

OR/14/001 Technical information

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Dearden, R A, Tye, A M and Marchant, A. 2013. User Guide for the corroded Asset failure. *British Geological Survey Internal Report*, OR/14/001.

Pre-requisite requirements

To use the *Corroded Asset Failure — Ferrous* map, a computer with vector-based GIS software is required.

It is highly beneficial to have a topographic GIS layer. If unavailable, see the Ordnance Survey website (<http://www.ordnancesurvey.co.uk/>) for the provision of OpenData.

Creation of the dataset

The 'Ferrous_failure' dataset is directly derived from the datasets listed in Table 9. The polygons in the original datasets were reclassified with three attributes (e.g. see Tables 2 to 8) and neighbouring polygons with the same attribute were merged.

The summary map was developed to provide an overview of the relative potential for corroded assets to fail due to ground instability. To create this summary map, matrices were created for each hazard as shown (for example) in Table 10. For each hazard attribute, the susceptibility for ferrous asset failure was rated for each corrosivity rating. This provides an indication of the likelihood that an asset in a soil of X corrosivity will fail due to a hazard with a potential to occur of Y. If for example, a location had a moderate potential for corroded assets to fail due to swelling clays, and the ground conditions were unlikely to be corrosive, the susceptibility of corroded assets to fail due to swelling clay would be unlikely (although they could fail due to ground instability alone). Conversely, if at the same location, the ground conditions were likely to cause corrosion to iron, the susceptibility of corroded assets to fail given the swelling clay conditions would be moderate.

Table 10 The swelling clay-corrosivity matrix used in the creation of the summary map.

Corrosivity attribute		
Ground conditions beneath top soil unlikely to cause corrosion to iron	Ground conditions beneath top soil may cause corrosion to iron	Ground conditions beneath top soil are likely to cause corrosion to iron

	Corroded underground assets unlikely to fail due to shrink-swell clays as the ground has low plasticity.	Unlikely	Unlikely	Unlikely
Swelling clay hazard attribute	Low potential for corroded underground assets to fail due to this hazard. Medium plasticity shrink-swell clays present, but may not result in ground movement.	Unlikely	Low	Low
	Moderate potential for corroded underground assets to fail as high to very high plasticity shrink-swell clays are present, and likely to cause ground movement.	Unlikely	Low	Moderate

Six matrices were created for each of the six hazards considered. The summary map was generated by reporting the most susceptible rating from all matrices at any one location.

Scale

The *Corroded Asset Failure — Ferrous* map is produced for use at 1:50 000 scale providing 50 m ground resolution. The mapping scales on which the original geological linework are based are shown in Appendix 1.

Dataset history

BGS is strategically surveying and resurveying areas of Great Britain, improving and updating the geological maps. It is anticipated that a new version of the dataset will be released once a significant proportion of the underlying dataset has changed. This report describes the first version of the *Corroded Asset Failure — Ferrous* map, generated during 2013.

Coverage

The data covers Great Britain, but not the Isle of Man.

Data format

The *Corroded Asset Failure — Ferrous* map has been created as vector polygons, which are available in a range of GIS and CAD formats, including ArcGIS (.shp) and MapInfo (.tab).

Limitations

- The corrosivity element of the dataset considers the potential for geological units to produce conditions that are corrosive to buried ferrous assets. It does not consider the effect on pipes of corrosive liquids that may be transported by pipes.
- The *Corroded Asset Failure — Ferrous* map has been developed at 1:50 000 scale and must not be used at high resolution.
- The *Corroded Asset Failure — Ferrous* map is based on, and limited to, an interpretation of the records in the possession of the British Geological Survey at the time the dataset was created.
- The dataset is based on published data and expert judgement, but was not derived from data showing incidences of corroded ferrous asset failure as this was not available. BGS would be

interested in using such data to test and inform the methodology; please get in touch with enquiries@bgs.ac.uk if you would like to discuss this further.

- Where geological units comprise multiple lithologies, a precautionary approach is taken and the potential for corrosion and movement is based on the worse case.
- This dataset is not an alternative for a ground investigation.
- Site observations represent the properties of the ground more accurately than the data provided by the *Corroded Asset Failure — Ferrous* map.
- Other more specific and detailed ground instability information may be held by BGS, and an assessment of this could result in a different outcome.
- An indication of potential natural ground instability does not necessarily mean that a location will be affected by ground movement or subsidence. Such an assessment can only be made by inspection of the area by a qualified professional.

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