Soil Alert 1
acid sulphate peats and alluvium

Potentially acid sulphate peats

Peat soils incorporating organic marine sediments may contain pyrite (FeS2) and are classed as potentially acid sulphate (sulphidic), meaning they have the potential to become very strongly acid when exposed to air. Data from the National Peat Inventory in Cambridgeshire's Fenland in 1982–86 revealed that 30 per cent of the peat soils in 1,600 auger-bore records had an acid sulphate layer within 80 cm depth. These conditions are also common on the Norfolk Broads and the Waveney valley, but may be found in any low-lying peats which have organic marine sediments at depth.

As long as these pyrite-rich sediments remain waterlogged the pH remains near neutral. When the peats are drained or excavated, oxidation occurs and the pH falls to a value of around 4 or below. Under these conditions iron ochre is produced, heavily staining water and blocking drains. Also, as the pH falls aluminium becomes increasingly soluble and available to plants at levels that can be toxic to plants, fish and other aquatic organisms. Metal and concrete structures are also at risk of corrosion under these acid conditions.

Ochre in Fenland drains and watercourses © Rodney Burton

If lowland peat soils in soil associations or series identified as potentially acid sulphate are to be drained or excavated (for example for creation of wildlife ponds, landscaping or habitat translocation), a detailed soil survey with soil testing is essential. To detect soil material likely to acidify on exposure to air, the pH is measured when newly sampled (preferably in the field). A duplicate sample is retained and kept moist with distilled water for 1-3 months. A significant fall in pH over this period indicates that the soil material has a potential to acidify if drained or exposed.

Management of peat in stockpiles differs from that of mineral soils. Peat identified as potentially acid sulphate should be stored in an environment that will reduce or eliminate acidification, either by keeping it wet or covering it with impermeable sheeting. This will also protect it from irreversible drying and wind erosion. Any stockpiled organic soils are at risk from spontaneous combustion and should be monitored accordingly.

On the National Soil Map of England and Wales, soil in peats that are potentially acid sulphate (sulphidic) occur within the following associations:

1024a Adventurers' 1 **1024b** Adventurers' 2 **1025** Mendham

Individual soil series affected by this soil alert:

10.24 Adventurers' 10.24 Martin Mere 10.25 Mendham 10.25 Prickwillow

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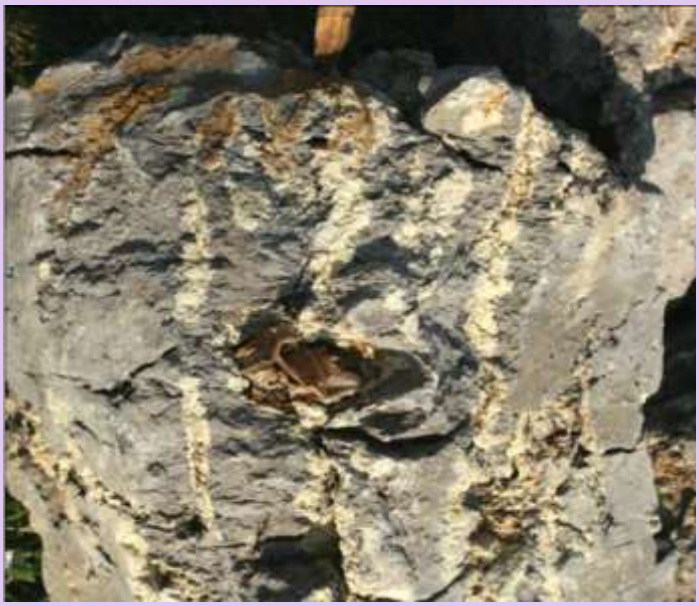
Potentially acid sulphate alluvial soils

The same phenomenon, with its associated problems, occurs where clayey marine alluvium contains iron pyrite. The Normoor series identifies soils which have already become acidified following drainage and these can be recognised by the presence of pale-yellow mottles composed of jarosite (hydrous sulphate of potassium and ferric iron) on ped faces and around voids.



Jarosite mottling © Rodney Burton)

The Normoor association is restricted to 60 km^2 in north Cambridgeshire on reclaimed clayey marine alluvium. These acid soils are not continuous and the association contains non-acid soils with a humose surface horizon (Downholland series) or non-humose clay soils (Wallasea series). Likewise, Normoor soils may occur sporadically within the Wallasea and Downholland associations. These may contain sufficient sulphide at depth to cause acidification and ochre formation if they are excavated. Therefore, it is advisable to dig pits and test the potential for acidification, as for peats (see above), if ponds, ditches or other excavations are planned. Where Normoor soils are identified by the presence of jarosite, the pH of the whole soil profile should be analysed, as long-term liming or exhaustion of the sulphide resource may have rendered the soil less acid.

Soils in marine alluvium that are already, or potentially, acid sulphate occur within these associations:

815	**Normoor**	**851a**	**Downholland 1**
813f	**Wallasea 1**	**851b**	**Downholland 2**
813g	**Wallasea 2**	**851c**	**Downholland 3**

Soil series in marine alluvium affected by this alert:

8.15 Normoor 8.13 Wallasea 8.51 Downholland

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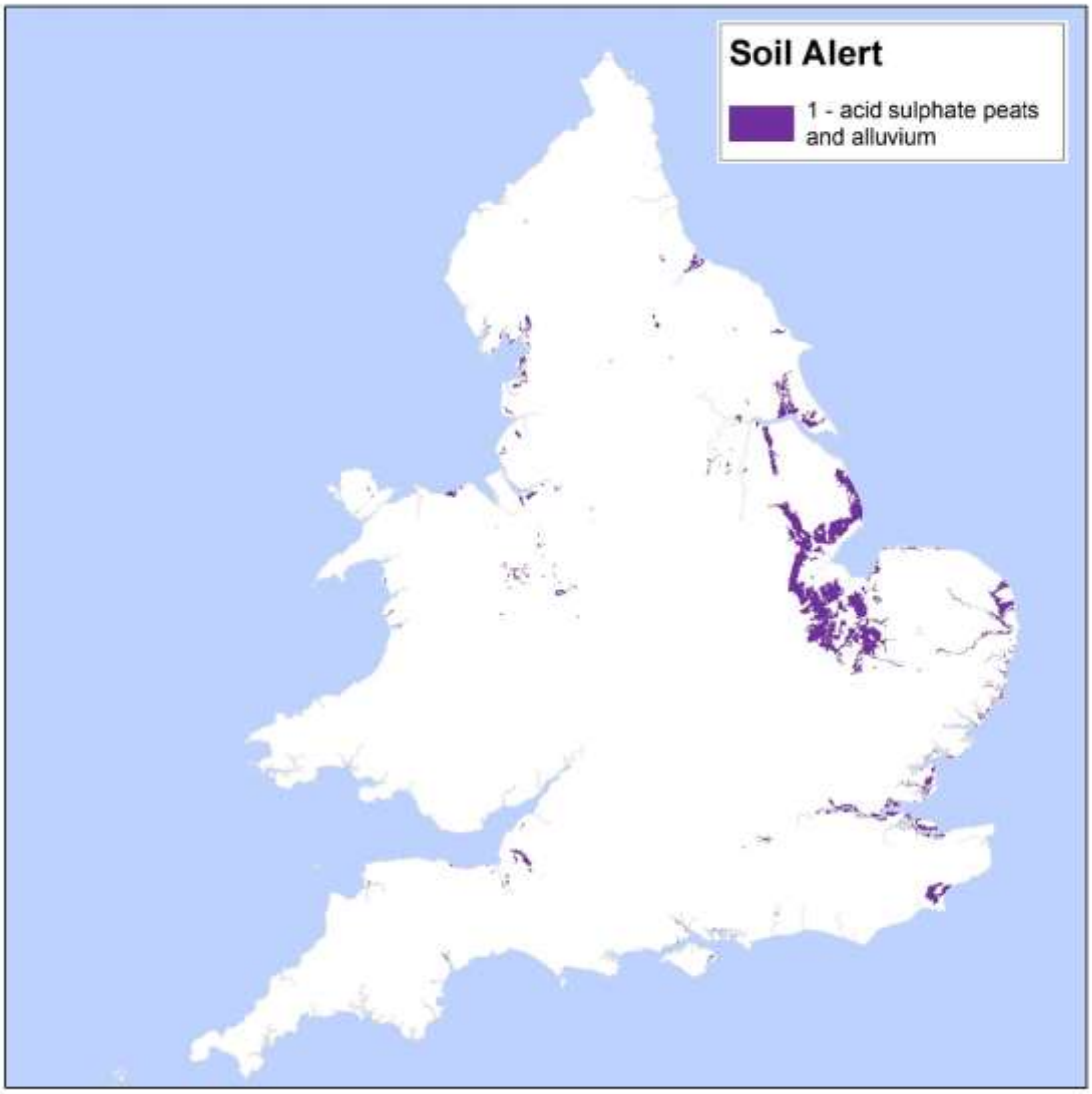

A useful reference for peat soils is Burton, R.G.O and Hodgson, J.M. (1980). *Lowland Peat in England and Wales*. Harpenden. This can be purchased from LandIS.

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