 24hrs) following incident Daily, until turbidity results show n exceedance³ Sampling and laboratory analysis: Once, when incident happened, sampling to be undertaken as soor 				
SW2	Alexandra Canal – upstream of proposed road and rail bridge	Physio-chemical parameters ¹					
SW6	Alexandra Canal – before the confluence with Cooks River	Physio-chemical parameters ¹					



Sampling ID	Sampling location	Monitoring parameters	Timing and Frequency
SW8	Cooks River – South of Marsh Street	 Physio-chemical parameters¹ Sampling and laboratory analysis² 	 as practical after incident (preferably no later than 24 hrs from the incident occurrence) Daily, as long as turbidity monitoring shows exceedances³

Notes:

- ¹ Field physio-chemical parameters include pH, DO, ORP, temperature, total dissolved solids (TDS) and turbidity (NTU). Monitoring will be performed using a multi-probe water quality handheld meter.
- ² Water sampling and laboratory analysis will be undertaken for testing parameters including:
- pH, total dissolved solids (TDS), total suspended solids (TSS), turbidity, major anions and cations (calcium, magnesium, potassium, sodium, chloride, sulfate, carbonate and bicarbonate alkalinity, total alkalinity)
- Nutrients: nitrate, nitrite, total nitrogen, ammonia and total phosphorus
- Contaminants of concern: per- and poly-fluoroalkyl substances (PFAS), total recoverable hydrocarbons (TRH), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), total phenols, organochlorine pesticides (OCP), organophosphorus pesticides (OPP), total and dissolved heavy metals (lead, zinc, copper, cadmium, chromium, nickel, iron, manganese, mercury, arsenic and aluminium), tributyltin (TBT) and polychlorinated biphenyls (PCBs)
- ³ Sampling should continue daily during incident unless trigger exceedances are shown to be unrelated to disturbance resulting from the site activities.



Figure 7-1 Water quality monitoring locations

Field physio-chemical parameters will be measured at each sampling location using a multi-probe water quality handheld meter (calibrated at least 24 hours prior to the measurements being collected). Further details are available in the SWMP.



When samples for laboratory tests are required, grab samples will be collected manually from the upstream and downstream of sampling locations as identified below within Alexandra Canal using a telescopic dip device, or similar. Samples will be collected at multiple depths and mixed in one composite sample, and the sample will be sent to laboratory as soon as practical.

Laboratory analysis will include all parameters as assessed in the baseline water quality monitoring program as detailed in Section 3.2 of this Plan as well as those required by the EPA accredited Site Auditor (as identified in the notes below Table 7-1 and in Appendix C Interim Audit Advice).

During works that have the potential to impact bed sediments, daily visual surveillance will be undertaken for potential disturbance causing sediment plume and oil / grease visual sheens by the Foreman. Environmental inspections, focussing on protection of water quality and minimising disturbance to bed sediments, will be undertaken on at least a weekly basis, and more often during the following activities / events:

- During the coffer dams installation and removal, the foreman will undertake visual surveillance twice a day (morning and afternoon). The environmental inspector will perform inspection once a day during the first week from the date construction starts, and twice a week afterwards.
- At incident events, the foreman will inspect the incident location twice a day (morning and afternoon), and the environmental inspector conducts daily inspections until the investigation is complete and corrective actions undertaken or monitoring results show exceedances ceased (whichever happens earlier).

Exceedances will be determined through comparison of upstream turbidity values against downstream turbidity values, and against baseline conditions to assess whether disturbance exceeds natural baseline variation (refer to baseline and trigger values in **Table 3-2** and **Table 4-2**). Significance of variation will be assessed using standard statistical methods for comparisons of non-parametric data (e.g. Kruskal-Wallis test / Mann-Whitney U test). Interpolation of baseline values will be used where insufficient information is available for a statistical baseline comparison.

A review of other influences (such as other activities within the Canal, weather events etc) will be undertaken to determine if the exceedance is potentially attributable to the works. Where exceedances are determined to be attributable to the works, works will be reviewed and an investigation will be completed by the Environment Manager and Project Manager (or their delegates). Works should cease temporarily until any additional measures, that may be required, are confirmed and implemented (per the agreed corrective actions in the incident report). In the event that an incident is confirmed to have occurred, appropriate notification will be undertaken to TfNSW, ER, and EPA.

7.4 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this sub plan, CoA and other relevant approvals, licenses and guidelines. Audit requirements are detailed in **Section 3.9** of the CEMP.

7.5 Reporting

Project reporting requirements specifically relevant to the management of works that potentially impact contaminated sediments within Alexandra Canal are detailed in the table below. Other general reporting requirements are further detailed in **Section 3.9** of the CEMP.



ltem	Frequency	Standards	External Reporting	Responsibility
Incidents	As required	As required by the CoA, EPL, TfNSW Environmental Incident Classification and Reporting procedure. Incidents will also be entered in the John Holland Event Tracker system.	Appropriate authority dependant on the nature of the incident however may include DPIE, EPA, Sydney Water, and TfNSW (refer to Section 3.8 in the CEMP).	Environment Manager / Foreman or delegate
Exceedances	As required	As per the CEMP.	Authorities as per compliance and reporting obligations. This may include EPA if required under the EPL, and includes Sydney Water for reporting under the Remediation Order.	Environment Manager / Foreman or delegate

Table 7-2 General environmental reporting requirements

In accordance with EPL Condition R4.8, in the event that sediment in Alexandra Canal is disturbed or mobilised outside of the environmental controls described in this Plan as a result of JHSWs works and activities, JHSW must notify the NSW EPA as soon as practicable and in any case within 24 hours. Within 14 days of this notification, the licensee must submit a report to NSW EPA detailing the cause of disturbance or mobilisation of the sediments, immediate actions that were undertaken, control measures that were in place and the actions put in place to prevent recurrence.

SYDNEY GATEWAY

8 Review and improvement

8.1 Continuous improvement

Continuous improvement of this Plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will:

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

8.2 Plan update and amendment

The processes described in **Section 3.9** to **Section 3.13** of the CEMP may result in the need to update or revise this Plan. In accordance with CoA C9, any variations to this Plan will be approved by the EPA accredited Site Auditor.

A copy of the updated Plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to **Section 3.11** of the CEMP. Further to this and in accordance with CoA C9, if the Plan is updated, evidence of the approval by the EPA accredited Site Auditor will be submitted to DPIE for information, along with the amended Plan.



Appendix A

Copy of remediation order (23004)

Note: On 21 March 2012 Sydney Water provided an update on actions required under this Order.

Environment Protection Authority

Remediation order

Section 23 of the Contaminated Land Management Act 1997

HO1833 23004/ Area #3151

Service: By Registered Mail to Registered Office and Principal Place of Business

Sydney Water Corporation (ABN) 115-123 Bathurst Street SYDNEY NSW 2000

Attention: Managing Director

Background

- A. On 25 August 2000 the Environment Protection Authority ("EPA") declared the bed sediments of the Alexandra Canal between Huntley Street, Alexandria and the junction of Alexandra Canal with the Cooks River at Mascot, being Lot 1 DP 532493, Lot 1 DP749404 and Lot 3 DP878489 ("the site") within the local government areas of Botany Bay, Marrickville and South Sydney as a remediation site.
- B. The bed sediments at the site have been found to be contaminated with chlorinated hydrocarbons including organochlorine pesticides (chlordane, total DDT and dieldrin), polychlorinated biphenyls (PCBs) and metals ("the contaminants") in such a way as to present a significant risk of harm to human health and the environment.
- C. The EPA has considered the matters in s.9 of the Contaminated Land Management Act ("the Act") and found that the contamination at the site presents a significant risk of harm because
 - Harm is being caused to the benthic biota that is in contact with the contaminants in the sediments;
 - Harm may be caused to humans from the increased risk associated with the consumption of contaminated fish; and
 - Disturbance of the sediments would mobilise the contaminants and hence increase the risk of harm.
- D. The EPA has considered all submissions made as to whether an order should be made.
- E. There are no other persons who are required to be served with a copy of this order for the purposes of s.24(3) of the Act.

Action required by this order

By this order, the EPA orders Sydney Water Corporation ("Sydney Water"), being the owner of the site, to do the following:

1. Sydney Water must refrain from carrying out, or from causing, permitting or allowing its agents, contractors, licensees or lessees from carrying out, any works or activities on the bed sediments of the site that would result in the disturbance, or further disturbance, of the bed sediments except as provided by this Order.

Examples of the types of works or activities that may come within the scope of this Order include construction and maintenance work relating to dredging activities or boating facilities (such as piers, wharves, slipways or marinas).

2. Prior to the conduct of works or activities coming within the terms of requirement 1, Sydney Water must prepare and submit for the EPA's approval a written plan directed at minimising the disturbance and migration of contaminated sediments at the site. The EPA may approve the plan or aspects of

the plan as submitted or approve the plan subject to a requirement that additional mitigation measures must be implemented.

This provision is waived for emergency works that are required to protect the safety or property of persons involved in the emergency (eg repairs to collapsed canal wall during flood). In this case the EPA must be notified of the situation and the actions being undertaken.

- 3. Any works or activities the subject of an approved plan must be performed in accordance with the plan.
- 4. The plan submitted to the EPA for its approval must be prepared in accordance with the EPA publication titled *Guidelines for Consultants Reporting on Contaminated Sites*, dated November 1997, as it relates to investigation and or remedial action plans.
- 5. Sydney Water must also, as far as reasonable, ensure that other persons who may carry out works or activities on the bed sediments of the site are made aware of this Order and are advised not to do anything inconsistent with the Order. Without limiting what Sydney Water is required to do to comply with this requirement, it must
 - a) develop and implement an information campaign to alert people near the site to the requirements of this Order;
 - b) erect signs along the length of the canal at 1 kilometre intervals to alert users of the canal about the requirements of this Order;
 - c) liaise with and provide information to relevant councils about the

requirements of this Order.

6. A copy of the documentation recording the information campaign must be provided to the EPA by (date to be inserted).

[SIGNED]

CAROLYN STRANGE <u>Director Contaminated Sites</u> <u>Department of Environment and Conservation</u> (by Delegation)

Date: 10 May 2004

NOTE:

Relationship to other regulatory instruments

This Order does not affect the requirement to comply with the provisions of any applicable environmental planning instruments, pollution reduction programs or the provisions of any other environmental protection legislation administered by the EPA.

Failure to comply with this Order

It is an offence to fail to comply with a remediation order. Heavy penalties may be imposed if you are convicted of this offence by the Land and Environment Court.

Information recorded by the EPA

Section 58 of the Contaminated Land Management Act 1997 requires the EPA to maintain a public record. A copy of this remediation order will be included in the public record.

Information recorded by councils

Section 59 of the Act requires the EPA to notify the relevant local council as soon as practicable after an order is made. The council is then required to note on its planning certificate issued pursuant to s.149(2) of the Environmental Planning and Assessment Act that the land is currently subject to a remediation order. The EPA is required to notify council as soon as practicable when the order is no longer in force and the notation on the s.149(2) certificate can be removed.

Guidelines made by the EPA

- Contaminated Sites: Guidelines for Assessing Service Station Sites, December 1994
- Contaminated Sites: <u>Guidelines for the vertical mixing of soil on former broad-acre agricultural land</u>, January 1995 (vertmix.pdf, 149kb, requires <u>acrobat reader</u>)
- Contaminated Sites: Sampling Design Guidelines, September 1995

- Contaminated Sites: <u>Guidelines for Assessing Banana Plantation Sites</u>, October 1997
- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, November 1997
- Contaminated Sites: Guidelines for the NSW site auditor scheme, June 1998
- Contaminated Sites: <u>Guidelines on Significant Risk of Harm from Contaminated Land and the Duty to</u> <u>Report</u>, April 1999 (sroh.pdf, 164kb, requires <u>acrobat reader</u>)

<u>Note</u>: All references in the EPA's contaminated sites guidelines to the *Australian Water Quality Guidelines for Fresh and Marine Waters* (ANZECC, November 1992) are replaced as of 6 September 2001 by references to the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ, October 2000), subject to the same terms.

Guidelines approved by the EPA ANZECC publications

- Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, published by Australian and New Zealand Environment and Conservation Council (ANZECC) and the National Health and Medical Research Council (NHMRC), January 1992
- Australian Water Quality Guidelines for Fresh and Marine Waters, Australian and New Zealand Environment and Conservation Council (ANZECC), November 1992, which are only approved for the purposes of contaminated site assessment, investigation, remediation and site auditing under the Contaminated Land Management Act (or other relevant legislation) commenced before September 2001
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4, October 2000

EnHealth publications (formerly National Environmental Health Forum monographs)

- *Composite Sampling*, by Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, Adelaide
- Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia, June 2002

National Environment Protection Council publications

• National Environment Protection (Assessment of Site Contamination) Measure 1999

The Measure consists of a policy framework for the assessment of site contamination, Schedule A (*Recommended General Process for the Assessment of Site Contamination*) and Schedule B (*Guidelines*). Schedule B guidelines include:

- B(1) Guideline on Investigation Levels for Soil and Groundwater
- B(2) Guideline on Data Collection, Sample Design and Reporting
- B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils
- B(4) Guideline on Health Risk Assessment Methodology
- B(5) Guideline on Ecological Risk Assessment
- B(6) Guideline on Risk Based Assessment of Groundwater Contamination
- B(7a) Guideline on Health-Based Investigation Levels
- B(7b) Guideline on Exposure Scenarios and Exposure Settings
- B(8) Guideline on Community Consultation and Risk Communication
- B(9) Guideline on Protection of Health and the Environment During the Assessment of Site Contamination
- B(10) Guideline on Competencies & Acceptance of Environmental Auditors and Related Professionals

Other documents

- *Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes*, NSW Agriculture and CMPS&F Environmental, February 1996
- Australian Drinking Water Guidelines, NHMRC & Agriculture and Resource Management Council of Australia and New Zealand, 1996



Appendix B Construction staging information (preliminary only)

This Appendix provides an overview of the drainage outlets and the bridge works in proximity to the Alexandra Canal

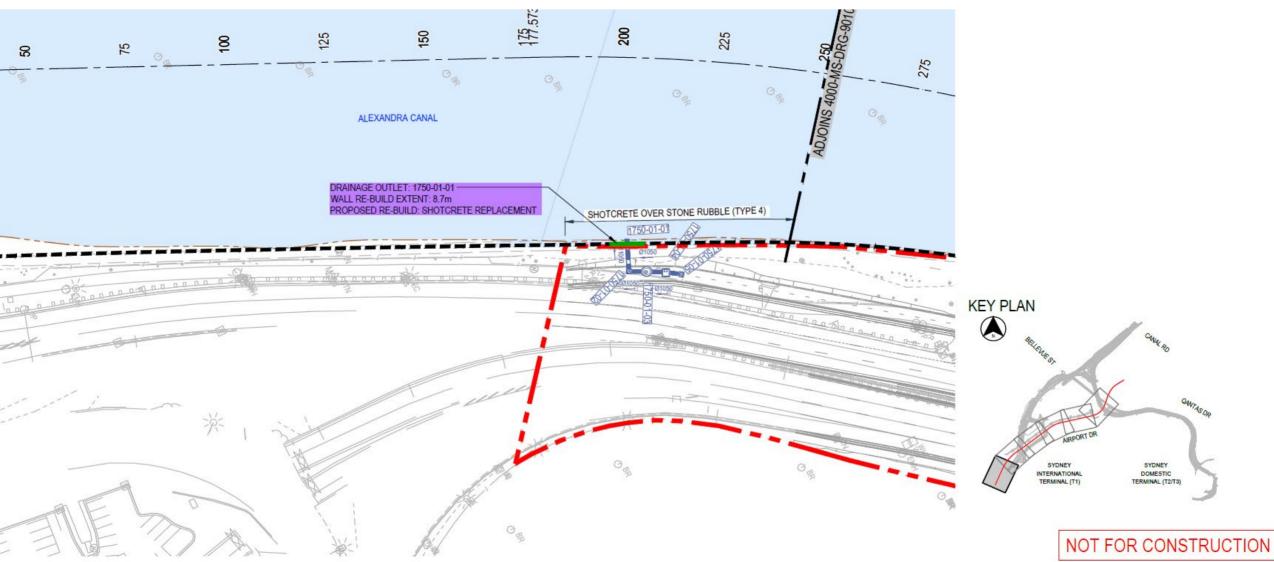
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SGWPW-JHSW-NWW-PM-PLN-000520 Contaminated Aquatic Sediments in Alexandra Canal Appendix Management Sub Plan

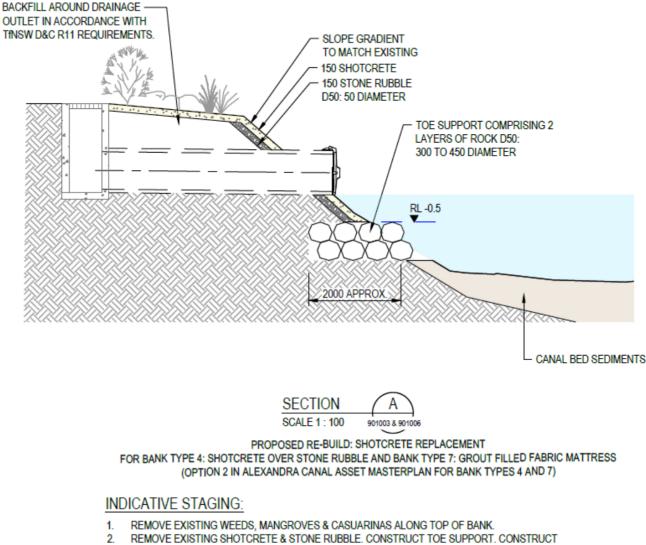
Design and Construction along the Canal



- **Being Constructed:** 1050mm diameter piped outlet
- **Wall Treatment:** Shotcrete replacement (shotcrete over stone rubble type 4)



- 1050mm diameter piped outlet
- 8.7m wall rebuild
- Environmental boom (up to 2) will be placed to prevent contaminated material being disturbed into the Canal
- Coffer Dam would be placed to allow drainage to construct toe
- Rocks gently placed to form structural support for shotcrete wall

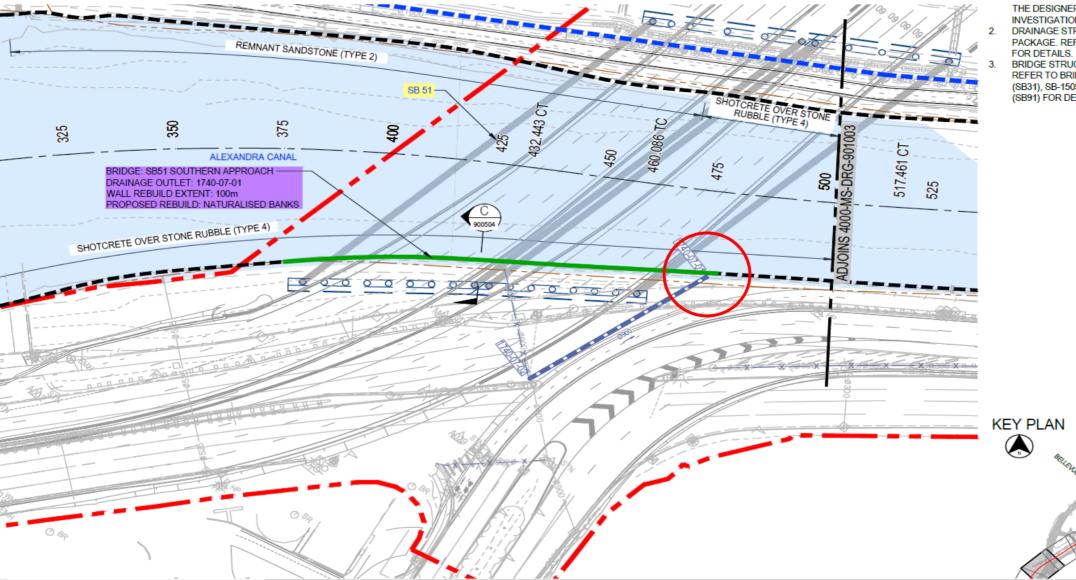


- DRAINAGE OUTLET AND BACKFILL IN ACCORDANCE WITH TRNSW D&C R11 REQUIREMENTS.
- PLACE STONE RUBBLE AND SHOTCRETE ON CANAL WALL FACE. SHOTCRETE COLOUR SHALL MATCH THE COLOUR OF THE EXISTING CANAL WALL.
- 4. PLANT NEW GRASSES ALONG TOP OF BANK.

Canal Wall Rebuild SB51 – (Case 178763 + BOA)



- Being constructed: Bridge Piers
- Wall Treatment: Shotcrete replacement (Shotcrete over Stone Rubble (Type 4))

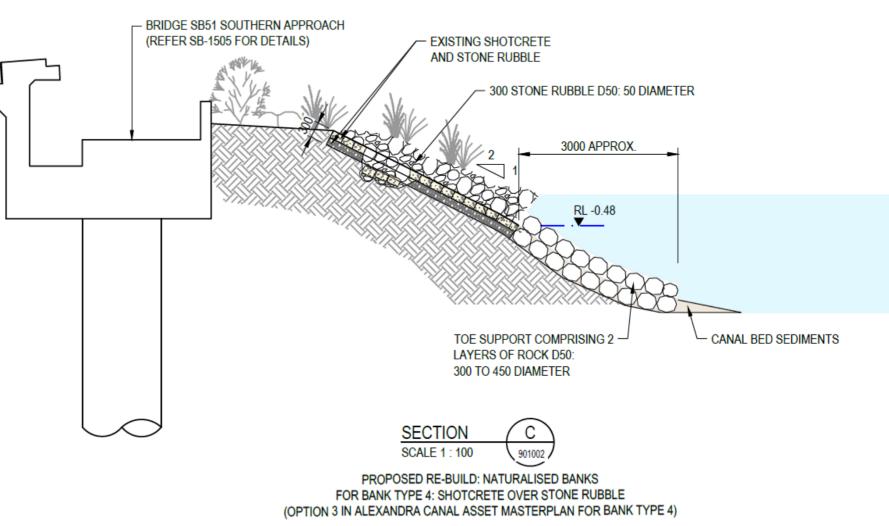


- THE DESIGNER DURING DETAILED DESIGN PENDING FURTH INVESTIGATION AND DESIGN DEVELOPMENT.
- DRAINAGE STRUCTURES ARE SHOWN INDICATIVELY IN THIS PACKAGE. REFER TO DRAINAGE PACKAGES (DR-1450) AND (FOR DETAILS.
- BRIDGE STRUCTURES ARE SHOWN INDICATIVELY IN THIS PA REFER TO BRIDGE DESIGN PACKAGES SB-1515 (SB21), SB-15 (SB31), SB-1505 (SB51), SB-1535 (SB61), SB-1560 (SB81) AND S (SB91) FOR DETAILS.

Canal Wall Rebuild SB51 – (Case 178763 + BOA)



- 100m wall rebuild
- Rocks to be placed gently from truck (not dumped).
 Nominally 300-450mm diameter
- Smaller stone rubble to b placed above toe, with shotcrete over
- In line with Alexandra Canal Asset Managemen Plan
- Double environmental booms to be placed around SB51 to prevent discharge of sediments o contaminants
- No rebuild on Northern bank

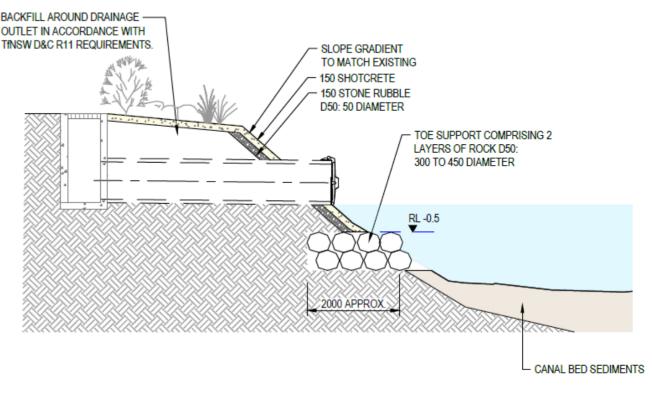


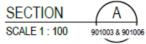
INDICATIVE STAGING:

- . REMOVE EXISTING WEEDS, MANGROVES & CASUARINAS WITHIN ALONG TOP OF BANK
- BREAK-UP EXISTING SHOTCRETE & STONE RUBBLE TO 300mm FROM CANAL WALL SURFACE.
- INSTALL ROCK BOULDERS OVER EXISTING SHOTCRETE AND LARGE TOE ROCKS.
- 4. PLANT LOW SALTMARSH SPECIES IN BANK AND NEW GRASSES ALONG TOP OF BANK.



- Being Constructed: 900mm diameter drainage pipe
- **Wall Treatment:** Shotcrete replacement (shotcrete over stone rubble type 4)
- Environmental boom (up to 2) will be placed to prevent contaminated material being disturbed into the Canal
- Coffer Dam would be placed to allow drainage to construct toe
- Rocks gently placed to form structural support for shotcrete wall





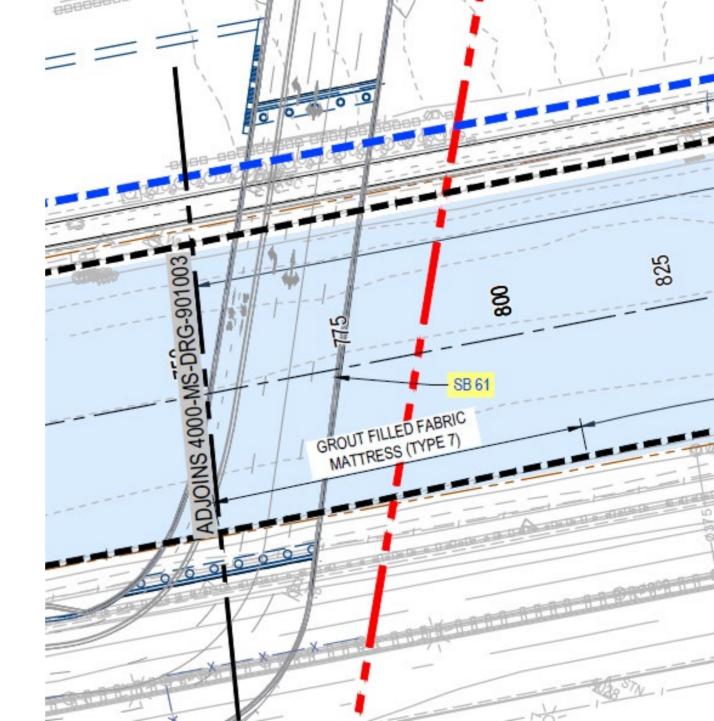
PROPOSED RE-BUILD: SHOTCRETE REPLACEMENT FOR BANK TYPE 4: SHOTCRETE OVER STONE RUBBLE AND BANK TYPE 7: GROUT FILLED FABRIC MATTRESS (OPTION 2 IN ALEXANDRA CANAL ASSET MASTERPLAN FOR BANK TYPES 4 AND 7)

INDICATIVE STAGING:

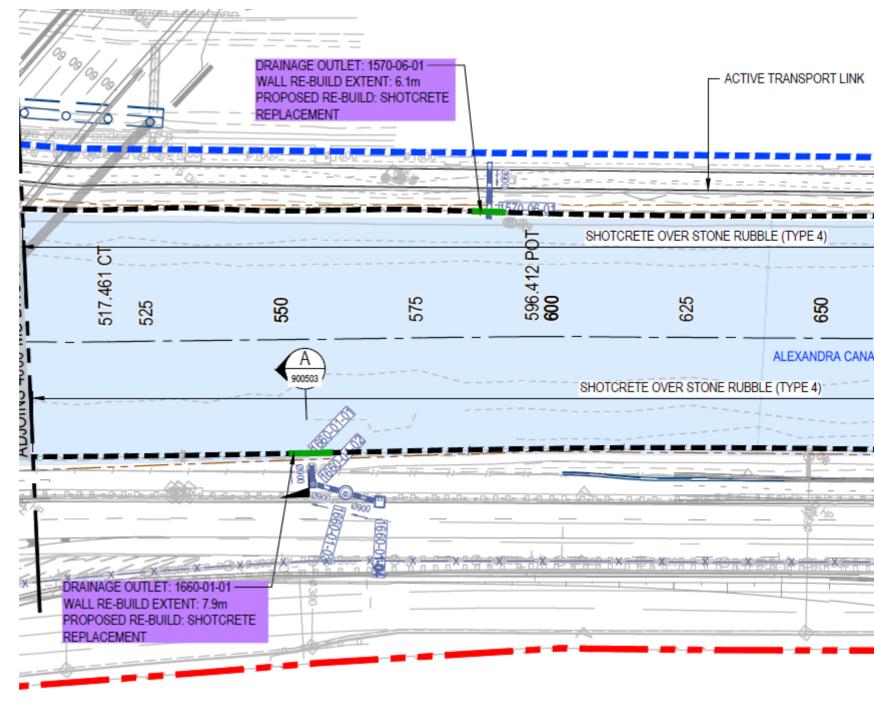
- 1. REMOVE EXISTING WEEDS, MANGROVES & CASUARINAS ALONG TOP OF BANK.
- REMOVE EXISTING SHOTCRETE & STONE RUBBLE. CONSTRUCT TOE SUPPORT. CONSTRUCT DRAINAGE OUTLET AND BACKFILL IN ACCORDANCE WITH TINSW D&C R11 REQUIREMENTS.
- 3. PLACE STONE RUBBLE AND SHOTCRETE ON CANAL WALL FACE. SHOTCRETE COLOUR SHALL MATCH THE COLOUR OF THE EXISTING CANAL WALL.
- 4. PLANT NEW GRASSES ALONG TOP OF BANK.

SB61 - (Case 178761 + BOA)

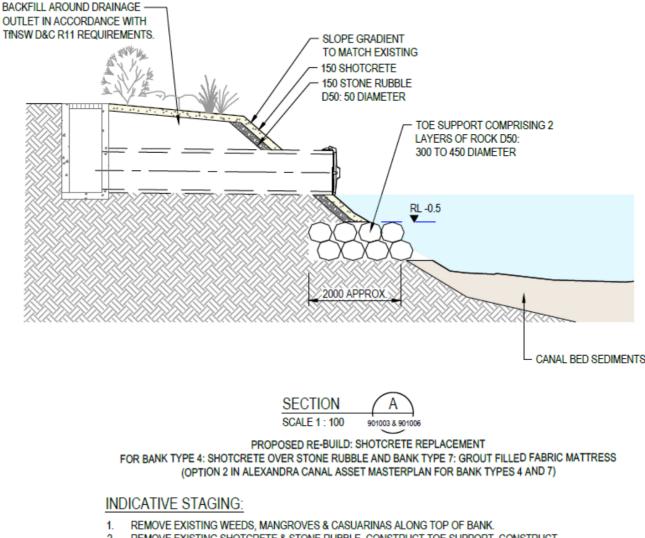
- Being Constructed: 2 x 900mm diameter drainage outlets (1 on North, 1 on South bank of Canal)
- Wall Treatment: N/A
- BOA and Case submission will include SEA documenting results of design and construction methodologies



- Being Constructed: 2 x 900mm diameter drainage outlets (1 on North, 1 on South bank of Canal)
- Wall Treatment: Shotcrete over Stone Rubble (Type 4)
- East of SB51
- 6.1m wall rebuild (northern bank)
- 7.9m wall rebuild (southern bank)



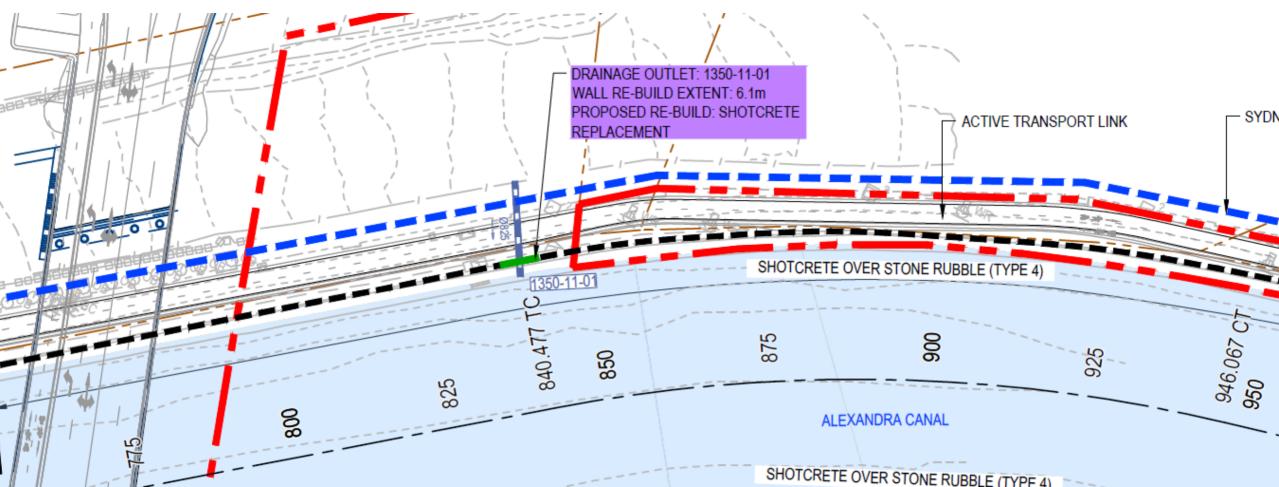
- 900mm diameter piped outlet
- Environmental boom (up to 2) will be placed to prevent contaminated material being disturbed into the Canal
- Coffer Dam would be placed to allow drainage to construct toe
- Rocks gently placed to form structural support for shotcrete wall



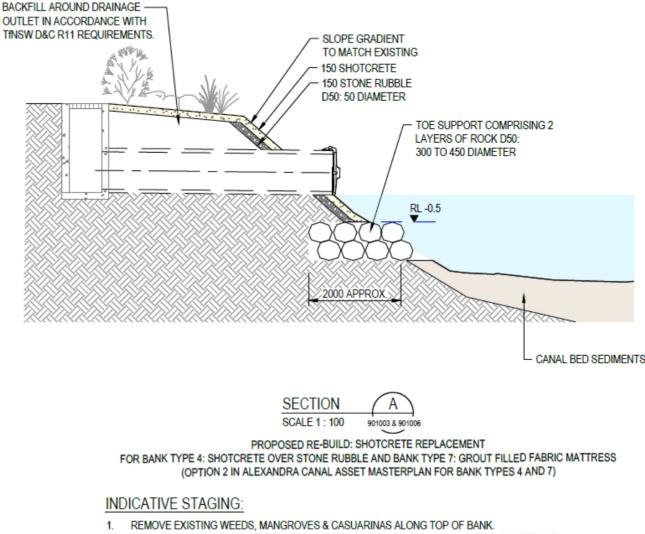
- REMOVE EXISTING SHOTCRETE & STONE RUBBLE. CONSTRUCT TOE SUPPORT. CONSTRUCT DRAINAGE OUTLET AND BACKFILL IN ACCORDANCE WITH TFNSW D&C R11 REQUIREMENTS.
- PLACE STONE RUBBLE AND SHOTCRETE ON CANAL WALL FACE. SHOTCRETE COLOUR SHALL MATCH THE COLOUR OF THE EXISTING CANAL WALL.
- 4. PLANT NEW GRASSES ALONG TOP OF BANK.



- **Being Constructed:** 1 x 825mm diameter drainage outlets (1 on North bank of Canal)
- Wall Treatment: Shotcrete over Stone Rubble (Type 4)
- West of Sb61
- 6.1m wall rebuild



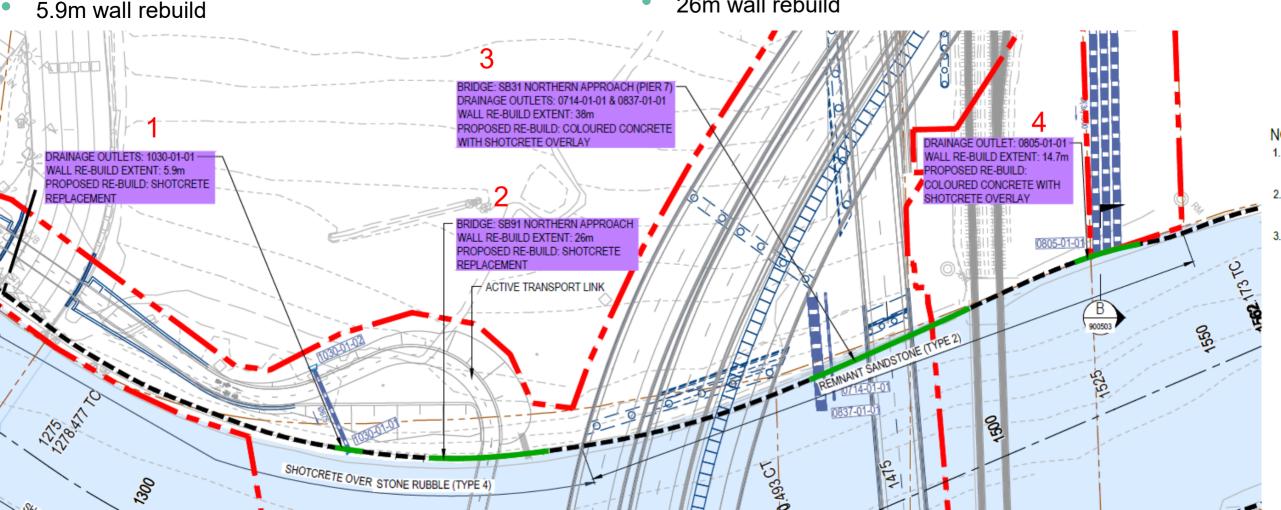
- 825mm diameter piped outlet
- Environmental boom (up to 2) will be placed to prevent contaminated material being disturbed into the Canal
- Coffer Dam would be placed to allow drainage to construct toe
- Rocks gently placed to form structural support for shotcrete wall



- REMOVE EXISTING SHOTCRETE & STONE RUBBLE. CONSTRUCT TOE SUPPORT. CONSTRUCT DRAINAGE OUTLET AND BACKFILL IN ACCORDANCE WITH TRNSW D&C R11 REQUIREMENTS.
- PLACE STONE RUBBLE AND SHOTCRETE ON CANAL WALL FACE. SHOTCRETE COLOUR SHALL MATCH THE COLOUR OF THE EXISTING CANAL WALL.
- 4. PLANT NEW GRASSES ALONG TOP OF BANK.

Canal Wall Rebuild

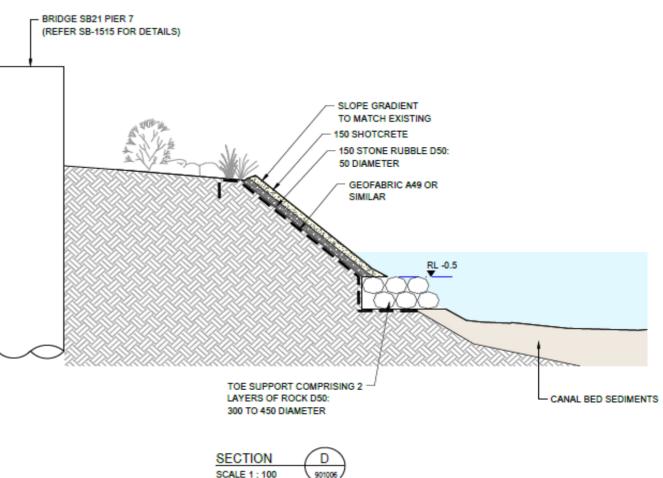
- ITEM 1 (Image below) CASE 178756
- **Being Constructed:** 1 x 675mm diameter drainage outlet
- **Wall Treatment:** Shotcrete over Stone Rubble (Type 4)
- HOLLAND ITEM 2 (Image below) – CASE 178764 + BOA
- Being Constructed: Bridge Abutments
- **Wall Treatment:** Shotcrete over Stone Rubble (Type 4)
- 26m wall rebuild



Canal Wall Rebuild SB81 – Case 178764 + BOA



- Environmental boom (up to 2) will be placed to prevent contaminated material being disturbed into the Canal
- Rocks gently placed to form structural support for shotcrete wall
- Geofabric to be placed with shotcrete atop geofabric
- Image for SB21, but SB81 similar



PROPOSED RE-BUILD: SHOTCRETE REPLACEMENT FOR BANK TYPE 4: SHOTCRETE OVER STONE RUBBLE AND BANK TYPE 7: GROUT FILLED FABRIC MATTRESS (OPTION 2 IN ALEXANDRA CANAL ASSET MASTERPLAN FOR BANK TYPES 4 AND 7)

INDICATIVE STAGING:

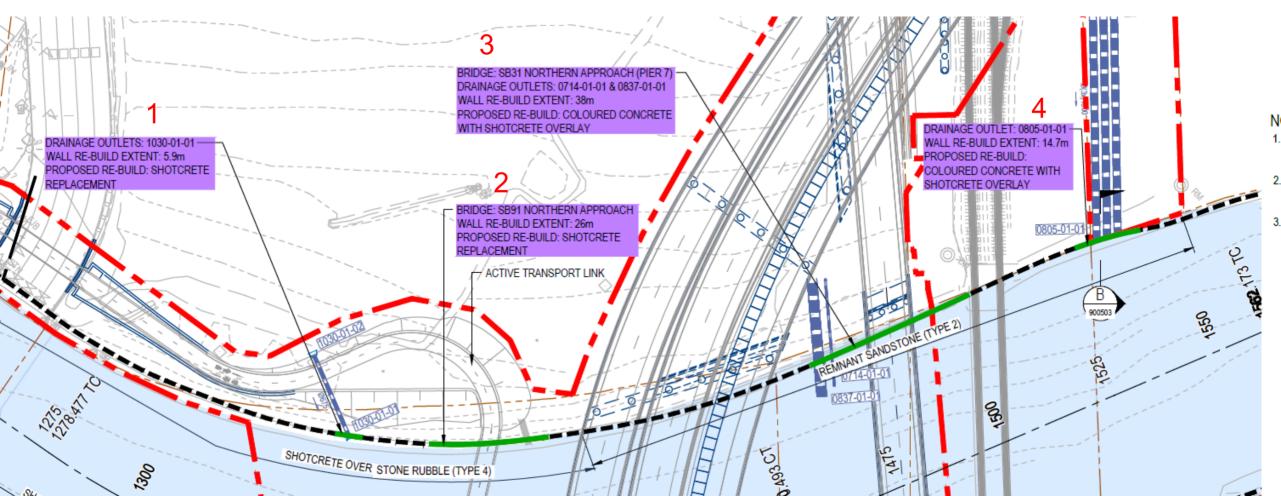
- 1. REMOVE EXISTING WEEDS, MANGROVES & CASUARINAS ALONG TOP OF BANK.
- REMOVE EXISTING SHOTCRETE & STONE RUBBLE. CONSTRUCT TOE SUPPORT WITH GEOFABRIC A49 (OR SIMILAR)
- PLACE STONE RUBBLE ON TOP OF GEOFABRIC A49 (OR SIMILAR) AND SHOTCRETE ON CANAL WALL FACE. SHOTCRETE COLOUR SHALL MATCH THE COLOUR OF THE EXISTING CANAL WALL.
- 4. PLANT NEW GRASSES ALONG TOP OF BANK.

Canal Wall Rebuild

- ITEM 3 (Image below) CASE 178761 + BOA
- Being Constructed: Bridge Abutments SB31
- Wall Treatment: Coloured Concrete with shotcrete overlay
- 38m wall rebuild

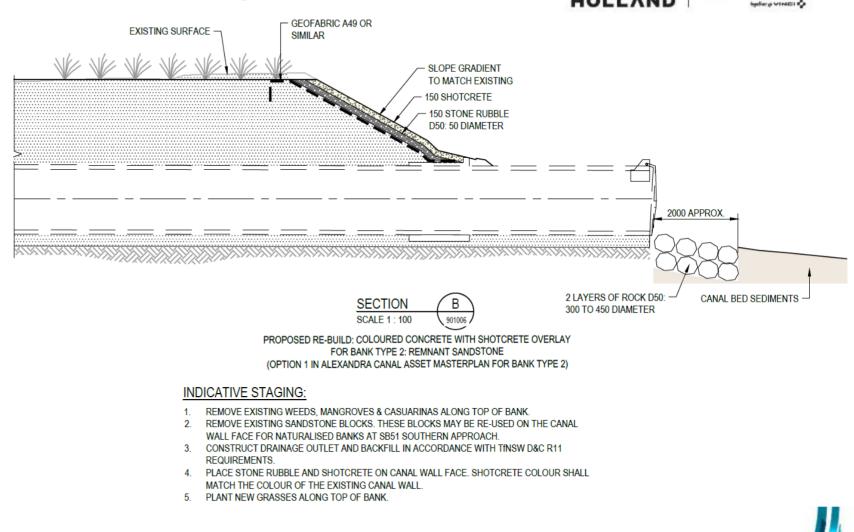


- ITEM 4 (Image below) CASE 178756
- **Being Constructed:** 3 x 1800mm diameter pipe outlets
- **Wall Treatment:** Coloured concrete with shotcrete overlay
- 14.7m wall rebuild



Canal Wall Rebuild – Case 178756 Drainage Outlets

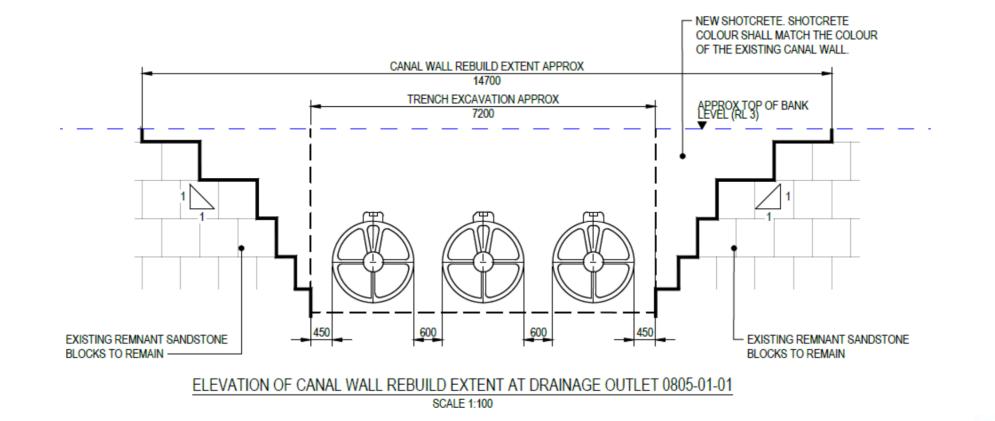
- Environmental boom (up to 2) will be placed to prevent contaminated material being disturbed into the Canal
- Coffer dam to be constructed and pit dewatered
- Rocks gently placed for scour protection at drainage pipe outlets
- Excavation for drainage pipes with backfill
- Placement of coloured concrete with shotcrete overlay



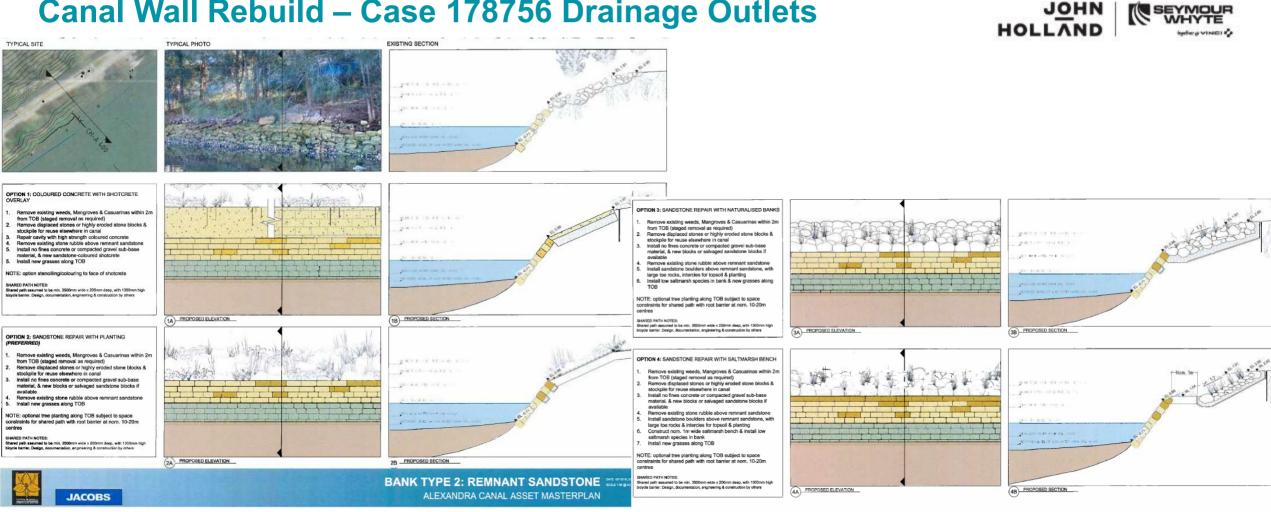
Canal Wall Rebuild – Case 178756 Drainage Outlets



- Elevation below, showing flood gates
- Shotcrete colour to match colour of the existing canal wall
- Rebuild to be stepped to match into existing sandstone blocks



Canal Wall Rebuild – Case 178756 Drainage Outlets



BANK TYPE 2: REMNANT SANDSTONE SOLETIMENT ALEXANDRA CANAL ASSET MASTERPLAN

SEYMOUR

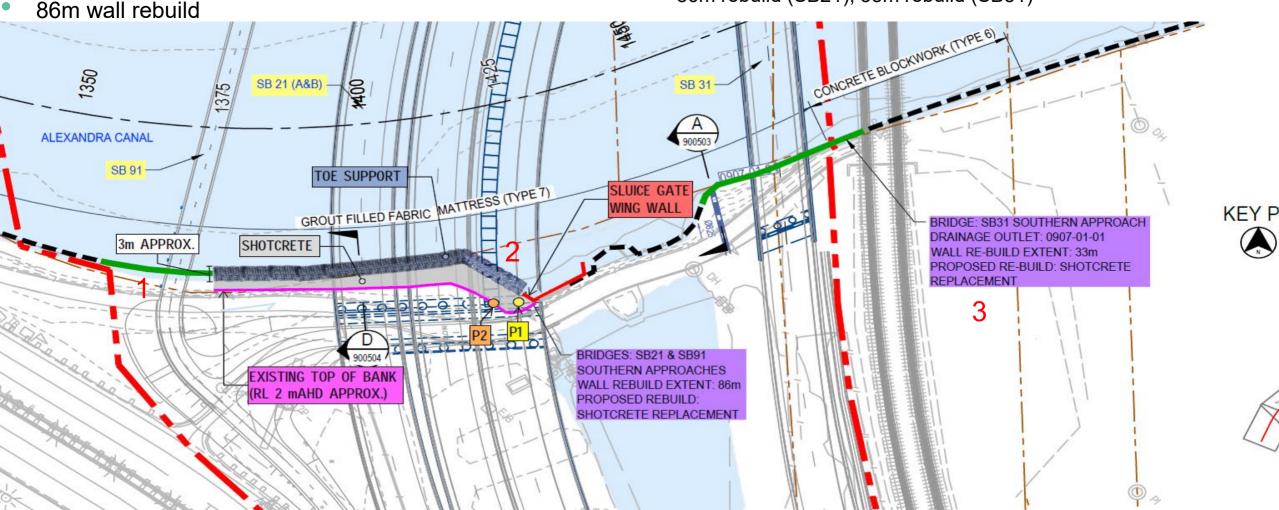
JACOBS

Canal Wall Rebuild

- ITEM 1 (Image below) CASE 178764 + BOA
- Being Constructed: Bridge Abutments SB91
- Wall Treatment: Shotcrete Replacement

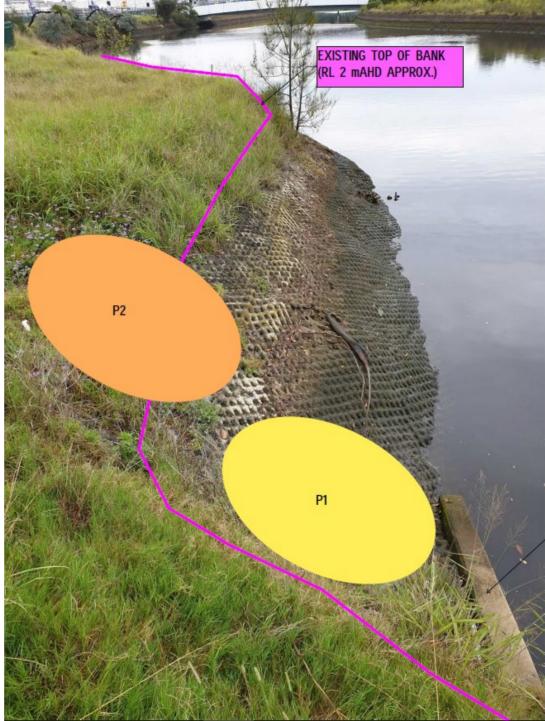


- ITEM 2 & 3 (Image below) CASE 178761 + BOA
- Being Constructed: Bridge Abutments SB21 and SB31
- Wall Treatment: Shotcrete Replacement
- 86m rebuild (SB21); 33m rebuild (SB31)



Canal Wall Rebuild – Case 178761 + BOA – SB21

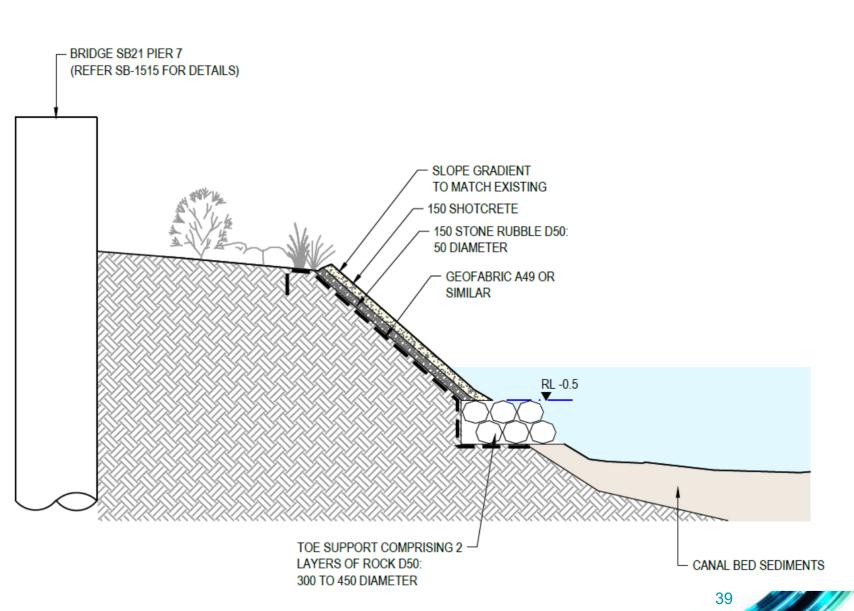
- Piles located in close proximity to existing canal wall
- Environmental boom (up to 2) will be placed to prevent contaminated material being disturbed into the Canal
- Rock platform to be built, per plan on previous slide (rocks to be gently placed)
- Piles to be constructed
- Shotcrete to be placed above rock platform and around piles
- Excess rocks to be removed



SLUICE GATE WING WALL

Canal Wall Rebuild – Case 178761 + BOA – SB21

- Piles located in close proximity to existing canal wall
- Environmental boom (up to 2) will be placed to prevent contaminated material being disturbed into the Canal
- Rock platform to be built, per plan on previous slide (rocks to be gently placed)
- Piles to be constructed
- Shotcrete to be placed above rock platform and around piles
- Excess rocks to be removed



HOLLAN

Summary of Construction Methods



- Wall rebuilds will follow proposed and preferred treatments in Alexandra Canal Asset Management Plan wherever possible
 - Preferred treatments cannot always be followed due to the steepness of the banks and need to provide scour protection
 - E.g. naturalised banks often preferred, where required, shotcrete replacement used (for Bank Type 4 and 7, as examples
- Rocks to be placed by boom/HIAB into canal, to sink into sediments
- Form the toe of any shotcrete rebuilds
- All drainage outlets will have a localised Coffer Dam at the outlet
- Where needed, rock platforms will be placed in the Canal to prevent coffer dam construction (i.e. SB21 southern abutment)



Appendix C

Site Auditor Interim Audit Advice





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Geosyntec Consultants Pty Ltd ABN 23 154 745 525 Suite 1, Level 9, 189 Kent St Sydney NSW 2000 www.geosyntec.com.au

20051 IA85 14Jan22 Revised CASACMP Rev1

14 January 2022

Robert Muir John Holland Seymour Whyte Joint Venture 10 Bourke Road, Mascot, NSW 2020

Via email: <u>Robert.Muir@jhsw.com.au</u> cc: <u>anne.andersen@jhsw.com.au</u>

Dear Rob,

Re: Interim Advice No. 85 – Review of the Revised Contaminated Aquatic Sediments in the Alexandra Canal Management Plan, Sydney Gateway, Tempe NSW Sydney Gateway Road Project

1 Introduction

John Holland Seymour Whyte Joint Venture (JHSW JV) has appointed Kylie Lloyd of Geosyntec Consultants Pty Ltd (Geosyntec) to conduct an Audit at the Sydney Gateway Project, NSW. The project is regarded as a critical element for the NSW Government's long-term strategy to invest in integrated transport network to improve access for passengers and freight to and around Sydney Kingsford Smith Airport.

The aim of the engagement is to enable a site audit statement (SAS) and associated site audit report (SAR) to be prepared that confirms the suitability of the site for proposed redevelopment as a road network, a new waste mound (cell) and leachate treatment plant, in accordance with the NSW EPA (2017) Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd edition).

2 Scope of Audit / Review and Nature of Interim Advice

NSW EPA (2017) describes the site assessment and audit process as:

- Consultant is commissioned to assess contamination. The contaminated site consultant designs and undertakes the site assessment and, where required, all remediation and validation activities to achieve the objectives specified by the owner or developer; and
- Site auditor reviews the consultant's work. The site owner or developer commissions the Auditor to review the consultant's work. The Auditor then prepares a SAR and SAS at the conclusion of the review, which are given to the owner or developer.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.

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This Audit is statutory in nature and makes reference to requirements contained within Conditions C7, C8, C9, E46, E47 and E90 of the State Significant Infrastructure SSI) 9737 dated 27 August 2020. This IA was prepared to address requirement of Condition C9, following update of the Contaminated Aquatic Sediments in Alexandra Canal Management Plan, as follows:

C9 Any variations to the Landfill Leachate, Gas and Odour CEMP Sub-plan and Contaminated Aquatic Sediments in Alexandra Canal CEMP Sub-plan must be approved in writing by the EPA accredited Site Auditor and evidence of the approval submitted to the Planning Secretary for information with the amended Sub-plan.

3 Current Interim Advice

In preparing this interim audit advice, the Auditor has reviewed the following reports related to land contamination assessment:

 JHSWJV (15 December 2021) Contaminated Aquatic Sediments in Alexandra Canal Management Plan SSI 9737 (Ref: SGWPW-JHSW-NWW-PM-PLN-000520 Rev 1) ('CASACMP').

The purpose of the current IA is to endorse the above plan following update of the document and the associated environmental work method statement (EWMS) to include the methodology and management of installation of temporary steel screw piles into the canal.

Reference is also made to the following associated documents

- JHSWJV (27 October 2021) Soil and Water Management Sub Plan Sydney Gateway Road Project - SSI-9737 (Ref: SGWPW-JHSW-NWW-PM-PLN-000515 Rev 0) ('SWMP').
- JHSWJV (21 October 2021) Construction Waste Management Plan (EPL 21524) (Ref: SGWPW-JHCW-NWW-EN-PLN-000539 Rev 7) ('CWMP').
- JHSWJV (16 December 2021) Environmental Work Method Statement Working in or Near Alexandra Canal ('EWMS') as included in the CASACMP.

4 Summary of the CASACMP

The purpose of the report is to describe how the JHSWJV proposes to manage work in Alexandra Canal, and how compliance with the existing Remediation Order (Ref. 23004) that applies to the bed sediments in the canal will be maintained through the Project.

The CASACMP has been revised to include the methodology and management of installation of temporary steel screw piles into the canal.

The key objective of the report is to address all requirements relevant to works within Alexandra Canal are captured, scheduled and assigned responsibility as outlined in:

- The combined environmental impact statement (EIS) / major development plan (MDP) prepared for the Sydney Gateway Project.
- Conditions of Approval (CoA) for SSI 9737 issued by the Minister for Planning and Public Spaces (NSW) on 27 August 2020.
- Updated mitigation measures (UMMs) detailed in the Response to Submissions Report.
- Roads and Maritime specifications G36, G38 and G40.
- The Project's Environmental Protection Licence (EPL).
- Relevant legislation and other requirements described in Section 3.1 of this Plan.
- The objectives and actions required by the NSW EPA's remediation order (Ref. 23004) that apply to the Alexandra Canal (Appendix A).

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The plan does not include measures to manage surface water quality impacts associated with works adjacent to the Canal or acid sulfate soils (which are managed through the Soil and Water Management Plan (SWMP) or any waste removal associated with works (which is managed through the Waste & Resources Management Plan).

The established targets include:

- · Compliance with the relevant legislative requirements, CoA and UMM.
- Meet EPL requirements.
- Provide training in the form of inductions to relevant Project personnel relating to works in Alexandra Canal, before they begin work on site.
- Ensure compliance with the NSW EPA's remediation order (Ref. 23004) that applies to the Alexandra Canal.
- Minimise the disturbance and migration of contaminated sediments at Alexandra Canal.
- Prevent the generation of ASS and therefore minimise the potential creation of sulfuric acid as a product of ASS.

The CASACMP provides the following requirements:

- Summary of environmental requirements
- Existing environment conditions
- · Construction activities and potential impacts
- Construction methodology and environmental control measures
- Compliance management
- Review and improvement

The adopted water quality trigger values (provided in WSP GHD (22 October 2019) Sydney Gateway Road Project Technical Working Paper 8 – Surface Water (Ref: SG04-G2S-EN-RPT-WQ-0006-05) and Appendix E of the WSP GHD (May 2020) Sydney Gateway Road Project Response to Submissions Report) were based on the following:

- For physical and chemical stressors, use the least stringent of the 80th percentile values from the monitoring data (from SW6) and the default trigger values for aquatic ecosystems in marine waters.
- For non-bioaccumulative toxicants, use the least stringent of the 80th percentile values from the monitoring data (from SW6) and the 80% species protection level for marine waters
- For bioaccumulative toxicants, use the least stringent of the 80th percentile values from the monitoring data (from SW6) and the 95% species protection level for marine waters.
- To obtain 80% species protection level, WSP GHD (22 October 2019) appeared to consider the minimum between ANZG (2018) trigger level for the protection of 80% ecosystem for marine water, ANZECC (2000) primary and secondary contact recreation trigger level, ANZECC (2000) water quality guidelines for aquaculture and human consumers of aquatic foods and Airports (Environment Protection) Regulation 1997.

The adopted sediment trigger values were based on ANZG (2018).

The mitigation measures adopted were based on the following principles:

- Preventing the dispersion of turbid plumes potentially containing elevated levels of chemicals of potential concern into Alexandra Canal.
- Preventing the generation of ASS and therefore minimising the potential creation of sulfuric acid as a product of ASS.

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A Joint Venture Project

The main adopted mitigation strategy to achieve the above is installation of coffer dams around the proposed construction activities. The proposed construction activities include installation of 10 outlets as part of the Project stormwater drainage system, as well as development of a bridge.

5 Summary of EWMS – Working in or Near Alexandra Canal

The EWMS has been prepared to identify environmental risk and mitigation measures to minimise potential adverse effects associated with construction activities on or adjacent to Alexandra Canal.

The EWMS identifies hazards and aspects, impacts and controls associated with planning and preliminary activities, mobilisation and site establishment, operation within or near Alexandra canal, earthworks and general construction, Active Transport Link works, Active Transport Link boardwalk diversion works, Bridge and Drainage construction works, installation and removal of coffer dams and permanent rockwall construction.

6 Summary of the SWMP

The purpose of the Soil and Water Management Plan (SWMP) is to describe how JHSWJV proposes to minimise and manage potential soil and water quality during construction of the projects. This also includes management of works within the Alexandra Canal to meet the requirement of the Remediation Order #23004, which is provided in the CASACMP.

The SWMP addresses responsibilities outlined in the following documents:

- The combined Environmental Impact Statement (EIS) / Major Development Plan (MDP) prepared for the Sydney Gateway Project.
- Conditions of Approval for SSI 9737 issued by the Minister for Planning and Public Spaces (NSW), on 27 August 2020.
- · Updated Management Measures (UMM's) detailed in the Response to Submissions Report.
- TfNSW specifications G36, G38 and G40.
- Relevant legislation and other requirements described in Section 3.1 of this Plan.
- Environment Protection Licence (EPL) # 21524 requirements.

The SWMP provides relevant erosion and sediment control plans relevant to this work, which has been reviewed for the purpose of this IA.

7 Summary of the CWMP

The Construction Waste Management Plan (CWMP) outlines a strategy for the management, disposal and recycling of waste generated during road construction associated with the Sydney Gateway Road Project, according to the principles of the resource management hierarchy outlined in the *Waste Avoidance and Resource Recovery Act 2001*.

The CWMP was prepared specifically to address the requirements of Operating Condition O5.2 of NSW EPL No. 21524, which are aimed at achieving the following outcomes:

- Contamination is not spread to less contaminated areas, or mixed with less contaminated or clean material, within the boundary of the licensed premises; and
- Material brough onto the former Tempe landfill site will not add to the current contamination impacts.

The CWMP provides a definition for the term 'waste' and definitions for the activities associated with the different waste streams (i.e. reuse; recycling; disposal; encapsulation). The CWMP provides a list of the types, waste classifications, and estimated quantities of waste streams that are likely to be generated during the road construction works, as well as the locations of where

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those waste streams are proposed to be stockpiled and reused at the site. Where waste cannot be reused within the project, the CWMP outlines the measures for offsite disposal.

The CWMP includes disposal of material from works in Alexandra Canal in Table 2 of the document.

8 Regulatory Requirements

A Remediation Order (Ref. 23004) for Alexandra Canal has been issued by NSW EPA to manage the bed sediments in Alexandra Canal that are contaminated with chlorinated hydrocarbons (including chlordane, total DDT and dieldrin), PCBs and metals.

In summary, Sydney Water is required to:

- Refrain from allowing any works on the bed sediments that allows further disturbance (other than allowed by the order).
- A written plan is to be submitted to NSW EPA for any disturbance of the sediments which must be prepared in accordance with EPA guidelines for Consultants Reporting (as appropriate), with the provision being waived for emergency works.
- All works must follow the plan and Sydney Water must make people aware of the requirements

These requirements are to be followed by any agents, contractors, licensees or lessees for works within the designated area.

9 Auditor Endorsement

The Auditor has reviewed the JHSWJV (15 December 2021) CASACMP, JHSWJV (27 October 2021) SWMP and JHSWJV (21 October 2021) CWMP against relevant guidelines made or approved by NSW EPA and considers that the document is appropriate, noting that approval by NSW EPA must be obtained prior to work commencement to satisfy Remediation Order requirements.

10 Closure

This interim advice has been prepared to provide the opinion of the Auditor based on the review of currently available information.

Should you have any queries or wish to discuss any points, please do not hesitate to Cheryl Halim or the undersigned.

Yours sincerely,

Kylie Lloyd Site Auditor Geosyntec Consultants Pty Ltd

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Appendix



Appendix D Plan

EWMS and Environmental Control

Environmental Work Method Statement – Working in or Near Alexandra Canal

EWMS No.:	102	Activity:	Working in or Near Alexandra Canal						
WRA Reference:	WRA/SG/001 Commencement Date:		October 2021	Completion Date:	December 2023				
Project No.:	7030		EWMS Review Date:	April 2022					
Project:	Sydney Gateway		To be Reviewed By:	Environment Department					
Site Address:	Qantas Building, Building 10 Bourke St, Mascot	D	Personnel Responsible for Monitoring this Activity:	Supervisors					
Employer:	John Holland / Seymour \	Whyte JV	Monitoring and Review Timeframe:	6 months					
ABN:	11 004 282 268		Maximum of 6 monthly						

Scope of Activity:

This Environmental Work Method Statement (EWMS) has been prepared to identify environmental risk and mitigation measures to minimise potential adverse impacts associated with construction activities on or adjacent the Alexandra Canal

Types of activity categories that will occur in or near Alexandra Canal and will be guided by this EWMS:

- Site establishment
- Demolition of footpath decking
- Drainage installation
- Earthworks
- Concrete Injected Columns
- Piling and Bridge Construction
- Active Transport Link
- Permanent bank scour and bank rebuild
- Landscaping / revegetation

The EWMS will be progressively revised as construction works progress to continue identifying and managing potential impacts from works occurring in or adjacent the Alexandra Canal

Refe	rences (Health, Safety and Environment)	- List below (legislations, guidelines)								
Airports (Environment Protection) Regulations 1997	Protection of the Environment Operations (Waste) Regulations 2005 (NSW)	Managing Urban Stormwater: Soils and Construction, Volume 1 (Landcom 2004) and Volume 2 (DECC 2008) (the "Blue Book").		Specification G36 – tal Protection.						
Airports Act 1996	Sydney Gateway Road Project Environment Impact Statement/ Preliminary Draft Major Development Plan Nov 2019	Sensitive Area Plan (SAP)	TfNSW QA S Soil & Water	tion Act 2012 (NSW)						
Sydney Airport Biodiversity Management TFNSW Waste Fact Sheets Heritage Act 1977 (NSW) Marine Pollution Act 2012 (NSW)										
Critical State Significant Infrastructure CSSI) approval (August 2020)	Contaminated Land Management Act 1997 (NSW)	Water Management Act 2000 (NSW)								
List- Discussions and planning with JHSWJVG E (These sources may include but not limited to: legislation	. .	trends, industry knowledge etc.)	odgement mee	eting.						
Position	Name	Signature		Date						
Senior Project Engineer:	Jason Audie	Ci)	Date	16/12/2021						
Environment Site Lead: John Bruun John Bruun Date: 16/12/2021										
Project Approval										
Area Manager:	Chris Carman	Date: 16/12/2021								

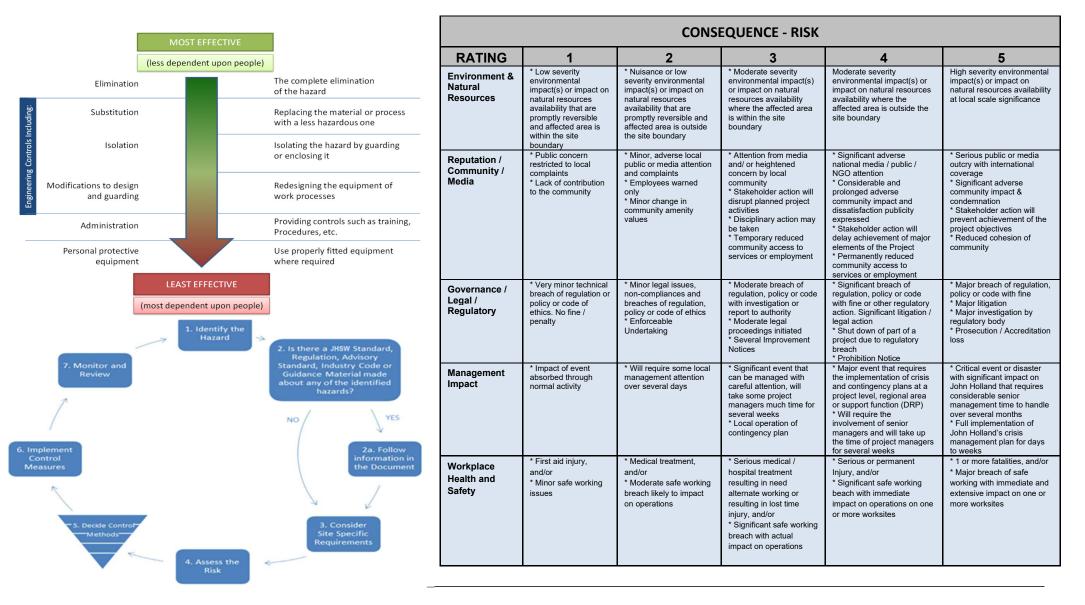


Equipment, Training and Qualifications

Plant and Equipment Required for this Activity	Personal Protective Equipment	
- Common plant & equipment includes:	Safety Footwear (AS/NZS 2210)	Hard Hat (AS/NZS 1801)
	Long-sleeved shirt (Hi-Visual) and long trousers	Gloves (AS/NZS 2161)
- Excavator	Eye Protection (AS/NZS 1337)	PFDs
- Backhoe	Waders	
- Bobcat		
- Auger		
- Boat (Small Punt)	Personnel Qualifications Required for this Activity	
- Compaction roller		
- Tipper / truck and dog	- Operator VOC's	
- Drill & Piling rigs	- Construction Induction (White Card)	
- Boom lift	 Site induction (including all requirements in this EWMS and relevant plans / maps, which all participants will be required to sign onto per p. 33 of 	
- Compressor	this EWMS)	
- Cranes		



Risk Assessment Framework



			_		CONSEQUENCE									
PROBABILITY OR CHANCE	QUALITATIVE ASSESSMENT	RECURRENCE TIMEFRAME		RATING	1	2	3	4	5					
≥ 90%	Almost certain to occur during the project / contract life	Less than "Monthly"		ALMOST CERTAIN	D	с	В	А	A					
51% to 89%	Considered likely to occur during the project / contract life	"Monthly" to "Yearly"		LIKELY	D	D	с	В	A					
30% to 50%	Considered a possible occurrence during the project / contract life	Between 2 and 5 years	гікегіноор	POSSIBLE	E	D	с	С	В					
5% to 29%	Considered unlikely to occur during the project / contract life	Between 5 and 20 years	Ľ	UNLIKELY	E	E	D	с	В					
< 5%	Considered a rare occurrence to happen during the project / contract life	Greater than every 20 years		RARE/ REMOTE	E	E	D	D	с					



Residual Risk / Opp. Rating	Suggested Action	Timing of Status Report and Management Plans	Authority to Accept or Tolerate Risk.
A	Take action to eliminate or implement additional controls to reduce it to acceptable level (ALARP / SFAIRP). "WHS / Environmental risks" the task or activity must not be performed. An alternative solution must be found.	Notify as soon as practicable, normally with 24 hours. Manage and re-evaluate risk / opportunity to allow <u>Business Unit</u> reporting monthly Notify John Holland's relevant Board	CEO / JHSWJV Project Director
		Committee and CEO / CFO	
	Implement additional controls to reduce it to ALARP/SFAIRP.	Notify as soon as practicable, normally within 72 hours.	Regional Gen Manager or Corporate EGM / CFO as appropriate.
В	"WHS / Environmental risks - The activity or task must not be performed without the explicit concurrence of the Project Director / Project Manager.	Manage and re-evaluate risk / opportunity to allow <u>project</u> reporting monthly Notify COO / Business Group EGM / CFO	EGM, JHSWJV Project Director
с	Implement additional controls reduce it to ALARP/SFAIRP where it is cost- effective to do so. "Onsite activities" – must not commence without Site Management review	Manage and re-evaluate risk / opportunity to allow <u>project</u> reporting <u>monthly</u>	Operational / Construction / Project Manager / Director
D	Implement additional controls to reduce to ALARP / SFAIRP (may be tolerable).	Manage and re-evaluate risk / opportunity to allow <u>project</u> reporting <u>monthly</u>	Team Leader
E	Lower priority (likely to be tolerable).	Monitor, manage and carryout activity in accordance with identified controls	Supervisor



	Hazard/Aspect	Impact		SK SCO out Con	ntrols Management Controls		RISK SCORE with Controls			Person Responsible (to ensure controls are applied)Construction ManagerEnvironment ManagerProject EngineerConstruction
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	controls are
	1. Obtaining required approvals to commence activity	 Non-compliance with approval conditions, relevant legislation and/or this EWMS 	3	Ρ	с	 EWMS will ensure compliance with all environmental safeguards and management measures contained in project approvals Works not to commence until activities are approved in the CEMP and Sub Plans No additional activities are permitted outside of the scope of the EWMS without approval If activities change ensure all permits and licences are updated, variations applied for and obtained 	3	Un	D	Manager Environment Manager
Planning & Preliminary Activities	2. Undertaking any required community consultation	• Impacts upon residents and community complaints	3	Ρ	с	 Community notification which refers to the works to be promulgated prior to commencement. A copy of this notification will be kept at the work site for referral by the construction team. The crew will be tool boxed on the Community Complaints Procedure. All personnel are to have copies of the project information line business card Any community enquiries are to be directed to the Sydney Gateway Project information team (as per business card) Condition survey of existing infrastructure (e.g. local roads, private property access, etc.) in close proximity to the works will be completed before commencing activities using excavators or other plant. 	2	Un	E	Manager Stakeholder Engagement
	3. Planning for the installation of erosion and sediment (ErSed) controls and spill containment	Uncontrolled sediment leaving site, resulting in pollution of waterways	3	Ρ	с	• A Progressive Erosion and Sediment Control Plan (PESCP) and site specific environmental controls plans will be prepared for the site and will incorporate progressive erosion and sediment controls where relevant in addition to spill controls.	2	Un	E	Manager



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls		SK SCOI		Construction Mgr / SPE Enviro Mgr
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	controls are
		 Fuel, oil or other liquid spill into waterways 				 Planning will be in line with Blue Book principles and will be designed and implemented to: Divert clean water around the site Minimise erosion and ground disturbance of footprint Reduce runoff water velocities and capture sediment using traps / checks Prevent sediment laden runoff and liquid spills such as poured concrete from moving off-site and entering any waterways, Alexandra Canal, coffer dams and drainage lines or drain inlets. 				
	 Unauthorised clearing or works beyond site boundaries 	 Breach of project conditions Regulatory action 	3	Ρ	с	 Ensure accurate survey set-out and cross checks of site boundaries All work crews to be fully briefed on "No Go" areas / zones and Site Environmental Plans Ensure boundary flagging and vegetation protection flagging is installed prior to commencement of works Crew to be fully briefed on work area boundaries and stop work procedures. 	3	Un	D	Surveyor Construction Mgr / SPE Enviro Mgr Supervisor
Mobilisation & Site Establishment	5. Mobilisation and access to work site	 Impacts upon residents and community complaints 	3	Ρ	С	 Community notification on the works to be promulgated to commencement. Works to be carried out during standard EPL 21524 work hours. Any work planned outside of standard work hours will be subject to and OOHW Permit in accordance with EPL 21524 conditions Noise impacts minimised in accordance with the Project Noise and Vibration Management Plan (NVMP) Affected property owners will receive notification prior to works in accordance with the Project Noise and Vibration Management Plan (NVMP) 	2	Un	E	Construction Manager Stakeholder Engagement Manager (SEM) Supervisor Operators Enviro Mgr / Coordinator



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls	RISK SCORE with Controls			Person Responsible
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
	6. Plant or equipment not clean on arrival to site	 Introduction of weeds to site Introduction of pests / diseases to Alexandra Canal 	3	Ρ	с	 All machinery used during construction are to be verified as clean and free of potential weeds, pests, and pathogens on arrival to site 	3	Un	D	Enviro Mgr / Coordinator Supervisor Operator
	7. Faulty Plant	• Fuel or oil leak / burst hose, resulting in water pollution or soil contamination within or adjacent Alexandra Canal	3	Ρ	с	 Plant pre-start to be conducted daily Qualified operators only Spill kits to be readily available at all work areas and crews trained in their use No refuelling of mobile plant in or near (within 40m) Alexandra Canal, use designated site refuelling areas only Non-Mobile Plant and large cranes are to be re-fuelled using spill mats and hydrocarbon booms prior to refuelling Vibration hammers to install sheet piles in or near waterways is to utilise biodegradable hydraulic fluids (e.g. Panolin) Report all spills and incidents to supervisor and JH Enviro Mgr / Coordinator immediately NSW DPI (Fisheries) is to be immediately notified of any fish kills in the vicinity of the works 	3	Un	D	Construction Manager Enviro Mgr / Coordinator Sepervisor Operators
	8. Fuel, chemical and liquid storage	• Fuel or chemical spill resulting in water pollution or soil contamination within or near a waterway	3	Ρ	с	 When in use and required for the work activity in or over the Alexandra Canal all fuels and chemicals to be stored in a bunded container / spill mat. All fuels and chemicals when not in use will to be stored at least 40m from waterways No refuelling of mobile plant in or near (within 40m) Alexandra Canal, use designated site refuelling areas only 	3	Un	D	Supervisor Operator Enviro Mgr / Coordinator



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls		SK SCOI		Person Responsible
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
						 Non-Mobile Plant and large cranes are to be re-fuelled using spill mats and hydrocarbon booms prior to refuelling 				
	9. Inadequate erosion and sediment controls	Uncontrolled sediment leaving site, resulting in pollution of waterways and Alexandra Canal	3	Ρ	с	 All ErSed controls, per the PESCP covering the work area, are to be installed and checked correct by Enviro Mgr prior to commencing work. If temporary ErSed controls are removed to allow work to proceed (dry weather) they are to be re-installed at close of day. Training to be provided to all levels of site staff in construction site ErSed. Permanent bank stabilisation and revegetation to be installed as soon as reasonably practical 	3	Un	D	Enviro Mgr / Coordinator Site Engineer Supervisor
	10. Fauna interaction	 Injuries or mortality of fauna 	3	Ρ	с	 NSW DPI (Fisheries) is to be immediately notified of any fish kills in the vicinity of the works. Should injured fauna or marine fauna be found on the site, local wildlife care of marine wildlife care groups and/or local veterinarians are to be contacted and arrangements made for the welfare of the animal. Phone number of the local WIRES group is1300 094 737. 	2	Un	E	Construction Manager Supervisor Operators Enviro Mgr/Coordinator
	11. Oil or fuel spill	Pollution of soils and/or waters	3	Р	с	All crews are to remain aware of and in compliance with the conditions of the	2	Un	E	Enviro Mgr Supervisor



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls		SK SCOI		Person Responsible
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
Operation of plant and equipment in, on or near Alexandra Canal						 relevant management plans and spill response procedures. Plant and equipment daily pre-start checks Site induction, addressing the management and response to spills and leaks. Vibrating Hammers to install sheet piles in or near waterways is to utilise biodegradable hydraulic fluids (e.g. Panolin) Consideration to be given to wrapping hydraulic hose joints with potential to leak or burst. Regular visual water quality checks for turbid plumes, hydrocarbon spills / slicks will be carried out when working in or near the waterway. All containers on vessels (e.g. drilling fluids, fuel, waste) should be closed and secured to the vessel where possible. Spill kits to be readily available at all work areas in or near Alexandra Wetlands and crews trained in their use Report all spills / incidents to JH Enviro Mgr / Coordinator immediately. Spill response training to be carried out on a regular basis by crews involved. Refuelling on/near water is to be avoided where possible. Follow refuelling methods from mobile and non-mobile plant. 				Operator Crew
	12. Fauna Interaction	 Injury or mortality of fauna 	3	Ρ	с	 Crew to be fully briefed on stop work protocol and the Fauna Protection Plan if unexpected fauna is encountered. Should injured marine fauna be encountered, local marine wildlife care groups and/or local veterinarians are to be contacted and arrangements made for the welfare of the animal. 24/7 Phone number for the ORRCA group is 02 9415 3333. 	2	Un	E	Enviro Mgr Supervisor Operator



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls		SK SCOI		Person Responsible
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
						 NSW DPI (Fisheries) is to be immediately notified of any fish kills in the vicinity of the works. 				Crew
Earthworks	 Acid Sulfate Soils Emplacement of imported contaminated fill material 	 Acidification of waters and damage to local ecosystems 	3	Ρ	с	 PASS/ASS identified and quantified during pre-construction are to be managed in accordance with project SWMP (ASSMP). Crew to be fully briefed on presence of PASS/ASS at the work area and how to manage in line with ASSMP. Provision to be available on site for stockpiling and treatment of PASS/ASS soils for re-use (Site Environmental Plan and ASSMP denote location/s). Provision to be available on site for the field identification of additional PASS/ASS using appropriate field tests (pHfox). Verification system to ensure no imported material is contaminated (incl. check points on ITP). On-site monitoring and verification (e.g. potential re-use onsite of PASS) and material selection from appropriate sources. 	3	Un	D	Enviro Mgr Supervisor Operator Crew
	15. Inadequate erosion and sediment controls	 Pollution of waters and ground / soils 	3	Ρ	с	 Earthworks within the Alexandra Canal itself will not occur 1 hour each side of high tide. This will significantly limit the amount of in stream disturbance and wet excavation and sedimentation. The works will also give consideration of tidal influence and variation in flow velocities. All ErSed controls, per the PESCP covering the work area, are to be installed and checked correct by Enviro Mgr prior to commencing work. 	3	Un	D	Enviro Mgr Supervisor Operator Crew



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls		SK SCOI		Person Responsible
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
						 If temporary ErSed controls are removed to allow work to proceed (dry weather) they are to be re-installed at close of day. Training to be provided to all levels of site staff in construction site ErSed. 				
	16. Clearing and Grubbing	 Over clearing or unauthorised clearing of vegetation 	4	Ρ	С	 A clearing permit must be prepared and signed by the clearing contractor prior to the commencement of clearing Delineate clearing limit with temporary fencing Refer to Clearing & Grubbing Plan for further clearing and grubbing safeguards and controls 	3	Un	D	Enviro Mgr Supervisor Operator Crew



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls		SK SCOI		Person Responsible
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
	17. Heritage find	 Impacts or destruction of heritage items / artefacts 	3	Ρ	С	 Heritage sites identified during pre- construction are to be managed in accordance with project Heritage Management Plan. Crews to be fully briefed on "No Go" areas / zones and Site Environmental Plans Ensure boundaries around heritage sites are clearly marked and crew are fully briefed on stop work protocol if unexpected heritage is encountered. If unexpected archaeological remains or relics are uncovered during the works, all works must cease near the material / find and the steps in the Roads and Maritime Standard Management Procedure: Unexpected Archaeological Finds must be followed. TfNSW Environment Manager, must be contacted immediately. 	3	Un	D	Enviro Mgr Supervisor Operator Crew
	18. Inadequate and or damage to Leachate controls	• Impact to bentonite wall	4	Ρ	С	 Earthworks cuts have been designed to ensure there is no requirement to impact the bentonite wall Earthworks adjacent or above the leachate sumps and pumps will ensure no impacts occurs Sump and pumps include solid bollard protection to ensure no impacts occur to existing pumps. Earthworks adjacent the above ground conduit electrical network that supply electricity to the leachate pumps will be protected during earthworks If the existing electrical network for the leachate pumps requires to be relocated. The network will be cut over to an alternative power supply to ensure the pumps are functioning as designed at all times 	3	Un	D	Enviro Mgr Supervisor Operator Crew



	Hererd/Append	Impact		SK SCO out Con		Management Controls	RISK SCORE with Controls			Person Responsible
Task	Hazard/Aspect (Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
Active Transport Link	19. Concrete works impacting the canal	Pollution of water and concrete / curing runoff	3	Ρ	С	 Weather and rainfall forecast will be conducted prior to concrete works. Concrete or concrete curing will not commence if the daily forecast is 80% rain over 20mm A minimum of 200m rolls of black plastic will be always available to cover concrete pours in case of unforeseen rain events A separation and containment bund will be constructed along the edge of the Alexandra canal top of bank. This will provide a physical containment system to prevent concrete or concrete runoff entering the Alexandra Canal. Steel concrete washout out trays that are full will be removed from the works area and placed at the designated concrete washout bays. Concrete washout trays will be covered with black plastic or similar prior to rain events Any water build-up of concrete water in the concrete washout trays will be removed form adjacent the Canal and sent to the designated concrete washout bay. The designated washout bays will be fully bunded and cleaned and disposed of at a regular interval to ensure adequate room Concrete curing agents will be stored in lock up containers away from the Alexandra canal when not in use. 	2	Un	E	Enviro Mgr Supervisor Operator Crew
Active Transport Link (Boardwalk Diversion)	20. Scour Rock and Screw Piling works Impacting the canal	Pollution of Waters - Impacts outside of the approved zone of disturbance	4	Ρ	с	 Install anchors and a double floating silt curtains in canal. Place the silt curtain anchors into the canal with ease to minimise sediment disturbance The silt curtains will provide the zone of approved disturbance to allow in waterway 	3	Un	D	Enviro Mgr Supervisor



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls		SK SCOI		Person Responsible
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
						 works and install of rocks and canal bank construction Ensure curtains are fixed to anchors, chains with floats Install curtain separators to created 1-2m separation. The 1-2m gap will be visually monitored, if discolouration of water occurs between the silt curtains, the works method will be reviewed and revised. Plumes outside of the silt curtain zone of approved disturbance will be recorded as an incident. A hydro-carbon boom will be utilised on the inside curtains Boat to include spill kits Once the curtains are installed and fully functioning the canal bank construction works will commence. Permanent rock install works is required for both permanent work and to allow ATL boardwalk abutment Earthworks within the canal itself will not occur 1 hour each side of high tide. This will significantly limit the amount of in canal disturbance and wet excavation. The works will give consideration of tidal influence and variation in flow velocities Once a suitable piling pad has been constructed on the canal bank. Install screw piles inside floating curtains. Ensure screw piles radius does not swing outside of double silt curtains. Always swing to landslide. Screw pile spoil is to be contained on a compacted and bunded area Daily water quality monitoring will occur during active construction works within the canal. This will utilise a Horiba or similar field unit. It will record water quality from 				Operator Crew



	Hozard/Acrost	Impact		SK SCO out Con		Management Controls		SK SCOR th Contro		Person Responsible
Task	Hazard/Aspect (Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
						 adjacent (outside) the silt curtains, 50m upstream and 50mm downstream (Refer to EWMS appendix) Any discrepancies in water quality monitoring results will incur a review of the works methods and investigation of other influencing factors such as upstream inputs, tidal movements and other storm water drain or run off influences. 				
Bridge & Drainage Construction	21. Leachate Pollution into the Alexandra Canal	Impact to bentonite wall	4	Ρ	с	 Bridge Piers, Piling and CMCs have all been designed behind the bentonite wall. Stormwater drainage has been designed above the bentonite wall. Therefore, will be constructed above the wall without impacts. The location of the bentonite wall will be located on site to ensure no damage or excavation impacts the wall during construction of the new stormwater drains The future drainage network under the desal pipe is separate network form the existing stormwater The existing stormwater pipes through the bentonite wall will remain intact and do not not require removal. 	3	Un	D	
Install and removal of coffer dams	 22. Disturbance of contaminated 23. sediments Pollution of waterway 	Impacts outside of the approved zone of disturbance	4	Ρ	С	 Coffer dam install is required for the construction for drainage outlets and working rock working platforms Install anchors and double floating silt curtains in canal. Place the silt curtain anchors into the canal with ease to minimise sediment disturbance The silt curtains will provide the zone of approved disturbance to allow in waterway works. (EWMS appendix) Ensure floating curtains are fixed to anchors, chains with floats 	3	Un	D	Enviro Mgr Supervisor Operator Crew



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls		SK SCOI		Person Responsible
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
						 Install curtain separators to created 1-2m separation. The 1-2m gap will be monitored, if discolouration occurs between the silt curtains, the works method will be reviewed and revised. Plumes outside of the silt curtain zone of approved disturbance will be recorded as an incident. A hydro-carbon boom will be utilised on the inside curtains Punt boat to include spill kits Once the curtains are installed and fully functioning the sheet piles will be installed using a crane and vibrating hammer Vibrating hammer will use panolin biodegradable oil Refer to Sheet Pile Works - Environmental Control Plan in EWMS appendix Once coffer dam is fully installed, including structural beam supports. The double silt curtains will be removed. The installed coffer dam will now provide the work zone containment system Once work is completed the double silt curtains will be reinstated using the same process followed to remove the sheet piles. Once sheet piles are fully removed and the Alexandra canal bank is stabilised, an inspection will occur between enviro and supervisors. The double curtains will then be removed from the Alexandra canal Daily water quality monitoring will occur during the install and removal of the coffer dams. This will utilise a Horiba or similar field unit. It will record water quality from adjacent (5m outside) the silt curtains, 50m upstream and 50mm downstream (Refer to EWMS appendix) 				



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls		SK SCOI		Person Responsible
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
						 Any discrepancies in water quality monitoring results will result in a review of the works methods and review of other influencing factors such as upstream inputs, tidal movements and other storm water drain influences. Routine water quality monitoring will continue to occur as per the Soil & Water Management Plan 				
Dewatering of coffer dams after inflows or rain events	24. Pollution of waters	Failure of dewatering procedures	4	Ρ	С	 During construction the coffer dams may have water infiltrate through the wall of the coffer dam, including water entering from rainfall. Surface water captured within the coffer dam can be utilised for dust suppression. The water can be pumped from the coffer dam to nearby holding tanks or similar allow works to continue. Water carts can fill directly from the coffer dam or from the holding tanks. This surface water will used for dust suppression. Water will also be dewatered from the coffer dam via water cart and / or pumped to the water treatment plant A dewatering permit will be required for these works to ensure the movement of water within the coffer dam is appropriately managed. 	3	Un	D	Enviro Mgr Supervisor Operator Crew
Permanent Rock wall on the Alexandra canal	25. Pollution of waters outside the allocated zone of disturbance	Failure of construction method and lack of controls	4	Ρ	с	 Permanent rock install and naturalised bank works is required for the construction to protect the banks of the Alexandra canal Install anchors and a double floating silt curtains in canal. Place the silt curtain anchors into the canal with ease to minimise sediment disturbance 	3	Un	D	Enviro Mgr Supervisor Operator



		Impact		SK SCO out Con		Management Controls		SK SCO		Person Responsible
Task	Hazard/Aspect (Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
						 The silt curtains will provide the zone of approved disturbance to allow in waterway works and install of rocks and canal bank construction Ensure curtains are fixed to anchors, chains with floats Install curtain separators to created 1-2m separation. The 1-2m gap will be visually monitored, if discolouration of water occurs between the silt curtains, the works method will be reviewed and revised. Plumes outside of the silt curtain zone of approved disturbance will be recorded as an incident. A hydro-carbon boom will be utilised on the inside curtains Boat to include spill kits Once the curtains are installed and fully functioning the canal bank construction works will commence. Earthworks within the canal itself will not occur 1 hour each side of high tide. This will significantly limit the amount of in stream disturbance and wet excavation. The works will give consideration of tidal influence and variation in flow velocities Daily water quality monitoring will occur during active construction works within the canal. This will utilise a Horiba or similar field unit. It will record water quality from adjacent (outside) the silt curtains, 50m upstream and 50mm downstream (Refer to EWMS appendix) Any discrepancies in water quality monitoring results will incur a review of the works methods and investigation of other influencing factors such as upstream 				Crew



	Hazard/Aspect	Impact		SK SCO out Con		Management Controls		SK SCOP th Contro		Person Responsible
Task	(Procedure Step)	(What can go wrong)	Cons	Prob	Risk	(Controls to be in place to manage Environmental Risks)	Cons	Prob	Risk	(to ensure controls are applied)
						inputs, tidal movements and other storm water drain or run off influences.				
General Construction activities	26. Nuisance to local residents due to excessive noise	Community complaints	3	L	с	 All work will be conducted during approved working hours and in accordance with the Environmental Protection Licence (EPL). In absence of EPL, noise impacts minimised in accordance with <i>Construction Noise and Vibration Guideline</i> (RMS, 2016). Works outside standard construction hours (OOHW) to be modelled, approved by Environment Manager, notification of at least five days given to residents if noisy works to be conducted outside of standard hours. 	2	Un	E	Enviro Mgr Community Mgr Supervisor
Construction Site Flood Warning Preparedness	27. Floods and work area inundation	 Pollution of waters Damage to or loss of plant and equipment 	3	Ρ	С	 Site supervisor and crew supervisors are to maintain a weather and flood watch during the works period. Crews to be briefed at pre-start around likelihood of flood events. Utilise the existing NSW BOM flood watch services are part of the Existing G36 Weather monitoring For extreme weather or a flood watch warning is issued, then move all mobile plant and equipment out of Alexandra canal to higher ground. 	3	Un	D	Construction Mgr Safety Mgr Supervisor Operator



		tide time word drawings ENVIRONM 1 - Install an two silt curta conduit pipe stall a hydro curtain 2 - This is th moval of the cause sedim zone of sedi 3 - This is th occurs within be stopped a recommence off. Sedimer classed as a 4 - The land allow access the edge of 1 river. Ensure with bund. 5 - Excavatid the coffer da place. 6 - The silt of small boat of fective and it 7 - Conduct removal of the 8- Ensure ex	AMS for related activities, including high k restrictions and permanent design ENTAL CONTROL PLAN: DESCRIPTION chors or small piles to tie and stabilise the ins. The curtains need to have braces (ie s) to maintain a 2m separation distance. In- carbon boom on the internal side of the silt e zone of containment . The install & re- sheet piles and install of the scour rock will entation in the waterway. This is approved ment disturbance. e zone of STOP WORKS. If sedimentation the 2m curtain separation zone. Works will and investigations undertaken. Works will a when environmental & engineering sign tation outside of the second curtain will be
Devening Full Location Head Contract Relations Contract Relations E Contract Relations E E Contract Relations E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E E	DEIRON LOT CODE DI-INDI WHITEIN UVERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDINA DV-VERDIN	A.01 Delly L1ME A.01 EF Cullet Trin_L Novie Delixit Novie Discourt Interaction Novie Novie Discourt Interaction Novie Novie Discourt Research Novie Novie Novie Discourt Research Novie Novie Novie Novie Discourt Research Research Novie Novie	CITY OF SYDRY - INVER WEST & BAYSDE COUNCLS A3 NEW ARPORT DRIvE AND GANTAS DRIVE RIG REGISTRATOR % RIG



Appendix: Environmental Work Method - Coffer Dam & Scour Rock (Example)



 Manufacture the silt curtain separators from Erwin Clamps and strong aluminium conduit or similar. Test the curtain separator system before deployment of the floating silt curtains.



2) The floating silt curtains require buoys, chains and anchors. Ensure that the install of the anchors is conducted with a crane or a boat with a Hiab. Place the anchors gently on the river / canal bed to limit sediment disturbance.



7) Install the working rock platform to project specifications.



 On completion of the structures work, remove rock platform install the permanent scour rock and permeant bank stabilisation.



 Prior to the install of the Coffer Dam. Install the double floating silt curtains, tie them off to the buoys and install separators. Install Hydro carbon boom on the inside of the curtains.



4) Installation and removal of the Coffer Dam will create sedimentation. This sedimentation occurs in the approved 'zone of disturbance'. If sedimentation occurs between the silt curtains gaps the works is stopped to allow settlement.



 During installation and removal of the Coffer Dam conduct daily water quality monitoring.



10) Keep maintaining the silt curtains during the works to ensure the curtains are secure and have the separation. Remove the coffer dams with vibrating hammer with Panolin oils only.



5) This photo demonstrates the disturb sediments settle back in the approved 'zone of disturbance'. This method ensures sediment does not migrate into the wider river / canal water column or surrounding ecosystems.



6) Once the Coffer Dams are installed and whaler beams fixed. Geotextile can be laid out inside the coffer dam to allow placement of the working platform.

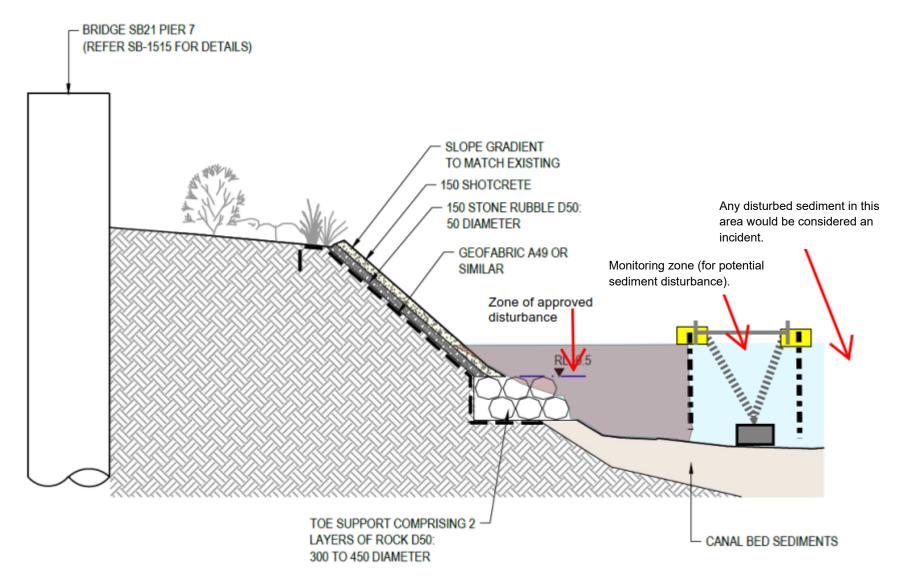


 Keep silt curtains in place while detailing the permeant rock scour. Ensure the upper bank has a 300mm high geo wrapped edge bund installed for erosion and sediment control.



12) Remove the silt curtains from the river / canal. Remove the hydrocarbon boom and remove the buoys and anchors.

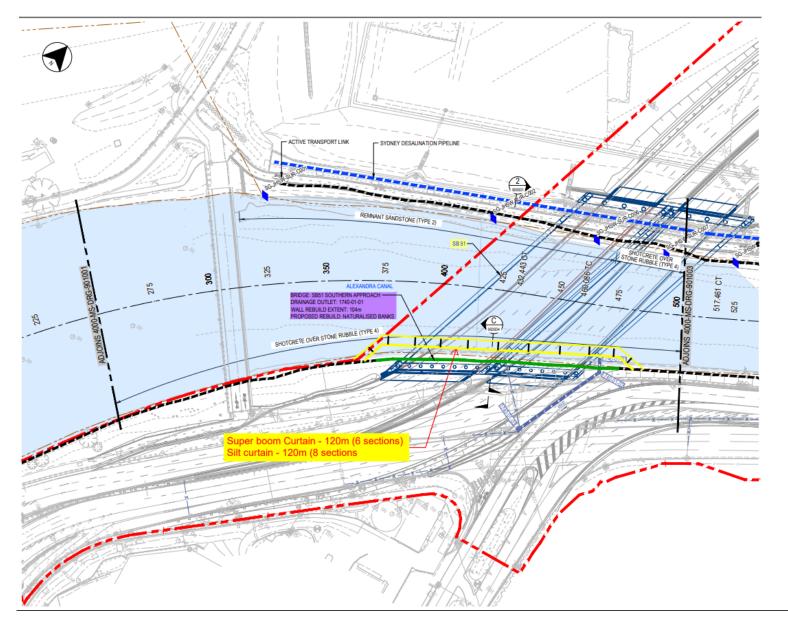




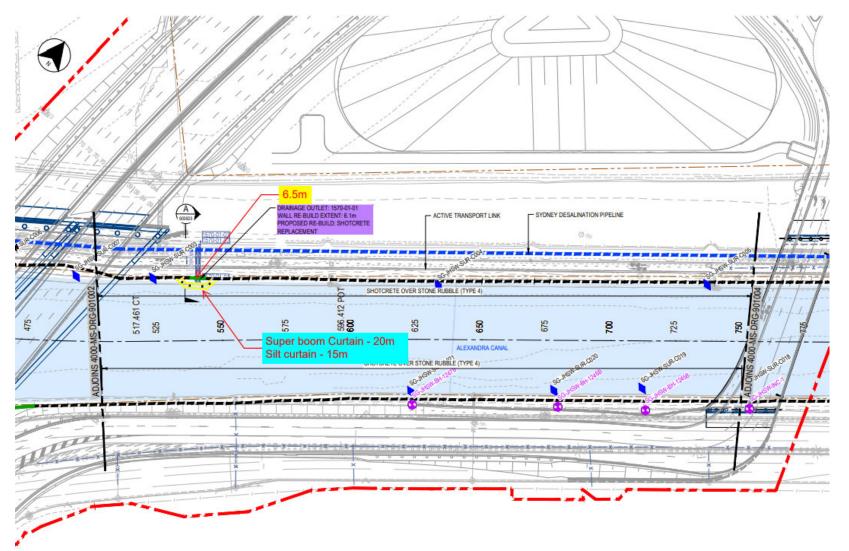






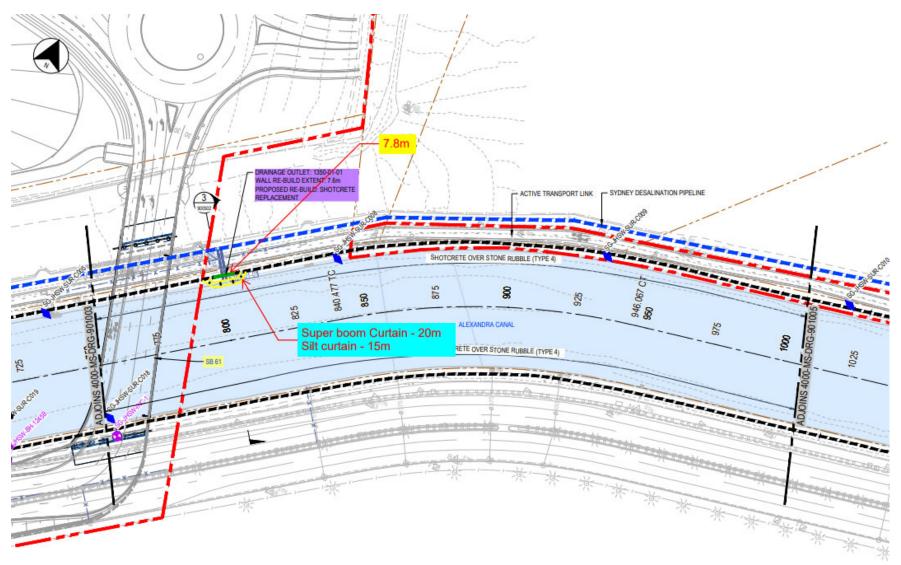




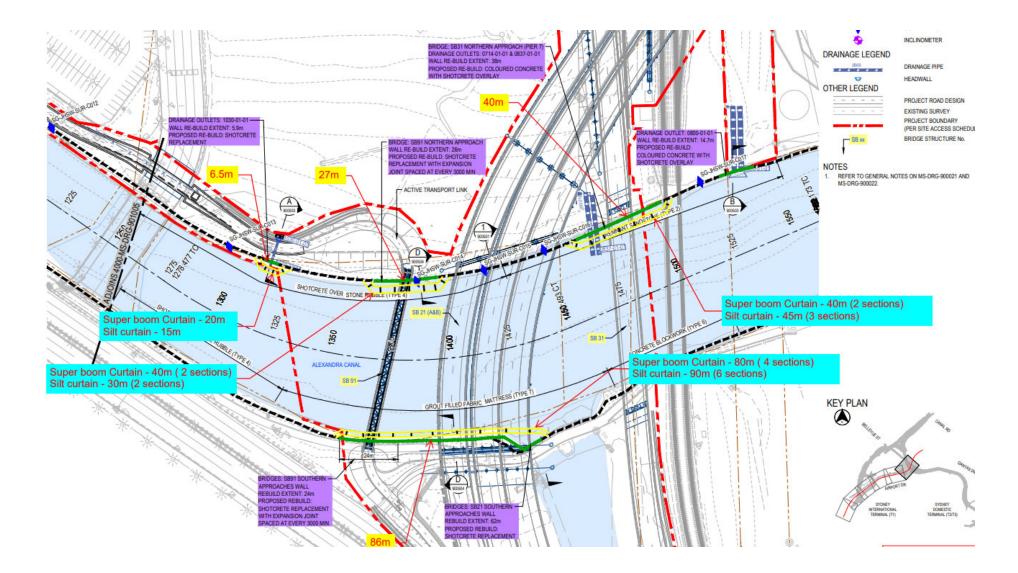














Review and Monitoring

Review No.	1	2	3	4	5	6	7	8	9
Name									
Date									

Review Comments	

WORKERS REVIEW SECTION: Please add in any new work activities that you may require, or any new control measures you may wish to add and contact site Environment Manager before commencing this new work activity.

A Record of nil needs to be recorded if no feedback is provided.



Employee's Acceptance

We, the undersigned, confirm that we have been consulted on the development and given opportunity to provide inclusions of the EWMS nominated above and the details have been explained and clearly understood. We also confirm that our required qualifications and training to undertake this activity are current. We also clearly understand that the controls in this EWMS must be applied as documented, otherwise work is to cease immediately.

Date	Name	Employer	Signature