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DOLTONE HOUSE GROUP

Doltone House Deepwater, Milperra

Acid Sulfate Soils Management Plan

301015-02379

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DOLTONE HOUSE GROUP
DOLTONE HOUSE DEEPWATER, MILPERRA
ACID SULFATE SOILS MANAGEMENT PLAN

Disclaimer

PROJECT 301015-02379 - DOLTONE HOUSE DEEPWATER, MILPERRA

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
A	Draft Issued for internal review	C Jones	S Mason-Jones		19-Feb-14		
0	Final Issue	C Jones	S Mason-Jones	C Thomas	07-Mar-14		

CONTENTS

1 INTRODUCTION

1.1 Overview

WorleyParsons has been engaged by Doltone House Group to review and update the 26 August 2011, Acid Sulfate Soil Management Plan (ASSMP) for the proposed development at the Deepwater Motor Boat Club site at 30 Webster Street, Milperra. This ASSMP is submitted as part of a Development Application (DA) submission to Bankstown City Council (Council) for the proposed development.

The guidance provided in this ASSMP is based upon the *Acid Sulfate Soil Manual* published by the Acid Sulfate Soil Management Advisory Committee (ASSMAC) in 1998.

1.2 Definition

Acid Sulfate Soils (ASS) are a type of soil naturally found in both coastal (tidal) and inland or upland (freshwater) environments. Typically, these areas are less than 5 metres above sea level and include swamps, marshes, estuarine floodplains and mangroves.

These soils contain iron sulphides which when exposed to oxygen generate sulphuric acid, and can also release toxic quantities of iron, aluminium and heavy metals. Left undisturbed, these soils are harmless. However, when the surface of these soils is broken through excavation and for the installation of services including drainage, telecoms and electrical services and the underlying layers are exposed to air, the soils can become oxidised (leading to acidic runoff) resulting in major impacts on aquatic life and water quality.

1.3 Actual and Potential ASS

ASS can be classified as either Actual or Potential. Actual ASS includes those that are exposed to the air and hence produce sulphuric acid. Potential ASS (PASS) is those that are waterlogged but have the potential to produce sulphuric acid if exposed to the air.

Where the site is to be excavated for the car park, for the detention basin and for the installation of services and utilities, this will involve disturbing both ASS on the surface and PASS once the top layer is disturbed.

1.4 Importance of ASS Management

ASS and their acidic runoff can have serious environmental impacts on both soil and water including:

- Increased soil acidity;
- Strips nutrients from the soil;

- Dissolves heavy metals causing the soil to become toxic to plants and animals;
- Potential to contaminate groundwater;
- Potential to corrode infrastructure; and
- Acidic runoff can also affects aquatic ecosystems and can kill marine life, including fish and crustaceans, and aquatic plants.

The environmental effects of the acid run off can last hundreds, even thousands of years.

Therefore, each person coming onto site, whether involved in excavation, the installation of services or unrelated trades must be aware of the presence of ASS/PASS and the potential impacts this may have on their particular trade or task. Those coming on site must also be aware of the potential impacts that their trade or task may have on ASS/PASS. Further, those involved in activities that disturb soils to any depth have a responsibility to consider, assess and manage ASS when undertaking soil disturbance on this site.

2 PURPOSE

The purpose of this Acid Sulfate Soils Management Plan (ASSMP) is to detail the mandatory requirements that need to be employed on site and to manage site constraints that exist on site.

As shown on **Figure 2-1**, the site is located in an area with high probability of occurrence of acid sulfate soil materials within the soil profile. The environment of deposition has been suitable for the formation of acid sulfate soil materials.

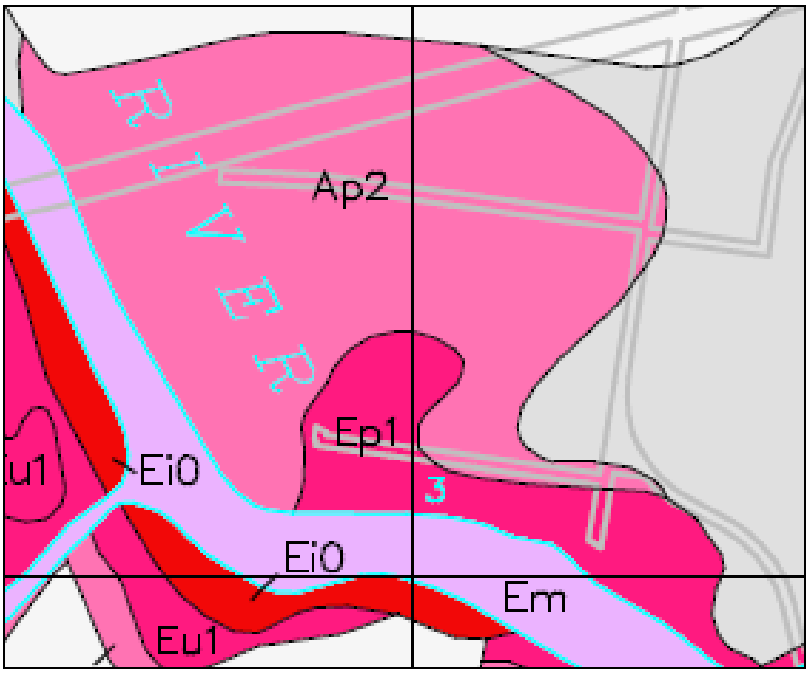

Figure 2-1 Extract of Liverpool Acid Sulfate Soil Risk Map, Edition 2 (Source: Department of Land and Water Conservation, December 1997)

Acid sulfate soil materials are likely to be widespread or sporadic and may be buried by alluvium or windblown sediments. The depth to acid sulfate soils materials are likely to be between 1 and 3 meters below the ground surface. There is an environmental risk if acid sulfate soil materials are disturbed by activities such as deep excavation for pipelines and deep drains.

The guidance provided in this ASSMP is based upon the *Acid Sulfate Soil Manual* published by the Acid Sulfate Soil Management Advisory Committee (ASSMAC) in 1998.

This ASSMP should be used during the planning stages of this project in preparation for construction work and should be made available onsite at all times. The controls suggested in this ASSMP are in addition to requirements outlined in any associated Statement of Environmental Effects (SEE), geotechnical investigations, permits or licenses or conditions of approval.

For details on the health and safety aspects of ASS contact an appropriate HS&E professional.

3 LEGISLATIVE REQUIREMENTS

3.1 Protection of the Environmental Operations Act 1997

Under the *Protection of the Environment Operations Act 1997* (POEO Act), it is an offence to cause or permit the pollution of waters or to unlawfully dispose of waste. All staff and contractors are responsible for correctly identifying and managing ASS to ensure pollution of waters does not occur, and if required disposing of ASS in a lawful manner.

Penalties of up to $5 million for corporations and $1 million (and prison terms) for individuals apply for wilfully or negligently causing harm or likely harm to the environment.

3.2 Bankstown Local Environmental Plan 2001

Clause 22 of the *Bankstown Local Environmental Plan 2001* (the LEP) provides the standards in relation to development involving acid sulfate soils as identified below.

22 Acid sulfate soils

(1) ***Consent usually required***
A person must not, without development consent, carry out works described in the following Table on land of the class specified for those works, except as provided by subclause (3).

Table

Class of land as shown on Acid Sulfate Soils Planning Maps	***Works***
1	*Any works*
2	*Works below the natural ground surface* *Works by which the watertable is likely to be lowered*
3	*Works beyond 1 metre below the natural ground surface* *Works by which the watertable is likely to be lowered beyond 1 metre below natural ground surface*
4	*Works beyond 2 metres below the natural ground surface* *Works by which the watertable is likely to be lowered beyond 2 metres below natural ground surface*
5	*Works within 500 metres of adjacent Class 1, 2, 3 or 4 land which are likely to lower the watertable below 1 metre AHD on adjacent Class 1,*

2, 3 or 4 land

*(2) For the purposes of the Table to subclause (1), **works** includes:*

(a) any disturbance of soil of a minor nature (such as occurs in carrying out agriculture, the construction or maintenance of drains, extractive industries, dredging, the construction of artificial water bodies (including canals, dams and detention basins) or foundations, or flood mitigation works), or

(b) any other works that are likely to lower the watertable.

*(3) **Exception following preliminary assessment***
This clause does not require consent for the carrying out of those works if:

(a) a copy of a preliminary assessment of the proposed works undertaken in accordance with the Acid Sulfate Soils Assessment Guidelines has been given to the consent authority, and

(b) the consent authority has given written advice to the person carrying out the works confirming that results of the preliminary assessment indicated the proposed works need not be carried out pursuant to an acid sulfate soils management plan prepared in accordance with the Acid Sulfate Soils Assessment Guidelines.

*(4) **Considerations for consent authority***
The consent authority must not grant a consent required by this clause unless it has considered:

(a) the adequacy of an acid sulfate soils management plan prepared for the proposed development in accordance with the Acid Sulfate Soils Assessment Guidelines, and

(b) the likelihood of the proposed development resulting in the discharge of acid water, and

(c) (Repealed)

*(5) **Public authorities not excepted***
This clause requires consent for development to be carried out by councils, county councils or drainage unions despite:

(a) clauses 14 and 15 of, and item 2 of Schedule 3 to, this plan,

(b) clause 10 of State Environmental Planning Policy No 4—Development Without Consent and Miscellaneous Complying Development.

The Council's Acid Sulfate Soils Planning Map identifies site mainly as Class 3 with a portion of the eastern boundary identified as Class 2. Refer to **Figure 3-1**. Accordingly, this ASSMP has been prepared to address the provisions of Clause 22(4).

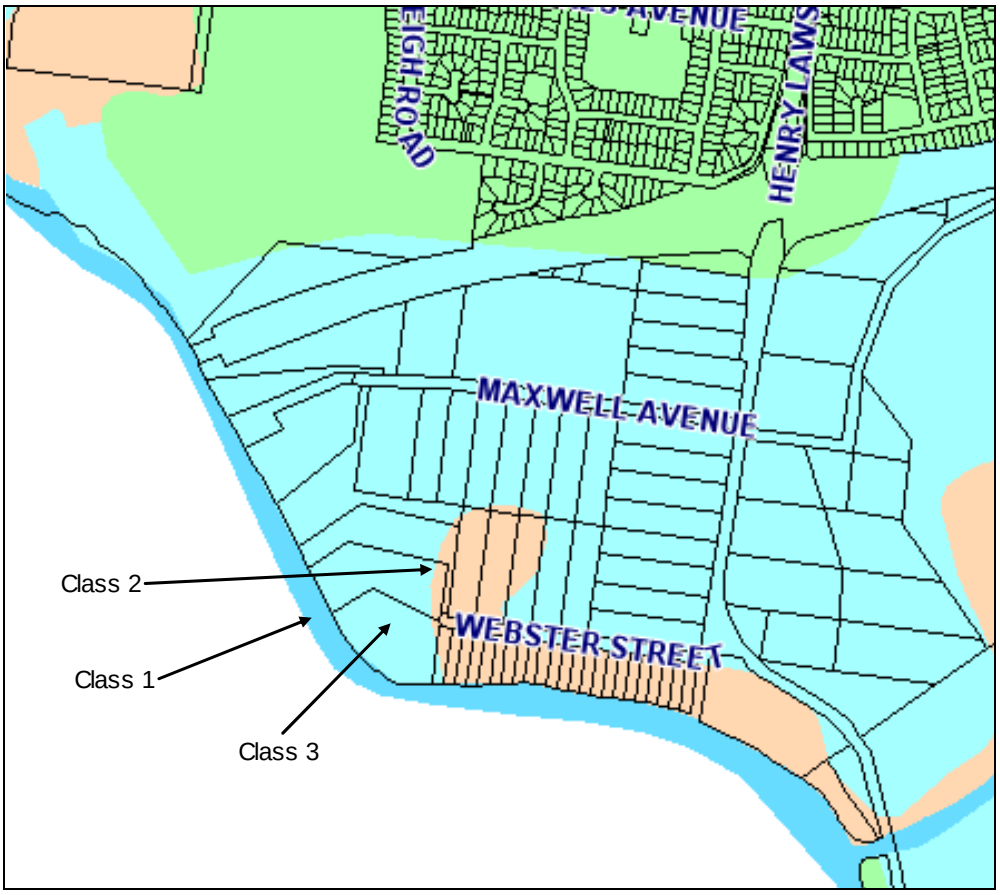

Figure 3-1 Extract of Council's Acid Sulfate Soils Planning Map (Source: Bankstown City Council, 2014).

4 IDENTIFICATION AND MANAGEMENT

4.1 Project Planning and Preliminary Assessment

It is important to determine if ASS are present early on in the project planning stage of works so that effective design options, management actions and controls can be incorporated into the project.

The assessment process should consist of three steps:

1. Determine if ASS is present,
2. Determine if the disturbance of ASS can be avoided, and
3. If disturbance cannot be avoided, then determine the appropriate management method required.

4.1.1 Determining if ASS is Present

A search of the CSIRO Australian Soils Resource Information System (ASRIS) was used to determine the probability of ASS occurring on the work site. In conjunction with the Preliminary Site Investigation (PSI) conducted by WorleyParsons in February 2014, it is strongly indicated that a there is a high probability that ASS will be uncovered on site during excavation and during the installation of drainage, services and utilities.

ASS planning maps are indicative only and observations made onsite should also be used to identify ASS. **Table 1-1** lists typical indicators of ASS/PASS and should be looked for by all earthworks contractors at all times when disturbing soils on this site.

Use **Table 1-1** to determine when onsite whether you are dealing with Potential or Actual ASS.

Table 1-1- Indicators of Potential and Actual ASS
Potential ASS Indicators:
• Presence of mangroves, reeds, rushes or swamp vegetation etc • Sulfurous (rotten egg gas) smell after rain following a dry spell or when the soils are disturbed • Marine or estuarine sediments • Soils can be described as unripe muds/sediments (soft, buttery, blue grey or dark greenish grey) which can include sands and gravels • Milky blue/green water • Shell fragments in the soil • Waterlogged, scalded or backswamp areas • Land below 5m AHD elevation
Actual ASS Indicators:
• Any jarosite (a pale yellow mineral deposit) or iron oxide (rusty) colouring

- Extensive iron stains on any drain surfaces, or iron stained drain water and ochre
- Deposits
- Corrosion of concrete and/or steel structures
- Surface or ground water on or draining from the site with a pH < 5.5, or of an
- Unusually clear or milky green
- Sulfurous (rotten egg gas) smell when soils are disturbed

Additionally, ASS locations can be found on the NSW Natural Resource Atlas (www.nratlas.nsw.gov.au) and can also be obtained from the relevant council website.

4.1.2 Determining if ASS Disturbance can be Avoided

First, consider an alternative design and/or route options to avoid disturbing ASS. If this is unavoidable then, to the greatest extent possible, keep the area of soil disturbance to a minimum and as shallow as possible and ***minimise the use of heavy machinery in ASS areas***. It is also highly recommended to not disturb the water table, generally < 1 metre deep closest to the Georges River.

In some instances it may be feasible to add additional clean fill to build up the ground level for those areas requiring excavation so that works do not impinge on any ASS layer or the usually shallow water table.

5 ASS MANAGEMENT CONTROLS

The management methods in this site specific ASSMP are for **small projects** which are allocated a **high risk** as shown in **Figure 5-1**.

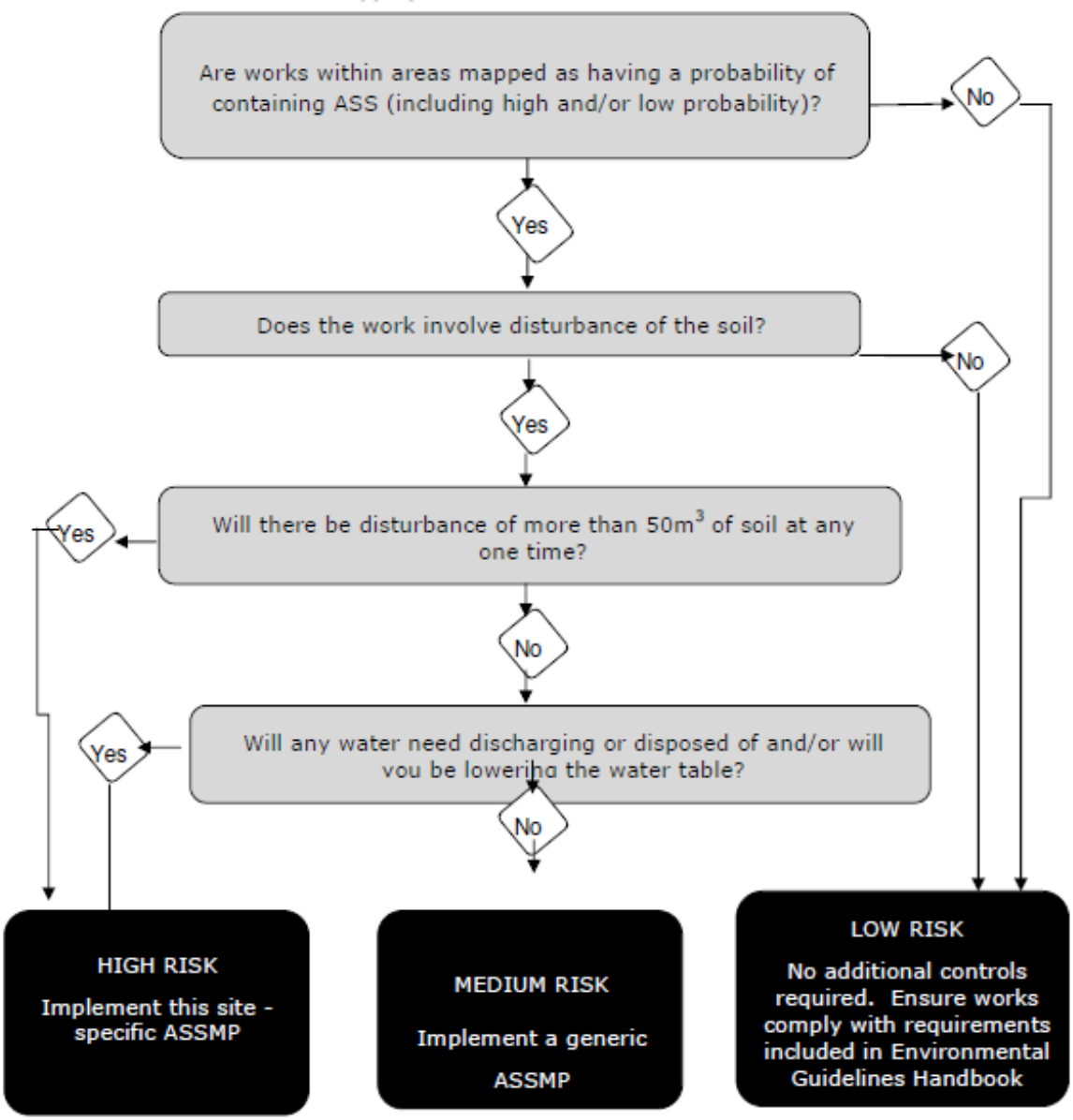

Figure 5-1 - Determining the appropriate management method for ASS

5.1 Prior to Starting Work

5.1.1 Site Induction to Inform Staff

Use a site induction and visual aids to inform and demonstrate to staff and contractors that there will be additional on-site management requirements. Designate suitable areas for stockpiling and/or provide waste bins for ASS.

5.1.2 Stage Works

Schedule the project to minimise the time ASS material is exposed to air and to ensure that it can be reburied as quickly as possible (that is within the same working day). This is especially important for sandy sediments as they tend to oxidise and leach rapidly (a few hours) as compared to clay (a few days).

Keep quantities to manageable proportions in suitably lined and covered waste bins or as suitably sized stockpiles, refer to **Sections 5.3**, **5.4** and **5.5**.

5.2 Determine ASS Type

The previous PSI for this site determined that on this site there is a strong chance that both ASS and PASS will be encountered during any earthworks on this site.

Table 1-1 lists the typical indicators for the presence of both ASS & PASS

5.3 Storage of ASS On-site

If ASS is required to be stored onsite, ensure that as excavation occurs, the different soil layers are stockpiled separately, in particular keeping non-ASS layers separate from ASS layers. A marked colour change should make this task relatively easy. Each layer should be managed according to its potential for acidification (see **Sections 5.4** and **5.5**).

Stockpile the highest risk soil (considered to be the most likely to become acid producing) closest to the trench/excavation.

Treatment provisions should also be available on site should Actual ASS be identified. More detail on treatment of Actual ASS is included in **Section 5.5**.

5.4 Potential ASS Management

5.4.1 Managing Potential ASS on Site

When storing **Potential ASS** onsite:

- It is best to store ASS soil in a covered, relatively air-tight bin lined with heavy duty plastic rather than stockpiling the soils;

- If bins are not available or it is not practical to use them then stockpile excavated soils on an impervious material such as heavy duty plastic, away from stormwater and drainage lines, and cover with a heavy duty plastic. The aim is to keep the material moist and not let it dry out;
- Ensure that stockpiles are bunded so as to run-off of acidic water;
- Ensure that sediment controls and diversion banks (if required) are installed around the stockpiles, in accordance with a site Erosion Sediment Control Plan (ESCP), consistent with the Landcom 'Blue Book';
- Ensure that soil in bins/ stockpiles remain moist and contained at all times;
- Minimise the surface area of the cut or excavation exposed to air. Disturbance and exposure to air may cause soils to become acidic making their treatment or disposal costly and time consuming. Therefore ensure that lids and plastic sheeting covers are as air-tight and water tight as possible. Secure and weigh down the covers using sandbags, straw bales or other heavy objects; and
- The management method chosen should take into account both weather and tidal conditions.

If at any stage there are indicators of Actual ASS, see **Section 5.5** below.

5.4.2 Re-instatement and Monitoring

It is recommended that PASS be re-instated on site where practical provided they are:

- Re-instated within 24 hours of being excavated and the soils have been correctly managed while onsite, and
- Soils are re-instated at the same depth as excavated, especially with respect to trenching operations.

Where this is not possible then it needs to be organised ***before any excavation commences,*** to bin and cover ASS having arranged to have it removed from site to a suitably registered landfill capable of accepting ASS. If re-instatement is not practical and the soil needs to be disposed off-site then refer to **Section 6** for disposal requirements.

Further, the site should be monitored on at least one occasion within six months of the works being completed to ensure that there are no residual effects from the works. Particular attention should be paid to infrastructure and to the health of plant life near the disturbed site.

5.5 Actual ASS Management

Where possible, Actual ASS should be treated and re-instated. If not practical, refer to **Section 6.2** for disposal requirements.

5.5.1 Managing Actual ASS

When storing Actual ASS onsite:

- It is best to store ASS soil in a covered bin lined with heavy duty plastic rather than stockpiling;
- If bins are not available or it is not practical to use them then stockpile the excavated material determined to be ASS on an impervious material such as heavy duty plastic, away from stormwater and drainage lines, and cover with a heavy duty plastic;
- Ensure the stockpiles are bunded to prevent run-off of acidic water;
- Ensure that sediment controls are installed around the stockpiles, in accordance with a site ESCP, consistent with the Landcom 'Blue Book';
- Ensure soil in bins/ stockpiles remains moist and contained at all times;
- Aim to minimise the surface area exposed to air. Disturbance and exposure to air may render soils acidic. Therefore covers need to be as air-tight and water tight as possible.
- Weigh down the edges using sandbags or equivalent; and
- The management method chosen should take into account weather and tidal conditions on this site.

Actual ASS are acid producing, therefore a treatment protocol must be determined and prepared for ***prior to excavation or trenching***, and must be undertaken before reinstatement or during long periods of storage. The following is required for treatment:

- The treatment area must be impervious and bunded with adequate drainage collection in a suitable location that will prevent any acidic water leaving the site.
- The treatment of soil should not occur in a sensitive area such as near a waterway or the nearby wetlands.

In general, Actual ASS should be spread in thin layers (0.15-0.30m) in preparation for treatment such as liming.

If ground water is intercepted and needs to be removed off site then under no circumstances must this water be pumped either into the adjoining wetlands/billabongs or into the Georges River. In these cases the water is to be assessed for pH, oils and greases and turbidity. Only when a qualified Environmental Specialist has confirmed in writing that the material passes the required criteria is the water to be removed by a licensed liquid waste tanker.

5.5.2 Treatment Process

Agricultural lime is used to neutralise ASS/PASS by raising the pH to 5.5 or greater. Where no soil analysis has occurred, lime application rates should be in the order of 45 kg per tonne of fine grade (1

or 2) agricultural lime (pH~8.2). However, this may vary depending on the type of soil and its sulfate content (which can be determined from soil analysis).

The following treatment process should be followed:

1. Excavated ASS is to be spread into thin layers (0.15-0.30m) thick within a bunded, treatment area.
2. Apply fine grade agricultural lime at a standard rate typically of 45kg of lime per tonne of soil to the surface of the now stockpiled material. Application of lime should be conducted during calm conditions to ensure lime is not blown away.
3. Mix lime into the ASS layer thoroughly avoiding catching and snagging the plastic liner and thereby allowing material to leach out. Ensure an even mix of soil and lime is created before spreading the next soil layer, as this will ensure that each layer is adequately neutralised.

The **lime must contain less than**: 1mg of calcium per kilogram; 0.2 mg mercury per kilogram and 20 mg lead per kilogram.

Always read the material safety data sheet (MSDS) for the lime to assess determines health and safety controls and/or personal protective equipment are required.

5.5.3 Remedial Action

Where there is evidence of negative impacts to plant life, animals, soils or water near the site, advice must be sought from a qualified Environmental Specialist.

6 DISPOSAL TO LANDFILL

Whenever off-site disposal of ASS is required then arrangements need to be made ***prior to excavating and stockpiling any material***. Arrangements will need to be made to have bins available and also arrangements need to be made with a suitably licensed facility to accept the ASS.

6.1 Potential ASS

6.1.1 Disposal at landfills licensed to dispose of Potential ASS

There are landfills licensed by the Office of Environment & Heritage (OEH) that have the capability and are licensed to accept Potential ASS.

OEH Environment Line (ph: 131 555) has details on facilities able to accept this waste.

Under certain conditions Potential ASS can be disposed of without treatment at a specifically licensed landfill provided that:

- The landfill is specifically licensed by OEH to dispose of Potential ASS below the water table;
- Soils are received at the proposed disposal point within 16 hours of being excavated;
- Soils meet the definition of 'virgin excavated natural material' (VENM);
- Soils have not dried out or undergone any oxidation of their sulfidic minerals; and
- Soils have a pH greater than 5.5.

When transporting Actual ASS, it is important to ensure that the transport time is minimised and the load covered to avoid contact with rain and the potential leaching of sulphuric acid.

If the spoil has been assessed as either Restricted Solid or Hazardous Waste, then it must be transported by a licensed waste transporter and waste tracking must occur.

More information on the disposal of ASS can be found in Part 4 of the Waste Classification Guidelines (Acid Sulfate Soils) (DECC, 2008).

7 REFERENCES

Acid Sulfate Soil Management Advisory Committee (ASSMAC) (1998), *Acid Sulfate Soil Assessment Guideline*, NSW, Australia

Bankstown City Council, Acid Sulfate Soils Planning Map

Department of Environment and Climate Change (2008), *Waste Classification Guidelines, Part 1 (Classifying Waste) and Part 4 (Acid Sulfate Soils)*, Sydney, NSW, Australia

Department of Land and Water Resources (1997), Liverpool Acid Sulfate Soil Risk Map, Edition 2

Department of Natural Resources, *Natural Resource Atlas*, www.nratlas.nsw.gov.au