Acid Sulfate Soils Management Plan

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Introduction

This Acid Sulfate Soils Management Plan (ASSMP) has been prepared to support a Development Application for a Dwelling Alterations and Additions at 40 Shearwater drive, Warriewood NSW 2102.

Property Address	40 Shearwater drive, Warriewood NSW 2102
Lot/Section/Deposit Plan	144/-/DP270385
Consent Authority	Newcastle City Council
Dated	Northern Beaches Council

This ASSMP has been prepared in accordance with the Acid Sulfate Soil Manual 1998.

Acid sulfate soils are naturally occurring soils that contain iron sulphides. When these soils are left undisturbed in the ground they present no issues to the environment. However, when these soils are exposed to air, oxidation occurs which results in sulfuric acid being produced. Sulfuric acid is extremely toxic and causes environmental impacts such as death to native flora and fauna, including aquatic species. These environmental impacts are estimated to last hundreds of thousands of years.

In NSW, acid sulfate soils are generally found along the coast, especially in low lying areas around creeks, lakes, mangroves, tidal areas and the like. Acid sulfate soil maps have been produced by the NSW Department of Land and Water Conservation (DLWC) which have been adapted for use in planning and development. The maps include five acid sulfate soil classes, with class 1 being the most severe category and class 5 being the least severe.

Acid Sulfate Soil Class

The acid sulfate soil class(es) for each property address can be identified on the associated Planning Certificate. Your local Council will also have access to the acid sulfate soil risk maps which identify the classes applicable to each individual property.

The applicable acid sulfate soil class(es) for the subject address are **class 2.**

Table 1 identifies the five classes and what works are required to trigger the need for an acid sulfate soils assessment. Note that no matter what class of acid sulfate soils applies to your site, you have to disturb more than one tonne of soil to trigger the need for an acid sulfate soils assessment. This equates to approximately two-thirds of a cubic metre of soil, depending on the soil type and its characteristics.

Table 1 – Classification Scheme in the Acid Sulfate Soils Planning Maps

Class	Works - disturbance of more than 1 tonne of soil
1	Any works
2	Works below natural ground surface Works by which the water table is likely to be lowered
3	Works beyond 1 metre below natural ground surface Works by which the water table is likely to be lowered beyond 1 metre below natural ground surface
4	Works beyond 2 metres below natural ground surface Works by which the water table 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 water table below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land

The maps do not describe the actual severity of acid sulfate soils but provide an indication of whether acid sulfate soils could be present on site.

It is very rare that a local development in a class 5 acid sulfate soils mapped area would lower the water table by more than 1m in an adjacent class 1-4 area, therefore it can be assumed that a class 5 site does not trigger the need for an acid sulfate soils assessment.

Acid Sulfate Soils Assessment

If your site is located within class 1-4 acid sulfate soils, and you are undertaking works as describe in **Table 1**, you have the option to undertake a preliminary assessment. This preliminary assessment would establish whether acid sulfate soils are present on site and whether they are in such concentrations that they warrant an ASSMP. However, this involves taking samples of the in-situ soils and sending them to a laboratory for testing. The time and cost it takes to report on this testing to only confirm that a ASSMP is warranted is not efficient in terms of the Development Application assessment process.

It is therefore recommended that you assume your site contains actual acid sulfate soils and use this ASSMP to manage them on site.

It should be noted that the above advice is only applicable for smaller scale residential development such as dwellings, pools, decks, car ports, etc. Any larger scale developments should consider the need for soil sampling and testing so that a targeted management plan can be established.

Mitigation Principles

Alternatives approaches that present the lowest risk to the environment should be considered in areas containing potential acid sulfate soils. Where possible, a development should be designed to minimise the disturbance of acid sulfate soils. For example, you may be able to consider an alternate site for the development that contains a less severe acid sulfate class, or you may be able to limit the amount of excavation required for a development.

While mitigation principles are theoretically possible, it is often not feasible or practical to simply move a development to an alternative site or limit excavations e.g. there may be specific engineering requirements for footing design that require deep excavations. Therefore, the risks associated with acid sulfate soils must be managed by other means.

Management of Acid Sulfate Soils

It is essential to neutralise excavated soils so that the pH is brought above 5.5. In most cases there is only a small chance of raising the soil pH to be completely neutral (pH 7), however a pH above 5.5 is enough to avoid most acid sulfate problems. Agricultural lime must be applied to exposed soils in order to lift the pH level.

Lime treatment rates are set out in the Acid Sulfate Soils Manual 1998 and require an understanding of the Oxidisable Sulfur percentage of the soil based on soil sampling and laboratory testing. In the absence of any such testing a 'Medium treatment level' is considered a good basis for the liming rate to be applied. This treatment level varies from 1.5kg of lime per tonne of soil to 200kg of lime per tonne of soil.

The following steps should be undertaken to manage the potential acid sulfate soils on site:

Step 1

All site personnel should be made aware of this ASSMP. Daily toolbox talks are recommended and ASSMP strategies discussed for the day's work.

Step 2

At any given time, limit the exposure of excavated soils on site. In practical terms you should aim to sequence excavations so that they remain uncovered for the smallest time possible. This is particularly important for sandy soils which oxidise and result in sulfuric acid being produced very quickly (a few hours) in comparison to clayey soils (a few days).

It is preferred to rebury soils on site and cap with non-acidic soils if possible. Artificial liners may also be introduced to prevent leaching of sulfuric acid.

If soils are to be taken off site you should consult your local authority on whether they can be accepted at an alternate site or disposed of at a licenced waste facility. Note that your local authority may require sampling and laboratory testing of the soils by a suitably qualified geotechnical or environmental consultant.

Step 3

Following excavation, the soil is to be laid out so that it is no more than 300mm thick. It is preferable that the area is bunded so that any leachates cannot escape.

A 'Medium treatment level' should be adopted as described above. It is recommended that a soil pH testing kit be used to guide the exact amount of lime to be applied. The closer the pH of the soil to 5.5, the less lime that should be used. You should be careful to not overshoot the optimum pH level of the soil which is between the range of 6.5 – 8.5. Alkaline conditions are also harmful to the environment.

Treatment of the exposed soils should occur within 24 hours of excavation. Treatment of soil shall be undertaken by applying lime over the surface of the soil. The lime must be mixed thoroughly into the soil via mechanical means e.g. rotary hoe or similar.

Monitoring of pH should be carried out during and after neutralisation to establish the effectiveness of the treatment. It is recommended that a soil pH testing kit be used to ensure the pH levels of the treated soil are above pH 5.5.

If you achieve a pH of at least 5.5 then the soil has been successfully neutralised. If this is not the case then additional lime should be added and mixed into the soil.

Step 4

Once the soils are successfully neutralised on site they can be reburied or reutilised as originally intended.

For any stockpiled soils on site, these must be bunded so that and site runoff does not result in soils escaping to the external environment. Covers should be available to place over the stockpiles if rainfall is expected. Good erosion and sediment control practices should be adopted as per the 'Blue Book'.

Considerations

The site supervisor should consider the following:

- Do site personnel obtain the appropriate experience to implement this ASSMP successfully or whether an external consultant/contractor is required to provide guidance?
- Has this ASSMP been included in a Construction Management Plan for the site?
- Will excavations be sequenced so that the time they remain open is minimised?
- Has the quantity of material to be excavated been calculated so that containment areas are sufficient to allow stockpiling?
- Have you planned for wet weather events and minimised the risk of sulfuric acid escaping to the external environment?
- Do you have sufficient lime available should high dosages or redosing be required?

Limitations

This ASSMP has been prepared for 40 Shearwater drive, Warriewood NSW 2102 and shall not be recopied or reused for other development sites.

This ASSMP must only be used for small developments due to the uncertainties of the actual potential of acid sulfate soils occurring on site.

If large amounts of acid sulfate soils will be disturbed, then you should not rely on this ASSMP. It is recommended that you engage a suitably qualified Geotechnical or Environmental Consultant to provide a targeted ASSMP based on site specific sampling and laboratory testing.