

ACID SULFATE SOILS

TWEED HEADS TO NERANG RIVER

Queensland
Natural Resources and Mines

SCALE 1 : 25 000

Projection: Universal Transverse Mercator (UTM) Zone 56
Horizontal Datum: GEOCENTRIC DATUM OF AUSTRALIA (GDA04)
Note: This map is CDAM compliant

REFERENCE

ACID SULFATE SOILS (ASS) ON RELATIVELY UNDISTURBED LAND				
Depth	Depth Code	Depth to Actual Acid Sulfate Soil ¹ (m)	Depth to Strongly Acidic Soil Layer ² (m)	Depth to Potential Acid Sulfate Soil ³ (m)
0 - 0.5m	0	A0	a0	S0
0.5 - 1m	1	A1	a1	S1
1 - 2m	2	A2	a2	S2
2 - 3m	3	A3	a3	S3
3 - 4m	4	A4	a4	S4
4 - 5m	5	A5	a5	S5
>5m	5+	A5+	a5+	S5+

NOTE:

- ¹ The depth codes above imply that a predominance of profiles in the map unit fall within the nominated depth range.
- ² Actual acid sulfate soil layers (designated with an A code) often overlie potential acid sulfate soil layers (designated with an S code). Where this occurs e.g. S1, the map unit is coloured according to the depth of the upper surface of the actual layer (A0) and overlaid with yellow dots. An 'a' preceding the soil depth code e.g. a1 indicates a strongly acid soil layer with field pH ranging from 4.5 to 5.0. This may or may not be a result of sulfate oxidation. Where 'a' depth codes in power on the map, the colour is as follows:
- ³ In areas where there is varying depth to an ASS layer that cannot be separately mapped at the operative scale, two colours are used to designate the dominant depths. This appears as equal width vertical stripes e.g. S1+.
- ⁴ 'P' indicates sediments of Pleistocene age⁵ or the 'P' indicates sulfidic sediments of Pleistocene age deeper than 5m.
- ⁵ Sediments in red areas associated with floodplain or saltmarsh and occasionally Cullenine dunes coverments. Oxidizable sulfur % in surface layers may be highly variable and often exceeds the Action Criteria⁶. This may include sulfur from organic compounds and modern sediments of sulfides in a wet, organic rich environment. ASS typically occurs at depth, where this occurs e.g. S2+ or S3+ the map is coloured as per the actual or potential depth category and is overlaid with a pattern.

- S** Land mapped at 1:100 000 scale where ASS occurs within 5m of the surface.
 - SdL** Limited field assessment but occurs in a landscape position where there is a reasonable probability of ASS occurrence. This is usually land where the present use precludes any disturbance e.g. National Parks, Reserves etc., or land where accessibility is severely restricted.
- ### ACID SULFATE ON DISTURBED LAND⁷
- SLP** Disturbed land, eg. Canal estate, Marina, Aquaculture, Quarry, Urban, Industrial likely to contain ASS. (In some cases partial or full treatment may have been undertaken). Limited field investigation.
- ### 5m AHD⁸ CONTOUR - NORMAL LIMIT OF FIELD INVESTIGATION
- LP** Land between the 5m AHD contour and the outer limit⁹ of Holocene, estuarine sulfidic sediments¹⁰ which form ASS. Holocene ASS has not been found in this study on land above 5m elevation. In some cases, the limit is <5m AHD. In the latter case, the land between the ASS limit and the 5m contour is designated LP explained below.
 - LPS** Land <5m AHD with low or negligible probability of ASS occurrence¹¹. Limited field assessment.
- ### LAND WITH A LOW PROBABILITY OF ACID SULFATE SOIL OCCURRENCE
- LP** Land between the 5m AHD contour and the outer limit⁹ of Holocene, estuarine sulfidic sediments¹⁰ which form ASS. Holocene ASS has not been found in this study on land above 5m elevation. In some cases, the limit is <5m AHD. In the latter case, the land between the ASS limit and the 5m contour is designated LP explained below.
 - LPS** Land <5m AHD with low or negligible probability of ASS occurrence¹¹. Limited field assessment.
- ### LAND NOT ASSESSED
- NA** Land not assessed for ASS as part of this survey. It may include non ASS land beyond the boundary established as the limit of Holocene, estuarine, sulfidic sediments¹⁰ but insufficient or no field testing was carried out¹².

¹ Acid sulfate soil is the generic term used to define soils derived from estuarine sediments containing iron sulfides (pyrite) or containing the acidic products of the oxidation of sulfides. The term includes actual and potential acid sulfate soils. Unless used with the superscript 'P' the code 'S' implies sulfidic sediments of Holocene age. The superscript 'P' implies sediments of Pleistocene age.

² An 'a' preceding the soil depth code indicates the probable depth to a soil layer or horizon where a field pH of 4.0 or less is encountered in a field of 4.0 or less is used as an indicator of an Actual Acid Sulfate Soil (AASS) with the notable exception of the topsoil, stratified, iron or acid soils. Extension areas with high actual acidity derived from sulfide oxidation may constitute a significant environmental hazard. Some soils with high organic matter may have the pH from organic acids. An 'a' preceding the depth code indicates the probable depth to a soil layer or horizon with field pH ranging from 4.5 to 5.0. This may or may not be a result of ASS oxidation.

³ An 'S' preceding the soil depth code indicates the probable depth to a Potential Acid Sulfate Soil (PASS) layer or horizon. PASS are soils where the oxidizable sulfur percentage exceeds the prescribed action criteria⁶ at a level treatment is required if oxidizable sulfur is conducted by the Total Oxidizable Sulfur (TOS) method, the Chromium Redox Sulphur (CRS) method or the Peroxide Oxidation - Combined Acidity and Sulfate (POCAS) method.

⁴ Oxidizable sulfur (Action Criteria) that trigger treatment are currently: S0 0.2%, S1 0.5%, S2 0.5%, S3 0.5%, S4 0.5%, S5 0.5%, S5+ 0.5%. NOTE: For disturbance > 1000 tonnes the action criteria is 0.2%, regardless of soil texture.

⁵ Limited or no field checking has been carried out in disturbed lands.

⁶ The reliability of elevation data is variable across the study area. AHD refers to Australian Height Datum.

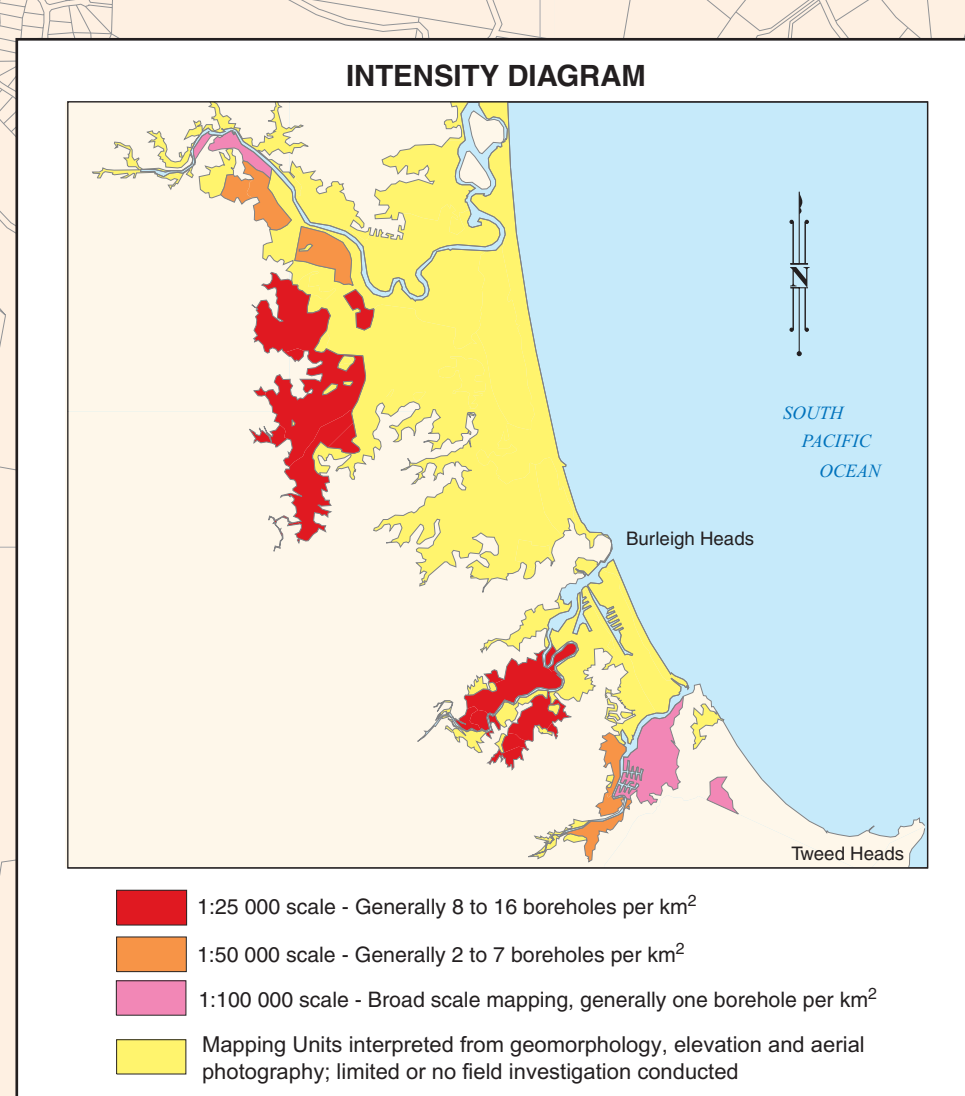
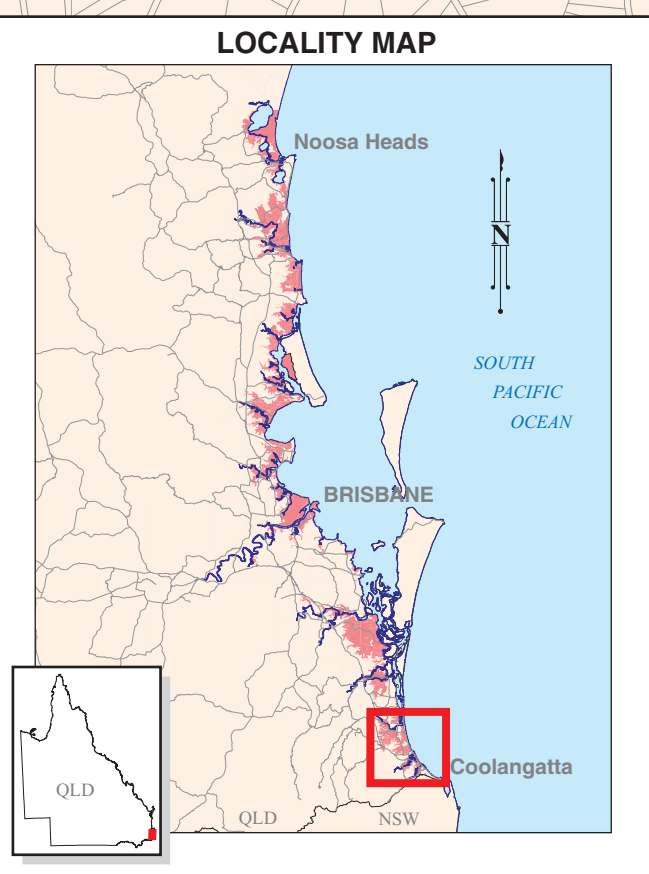
⁷ The primary focus of ASS investigation in this study was on the sulfidic sediments that were deposited in the Holocene epoch, that is, during the last 10 000 years. Experience in coastal mangrove regions suggests that Holocene sediments may contain ASS, but that Pleistocene sediments may also contain ASS. In a related mangrove region, being treated under other government plans or not, considerable ASS has been found beneath land whose surface is both above and below 5m AHD. Generally, Pleistocene sediments are found to greater depths below the surface than equivalent Holocene sediments.

⁸ The outer boundary of Holocene estuarine ASS commonly occurs at the intersection with hard rock or other materials of non estuarine origin. It is either at the 5m contour or at lower elevations. This boundary is established using limited checking of the boundary itself, together with the use of contour lines and geological map boundaries. There is no field assessment beyond the 5m AHD contour level. It should be noted, however, that certain floodplains on land above 5m AHD may contain sulfidic material of non estuarine/Holocene origin. Additionally, much alluvial estuarine, sulfidic sediments may occur at depth on land <5m AHD, as discussed in footnote¹⁰ above.

⁹ CAUTION: It is not possible to accurately map the distribution of ASS adjacent to rivers and streams at the current mapping scale of approximately 1:25 000. ASS may also be buried below alluvium of past and present stream channels some distance upstream of floodplain areas.

¹⁰ NOTE: This map should be used in conjunction with the accompanying report covering this area.

- BSP** Borehole locations where profiles were described in detail and samples taken for analysis
- Local Authority boundary
- Digital Cadastral Database



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