

## 1. PURPOSE

- To establish a consistent process and a specific protocol for managing Acid Sulphate Soils (ASS) in all areas of EGW infrastructure.
- To raise awareness of EGW staff regarding potential impacts of ground disturbances where a potential ASS site has been identified.
- To have a process in place to ensure minimal environmental impact, OHS risks and ongoing protection of assets.

This SOP applies to all EGW staff and contractors undertaking work on EGW's behalf.

## 2. INTRODUCTION

Acid Sulphate Soil occurs naturally in coastal and inland settings. These soils contain metal sulphide minerals, which, if drained, excavated or exposed to air, can react with oxygen and water to form sulphuric acid.

Undisturbed ASS does not present any risk however if disturbed, ASS can create an acidic environment, which presents occupational health and safety risks (skin, eye irritation and burns), risks to assets (corrosion of steel and concrete infrastructure) and environmental damage (acidified soils and water, dead vegetation, dead fish etc). ASS can also lead to the release of other contaminants such as heavy metals when combined with acidic materials. The release of these contaminants can cause harm to plants and animals, and contaminate drinking water.

ASS is generally found in low lying areas within coastal plains or wetlands and along the edges of water bodies. Maps of potential CASS in EGW's region are located in Appendix 1.

## 3. ACRONYMS AND DEFINITIONS<sup>1</sup>

**ASS** - Acid Sulfate Soil is any soil that contains sulfidic or sulphuric material

**CASS** - Coastal Acid Sulfate Soil is an acid sulfate soils (ASS) that has formed as a result of sea influence (excluding cyclic salt)

**CSEM** - Contractor Safety and Environment Management

**HSE** - health, safety and environment (as in EGW's HSE Team)

**PASS** - Potential Acid Sulfate Soil is any soil (coastal or inland) that contains sulfidic material but not sulphuric material

**Sulfidic Material** is any soil, sediment or peat layer that contains metal sulfides (generally pyrite or iron sulfide). This material only exists under oxygen free or anoxic waterlogged conditions.

**Sulfuric Material** is any soil, sediment or peat layer that contains sulfuric acid (H<sub>2</sub>SO<sub>4</sub>). Sulfuric acid is produced by oxidation of sulfidic material.

## 4. APPROVAL

Managing Director

---

<sup>1</sup> Victorian Coastal Acid Sulfate Soils Strategy, DSE (2009)

## 5. RESPONSIBILITIES

All EGW employees are responsible for:

- operating in accordance with this SOP; and
- reporting any suspected or actual evidence of ASS to their supervisor without delay.

Managers/Team Leaders/Supervisors are responsible for ensuring that:

- relevant staff are trained in the requirements of this SOP; and
- reports of suspected or actual ASS are referred to the HSE Team to allow appropriate management action to be taken.

The HSE Team is responsible for:

- the provision of specialist support as required;
- reporting serious ASS related incidents to the Environmental Protection Authority (EPA) and the Department of Environment and Primary Industries (DEPI) following consultation with Executive Management; and
- reviewing field safety and environmental practices.

Project Managers (including external service providers) are responsible for:

- designing works to avoid or minimise environmental impacts and OHS risks;
- ensuring that any EGW works involving ASS or PASS are identified and advised to the managers and team leaders responsible for the works; and
- ensuring that any contract works involving ASS or PASS are correctly identified in CSEM Form 2.1 and advised to the contractors involved in the works.

A flowchart has been developed to assist project managers to meet the expectations of DEPI and this SOP – DOC/14/7874. There are also so templates available to assist Project Managers - SUB/13/258.

If in doubt speak, seek assistance from the HSE Team.

## 6. PROCEDURE

### 6.1 Activities That May Disturb ASS<sup>2</sup>

The types of activities which EGW and/or EGW contractors undertake which may disturb ASS include, but are not limited to:

- Excavating soil
- Filling land
- Moving ASS horizontally or vertically
- Temporarily or permanently dewatering soil containing ASS

---

<sup>2</sup> Victorian Coastal Acid Sulphate Soils Strategy, op cit

- Drilling for bores (vertical and directional)
- Infrastructure works – flood management, drainage works, water and sewer pipe installation
- Water extraction

## 6.2 High Risk Activities That May Disturb ASS<sup>3</sup>

The following are considered high risk activities that may be undertaken by EGW and/or EGW contractors, or may be undertaken by other parties in regions in which EGW assets are located or our operations take place:

- Excavating soil/sediment on low lying / coastal areas
- Extracting or lowering groundwater
- Filling land (more than 100m<sup>3</sup> with an average depth of 0.5m) over *in situ* PASS
- Planting vegetation (crops or plantation) that may potentially lower the water table
- Coastal or inshore dredging

Before undertaking any construction or maintenance activities project managers should confirm whether or not the activity will be taking place in a ASS or PASS area. If yes, is there a potential for the works to disturb ASS i.e. will any of the above activities or any other ground disturbance activities be undertaken?

## 6.3 Identifying ASS Disturbance

### 6.3.1 Initial Identification

- Water with pH less than 4
- Death and bleaching of surrounding vegetation (can include aquatic)
- Unusually clean or milky blue-green drain water within or flowing from the area
- Extensive iron stains on drain or pond surfaces, or iron stained water and ochre deposits

### 6.3.2 Typical Ongoing Symptoms or Environmental Impacts

- Dead fish
- Corrosion of concrete and/or steel structures
- Skin irritation after exposure to water

Visual indicators / examples of ASS disturbance are located in Appendix 2.

***In the event of noticing any indicators of ASS disturbance, stop work and notify your supervisor. In extreme events, notify the HSE Team without delay.***

<sup>3</sup> Victorian Best Practice Guide for Assessing and Managing Coastal Acid Sulfate Soils - DSE October 2010

## 6.4 Management Measures

If the site assessment indicates that the material has the potential to generate acid they are classified as acid sulfate soils. A formal risk assessment is to be undertaken using the process outlined in the “*Victorian Best Practice Guide for Assessing and Managing Coastal Acid Sulfate Soils (DSE October 2010)*” (see Appendix 3). Management measures will then follow, the suitability of which will depend on the nature and location of the ASS. The hierarchy for management is:

1. Avoid disturbance (compare the site with the potential CASS map in Appendix 1 first)
2. Minimise disturbance
3. Prevent oxidation
4. Treat to reduce or neutralise acidity
5. Offsite reuse or disposal

In severe cases which have resulted in an environmental impact, the incident is to be reported to the EPA and the DEPI Public Land Services/Public Land Division officers.

## 6.5 Further Information

Further information regarding ASS may be found in the following DEPI publications:

- Victorian Coastal Acid Sulphate Soils Strategy - DSE July 2009
- Victorian Best Practice Guide for Assessing and Managing Coastal Acid Sulfate Soils - DSE October 2010

## 7. SAFETY

### 7.1 Health Effects – sulphuric acid

Acid sulphate soils contain metal sulphide minerals, which, if drained, excavated or exposed to air, can react with oxygen and water to form sulphuric acid.

Sulphuric acid is considered very corrosive to skin and eyes at concentrations greater than 15% in water causing severe burns and scarring. The acid is irritating to skin and eyes at concentrations between 5 and 15 % in water and may cause redness and soreness.

The corrosive properties of sulfuric acid are accentuated by its highly exothermic reaction with water. This can result in additional tissue damage to either skin or eyes due to dehydration and particularly secondary thermal damage due to the heat liberated by the reaction with water.

### 7.2 First Aid

#### 7.2.1 Eyes

Immediately irrigate with water for at least 15 minutes and ensure that eyelids are held open. Tilt the head to prevent any wash-water coming into contact with the unaffected eye. Seek immediate medical assistance, whilst continually rinsing the eye(s) with copious amounts of water.

### **7.2.2 Skin**

Immediately wash contaminated skin with plenty of water for at least 15 minutes. Remove contaminated clothing and wash before reuse. If irritation persists, seek immediate medical attention, whilst continually rinsing the skin with copious amounts of water.

### **7.3 Safety management of ASS**

Testing of soil samples in the coastal areas of East Gippsland have indicated that average concentrations of sulphuric acid are approximately 150ppm (0.015%), such that health effects as described above are unlikely. However, as soil sample test results are unlikely to be readily available in the field, it is best practice to assume that handling CASS is a high safety risk.

### **7.4 Handling ASS – Personal Protective Equipment (PPE)**

If ASS is disturbed as per section 6.1 above, it is best practice to avoid any human contact with the soil. If contact is unavoidable, operators should wear full protective clothing, safety glasses and appropriate gloves (laminated film, Neoprene or PVC).

## **8. TRAINING**

All relevant staff and managers will be trained in regard to this SOP.

## **9. RECORDS**

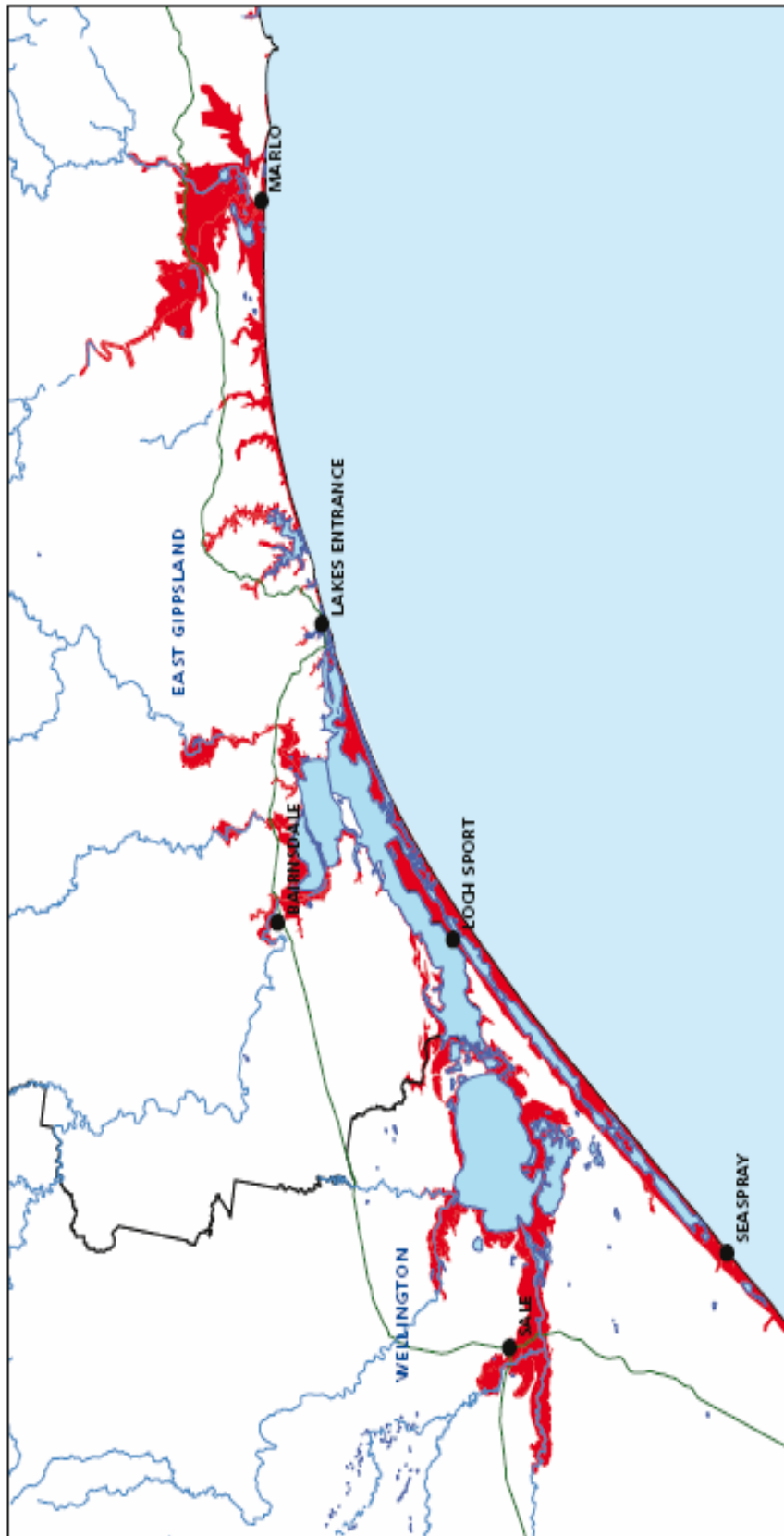
- CSEM Form 2.1
- Environment Management Systems (EMS) database

## **10. RELATED / REFERENCED DOCUMENTS**

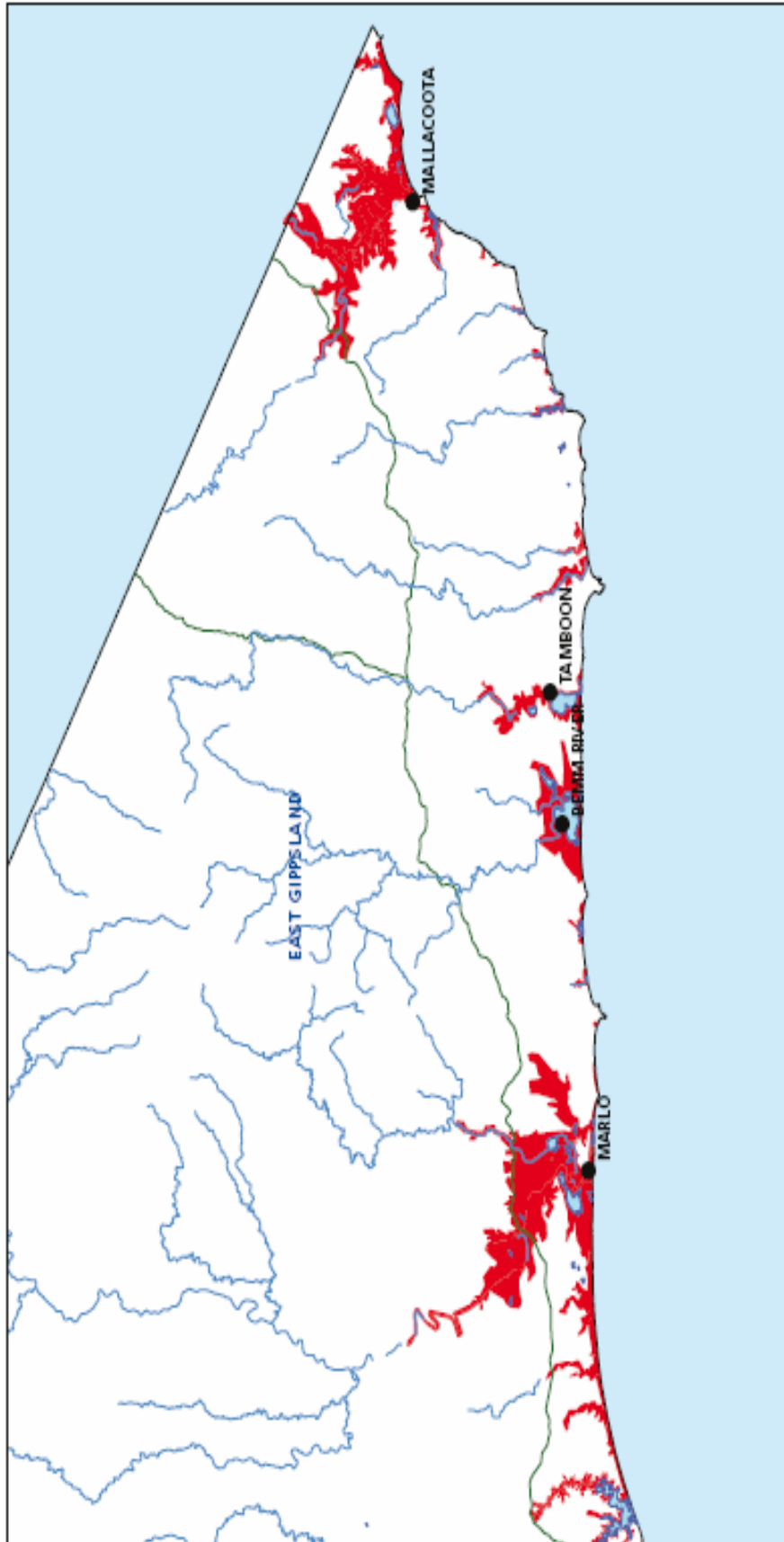
- EMS Manual
- SOP029 Chemical Spill Response
- EGW063 “Spill Station” Chemical Spill Kit Use
- Victorian Coastal Acid Sulphate Soils Strategy - DSE July 2009 (EGW DOC/10/37161)
- Victorian Best Practice Guide for Assessing and Managing Coastal Acid Sulfate Soils - DSE October 2010 (EGW DOC/10/37162)

### **Appendices:**

1. Land in the East Gippsland Region with Potential to Contain CASS.
2. Visual Indicators / Examples of ASS Disturbance.
3. Flow Diagram for Victorian CASS Risk Identification Process



**Map 5 Gippsland Lakes**  
Prospective Land: land that has the potential to contain Coastal Acid Sulfate Soils



**Map 6 East Coast**  
Prospective Land: land that has the potential to contain Coastal Acid Sulfate Soils



**Visual Indicators / Examples of ASS Disturbance**

**Monosulfidic black ooze**



**Monosulfidic black ooze**



**Soil scald caused by disturbance of CASS**



**Exposed aggregate on a culvert in the Heart Morass. Dissolution of concrete structures helped detect disturbed CASS.**



**Marine deposits Seaspray**



**Bleached soil – heart Morass**





Bleached and iron stained soil



Dead vegetation



Flow diagram for Victorian CASS Risk Identification Process

