OR/14/001 What information does the dataset provide

From Earthwise

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.

Overview

This section describes the subsurface property datasets included in the *Corroded Asset Failure — Ferrous* map.

Summary map

The summary layer provides an overview of the susceptibility of corroded ferrous assets to fail due to ground movement. It is derived from the datasets described in Sections Corrosivity to Collapsible ground.

Corrosivity

The aggressiveness of the soil to ferrous assets depends on the soil characteristics. Corrosion is more likely to occur where some or all of the following conditions coexist:

- drainage is poor;
- low resistivity;
- pH is either low or high, and
- primary or secondary sulphides or sulphates are present

The corrosivity layer is based on the CIPRA ratings for assessing the corrosive properties of soils. It includes weighted scores for resistivity, soil alkalinity and acidity, moisture or the hydrological properties of parent materials, redox status, and the presence of sulphides/sulphates (Tye et al., 2011[1]).

This component data layer is derived from the BGS Corrosivity (ferrous) dataset. Information about the original dataset can be viewed at: http://www.bgs.ac.uk/products/geohazards/corrosivity.html.

Soluble rocks

Some types of ground contain layers of material that can dissolve in underground water. This can cause underground cavities to develop. The ground above cavities can collapse, resulting in subsidence. More commonly, changes in ground or surface water flow can flush away unconsolidated sediment, potentially leading to the collapse of overlying materials also leading to subsidence at the surface. If such subsidence occurs, the ground around underground assets can move causing corroded assets to fail. If the underground asset in question is a pipe containing liquid, leaking water can increase dissolution or flushing of unconsolidated sediments, leading to a potentially more significant hazard.

This component data layer is derived from the soluble rocks layer of the BGS GeoSure dataset. This

data layer has been reclassified to provide an indication of the potential for corroded ferrous assets to fail as a result of ground movement due to dissolution. Information about the original dataset can be viewed at: http://www.bgs.ac.uk/products/geosure/soluble.html.

Landslides

A landslide is an outward and downward movement of material on a slope, due to the force of gravity. A slope is under stress from gravity but will not move if its strength is greater than this stress. If the balance is altered so that the stress exceeds the strength, then movement will occur. If movement does occur, underground assets could be damaged resulting in failure of that asset. If the underground asset in question is a pipe containing liquid, leakage could alter the strength of the deposit, leading to a more significant subsidence hazard.

This component data layer is derived from the landslide layer of the BGS GeoSure dataset. This data layer has been reclassified to provide an indication of the potential for corroded ferrous assets to fail as a result of ground movement due to landslide. Information about the original dataset can be viewed at: http://www.bgs.ac.uk/products/geosure/landslides.html.

Landslide hazards present along the coastline may be under-represented in this dataset due to inaccuracies in the digital elevation model along the coastline.

Compressible ground

Many geological deposits contain water-filled pores. When the ground is compressed by a building or other load, the water in the pore space can be squeezed out, causing the ground to compress. This may cause uniform or non-uniform settling, resulting in tilting, cracking or distortion of underground assets, particularly if they are corroded. If the underground asset in question is a pipe containing liquid, leakage could alter the strength of the deposit, leading to more significant ground movement.

This component data layer is derived from the compressible ground layer of the BGS GeoSure dataset. This data layer has been reclassified to provide an indication of the potential for corroded ferrous assets to fail as a result of ground movement due to compressibility. Information about the original dataset can be viewed at: http://www.bgs.ac.uk/products/geosure/compressible.html.

Swelling clays

Clays that are susceptible to shrink and swell, change volume significantly according to how much water they contain. All clay deposits change volume as their water content varies, typically swelling in winter and shrinking in summer, but some do so to a greater extent than others. Contributory circumstances include the change in moisture content brought about by drought, leaking pipes, tree roots drying out the ground, or changes to local drainage patterns, such as the creation of soakaways. Shrinkage may remove the support from underground assets such as pipes or foundations, whereas clay expansion may lead to uplift or lateral stress on part or all of an asset; any such movement may cause cracking and distortion. If the asset in question is a pipe that leaks, the water added to the ground may cause additional swelling, possibly causing further differential uplift.

This component data layer is derived from the shrink-swell layer of the BGS GeoSure dataset. This data layer has been reclassified to provide an indication of the potential for corroded ferrous assets to fail as a result of ground movement due to swelling clay. Information about the original dataset can be viewed at: http://www.bgs.ac.uk/products/geosure/shrink_swell.html.

Running sands

Running sand conditions occur when loosely-packed sand, saturated with water, flows into an excavation or other type of void. The pressure of the water filling the spaces between the sand grains reduces the contact between the grains causing them to be carried along by the flow. This can lead to subsidence of the surrounding ground. Running sand can result in ground instability for underground assets in two ways; first, sand may run into a void removing the support from beneath an underground asset and secondly if a failed pipeline asset is leaking, the flow of water may cause sands to flow, thereby resulting in subsidence of surrounding ground.

This component data layer is derived from the running sand layer of the BGS GeoSure dataset. This data layer has been reclassified to provide an indication of the potential for corroded ferrous assets to fail as a result of ground movement due to running sand. Information about the original dataset can be viewed at: http://www.bgs.ac.uk/products/geosure/running_sand.html.

Collapsible ground

Collapsible ground comprises certain fine-grained materials with large pore spaces. Such deposits can collapse when they have been loaded and then become saturated by water. If the ground below a building collapses it may cause the building to sink. If the collapsible ground is variable in thickness or distribution, structures may suffer from distortion, tilting or cracking. Underground assets may be affected by such movement, particularly where corroded. If the underground asset in question is a pipeline that leaks, the additional water may accentuate the ground stability issue resulting in more widespread breakages.

This component data layer is derived from the collapsible ground layer in the BGS GeoSure dataset. This data layer has been reclassified to provide an indication of the potential for corroded ferrous assets to fail as a result of ground movement due to collapsible ground. Information about the original dataset can be viewed at: http://www.bgs.ac.uk/products/geosure/collapsible.html.

Data summary

The original datasets used in the creation of the *Corroded Asset Failure — Ferrous* map are detailed in Table 9.

Table 9   Details of the original datasets used in the
Corroded Asset Failure — Ferrous map.

Data layer	Layer ID	Original dataset	Dataset owner	Scale
Summary	Summary	N/A	BGS	1:50 000
Corrosivity	Corrosiv	Corrosivity v1	BGS	1:50 000
Soluble rocks	Soluble	GeoSure v6	BGS	1:50 000
Landslides	Lndslides	GeoSure v6	BGS	1:50 000
Compressible ground	Compress	GeoSure v6	BGS	1:50 000
Swelling clay	Swell	GeoSure v6	BGS	1:50 000
Running sand	Runsand	GeoSure v6	BGS	1:50 000
Collapsible ground	Collapse	GeoSure v6	BGS	1:50 000

Reference

1. ↑ Tye et al. 2011. User guide for the British Geological Survey Corrosivity (ferrous) dataset. *British Geological Survey. Open Report* OR/11/023

Retrieved from 'http://earthwise.bgs.ac.uk/index.php?title=OR/14/001_What_information_does_the_dataset_provide&oldid=54522'
Category:

- OR/14/001 User Guide for the Corroded Asset Failure – Ferrous map

- This page was last modified on 19 October 2021, at 09:29.