Appendix B3: Soil and Water Management Sub-Plan

NEWCASTLE INNER CITY BYPASS – RANKIN PARK TO JESMOND (STAGE 4 – MAIN WORKS)

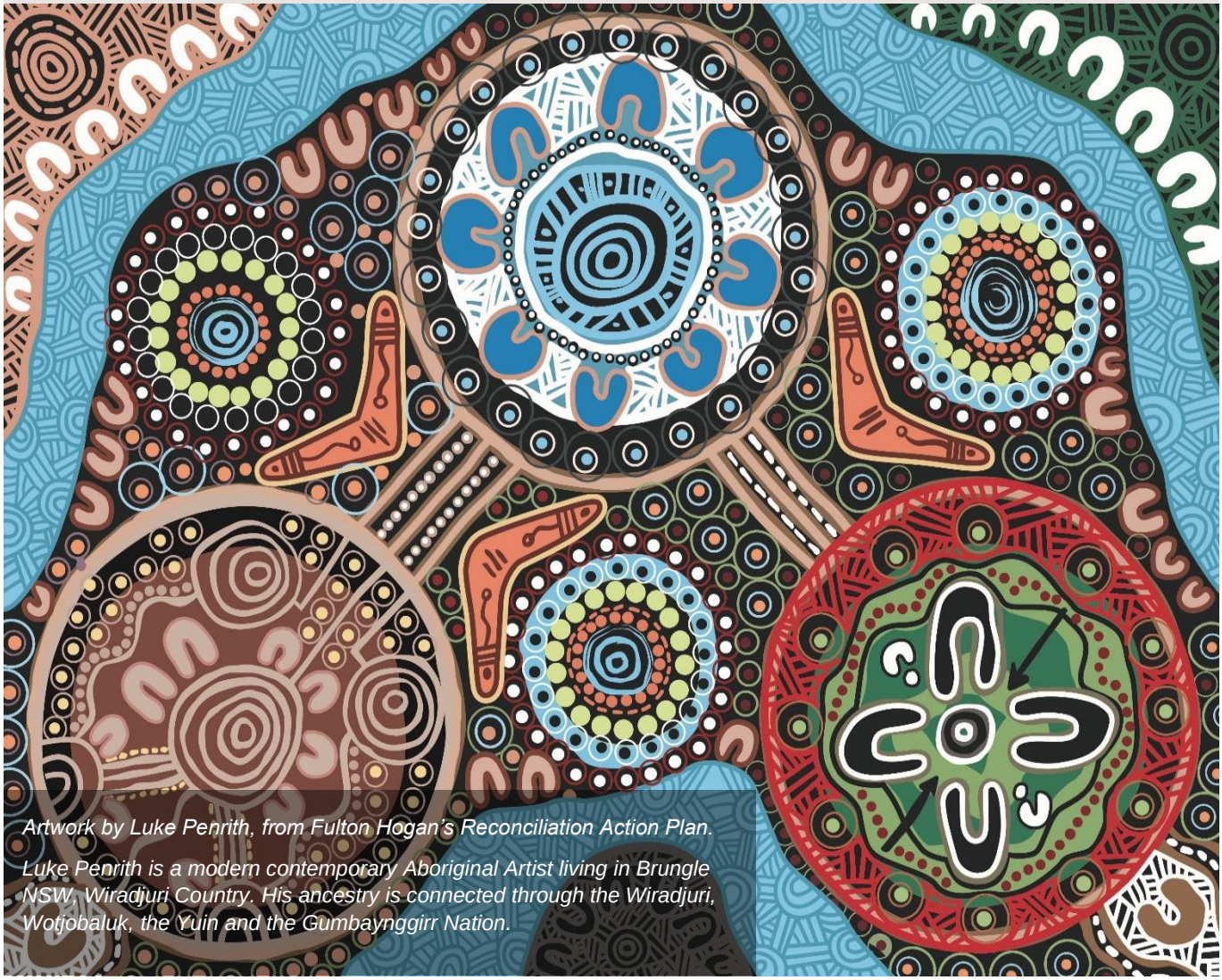
Doc ID: RP2J-CEMP-SWMP Revision No: 4 Published: 20/02/2023

ACKNOWLEDGMENT OF COUNTRY

Fulton Hogan acknowledges the Awabakal People as the Traditional Owners of the land we are working on, and pay our respect to their Elders past, present and emerging.

We recognise their deep connection to Country and value the contribution to caring for, and managing the land and water.

We are committed to pursuing genuine and lasting partnerships with Traditional Owners to understand their culture and connections to Country in the way we plan for and carry out the delivery of the Works.



Artwork by Luke Penrith, from Fulton Hogan's Reconciliation Action Plan.

Luke Penrith is a modern contemporary Aboriginal Artist living in Brungle NSW, Wiradjuri Country. His ancestry is connected through the Wiradjuri, Wotjobaluk, the Yuin and the Gumbaynggirr Nation.

Document control

This is an e-copy of the Plan and it interfaces with the other associated plans, which together describe the proposed overall project management system for the project.

The latest revision of this plan is available on the Fulton Hogan server. If any unsigned hard copies of this document are printed, they are valid only on the day of printing.

The revision number is included at the bottom of each page. When revisions occur, the entire document will be issued with the revision number updated accordingly for each owner of a controlled copy.

Attachments/Appendices to this plan are revised independently of this plan.

Revision History

REV	DATE	AUTHOR / REVISED BY	ENDORSED BY	BRIEF DESCRIPTION OF CHANGE
0	29/08/2022	[redacted]	[redacted]	Initial issue for TfNSW & ER review
1	30/09/2022	[redacted]	[redacted]	Revised in response to comments from TfNSW & the ER
2	01/11/2022	[redacted]	[redacted]	Revised in response to agency consultation and comments from SEEC.
3	18/11/2022	[redacted]	[redacted]	Revised in response to agency consultation
4	20/02/2023	[redacted]	[redacted]	Revised the definition of non-compliance and non-conformance in the Glossary/ Abbreviations.

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Glossary/ Abbreviations

Term/ abbreviation	Definition
CEMP	Construction Environmental Management Plan
CoA	Condition of Approval
Construction	Has the same meaning as the definition of the term in the Project Approval
Construction Boundary	Has the same meaning as the definition of the term in the Project Approval: The area physically affected by works described in documents listed in Condition A1.
D&C	Design and Construct
Department/ DPE	NSW Department of Planning and Environment
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPL	Environment Protection Licence
ER	Environmental Representative for the SSI
ESCP	Primary Erosion and Sediment Control Plan
EWMS	Environmental Work Method Statement
FFMP	Flora and Fauna Management Sub-Plan
HP	Hold Point: a point in the construction or verification process beyond which work may not proceed without receiving authorisation from the appropriate party.
IERP	Incident and Emergency Response Plan
Material harm	Has the same meaning as the definition of the term in the Project Approval: Is harm that: (a) involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial, or (b) results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment)
Minister, the	NSW Minister for Planning
NA	Not applicable
NEPM	National Environment Protection Measure
Non-compliance	Has the same meaning as the definition of the term in the Project Approval: An occurrence, set of circumstances or development that is a breach of the Project Approval. This includes a failure to comply with the processes included within this CEMP.

Non-conformance	Failure to conform to the requirements of project or Fulton Hogan system documentation.
OEMP	Operational Environmental Management Plan
OEMS	Operational Environmental Management System
PESCP	Progressive Erosion and Sediment Control Plan
Planning Secretary, the	Planning Secretary of the DPE (or nominee, whether nominated before or after the date on which the Project Approval was granted.
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
Project, the	Newcastle Inner City Bypass Rankin Park to Jesmond
Project Approval, the	The Minister's approval for the SSI.
Relevant Council(s)	Has the same meaning as the definition of the term in the Project Approval: Lake Macquarie City Council and City of Newcastle, as relevant.
REMM	Revised Environmental Management Measure
RMS	Roads and Maritime Services (now TfNSW)
SEEC	Strategic Environmental and Engineering Consulting
SPIR	Submissions and Preferred Infrastructure Report
SDS	Safety Data Sheets
SGWQCMP	Surface and Ground Water Quality Construction Monitoring Program
SSI	State Significant Infrastructure, as generally described in Schedule 1 of the Project Approval, the carrying out of which is approved under the terms of the Project Approval.
SWMP	Soil and Water Management Sub-Plan
SWMS	Safe Work Method Statements
SWTC	TfNSW Scope of Works and Technical Criteria
TfNSW	Transport for NSW
UDLP	Urban Design and Landscape Plan
WEMP	Waste and Energy Management Sub-Plan
Work(s)	Has the same meaning as the definition of the term in the Project Approval: All physical activities to construct or facilitate the construction of the SSI, including environmental management measures and utility works. however, does not include work that informs or enables the detailed design of the SSI and generates noise that is no more than 5 dB(A) above the rating background level (RBL) at any residence

1. Introduction

1.1. Purpose

This Soil and Water Management Sub-Plan (SWMP) describes how Fulton Hogan will manage construction of the Newcastle Inner City Bypass Rankin Park to Jesmond (RP2J) Project (the project) to ensure that impacts on soil and water are minimised. It is noted that this SWMP addresses the requirements of the contaminated soil management plan as outlined in Table 3 (under SW05).

This SWMP has been prepared to detail how Fulton Hogan will comply with the project approval, and implement and achieve relevant performance outcomes, commitments and mitigation measures specified in the EIS as amended by the SPIR and subsequent Modification 1 Submissions Report (also known as 'Revised Environmental Management Measures' (REMMs)) during construction of the project. Additionally, this SWMP has been prepared to address the requirements of the Scope of Works and Technical Criteria (SWTC) Appendix 4 Additional Environmental Requirements, TfNSW Specification D&C G36 Environmental Protection (G36) and TfNSW Specification D&C G38 Soil and Water Management (G38).

This SWMP will be updated as required once the Environment Protection Licence (EPL) for the project is obtained.

For the avoidance of doubt, the CEMP (including this SWMP) relates to the construction phase only. Detailed design environmental requirements will be addressed as part of the detailed design phase, separate to the CEMP approvals process. Detailed design is generally completed about six months after CEMP approval. In addition, operational environmental requirements will be met during the operational phase (upon the completion of construction) and addressed in the Operational Environmental Management Plan (OEMP) or Environmental Management System (EMS) as agreed with the Planning Secretary in accordance with CoA D3.

1.2. Background

Chapter 13 of the EIS assessed the extent and magnitude of potential impacts of construction and operation of the project on soil and water quality. As part of this, a detailed water quality assessment was undertaken and included in the EIS as:

- EIS Volume 8 – Technical Paper 7 – Water Quality and Watercourse Assessment, prepared by Aurecon for RMS, dated November 2016.

1.3. Structure of SWMP

This SWMP is part of Fulton Hogan's environmental management framework for the project and is supported by other documents, such as the primary Erosion and Sediment Control Plan (ESCP), Progressive Erosion and Sediment Control Plans (PESCPs) and Environmental Work Method Statements (EWMSs). The review and document control processes for this SWMP are described in Chapters 11 and 12 respectively of the CEMP.

1.4. Consultation for preparation of the SWMP

In accordance with CoA C4(e), consultation with the City of Newcastle, DPI Fisheries and DPE Water has been undertaken during the preparation of this SWMP.

There are no outstanding issues in relation to the SWMP. City of Newcastle advised they had no comments. DPI Fisheries provided no written comments and attended a meeting with TfNSW where no concerns were raised. DPE Water confirmed Fulton Hogan's responses were adequate to address their comments. A summary of the consultation is provided below.

City of Newcastle

City of Newcastle advised they were 'happy' with the SWMP and had no comments.

DPI Fisheries

26/09/22 1:30PM via mobile voicemail message – Fulton Hogan advised that the SWMP would be issued for review and comment by the end of the week (i.e. 30/09/22).

05/10/22 7:57AM via email - Fulton Hogan provided Revision 1 of the SWMP for review and comment. Comments were requested by 19/10/22.

05/10/22 2:15PM via mobile voicemail message - Fulton Hogan asked DPI Fisheries to confirm that the SWMP sent that morning was received, and requested a return email or phone call.

20/10/22 meeting between TfNSW and DPI Fisheries – TfNSW outlined that the project is State Significant Infrastructure and only contains first order ephemeral watercourses with no key fish habitat. Moreover, consultation was completed with DPI Fisheries on the monitoring programs with no comments. A meeting action was assigned to DPI Fisheries to provide a response.

27/10/22 3:02PM via mobile voicemail message - Fulton Hogan asked whether DPI Fisheries had any comments on the SWMP and requested a return email or phone call.

01/11/22 via email – TfNSW advised DPI Fisheries that it was Fulton Hogan's intention to submit the SWMP tomorrow (i.e. 02/11/22). TfNSW highlighted that based on previous discussions DPI Fisheries did not raise any concerns due to the lack of any key fish habitat in the project area. TfNSW requested a return email from DPI Fisheries.

01/11/22 via email - Fulton Hogan advised comments had not been received and given the time elapsed since originally providing the SWMP for comment (on 05/10/22), it was Fulton Hogan's intention to submit the SWMP to the Planning Secretary of the Department of Planning and Environment (DPE) for approval. In so doing, allowing the CEMP approvals process to progress, without delaying the commencement of the project. Fulton Hogan advised that in the event comments were received after the approval of the CEMP, Fulton Hogan would work with DPI Fisheries to address those comments at that point in time.

10/11/22 via email – DPI Fisheries advised that they have no objections or comments to make in relation to the SWMP.

DPE Water

DPE Water provided recommendations that:

- the SWMP includes the requirement to meter groundwater inflows that may occur due to the project, and this be reported within regular updates.
- Works within waterfront land be carried out in accordance with the Guidelines for Controlled Activities on Waterfront Land (NOSW 2012).

Fulton Hogan responded:

- As stated in Section 1.4 of the SWMP, the Surface and Ground Water Quality Construction Monitoring Program (SGWQCMP) required under CoA C9(a) was prepared separately to the CEMP (by TfNSW) and approved by the Planning Secretary. Consultation with DPE Water in relation to the SGWQCMP was undertaken as part of that process. Section 4.2.5 of the SGWQCMP explains that as none of the cuts intersect the regional groundwater table, groundwater inflows are expected to be low to negligible and dependent on rainfall recharge. Therefore, consistent with the EIS and SGWQCMP, it is not considered necessary to include an additional requirement to meter groundwater inflows within the SWMP. Groundwater monitoring and reporting will be undertaken during construction in accordance with the SGWQCMP prepared by TfNSW and approved by the Planning Secretary.
- Section 3.2 of the SWMP will be amended to refer to:
  - 'NSW Office of Water (NOW) Guidelines for controlled activities on waterfront land (2012)' instead of 'NSW Department of Primary Industries (Water) Guidelines for controlled activities on waterfront land – Riparian corridors (2018).'

DPE Water confirmed the clarifying responses were adequate to address DPE Water's comments.

Copies of this consultation correspondence is included at Appendix A5 of the CEMP.

Ongoing consultation will be undertaken during detailed design and construction of the project as required by the environmental documents. This will be subject to a separate consultation process to that required for preparation of this SWMP.

For the avoidance of doubt, as noted in the CEMP (main section), the surface and ground water quality Construction Monitoring Program (SGWQCMP) required under CoA C9(a) was prepared separately to the CEMP (by TfNSW) and approved by the Planning Secretary. Consultation with the relevant council, DPI Fisheries and DPE Water in relation to the SGWQCMP has already been undertaken as part of that process.

2. Objectives, targets and environmental performance outcomes

2.1. Objectives

The key objective of the SWMP is to ensure that impacts to soil and water are minimised and within the scope permitted by the project approval. To achieve this objective, Fulton Hogan will undertake the following:

- Ensure appropriate controls and procedures are implemented during construction activities to avoid or minimise potential adverse impacts to soil and water along the Project corridor
- Ensure appropriate measures are implemented to address the relevant CoA and REMMs outlined in Table 2 and Table 3 respectively.
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Chapter 3 of this SWMP.

2.2. Targets

The following targets have been established for the management of soil and water impacts during the project:

- Ensure full compliance with the relevant legislative requirements, CoA and REMMs outlined in Table 2 and Table 3 respectively.
- Minimise or avoid impacts on soil and water.

2.3. Environmental performance outcomes

The construction-related environmental performance outcomes relevant to this SWMP are listed in Table 1. A cross reference is also included to indicate where the environmental performance outcome is addressed in this SWMP in terms of how it will be implemented and achieved.

Table 1: Environmental performance outcomes relevant to soil and water management

Key issue	Environmental performance outcome	How implemented and achieved
Water quality	Impacts to water quality are minimised during construction	Chapter 6 mitigation measures.
	Successful avoidance of significant soil erosion	Chapter 6 mitigation measure ID SWMM1, SWMM3.
Soils and contamination	All unexpected contamination is managed in accordance with an unexpected finds procedure.	Chapter 6 mitigation measure ID SWMM63. Appendix D

3. Legal and other requirements

3.1. Legislation

Legislation relevant to soil and water management includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act)
- *Environmental Planning and Assessment Regulation 2000*
- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Water Management Act 2000* (WM Act)
- *Fisheries Management Act 1994* (FM Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), and
- *Water Act 1912* (Water Act).
- *Contaminated Land Management Act 1997*
- *National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended) (Cth)
- *Environment Protection and Biodiversity Conservation Regulations 2000* (as amended).
- *Soil Conservation Act 1938*
- Protection of the Environment (General) Regulation 2009 (as amended)
- *Water Management Amendment Act 2014*
- *Water Management (General) Amendment (Aquifer Interference) Regulation 2011.*

Relevant provisions of the above legislation are explained in the Register of legal and other requirements included in Appendix A1 of the CEMP.

3.2. Guidelines and standards

The main guidelines, standards and policy documents relevant to this SWMP include:

- Acid Sulfate Soil Manual (ASSMAC 1998)
- Acid Sulfate Soil and Rock – Victorian EPA Publication 655.1 – July 2009
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ 2000)
- National Water Quality Management Strategy (NWQMS) (Department of Sustainability, Environment, Water, Population and Communities (DSEWPC), 1994)
- NSW Water Quality and River Flow Objectives (DECCW, 2006)
- Department of Environment and Conservation (DEC): Bunding & Spill Management. Insert to the Environment Protection Manual for Authorised Officers - Technical section "Bu" November 1997
- Managing Urban Stormwater: Soils and Construction. Landcom, (4th Edition) March 2004 (reprinted 2006) (the “Blue Book”). Volume 1 and Volume 2
- Volume 2D Main Roads Construction (DECC 2008)
- Roads and Maritime Code of Practice for Water Management, Road Development and Management (RTA 1999)
- Roads and Maritime Erosion and Sedimentation Management Procedure (RTA 2009)
- Roads and Maritime Technical Guideline, Temporary Stormwater Drainage for Road Construction (Roads and Maritime 2011b)
- Roads and Maritime Technical Guideline, Environmental Management of Construction Site Dewatering (RTA 2011b)
- Roads and Maritime Stockpile Site Management Guideline (Roads and Maritime 2015)
- Management of Tannins from Vegetation Mulch (Roads and Maritime 2012b)
- Guideline for Batter Surface Stabilisation using vegetation (Roads and Maritime 2015e).
- DLWC, 1998. Constructed Wetlands Manual

- Fairfull, S. and Witheridge, G. (2003) Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings. NSW Fisheries, Cronulla, 16 pp
- NSW Fisheries, November 2003. Fishnote – Policy and Guidelines for Fish Friendly Waterway Crossings (Ref: NSWF – 1181)
- NSW Office of Water (NOW) *Guidelines for controlled activities on waterfront land* (2012).
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (EPA, March 2004)
- WorkCover's Storage and Handling of Dangerous Goods Code of Practice (WorkCover, 2005)
- Consultants Reporting on Contaminated Land: Contaminated Land Guidelines (EPA, 2020).
- Roads and Maritime Guideline for the Management of Contaminated Land (Roads and Maritime 2013a)
- TfNSW Environmental Incident Procedure (TfNSW 2021)
- EPA Guidelines on contaminated land management.

3.3. Conditions of approval

The CoA relevant to this SWMP are listed in Table 2. A cross reference is also included to indicate where the condition is addressed in this SWMP or other project management documents.

Table 2: Conditions of approval relevant to SWMP

<table>
<tr><th>CoA No.</th><th>Condition requirements</th><th>Document reference</th></tr>
<tr><td colspan="3">PART C - CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN</td></tr>
<tr><td colspan="3">CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN</td></tr>
<tr><td>C4</td><td>The following CEMP Sub-plans must be prepared in consultation with the relevant public authorities identified for each CEMP Sub-plan:
Table 3: CEMP Sub-plan and relevant public authorities
<table>
<tr><th></th><th>Required CEMP Sub-plan</th><th>Relevant public authorities to be consulted for each CEMP Sub-plan</th></tr>
<tr><td>(a)</td><td>Traffic and transport</td><td>Relevant council and Health Administration Corporation</td></tr>
<tr><td>(b)</td><td>Noise and vibration</td><td>Relevant council and Health Administration Corporation</td></tr>
<tr><td>(c)</td><td>Flora and Fauna</td><td>DPI Fisheries and Relevant council</td></tr>
<tr><td>(d)</td><td>Air quality</td><td>Relevant council and Health Administration Corporation</td></tr>
<tr><td>(e)</td><td>Soil and water</td><td>Relevant council, DPI Fisheries and DPE Water,</td></tr>
<tr><td>(f)</td><td>Aboriginal cultural heritage</td><td>Heritage NSW and Registered Aboriginal Parties</td></tr>
<tr><td>(g)</td><td>Flood management</td><td>Relevant council</td></tr>
</table></td><td>Section 1.4</td></tr>
<tr><td>C5

(a)</td><td>The CEMP Sub-plans must state how:

the environmental performance outcomes identified in the documents listed in Condition A1 and terms of this approval will be achieved;</td><td>Section 2.3</td></tr>
<tr><td>(b)</td><td>the mitigation measures identified in the documents listed in Condition A1 and terms of this approval will be implemented;</td><td>Through the implementation of this SWMP (in particular refer to Section 3.4).</td></tr>
<tr><td>(c)</td><td>the relevant terms of this approval will be complied with; and</td><td>Through the implementation of this SWMP</td></tr>
<tr><td>(d)</td><td>issues requiring management during construction, as identified through ongoing environmental risk analysis, will be managed.</td><td>Chapter 5, second paragraph

Chapter 6</td></tr>
</table>

<table>
<tr><th>CoA No.</th><th>Condition requirements</th><th>Document reference</th></tr>
<tr><td>C6</td><td>The CEMP Sub-plans must be developed in consultation with the relevant public authorities specified in Table 3. Details of all information requested by an authority to be included in a CEMP Sub-plan as a result of consultation, including copies of all correspondence from those authorities, must be provided with the relevant CEMP Sub-Plan.</td><td>Section 1.4</td></tr>
<tr><td>C7</td><td>Any of the CEMP Sub-plans may be submitted along with, or subsequent to, the submission of the CEMP but in any event, no later than one (1) month before construction for approval by the Planning Secretary.</td><td>CEMP (main section) Section 1.4</td></tr>
<tr><td>C8</td><td>Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Planning Secretary, or as otherwise agreed by the Planning Secretary. The CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER must be implemented for the duration of construction. Where construction of the SSI is staged, construction of a stage must not commence until the CEMP and sub-plans for that stage have been approved by the Planning Secretary.</td><td>CEMP (main section) Section 1.4</td></tr>
<tr><td colspan="3">CONSTRUCTION MONITORING PROGRAMS</td></tr>
<tr><td>C9</td><td>The following Construction Monitoring Programs must be prepared in consultation with the relevant public authorities identified for each to compare actual performance of construction of the SSI against the performance predicted in the in the documents listed in Condition A1 or in the CEMP:
Table 4: Construction Monitoring and relevant public authorities
<table>
<tr><th></th><th>Required Construction Monitoring Programs</th><th>Relevant public authorities to be consulted for each Construction Monitoring Program</th></tr>
<tr><td>(a)</td><td>Surface and Ground Water Quality</td><td>DPI Fisheries, DPE Water and Relevant council</td></tr>
<tr><td>(b)</td><td>Air Quality</td><td>Relevant council and Health Administration Corporation</td></tr>
<tr><td>(c)</td><td>Noise and vibration</td><td>Relevant council and Health Administration Corporation</td></tr>
<tr><td>(e)</td><td>Flora and fauna</td><td>DPI Fisheries and Relevant council</td></tr>
</table></td><td>SGWQCMP - prepared separately to the CEMP (by TfNSW) and approved by the Planning Secretary.</td></tr>
<tr><td colspan="3">PART E – SOILS</td></tr>
<tr><td>E57</td><td>All reasonably practicable erosion and sediment controls must be installed and appropriately maintained to prevent water pollution. When implementing such controls, any relevant guidance in the Managing Urban Stormwater series must be considered.</td><td>Chapter 6 mitigation measure ID SWMM1-SWMM7, SWMM21-SWMM33.</td></tr>
<tr><td colspan="3">PART E – Contaminated sites</td></tr>
<tr><td>E58</td><td>Areas of soil contamination identified within the documents referred to in Condition A1 must be management in accordance with Management Measure SW04 and SW05 as described in the SPIR.</td><td>Refer to Table 3 under REMM SW04 and SW05.</td></tr>
<tr><td>E59</td><td>An Unexpected Contaminated Land and Asbestos Finds Procedure must be prepared before the commencement of work and</td><td>Chapter 6 mitigation measure ID SWMM63.</td></tr>
</table>

CoA No.	Condition requirements	Document reference
	must be followed should unexpected contaminated land or asbestos (or suspected contaminated land or asbestos) be excavated or otherwise discovered during works.	Appendix D
E60	The **Unexpected Contaminated Land and Asbestos Finds Procedure** must be implemented for the duration or work.	Chapter 6 mitigation measure ID SWMM63. Appendix D section 2 Scope.
PART E – WATER		
E85	The SSI must be designed, constructed and operated to achieve the outcomes described in the documents listed in condition A1 and/or to maintain the *NSW Water Quality Objectives* where they are being achieved as at the date of this approval, and contribute towards achievement of the *NSW Water Quality Objectives* over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the SSI contains different requirements in relation to the *NSW Water Quality Objectives*, in which case those requirements must be complied with.	Detailed Design SGWQCMP Section 6.2 for the approved project specific water quality objectives.
E86	Drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drainage swales and depressions must be constructed in accordance with the relevant guidelines and designed by a suitably qualified and experienced person.	Detailed Design Chapter 6 mitigation measure ID SWMM1, SWMM3, SWMM4, SWMM34.

3.4. Revised environmental management measures

Relevant construction-related REMMs from the Modification 1 Submissions Report are listed in Table 3. A cross reference is also included to indicate where the measure is addressed in this SWMP or other project management documents.

Table 3: Revised environmental management measures relevant to SWMP

ID No.	Revised environmental management measure	Document reference
Soils, contamination and water quality		
Watercourse erosion		
SW01	Roads and Maritime will investigate the following during detailed design: ▪ Watercourse 2 (northern branch) – additional stabilisation measures near the bridge to minimise the risk of the existing gully head located about 200 metres downstream of the bridge from undermining the bridge or creek realignment work ▪ Watercourse 2 (southern branch) – additional stabilisation measures near the culvert outlet to minimise the risk of undermining of the outlet structure by the existing gully head (currently located about 100 metres downstream)	Detailed Design

ID No.	Revised environmental management measure	Document reference
	▪ Watercourse 3 and 4 - stabilised flow paths, including scour protection measures, to convey the cross drainage outlet flows to existing drainage lines on the western side of the project ▪ Watercourse 4 – measures such as energy dissipaters to minimise erosion risk in the gully system below the multi-storey hospital carpark ▪ Watercourse 4 – measures to minimise erosion and scour risk downstream of the project associated with concentrated flows from drainage outlets.	
Impacts to water quality and soil erosion		
SW02	A soil and water management plan will be prepared in accordance with: ▪ Roads and Maritime *Code of Practice for Water Management, Road Development and Management* (RTA 1999) ▪ *Roads and Maritime Erosion and Sedimentation Management Procedure* (RTA 2009) ▪ *Managing Urban Stormwater, Soils and Construction, Volume 1 4th Edition, March 2004* (Landcom 2004) and Managing Urban Stormwater, Volume 2D – Main road construction (DECC 2008) ▪ Roads and Maritime *Technical Guideline, Temporary Stormwater Drainage for Road Construction* (Roads and Maritime 2011b) ▪ Roads and Maritime *Stockpile Site Management Guideline* (Roads and Maritime 2011c) ▪ Roads and Maritime *Technical Guideline, Environmental Management of Construction Site Dewatering* (RTA 2011b) ▪ *Management of Tannins from Vegetation Mulch* (Roads and Maritime 2012b) ▪ *Guideline for Batter Surface Stabilisation using vegetation* (Roads and Maritime 2015e).	This SWMP Section 3.2
SW03	The soil and water management plan will address the following: ▪ Identify areas of high risk based on soil erodibility	This SWMP Section 5.1 Appendix A
	▪ Management strategies to be used to minimise surface water impacts, including identification of water treatment measures, discharge points and erosion and sediment control measures	Chapter 6 mitigation measure ID SWMM1–SWMM33.
	▪ Minimising stormwater (volume and velocity) from running onto downstream work by appropriate staging of the work and, where necessary, utilising erosion control measures	Chapter 6 mitigation measure ID SWMM1-SWMM7, SWMM10, SWMM12-SWMM20.
	▪ Maximising diversion of clean water around or through disturbed portions of the site	Chapter 6 mitigation measure ID SWMM1-SWMM4, SWMM14, SWMM16, SWMM17.
	▪ Sedimentation basin construction and management	Chapter 6 mitigation measure ID SWMM1, SWMM3, SWMM72-

ID No.	Revised environmental management measure	Document reference
		SWMM75. Appendix A
	▪ Measures to monitor and manage spoil, fill and materials	Chapter 6 mitigation measure ID SWMM33. WEMP Chapter 7 mitigation measure ID WEMM1, WEMM3, WEMM8, WEMM13, WEMM14 WEMM15. WEMP Section 8.4
	▪ Protection of waterways	Chapter 6 mitigation measure ID SWMM1-SWMM4, SWMM34-SWMM39.
	▪ Management of tannins that may be generated from stockpiled vegetation	Chapter 6 mitigation measure ID SWMM29, SWMM33.
	▪ Monitoring of discharge waters	Chapter 6 mitigation measure ID SWMM43, SWMM44. SGWQCMP Section 5.5
	▪ Measures for the management of tannins from stockpiled vegetative materials	Chapter 6 mitigation measure ID SWMM29, SWMM33.
	▪ Management of stockpiles.	Chapter 6 mitigation measure ID SWMM22, SWMM25, SWMM33, SWMM42.
Contaminated soil		
SW04	Further soil testing would be carried out to delineate the extent of areas of contamination and classify the soils against the relevant criteria for reuse on-site or for disposal off-site.	Chapter 6 mitigation measure ID SWMM65, SWMM66.
SW05	A contaminated soil management plan will be prepared in accordance with the *Contaminated Land Management Act 1997*, Roads and Maritime *Guideline for the Management of Contaminated Land* (Roads and Maritime 2013a), *Roads and Maritime Environmental Incident Classification and Reporting Procedure*, (Roads and Maritime 2016c) and EPA Guidelines on contaminated land management. The contaminated soil management plan will include: ▪ Contaminated land legislation and guidelines including any relevant licences and approvals to be obtained	This SWMP Section 1.1 Section 3.1 Section 3.2

ID No.	Revised environmental management measure	Document reference
	▪ Identification of locations of known or potential contamination	Section 4.2 Figure 2
	▪ Identification of rehabilitation requirements, classification, transport and disposal requirements of any contaminated soil	Chapter 6 mitigation measure ID SWMM63-SWMM66.
	▪ Measures to manage excavation, segregation, stockpiling, validation and disposal requirements for potentially contaminated materials	Chapter 6 mitigation measure ID SWMM64-SWMM66.
	▪ Measures to ensure the contaminated soil is managed so that it does not pose a risk to water quality. Measures to be implemented include ensuring contaminated soils are deep buried and blended where further testing confirms on-site reuse is acceptable, or off-site disposal to a licensed facility where required	Chapter 6 mitigation measure ID SWMM64-SWMM68.
	▪ Contaminated management measures including unexpected finds procedures for unanticipated discovery of contaminated material or other source of contamination during construction.	Chapter 6 mitigation measure ID SWMM63.
Soil erosion		
SW06	The project will be constructed in accordance with the soil and water management plan.	This SWMP Section 1.1
Accidental spills during construction		
SW07	An emergency spill response procedure will be prepared to minimise the impact of spills including details on the requirements for managing, cleaning up and reporting.	Incident and Emergency Response Plan (IERP) – Incident and emergency response flowchart – Chemical – oil and fuel spills
SW08	Spill kits and adequate quantities of suitable material to counteract spillage would be kept readily available	Chapter 6 mitigation measure ID SWMM61.
SW09	The refuelling of plant and maintenance of machinery will be carried out in designated refuelling areas. Refuelling would be attended at all times.	Chapter 6 mitigation measure ID SWMM60.
SW10	Vehicle wash-downs and/or concrete truck washouts will be located in a designated bunded area or located off-site.	Chapter 6 mitigation measure ID SWMM49, SWMM50.
SW11	Machinery will be checked daily to ensure that there are no oil, fuel, or other liquid leaks.	Chapter 6 mitigation measure ID SWMM57.
Contamination		
SW12	In the event that indicators of contamination are encountered during construction of the project (such as odours or visually contaminated materials), work in the area will cease until advice on the need for remediation or other action is obtained from the	Chapter 6 mitigation measure ID SWMM63.

ID No.	Revised environmental management measure	Document reference
	Roads and Maritime project manager.	
Water quality impacts		
SW13	A soil conservation specialist will be engaged during construction to advise on the planning and implementation of erosion and sedimentation controls.	Section 7.1.1
SW14	Sediment laden water will be directed through the construction phase water management system. All construction sedimentation basins and associated temporary drainage shall be designed and constructed as detailed in this report to manage flows generated by the 80th percentile five day rainfall event.	Chapter 6 mitigation measure ID SWMM1, SWMM3. Appendix A
SW15	Water quality monitoring will be carried out at key discharge points from the construction phase water management system. The monitoring requirements will be defined in the soil and water management plan and will include collection of samples for analysis from sedimentation basin discharge points and visual monitoring of other points of release of construction waters.	SGWQCMP - prepared separately to the CEMP (by TfNSW) and approved by the Planning Secretary.
Building demolition impacts		
SW16	During demolition the following controls will be implemented: ▪ Scheduling of work to avoid strong winds and rainfall	Chapter 6 mitigation measure ID SWMM45. AQMP Chapter 6 mitigation measure ID AQMM8.
	▪ Mandatory coverage of trucks carrying waste and debris	AQMP Chapter 6 mitigation measure ID AQMM9.
	▪ Temporary barriers or dust screens, as appropriate, to suppress the effect of dust movement to uncontrolled sites	AQMP Chapter 6 mitigation measure ID AQMM13.
	▪ Dust suppression such as wetting measures	AQMP Chapter 6 mitigation measure ID AQMM2.
	▪ Appropriate control of temporary stockpiles on hardstands.	AQMP Chapter 6 mitigation measure ID AQMM2.
Water quality impacts		
SW17	Construct the operational water quality controls detailed in this report (subject to further refinement during detailed design).	Detailed Design - Operational water quality controls will be constructed in accordance with the Detailed Design.
Revegetation		

ID No.	Revised environmental management measure	Document reference
SW18	Proposed re-vegetation of cleared areas will be carried out with consideration of minimising erosion and in accordance with the *Guideline for Batter Surface Stabilisation using vegetation* (Roads and Maritime 2015e).	Chapter 6 mitigation measure ID SWMM38, SWMM41. Section 3.2
Water quality impacts		
SW19	Where practical stormwater, including road runoff and intercepted groundwater, will be directed towards operational water quality treatment structures that will assist in the removal of pollutants from discharge water.	Section 1.1 - operational environmental requirements will be addressed in the OEMP or EMS as agreed with the Planning Secretary in accordance with CoA D3.
SW20	As part of an operational environmental management plan visual inspection of stormwater management system, including the operational water quality treatment structures, will be carried out for a minimum period of 12 months to ensure the stormwater management system is operating as designed.	Section 1.1 - operational environmental requirements will be addressed in the OEMP or EMS as agreed with the Planning Secretary in accordance with CoA D3.
Groundwater		
Groundwater inflow		
GW01	During detailed design the cuttings will be designed to minimise the volume of groundwater inflow as far as is practicable.	Detailed Design
Groundwater monitoring		
GW02	A groundwater monitoring program will be prepared and implemented. The program will include: ▪ Installation of monitoring bores (to replace those that would be removed during construction) ▪ New monitoring bores will be installed both in and outside the predicted zones of perched groundwater drawdown to confirm the conceptual model. New bore(s) will be established in the proposed mine remediation area to confirm the depth to groundwater and groundwater quality ▪ New monitoring bores will be installed near where mine remediation work is proposed to confirm the groundwater depth ▪ Establishment of project specific water quality objectives ▪ Bores will initially be monitored monthly for 12 months to collect baseline data. Monitoring will start as soon as possible and before the start of construction and will continue until completion, which may be after start of construction. The frequency of monitoring will then be reviewed to determine the appropriate regime ▪ Bores will be monitored for standing water level and water quality (including pH, total dissolved solids, dissolved metals,	SGWQCMP - prepared separately to the CEMP (by TfNSW) and approved by the Planning Secretary.

ID No.	Revised environmental management measure	Document reference
	nutrients and total recoverable hydrocarbons (silica gel clean-up) ▪ A program of reporting of the monitoring results so that any unforeseen impacts are identified and responded to in a timely manner ▪ The monitoring program will continue until 12 months after completion of construction with an annual review of groundwater data unless results permit an earlier end date.	
Groundwater discharge		
GW03	During detailed design Roads and Maritime will review the monthly groundwater monitoring data to confirm the proposed construction and operational water management controls are appropriate and the project specific water quality objectives can be achieved.	Detailed Design
Groundwater dewatering		
GW04	A construction groundwater and dewatering management plan will be prepared to manage groundwater inflows during construction.	Chapter 6 mitigation measure ID SWMM43, SWMM44.
Groundwater quality		
GW05	Coal seams exposed by cuttings will be sealed with shotcrete or over-excavated and backfilled with an inert material.	Detailed Design Chapter 6 mitigation measure ID SWMM67
Groundwater discharge		
GW06	During construction, all groundwater seepage in the cuttings will be handled in the construction phase surface water management system.	Chapter 6 mitigation measure ID SWMM1, SWMM4, SWMM43, SWMM44, SWMM76.
Groundwater management		
GW07	An operational groundwater management plan will be prepared if groundwater monitoring results indicate there are likely to be post-construction groundwater quality discharge exceedances of the project specific water quality objectives.	Section 1.1 - operational environmental requirements will be addressed in the OEMP or EMS as agreed with the Planning Secretary in accordance with CoA D3.

4. Existing environment

This Chapter provides a brief summary of what is known about soil, contamination and water quality within and adjacent to the project based on information provided in Chapter 13 of the EIS.

4.1. Soil

4.1.1. Acid sulfate soils and rock

The EIS (p463) identified that the project area is mapped as 'No Known Occurrence' where acid sulfate soils are not known or expected to occur.

The EIS (p501) also identified that the project area is underlain by potential acid generating rock strata that are generally associated with coal seams. Acid sulfate rock testing was therefore carried out as part of the EIS geotechnical assessment for the project (Aurecon 2016e). The EIS identified that Chromium reducible sulfur results for all 21 samples were low, ranging from less than 0.005 to 0.03 per cent, indicating low potential acidity in the samples and a low risk of acid generation resulting from the exposure of rock to the atmosphere when excavated (EIS, p463).

4.1.2. Soil landscape

The EIS (p462) identified the 1:100,000 Soil Landscape Sheet of the Newcastle Region (Department of Land and Water Conservation (DLWC) 1995)) shows that soil landscapes in the project area are mostly the Killingworth soil landscape. Other soil landscapes include Beresfield landscapes at the northern end of the project area and Gateshead and Cedar Hills landscapes in the southern end (refer to Figure 1). Dominant soils in these soil landscapes include brownish black pedal loam (topsoil), bleached hard setting loamy sand to sandy clay loam (topsoil) and pedal yellowish brown clay (subsoil) (p462).

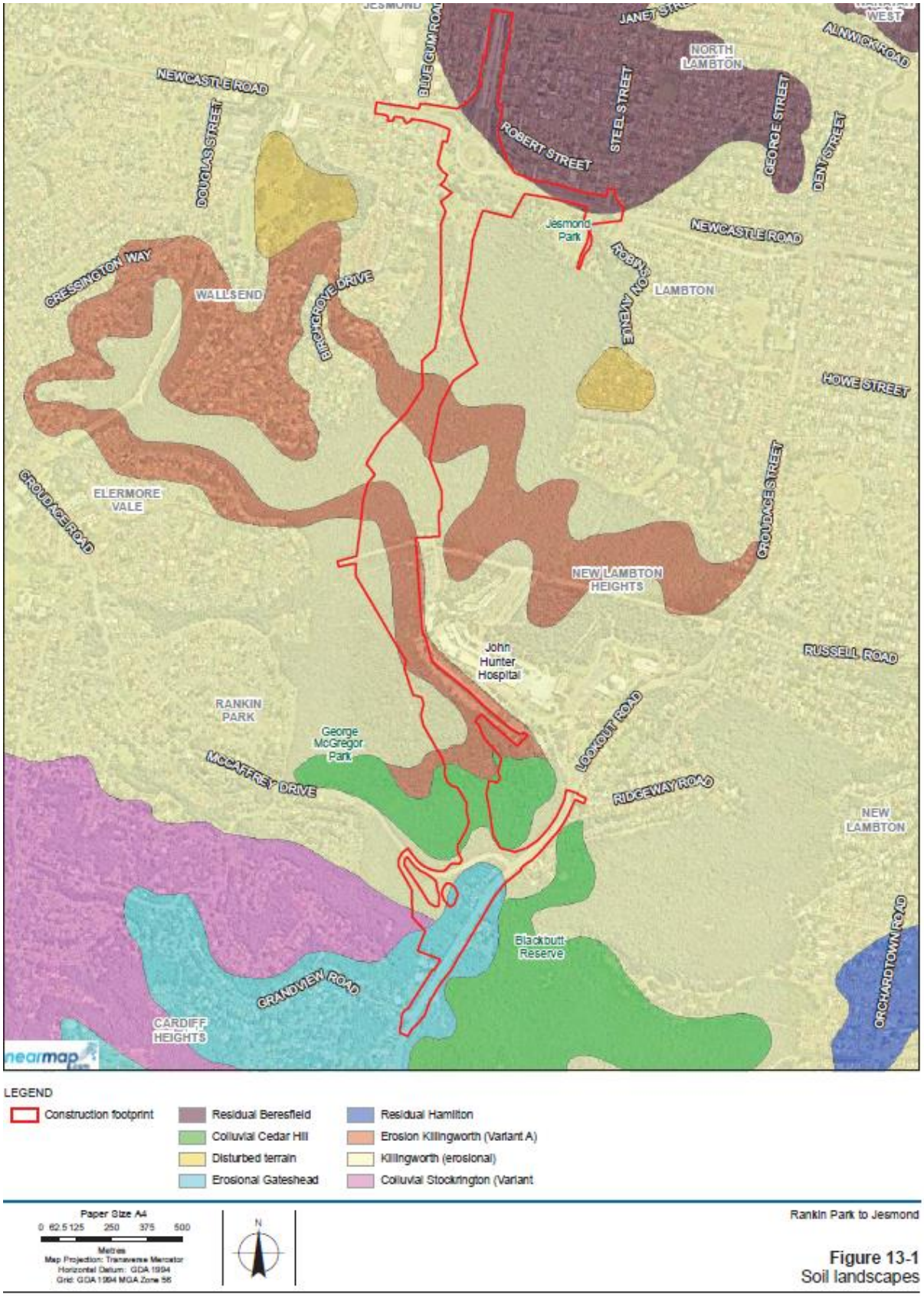


Figure 1: Soil landscapes (EIS, p465)

4.2. Contamination

A search of the NSW Environment Protection Authority (EPA) database undertaken as part of the EIS for NSW EPA notices in suburbs surrounding the project area on 2 November 2015 identified no notices of contaminated sites (EIS 465).

The EIS contamination assessment (GHD 2016e) carried out for the project found there was potential for contaminated land to be present in the project area due to a range of historical and current activities as detailed in Table 4.

Table 4: Potential contamination sources (EIS, p465)

Source	Discussion	Potential contamination
Pest and weed control	Potential historical use of herbicides or pesticides across the study area for weed control (road verges and agricultural purposes)	Arsenic, organochlorine pesticides (OCPs) and organophosphate pesticides (OPPs)
Fill materials of unknown origin from former mining activities	Fill materials are thought to have been used in the study area for the purpose of infilling adits, drifts and vertical shafts	Heavy Metals, total recoverable hydrocarbons (TRH), benzene, toluene, ethyl benzene and total xylene (BTEX), polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), OCPs, OPPs, phenols and asbestos
Illegal dumping	Illegal dumping of building and waste materials was identified across the study area	Heavy Metals, TRH, BTEX, PAHs, PCBs OCPs, OPPs, phenols and asbestos
Tramway	Tramway supporting structures and long-term operation	Heavy metals, TPH, PAHs, PCBs, phenols and asbestos
Shanty town	Building materials, burial of household wastes including putrescible wastes, ash, oils and nightsoil	Heavy metals, TPH, PAHs and asbestos
Coal seams	Presence of naturally occurring coal seams	TRH, PAHs

4.2.1. Soil – ecological assessment

As part of the EIS, the laboratory results of the soil sampling were compared against the adopted ecological assessment criteria. These results are summarised in Table 5, Table 6 and shown on Figure 2.

The EIS (p466) identified that the results indicate there are no widespread soil contamination issues for ecology and the observed exceedances are generally localised and scattered in the project area. In addition, the potential contamination source is likely to be the presence of surface fill or surface water run-off from roads impacting adjacent soils (EIS, p466).

Table 5: Soil – locations exceeding ecological assessment criteria – commercial/ industrial (EIS, p466)

Parameter	Location	Laboratory result	Criteria
Chromium (total)	TPAG03 (0 - 0.3 m)	390 mg/kg	310 – 660 mg/kg
Zinc	BHSM04 (0.5 - 0.6 m)	160 mg/kg	110 – 620 mg/kg
	TPAG03 (0 - 0.3 m)	880 mg/kg	
	TPAG35 (0 - 0.1 m)	110 mg/kg	
	BHAG29 (0 m)	580 mg/kg	
	BHAG29 (0.2 m)	220 mg/kg	
	BHDM01 (0.5 - 0.6 m)	140 mg/kg	
TRH C16-C34	TPAG42 (0.0 - 0.1 m)	2200 mg/kg	1700 mg/kg
Benzo(a)pyrene	TPAG01 (0 - 0.1 m)	11 mg/kg	1.4 mg/kg

Table 6: Soil – locations exceeding ecological assessment criteria – public open space (EIS, p467)

Parameter	Location	Laboratory result	Criteria
Chromium (total)	TPAG03 (0 - 0.3 m)	390 mg/kg	190 – 400 mg/kg
Zinc	BHSM04 (0.5 - 0.6 m)	160 mg/kg	70 – 400 mg/kg
	BHSM05G (0.2 - 0.3 m)	100 mg/kg	
	TPAG03 (0 - 0.3 m)	880 mg/kg	
	TPAG35 (0 - 0.1 m)	110 mg/kg	
	TPAG42 (0 – 0.1 m)	70 mg/kg	
	BHAG29 (0 m)	580 mg/kg	
	BHAG29 (0.2 m)	220 mg/kg	
	BHDM01 (0.5 - 0.6 m)	140 mg/kg	
	TPAG11 (0 – 0.1 m)	87 mg/kg	
TRH C16-C34	TPAG42 (0.0 - 0.1 m)	2200 mg/kg	300 – 1300 mg/kg
Benzo(a)pyrene	TPAG01 (0 - 0.1 m)	11 mg/kg	0.7 mg/kg
	BHSM04 (0.01 m)	1 mg/kg	
	TPAG01 (0 - 0.1 m)	11 mg/kg	
	TPAG03 (0 - 0.3 m)	1.2 mg/kg	
	TPAG42 (0 - 0.1 m)	120 mg/kg	
	BHAG35 (0 m)	5.6 mg/kg	
	BHAG35 (0.2 m)	2.9 mg/kg	
	BHAG35 (0.5 m)	1.6 mg/kg	
	BHAG35 (1.0 m)	1.8 mg/kg	
	BHAG29 (0 m)	1.3 mg/kg	
	TPAG10 (0 - 0.1 m)	3.9 mg/kg	

4.2.2. Soil – health assessment

As part of the EIS, the laboratory results of the soil sampling were compared against the adopted health assessment criteria. These results are summarised in Table 7, Table 8 and shown on Figure 2. There are a limited number of samples that are above the criteria.

The EIS (p468) identified that the results indicate there are no widespread soil contamination issues for health and the observed exceedances are generally localised and scattered in the project area. The potential contamination source is likely to be the presence of surface fill or surface water run-off from roads impacting adjacent soils.

Refer to Chapter 6 mitigation measure ID SWMM64 and SWMM65 which detail how isolated areas of soil contamination known to exceed the human health assessment criteria will be managed.

Table 7: Soil – locations exceeding health assessment criteria – commercial/ industrial (EIS, p468)

Parameter	Location	Laboratory result	Criteria
Benzo(a)pyrene	TPAG42 (0 - 0.1 m)	190 mg/kg	40 mg/kg

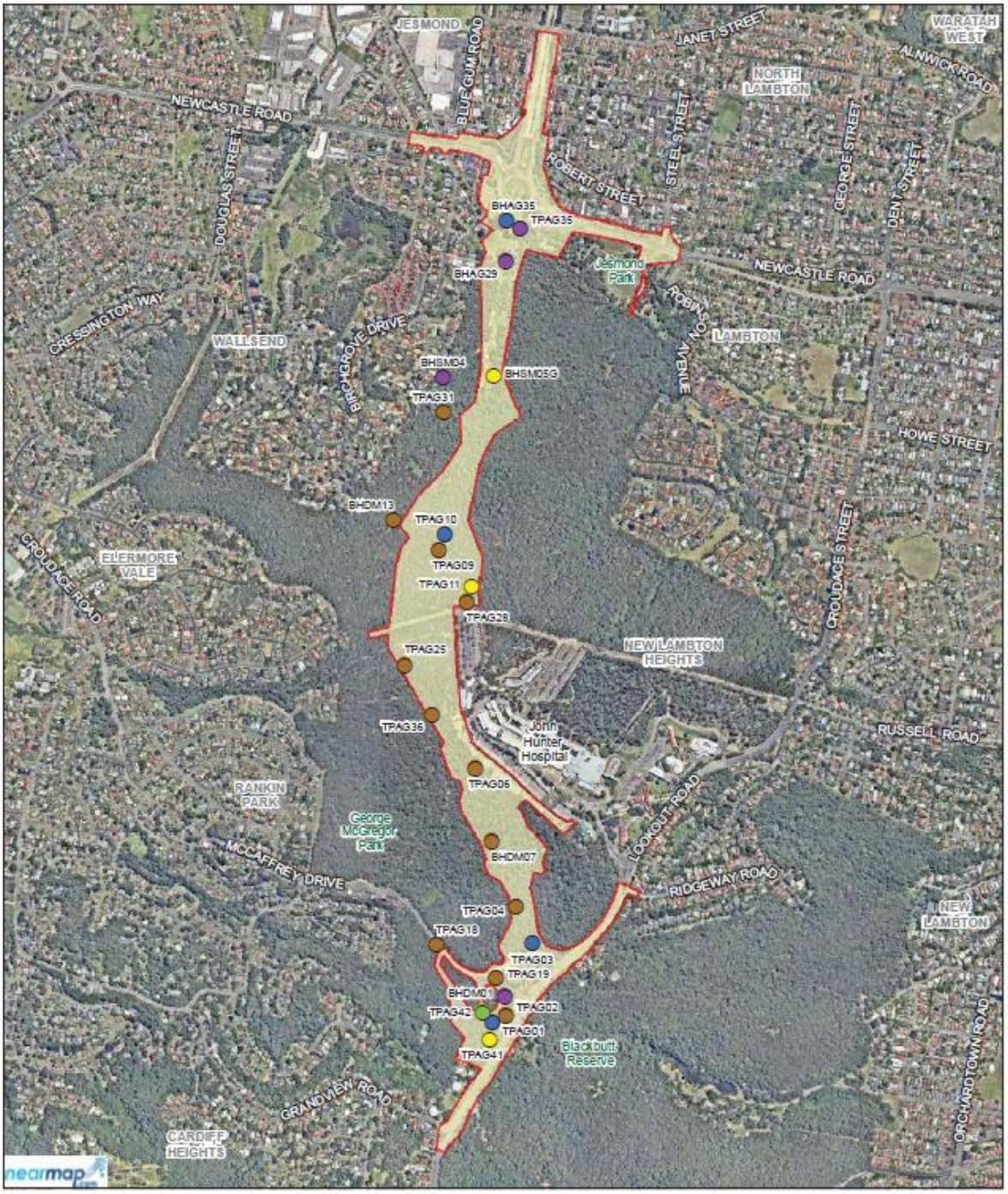
Table 8: Soil – locations exceeding health assessment criteria – public open space (EIS, p468)

Parameter	Location	Laboratory result	Criteria
Chromium (total)	TPAG03 (0 - 0.3 m)	390 mg/kg	300 mg/kg
Benzo(a)pyrene	TPAG01 (0 - 0.1 m)	16 mg/kg	3 mg/kg
	TPAG42 (0 - 0.1 m)	190 mg/kg	
	TPAG42 (0.3 - 0.5 m)	21 mg/kg	
	BHAG35 (0 m)	7.7 mg/kg	
	BHAG35 (0.2 m)	4 mg/kg	
	TPAG10 (0 - 0.1 m)	5.6 mg/kg	

4.2.3. Soil – indicative waste classification

As part of the EIS, the laboratory results of the soil sampling were compared against the *Waste Classification Guidelines, Part 1: Classifying Waste* (EPA 2014a). This indicated that most of the soils in the project area would most likely be classified as general solid waste (Figure 3). Concentrations of chromium, lead, benzo(a)pyrene and total PAH in eight locations classified materials as either restricted solid waste or hazardous waste.

The EIS (p468) identified that based on the analysis it is considered likely that most of the existing soil would be suitable for reuse on site. However, should off-site disposal be required, additional sampling and waste classification will be undertaken in accordance with the EPA *Waste Classification Guidelines* (refer to Chapter 6 mitigation measure ID SWMM66).



LEGEND

- Construction footprint
- Within assessment criteria
- All criteria exceeded
- Ecological residential / open space criteria exceeded
- Ecological commercial / industrial and residential / public open space criteria exceeded
- Ecological commercial / industrial and residential / public open space, Health residential / open space criteria exceeded

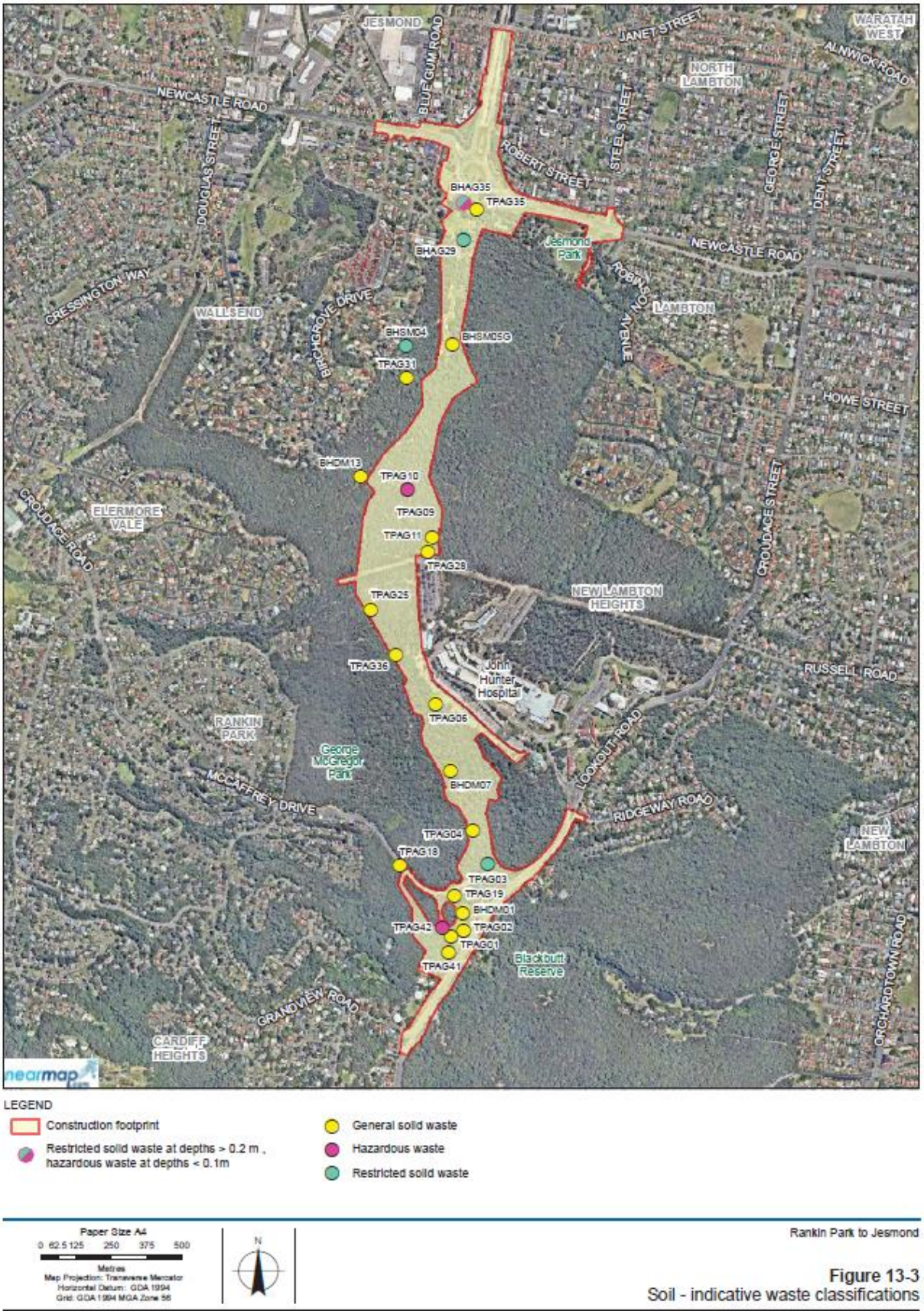
Paper Size A4
0 62.5 125 250 375 500
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Rankin Park to Jesmond

Figure 13-2
Soil – sampling locations compared to adopted assessment criteria

Figure 2: Soil – sampling locations compared to adopted assessment criteria (EIS, p469)



LEGEND

- Construction footprint
- Restricted solid waste at depths > 0.2 m , hazardous waste at depths < 0.1m
- General solid waste
- Hazardous waste
- Restricted solid waste

Paper Size A4
0 62.5 125 250 375 500
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Rankin Park to Jesmond

Figure 13-3
Soil - indicative waste classifications

Figure 3: Soil – indicative waste classifications (EIS, p470)

4.3. Water quality

The ridgeline that dominates the project area marks the boundary of a number of catchments intersecting the project area (refer to Figure 4). These are described further in Section 4.3.1 based on the information provided in the EIS.

4.3.1. Catchments

Ironbark Creek and Dark Creek

Local catchments

The EIS (p471) identified that the local catchments within the immediate project area comprise first order ephemeral streams on the higher elevations and the third order stream of Dark Creek which is piped under Newcastle Road. The elevated areas are typically densely vegetated and include the John Hunter Hospital precinct. The ephemeral watercourses are characterised by rocky and gravel based substrates and provide very limited opportunities for native aquatic or wetland vegetation and are not considered key fish habitat (EIS, p471).

The low elevation local catchments that are located outside the immediate project area include Ironbark Creek and Dark Creek which present permanent yet variable flows of water in second and third order waterways. These are located within a mix of land uses that are dominated by residential, modified open space, commercial and industrial centres including Jesmond, Wallsend, Hexham and Sandgate (EIS, p471).

Downstream of the project, Dark Creek is comprised of a significantly modified waterway that includes a concrete lined channel, road culverts and piped sections for a distance of about 1.6 kilometres. It then flows through a modified unlined drainage channel for about 900 metres before it joins with Ironbark Creek. Blue Wren Creek and Ironbark Creek are comprised of a less modified morphology as compared to Dark Creek, yet concrete lining and road culverts are present. The majority of the watercourse is located within modified open space parkland for about 5.5 kilometres before the junction with Dark Creek. The watercourse includes aquatic flora, riparian vegetation and limited potential for significant benthic fauna (EIS, p471).

Following the junction of the two creeks, Ironbark Creek flows through a maintained unlined channel for about one kilometre where it reverts to a relatively unmodified channel system and enters the sensitive aquatic environment of the wetlands (EIS, p471).

Sensitive receiving environment (wider catchment)

The lower reaches of the Ironbark Creek catchment contain extensive areas of wetlands associated with the Hunter River floodplain (EIS, p471):

- Hunter Estuary Wetlands Ramsar site (EPBC Act) – this is comprised of the Kooragang Nature Reserve (located on the north arm of the Hunter River) and Shortland Wetlands which is located about six kilometres downstream of the project
- Hunter Wetlands Nature Reserve (NSW *National Parks and Wildlife Act 1974*) – this site is comprised of a number of areas on the south and north arms of the Hunter River, the nearest of which is about six kilometres downstream of the project. This area is also mapped as a nationally important wetland
- There are a number of areas mapped under State Environmental Planning Policy (Coastal Management) 2018 on the south and north arms of the Hunter River, the nearest of which is about three kilometres downstream of the project.

The downstream wetlands are generally brackish to saline due to tidal influence, and slightly acidic to slightly alkaline (EIS, p471).

Styx Creek catchment

The project area includes a small portion of the Styx Creek catchment (EIS, p471). The upper reaches of the Styx Creek catchment are characterised by heavily vegetated slopes (including Blackbutt Reserve), with the remainder of the catchment including a mixture of residential, commercial and industrial development. Styx Creek drains into Throsby Creek at Islington, which flows into the Hunter River at Newcastle. Within the Styx Creek catchment, the project includes minor construction activities including minor utility realignments, installation of footpaths and

retaining walls and minor road pavement changes. The potential off site impacts to water quality as a result of this limited work are considered low risk. As such, the potential impacts of the project on the Styx Creek catchment are minimal and are not considered further in this report (EIS, p472).

4.3.2. Surface water quality (local catchments)

As part of the EIS (p472), a search was carried out of publicly available water quality data near the project area, including data held by NSW Office of Environment and Heritage, Newcastle City Council and Waterwatch NSW. Water quality sampling locations for these catchments are shown on Figure 4. Limited water quality data was available for the Dark Creek and Ironbark Creek catchments. There was no available data for the Styx Creek catchment. However, due to the extensively developed nature of the catchment it is expected to be heavily influenced by urban pollution (EIS, p472).

Based on the available data, water quality in the Dark Creek and Ironbark Creek local catchments is typically fresh to brackish and slightly acidic to slightly alkaline. There is wide variability in electrical conductivity (EC), turbidity, dissolved oxygen and nutrient concentrations (EIS, p472).

4.3.3. Groundwater quality

As part of the EIS (p472), groundwater quality sampling was carried out on 20 August 2015 at 10 locations (Figure 5) in the project area as part of geotechnical investigations (Aurecon 2015). The collected samples were subject to a range of field tests and laboratory analysis. The contamination assessment (GHD 2016e) carried out for the project compared the results to the groundwater investigation levels in the National Environment Protection Measure (NEPM) (2013). The NEPM investigation levels vary according to the end use of the water and those adopted for the project area were based on recreational, environmental and health use/exposure (EIS, p472).

The adopted groundwater investigation levels do not necessarily indicate there is a significant environmental or health risk, but rather provide an indication of potential risks (EIS, p472).

Comparison of the results with the adopted groundwater investigation levels exceedances for cadmium, chromium, copper, nickel and ammonia at six locations (Figure 5) with the deeper regional groundwater being of poorer quality than the upper perched groundwater which showed only isolated minor exceedances of a few analytes above the 95% species protection guideline values (ANZECC/ARMCANZ 2000). The perched groundwater currently naturally seeps into local watercourses and is already influencing surface water quality in the surrounding ephemeral watercourses surrounding that drain to Dark Creek and Ironbark Creek (EIS, p472).

As the concentrations of heavy metals in groundwater did not generally correspond with significant heavy metal contamination in fill/soils, it was considered that the heavy metal concentrations in the groundwater are likely to be naturally occurring and potentially indicative of regional water quality (EIS, p472). The assessment concluded that there is a low potential for soil contamination to have migrated to groundwater in the project area, and for potentially contaminated groundwater to have migrated from the project area.

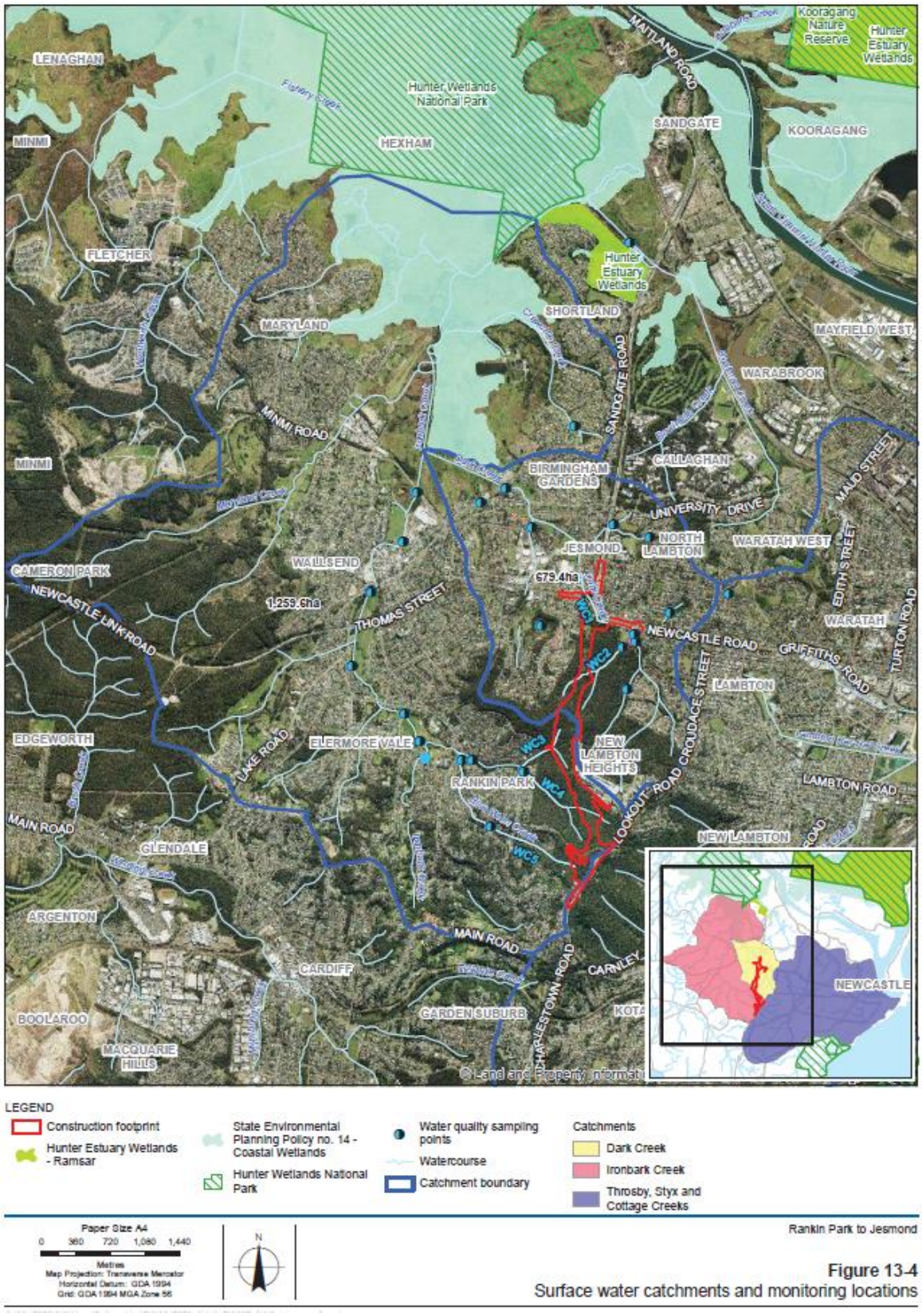


Figure 4: Surface water catchments and monitoring locations (EIS, p473)

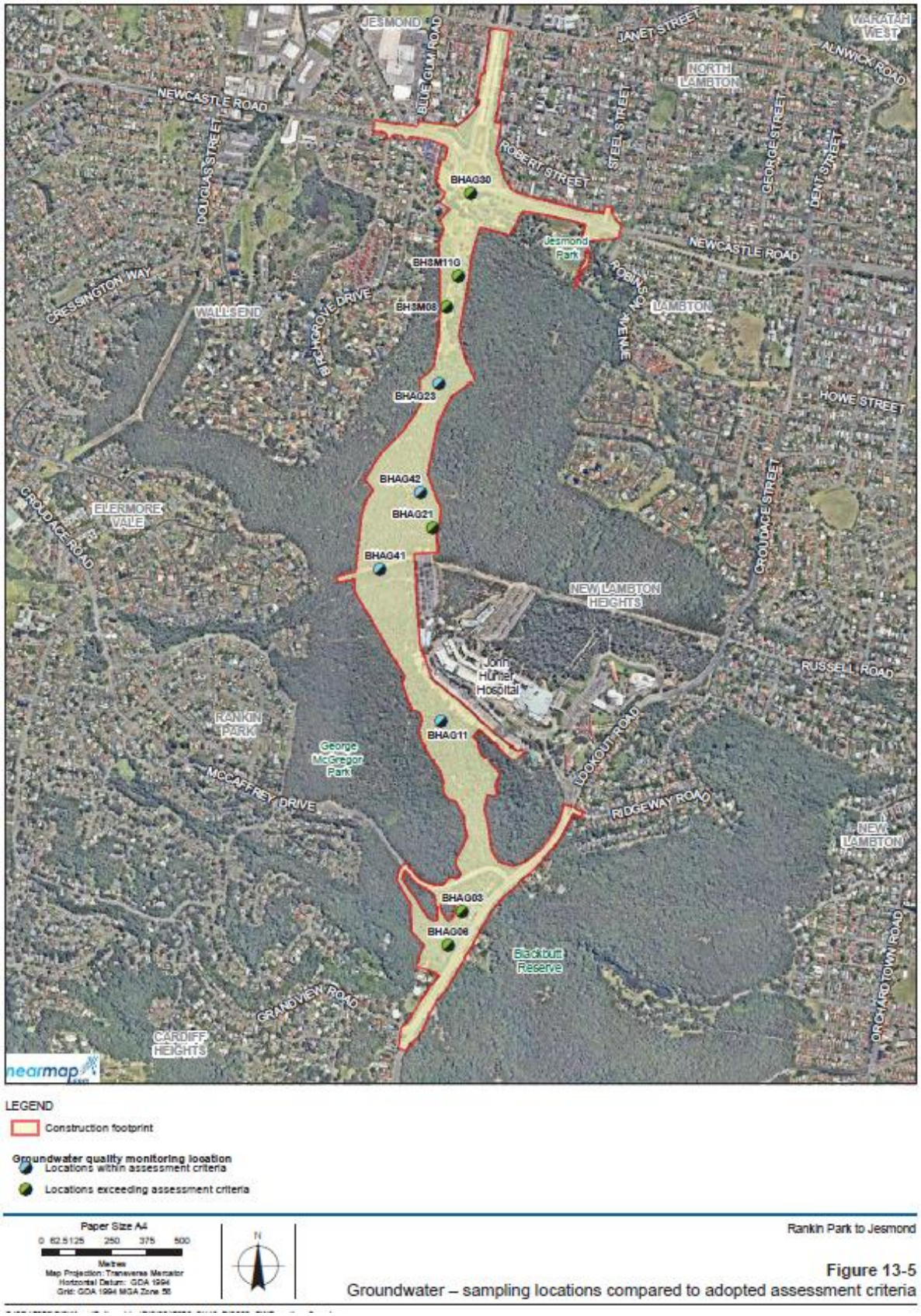


Figure 5: Groundwater – sampling locations compared to adopted assessment criteria (EIS, p474)

5. Environmental aspects and impacts

The key construction activities and the associated potential sources of soil and water impact are identified through a risk management approach. The consequence and likelihood of each activity's impact on the environment has been assessed to prioritise its significance. The results of this risk assessment are included in Appendix A3 of the CEMP.

Ongoing environmental risk analysis will be undertaken during construction through regular inspections, monitoring and auditing as described in Chapter 7. This will ensure that issues requiring management (including cumulative impacts) are appropriately managed.

5.1. Soils

During construction, impacts on soils would be primarily associated with soil erosion during rainfall or wind events, when sediments or pollutants can flow or be blown to sensitive receiving environments. The EIS (p475) identified that the highest risk to soil would occur during construction activities such as:

- Clearing of vegetation and topsoil
- Earthworks, including excavation or filling
- Stockpiling of topsoil, vegetation and other construction materials
- Transportation of cut or fill materials
- Movement of heavy vehicles across exposed ground
- Removal of riparian vegetation
- Construction in any areas of highly erodible soils

In accordance with the Blue Book, soils with K-factors below 0.02 have low erodibilities, those between 0.02 and 0.045 have moderate erodibilities, while those above 0.045 have high erodibilities. A K-factor of 0.043 has been adopted during the preparation of the primary erosion and sediment control plan (refer to Appendix A), meaning the project has moderately erodible soils.

The project will include primary and progressive erosion and sediment control plans (refer to Chapter 6 mitigation measure ID SWMM1, SWMM4); construction erosion and sediment controls (refer to Chapter 6 mitigation measure ID SWMM3, SWMM5); and material handling controls (refer to Chapter 6 mitigation measure ID SWMM22, SWMM25, SWMM27, SWMM42) to minimise the potential impacts of construction activities on the downstream environment.

5.2. Contamination

The EIS (p478) identified that there is a low potential for significant widespread soil contamination associated with previous land uses in the project area. Soil sampling identified only localised areas of shallow fills and natural soils that have existing levels of contaminants above the relevant environmental and health assessment criteria.

Given the observed exceedances are generally localised, scattered in the construction footprint and are only located in relatively shallow soils, with the implementation of mitigation measures (including Chapter 6 mitigation measure ID SWMM63-SWMM68) no significant impacts are expected.

The EIS (p479) identified that there are no significant health risks to workers from direct contact with contaminated soils and groundwater given the observed low levels of contaminants.

The project will encounter coal seams in cuttings. While these have the potential to generate harmful gases, the EIS (p479) considered this to be a low risk to workers given that any gases generated will be quickly diluted and dispersed in the open air environment. Exposing the coal seams has the potential to accelerate the release of naturally occurring sulphides or hydrocarbons by increased oxidisation and dewatering (EIS p479). To minimise these risks, the exposed coal seams will be sealed with shotcrete or by over-excavation and backfilling with an inert material in accordance with the Detailed Design (refer to Chapter 6 mitigation measure SWMM71). As a result,

there are not expected to be ongoing impacts to soils and groundwater associated with excavation and exposure of the coal seams.

5.3. Water quality

Construction of the project will include the establishment of temporary construction access tracks, demolition of existing buildings and structures, clearing and mulching of vegetation, earthworks including cutting and filling, works in waterways, paving and construction of bridges.

Each of these construction elements has the potential to impact on water quality. Mitigation measures in Chapter 6 of this SWMP will be implemented to ensure that impacts are minimised. As such, the potential for appreciable impacts to the downstream environment are considered to be minimal.

6. Environmental mitigation measures

Specific mitigation measures to address impacts on soil and water are outlined in Table 9.

Table 9: Soil and water mitigation measures

ID No.	Mitigation measure	Timing		Responsibility
		PC[1]	C[2]	
GENERAL				
SWMM1	Prepare a primary *Erosion and Sediment Control Plan* (ESCP) (refer to Appendix A) in accordance with Soils and Construction - Managing Urban Stormwater Volume 1 (Landcom, 2004) and Volume 2D (DECC, 2008a) (commonly known as 'the Blue Book'). This includes determination of the soil erodibility factor for the project.	✓	✓	Environmental Coordinator
SWMM2	Install erosion and sediment controls in all construction areas where soil disturbance is going to occur, in advance of site disturbance or as part of initial site setup.		✓	Environmental Coordinator Project Engineers Foreman
SWMM3	Implement/ install all erosion and sediment controls in accordance with the primary ESCP contained in Appendix A. The plan has been prepared in accordance with the Blue Book (Landcom, 2004 and DECC, 2008).		✓	Environmental Coordinator Project Engineers Foreman
SWMM4	In addition to the overarching primary ESCP (refer to Appendix A), prepare Progressive Erosion and Sediment Control Plans (PESCPs) prior to commencing each stage or parcel of work where there is a risk of erosion and sediment loss. PESCPs include relevant standard drawings from the Blue Book (Landcom, 2004 and DECC, 2008).	✓	✓	Environmental Coordinator Project Engineers
SWMM5	Install erosion and sediment control measures for each particular section of works in accordance with the PESCP, in advance of site disturbance or as part of initial site setup.		✓	Project Engineers Foreman

ID No.	Mitigation measure	Timing		Responsibility
		PC[1]	C[2]	
SWMM6	Install certain structures and controls (i.e. sediment basins, pipes and culverts) early (i.e. in advance of site disturbance or as part of initial site setup) to promote successful erosion and sediment control during construction (principally during clearing, stripping and earthworks).		✓	Project Engineers Foreman
SWMM7	Update PESCPs as required and as the works progress and the site changes.		✓	Environmental Coordinator
MINIMISING DISTURBANCE				
SWMM8	Establish clearing limits and work boundaries that are well defined using barrier tape (or equivalent) prior to any construction, clearing or stripping works commencing.		✓	Environmental Coordinator Project Engineers Foreman
SWMM9	Minimise the extent of clearing and retain as much native vegetation as possible.		✓	Project Engineers Foreman
SWMM10	Clear land progressively and clear the areas associated with the current section/ stage of works only.		✓	Project Engineers Foreman
SWMM11	Initially clear and grub leaving the soil surface in a reasonably rough condition with some surface vegetative cover.		✓	Project Engineers Foreman
DRAINAGE CONTROL				
SWMM12	Maximise the separation of ‘clean’ (offsite) run-on water from ‘dirty’ (onsite) (e.g. turbid) construction area runoff as much as possible.	✓	✓	Environmental Coordinator Project Engineers Foreman
SWMM13	Construct drainage structures early in the project including: - Sediment traps and sediment basins - Catch drains, and - Culverts/ pipes and associated inlet and outlet protection (e.g. dissipaters).		✓	Project Engineers Foreman
SWMM14	Maximise the diversion of turbid construction runoff into sediment controls (e.g. sediment traps and sediment basins).		✓	Project Engineers Foreman
SWMM15	Control runoff during the construction of embankments (e.g. fill shaping and the construction of temporary batter drains).		✓	Project Engineers Foreman

ID No.	Mitigation measure	Timing		Responsibility
		PC[1]	C[2]	
SWMM16	Divert clean water runoff into pits and the stormwater drainage system as soon as practical to reduce surface flow lengths.		✓	Project Engineers Foreman
SWMM17	Divert offsite run-on water around the works site as much as possible. Use permanent cut-off drains to achieve this as much as possible.		✓	Project Engineers Foreman
SWMM18	Maintain slope lengths at appropriate lengths (refer to the standard drawings in the Primary ESCP in Appendix A) to reduce water velocity and minimise erosion.		✓	Project Engineers Foreman
SWMM19	Use geotextile linings or other surface protection methods to provide temporary surface protection in areas where appropriate (e.g. batter drains, culvert construction).		✓	Project Engineers Foreman
SWMM20	Use check dams within diversion drains where required to reduce water velocity and minimise erosion within the drains.		✓	Project Engineers Foreman
EROSION AND SEDIMENT CONTROL				
SWMM21	Progressively stabilise disturbed/ exposed ground surfaces using temporary methods such as soil binders, cover crop species or other appropriate practices.		✓	Project Engineers Foreman
SWMM22	Stabilise stockpiled soils and batters progressively using temporary methods such as geotextile fabric, stabilised mulch, soil binders (e.g. Gluon polymer emulsion) or cover crop species.		✓	Project Engineers Foreman
SWMM23	Immediately commence stabilisation of waterways, including their banks, after the completion of any works within these areas. All stabilised areas to mimic a naturalised creek system and the disturbed areas to be planted with native species in accordance with the Landscape Design Drawings.		✓	Project Engineers Foreman
SWMM24	Minimise the generation of dust using methods such as water trucks (using preferably non-potable water), temporary stabilisation methods, soil binders, compaction, progressive revegetation techniques or other appropriate practices.		✓	Project Engineers Foreman
SWMM25	Use temporary ground covers such as soil binders (e.g. Gluon polymer emulsion), hydroseed or hydromulch as much as possible to stabilise batters, stockpiles and large surface areas.		✓	Project Engineers Foreman

ID No.	Mitigation measure	Timing		Responsibility
		PC[1]	C[2]	
SWMM26	Construct sediment control measures as close to the potential source of sediment as possible.		✓	Project Engineers Foreman
SWMM27	Minimise the tracking of mud and soil material onto local roads using shakers, rubble pads or washdown areas.		✓	Foreman
SWMM28	Provide sediment fencing (or equivalent) downslope of disturbed areas that cannot be directed into a designated sediment trap or bund unless completely impractical (e.g. works within watercourses). Implement enhanced erosion controls in these locations.		✓	Environmental Coordinator Project Engineers Foreman
SWMM29	Use mulch bunds, earth bunds or straw bales as alternatives to sediment fencing where appropriate. However, do not use mulch in concentrated flow areas or where it has the potential to result in tannin leachate into waterways. Refer to and implement the Management of Tannins from Vegetation Mulch (Roads and Maritime 2012b).		✓	Environmental Coordinator Project Engineers Foreman
SWMM30	Place wet sediment/ sludge from the bottom of a trench/ tank in a shallow pit lined with heavy duty plastic sheeting to dry out (evaporation pit). Once the sludge has dried out sufficiently to allow it to be spaded this waste can be reused onsite or disposed of offsite in accordance with the *Waste Classification Guidelines* (EPA, 2014a).		✓	Foreman
SWMM31	Install sediment controls around stormwater inlet pits where appropriate and where they will not cause or exacerbate flooding. Consider traffic management and safety if installing such devices on live traffic roads.		✓	Environmental Coordinator Project Engineers Foreman
SWMM32	Remove sediment controls (including sediment basins and sediment traps) only after works are complete and at least 70 per cent stabilisation of disturbed surfaces in the contributing catchment is achieved.		✓	Environmental Coordinator Foreman
SWMM33	Locate stockpiles in accordance with the Stockpile management protocol included in Appendix G of this SWMP.		✓	Project Engineers Foreman
WORKS IN OR NEAR WATERWAYS				
SWMM34	Design, construct and maintain any temporary waterway crossings and stream diversions in accordance with relevant guidelines (e.g. the Blue Book). The design must be carried out by a suitably qualified and experienced person.		✓	Environmental Coordinator

ID No.	Mitigation measure	Timing		Responsibility
		PC[1]	C[2]	
SWMM35	Prepare and undertake all works in or near waterways (including ephemeral creeks) in accordance with a 'Working in or near waterways' EWMS to minimise the potential for bank instability, scour, flooding, accidental spills and other adverse impacts of construction activities on the water quality of receiving waterways. *It is noted that EWMS (including that for 'Working in or near waterways') are prepared progressively throughout construction and prior to the commencement of the relevant activities, separate to the CEMP/SWMP approval process. Refer to CEMP Section 3.7 for additional details about EWMS.*		✓	Environmental Manager Project Engineers Foreman
SWMM36	Complete any vegetation clearing and removal of topsoil near waterways in accordance with a *Clearing and Grubbing* EWMS.		✓	Environmental Coordinator Project Engineers Foreman
SWMM37	Minimise impact to riparian vegetation.		✓	Environmental Coordinator Project Engineers Foreman
SWMM38	Undertake permanent replanting/ revegetation with local native species in accordance with the Landscape Design Drawings, as soon as practicable.		✓	Project Engineers Foreman
SWMM39	Restrict access to waterways to the minimum amount of bank length required for the activity.		✓	Environmental Coordinator Project Engineers Foreman
STABILISATION OF DISTURBED AREAS				
SWMM40	Commence stabilisation of waterways, including their beds and banks, immediately after the completion of any works within these areas.		✓	Project Engineers Foreman
SWMM41	Control dust through progressive revegetation techniques and by watering unsealed areas (in that order to minimise the use of water).		✓	Project Engineers Foreman
SWMM42	Use temporary ground covers such as soil binders (e.g. Gluon polymer emulsion), hydroseed or hydromulch as much as possible to stabilise batters, stockpiles and large disturbed areas.		✓	Project Engineers Foreman
SURFACE WATER QUALITY MANAGEMENT				
SWMM43	Carry out all dewatering (including for onsite reuse and offsite discharge) in accordance with the Dewatering procedure contained in Appendix E.		✓	Environmental Coordinator

ID No.	Mitigation measure	Timing		Responsibility
		PC[1]	C[2]	
SWMM44	If water is to be reused onsite (e.g. for dust suppression or construction purposes), comply with the relevant reuse criteria contained in the Dewatering procedure in Appendix E.		✓	Environmental Coordinator Project Engineers Foreman
SWMM45	Check weather forecasts daily and implement the Heavy rainfall event procedure (contained at Appendix C) where required or the Flood preparedness and flood incident procedure (contained at Appendix A of the Flood Management Sub-Plan (FMP)) where required.		✓	Environmental Coordinator
SWMM46	Where available and practicable, and of appropriate chemical and biological quality, use stormwater, recycled water or other water sources where feasible and reasonable, in preference to potable water for construction activities, including dust control.		✓	Environmental Coordinator Project Engineers Foreman
SWMM47	Where practicable, reuse water from construction sediment traps and sediment basins (e.g. for dust suppression or construction purposes) in preference to discharge. *It is noted that reuse may not be feasible or possible during wet site conditions.*		✓	Environmental Coordinator Project Engineers Foreman
MANAGEMENT OF OTHER ACTIVITIES WITH POTENTIAL WATER QUALITY IMPACT				
Concreting and saw cutting				
SWMM48	Wash concrete mixers, pumps, concrete tools and other equipment at specially designated washout areas that are constructed in a manner that will prevent storm water surface run-off from being contaminated.		✓	Environmental Coordinator Foreman
SWMM49	Locate washout areas within an area that is not subject to natural surface storm water run-off and away from drainage lines. Install signs to advise workers of their locations.		✓	Environmental Coordinator Foreman
SWMM50	Construct the washout areas with an impermeable type material capable of retaining any contaminated water and concrete residue. Ensure they are bunded and at least 50m away from a natural waterbody, surface drain or drainage pit.		✓	Environmental Manager Foreman
SWMM51	Monitor the washout areas to ensure that they are not getting over capacity and that the washing activity is not contaminating the surrounding area.		✓	Environmental Coordinator Foreman
SWMM52	Carry out saw cutting with appropriate environmental controls in place (e.g. bunds) to prevent slurry from entering stormwater drains or waterways.		✓	Environmental Coordinator Foreman
Spray sealing and asphalt paving				

ID No.	Mitigation measure	Timing		Responsibility
		PC[1]	C[2]	
SWMM53	Properly maintain, store and regularly check spray sealing and asphalt paving plant, equipment and associated tools to minimise the risk of spills.		✓	Foreman
SWMM54	Promptly contain and collect any spills of fuel or bitumen materials using spill kits. Maintain spill kits and fire extinguishers at all times in the spray trucks, tankers and associated plant.		✓	Foreman
SWMM55	Promptly report all spills to the Environmental Coordinator.		✓	Project Engineers Foreman
SWMM56	Allocate designated equipment washdown and cleaning areas for major asphalt works with appropriate environmental controls in place (e.g. bunds) to prevent washout water from reaching the receiving environment.		✓	Foreman
Storage and handling of fuels and chemicals				
SWMM57	Ensure vehicles and machinery are properly maintained to minimise the risk of fuel/oil leaks/spills.		✓	Project Engineers Foreman
SWMM58	Keep liquid chemicals and fuels in bunded storage areas or sheds that have the capacity to contain spills from leaky containers or from an incident involving a decanting activity. Ensure the bunded capacity is at least 120 per cent (120%) of the total capacity of all containers stored inside the bunded area or shed.		✓	Foreman
SWMM59	Do not locate bulk storage of fuels or chemicals at or below the 20 year ARI flood level where possible, or within 100 metres of any watercourse or mapped EEC. In constrained areas where this cannot be achieved, additional risk assessment and additional mitigation measures must be considered and implemented to manage risk to sensitive receivers to an acceptable level.		✓	Environmental Coordinator Foreman
SWMM60	Ensure that refuelling is undertaken within a bunded area and at least 50m away from a natural waterbody, surface drain or drainage pit. Refuelling must be attended at all times.		✓	Project Engineers Foreman
SWMM61	Ensure spill containment kits are kept on site at all times.		✓	Environmental Coordinator
Effluent				
SWMM62	Ensure portable toilet block systems are regularly serviced. All effluent facilities will be positioned with		✓	Environmental Coordinator

ID No.	Mitigation measure	Timing		Responsibility
		PC[1]	C[2]	
	consideration of vicinity of watercourses, sensitive flora/ fauna habitats and residents.			Project Engineers Foreman
MANAGEMENT OF CONTAMINATED AND OTHER MATERIALS				
SWMM63	In the event that unexpected contamination or asbestos is identified or suspected, implement the Unexpected contaminated land and asbestos finds procedure contained at Appendix D.		✓	Environmental Manager
SWMM64	Avoid/ limit excavation (where practicable) in the isolated areas of contaminants known to exceed the human health assessment criteria for commercial industrial land use identified in Table 7.		✓	Environmental Manager Project Engineers
SWMM65	Where avoidance is not possible and excavation is required in areas of identified contamination, carry out further soil testing to determine the extent of areas of contamination and the soils' suitability for reuse onsite against Table 7 of this SWMP.		✓	Environmental Manager Project Engineers
SWMM66	Carry out further soil testing to classify areas of identified contamination in accordance with the EPA *Waste Classification Guidelines* (2014) prior to transporting the soil/ waste off site to a suitably licensed waste facility.		✓	Environmental Manager Project Engineers
SWMM67	Divert clean surface runoff away from any contaminated land.		✓	Environmental Manager Project Engineers
SWMM68	Capture and manage any surface runoff contaminated by exposure to contaminated land.		✓	Environmental Manager Project Engineers
SWMM69	Not used			
MANAGEMENT OF ACID SULFATE SOILS				
SWMM70	Should the presence of ASS/ PASS be confirmed, follow the Acid sulfate soil management procedure contained at Appendix B.		✓	Environmental Coordinator Project Engineers Foreman
GROUNDWATER				
SWMM71	Where coal seams are exposed by cuttings, seal them with shotcrete or over-excavate and backfill with an inert material (in accordance with the Detailed Design).		✓	Environmental Coordinator Project Engineers Foreman
SEDIMENT BASINS				
SWMM72	Provide suitable access into sediment basin locations to allow for safe removal of sediment and maintenance operations.		✓	Environmental Coordinator Project Engineers

ID No.	Mitigation measure	Timing		Responsibility
		PC[1]	C[2]	
				Foreman
SWMM73	Immediately schedule de-silting and water treatment if sediment accumulates to a level above 30 per cent of the sediment storage zone marker.		✓	Environmental Coordinator Project Engineers Foreman
SWMM74	Include the following items on sediment basins: - A spillway constructed and stabilised to the 100-year ARI event - A marker peg (or equivalent) showing the boundary between the Sediment (Storage) and Water (Settling) zones of the basin - A sediment basin ID - Lined inlets to minimise scour, and - Measures to minimise the safety risk for site workers.		✓	Environmental Coordinator Project Engineers Foreman
SWMM75	Test sediment basins and, if required, treat, prior to discharge within 5 days of a rainfall event that causes runoff (refer to the Dewatering procedure contained in Appendix E for water quality criteria). Alternatively, pump sediment basins out for construction or dust control purposes to ensure the required capacities remain available for future rainfall.		✓	Environmental Coordinator Project Engineers Foreman
SWMM76	Increase the size of sediment basins with cut batters in their catchments by 5% to account for potential groundwater seepage/inflows into cuttings (this approach has already been adopted as part of the Primary ESCP contained in Appendix A).	✓	✓	Environmental Manager

[1] PC means pre-construction; [2] C means construction

7. Compliance management

7.1. Roles and responsibilities

Fulton Hogan's Project Team organisational structure and overall roles and responsibilities are outlined in Section 4.1 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Table 9 of this SWMP.

7.1.1. Project Soil Conservationist

The environmental responsibilities of the Project Soil Conservationist are to:

- Advise on the planning and implementation of erosion and sedimentation controls
- Review all erosion and sediment control plans
- Inspect erosion and sediment controls and prepare reports on these inspections
- Assist in project training in regard to project erosion and sediment control issues
- Review this SWMP.

7.2. Training

All employees, subcontractors and utility staff working on site will undergo site induction training relating to soil and water management issues, including:

- requirements of this SWMP
- relevant legislation
- roles and responsibilities for soil and water management
- identification of potential contamination or ASS, including indicators such as odours, soil discolouration or visually contaminated materials
- in the event that indicators of contamination or ASS are encountered during construction (such as odours, soil discolouration or visually contaminated materials), work in the area will cease, and the finds will be managed in accordance with the unexpected contamination land and asbestos finds procedure (refer to Appendix D) or Acid sulfate soil management procedure (refer to Appendix B)
- locations of spill containment kits.

Targeted training in the form of toolbox talks or specific environmental training will also be provided to personnel with a key role in soil and water management. Examples of training topics include:

- Erosion and sediment control installation methodology
- Working in or near waterways
- Emergency response measures in high rainfall events
- Preparedness for high rainfall events
- Lessons learnt from incidents and other event e.g. high rainfall or flooding
- Incident and emergency response spill procedure.

Further details regarding staff induction and training are outlined in Chapter 5 of the CEMP.

7.3. Complaints

Complaints will be recorded and addressed in accordance with Section 6.2.3 of the CEMP and the Community Communication Strategy (CCS).

7.4. Inspections and monitoring

Regular inspections and monitoring specific to soil and water will be undertaken during construction in accordance with the Surface and Ground Water Quality Construction Monitoring Program (SGWCMP) prepared by TfNSW and approved by the Planning Secretary under CoA C12.

General requirements and responsibilities in relation to inspections and monitoring are documented in in Sections 8.1 and 8.2 of the CEMP respectively.

7.5. Auditing

Auditing (both internal and external) will be undertaken to assess the effectiveness of environmental mitigation measures, compliance with this SWMP, TfNSW specifications and other relevant approvals, permits and licences. Auditing requirements are detailed in Section 8.4 of the CEMP.

7.6. Reporting

General reporting requirements and responsibilities are documented in Chapter 9 of the CEMP.

7.7. Non-conformances

Non-conformances will be dealt with and documented in accordance with Chapter 10 of the CEMP.

8. Review and improvement of SWMP

The SWMP will be reviewed to ensure compliance with legislative requirements and its suitability and effectiveness for the project.

The review may be in the form of:

- A formal management review
- An audit, and/or
- An inclusion as a separate item at a site meeting.

The Environmental Manager may review and update the SWMP more regularly where:

- Significant changes in construction activities occur
- Where targets are not being achieved, or
- In response to audits and non-conformance reports.

Any minor changes to the SWMP will be approved by the ER and the remainder approved by the Planning Secretary in accordance with CoA C8. For additional information about the document review process, refer to Section 1.6 of the CEMP.

Appendix A: Primary Erosion and Sediment Control Plan (ESCP)

Newcastle Inner City Bypass - Rankin Park to Jesmond (RP2J)

PRIMARY EROSION AND SEDIMENT CONTROL PLAN

REV	DATE	DRN.	APP.	REVISION DETAILS	CLIENT	PROJECT TITLE	DRAWING TITLE
1	19/9/22	E.S.M	N.R.	Issued	NSW GOVERNMENT Transport for NSW	**Newcastle Inner City Bypass Rankin Park to Jesmond**	**PRIMARY EROSION AND SEDIMENT CONTROL PLAN**
						Fulton Hogan	Cover sheet and locality plan

NOTES:

1. THIS IS A PRIMARY EROSION AND SEDIMENT CONTROL PLAN (ESCP) WHICH IDENTIFIES THE MAJOR CONTROLS AND MANAGEMENT APPROACH ONLY. THIS PLAN MUST BE SUPPLEMENTED DURING CONSTRUCTION BY PROGRESSIVE EROSION AND SEDIMENT CONTROL PLANS (PESCPs) WHICH CONTAIN DETAILED INFORMATION REGARDING SPECIFIC CONTROLS WITHIN EACH CATCHMENT.

2. THE EROSION AND SEDIMENT CONTROL PLAN (ESCP) SHOULD BE READ IN CONJUNCTION WITH THE PROJECT SOIL AND WATER MANAGEMENT SUB-PLAN.

3. CONTROLS SHOWN ON THE PLAN ARE INDICATIVE ONLY. EXACT LOCATION WILL BE MODIFIED TO SUIT SITE CONDITIONS AND FUNCTION.

4. 'CLEAN WATER' FLOW TO BE MAINTAINED, MAXIMISING SEPARATION OF 'CLEAN' AND 'DIRTY' WATER AS MUCH AS POSSIBLE.

5. 'CLEAN WATER' DIVERSION BUNDS WILL BE INSTALLED TO A HEIGHT PREVENTING PONDING WATER WHERE POSSIBLE.

6. SHOULDER PAVEMENT WILL BE MAINTAINED FOR CONSTRUCTION GATES, ALLOWING LONG MERGING LANES INTO LIVE TRAFFIC. A SWEEPER OR SIMIILAR WILL BE USED TO KEEP THE PAVEMENT FREE OF RESIDUAL SEDIMENT. IF SHOULDER PAVEMENT CAN NOT BE RETAINED, ALTERNATIVE STABLE MATERIAL WILL BE USED.

7. DISTURBANCE IS TO BE MINIMISED WHERE POSSIBLE, RETAINING VEGETATION COVER FOR AS LONG AS POSSIBLE.

8. EARLY CONSTRUCTION OF DRAINAGE CONTROLS WILL BE COMPLETED - SEDIMENT TRAPS, BASINS, PIT PROTECTION, CHECK DAMS, SHOULDER DYKES ETC.

9. ALL 'DIRTY WATER' MUST BE DIVERTED TO LOCAL SEDIMENT CONTROL MEASURES.

10. DEWATERING IS TO BE UNDERTAKEN IN ACCORDANCE WITH THE SOIL AND WATER MANAGEMENT SUB-PLAN AND BASIN MANAGEMENT EWMS (PERMIT REQUIRED).

11. DUST TO BE MINIMISED WITH WATER CARTS, LIMITING VEHICLE SPEEDS, VEGETATING / COVERING STOCKPILES AND THE USE OF SOIL BINDERS.

12. DISTURBED AREAS ARE TO BE PROGESSIVELY REVEGETATED USING COVER CROPS OR PERMANENT REVEGETATION DESIGN.

13. TEMPORARY CONTROLS ARE TO REMAIN UNTIL THE SITE IS STABILISED WITH A C-FACTOR OF 0.05 (70% SURFACE COVER).

14. COVER/STABILISE STOCKPILES WHICH WILL BE IN PLACE FOR MORE THAN 20 DAYS, IF STOCKPILES ARE SUSCEPTIBLE TO EROSION THIS IS REDUCED TO 10 DAYS FROM FORMING EACH STOCKPILE.

15. SEDIMENT BASINS ARE TYPICAL 'BLUEBOOK' BASINS AND HAVE BEEN DESIGNED FOR TYPE F/D (DISPERSIBLE) SEDIMENT. A NUMBER OF LOCATIONS HAVE BEEN IDENTIFIED AS SUITABLE FOR USE OF HIGH EFFICIENCY SEDIMENT (HES) BASINS HOWEVER THE USE OF HES BASINS IS SUBJECT TO APPROPRIATE CONDITIONS WITHIN THE PROJECTS ENVIRONMENTAL PROTECTION LICENCE.

NOTE: CONTROLS SHOWN ON THIS PLAN ARE INDICATIVE ONLY. THE EXACT LOCATION OF CONTROLS AND ACCESS TRACKS WILL BE DETERMINED ON SITE AND WILL BE INFLUENCED BY SPECIFIC SITE CONDITIONS.

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1	19/9/22	E.S.M	N.R.	Issued.	NSW GOVERNMENT Transport for NSW	**Newcastle Inner City Bypass Rankin Park to Jesmond** Fulton Hogan	**PRIMARY EROSION AND SEDIMENT CONTROL PLAN**

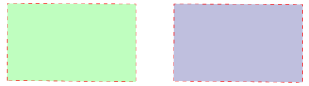
Legend

Sediment basin 

Dirty water 

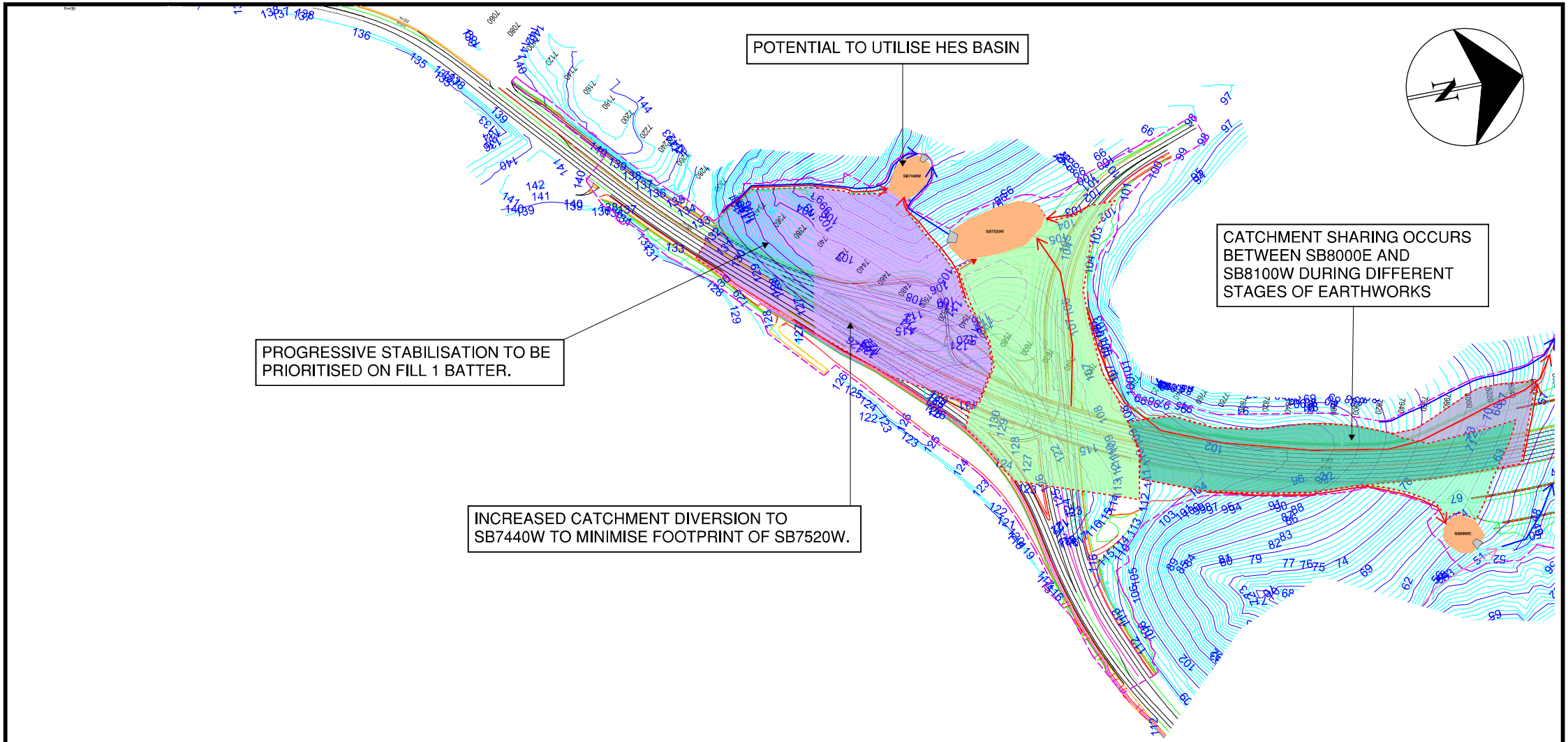
Clean water 

Stabilised overflow 

Site catchment areas 

Existing Flow Path 

REV	DATE	DRN.	APP.	REVISION DETAILS	CLIENT	PROJECT TITLE	DRAWING TITLE
1	19/9/22	E.S.M	N.R.	Issued	NSW GOVERNMENT Transport for NSW	Newcastle Inner City Bypass Rankin Park to Jesmond Fulton Hogan	PRIMARY EROSION AND SEDIMENT CONTROL PLAN Legend



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CLIENT

NSW GOVERNMENT Transport for NSW

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Newcastle Inner City Bypass
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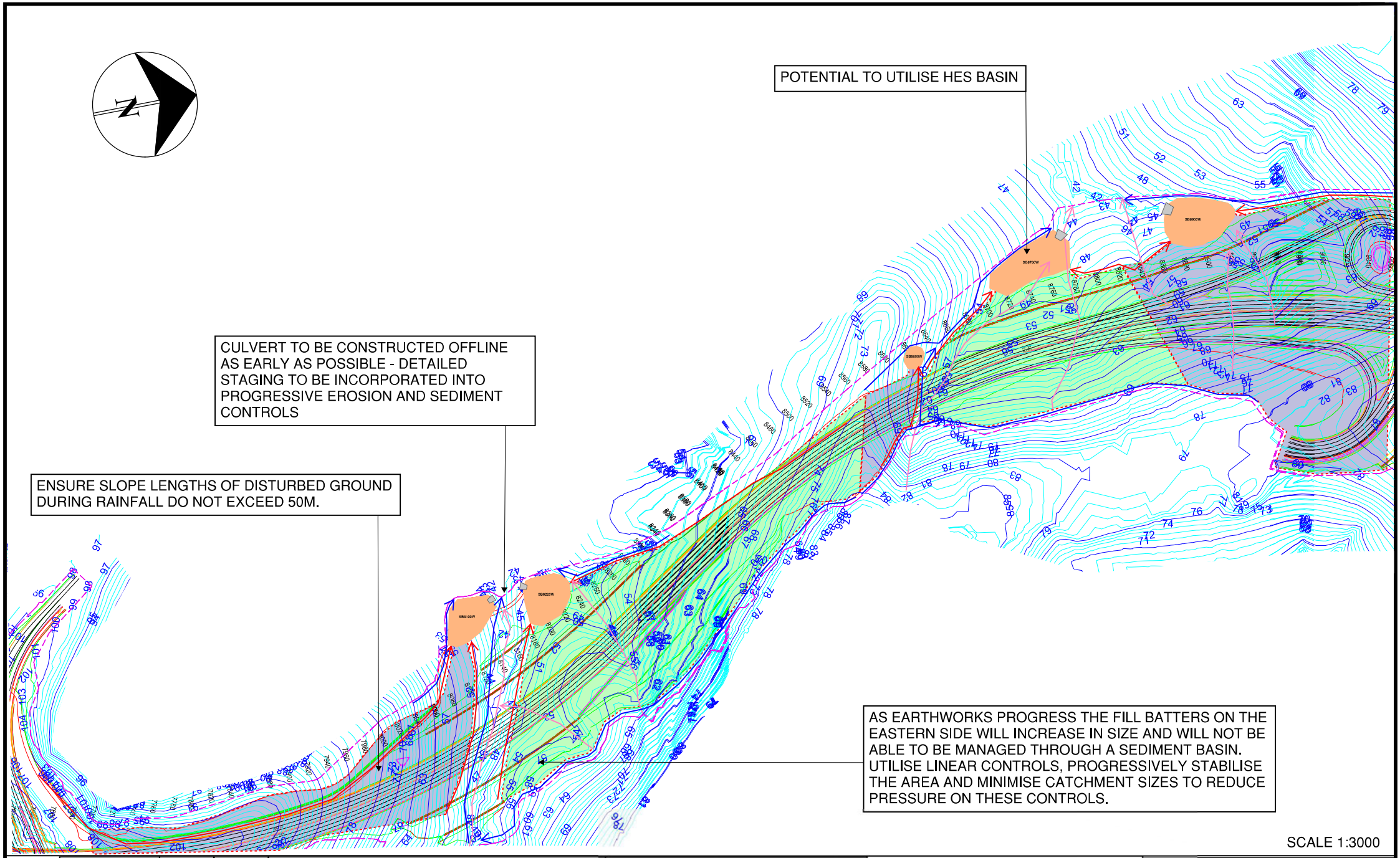
Fulton Hogan

DRAWING TITLE

PRIMARY EROSION AND SEDIMENT CONTROL PLAN



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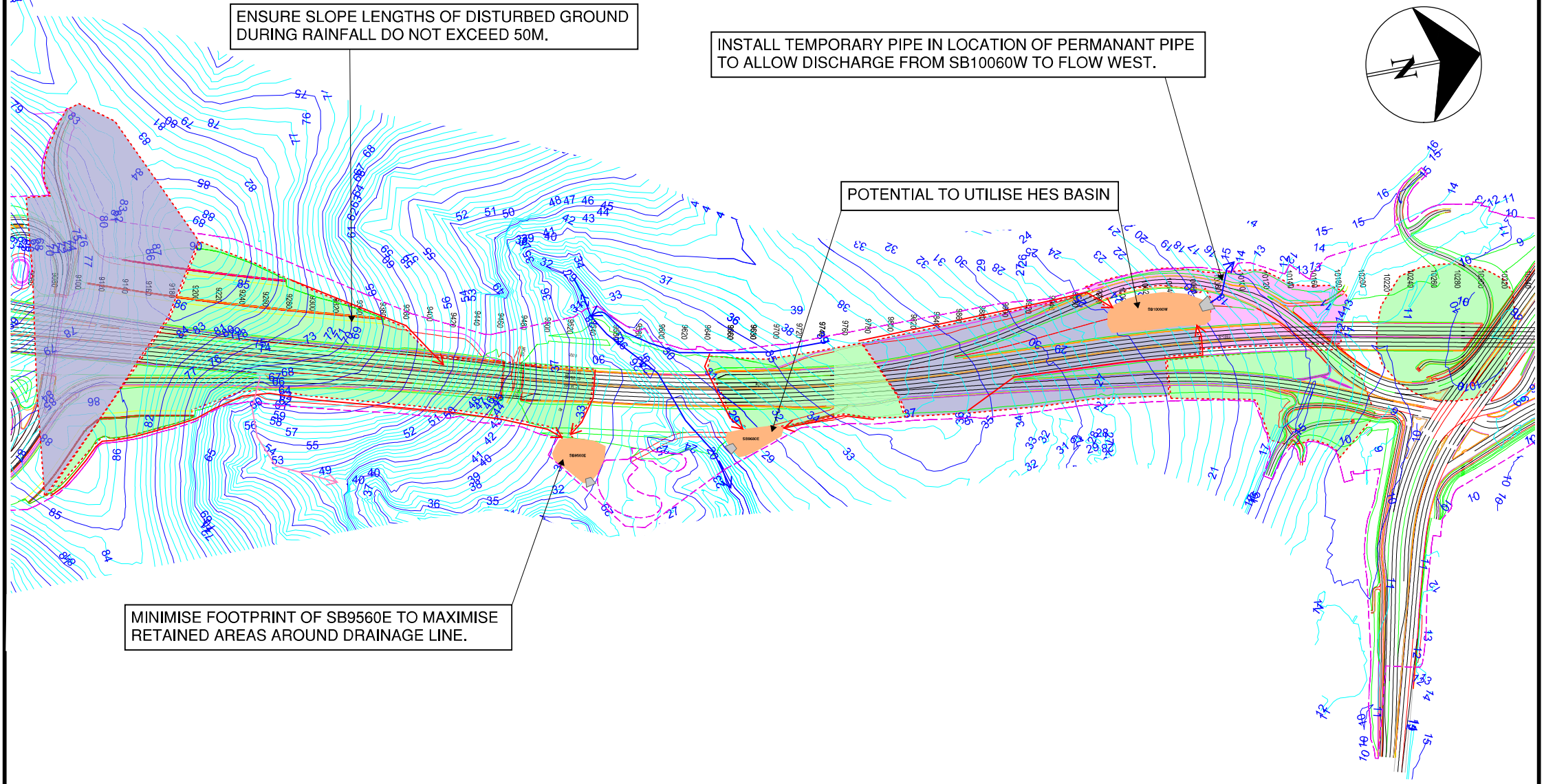

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Newcastle Inner City Bypass
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Fulton Hogan

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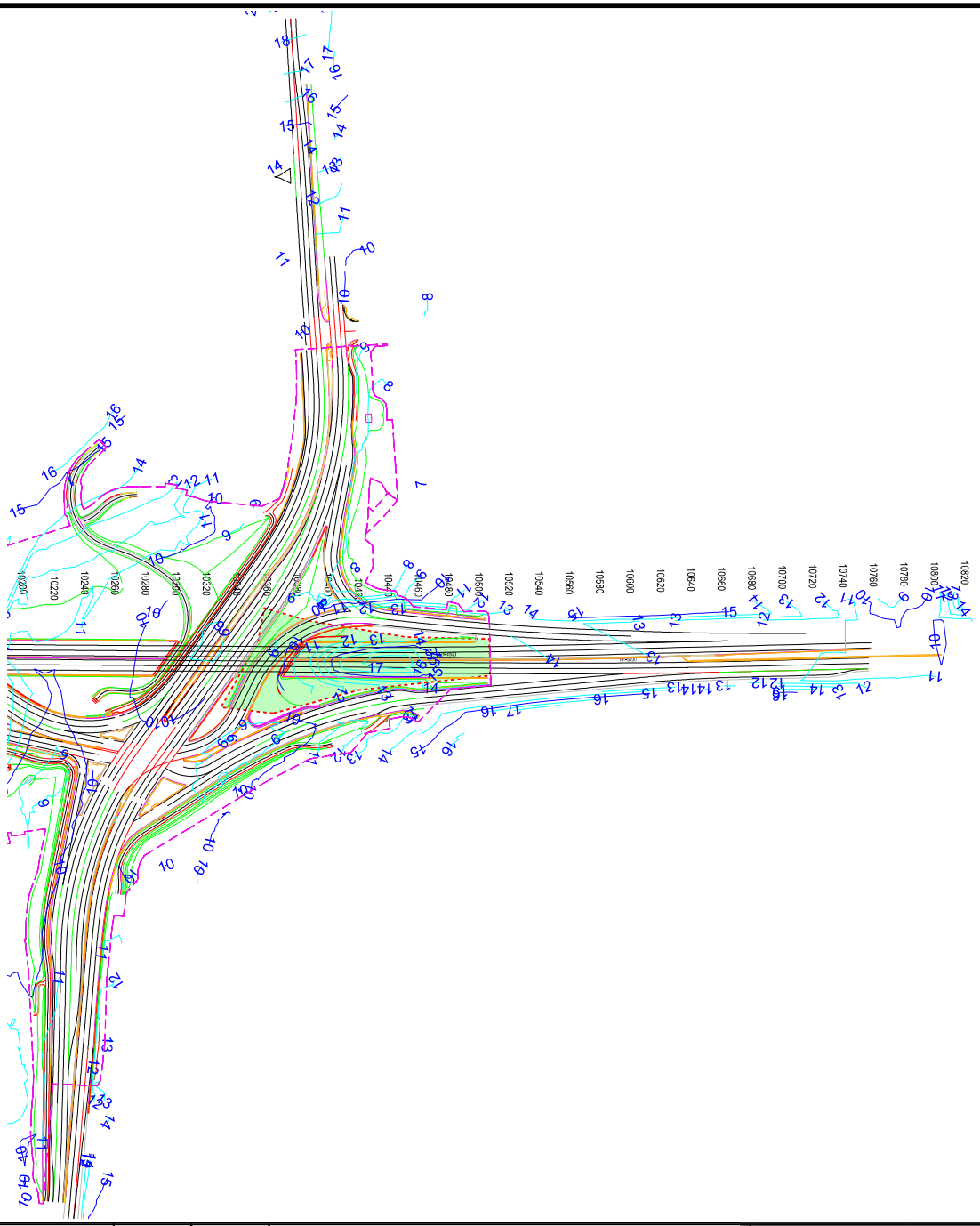
PRIMARY EROSION AND SEDIMENT CONTROL PLAN



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CLIENT

NSW GOVERNMENT Transport for NSW

PROJECT TITLE
Newcastle Inner City Bypass
Rankin Park to Jesmond

Fulton Hogan

DRAWING TITLE

PRIMARY EROSION AND SEDIMENT CONTROL PLAN

Catchment	7440W	7520W	8000E	8100W	8220W	8600W	8760W	8900W	9560E	9680E	10060W	10100W	10100E	10250	10400
Total Catchment (ha)	2.7	2.55	1.69	2.31	3.62	0.34	2.37	6.98	3.24	0.9	2.01	0.82	0.97	1.13	0.67
Disturbed Catchment (ha)	2.7	2.55	1.69	2.31	3.62	0.34	2.37	6.19	3.24	0.9	2.01	0.82	0.97	1.13	0.67
Soil erodibility (K-factor)	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043
Slope length (m)	30	30	50	50	40	40	50	50	50	50	50	30	40	50	20
Slope gradient (%)	35	22	20	20	18	30	19	20	19	10	8	10	8	3	13
Soil loss (t/ha/yr)	905	567	753	753	561	984	708	753	708	299	222	211	192	77	226
Soil loss (m^3/ha/yr)	696	436	579	579	432	602	545	579	545	230	171	163	148	59	174
Soil loss (m^3/yr)	1880	1113	978	1337	1562	205	1291	3584	1765	207	344	134	144	67	117
Basin Required?	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	NO
Settling Zone Volume (m^3)	527	498	330	451	707	66	463	1362	632	176	392	-	-	-	-
Sediment Zone Storage (m^3)	320	189	166	227	266	35	219	609	300	35	58	-	-	-	-
Total Basin Volume (m^3)	847	687	496	678	973	102	682	1971	932	211	450	-	-	-	-
Total Basin Volume (m^3+5%)*	-	721	521	712	1021	107	-	2070	979	221	473	-	-	-	-

* Basin volume increased by 5% to allow for potential groundwater inflows
Note: 5-day, 80th percentile rain event - 30.5mm, (Cv = 0.64), R-Factor - 2630

REV	DATE	DRN.	APP.	REVISION DETAILS	CLIENT	PROJECT TITLE	DRAWING TITLE
1	19/9/22	E.S.M	N.R.	Issued	NSW GOVERNMENT Transport for NSW	Newcastle Inner City Bypass Rankin Park to Jesmond Fulton Hogan	PRIMARY EROSION AND SEDIMENT CONTROL PLAN Catchment/basin Details

Appendix B: Acid sulfate soil management procedure

Appendix B Acid sulfate soil management procedure

1 Purpose

This procedure details the actions to be taken in the unlikely event that actual acid sulfate soils (ASS) or potential acid sulfate soils (PASS) are encountered during excavation/ construction activities. This procedure is prepared to demonstrate compliance with the following standards and guidelines:

- National Acid Sulfate Soils Guidance - National Acid Sulfate Soils Sampling and Identification Methods Manual (Water Quality Australia, June 2018)
- National Acid Sulfate Soils Guidance - National Acid Sulfate Soils Identification and Laboratory Methods Manual (Water Quality Australia, June 2018)
- The Acid Sulfate Soils Manual (1998)
- Acid Sulfate Soils Assessment Guidelines (1998)
- Laboratory Methods Guidelines (2004)
- EPA Waste Classification Guidelines (2014), Part 4: Acid Sulfate Soils
- National Acid Sulfate Soils Guidance (NASSG): National acid sulfate soils sampling and identification methods manual, Department of Agriculture and Water Resources (2018), and
- Technical Guideline: Guidelines for the Management of Acid Sulfate Materials: Acid Sulfate Soils, Acid Sulfate Rock and Monosulfidic Black Ooze (Roads and Traffic Authority, 2005).

As described in the SWMP Section 4.1.1, acid sulfate soils are not known or expected to occur in the project area.

2 Scope

This procedure applies to all construction activities undertaken as part of the project that have the potential to uncover/ disturb ASS/ PASS.

3 Induction and training

All site personnel and subcontractors working in areas of high probability ASS risk will be trained in the relevant parts of this procedure.

4 Procedure

Identification of ASS treatment areas

The design and location of ASS treatment areas (if required) will be marked on PESCPs and any other relevant plans.

Unexpected actual ASS or PASS encountered during excavation / construction activities

If ASS / PASS is encountered during excavation/construction activities the Foreman must:

- STOP ALL WORK in the immediate/ affected area and contact the Environmental Manager (EM)
- Recommence works in alternate area(s) where practicable.

The EM is responsible for testing of ASS / PASS and will undertake testing to determine the acidity (field pH test) and potential for acidity (field pH_{FOX} test with 30 % hydrogen peroxide) of the material encountered.

Any of the following characteristics indicate the presence of ASS:

- Black ooze/ sludge/ gel-like material
- Soil pH of less than four
- A sulphurous smell following soil disturbance
- Pale yellow surface encrustations;
- Excessive iron staining on drain surfaces or stream banks, or iron stained drain water and orange red ochre deposits around water bodies

- Excessive corrosion of concrete and / or steel structures exposed to ground or drainage waters, or rapid corrosion of fresh steel in the soil; and
- Blue-grey, blue-green or grey waterlogged soils which smell of rotten egg gas.

High risk indicators for PASS could include:

- Low position in the landscape
- Soil from beneath the water table or from an intertidal zone
- Heavy textures
- Grey soil colours; and
- Sulfur odour (rotten egg odour).

Action criteria for management intervention

Table 10 details the texture based action criteria for management of ASS disturbance. Where soils containing concentrations at or above the action criteria are disturbed, management of spoil is required.

For the purposes of the project, both action criteria have been included for reference purposes, i.e. less than 1,000 tonnes for fine texture soils, and greater than 1,000 tonnes for all soil types. As the project will disturb spoil greater than 1000 tonnes, the action criteria of greater than 1000 tonnes disturbed should be used.

Table 10: Action criteria based on the ASS analysis for three broad texture categories (Source: Ahern et al. 1998)

Type of material	Clay content	Action criteria 1 to 1000 tonnes disturbed		Action criteria >1000 tonnes disturbed	
Texture range (McDonald et al. (1990)	Approx clay content (%<0.002 mm)	Sulphur trail % S oxidisable e.g. STOS or SPOS	Acid trail mol H+/tonne e.g. TPA or TSA	Sulphur trail % S oxidisable e.g. STOS or SPOS	Acid trail mol H+/tonne e.g. TPA or TSA
Coarse Texture Sands to loamy sands	≤5	0.03	18	0.03	18
Medium Texture Sandy loams to light clays	5 – 40	0.06	36	0.03	18
Fine Texture Medium to heavy clays and silty clays	≤40	0.1	62	0.03	18

Neutralisation of excavated acid sulfate materials (ASM) from earthworks

If field tests are positive or inconclusive, laboratory analysis will be required to determine if the material is in fact ASS and/or the required treatment rates based on the net potential acidity.

Neutralising agents must be incorporated within all ASS / PASS. All cut batters shall be coated with fine aglime at the rate of five kg/m and the lime coating should be checked and re-limed as necessary on a daily basis during periods of dewatering during construction excavation. The base of all fill areas where treated material is to be placed shall be treated with a neutralising agent forming a guard layer prior to the placement of any fill soils to neutralise downward seepage of acidic drainage water. This application may need to be increased depending on stockpile height and actual and potential acidity of the ASM developed through detail assessment.

Aglime rates will be as determined through analytical assessment to establish per cent of sulfur present (S%) to determine an indicative level of treatment as specified in Table 11. Interpretation of analytical data must be conducted by an appropriately qualified and experienced in dealing with ASS/PASS management.

ASS/PASS must be sufficiently dry before neutralising is commenced so that the lime can be thoroughly mixed through the soil. Where moisture levels in soil are high, the soil must be dried by spreading and leaving open to the atmosphere. A dedicated area will be set up to dry and treat PASS. Treatment areas must be away from sensitive receivers, earth bunded, and have an aglime base. Drying can be accelerated by regular aeration by turning with an excavator or backhoe. Drying should be carried out on a guard layer and protected from stormwater ingress.

Mixing of ASS/PASS with neutralising agent shall be carried out by spreading the soil in layers of not more than 300mm to 400mm thick using an agricultural spreader and disc plough, rotary hoe or similar. Care shall be taken to ensure that mixing occurs throughout the depth of the layer prior to placement of new material.

Following the successful treatment of the lot (as determined through the validation testing), the material shall be compacted and the next layer of excavated material to be treated shall be placed over the already treated material. This process shall be continued until the required site elevation is achieved.

Even when neutralised, excavated and processed will not be used for upper pavement layers above Upper Zone Formation (UZF), including Selected Material Zone (SMZ) and verge and other layers with the potential to be exposed.

Table 11: Treatment levels and aglime required to treat total weight of disturbed ASS (Source: Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines 2002)

Disturbed ASS (tonnes) (=m³×BD) †	Soil Analysis* – Existing Acidity plus Potential Acidity (converted to equivalent S% units)													
	0.03	*0.06*	*0.1*	*0.2*	*0.4*	*0.6*	*0.8*	*1*	*1.5*	*2*	*2.5*	*3*	*4*	*5*
1	0	0	0	0	0	0.03	0.04	0.05	0.1	0.1	0.1	0.1	0.2	0.2
5	0	0	0	0.05	0.1	0.1	0.2	0.2	0.4	0.5	0.6	0.7	0.9	1.2
10	0	0.03	0.05	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.2	1.4	1.9	2.3
50	0.1	0.1	0.2	0.5	0.9	1.4	1.9	2.3	3.5	4.7	5.9	7.0	9.4	12
100	0.1	0.3	0.5	0.9	1.9	2.8	3.7	4.7	7.0	9.4	12	14	19	23
200	0.3	0.6	0.9	1.9	3.7	5.6	7.5	9.4	14	19	23	28	37	47
250	0.4	0.7	1.2	2.3	4.7	7.0	9.4	12	18	23	29	35	47	59
350	0.5	1.0	1.6	3.3	6.6	10	13	16	25	33	41	49	66	82
500	0.7	1.4	2.3	4.7	9.4	14	19	23	35	47	59	70	94	117
600	0.8	1.7	2.8	5.6	11	17	22	28	42	56	70	84	112	140
750	1.1	2.1	3.5	7.0	14	21	28	35	53	70	88	105	140	176
900	1.3	2.5	4.2	8.4	17	25	34	42	63	84	105	126	168	211
1000	1.4	2.8	4.7	9.4	19	28	37	47	70	94	117	140	187	234
2000	2.8	5.6	9.4	19	37	56	75	94	140	187	234	281	374	468
5000	7.0	14	23	47	94	140	187	234	351	468	585	702	936	1170
10000	14	28	47	94	187	281	374	468	702	936	1170	1404	1872	2340

L	**Low treatment:** (≤0.1 tonnes lime)
M	**Medium treatment:** (>0.1 to 1 tonne lime)
H	**High treatment:** (>1 to 5 tonnes lime)
VH	**Very High treatment:** (>5 to 25 tonnes lime)
XH	**Extra High treatment:** (>25 tonnes lime)

Notes

1. The tonnes (t) of pure fine aglime, CaCO3 required to fully treat the total weight/volume of ASS can be read from the table at the intersection of the weight of disturbed soil [row] with the existing plus potential acidity [column]. Where the exact weight or soil analysis figure does not appear in the heading of the row or column, use the next highest value
2. An approximate soil weight (tonnes) can be obtained from the calculated volume by multiplying volume (cubic m) by bulk density (t/m3). (Use 1.7 if B.D. is not known.) Dense fine sandy soils may have a BD up to 1.7, and hence 100 cubic metres of such soil may weigh up to 170 t. In these calculations, it is necessary to convert to dry soil masses, since analyses are reported on a dry weight basis.
3. Potential acidity can be determined by Chromium Reducible Sulfur (SCR), Peroxide Oxidisable Sulfur (SPOS) and Total Oxidisable Sulfur (STOS). For samples with pH less than 5.5, the existing acidity must also be determined by appropriate laboratory analysis eg. Titratable Actual Acidity (TAA). Soils with retained acidity e.g. jarosite or other similar insoluble compounds have a less available acidity and will require more detailed analysis. The amount of treatment required may be reduced if the self-neutralising capacity of the soil is appropriately measured.

Neutralising materials

For management or neutralisation of ASS/PASS soils, medium-fine Aglime will be used. Dolomitic Aglime, or magnesium-blend Aglime, will not be used. In general, a finer grind is better. The Aglime purity should preferably be 90 per cent or better, (that is, neutralising value (NV) greater than 90), unless there is a significant savings to be made by use of less pure Aglime. In the latter case, however, the individual lime dosing rates will need to be increased accordingly. The requirement for greater amounts of Aglime of lower purity should be borne in mind when assessing the supplies of this material, as the cost savings from less pure material may be offset by the need for more, and correspondingly higher total transport costs.

ASS/PASS treatment will occur within an ASS treatment area. Material which is transported to treatment cells must be completely treated and removed from the treatment area before new material is introduced. This will ensure that treated material remains segregated and is not mixed with contaminated material. Aglime or other suitable treatment material will be stored at the treatment area in sufficient quantities to enable the treatment of all ASS/PASS material expected to be treated in the upcoming few weeks/months and will be determined by the expected delivery schedule of treatment material. The management of onsite treatment is the responsibility of the Site Foreman, with assistance from the Environmental Manager (EM).

Aglime is non-corrosive, and requires no special handling – it may be necessary to cover the stockpile with a tarpaulin or cover the stockpile with plastic, to minimise dust generation and prevent wetting, since it is then more difficult to spread. Intermittently, until such time as field testing suggests otherwise, a small quantity of Aglime will be stored on site, in the order of 200 kilograms or so. This will enable the regular treatment of soil and cater for any unexpected occurrences of ‘hotter’ ASS/PASS.

Dolomitic aglime, or magnesium-blend aglime, should not be used as these materials impose environmental risks from overdosing with the potential to damage estuarine ecosystems. A reasonable quantity of calcium hydroxide solution (hydrated lime) shall be kept on site at all times for treatment of acidic waters. The supply shall be stored in a covered and bunded area to prevent accidental release to waters. Neutralising agents must be replenished and or replaced regularly to remain effective against loss by wind or water erosion.

Validation of ameliorated ASS / PASS

Samples of the treated soil should be taken and laboratory analysed to demonstrate compliance with the performance criteria (i.e. verification testing). These performance criteria equate to there being no net acidity in the soil following neutralisation. Soil that has been treated by neutralisation techniques and has not met these criteria must be retreated until the above performance criteria are met.

The objective of ameliorating ASS / PASS materials is to ensure that there is no chance that net acidity will be produced. Validation testing only occurs when soils have been treated (with a neutralising agent) to prevent any future acidification. If results of the validation testing indicate a failure to comply with the performance criteria, soil may need to be re–treated with an additional application of neutralising agent.

Soils that have been mixed with aglime will be analysed by either the SPOCAS or SCR Suite test methods at a rate of one sample per 250 cubic metre. All validation samples are to be recorded by GPS or survey, clearly marked on a map/sketch or otherwise recorded.

Where large quantities (greater than 1,000 cubic metres) of ameliorated soils are involved and ‘net acidity’ rates are generally low (18 mol H+/t to less than 125 mol H+/t or 0.03 to 0.20 per cent sulfur), a reduced rate of sampling may be appropriate subject to approval. A rate of one sample per 1,000 cubic metre may be suitable for example.

The following performance criteria must be attained for soil that has been treated using neutralisation:

- The neutralising capacity of the treated soil must exceed the existing plus potential acidity of the soil
- Post-neutralisation, the soil pH is to be greater than 5.5
- Excess neutralising agent should remain within the soil until all acid generation reactions are complete and the soil has no further capacity to generate acidity.

If ameliorated ASS is going to be reused on site, due environmental regard for areas of placement should be assessed, documented and approved by the Environmental Manager (EM). Assessment measures may include:

- Location of proposed placement areas and potential receptors (waterways, sensitive flora and fauna, structures)

- Stability and suitability of materials as select fill (especially clays), and
- Suitability of soil type for plant growth.

In the unlikely event that the treated material is unable to be reused on-site for other purposes, the material will need to be disposed of to an appropriately licensed waste disposal facility. The EM will liaise with a licensed waste facility and coordinate the process.

Large-scale dewatering or drainage

Earthworks and/or pumping that result in localised drainage or lowering of groundwater and the exposure of sulfidic soils to the ingress of oxygen may generate acidity as a function of soil type(s), sulfide contents, area exposed, and length of time the excavation remains 'dry'. The scale of the dewatering or drainage should be defined by the size of the cone of depression rather than the size of the void. Activities of this type are high-risk, and should not be undertaken without technical risk assessment by qualified personnel and the formulation of management measures sufficient to reduce risk to levels acceptable by the administering authorities.

Neutralising acid leachate and drain water using lime

The liming rate for treating acid water should be carefully calculated to avoid the possibility of "overshooting" the optimum pH levels of 6.5 to 8.5 (or as per EPL discharge requirements). This can occur quite easily if more soluble or caustic neutralising agents such as hydrated lime (pH 12) or magnesium hydroxide (pH 12) are used. It should be noted that when neutralising acid water, no safety factor is used. However, monitoring of pH should be carried out regularly during neutralisation procedures.

Agricultural lime (pH 8.2) is the safest neutralising agent. It equilibrates around a pH of 8.2 that is not generally harmful to plants, stock or humans and most aquatic ecology species. The main shortcoming associated with the use of lime is its insolubility in water.

When using alkaline materials, strict protocols must be established for the use, handling and monitoring of these materials. Prior to any ASS / PASS management, appropriate personal protective equipment (PPE) is to be worn as per relevant Safety Data Sheets (SDS) (e.g. for Lime). This may include:

- Eye goggles and/or face masks
- Hard Hat
- Rubber boots, gloves
- Appropriate clothing (e.g. long sleeved shirts).

Calculating the quantity of lime

The current pH is measured with a recently calibrated pH detector. The desired pH is usually between 6.5 and 8.5 with pH 7 is normally targeted. The volume of water can be calculated by assuming one cubic metre of acid water is equivalent to one kilolitre (1000 litre) and 1,000 cubic metre is equivalent to one megalitre (ML).

As a general guide, Table 12 shows minimum quantities of pure lime, hydrated lime or sodium bicarbonate needed to treat dams or drains of one ML (1,000 cubic metre) capacity.

Table 12: Quantity of pure neutralising agent required to raise from existing pH to pH 7 for one Megalitre of low salinity acid water

Current water pH	[H+] {mol/L}	H+ in 1 Megalitre {mol}	Lime to neutralise 1 Megalitre {kg pure CaCO3}	Hydr. lime to neutralise 1 Megalitre {kg pure Ca(OH)2}	Pure NaHCO3/ 1 Megalitre {kg }
0.5	0.316	316,228	15,824	11,716	26,563
1.0	0.1	100,000	5,004	3705	8390

1.5	0.032	32,000	1,600	1185	2686
2.0	0.01	10,000	500	370	839
2.5	0.0032	3,200	160	118	269
3.0	0.001	1,000	50	37	84
3.5	0.00032	320	16	12	27
4.0	0.0001	100	5	4	8.4
4.5	0.000032	32	1.6	1.18	2.69
5.0	0.00001	10	0.5	0.37	0.84
5.5	0.0000032	3.2	0.16	0.12	0.27
6.0	0.000001	1	0.05	0.037	0.08
6.5	0.00000032	.32	0.016	0.12	0.027

Notes on Table C-3:

1. 1 m3 = 1,000 litre = 1 kilolitre = 0.001 megalitre
2. Agricultural lime has very low solubility and may take considerable time to even partially react
3. Hydrated lime is more soluble than aglime and hence more suited to water treatment. However, as Ca(OH)2 has a high water pH, incremental addition and thorough mixing is needed to prevent overshooting the desired pH. The water pH should be checked regularly after thorough mixing and time for equilibration before further addition of neutralising product
4. Weights of lime or hydrated lime are based on theoretical pure material and hence use of such amounts of commercial product will generally result in under treatment
5. To more accurately calculate the amount of commercial product required, the weight of lime from the table should be multiplied by a purity factor (100/ Neutralising Value for aglime) or (148/ Neutralising Value for hydrated lime).
6. Calculations are based on low salinity water acidified by hydrogen ion, H+ (acid) and do not take into account the considerable buffering capacity or acid producing reactions of some acid salts and soluble species of aluminium and iron. For example, as the pH increases towards 4, the precipitation of soluble ferric ion occurs, liberating more acid:

   $Fe3+ + 3H2O \rightarrow Fe(OH)3 + 3H+$
7. If neutralising substantial quantities of ASS leachate, full laboratory analysis of the water will be necessary to adequately estimate the amount of neutralising material required.

Application of lime to water

To increase the efficiency, lime should be mixed into a slurry before adding. A slurry can be prepared in a concrete truck, cement mixer or large vat with an agitator. Methods of application of the slurry include:

- Spraying the slurry over the water with a dispersion pump
- Pumping the slurry into the water body with air sparging (compressed air delivered through pipes) to improve mixing once added to water
- Pouring the slurry out behind a small motorboat and letting the motor mix it in

- Incorporating the slurry into the dredge line (when pumping dredge material)
- Using mobile water treatment equipment such as the 'Neutra- mill' and 'Aqua Fix' to dispense neutralising reagents to large water bodies.

A change in pH will not be instantaneous. The rate of neutralisation will vary with the solubility, fineness of the lime, the application technique and the acidity (pH) of the water. The finer the lime (preferably microfine with the consistency of white dust) and the more agitated the water, the faster the lime will dissolve and become effective. The pH must be carefully monitored even after the desired pH has been reached. If the water has not reached the desired pH within two weeks, more lime may need to be added. Before additional lime is added, the lack of success should be investigated. Issues to consider may include:

- The quality of the lime being used
- The effectiveness of the application technique
- The existence of additional sources of acid leaching into the water body further acidifying the water, and
- The lime has become lumpy and is sitting on the bottom

Neutralisation may be faster if higher rates are used, but is not recommended as it is expensive and resource wasteful. Moreover, over-dosing may result, though this is unlikely to be a concern with agricultural lime.

Disposal of potential acid sulfate soils below the water table

Potential ASS may be disposed of in water below the permanent water table, provided:

- this occurs before they have had a chance to oxidise, i.e. within 24 hours of excavation and
- they meet the definition of 'virgin excavated natural material' (VENM) under the POEO Act, even though they contain sulfidic ores or soils.

Landfills must be licensed by the EPA to dispose of potential ASS below the water table. The disposal site's licence will outline what documentation needs to be kept and for how long.

Soil that has dried out, undergone any oxidation of its sulfidic minerals, or which has a pH of less than 5.5 must be treated by neutralisation.

Appendix C: Heavy rainfall event procedure

Appendix C Heavy rainfall event procedure

1 Purpose

To detail the actions to be taken in the event of a 'heavy' or 'violent' rainfall forecast as defined by the Australian Government Bureau of Meteorology. The procedure outlines how to monitor rainfall forecasts and prepare site to minimise impacts as much as practicable.

For management measures and procedures to be implemented prior to a flooding event, including timeframes for securing work sites and moving plant and equipment, refer to the Flood Management Sub-Plan (FMP).

Table 13: Definition of Rain or Showers Intensity

Category	Description
Light	Up to 2 mm per hour. Individual drops easily identified, puddles form slowly, small streams may flow in gutters.
Moderate	2.2 mm to 6 mm per hour. Rapidly forming puddles, down pipes flowing freely, some spray visible over hard surfaces.
Heavy	6.2 mm to 50mm mm per hour. Falls in sheets, misty spray over hard surfaces, may cause roaring noise on roof.
Violent	Over 50mm per hour. Gutters and downpipes overflowing, spray to height of several centimetres over hard surfaces, may cause roaring noise on roof.

Source: Australian Government Bureau of Meteorology website http://www.bom.gov.au/info/wwords

2 Induction and training

All Fulton Hogan Superintendents, Foremen and Engineers will be trained in this procedure.

3 Procedure

1. Monitoring of 'heavy' or 'violent' rain or shower events (through the Australian Government Bureau of Meteorology):
2. On each working day, the Environmental Manager (EM)/ Environmental Coordinator (EC) or delegate will log on to the Australian Government Bureau of Meteorology website http://www.bom.gov.au/weather/nsw review the weather forecast for the next three days and notify the project team of the same by email. When rain or showers are described as 'heavy' or 'violent', the EM/EC or delegate will highlight that:
    a. rain or showers are described as 'heavy' or 'violent' (as applicable)
    b. the Heavy rainfall event procedure must be followed.
3. The EM/ EC or delegate will keep a record of all weather forecast emails.
4. The daily weather forecast may be discussed at Pre-start Meetings as deemed required by the Fulton Hogan Foreman/ Superintendent.
5. When rain or showers are described as 'heavy' or 'violent' the Fulton Hogan Superintendent will notify the project team of personnel who will monitor and maintain erosion and sediment controls if required.
6. The Foremen will ensure that there is an adequate supply of erosion and sediment control measures on site.
7. Prior to the 'heavy' or 'violent' rainfall or shower event, the Foremen and the EM/ EC or delegate will inspect

erosion and sediment control measures, focusing on the critical areas first. These may include works areas near waterways, stockpile areas and chemical storage areas. Specific controls in these areas (particularly near waterways) will change as work progresses and therefore, must be implemented in accordance with the current PESCP.

8. Additional temporary erosion and sediment controls will be installed as required.
9. During the event if the rainfall is potentially causing runoff, daily inspection will be undertaken (if safe to do so) in accordance with CEMP Section 8.1.1.
10. Within 24 hours of cessation of a rainfall event, if the rainfall has potentially caused runoff to occur on or from the project, inspection will be undertaken (if safe to do so) in accordance with CEMP Section 8.1.1.

Appendix D: Unexpected contaminated land and asbestos finds procedure

Appendix D Unexpected contaminated land and asbestos finds procedure

1 Purpose

This procedure details the actions to be taken in the event that potentially contaminated soil/material or asbestos is unexpectedly encountered during excavation/ construction activities.

This procedure has been prepared to address the requirements of CoA E59.

2 Scope

This procedure applies to all construction activities undertaken as part of the project. The procedure will be implemented for the duration of work.

3 Procedure

1. If potential contaminated soil/ material is encountered during excavation/ construction activities:
    - STOP ALL WORK in the immediate/affected area
    - Immediately notify the Environmental Manager, who will promptly notify TfNSW, the ER, the PV and relevant Authorities of the find.
    - Erect exclusion fencing and signage to avoid inadvertent impacts
    - Recommence works in an alternate area, where practicable.
2. Prior to any contamination investigation/ management, appropriate personal protective equipment (PPE) is to be worn as per the relevant Safety Data Sheets (SDS). This may include, but not be limited to:
    - eye goggles
    - face mask
    - rubber boots
    - rubber gloves, and
    - work clothes.
3. Implement the G36 Hold Point for Contaminated Land under Clause 4.2.4 where required
4. The Environmental Manager will evaluate the situation and, if considered necessary, commission a suitably qualified contamination specialist to undertake a contamination investigation in the area of the find. A report of the investigation will be prepared to determine the full nature and extent of any contamination at the project area, and to advise on the need for remediation or other action. The level of reporting must be appropriate for the identified contamination in accordance with relevant EPA guidelines, including *Consultants Reporting on Contaminated Land: Contaminated Land Guidelines* (EPA, 2020) and assess the requirement to notify the EPA.
5. A copy of any contamination investigation report will be submitted to TfNSW for review. TfNSW shall determine whether consultation with the local council and/ or EPA is required prior to continuation of construction works within the affected area. TfNSW may at its discretion choose to take over the investigation and management of an unexpected contamination find, and directly appoint an EPA accredited contaminated site auditor.
6. The material is to be classified in accordance with the *Waste Classification Guidelines* (EPA 2014). If necessary, in consultation with TfNSW, the Environmental Manager will liaise with the relevant authorities to determine the appropriate management options.
7. The Environmental Manager (in consultation with a suitably qualified contamination specialist and TfNSW) will determine the appropriate management measures to be implemented. This may include treatment or offsite disposal. If the material is to be disposed offsite, ensure the waste facility is appropriately licensed.

8. If the material is suspected or is known to contain asbestos, follow the *Incident and Emergency Response Flowchart - Asbestos* contained in the Incident and Emergency Response Plan (IERP).
9. If the material is determined to be ASS or PASS, follow the Acid sulfate soil management procedure contained at Appendix B.
10. If required, contaminated soils will be treated and validated in accordance with an approved Remediation Action Plan (RAP) to be developed in consultation with TfNSW and the suitably qualified contamination specialist with consideration for the remediation hierarchy. The Remediation Action Plan must be prepared in accordance with EPA guidelines on contaminated land management, and must include the following:

    (a) Testing requirements for any contaminated material prior to its disposal off site

    (b) Validation plan, which must include the area in the immediate vicinity of (both below and adjacent to) the known contamination

    (c) Implications of the validation results on the waste classification for material that may be excavated in the vicinity of the known contamination.
11. Carry out remediation of the contaminated material, or its removal and disposal, in accordance with the Remediation Action Plan.
12. Remedial actions are to be incorporated into specific SWMS and EWMS and to be further toolboxed to project team and subcontractors.
13. Recommence works once remedial works have been implemented and appropriate validation has been received.

Appendix E: Dewatering procedure

Appendix E Dewatering procedure

1 Purpose

This procedure details the process for dewatering water capture points (including licensed sediment basins) to ensure dewatering activities do not cause erosion impacts and/or pollute the environment.

2 Scope

This procedure applies to all construction activities that require dewatering. Dewatering water capture points is required to allow work to continue in construction areas and to maintain sediment basin capacity

3 Induction and Training

All site personnel and subcontractors responsible for dewatering activities will be trained in this procedure.

4 Procedure

a. Identification of areas requiring dewatering

Areas which may require dewatering include but are not limited to:

- piling works e.g. associated with retaining walls and bridge construction
- sedimentation controls (e.g. sediment basins/ traps/ sumps)
- active excavations
- cuttings
- culvert and drainage construction areas.

b. Consider reuse options

Onsite reuse options will be considered as a priority before any offsite discharges are permitted. Onsite reuse may include applications such as:

- dust suppression
- earthworks compaction
- plant/ vehicle wash down
- vegetation establishment / rehabilitation
- land irrigation.

The reuse of water must not cause further ponding or result in concentrated runoff leaving the construction site, which would be considered an unauthorised discharge.

c. Water quality criteria

Water quality criteria that must be met prior to any onsite reuse or offsite discharge is detailed below. The testing of water for additional pollutants should be considered where the water has encountered, or is likely to have encountered, the following activities:

- General earthworks in soils with known contamination issues
- Earthworks in acid sulfate soils
- Hydrocarbon spills.

Onsite reuse

The onsite reuse water quality criteria is dependent upon the origin of the water (e.g. surface water or groundwater) and proposed end use/ application of the water. Refer to Table 14.

Table 14: Water quality criteria for onsite reuse

Origin	End Use/ Application	Water Quality Parameter	Criteria
Surface water	▪ Dust suppression ▪ Earthworks compaction ▪ Plant/ vehicle wash down	Oil and grease	No visual evidence
	▪ Vegetation establishment/ rehabilitation ▪ Land irrigation	Oil and grease	No visual evidence
		pH	6.5-8.5
Groundwater	▪ Dust suppression ▪ Earthworks compaction ▪ Plant/ vehicle wash down ▪ Vegetation establishment/ rehabilitation ▪ Land irrigation	Oil and grease	No visual evidence
		pH	6.5-8.5
		Odour	No olfactory response

Offsite discharge

All offsite discharge must comply with the water quality discharge criteria specified in the EPL. Where no criteria have been specified, comply with the following criteria identified in G38 Clause 3.3.4:

- Total Suspended Solids (TSS) of 50 mg/L
- pH between 6.5 and 8.5, and
- no visible trace of oil and grease.

If a statistical correlation is developed between turbidity (NTU) and Total Suspended Solids (TSS) through the construction phase for discharge water, turbidity measurements may be used to allow discharge from sediment basins before laboratory data is available.

A copy of the statistical correlation assessment methodology and results will be provided to TfNSW for approval prior to submitting them to the EPA for any approval required by the EPL. TfNSW will be provided with copies of any approvals required under the EPL in accordance with G38 Clause 3.3.4.

d. Water treatment

Water treatment will be undertaken as detailed below, subject to the requirements of the EPL.

pH levels

- If the pH of water is outside the range 6.5-8.5 it will be neutralised. If the water is above 8.5, acid will be used to lower the pH. If the water pH is below 6.5, a base will be used to raise the pH; and
- To treat water with acid, safety requirements will be followed as outlined in the relevant Safety Data Sheets (SDS) and Safe Work Method Statements (SWMS).

Treatment to lower pH

- Hydrochloric acid is used to lower pH.

Treatment to raise pH

- Aglime or Hydrated Lime is used to raise pH.

Total Suspended Solids (TSS)

- If the TSS of water is greater than 50 mg/L, flocculation is required.
- Treating water with flocculent or coagulant (e.g. gypsum) will make the sediments drop to the bottom. As a guide, a gypsum dosing rate of about 30kg per 100m^3 of stored water will be used and application methods will be applied in accordance with the methods recommended in Managing Urban Stormwater: Soils &

Construction (Volume 1, 2004). Note that an even application over the captured water is essential for effective flocculation.

- The use of flocculants or coagulants other than gypsum may be trialled in consultation with TfNSW and the EPA. These methods may include 'floc blocks', polyelectrolytes and other suitable coagulants. Use of flocculants or coagulants other than gypsum must be approved by TfNSW in accordance with G38 Clause 3.3.2.
- Only environmentally safe flocculants are to be used based on Environmental Manager review of SDS information.
- Apply evenly in water and wait for the sediment to settle out.
- Apply the flocculant or coagulant (whether gypsum or another approved material) to settle suspended sediments within 24 hours of the conclusion of each rain event causing runoff in accordance with G38 Clause 3.3.3.

Hydrocarbons

- If an oily sheen is found on the surface of the water, the Environmental Manager (or delegate) will use a hydrophobic oil boom (or similar) to skim off the sheen prior to discharge.
- If a heavy oil layer is found on the surface of the water the Environmental Manager (or delegate) will have the oily water removed by a licensed liquid waste contractor and disposed of at an appropriately licensed waste facility.

e. Dewatering

Obtain a Dewatering Permit PRIOR TO any dewatering (refer to Appendix F)

Sediment basins

Once water has been tested and meets all the EPL criteria, discharge approval will be given (via the Dewatering permit contained in Appendix F) for it to be released to the clean water system. Ensure the discharge point will not result in scour or erosion.

Other water capture points

Where dewatering is required from water capture points (other than sediment basins), the volume and quality of water will be considered as documented in the Dewatering permit contained in Appendix F.

For large quantities or poor quality water, as assessed by the Environmental Manager (or delegate), the water will be reused onsite or pumped/ carted to a holding tank or sediment basin.

If there is no capacity to take the captured water, the captured water will either be treated (flocculated) in situ, tested and released to an appropriate area (e.g. grassed area, lined catch drain) once the desired water quality standards have been achieved or, pumped into a water cart and taken to another holding tank or sediment basin which does have the required capacity.

Pumps

Pump requirements are outlined below:

- Pumps must only be operated by dedicated dewatering crews toolboxed on this procedure.
- During dewatering, pumps must be supervised at all times.
- Use floating siphon devices where practicable to minimise resuspension of sediment during dewatering operations.
- The pump discharge supervisor is to monitor the pump outlet for change in water quality in receiving waters.
- If water quality changes from the pump outlet during pumping, the pump must be shut down and the Environmental Manager (or delegate) contacted. The water quality is to be re-tested and a new Dewatering permit (refer to Appendix F) issued.

Appendix F: Dewatering permit

[Note - The Dewatering Permit will be updated during construction as required, separate to this SWMP/ CEMP]

Dewatering permit

MUST BE COMPLETED BY ENVIRONMENTAL MANAGER (OR DELGATE)

ID:	**Date of Last Rain Event:** _____ **Amount of Rain:** _____mm	**Date Inspected:** _____

#	CONTROL MEASURE	CONDITIONS
	WORK SITE LOCATION	
1	**Initial Test** **Date:** _____ **Time:** _____	
	What is the estimated volume of water?	Volume = _____m^3
	Onsite Reuse	
	Where origin of water is SURFACE WATER, and proposed end use is: ▪ Dust suppression ▪ Earthworks compaction, and/ or ▪ Plant/ vehicle wash down: Onsite Reuse Permitted only if: • No visual evidence of oil or grease.	Oil or Grease Visible? ☐ Yes ☐ No *If oil and/or grease visible, remove using a suitable absorbent material.*
	Where origin of water is SURFACE WATER, and proposed end use is: ▪ Vegetation establishment/ rehabilitation, and/ or ▪ Land irrigation Onsite Reuse Permitted only if all of the following are met: • No visual evidence of oil or grease • pH is 6.5 - 8.5	Oil or Grease Visible? ☐ Yes ☐ No *If oil and/or grease visible, remove using a suitable absorbent material* . pH = _____
	Where origin of water is GROUNDWATER, and proposed end use is: ▪ Dust suppression ▪ Earthworks compaction ▪ Plant/ vehicle wash down: ▪ Vegetation establishment/ rehabilitation, and/ or ▪ Land irrigation Onsite Reuse Permitted only if all of the following are met: • No visual evidence of oil or grease • pH is 6.5 - 8.5 • No olfactory response to odour	Oil or Grease Visible? ☐ Yes ☐ No *If oil and/or grease visible, remove using a suitable absorbent material.* pH = _____ Olfactory response to odour? ☐ Yes ☐ No
	Offsite Discharge	
	Offsite Discharge Permitted only if all of the following are met: • All project EPL discharge criteria.	Oil or Grease Visible? ☐ Yes ☐ No *If oil and/or grease visible, remove using a suitable absorbent material.*

		pH = _____ TSS = _____mg/ L Other = _____
2	**Flocculate** How much flocculent was added? How much Lime/ Acid was added	Amount: _____L Date added: _____ Amount: _____L Date added: _____
3	**Final Test** **Date:** _____ **Time:** _____	
	What is the estimated volume of water?	Volume = _____m^3
	Onsite Reuse	
	Where origin of water is SURFACE WATER, and proposed end use is: ▪ Dust suppression ▪ Earthworks compaction, and/ or ▪ Plant/ vehicle wash down: <u>Onsite Reuse Permitted only if:</u> • No visual evidence of oil or grease.	Oil or Grease Visible? ☐ Yes ☐ No *If oil and/or grease visible, remove using a suitable absorbent material.*
	Where origin of water is SURFACE WATER, and proposed end use is: ▪ Vegetation establishment/ rehabilitation, and/ or ▪ Land irrigation <u>Onsite Reuse Permitted only if all of the following are met:</u> • No visual evidence of oil or grease • pH is 6.5 - 8.5	Oil or Grease Visible? ☐ Yes ☐ No *If oil and/or grease visible, remove using a suitable absorbent material* . pH = _____
	Where origin of water is GROUNDWATER, and proposed end use is: ▪ Dust suppression ▪ Earthworks compaction ▪ Plant/ vehicle wash down: ▪ Vegetation establishment/ rehabilitation, and/ or ▪ Land irrigation <u>Onsite Reuse Permitted only if all of the following are met:</u> • No visual evidence of oil or grease • pH is 6.5 - 8.5 • No olfactory response to odour	Oil or Grease Visible? ☐ Yes ☐ No *If oil and/or grease visible, remove using a suitable absorbent material.* pH = _____ Olfactory response to odour? ☐ Yes ☐ No
	Offsite Discharge	

	Offsite Discharge Permitted only if all of the following are met: • All project EPL discharge criteria.	Oil or Grease Visible? ☐ Yes ☐ No *If oil and/or grease visible, remove using a suitable absorbent material.* pH = _____ TSS = _____mg/ L Other = _____
4	**Method of Discharge:** _____	Discharge location: ☐ Stormwater drainage ☐ Creek/ river ☐ Well grassed area ☐ Design spillway ☐ Earthworks ☐ Other:_____
5	**Date and Time of Discharge:**	
6	**Discharge Conditions:** _____	
7	**Quality of Receiving Waters:**_____ **Potential Impact of Discharge Water:**_____ *Prior to offsite discharge, consideration must be given to the quality of the receiving waters so that the potential impact of the discharge water can be assessed. Any water discharged from the project site must be of the same quality, or better, than the quality of the receiving waters (at the time of discharge).*	
8	**Approved by:** **Signature:** **(MUST BE ENVIRONMENTAL MANAGER or DELGATE)**	
9	**Name** **Discharged by:** _____ Signature: _____ Date: _____	**Name** **Discharged by:** _____ Signature: _____ Date: _____

Appendix G: Stockpile management protocol

Appendix G Stockpile management protocol

1 Purpose

This protocol provides a process for the establishment of temporary stockpile areas within and outside the approved project boundary to ensure that environmental impacts associated with stockpiling are minimised during construction.

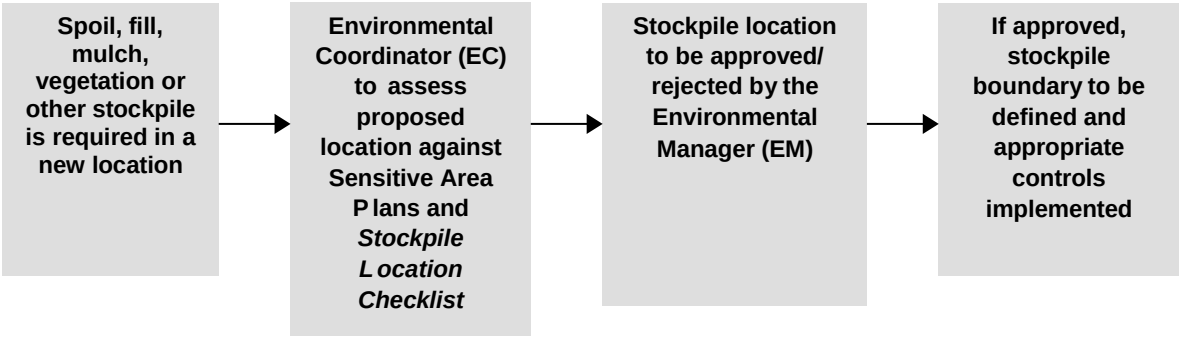
Stockpile sites may typically be required to store material including, but not limited to:

- Excavated materials to be used in fill embankments and other design features
- ASS subject to treatment prior to reuse
- Excavated material unsuitable for reuse in the formation
- Excess concrete, pavement, rock, steel and other material stored for either future use in the project or prior to removal from site, and
- Topsoil, mulch, excess timber for landscaping and revegetation works.

2 Scope

This protocol and associated Stockpile Location Checklist describe the environmental criteria/ factors to be considered to ensure stockpiles are located in areas where potential environmental harm is minimised.

To avoid duplication, refer to the relevant Sub-Plan e.g. AQMP, WEMP, FFMP, NVMP, ACHMP, NAHMP and this SWMP for the mitigation measures that will be implemented to avoid/ minimise air quality; waste management; flora and fauna; noise; Aboriginal cultural heritage; Non-Aboriginal heritage; and erosion and sediment impacts respectively from stockpiles.



3 Induction and Training

All site personnel and subcontractors will be trained in this procedure.

4 Procedure

a. Proposed stockpile information

Prior to requesting the assessment of a stockpile location from the EC, the person requesting the new stockpile location should check approved stockpile locations to ensure current approved stockpile sites cannot be better used. Minimise the number of stockpiles sites wherever practicable.

If existing sites cannot be used, the expected quantity of material, expected dimensions required, expected stockpiling timeframes, destination of the stockpiled material, whose land the stockpile will be located on and the type of material to be stockpiled must be detailed. Once this information is known, the EC shall be contacted for an assessment of the proposed stockpile location.

b. Assessment of stockpile site

The EC shall utilise the Stockpile location checklist (refer to Appendix H) to assess the stockpile location.

Note stockpiles within the approved project boundary are intrinsic to and undifferentiated from the bulk earthworks operations, these stockpiles are assessed in accordance with the section below of this protocol.

b. Approval of stockpile site

Stockpiles within the approved project boundary

The EC shall give the completed Stockpile location checklist (refer to Appendix H) to the EM for review and assessment. Following this review, the EM shall either approve or reject the proposed stockpile location and notify the EC of the decision.

A register of all stockpile sites (Appendix I) shall be kept on file by the EC and they shall also ensure that any additional erosion and sediment control measures are included in the relevant progressive erosion and sediment control plan (PESCP).

Stockpiles on TfNSW land outside the approved project boundary

Where a stockpile is proposed outside the approved project boundary but on TfNSW owned land, the EM will assess whether the proposal is consistent with the approved project and complete the Stockpile location checklist (refer to Appendix H).

Note: As approval of stockpiles on TfNSW owned land outside the approved project boundary will be determined by TfNSW, the timeframes for approval will be greater than through the EC/ EM.

Stockpiles not on TfNSW land outside the approved project boundary (i.e. on private land)

Where a stockpile is proposed on land outside the approved project boundary that is not TfNSW owned land, the EM will assess whether the proposal is consistent with the approved project, complete the Stockpile location checklist (refer to Appendix H) and obtain evidence of landowner consent.

Note: As approval of stockpiles on land outside the approved project boundary will be determined by TfNSW the timeframes for approval will be greater than through the EC/ EM.

c. Preparing stockpile site

If the proposed stockpile site is approved, the boundaries will be agreed between the person proposing the stockpile and the EC (or TfNSW where required). The proposed stockpile site will be marked out and appropriate erosion and sediment controls installed. Stockpile sites will also be signposted to clearly identify and delineate between other stockpiles. The erection of signs will be agreed with the Foreman.

Details of stockpile management in regard to erosion and sediment control will be included in the relevant PESCP.

d. Mulch stockpiles

As stated above, the Stockpile location checklist will be used to ensure stockpiles are located in areas where potential environmental harm is minimised. This includes locating mulch stockpiles away from drainage lines, watercourses and concentrated flows to minimise potential tannin impacts.

For the management of mulch generally (including mulch used in erosion and sediment control), the mitigation measures identified in Chapter 6 of this SWMP (i.e. ID SWMM1, SWMM4, SWMM29) will be implemented to avoid/ minimise tannin impacts on water quality. This involves implementation of Environmental Direction – Management of Tannins from Vegetation Mulch (RMS, 2012).

The abovementioned approach is deemed to satisfy the requirements of G38 Clause 3.6 Tannin Management.

Appendix H: Stockpile location checklist

[Note - The Stockpile location checklist will be updated during construction as required, separate to this SWMP/ CEMP]

Stockpile location checklist

Proposed stockpile number	
Chainage	
Location sketch is attached? (mandatory)	☐ Yes
Stockpile type and dimensions (HxWxD):	

General Instructions

1. Determine the location of stockpile sites following review of the following documents and requirements:
    a. CEMP and Sub-Plans, including review of relevant mitigation measures
    b. Sensitive area plans
    c. Stockpile management protocol
    d. G36, G38 and G40
    e. TfNSW SWTC
    f. Roads and Maritime Services Stockpile Site Management Guideline (EMS-TG-10)
    g. Environmental Direction – Management of Tannins from Vegetation Mulch (RMS, 2012).
2. Where proposed sites do not comply with the criteria below, provide justification and additional mitigation measures to demonstrate how potential impacts will be managed.

Table H-1 Stockpile location criteria

Criteria		Source of requirement	Does the proposed site meet the criteria?	If proposed site does not meet the criteria, provide justification/ additional mitigation measures to demonstrate how potential impacts will be managed.
Vegetation and trees (including fire safety)	Site should minimise damage to natural vegetation and trees	G40 cl 4.2		
	Site should be located outside of the tree protection zone of trees or native vegetation identified for retention. Refer to AS 4970 and ensure a zone of at least 5m from trees to be retained.	G 38 cl 3.5(a)		
Segregation of materials	Site should be located separate from topsoil stockpiles (that are free from noxious weeds)	G 38 cl 3.5(e) G 38 cl 3.5(f)		
Drainage and water quality (including tannin management)	Site should be located away from drainage lines and watercourses	G40 cl 4.2 G 38 cl 3.6		
	Site should be located at least five metres (5m) from likely areas of concentrated water flows and at least 10 metres from waterways that are	G 38 cl 3.5(b) G 38 cl 3.6		

Criteria		Source of requirement	Does the proposed site meet the criteria?	If proposed site does not meet the criteria, provide justification/ additional mitigation measures to demonstrate how potential impacts will be managed.
	classified as Class 1 and Class 2 from the DPI Fisheries guideline "*Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*" or any permanent or ephemeral drainage line with direct drainage to SEPP 14 Wetlands identified in SEPP No 14 unless otherwise approved by the TfNSW.			
Flooding	Site should be located above the 1 in 20 year flood level	G 38 cl 3.5(b) G 38 cl 3.9 (g)		
Ecological	Site should be located in areas of low ecological value	G 38 cl 3.5(a)		
Heritage	Site should be located in areas of low heritage conservation value	G 38 cl 3.5(a)		
Erosion	Site should be located on the areas of the Construction Site with the lowest practicable erosion risk	G 38 cl 3.5(a)		
Slope of land	Site should be located on relatively level ground	G 38 cl 3.5(b)		
Sensitive receivers	Site should be located as far as possible from residential dwellings and other noise sensitive areas	G 38 cl 3.5(b)		
	Site should be located as far as possible from sensitive receivers	REMM AQ02		
Access	Site should be located so that the stockpiled material may be transported away at any time.	G40 cl 4.2		

Prepared by Environmental Coordinator:…… Date: / /

Environmental Manager:…… Date: / /

Approved/ Rejected (please circle) by:…… Date: / /

Appendix I: Approved stockpile location register

[Note - This Approved stockpile location register will be updated during construction as required, separate to this SWMP/ CEMP]

Approved stockpile location register

Table I-1 Approved stockpile location register

Stockpile Number/ Identifier	Date Approved	Location Description	Chainage	Issued To	Updated PESCP? (yes/ no/ not required)