3.4 Management of Acid sulfate soils

If a potential ASS hazard is identified it is expected that on-ground staff will notify their supervisors and/or environmental engineers to confirm the hazard and initiate a suitable management plan (see Action Flowchart page 5).

As such on-ground staff would not be expected to develop extensive management plans without such assistance and much of the detail on the formulation of appropriate response strategies is not included in this version of the manual. Extensive guidance on best practice for management of ASS is provided in the detailed manuals produced by the NSW and Qld state governments in their technical manuals on ASS.

However the following general section on management principles is provided for broad knowledge and understanding of the recommended options for dealing with the ASS issue.

3.4.1 Management Principles


The following form the principles of management as stated in the Queensland ASS Technical manual.

1. The disturbance of ASS should be avoided wherever possible.

2. Where disturbances of ASS is unavoidable, preferred management strategies are:
   - minimisation of disturbance;
   - neutralisation;
   - hydraulic separation of sulfides either on its own or in conjunction with dredging; and
   - strategic reburial (reinterment).

Other management measures may be considered but must not pose unacceptably high risks.

3. Works should be performed in accordance with best practice environmental management when it has been demonstrated that the potential impacts of works involving ASS are manageable to ensure that the potential short and long term environmental impacts are minimised.

4. The material being disturbed (including the in situ ASS) and any potentially contaminated waters associated with ASS disturbance, must be considered in developing a management plan for ASS and/or in complying with the general environmental duty.

5. Receiving marine, estuarine, brackish or fresh waters are not to be used as a primary means of diluting and/or neutralising ASS or associated contaminated waters.

6. Stockpiling of untreated ASS above the permanent groundwater table with (or without) containment is not an acceptable long-term management strategy. For example, soils that are to be stockpiled, disposed of, used as fill, placed as temporary or permanent cover on land or in waterways, sold or exported off the treatment site or used in earth bunds, that exceed the ASS action criteria should be treated/managed.

7. The following issues should be considered when formulating ASS environmental management strategies:
   - the sensitivity and environmental values of the receiving environment. This includes the conservation, protected or other relevant status of the receiving environment (e.g. Fish Habitat Area, Marine Park, Coastal Management District and protected wildlife);
   - whether ground waters and/or surface waters are likely to be directly or indirectly affected;
   - the heterogeneity, geochemical and textural properties of soils on-site; and
   - the management and planning strategies of Local Government and/or State Government, including Regional or Catchment Management Plans/Strategies and State and Regional Coastal Management Plans.

NOTE: detailed discussion on individual strategies is contained in both the Qld ASS technical Manual: Soil Management Guidelines and the NSW ASS Manual.

A more generalised statement of management principles can be found in:

**Management Solutions**

Our understanding of acid sulfate soil chemistry and its effects has increased rapidly over the past five years, but there is still much to be learnt about management and rehabilitation of these soils.

**Avoidance**

The best technique for managing acid sulfate soils is to avoid disturbing or draining the iron sulfide layer in the first place. Iron sulfides are harmless while covered by water. To avoid disturbing the iron sulfide layer, it is important to know where it is likely to be found, and some states produce maps for this purpose. It is necessary to take soil cores to find out the exact location and depth of the iron sulfide layer on a particular site.

**Recognition**

It is useful to know what the iron sulfide layer looks like so that if it is uncovered accidentally it can be re-covered with water immediately. These indicators include the cloudy green-blue water, excessively clear water, iron stains, poor pasture, scalded soil, and yellow jarosite described earlier.

**Liming**

Sulfuric acid can be neutralised with agricultural lime, but this is too costly for large areas of badly affected land. One technique that has had good results to date is liming of drains so that the sulfuric acid produced in the drain walls is neutralised by the lime as it is washed out. Acid water can also be neutralised by lime.

**Water cover**

Re-flooding land with freshwater can halt further acidification. It may even reverse the acidification process if the site can be kept wet and there is sufficient organic matter. Water cover can enable acid tolerant grasses to re-colonise severe acid scald areas preventing soil erosion. However, freshwater re-flooding may increase acid discharges if acid water can sit closer to the ground surface and more easily flow into waterways during moderate rainfall. The use of freshwater re-flooding requires caution and technical advice before it is applied.

Seawater flushing may lead to increased acid neutralisation but may cause other impacts that have not been fully investigated. For example, acid sulfate soils change chemically and physically once they are oxidised. The landscape may be at a much lower elevation due to soil shrinkage and may also transmit saltwater to areas previously unaffected. Research into both freshwater and seawater flooding of acidified lands is being investigated.

Landowners are advised to seek expert technical advice for remediation of acid sulfate soil sites.

**Forestry**

Some commercially valuable tree species will grow on acid sulfate soils. Trials are underway to discover if trees can transpire large quantities of surface water to reduce acid export from ‘backswamp’ areas. This experimental concept requires careful controls to prevent any further oxidation of potential acid sulfate material.

**Sea water neutralisation**

A number of flood-gates are now managed to open periodically to seawater to neutralise drain acid, control weeds and improve fish passage. However, the use of seawater to neutralise acid produced by developments raises a number of ethical, moral and legal questions that need to be addressed. At present the biological impacts of seawater neutralisation are unknown.

**Shallow drainage**

Wide, shallow drains like the one shown below allow surface water to drain quickly from the surface of low-lying land without exposing the iron sulfide layer beneath the soil. Deep, narrow drains are more likely to expose the iron sulfide layer and leak sulfuric acid into waterways.

![Fig. 3.28: Drains that have exposed acid sulfate soils](image-url)