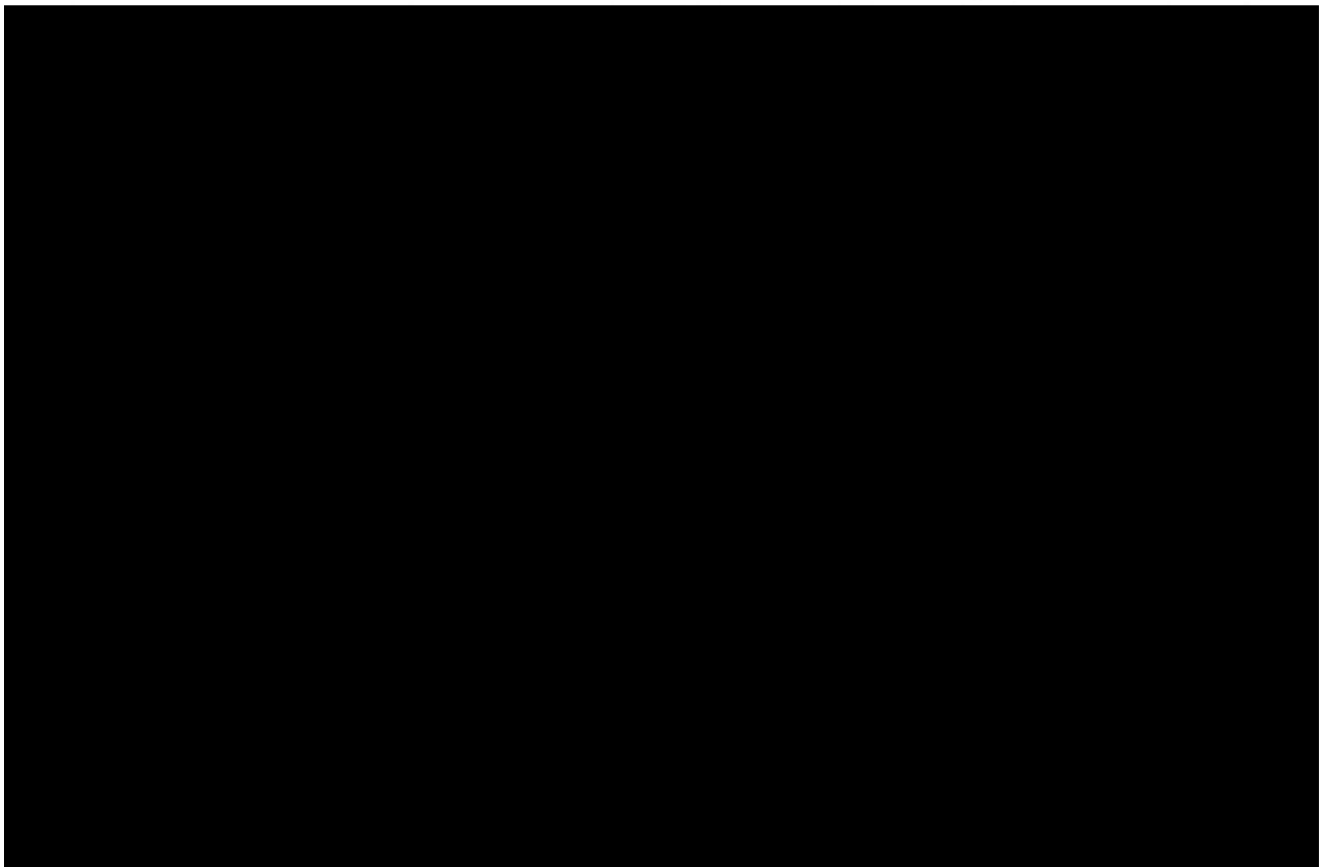


Acid Sulphate Soils Management Plan

Cross River Rail Project – Tunnel, Stations and Development
Package (TSD)



Document number: CRRSD-EN-ENMP-CBGU-000011

Revision date: 24/10/2025

Revision: 6

Compliance Matrix

Table 1 Compliance matrix

CRRDA REFERENCE	REQUIREMENT	ADDRESSED IN SECTION
Coordinator-General's change report		
Appendix 1 – Part C. – Condition 19 Acid sulphate soils		
(a)	Acid sulphate soils must be managed in accordance with the methods and requirements of the latest edition of the Queensland <i>Acid Sulphate Soil Technical Manual</i> .	This Plan

Details of Revision Amendments

Document Control

The CBGU Project Director is responsible for ensuring that this Plan is reviewed and approved. The Project Environment & Sustainability Manager is responsible for updating this Plan to reflect changes to the Project, legal and other requirements, as required.

Amendments

Any revisions or amendments must be approved by the CBGU Project Director before being distributed / implemented.

Distribution and Authorisation

The CBGU Project Director is responsible for the distribution of this Plan. The controlled master version of this document is available for distribution as appropriate and maintained on TeamBinder. All circulated hard copies of this document are deemed to be uncontrolled.

All personnel employed on the Project will perform their duties in accordance with the requirements of this Plan, supporting management plans, and related procedures.

Table of Contents

1	Introduction.....	1
1.1	Background.....	1
1.2	Context	1
1.3	Objectives	1
1.4	Legislative Framework	1
1.4.1	Commonwealth Legislation	1
1.4.2	State Legislation	1
1.4.3	Approvals, Permits and Licences	2
1.4.4	Guidelines and Standards	2
2	Required Outcomes.....	3
2.1	Coordinator-General Conditions	3
2.2	Environmental Outcomes	3
2.3	Performance Criteria	3
3	Impacts and Mitigation Measures.....	4
3.1	Impacts	4
3.1.1	Potential Groundwater Acidification	4
3.2	Mitigation Measures	5
3.2.1	Site-Specific Acid Sulfate Soil Control Plans	6
4	Compliance Management	7
4.1	Roles and Responsibilities	7
4.2	Induction and Training.....	7
4.2.1	Environmental Induction	7
4.2.2	Environmental Training	7
4.3	Incidents and Emergencies.....	7
5	Inspections, Monitoring, Auditing and Reporting	8
5.1	Environmental Monitoring	8
5.1.1	Inspections	8
5.1.2	Monitoring.....	8
5.1.3	Auditing	8
5.1.4	Corrective Action	8
5.2	Reporting.....	9
5.2.1	Monthly Reporting.....	9
5.2.2	Incidents and Non-Compliance Event Reporting	9
5.3	Documentation and Communication	9
5.3.1	Environmental Records	9
5.3.2	Document Control	9

5.3.3	Review and Improvement	9
5.3.4	Communication	9

Table of Tables

Table 1	Compliance matrix.....	i
Table 2	Referenced Documents	v
Table 3	Terms.....	vi

Referenced Documents

The following provides a list of referenced documents either as a sub-plan to this plan or referenced from.

Table 2 *Referenced Documents*

Document Number	Document Name	Location of Controlled Version
Referenced Project Plans include:		
CRRTSD-EN-MPL-CBGU-000019	Construction Environment Management Plan	TeamBinder
CRRTSD-EN-ENMP-CBGU-000010	Contaminated Land Management Procedure (Including Unexpected Contamination and Asbestos Finds)	TeamBinder
CRRTSD-EN-ENMP-CBGU-000017	Water Quality Management Plan	TeamBinder
CRRTSD-EN-ENMP-CBGU-000016	Erosion and Sediment Control Plan	TeamBinder
CRRTSD-CU-MPL-CBGU-000018	Communications and Stakeholder Engagement Management Plan	TeamBinder

Note: this Management Plan may not contain the current version of the documents listed above. Refer to the 'location of controlled version' for the most current version.

Glossary of Terms

Table 3 Terms

Term	Meaning
$\mu\text{g}/\text{m}^3$	Micrograms per Cubic Meter of Air
2012 CGER	Coordinator-General's evaluation report
AASS	Actual Acid Sulphate Soils
ACH Act	Aboriginal Cultural Heritage Act 2003
ARI	Average Recurrence Interval
ASS	Acid Sulphate Soils
BCC	Brisbane City Council
BTC	Brisbane Transit Centre
CaCO_3	Calcium carbonate (Aglime)
CBD	Central Business District
CBGU	Design & Construct Contractor comprising a joint venture with CPB Contractors Pty Ltd, BAM International Australia Pty Ltd, Ghella Pty Ltd and UGL Engineering Pty Ltd
CEMP	Construction Environmental Management Plan
CG	Coordinator-General
CGCR	Coordinator-General change reports
CHMP	Cultural Heritage Management Plans
CLR	Contaminated Land Register
COEMP	Commissioning Environmental Management Plan
CPB CMS	CPB Contractors Management System
CRR	Cross River Rail
CSEP	Communications and Stakeholder Engagement Plan
DATSIP	Department of Aboriginal and Torres Strait Islander Partnerships
dBA	means decibels measured on the 'A' frequency weighting network
DEHP	Department of Environment and Heritage Protection (now DES)
Delivery Authority	Cross River Rail Delivery Authority
DETSI	Department of Environment, Tourism, Science, and Innovation
Directly Affected Persons	An entity being either the owner or occupant of premises for which predictive modelling or monitoring indicates the Project impacts would be above the performance criteria in the Imposed Conditions.
DTMR	Department of Transport and Main Roads
ECM	Environmental Constraints Map
EIS	Environmental Impacts Statement
EMP	Environmental Management Plan

Term	Meaning
EMR	Environmental Management Register
EMS	Environmental Management System
EP Act	Environmental Protection Act 1994 (Qld)
EPP (Water)	Environmental Protection (Water) Policy 2009 (Qld)
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Sub-Plan
EWMS	Environmental Work Method Statements
GHG	Greenhouse Gas
INB	Inner Northern Busway
IECA	International Erosion Control Association
LA10 adj	means the A-weighted sound pressure level, adjusted for tonal character or impulsiveness, that is exceeded for 10% of a 1 hour period when measured using time-weighting 'F'
LAeq adj	means an A-weighted sound pressure level of a continuous steady sound, adjusted for tonal character, that within a 1 hour period has the same mean square sound pressure of a sound that varies with time
LCA	Licensed Construction Area
mg/m ² /day	Milligrams per Square Meter per Day
mm/s PPV	Millimetres per Second Peak Particle Velocity
NATA	National Association of Testing Authorities
NEPM	National Environmental Protection Measure
PA	Princess Alexandra
PAH	polycyclic aromatic hydrocarbons
PASS	Potential Acid Sulphate Soils
PFAS	per- and poly-fluoroalkyl substances
PM ₁₀	Particulate Matter of 10 Microns in diameter or smaller
Predictive Modelling	Means the use of an appropriate analytical scenario testing, whether or not by numerical measurements, undertaken prior to the commencement of Project Works
Project	Cross River Rail Project
PSI	Preliminary Site Investigations
PSTR	Project Scope and Technical Requirements
QLD	Queensland
QR	Queensland Rail
RfPC	EIS Request for Project Change
RNA	Royal National Agriculture and Industrial Association
SDS	Safety Data Sheets

Term	Meaning
SPL	Sound Pressure Levels
SQP	Suitably Qualified Person
TMR	Transport and Main Roads
TRH	total recoverable hydrocarbons
TSP	Total Suspended Particulates
WQMP	Water Quality Management Plan

1 Introduction

1.1 Background

The Design and Construction Joint Venture comprising of CPB Contractors Pty Ltd, BAM International Australia Pty Ltd, Ghella Pty Ltd and UGL Engineering Pty Ltd (CBGU D&C JV or CBGU) is responsible for delivering the Cross River Rail (CRR) Project (the Project) on behalf of the Cross River Rail Delivery Authority (the Delivery Authority).

This Acid Sulphate Soils Management Plan should be read in conjunction with the Project's overarching Construction Environment Management Plan (CEMP).

The CEMP provides specific details regarding the background of the Project, the scope of the Project and the staging and timing of key milestones associated with the construction of the Project

1.2 Context

This Acid Sulphate Soils Management Plan (ASSMP) forms part of the Construction Environmental Management Plan (CEMP) developed for the construction of the Project. The ASSMP describes how the CBGU JV will manage and minimise potential and actual Acid Sulphate Soil impacts during construction of the Project.

1.3 Objectives

The objective of this ASSMP is to achieve the environmental outcomes stated in the CEMP through the implementation of site-specific mitigation measures. It will also:

- Nominate the Project's monitoring and reporting requirements in relation to Acid Sulfate Soil (ASS)
- Manage the impact on the environment and public health as a result of ASS
- Monitor the effects of management and mitigation measures.

1.4 Legislative Framework

1.4.1 Commonwealth Legislation

No Commonwealth legislation is specifically relevant to this ASSMP.

1.4.2 State Legislation

State legislation that may be relevant to the management of ASS include:

- *Cross River Rail Delivery Authority Act 2016*
- *Environmental Protection Act 1994*
- *Environmental Protection (Water and Wetland Biodiversity) Policy 2019.*
- *Building Act 1975*
- *Environmental Protection (Water) Policy 2009*

- *City of Brisbane Act 2010*
- *Local Government Act 2009*
- *Planning Act 2016*
- *Land Act 1994*
- *Nature Conservation Act 1992*
- *Water Act 2000*

1.4.3 Approvals, Permits and Licences

CBGU will obtain licences, permits and approvals as required by law and maintain them as required throughout the delivery phase of the project. No condition of the Infrastructure Approval removes the obligation for CBGU to obtain, renew or comply with such necessary licences, permits or approvals.

All relevant approvals, permits and licences have been identified in the CEMP.

There are no approvals expected to be required specifically in relation to ASS.

1.4.4 Guidelines and Standards

Project works must be undertaken in accordance with specific guidelines and standards. Guidelines and standards related to the management of acid sulfate soils, that must be met include, but are not limited to:

- *Queensland Acid Sulphate Soil Technical Manual – version 4*
- *National Environment Protection (Assessment of Site Contamination) Measure 1999.*

2 Required Outcomes

2.1 Coordinator-General Conditions

The Imposed Conditions relating to Acid Sulphate Soils for the Project can be found on the Coordinator-General's website (<http://www.dsdmip.qld.gov.au/coordinator-general/assessments-and-approvals/coordinated-projects/completed-projects/cross-river-rail-project.html>).

2.2 Environmental Outcomes

The following environmental outcomes in relation to ASS are to be achieved for the Project:

- Construction activities avoid or minimise environmental and public health risks associated with disturbance of potential ASS encountered during construction works
- Construction activities do not impact on the environmental values of the Brisbane River and other waterways within the study corridor.

2.3 Performance Criteria

The following performance criteria must be achieved throughout construction of the Project:

- Groundwater discharge from worksites complies with the environmental objectives established in the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (EPP (Water))*.
- ASS is avoided, or if intercepted, is managed to avoid adverse impact to environmental values, infrastructure, construction equipment, construction personnel or the public.

3 Impacts and Mitigation Measures

3.1 Impacts

There is a possibility of encountering ASS where surface works are proposed in a number of the isolated alluvial valleys along the extent of the Project alignment and there is potential for the disturbance (by removal or exposure to air via dewatering) of these sediments to result in impacts to the quality of both surface water and groundwater. The potential environmental impacts without controls associated with disturbance of ASS, may include (controls are discussed in Section 3.2):

- Changes to water chemistry of receiving waterbodies
- Sedimentation of waterways and accelerated erosion
- Changes to the aquatic ecosystem through deoxidation of waterbodies
- Oxidation of ASS and ASS affected sediments and generation of acid leachate
- Contamination (both on and offsite) of surrounding soils and/or waters impacting local ecology
- Delays in construction program and increased costs
- Risk to human health through direct exposure
- Impacts on concrete structures coming into contact with ASS
- Direct impacts on soil organisms and vegetation
- Negative public relations associated with pollution and prosecution.

Due to the proximity of the Brisbane River and the confluence of two paleochannels (alluvial formations), Albert Street Station has been identified as high-risk area that will require management or mitigation during the course of the Project. There is also moderate potential for the Woolloongabba Station to require management. At other precincts, the potential for exposure of ASS from excavation is considered low.

Construction activities at these worksites that have the potential to disturb ASS include:

- Construction of stormwater treatment, control and collection measures
- Lowering of groundwater levels during tunnelling operations
- Stockpiling and removal of spoil material at construction worksites.

The areas of PASS and ASS that have been identified for the Project to date have been identified. The maps of areas of PASS and ASS will be updated as the early works investigations progress across the Project alignment.

3.1.1 Potential Groundwater Acidification

ASS is present within the Project area as noted above in the precincts that are closest to the Brisbane River. Harmful substances can be transferred from the site of acid generation by surface water and/or groundwater. The formation of acidic waters and the disturbance or dewatering of ASS can result in impacts to the aquatic environment and may have both short and long term risks to aquatic organisms.

Potential groundwater acidification is possible with the construction of the Albert Street Station, although this area has high levels of prior development associated with basement parking in many adjoining properties.

Predicted impacts have also been reduced from the Evaluated Project (2011) due to changes in the construction methodology at Albert Street Station from a cut and cover to a fully mined cavern which reduced the surface area excavated and thus the volume of the soil to be exposed and removed.

Dewatering associated with the tunnelling, particularly in the vicinity of the Brisbane River may also result in acidification of the groundwater, if ASS or PASS materials are exposed to air. The dewatering process combined with acidic groundwater has the potential to expose concrete and steel structures to acid conditions and/or result in acidic groundwater .

3.2 Mitigation Measures

- To inform detailed design and construction planning, ASS investigations are being undertaken in accordance with Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1981 in areas below 5 metres AHD, where proposed excavation or soil disturbance is to occur. As these investigations progress there will be updates to this ASSMP, specifically the mitigation measures.
- The provisions of this ASSMP are to apply to all locations where the ongoing ASS investigations identify the likelihood of ASS being disturbed.
- This ASSMP will be updated with site specific management strategies following the outcome of the ASS investigations and may include:
 - Neutralising the soils with alkaline material, such as lime the necessary rates of which shall be stipulated by the investigations being undertaken currently;
 - Hydraulic separation via sluicing and/ or hydrocloning;
 - Strategic reburial below groundwater table;
 - Stormwater/ groundwater collection, control and treatment measures;
 - Validation of treated material prior to disposal (on and/or offsite)
- All leachate and runoff from ASS treatment and stockpile areas will be captured, contained, analysed and treated (if necessary) prior to offsite discharge in compliance with relevant works approvals and surface water discharge criteria adopted for the Project.
- Management measures implemented at Albert Street and Woolloongabba worksites, in accordance with the Erosion and Sediment Control Plan (ESCP) have been designed to protect the Brisbane River and associated tributaries from runoff from disturbed areas within the worksite and any designated areas used for ASS stockpiling and treatment.
- Where practicable, natural surface and subsurface drainage regimes and flow paths within the Albert Street and Woolloongabba worksites have been maintained to minimise changes to natural water table levels and tidal influences associated with the Brisbane River and Norman Creek
- A Groundwater Monitoring Program, is currently implemented in accordance with the Water Quality Management Plan (WQMP) – the program monitors changes to the baseline groundwater conditions, including changes in pH and is used to inform CBGU regarding ASS management processes
- Keep documented records of contaminated material movement and disposal

3.2.1 Site-Specific Acid Sulfate Soil Control Plans

Where required, site-specific mitigation measures will be fully developed following the completion of the ASS investigations currently being undertaken by an SQP.

Where required, site-specific mitigation measures will be referenced within in the site-specific acid sulfate soil control plans. These can be provided on request to the IEM.

4 Compliance Management

4.1 Roles and Responsibilities

The organisational responsibilities and accountabilities in relation to environmental management throughout Project construction works are outlined in the overarching CEMP.

4.2 Induction and Training

4.2.1 Environmental Induction

Details regarding environmental induction requirements have been outlined in the overarching CEMP.

All CBGU staff, subcontractors and visitors to worksites must attend general induction training that covers general environmental management requirements, site-wide controls and site-specific and work specific risks and mitigation measures. Further details regarding environmental induction requirements have been outlined in the overarching CEMP.

4.2.2 Environmental Training

Details regarding environmental training requirements have been outlined in the overarching CEMP.

4.3 Incidents and Emergencies

The immediate response to all incidents is to make the area safe and undertake measures to prevent further environmental harm. The Environment and Sustainability Manager, Shared Services Director and Project Director should be notified immediately in the event of an environmental incident. All incidents and emergencies are to be managed according to the process as outlined in the CEMP. This is inclusive of:

- Incident Notification
- Incident Types
- Incident Prevention Management
- Incident Investigation, and
- Complaint Management.

5 Inspections, Monitoring, Auditing and Reporting

This section outlines the compliance processes that have been adopted by CBGU to ensure compliance with the Coordinator-General Conditions and any other legislative requirements. The section below details specific requirements relating to Inspections, monitoring, auditing and reporting requirements have not been outlined in the overarching CEMP.

5.1 Environmental Monitoring

5.1.1 Inspections

CBGU will undertake environmental inspections to develop and evaluate the effectiveness of environmental controls. Routine site inspections will monitor for the presence of flocculation of iron in surface water drains, mortality of aquatic flora and/or fauna in adjacent waterways, visible corrosion of concrete structures.

Inspections are to be undertaken as nominated in the CEMP.

5.1.2 Monitoring

Monitoring will be undertaken at various locations to validate the impacts predicted for the Project to measure the effectiveness of environmental controls and implementation of this ASSMP. The monitoring also helps in addressing any potential Community Complaints that may be made. The monitoring requirements for ASS are outlined below.

- For construction works involving disturbance of ASS, conduct appropriate monitoring of receiving waters predicted to be influenced by drainage from a worksite or construction works involving ASS. Monitoring should be in accordance with Queensland Acid Sulfate Soil Technical Manual - Soil Management Guidelines v4.0 (DSITI 2014), site EMP/ASSMP and requirements for any receiving waters.
- For construction works involving disturbance of ASS, conduct groundwater and surface water monitoring in areas hydraulically connected to sites of ASS disturbance – in accordance with the requirements of the WQMP.

5.1.3 Auditing

Audits will be undertaken to assess the effectiveness of environmental controls, compliance with the CEMP, compliance with Environmental Design Requirements, and other relevant permits, approvals, and guidelines.

Audits will be undertaken in accordance with the CEMP.

5.1.4 Corrective Action

The process for developing and implementing Correction Actions has been specified within the overarching CEMP.

Corrective actions must be undertaken where monitoring or validated complaints indicate the environmental outcomes or Imposed Conditions are not achieved in relation to particular works, either because the performance criteria have not been met, or mitigation measures have not been implemented. Where

corrective actions become necessary, the specific works that do not achieve the environmental outcomes or meet the Imposed Conditions must cease until the corrective actions have been developed and implemented.

5.2 Reporting

5.2.1 Monthly Reporting

A report in relation to acid sulfate soils will also be prepared as and when required.

The specific requirements of the Monthly Report have been identified in the CEMP.

5.2.2 Incidents and Non-Compliance Event Reporting

Details regarding reporting, including provision of interim and detail reports have been provided in the overarching CEMP.

5.3 Documentation and Communication

5.3.1 Environmental Records

The process for managing and collecting environmental records is detailed in the overarching CEMP. All relevant records in relation to acid sulfate soils must be maintained in accordance with these requirements. Records of the following acid sulfate soil management information, as a minimum, must be kept throughout the construction phase:

- Any acid sulfate soil records required by contaminated land management legislation;
- Transporter or contractor details (including company name, licensed operator name and license number) (Outline WMP p 11).

5.3.2 Document Control

Document control requirements have been specifically addressed within the overarching CEMP.

5.3.3 Review and Improvement

Review requirements have been specifically addressed within the overarching CEMP.

5.3.4 Communication

All internal and external communication with all stakeholders including the public, Coordinator-General, government agencies and the Delivery Authority must be completed in accordance with the requirements of the overarching CEMP.