General Information Required to Assist Assessment of Development Proposals Involving Acid Sulfate Soils (Version 4, June 2004)

Purpose
This document contains information required by officers of the Department of Natural Resources and Water (NRW) to properly assess the majority of development applications involving acid sulfate soil (ASS) matters. This document should be referred to and used when submitting acid sulfate soils information to NRW when State Planning Policy 2/02: *Planning and Managing Development Involving Acid Sulfate Soils* (SPP 2/02) applies. This information is required by NRW for effective assessment of applications referred to the Department as an Advice Agency under the *Integrated Planning Regulation 1998* or for the assessment of other applications. Other relevant regulatory authorities (ie. Commonwealth, State or Local) may find this document useful for their assessment responsibilities involving ASS matters.

Level of detail needed in an application
The level of detail required will vary according to site-specific factors and the scale and complexity of the development proposal. Applicants should be aware that information in addition to that outlined below on ASS matters may be requested for some developments. Likewise, some information outlined below may not be applicable for particular developments. The applicant should explain why particular information described below has not been provided for review when the application and its attendant information are submitted to NRW.

Sources of further advice
NRW have regional offices throughout coastal Queensland that are able to provide advice to local government, development proponents and State agencies on applications referred to the Department under various legislation including the *Integrated Planning Act 1997*. The 'IDAS Referral Agency Addresses and Contact Details' document on the Integrated Planning Act website (www.ipa.qld.gov.au) contains a list of the regional NRW office details for particular local government areas.

State Planning Policy 2/02: *Planning and Managing Development Involving Acid Sulfate Soils* sets out the State Government's position on acid sulfate soils. Due to the complexity of acid sulfate soils assessment and management a number of technical guidelines are currently used in Queensland, as follows:

- State Planning Policy 2/02: *Planning and Managing Development Involving Acid Sulfate Soils*
- State Planning Policy 2/02 Guideline: *Acid Sulfate Soils*
- *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998* (CR Ahern, MR Ahern and B Powell 1998)
- Chapters of the *Queensland Acid Sulfate Soil Technical Manual*
  - *Soil Management Guidelines* (SE Dear, NG Moore, SK Dobos, KM Watling and CR Ahern 2002)
  - *Acid Sulfate Soils Laboratory Methods Guidelines* (CR Ahern, AE McElnea, LA Sullivan 2004)
- *The Instructions for the Treatment and Management of Acid Sulfate Soils* (Queensland Government 2001).

These documents are either available from the NRW website (www.nrm.qld.gov.au/land/ass) or by contacting your regional NRW office. *The Instructions for the Treatment and Management of Acid Sulfate Soils* are available from the EPA.

Application of State Planning Policy 2/02
State Planning Policy 2/02 applies within the local governments listed in Annex 1 of the policy, to all land, soil and sediment at or below 5 m AHD where the natural ground level is less than 20 m AHD. Within these areas, the SPP applies to development involving any of the following activities:

- excavating or otherwise removing 100 m^3 or more of soil or sediment; or
- filling of land involving 500 m^3 or more of material with an average depth of 0.5 m or greater.

If State Planning Policy 2/02 applies to a development then an ASS investigation should be provided to the assessment manager and also to NRW if required by the *Integrated Planning Regulation 1998*. Such investigations are to be in compliance with State Planning Policy 2/02 Guideline and the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998* (Ahern *et al*. 1998). Different levels of investigation may be appropriate for different proposals or types of disturbance.

An ASS management plan (or similar) should be prepared if the ASS investigation report concludes that ASS are present above the ASS Action Criteria[1] and could be disturbed by the proposed development. **The ASS**

[1] Appendix 5, State Planning Policy Guidelines 2/02: *Acid Sulfate Soils*

investigation report must be provided with, or prior to, the submission of an ASS management plan (if an ASS management plan is required). Submission of an incomplete ASS investigation report may mean that NRW officers will not accept the ASS management plan for review.

Outline of this document

- **Section A** details the information that should be provided as part of an ASS Investigation Report.
- **Section B** details the information that should be provided as part of an ASS Management Plan.
- **Section C** details additional 'information request' items that should be provided (as applicable) when a development involves disturbance to surface water, disturbance to groundwater or filling.

Where possible, applicants and consultants should reference the information items below (eg. A1) in their reports to demonstrate to reviewers that each item has been adequately considered.

The content of this document will be reviewed periodically and comments and suggestions for improvements can be offered to NRW via Angus.Mcelnea@nrm.qld.gov.au.

A Information required to determine if ASS are present or absent in the soils or sediment to be disturbed

Cross-references to specific sections of the SPP 2/02 Guideline are provided in the right hand margin of the document, eg. [s#.xx]

Desktop assessment and site description

A1. Provide the following information about all proposed excavation or filling activities that will or may disturb soil or sediment below 5 m AHD:
- the purpose of each proposed disturbance
- the method of disturbance (eg. dry excavation following groundwater extraction over 3 month period)
- the maximum time envisaged for disturbance activity (eg. 2 months)
- the dimensions (length, width and depth) of each disturbance
- the volume of each soil disturbance below 5 m AHD
- whether the disturbance(s) may intercept or otherwise disturb the permanent watertable
- the lowest elevation (in metres AHD) of material to be sourced as fill. [s6.10]

Note: Where disturbance dimensions or locations are not finalised, ensure that this is made clear in the acid sulfate soil investigation report and provide approximate locations and provide conservative volume and dimension figures. Should the nature, location or dimensions of the disturbance change, then associated ASS investigation or management reports may need to be revised.

A2. Clearly define the location of each disturbance on site maps, plan diagrams and/or colour air photos that are of an appropriate scale for the development. Mark and label the location of each borehole/investigation pit on the diagram, map or air photo. [s6.10]

A3. Locate the site on an existing acid sulfate soil map (if available), and describe the map name, date, version, scale and mapping units that the development site is on, and mapping units adjacent to the proposed development site. Note if ASS are known to be present on any adjacent properties. [s6.12]

A4. Provide descriptions of the landscape pattern, soils, geology, topography and surface elevation of the proposed site. Include a colour photo or image and survey plan showing contours. Note if any of the site description criteria indicate that ASS may be present. [s6.14]

A5. Identify the proximity of the areas to be disturbed and/or the site to environmentally sensitive areas. These areas include but are not limited to National Parks, Conservation Parks, Declared Fish Habitat Areas, Marine Parks, Wetland of State or Regional Significance. [s9.13]

A6. Identify on-site and off-site conservation values including flora and fauna that may be affected by changes to soil or water pH, groundwater table levels, or potentially toxic effects of any mobilised metals.

A7. Provide a copy of any written advice received from any Commonwealth, State or Local Government authority regarding the investigation of ASS on this site.

Note: Any reference to verbal advice will not be considered by NRW in the assessment of an ASS investigation or management plan. Evidence of written advice must be provided.

Soil Sampling

A8. Provide a brief description of the sampling equipment, methods used to undertake field tests (pH_F, pH_{FOX}) and protocols to retrieve, transport and store all soil samples. [s6.21–6.23]

A9. Provide a borelog or soil profile description for each borehole or investigation pit and mark the location of each borehole or investigation pit with a clear label on an appropriately-scaled map or air photo of the property. Ensure that the following information is presented in a manner that enables cross-referencing or correlation of soil profile descriptions with pH field test results and laboratory analysis results:

- the Australian Grid Reference for each borehole or soil investigation pit, and
- field description information (horizon, texture, colour, presence of jarosite, shell etc.), and
- sampling depths (include sample numbers for cross-reference). [s6.19]

Note: Depth should be in both metres below ground level (BGL) and Australian Height Datum (AHD).

Note: It is preferred that soil description information, field pH test results and laboratory results are presented side-by-side on the same page.

Note: The boreholes should be described according to the Australian Soil and Land Survey Field Handbook (McDonald et al. 1990) and include field texture, horizon differentiation, depths, colour, mottles, pH and electrical conductivity. Appropriate soil engineering terms in accordance with AS1726-1993 (Standards Australia 1993, Geotechnical site investigations) can also be used.

Note: Starting from the present soil surface, soil samples should not exceed 0.5 m intervals down the profile, to at least one metre below the depth of the proposed disturbance or to at least two metres below the land surface, whichever is greater.

Note: All samples should be retained, appropriately stored, numbered and registered even if not analysed.

Note: The location of each borehole and its existing surface height (Australian Height Datum) should be accurately surveyed and presented on a colour aerial photo, along with the boundaries of the area(s) to be disturbed.

A10. Provide justification if the ASS investigation does not comply with the *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998* (CR Ahern, MR Ahern and B Powell 1998) in regards to:

- the number of boreholes;
- field pH test frequencies;
- the number of samples collected at each borehole;
- sample handling and storage protocols;
- the number of samples submitted for laboratory analysis;
- the laboratory methods used for analysis of samples; and
- field description information.

Note: These Guidelines are commonly referred to as the 'QASSIT Guidelines' in a number of reports and management plans. Given the number of ASS-related guidelines that exist, this document can be abbreviated to the 'Queensland Sampling Guidelines' in the text of a report.

Sample Selection and Laboratory Analysis

A11. Provide a list of field pH results (pH_F and pH_{FOX}) and laboratory results (in %S or mol H^+/t units) and highlight all samples that exceed the ASS 'Action Criteria' and those that are likely to be potential or actual acid sulfate soils. [App. 5]

Note: It is preferred that soil description information, field pH results and laboratory results (or a summary of this information for each sample) are presented side-by-side on the same page.

Note: Where a number of boreholes are being provided, a synthesis and/or summary of the information will be helpful to enable efficient interpretation of the soil investigation results. This should not be seen as a surrogate for the accurate and comprehensive documentation of the primary data.

A12. If applicable, define where ASS are absent and use the results from the desktop assessment, site and field indicators, field test results and laboratory results as evidence to support this. [s6.25–6.26]

A13. Supply a copy of all laboratory analysis certificates and ensure that sample identification numbers can be cross-referenced to soil profile descriptions and to a borehole location diagram. Terminology and method codes should be consistent with the *Acid Sulfate Soils Laboratory Methods Guidelines* (CR Ahern, LA Sullivan, AE McElnea 2004). [s6.30]

Level of treatment

A14. Define the 'level of treatment' and tonnes of fine agricultural lime that will be required to neutralise the maximum amount of existing and potential soil acidity that could be generated as a result of the disturbance to acid sulfate soils. Ensure that all variables used to define the 'level of treatment' are documented. [s9.6]

Note: Disturbances likely to alter the watertable of the area or that are close to an environmentally sensitive area are to be treated and managed as requiring an extra high level of treatment.

ASS Mapping

A15. Formulate ASS maps identifying borehole locations, the areas to be disturbed and the occurrence of both actual acid sulfate soils and potential acid sulfate soils according to the upper depth of occurrence, eg. 0–0.5 m, 0.5–1 m, 1–1.5 m etc. and to at least 1 metre below the depth of disturbance. SS maps for developments are usually at a scale of 1:5000 or larger.

For complex and/or very large or intense disturbances (typically greater than 10 000 m^3) also display cross-sectional diagrams that show laboratory results (eg. S%) and soil layers/horizons/geomorphic facies according to the upper depth of occurrence, eg. 0–0.5 m, 0.5–1 m, 1–1.5 m etc. and borehole locations. Sampling on a 50–75 metre grid may be required for such disturbances. [App 4.8]

B Information required for ASS management

The following information should be provided as part of an ASS Management Plan (ASSMP), or a section within an Environmental Management Plan (EM Plan), an Environmental Management Program (EMP) or a Site Based Management Plan (SBMP) covering soil and water management associated with the disturbance and treatment of ASS.

Soil and Water Management

For all disturbances

B1. Clearly identify and locate areas of the site on a map and/or on cross-sectional diagrams showing areas where ASS will be avoided and areas where ASS will be disturbed. [s9.1]

Note: Clear definition of areas to be disturbed and avoided may assist in conditioning of an application. Revision of applicable plans may be necessary if these areas change significantly.

B2. Outline the proposed construction and environmental management measures that will be employed to minimise the disturbance of ASS.

B3. For each type of disturbance as identified in the ASS investigation report identify the soil and water management strategies that will be employed (see the *Soil Management Guidelines* (Dear *et al*. 2002) with respect to soil management issues). [s9.3]

B4. For each type of disturbance as defined in the ASS investigation report identify performance criteria, monitoring, verification, environmental risk and management considerations for soil, surface water and groundwater, taking into account any additional site-specific factors that may increase the level of risk or management (see the *Soil Management Guidelines* for further information). [s9.3, s10]

B5. Identify any 'higher risk' or 'generally unacceptable management strategies' that are proposed during the construction stage, and outline the measures that will be used to mitigate the level of risk associated with each activity. Again, undertake a risk assessment if any 'higher risk' management or 'generally unacceptable management strategies' are proposed (see the *Soil Management Guidelines*). [s9.4]

Note: Higher risk management strategies include stockpiling acid sulfate soils, strategic reburial of soils with existing acidity, large scale dewatering, and vertical mixing. Generally unacceptable management strategies include: above ground capping, hastened oxidation, seawater neutralisation and offshore disposal of ASS.

B6. For any soil that is to be removed off-site, describe the volume of soil to be removed, protocols that will apply for its selection and transport, the location to which it will be removed, and proposed management measures that will be utilised off-site. [s4.3]

Note: Untreated ASS should not be transported off-site without detailed risk assessment of the procedures and without authorisation from the landowner receiving the materials.

ASS Treatment

For disturbance in the low, medium, high and very high 'level of treatment' category

B7. Provide a suitably detailed plan of management that reflects the relevant level of treatment requirements set out in Section 9 of the SPP 2/02 Guideline. [s9.9–9.13]

For disturbances in the extra high 'level of treatment' category

B8. Formulate a detailed EM Plan using Appendix 4 of the SPP 2/02 Guideline and the *Soil Management Guidelines* that is based on the results of the acid sulfate soil investigation, and other relevant surface water, groundwater or filling site assessments (as relevant). The EM Plan must account for each form of disturbance, and must specify all potential environmental impacts, performance criteria, and mitigation strategies together with relevant monitoring, reporting and, if an undesirable impact or unforeseen level of impact occurs, appropriate reporting and corrective actions. [s9.14–9.15, App 4]

Note: A site assessment of surface water (see part C) should be undertaken to support an EM Plan for disturbances requiring this level of treatment.

C Additional information required to determine the potential impacts from disturbance of ASS associated with changes in surface water or groundwater associated with excavations, filling and groundwater extraction activities

Site Assessment of Surface Water

C1. Describe the existing surface water resources including the characteristics of the local drainage basin and the existing drainage pattern.

C2. Describe the water quality including seasonal variations or variations with flow where applicable including, but not limited to: measurements of pH, conductivity, dissolved oxygen, aluminium, total iron and dissolved iron. Additional parameters may need to be measured depending on site specific circumstances. [s10.6]

C3. Define the location of all drainage channels and all existing points of discharge from the site and how any of these points or drains will be altered as a result of construction activities. Locate these points on a scaled site map.

C4. Identify the proximity of any aquatic environments (eg. Declared Fish Habitat area) to existing points of discharge.

Site Assessment of Groundwater related to proposed ASS disturbance [s7]
TO BE COMPLETED IF DRAINAGE, PUMPING OR ANOTHER METHOD OF DISTURBING GROUNDWATER IS INVOLVED

C5. Identify the extent of *in situ* potential acid sulfate soils that may be exposed by dewatering or groundwater draw down associated with the proposed works. This can be done by modelling the 'cone of depression' associated with any draw down of the watertable.

C6. Provide a map showing the number and location of monitoring bores in relation to site boundaries and areas of significant groundwater disturbance.

C7. Provide information as set out in Section 7.4 of the SPP 2/02 Guideline that describes groundwater chemistry and quality including seasonal variations where applicable (including direction of flow). [s7.4]

C8. Provide information as set out in Section 7.5 of the SPP 2/02 Guideline to demonstrate that there will be negligible effect on other groundwater users and related environments or conduct a full groundwater investigation as per section 7.5 to 7.9 of the SPP 2/02 Guideline. [s7.5]

Site Assessment of Filling Activities related to proposed ASS disturbance [s8]
TO BE COMPLETED IF FILLING ACTIVITES ARE INVOLVED

C9. Provide a site map (or as per A2) and define the dimensions and locations of area(s) where fill is proposed to be placed, the depth and volumes of fill at these locations and the location of all investigative boreholes dug within the area(s) to be filled.

C10. Define from where the fill will be sourced (both on-site and off-site).

C11. Using information collected in the ASS investigation report, identify the extent of any *in situ* potential acid sulfate soils or actual acid sulfate soils that may be exposed or disturbed by displacement and extrusion of soil or changes to groundwater levels associated with the proposed works. [s8.4]

C12. Provide information as set out in Section 8.5 of the SPP 2/02 Guideline (supported by geotechnical investigations or similar) to assess how the load associated with placing of fill (or any other structures associated with the filling activity) will effect the underlying soil, ground water levels and surface water runoff at the site. [s8.5]

C13. Based on the information provided in accordance with Section 8 of the SPP 2/02 Guideline, provide a conclusion from the geotechnical engineer or engineering geologist as to whether disturbance to ASS is likely or not.

End of Document