Sydney Port Botany Terminal 3 Project
Acid Sulphate Soils Management Plan

Terms and Definitions

The following terms, abbreviations and definitions are used in this plan:

Terms	Explanation
SPBT3	Sydney Port Botany Terminal 3
CEMP	Construction Environmental Management Plan
EM	Environmental Manager
EPA	Environmental Protection Agency
ERAP	Environmental Risk Action Plan
NATA	National Association of Testing Authorities
OEH	Department of Climate Change and Water
ASSMP	Acid Sulphate Soils Management Plan
EIS	Environmental Impact Statement
AASS	Actual Acid Sulphate Soil
ASS	Acid Sulphate Soil - Is the common name given to soil and sediment containing iron sulphides (principally iron pyrite), or products of the oxidation of sulphides. These soils have the potential to cause adverse environmental effects resulting from the release of acidic discharge to streams and rivers
Contamination	Contamination means the presence in, on or under the land of a substance at a concentration above the concentration at which the substance is normally present in, on or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment
PASS	Potential Acid Sulphate Soil
SWQMP	Soil and Water Quality Management Plan
MCoA	Ministers Conditions of Approval

Distribution

The master 'controlled' ASSMP document forms part of the project's CEMP as an Appendix. The controlled copy will be retained in TeamBinder, the Laing O'Rourke document management system, where it can be accessed by personnel as necessary.

All paper copies of this ASSMP will be considered as 'uncontrolled' unless they have been allocated a 'copy number' in a colour other than black.

The client representative will be provided with a copy in conjunction with the submission of the CEMP.

Issue, Revision and Re-issue

The initial issue of this ASSMP has been reviewed by Laing O'Rourke's Regional Environmental Manager to ensure it meets the requirements of the current EMS and policy, contract, specifications and standards. The plan is approved for use on the project by the Project Director. Evidence of initial review and approval is by signatures on the cover sheet.

In conjunction with the submission of the ASSMP, Laing O'Rourke will coordinate and facilitate an initial ASSMP Workshop with representatives from the client and Laing O'Rourke to discuss the contents and application of the ASSMP to facilitate the approval of the ASSMP and agree the proposed management measures and controls.

Revisions of this ASSMP may be required throughout the duration of the project to reflect changing circumstances or identified opportunities for improvement.

Revisions may result from:

- Management Review
- Changes to the Company's standard system
- Audit (either internal or by external parties)
- Client complaints or non-conformance reports.

Revisions shall be reviewed and approved by the Project Manager prior to issue. Updates to this ASSMP are numbered consecutively and transmitted to holders of controlled copies.

Contents

1. Introduction

This Acid Sulphate Soils Management Plan (ASSMP) has been developed to address the construction activities associated with the Sydney Port Botany Terminal 3 (SPBT3) Project. In particular, the plan has been developed to address the requirement for an Acid Sulphate Soils Management Plan as outlined in the conditions of approval.

Development of Sydney Port Botany Terminal 3 will involve the construction of onshore civil infrastructure including container stacking areas. The proposed Terminals have four berths with a total length of 1,180 m. The approximate Terminal area, excluding the Wharf area is 46 ha.

The key components of the Sydney Port Botany Terminal 3 include:

- Ground treatment and consolidation measures
- Drainage, utilities, services
- Container yard
- HV & LV electrical
- Buildings
- Rail yard

1.1 Objective

The objectives of this ASSMP is to ensure that water quality, soil runoff, site wastewater, and potential water contamination associated with ASS are considered and effectively managed as part of the construction works.

This SWQMP seeks to ensure that control measures and procedures for management of acid sulphate soils are managed effectively to prevent any negative environmental impact on Botany Bay and associated ecosystems. Appropriately trained personnel and experience gained from previous projects will be used to achieve high environmental performance on the SPBT3 Project.

It is recognised that during construction some specific areas will require alterations to the planned control measures due to changing circumstances. In these situations, the planned control measures will be reviewed, risk assessed and, where appropriate and practical, amended as necessary prior to commencing new or modified activities. These alterations are expected to primarily involve erosion and sediment control issues and will be documented as updated erosion and sediment control plans for different stages of the construction works.

This ASSMP aims to satisfy the following objectives:

- Address the requirements of the planning approval for the SPBT3 Project
- Address the requirements of the Environmental Impact Statement (EIS) for the Port Botany expansion
- Address the requirements outlined in the Aurecon Framework Construction Environmental Management Plan
- Address the requirements of the relevant environmental legislation as it applies to this project
- Address the requirements of the Environment Protection Licence issued for the works undertaken for the SPBT3 Project
- Summarise potential impacts on the environment from the proposed works
- Document environmental procedures to control potential environmental impacts.

Responsibilities for the implementation and management of this ASSMP are in accordance with the Project's Construction Environmental Management Plan.

1.2 Commitment

It is the commitment of Laing O'Rourke to implement all measures discussed in this ASSMP and to meet all relevant criteria to ensure the health of Botany Bay and its surrounds is maintained and that a safe worksite is upheld.

1.3 Targets

The following targets have been identified in terms of soil and water management for the project:

- There is no discharge from the Project site or designated treatment site of acid sulphate material
- There is no acidic drainage from the Project site or designated treatment site caused by the construction activities of the Project
- There are no justified complaints regarding effects from ASS
- The requirements of published guidelines on ASS management are addressed
- Management control measures to minimise potential environmental impacts are documented
- Responsibilities for the implementation and management of this ASSMP are consistent with those responsibilities stated in the CEMP.

1.4 Statutory provisions and guidelines

The following statutory provisions and guidelines are applicable to the Project, with regards to water quality:

- Sydney Port Botany Terminal 3 Planning Approval
- POEO Act 1997
- Acid Sulphate Soils Manual (ASSMAC, 1998)

1.5 Ministers Conditions of Approval

MCoA's relevant to soil and water quality management are outlined below.

MCoA Reference	MCoA Detail
B2.6	Prior to the commencement of construction activities, the Applicant must prepare an Acid Sulphate Soils Management Plan to assess and manage any Acid Sulphate Soils (ASS) or potential ASS (PASS). The Plan shall be prepared in accordance with the Acid Sulphate Soils Manual 1998 published by the NSW Acid Sulphate Soil Management Advisory Committee. In the event that ASS is encountered during the works, the Applicant shall notify the NSW Maritime Authority immediately.

2. References

- Port Botany Expansion Environmental Impact Statement
- Aurecon Framework Construction Environmental Management Plan Sydney Terminal 3 Sydney International Container Terminals Pty Limited, Revision 3
- Acid Sulphate Soils Manual (ASSMAC, 1998)
- Reference is also made to the NSW Protection of the Environment Operations Act which integrates into one Act all of the controls necessary to regulate pollution and reduce

degradation of the environment. The Act also provides for licensing of scheduled development work, scheduled activities and for offences and prosecution under this Act

- This Act has specific relevance to this plan with regards to the potential for pollution of waters resulting from erosion and sedimentation. In particular, Section 120 of the Act provides for the prohibition of pollution of waters and outlines the associated offence of pollution of waters

3. Background Information

Acid Sulphate Soil (ASS) is the common name given to soil and sediment containing iron sulphides (principally iron pyrite), or products of the oxidation of sulphides. These soils have the potential to cause adverse environmental effects resulting from the release of acidic discharge to streams and rivers. Such effects include infrastructure being 'eaten away' by the acid (such as bridge pilings and other structures in contact with the acidic ground/water), death to aquatic life (such as fish kills and vegetation destruction) and a decrease in the quality of the water for humans and animal life.

Sulphides which are not exposed to the atmosphere and remain below the water table are quite harmless. However, should sulphides be exposed to air this can result in oxidation and the production of sulphuric acid if the soil's capacity for neutralisation is insufficient.

Acid generation from sulphidic soils is largely confined to present and former wave-protected mangrove and salt marshes and tidal lakes and swamps where fine, very wet sediments can accumulate with organic debris. This is typically below 5m above sea level, or below 5m AHD (Australian Height Datum).

ASS can be classified as:

- Actual Acid Sulphate Soils (AASS) which are soils that have already reacted with oxygen to produce acid, or
- Potential Acid Sulphate Soil (PASS) which is soil that contain iron sulphide, but has not been exposed to oxygen (e.g. soil below the watertable) and therefore has not produced sulphuric acid (although it has the potential to do so).

4. Indicators of ASS

Visual or odorous indicators of the presence of acid sulphate soils in excavated materials and surrounding waterways include the following:

- Any jarosite (pale yellow mineral) or substantial iron oxide (red) mottling in material excavated or left exposed
- Iron staining on drain or pond, iron stained water
- Presence of corroded shell
- Sulphurous smell. e.g. hydrogen sulphate or rotten egg gas
- Unusually clear or milky blue-green drainage water flowing from the area (presence of aluminium)
- Corrosion of concrete or steel structures
- Fishkills
- Dead, dying, or "stunned" vegetation.

5. Strategic Approach

5.1 ASS Investigation

Upon suspected acid sulphate soils material, an excavation-specific ASS investigation will be conducted at the site during excavation works in accordance with the contract requirements. Sampling will be in accordance with the Acid Sulphate Soils Manual.

Field pH tests on suspected ASS will be undertaken by a person qualified and experienced in ASS testing. Laboratory tests will be completed by a NATA accredited laboratory.

The NSW Maritime Authority is to be notified immediately if ASS are encountered during the works

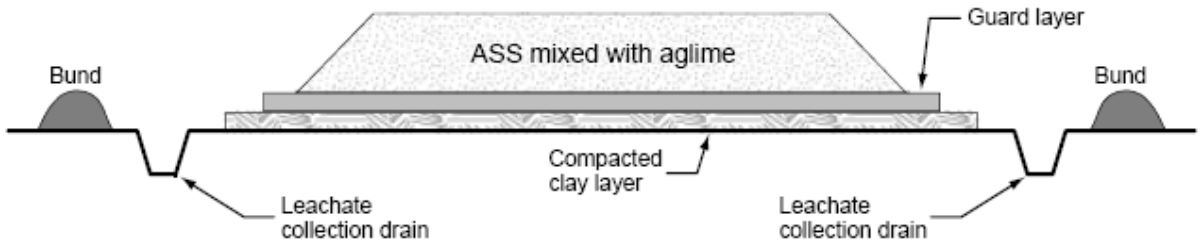
Where remediation is required, geotechnical advice will be sought to establish the level of investigation and action to be taken. This has usually involved treatment with agricultural lime and replacement of the affected areas. Liming rates will be determined based on the results of the site investigations. Where required, this ASSMP will be reviewed and updated to address the outcomes of further investigations.

5.2 ASS Treatment

The treatment measures outlined below are considered indicative of those to be implemented should ASS be discovered during the works.

Should ASS be identified during the works, the treatment process and specific control measures will be documented in a specific Acid Sulphate Soil Environmental Risk Action Plan (ERAP) and in compliance with the requirements of this ASSMP. The location of treatment and control measures will be documented (including drawings within the Acid Sulphate Soil ERAP. All personnel involved in the treatment will be inducted onto the ASSMP and the specific JSEA prior to commencing the works).

A suitably sized dedicated treatment area will be created at a location agreed with the Client's Representative. The location of the area would be dependent upon the quantities involved. All treated spoil will be tested to verify neutralisation prior to use elsewhere or disposal. ASS should be treated after excavation and dried to ensure oxidation is complete. This treatment will involve uniformly mixing lime with the ASS material by physical and/or mechanical means. ASS to be treated will be placed on the treatment area in layers not thicker than 300mm, as shown in Figure 1.



Cross section of a treatment area (Source: Qld ASS Technical Manual v 3.8)

Where excavated ASS is to be treated onsite, the following actions will be carried out:

- Ensure that if large areas of PASS are identified they are retained below water level under stable anoxic conditions.

- Testing for pHF and pHFOX to classify the PASS content. Stockpiling of the spoil will be categorised by the difference in pH. Laboratory testing as required will be undertaken by a NATA accredited laboratory
- Bunding will be constructed around the perimeter of the designated ASS treatment area to intercept and contain run-off from the area during soil treatment operations. The bund will be constructed from non-ASS material or lime treated ASS material
- All excavated spoil will be stored and treated within this bunded area as soon as possible after being excavated
- The base of the ASS treatment area will be limed prior to placement of each layer of ASS. Respreading of agricultural lime prior to placement of each new layer of soil, and at the conclusion of all treatment. The base of the treatment pad will have a minimum agricultural lime application rate of 5 kg/m2
- The treatment area will retain enough storage capacity to hold any potentially acidic waters/ run-off from the PASS. This will collect drainage water from the treatment area in the event seepage or rainfall occurs during and between treatment
- The treatment area bund will be built to a height of 400mm
- Soil treatment shall be undertaken as soon as possible after the material has been excavated to limit the opportunity for the accumulation or release of acidic pollutants
- Soil to be treated shall be placed in layers not exceeding 300mm and be thoroughly mixed with the fine agricultural lime at a minimum rate of 11 kg/t or other applicable rate as determined by subsequent testing
- The amount of excavated material will be minimised, wherever possible, to allow for treatment of manageable quantities of AASS/ PASS material
- A covered stockpile(s) of agricultural lime and hydrated lime will be kept inside the site boundary in volumes sufficient for predicted treatment works. This will allow all treatment to occur in a timely manner. The stockpile(s) will be replenished on an as required basis throughout excavation activities
- The effectiveness of the treatment process shall be confirmed by verification samples at rate of 1 per 100m^3. Sampling and analysis shall be completed by a NATA accredited laboratory
- Where treatment has not been successful, the material shall be retreated
- Final disposal of treated ASS shall be agreed with the Client Representative.
- Surface water with the potential to become acidic as a result of interaction with the treatment area or excavations will be treated and monitored as follows:
- Surface water accumulated in excavations or treatment area will be tested for pH. If the pH is outside the range of 6.5 – 8.5 then the water will be neutralised with the addition of agricultural lime or hydrated lime
- Records of water discharged from site shall be maintained
- Backfilling excavations, completion of footings as soon as possible to minimise the oxidation of insitu soils exposed within the excavations
- Minimise the drainage of soils by limiting any groundwater drawdown within excavations to the absolute minimum required to complete the excavation safely. Seepage entering the excavation should be minimised through the use of physical barriers

- Where material is to be transported to the treatment facility via public roads, wheel cleaning facilities will be established at site exits to prevent offsite contamination during transport
- Material will be transported within trucks with secure tailgates
- Records of transport including individual truck details and quantity transport will be retained at the Project Office
- At the end of each transport shift an inspection of the transport route will be undertaken by the Supervisor to determine if material has been spilt. Where material has been spilt on public roads it will be removed immediately
- When run-off accumulates, water quality will be monitored regularly during the construction period, particularly following substantial rainfall events. Retained water will be sampled, tested and treated to the parameters above and as nominated in the Soil and Water Quality Management Plan (SWQMP) for discharge.

6. Mitigation Measures

Mitigation measures for soil and water quality management for the construction phase of the project are outlined below.

Mitigation Measures	Responsibility	Source of Requirement	Timing
Implement the procedures and protocols outlined in this ASSMP	Environment Manger Project Engineer	MCoA B2.6	Throughout construction
Notify the NSW Maritime Authority immediately if ASS are encountered during the works	Project Manager	MCoA B2.6	Throughout construction
Ensure an adequate supply of agricultural grade lime is stockpiled and available for use on site	Environment Manger Superintendent	Best Practice	Throughout construction

6.1 Training

As part of site induction / training, all personnel engaged in site works will be made aware of this ASSMP in order to promote a general awareness of the environment and to minimise any potential impact from uncovering ASS. Evidence of environmental induction of personnel in this project will be maintained in the project training records.

The training will highlight the need for any excavation to be planned and controlled. Regular toolbox meetings will be held and information regarding ASS and a reinforcement of a positive attitude towards ASS will be included, where required.

7. Records and Communication

All records of soil testing will be kept on file in the project records. This filing will follow the system outlined in the Project Business Plan. These records need to include the pH prior to and after testing, the volume of material treated and the volume of lime added. The volume of material treated will be summarised.

Accurate and up to date records are to be maintained for all monitoring. Monthly reporting will include details on:

- Testing and treatment undertaken in the management of acid sulphate soils of the site
- Location and volumes of excavated soil

- pH testing results
- Treatment methodology
- Liming dosage rates
- Location of placement of treated fill on or off-site and
- Surface water testing results (if required)

8. Environmental Incidents and Complaints

Should an environmental incident occur during the course of the works, it shall be handled in accordance with the requirements of the CEMP.

Appendix 1 Acid Sulphate Soil Treatment Flowchart