BRITISH SOCIETY OF SOIL SCIENCE

GUIDANCE DOCUMENT 5

# Soils and Land Quality: How to find online maps and data sets

A practical guide to accessing and using online maps and data sets for soils, land quality and land use across the UK, for rural professionals, consultants, land managers and decision makers.

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## 1. Introduction

The purpose of this Guidance Note is to advise soil specialists, agricultural and environmental consultants and rural practitioners (land agents and agricultural valuers) on how they can best obtain and make use of available information on soils and agricultural land quality.

Some readers may have taken modules in soils and land evaluation at college and so will have some grounding in the subject, but it is assumed here that not all will have had sufficient training and practice in soil and land classification to carry out their own surveys at a professional level.

For planning applications involving agricultural land in all parts of the UK there are statutory requirements to protect the best quality agricultural land, and supporting evidence on land quality may have to be produced with an application[1]. Likewise, The Design Manual for Roads and Bridges (DMRB)[2] is the basis of environmental impact assessments (EIAs) for infrastructure projects and the latest revision states that soil resource and/or land capability surveys should be undertaken to inform the baseline scenario.

For farmers or investors buying or renting farmland it is common sense for them or their agent to seek information on its quality.

The Guidance Note has undergone substantial revision since it was first published in 2020. This is mainly in response to the Land Use Framework, published in March 2026[3]. The Framework specifically commits to improving access to high-quality data to tackle a broad range of environmental challenges. Following a collaborative effort by Defra and Cranfield University to make our most comprehensive soils datasets publicly available, the National Soil Map for England and Wales (NATMAP) and a range of additional LandIS (Land Information System) datasets are now openly accessible to all through a new public LandIS Portal (see 3.1). Alongside this, Defra has published an updated version of the Agricultural Land Classification (ALC) map for England and Wales (see 2.1).

The aim, here, is to provide an understanding of the subject areas and give directions on how to obtain published information and seek professional assistance when necessary. The first section deals with ALC, as this is the short cut to understanding the agricultural quality of a piece of land and is the most commonly required data set. The next section deals with soil maps, as these are the foundation of ALC and are useful for those seeking more detail about a piece of land. A third section describes online maps and databases that identify potentially contaminated land.

Subsequent sections cover precision farming and circumstances when more detailed and specialised information might be needed. For example: where a farm that is for sale or rent, where a planning application affects agricultural land, or where land may need to be restored for farming following mineral extraction. In all cases, expert assistance may have to be obtained from specialists, such as soil scientists, who carry appropriate professional indemnity for the expert advice they provide. Guidance is provided on how such advice can be obtained and examples are given of situations where information on soils and land quality has been deployed effectively. Final sections provide details of BSSS training courses and some suggested further reading.

[1] https://www.gov.uk/government/publications/agricultural-land-assess-proposals-for-development/guide-to-assessing-development-proposals-on-agricultural-land

[2] HM Government (2019), Design Manual for Roads and Bridges (2019), *LA09 Geology and Soils* https://standardsforhighways.co.uk/dmrb/

[3] Land Use Framework - GOV.UK

All references were viewed and checked in June 2026. A full reference is given for documents that are also published in hard copy, but only a hyperlink is provided where the referenced material exists online.

## 2. Agricultural Land Classification – Sources of Information

### 2.1 Agricultural Land Classification – England

The National Planning Policy Framework (NPPF)[4] requires that local government seeks to protect and preserve best and most versatile (BMV) agricultural land.

For planning applications affecting BMV land, specific consultations with Natural England are required under the Development Management Procedure Order and the Town and Country Planning Act (1990) Schedule 5 – *Conditions relating to Mineral Working*[5]. These are for non-agricultural development proposals that are not consistent with an adopted local plan and involve the loss of 20 hectares or more BMV land (or land of any area or quality in relation to mineral extraction). Further advice for local Planning Authorities regarding validity of submitted ALC maps can be found in the British Society of Soil Science Guidance Document 1[6].

Provisional ALC maps published by the Ministry of Agriculture Fisheries and Food (MAFF) in the 1960's were widely used until very recently. The scale was 1:63,360 (one inch to one mile) and they covered the whole of England and Wales and were intended for strategic planning purposes[7]. These maps grade land according to the severity of environmental constraints on agricultural production, taking into account such factors as soil, gradient, rainfall and altitude. There are five grades, the best being Grade 1, which is land with only very minor limitations, typified by Lincolnshire silt soils. Grade 5 land, with very severe limitations, includes, for example, moorland rough grazing in the south west of England.

The ALC system was revised by MAFF in 1988, and updated by Defra in 2025, dividing Grade 3 into Subgrades 3a and 3b. Land in Grades 1, 2 and Subgrade 3a later became classed as BMV[8].

Defra's MAGIC contains numerous detailed maps and reports on land affected by planning proposals, carried out between 1988 and 1999[9]. These were commissioned by MAFF and Defra and use the revised classification system that identifies Subgrades 3a and 3b. The accompanying reports and soil profile data (where available) can be obtained by clicking the 'identify' ( **i** ) icon in the toolbar at the top of the page and then clicking inside the post 1988 ALC survey of interest. This should open an information box, where there is a hyperlink to the ALC report and data at the bottom. Alternatively, the accompanying reports and detailed ALC maps are available in portable document format (pdf) on Natural England's Access to Evidence website[10].

[4] Ministry of Housing, Communities and Local Government (updated 2025) *National Planning Policy Framework.* https://www.gov.uk/government/publications/national-planning-policy-framework--2

[5] Town and Country Planning Act (1990), Schedule 5, *Conditions relating to Mineral Working* https://www.legislation.gov.uk/ukpga/1990/8/schedule/5

[6] https://soils.org.uk/wp-content/uploads/2022/02/Assessing-Agricultural-Land-Jan-2022.pdf

[7] https://publications.naturalengland.org.uk/category/5954148537204736

[8] https://publications.naturalengland.org.uk/publication/6257050620264448

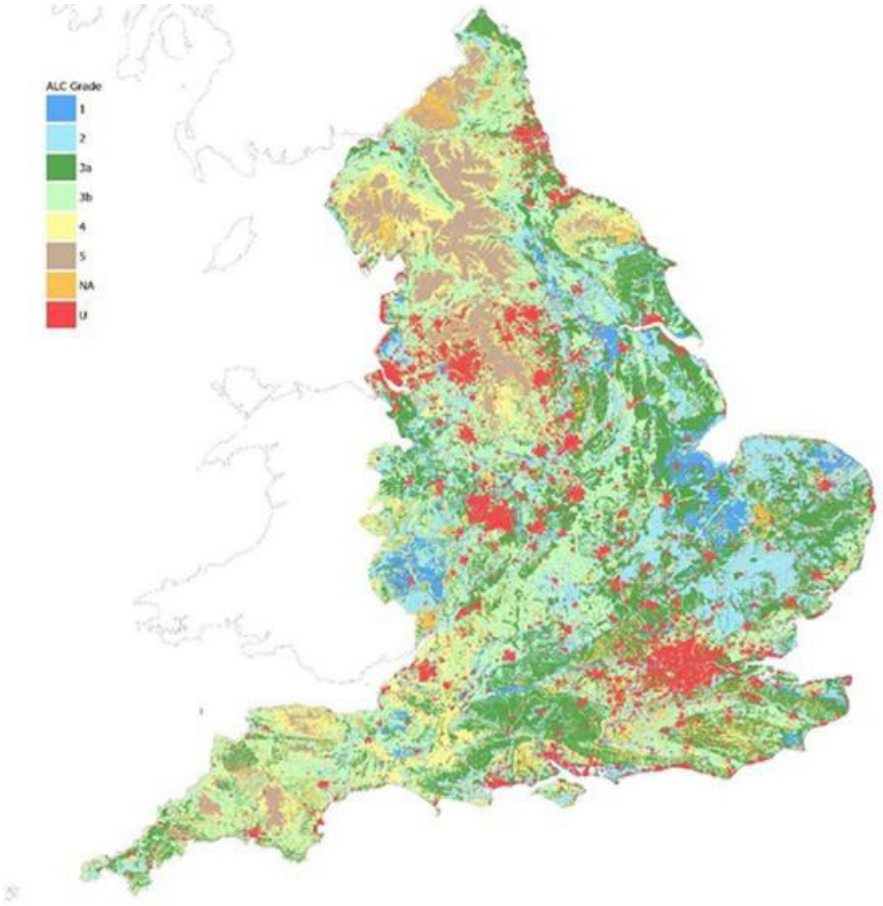
[9] https://magic.defra.gov.uk/

[10] https://publications.naturalengland.org.uk/category/5735244522061824

Natural England has also published online *Likelihood of Best and Most Versatile Agricultural Land* strategic scale (1:250,000) maps which predict the likelihood of ALC Grades 1, 2 and 3a[11]. The maps are intended for strategic planning purposes only and are not suitable for use below 1:250,000[12].

The Provisional ALC maps were reissued in the late 1980's at a 1:250,000 scale (quarter inch to the mile) to better reflect their originally intended strategic use and are still available online within Natural England's Access to Evidence website[13], but only for historical reference. A new Predictive ALC map was produced for England by Defra in 2026, has been published on Natural England's Access to Evidence website[14] and should be used in place of the provisional maps. The new map is also intended for strategic purposes only, and was compiled using soil data from LandIS (Cranfield University) covering 764 soil series and their properties relevant to ALC criteria, combined with 30-year climate data from the Met Office.

Information on the application of these maps for planning applications is provided in 7.3.




**Predictive ALC Map for England**

[11] https://publications.naturalengland.org.uk/category/5208993007403008

[12] Stratmapexplannote 2015 A2E Catalogue version 2017 (3).pdf

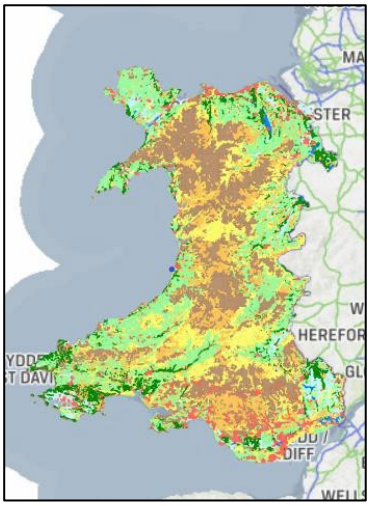
[13] Natural England Access to Evidence - Regional Agricultural Land Classification Maps

[14] https://publications.naturalengland.org.uk/publication/6257050620264448

## 2.2 Agricultural Land Classification – Wales

The Welsh ALC system is the same as England's and the management of soil and ALC maps and data in Wales is the responsibility of the Land Quality Advisory Service (LQAS) of the Welsh Government[15].

Planning Policy Wales (Edition 12, February 2024) provides strong protection for BMV land with paragraphs 3.58 and 3.59 giving strict conditions under which such land can be developed[16].



The Welsh Government have developed a powerful and useful online tool called *The Predictive ALC Map for Wales*[17], using Defra's 2025 classification guidelines[8]**.** It is based on published soil maps, combined with topographic and climatic data. In addition to predicting the ALC grade, LQAS have published a map[18] to show where detailed ALC surveys have been undertaken, and validated survey reports can be requested from the LQAS using the relevant survey reference number. The published guidance note[19] should be used in conjunction with the predictive map.

For planning applications, where the Predictive ALC Map identifies land in Grades 1, 2 or 3a (i.e. BMV), a detailed survey will be required to determine which grades are actually present and in what proportion.

The LQAS will provide advice on survey requirements and validate ALC surveys for Local Planning Authorities, developers or surveyors free of charge on request.

## 2.3 Land Capability for Agriculture - Scotland

Scotland has a different classification system from that of England and Wales, termed the Land Capability for Agriculture (LCA)[20]. It recognises seven Classes of land, of which four are subdivided to create a total of 13 Classes and Divisions. Class 1 identifies land with the greatest potential flexibility of use and Class 7 is land of very limited agricultural value. Prime Quality agricultural land is the equivalent designation to England and Wales' BMV and comprises land in Classes 1, 2 or 3.1. The Scottish Government's National Planning Framework 4 provides continuing protection for agricultural land, as well as other important soil resources, such as carbon-rich soils and peatland[21].

LCA maps, in hard copy, are available from the James Hutton Institute (incorporating the former Macaulay Land Use Research Institute)[22]. These hard copy maps are available at two scales:

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[15] Agricultural land classification: enquiries | GOV.WALES

[16] Welsh Government (2024), *Planning Policy Wales* Planning policy Wales | GOV.WALES

[17] Agricultural land classification: predictive map | GOV.WALES

[18] Post 1988 Agricultural Land Classification (Wales) Surveys | DataMapWales

[19] Agricultural land classification: predictive map guidance | GOV.WALES

[20] Bibby, J.S, Douglas, H.A, Thomasson, A.J. and Robertson, J.S. (1982), *Land capability classification for agriculture.* Macaulay Institute for Soil Research LAND-CAPABILITY-CLASSIFICATION-FOR-AGRICULTURE.pdf and an accompanying map of climatic limitations at hutton.ac.uk/sites/default/files/files/soils/LCA_Climatic_Conditions_1982.jpg

[21] Scottish Government National Panning Framework 4 (2023) National Planning Framework 4 - gov.scot

[22] https://www.hutton.ac.uk/land-capability-for-agriculture-lca/

1:250,000 reconnaissance scale maps that cover the whole country in seven sheets and a more detailed scale of 1:50,000 which covers most of the cultivated land. Guidance on the use of the maps states that 'Where it exists the 1:50,000 scale map information is seen as the definitive mapped assessment' and should take precedent over the less detailed 1:250 000 scale maps[23]. Apart from the improvement in scale, the 1:50,000 scale LCA maps were derived by field inspection while the National scale map was largely derived from desk studies.

Digital versions of these maps ('National Scale' and 'Partial Cover') can be viewed online or downloaded in a GIS format free on the James Hutton Soil maps website[23].

### 2.4 Agricultural Land Classification – Northern Ireland

There are no published ALC maps for Northern Ireland apart from a very generalised, small-scale map (Fig 9D.1) within *Soil and Environment: Northern Ireland* (Cruickshank et al 1997)[24]. The ALC system is essentially the same as that of England and Wales[7], subdividing Grades 3 into A and B (but here, capitalised), with Grades 1, 2 and 3A being classed as BMV. In the absence of ALC maps, the classification for a specific piece of land has to be applied by the user to the published soil maps (see 3.3, below), or by ordering a report from the Agri-Food and Business Sciences Institute (AFBI)[25], for which there may be a charge.

Policies for the protection of agricultural land and consultation on rural planning matters are the responsibility of the Department of Agriculture, Environment and Rural Affairs.

## 3. Soils - Sources of Information

Soil maps and their accompanying books are a useful resource for anyone wishing to understand more about the properties of a particular piece of agricultural land than is obtainable from ALC maps. In particular, they can assist with the assessment of the suitability of land for a change of use or in gaining an understanding of problems in productivity. As such, they are often consulted by surveyors and valuers at point of sale or in rent negotiations. For EIAs concerning agricultural land, soil information is a fundamental part of the baseline data set.

### 3.1 Soil Maps – England and Wales

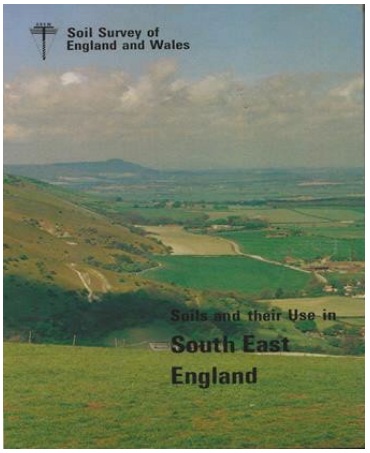
Soil mapping in England and Wales, using a national classification system, began before the Second World War, and the preparation and publication of new maps ceased in the 1990s. The Soil Survey of England and Wales (SSEW) were taken over by Cranfield University in 1987, becoming the Soil Survey and Land Research Centre (SSLRC). It is still based at Cranfield within The Centre for Soil, Agrifood and Biosciences (SABS), where its work is now focused on research into environmental

[23] Soil maps - James Hutton Institute

[24] Cruickshank J.G. (ed), (1997). *Soil and Environment: Northern Ireland*. Agricultural and Environmental Science Division, DANI and the Queens University of Belfast.

[25] https://www.afbini.gov.uk/article/soil-maps-and-soil-survey

issues of soil properties and management, rather than soil mapping




The whole of England and Wales is covered by the National Soil Map (NatMap) comprising six soil maps at a scale of 1:250,000, showing soil *associations* that contain a number of component *series* (see below), usually in a specified relationship according to geology and topography. Accompanying Regional Bulletins entitled *Soils and their Use in Wales/Northern England/Midland and Western England/South West England/ Eastern England/South East England* provide much useful information on soil properties and their suitability for a range of uses and management.

The digital version of NatMap has now been "unlocked" by Defra, providing free and unrestricted access through Cranfield's LandIS Portal[26].

As well as NatMap, this Portal provides links to point data, soil series definitions, the National Soil Inventory and detailed maps. The links below are not live, as they can only be opened on the LandIS portal after opening a free account.


Point data

Soil Series definitions


National Soil Map


National Soil Inventory - NSI


Detailed Map Outlines

**Point data** contains 150,000 auger records which are downloadable. Caution should be used in using these for ALC purposes as the Soil Survey of England and Wales did not differentiate medium and heavy clay loam in hand texturing.

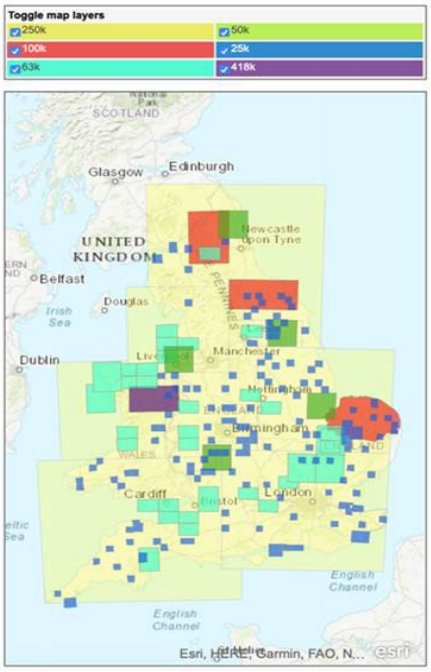
**Soil series definitions** provide a tabular summary and a link to the full descriptions in the LandIS Soils Guide[27]. The guide also provides definitions of soil associations, Soilscapes (see below) and the World Reference Base.

**National Soil Inventory (NSI)** is a set of point data covering England and Wales on a 5 km grid and provides detailed information for each intersect of the grid. Collectively, NSI data are statistically representative of the soils of England and Wales and they offer a valuable foundation for future monitoring of soil quality. The original sampling was from around 1980 and partial resampling took place in the mid-1990s.

**The Detailed Map Outlines** link identifies the locations of detailed mapping, including published soil maps and other unpublished detailed surveys such as individual farm maps, although these are not downloadable here and have to be purchased from LandIS.

[26] https://portal.landis.org.uk/

[27] LandIS - Land Information System - Soils guide




The soil maps of England and Wales are accompanied by books, variously called Memoirs, Records, Special Surveys or Bulletins, and contain a wealth of information on the soils in their landscape setting. They can be purchased through LandIS[28] or from online bookshops and some are digitised and downloadable. Another useful publication is the Soil Survey Field Handbook which provides a methodology and terminology for describing soils in the field[29].

The more detailed maps (1:10,000 to 1:63,360 scale) show the *soil series* as the basic map unit. A series consists of soils with similar profile characteristics (layering, texture, natural drainage, depth, organic matter content etc) and formed from similar geological parent materials and which, in a similar climate, can be expected to have the same management characteristics. Series are given the name of the place in which they were first recognised or are extensive. For example, the Fladbury series identifies a wet alluvial clay first recognised in the Vale of Evesham.

A *phase* may be used to subdivide a series to emphasise a local characteristic, such as topsoil stoniness, that is likely to have special management implications.

The Soils Guide also contains definitions of Soilscapes. It is an easy-to-understand classification of soils used to describe the soils of England and Wales only. Soilscapes conveys a summary of the broad regional differences in the soil landscapes of England and Wales and is not intended as a means for supporting detailed assessments, such as planning applications or site investigations; nor should it be used to support commercial activities.

The LandIS Portal contains a simplified version of NatMap called the NatMap/Soilscapes Explorer where one can search for a location and a summary will appear of the soil association, Soilscapes classification, main soil characteristics and other features such as carbon, erosion risk, fertility, habitats and drainage.

The ***Soils Site Reporter***[30] is a purchasable online soil reporting tool which produces site-specific soils information with maps and soil descriptions. Each report, downloadable in pdf format, provides detailed information on the expected soil conditions at the site and outlines interpretations of suitability for different uses. A variety of environmental issues, such as the potential of damaging ground movement or pipe corrosion and the ease with which chemicals can leach into groundwater or run off into rivers, are also included.


[28] LandIS - Land Information System - Paper Publications

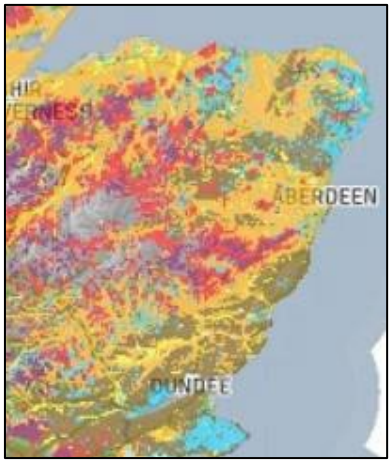
[29] Hodgson, J.M. (ed.) (1997). *Soil Survey Field Handbook*. Technical Monograph No. 5. Soil Survey and Land Research Centre, Silsoe.

[30] Soil Site Reports - Homepage

Other purchasable reports are also available on the Soil Sites Reporter page, including LEACS (Leakage Assessment from Corrosivity and Shrinkage), which is an environment management information system for the water and utility sector, and NPD (Natural Perils Directory), which provides geohazard assessments to the insurance and finance sector, local government and utility companies.

**Soil Alerts for the Sustainable Management of Soil** are another useful tool on LandIS[31]. Soil alerts are designed to draw attention to soil features that could significantly influence project outcomes, such as in construction, land restoration, or habitat translocation. They are linked to soil associations and series and provide guidance for land managers, engineers, and environmental practitioners who may not be trained soil scientists but need to understand key soil properties.

## 3.2 Soil Maps - Scotland




As in England and Wales, the Soil Survey of Scotland began mapping in 1938 and by 1947 was charged with the systematic mapping of Scotland's soil resource. Survey work effectively came to an end in 1986. By then, approximately 95 percent of the cultivated land in Scotland was mapped in the field at 1:25,000 scale, to be published mainly at 1:63,360, but with some maps published at 1:50,000 and 1:25 000 scales. The whole country is mapped at a reconnaissance scale of 1:250,000[32].

Paper versions, with accompanying books (Memoirs), can be purchased from the James Hutton Institute[23]. Digital versions of the soil maps in GIS format (digitised from both 1:250 000 and 1:25,000 scale maps) can be downloaded free of charge from the Institute[33]. Digital versions and accompanying Memoirs are also available to view and download from the Scotland's soils website[34]. Scanned copies of the original paper maps can be viewed at the National Library of Scotland's website[35].

Online information on certain soil properties is available on the James Hutton Institute's SoilFinder[36], in which the user is able to select a range of soil properties for a specific soil type and choose whether to display results for cultivated or semi-natural soils. The Soil Finder app is available for both Apple and Android devices[37].

The Scottish classification also employs Associations and Series, but maps at 1: 250,000 scale show landform units with component soils grouped by Associations. It is worth noting that the concept of *Soil Association* differs between Scotland and the rest of the UK in that it is based on the geological origins of the parent material, thus, for example, all soils derived from Quartzite parent materials belong to the Durnhill Association.

[31] LandIS - Land Information System - Soil Alerts

[32] 183151002_Mapping_Scotlands_Soil_Resources.pdf

[33] Soil maps - James Hutton Institute

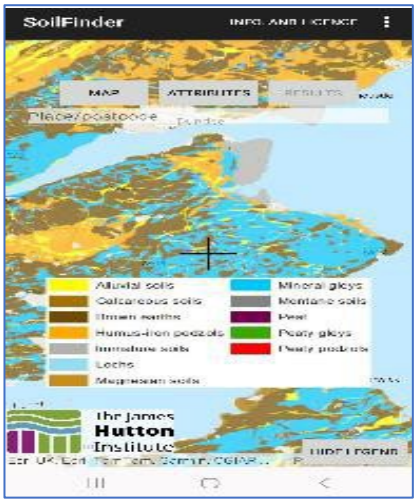
[34] Soil maps | Scotland's soils

[35] Soil Survey of Scotland, 1950s-1980s - One-Inch to the mile / 1:50,000 - National Library of Scotland

[36] SoilFinder - The James Hutton Institute | Science connecting land and people

[37] Soil Finder App - App Store and SoilFinder (Scotland) - Apps on Google Play

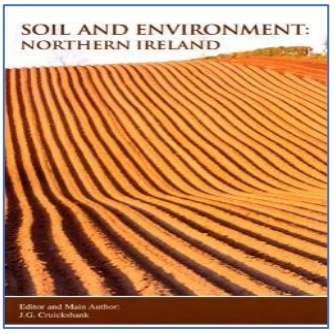
The *soil series* is very similar in concept to that of England and Wales being defined as '*a set of soils derived from the same or similar parent materials under the same conditions of formation and thus having a similar sequence of soil horizons'*, as are *phases*. The Scottish soil classification was revised in 2013 so the earlier paper maps still show the older classification while the digital dataset uses the latest classification.




**A screenshot of a soil map from James Hutton's Soil**

## 3.3 Soil Maps – Northern Ireland

The whole of Northern Ireland has been mapped at a scale of 1:50,000 and, in addition, there is a 1:250,000 scale map of the province. The paper and digital versions of these maps can be purchased from the Agri-Food and Biosciences Institute (AFBI)[25].




## 4. Land Contamination – Sources of Information

Land contamination can pose risks to land users, the environment and property (collectively referred to as receptors). Regardless of how the land has come to be contaminated, it is a legal requirement to actively take steps to remove or at least reduce risks of significant harm occurring to receptors from contamination. Contamination can be present in soil, water and ground gas.

Without carrying out a ground investigation there is no certain way of confirming whether the land is contaminated beyond an unacceptable level and even then, it is not possible to declare a site completely free of contamination.

The assessment of risks requires a complex model, which establishes potential linkages between the various receptors and contaminants – meaning that formal decisions should only be made in consultation with a qualified person. In order to meet standards for a full contaminated land assessment, detailed information must be purchased from recognised institutions.

However, there are ways to identify how **likely** it is that contamination is present or absent at a site, and many useful and freely available sources of information are described in this section. Although numerous factors must be considered, a desk-based screening exercise should be able to identify potentially significant issues.

## 4.1 Land contamination – England and Wales

Scanned copies of historical trade directories maintained by the University of Leicester's Special Collections Online can provide information on potentially contaminative former land uses on the site or nearby (such as industrial sites, blacksmiths, garages etc) since the records began[38]. The Francis Frith collection website[39] contains historical maps and photographs which may display some of these land uses and help put them into perspective. Historical aerial photography accessible on Google Earth Pro[40] (available to download free) can also help identify potentially contaminative former land uses. Roadnames will often provide clues (e.g. Old Gravel Pit Lane could suggest the presence of a former pit, perhaps infilled with waste). Google Maps can help in the identification of present-day potentially contaminative land uses in the vicinity of the site.

Local authorities have a duty to strategically identify all known/registered contaminated sites within their boundary and so, by the Freedom of Information Act, information can be requested directly from the local authority. Requests for information on local pollution incidents, landfills, environmental permits and some relevant licenses can also be made in writing to the Environment Agency[41].

The Groundsure Envirodata viewer interactive map[42] displays locations of authorised landfills and registered historical landfills that are capable of generating harmful concentrations of ground gas and leachable contaminants. Groundsure also provides data on per-and poly-fluoroalkyl substances (PFAS): a large group of synthetic chemicals often referred to as "forever chemicals" associated with airports, military land, fire stations, chemical sites, wastewater treatment plants, landfills, incinerators, and industries such as paint and plastic manufacturing.

[38] Historical Directories of England & Wales - Special Collections

[39] Francis Frith: Old Photos, Maps, Books and Gifts

[40] Earth Versions – Google Earth

[41] Environment Agency - GOV.UK

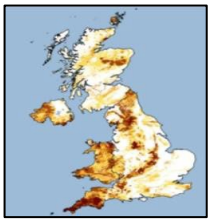
[42] Groundsure

Below, is a screenshot of a Groundsure map showing landfill sites near Redruth in Cornwall.


Details of some previous ground investigations are publicly available to view on the British Geological Survey website[43]. Subsurface conditions are described in detail on the historical exploratory hole logs which will often include descriptions of visual or olfactory signs of contamination if they were encountered. It is useful to note, if these are detailed on the logs, any permeable geological layers, as these could provide pathways of contamination to deeper groundwater. Groundwater strikes are significant, as groundwater is considered to be an environmental receptor.

Local authority online planning portals may also contain ground investigation results within documents submitted as part of previous planning applications for the site or nearby land. The portal can be consulted directly, as it is different from the information request to the authority described above.

If the site is close to a historical wartime strategic target (Luftwaffe target, decoy site etc), unexploded bombs could be a risk, particularly if ground disturbance is anticipated on the site. A free unexploded bomb risk map of the region can be downloaded from the Zetica website[44].



Radon is restricted to certain geological formations, such as the granites of Devon and Cornwall, and Northampton Ironstone, and needs to be considered when constructing an enclosed living or working space in affected areas. Public Health England provides an indicative atlas of radon levels (right)[45].

Finally, potential sources of contamination are not always on record and although locations such as farmland may look 'clean and natural', accumulated years of dumping, burning or burial of wastes or the use of pesticides and insecticides may have provided a legacy of contamination. Spores of

[43] Geology of Britain viewer - British Geological Survey

[44] Risk Maps | Zetica UXO

[45] UKradon - UK maps of radon

anthrax, a fatal disease of cattle, are able to survive in buried carcases and surrounding soils for up to 48 years. Such sources of contamination are very unlikely to be present on every farm, but it is important to consider the possibility.

The easily identifiable receptors are people and animals that use the site and the surrounding land, or people and animals that will use the site if there are intentions to change its use. Defra's MAGIC Map Application website[9] provides an interactive map that displays a variety of published data and is particularly relevant for identifying other receptors. Sensitive receptors on or close to the site could include groundwater Source Protection Zones, surface water bodies, sites of designated environmental interest and listed buildings.

## 4.2 Land contamination – Scotland

Many of the sources of information listed above also provide data for Scotland. Below are a few additional resources. Scanned copies of historical trade directories are maintained by the National Library of Scotland[46] and can be accessed online.

The Freedom of Information (Scotland) Act is applicable for requesting available information. Requests for information on local pollution incidents, landfills, environmental permits and some relevant licences can be made in writing to the Scottish Environment Protection Agency[47] or viewed on their Data Publication webpage[48]. Scotland's environment web map displays various features which may display possible receptors on or within the vicinity of the site[49].

## 4.3 Land contamination – Northern Ireland

Many of the sources of information listed earlier in this section also provide data for Northern Ireland. Below are a few additional sources which provide detail for sites located there.

Trade directories for the years 1819 to 1900 are available online at the Public Records Office of Northern Ireland[50]. Regional trade directories for years after this time can be found at the National Library of Ireland and the National Archives of Ireland[51,52]. The Public Record Office of Northern Ireland Historical maps website displays various illustrations which could identify historical land uses on a site or within its vicinity[53].

The Department of Agriculture, Environment and Rural Affairs (Daera) provide a database which holds records of previously industrial land uses on sites and has been recently updated to include information on waste management sites and locations of pollution incidents[54].

[46] National Library of Scotland (2012), *Scottish Post Office Directories* Scottish Post Office directories - National Library of Scotland

[47] Access to information | Beta | SEPA | Scottish Environment Protection Agency

[48] Scottish Environment Protection Agency, *SEPA Data Publication* Environmental data | Scottish Environment Protection Agency (SEPA)

[49] Scotlands environment map | Scotland's environment web

[50] Public Record Office for Northern Ireland | nidirect

[51] National Library of Ireland | National Library of Ireland

[52] The National Archives of Ireland

[53] PRONI Historical Maps Viewer | The Public Record Office of Northern Ireland

[54] Historical Landuse | Department of Agriculture, Environment and Rural Affairs

Geological data and maps are available to view on the Geological Survey Ireland website[55] and the Geological Survey of Northern Ireland website[56]. The Northern Ireland planning portal[57] provides a map search tool to browse planning applications for reports on ground investigation which may have been carried out on a site or in its vicinity. To identify potential receptors at the site or in its vicinity, information can be viewed on Daera's interactive map for Northern Ireland[58].

## 5. Uses of Agricultural Land Classification and Soil Maps

Readers of this section should be aware that published ALC maps are intended for planning purposes and not for land and rent valuations.

By way of example, the Welsh Government guidance on using the Predictive ALC Map states, *The Predictive Agricultural Land Classification Map has not been designed for, and the Welsh Government does not approve of, the following uses: valuing agricultural land; assigning agricultural rents; and, allocating financial support*[19].

However, the use of these maps for such purposes has become so widespread that the aim here is to advise land agents and valuers of the limitations of these maps and demonstrate how corroborative information should be sought from published or commissioned soil surveys.

### 5.1 Land sales

In recent years it has become common practice for farm sales' particulars to contain information on soils, taken from the 1:250,000 scale National Soil Map. Almost always, too, there is information on the grade of land taken from ALC/LCA maps. Often, however, only a minimum of information is provided; sometimes no more than, *"The farm comprises Grade 2 land with soils of the Downholland and Peacock associations."* Such information is very sparse, considering that the productive potential of the farm depends, to a large extent, on the quality of its soils. Closer reading of the information that comes with the National Soil Map enables a more complete and informative summary to be made. For example, *"The farm comprises Grade 2 land on the fen and fen-edge. The Downholland association soils on the fen have a peaty topsoil over clay, while the Peacock association on the gently sloping fen-edge comprises a humose topsoil over heavy loam and clay. All the land is under-drained and well suited to combinable crop rotations, and the fen soils provide good yields of root crops and vegetables."* In terms of professional indemnity, it is safe to provide this level of information, as it is taken from citable publications, and so is more than just the opinion of an individual practitioner.

Care does need to be taken, though, when quoting from these publications. For example, a recent sales' particulars said only that the soils of an irrigated sand-land farm in the Midlands were of the 541a Milford association. Anyone looking this up would have been surprised to discover Milford soils are shallow red loams over hard rock and confined to hills of Devon and Wales where they are described as best suited to pasture. The estate agent had not noticed that the suffix 'a' to 541 on the map legend was in reality 'A', and the soils were the Bearsted association of deep sands and loamy sands, well

[55] https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx

[56] GSNI - British Geological Survey

[57] Northern Ireland Public Register

[58] Natural Environment Map Viewer | Department of Agriculture, Environment and Rural Affairs

suited to horticultural and root crops. An example of the successful use of soil information in a farm sales particular is given in Section 7.2.

## 5.2 Land purchase

Land classification and soil maps can assist a practitioner who is advising a purchaser on the suitability of farmland for its intended use, whether for investment or in-hand farming. In particular, in England and Wales the Landis *Soils Site Reporter*[28] will pull together a great deal of local data in a concise and readable report. For Northern Ireland such information is not yet available online and would have to be commissioned from AFBI[25]. For Scotland most of the information is online but not packaged as a 'soil reporter', and the user would need to make their own interpretation from the soil and LCA maps on the James Hutton Soil maps website[23].

If the grade of land is of concern to the purchaser, and detailed surveys of the area in question are not available (such as on MAGIC[9] in England), then there is little option but to engage a specialist who can examine available soil, topographic and climatic information and assess the quality according to the ALC classification in England and Wales, or the Scottish and Northern Ireland systems. The specialist will need to visit the farm to make observations with a soil auger and spade. Information on how to find a specialist with the relevant expertise is contained in Section 6.

## 5.3 Planning applications

Natural England is a statutory consultee in the planning process and has published a guide to assessing development proposals on agricultural land (2021)[59]. Developers and local planning authorities (LPAs) should refer to government policies and legislation when considering development proposals that affect agricultural land and soils. The guide aims to protect BMV agricultural land from significant, inappropriate or unsustainable development, and all soils by managing them in a sustainable way.

The National Planning Policy Framework[4] and most local government plans state that development of BMV land should be avoided, where possible, if there is land of poorer quality or a brownfield site in the district. Therefore, many planning applications relating to farmland include a land classification survey as part of the EIA. Such a survey requires the use of a qualified specialist who is able to produce not only a map to show the grading of the land, but also a supporting report presenting the auger logs and the justification for the grading.

In recent years local planning authorities have routinely requested land classification information for proposed developments that involve the permanent or long-term loss of any agricultural land, even for those with a potentially reversible footprint, such as wind and solar farms. The impact of small-scale developments is assessed at local government level, but Natural England has to be consulted on developments that would involve the loss of 20 hectares or more of BMV land or any land affected by mineral extraction. In Scotland the consultee is Scottish Government's Agriculture, Food and Rural Communities Directorate. The Scottish Planning Framework[21] states that development on prime agricultural land, or land of lesser quality that is locally important should not be permitted, except where it is essential. In Northern Ireland the consultee on land quality for large scale developments is the Department of Agriculture, Environment and Rural Affairs and in Wales it is the Welsh

[59] Guide to assessing development proposals on agricultural land - GOV.UK

Government's Land Quality Advisory Service[15]. Planning Policy Wales (2024)[16] provides strong protection for BMV land with paras 3.58 and 3.59 giving strict conditions under which such land can be developed.

In all parts of the UK the strength of the developer's case depends on demonstrating that the social, economic or environmental benefit clearly outweighs the agricultural impact – and that there is no suitable alternative site for the development on land of poorer quality.

## 5.4 Rent reviews

In the past, the grade of land on the Provisional ALC maps was often one of the criteria by which the rental value of land was assessed, even though they were not intended for this purpose. In the 1980's tenants and their agents became increasingly aware that these maps were not accurate at farm level and many successfully employed soil specialists to reassess the grade of the land as an aid to rent negotiations. This was particularly common in eastern England where some farmers found that they were not achieving the yields on the range of crops normally associated with land in Grades 1 and 2. Very often the farmer's opinion on the quality of the land was justified as the soil survey showed that all or part of the farm was not of the quality claimed by the landlord. An example of a successful appeal by a tenant farmer is given below in Section 7.3.

This issue has been resolved on most of the affected farms, but it may become significant again if the climate changes sufficiently to affect crop production. Increasing dryness would result in yield reductions on some unirrigated crops, especially on sandy soils in the low rainfall areas of East Anglia and the East Midlands. Increasing wetness would impede cultivations on heavy land and reduce the reliability of yields of combinable crops. Conversely, some chalk land farmers in Kent and Sussex are already investing in high value continental crops, such as champagne grape vines and olives, in anticipation of future warming.

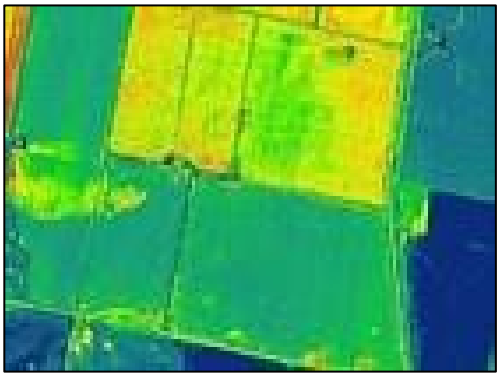
The agro-climatic data sets on which the UK land classifications are based are old: 1941-1970 for rainfall and 1961-1980 for temperature[6]. It is reasonable to assume that, perhaps in the not too distant future, those who have a financial interest in the quality of land, such as landlords and tenants, may seek to challenge the basis on which the quality of a farm is assessed. The introduction to the updated ALC Guidelines[7] state that changes to grading criteria or reference climate data will be considered in any future full technical update.

## 5.5 Dilapidations

Negotiations concerning dilapidations at the end of a tenancy may focus on the condition of the soil, particularly on root crop and vegetable growing land. Typical soil issues relate to structural deterioration, nutrient depletion and disease and pest build up. An example is given in Section 7.4 of how a soil scientist was employed to resolve a dispute between the landlord and outgoing tenant.

## 5.6 Precision Farming

The UK's farming industry is becoming increasingly interested in precision farming, with publicly available and published soil maps not sufficiently detailed for this application.

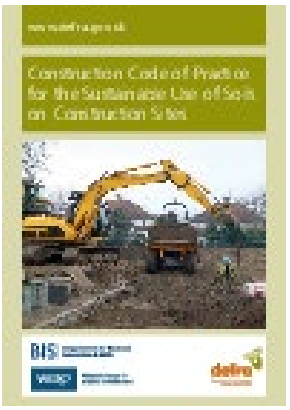


In recent years, service companies have been formed which offer soil zoning services based on emergent technologies such as EMI scanning, satellite image interpretation, ground penetrating radar, near infra-red scanning and drone imaging. These services add usefully to the body of knowledge about the soils at a given site. The information is not the equivalent of a specialist soil survey, with 'boots on the ground', but it can reveal valuable knowledge about 'in-field variation' of soil properties for nutrient management.

Many of these techniques are susceptible to recent weather conditions, and soil moisture variations can contribute to the patterns reported. Examples of the companies offering such services are Agrovista[60], Rhiza[61] and Frontier[62].

These zoning soil maps and reports are highly focused and have little application beyond precision farming and their data are not transferable to issues such as land classification and planning applications.

## 5.7 Land restoration



Land agents and other consultants often manage damage claims on behalf of clients whose land has been affected by mineral extraction or construction works for infrastructure projects. Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (the Soil Code)[63] focuses on the sustainable use of soil, so that the mining and construction industries have a duty of care when handling and restoring soils.

Mineral planning in England is now covered in the National Planning Policy Framework[4] and accompanying online guidance[64]. The guidance describes the need to identify the quality and quantity of topsoil and subsoil resources available on mineral extraction sites for reuse in restoring the sites to agricultural land, or other use, such as nature conservation.

Further advice on the legislation, policies and advice that planning authorities need to consider in reclaiming the quality and structure of soil for farming use is provided on the UK Government website ('Reclaim minerals extraction and landfill sites to agriculture[65]'). Defra's Soil Code provides a practical

[60] Reclaim minerals extraction and landfill sites to agriculture - GOV.UK

[61] Home - Rhiza

[62] About us | Frontier Agriculture

[63] Department for Environment, Food and Rural Affairs (2009), *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*. Code of practice for the sustainable use of soils on construction sites - GOV.UK

[64] Ministry of Housing, Communities & Local Government (2014). *Minerals*. Minerals - GOV.UK

[65] Reclaim minerals extraction and landfill sites to agriculture - GOV.UK

guide to identifying and safeguarding valuable topsoil and subsoil resources for re-use on development sites, including industrial, commercial, infrastructure (road and rail), utilities (oil, gas, water, electricity) and residential. The Code is illustrated with many case studies, such as the Channel Tunnel Rail-link (also known as HS1).

The mineral guidance and Soil Code highlight the need to identify soil resources available for re-use on site at an early stage as part of pre-construction planning. This will commonly involve a survey on site carried out by a soil scientist (as distinct from a geotechnical or geo-environmental surveyor) using a hand auger and spade to excavate small trial pits to log soil layers to a depth of approximately 100 cm. The findings of the soil survey should include a soil map to identify the location and extent of the main soil types (also often referred to as soil units) and an accompanying description of their physical characteristics and resilience to structural damage when being handled for soil stripping, soil storage and soil spreading. It should also include laboratory analyses of representative samples (pH, nutrients, organic matter, salinity, potential contaminants etc) to adequately characterise the different soil materials.

The soil report (commonly known as a Statement of Physical Characteristics, Soil Resource Plan or Soil Management Plan) should include, in relation to the intended after-use, recommendations for soil handling, especially in terms of location and maximum heights of soil stockpiles, areas of soils to be stripped, the location of haul routes and suitable weather conditions for working. It should be stressed that inappropriate soil handling in wet weather, when the soil is too wet (plastic) and prone to compaction, is the main cause of damage to soil structure and drainage. The need for subsequent remediation, such as alleviating soil compaction, will increase the cost of the project and may not be entirely successful.

Soil samples should be collected for particle size determination and nutrient testing in a UKAS accredited laboratory. Natural England's Technical Information Note 035 provides clear guidance on how samples should be taken[66].

The Institute of Quarrying has published good practice guidance for handling soils[67], to succeed MAFF's 'Good Practice Guide for Handling Soils in Mineral Workings'. The guide is designed specifically to help the mineral industry and its contractors achieve a good standard of restoration when using various combinations of earth-moving machinery for soil stripping, storage and replacement.

The British Society of Soil Science (BSSS) has also published relevant guidance on soil handling and restoration[68], and Working with Soil Guidance Note 3 on 'Benefitting from Soil Management in Development and Construction'[69].

Best practice guidance recommends that close liaison is maintained between the relevant parties; typically the client or agent, client's consultants (usually a soil scientist or agricultural specialist) and the contractor or contractor's consultant, in order that soil issues can be dealt with during the course of the project. For example, method statements devised prior to construction might need to be modified to meet site specific circumstances or incorporate new ideas. This may involve supervision of the works by suitably qualified personnel.

[66] Soil sampling for habitat recreation and restoration - TIN035

[67] quarrying.org/hubfs/Soils Guidance/IQ Soil Guidance full document including all practitioner advice updated May 2022.pdf

[68] British Society of Soil Science (2018) WWS-4-Soil-Handling-and-Restoration.pdf

[69] ritish Society of Soil Science (Version 3, January 2022) WWS3 - Benefitting from Soil - Management in Development and Construction - Jan 2022

*Aftercare*

On mineral and waste sites that are to be returned to agriculture there is a statutory requirement for a five-year 'aftercare' period, once the consented landform has been constructed and the restored soil profile has been replaced. This usually involves planting the restored land with a nurse crop of deep rooting grass such as Italian rye grass and clover mix in the first year to help improve soil structure and aeration, with the reintroduction of arable crops in year two or three.

Annual meetings between relevant parties (mineral authority, mineral operator, soil scientist, and land-owner/farmer) are best held in the late spring/ early summer (when patchy grass growth is most visible and soil inspection pits can be easily dug) to agree grazing or crop management in the following season and to identify and agree any further remedial measures which might be necessary, such as alleviation of compaction.

In England, under Section 72(5) of the Town and Country Planning Act 1990[70], Mineral Planning Authorities may impose restoration and aftercare conditions on mineral workings. While it is generally a condition of mineral planning consent, the requirement for an aftercare scheme following the restoration of agricultural land may also be given as mitigation in Environmental Impact Assessments of development projects involving agricultural land, such as HS2. Soil aftercare is also described in Section 6.4 of the Soil Code and in the Welsh Government Minerals Technical Advice Notes on minerals and mining[71].

## 6. Obtaining Professional Support

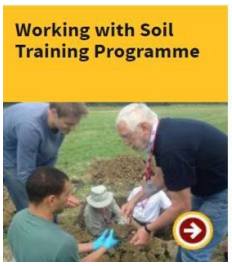
Soil resources and ALC surveys and advice on land restoration are best carried out by a suitably qualified and experienced soil scientist or environmental specialist who has the necessary professional indemnity insurance.

The BSSS website has a 'Find an Expert' facility[72]. Appropriately qualified and experienced specialists may be Full Members (M.I.Soil Sci) or Fellows (F.I.Soil Sci) of the Society, which incorporates the former Institute of Professional Soil Scientists. Full members have at least five years' professional experience. Fellowship is awarded to soil scientists who have made a significant contribution to soil science. Many BSSS members also have Chartered Scientist accreditation.

[70] UK Parliament Town and Country Planning Act 1990

[71] Planning policy and guidance: minerals and mining | Sub-topic | GOV.WALES

[72] Find an Expert - British Society of Soil Science




BSSS has developed a professional competency scheme called *Working with Soil* in order to develop professional skills and to assist those commissioning soil-related work identify appropriately qualified and experienced consultants. A set of public domain competency documents outline the skills, knowledge and experience required to carry out a range of professional activities, and can be downloaded from the Society's website[73]. Document 1 identifies the foundation field soil investigation skills required to carry out a range of investigations and there are then nine further, more focused documents relating to the conduct of projects such as ALC surveys, Soil Science in Soil Handling and Restoration, and Soil Science in Land Evaluation and Planning. The documents can be references in tender invitations to specify the skills required of potential contractors. BSSS also offers a number of short training courses related to soil classification and the ALC scheme for England and Wales[74].

For rural surveyors who wish to gain further training in soil science and land restoration, Cranfield University provides a range of short courses, post graduate courses and Continuing Professional Development (CPD), as do other universities and agricultural colleges, such as Scotland's Rural College (SRUC). Some independent consultants provide bespoke, locally focused courses for individual consultancy firms and Estate Agents.

## 7. Case studies

The following are a range of examples where land agents and valuers have commissioned soil and land classification experts to resolve serious issues affecting their client's interests. Names and locations have been altered.

### 7.1 Restoration of a landfill site

A soil scientist was commissioned by the agent of a country estate to assess the quality of restored agricultural land at a former municipal waste site in northeast England. Estate land was leased to the Borough Council for use as a landfill site. Following the cessation of the landfill operations the land was restored using soil which had been stripped and stored on site. The estate had specified in the lease that the restored land be returned in a condition consistent with its original and be of *no less agricultural viability than that of surrounding land.*

MAFF had commissioned a detailed ALC survey of agricultural land at an adjacent site proposed for opencast coal mining. This survey confirmed the presence of grade 3a and 3b agricultural land in the vicinity and it was agreed by the estate and the council that it was representative of the landfill site prior to excavation.

The soil survey of areas of the site restored to agricultural grassland found that patchy growth reflected the variable depth and quality of rootable soil on site. In some places the ground was bare and here the

[73] Professional Competencies - British Society of Soil Science

[74] Soil Training - British Society of Soil Science

soil was extremely compacted and very difficult to excavate by spade and auger. Elsewhere, where soils were uncompacted, the grass cover was thick and healthy. The restored land was assessed as ALC Grade 4 due to the uneven ground surface, soil wetness resulting from compaction and shallow rooting causing the grass to suffer from drought in summer. As it was determined to be of lower quality than the surrounding land, the estate successfully negotiated with the council that it should fulfil the terms of the lease and improve the quality of restoration.

## 7.2 Sale of an agricultural estate

This 500 ha estate, owned by an investment fund, was put up for sale. The Provisional ALC map showed the land to be equally divided between Grades 3 and 4, but the vendor's agents thought this was not a fair reflection of the quality of this productive arable estate. They suspected the grades reflected the fact that the land had been neglected and under grass when the original ALC assessment was made in the 1960s.

## 7.3 Rent review in Breckland

The agents commissioned a soil survey of the estate to accurately reassess the ALC grading. This determined 85% of the estate to be Grade 3a, 10% Grade 2 and only 5% Grade 4. The agents' opinion was that this significantly boosted the sale price by attracting interest from European farmers and institutional investors.

A tenanted farm in Breckland consisting largely of sandy soils gave lower yields of sugar beet than neighbouring farms. The landlord's agent claimed that this must be due to poor husbandry; a claim strongly disputed by the tenant who was pressing for a rent reduction. The tenant's agent commissioned a soil scientist to examine the land. A careful examination of the soils under sugar beet showed no compaction but, nevertheless, the rooting of most plants terminated abruptly at 35 cm depth.

Soil analysis revealed that the colloidal content (a combination of clay, silt and organic matter) below 35 cm was only 1.04%, indicating that the rooting medium was almost pure sand; in contrast to the more loamy sands of the surrounding farms. Research in Denmark has demonstrated that sugar beet rooting is inhibited in sandy soils with a colloidal content of less than 5%. Thus, the low yields were confirmed to be due not to poor husbandry but to the nature of the soil.

## 7.4 Dilapidations at a Fenland farm

The Fenland tenancy fell vacant after 12 years, during which the farmer had grown carrots, potatoes and sugar beet with only an occasional cereal break. The landlord's agent was concerned that such intensive root and potato production had damaged the productive capacity of the holding through a build-up of disease, compaction and depletion of trace elements such as copper and boron. A detailed

Soil survey and analysis revealed the following: moderate compaction in some fields, but within plough depth, and therefore easily removable; adequate boron, but low copper levels in some fields, although no lower than is common in a district where regular applications are required. Nematode numbers were moderate or low in all fields. However, infection with violet root rot was severe in many fields, and it was recommended that the production of carrots¸ potatoes and sugar beet should cease for about five years. Dilapidations between landlord and tenant were assessed on that basis.

## 8 Applications and interpretation of soil data: suggested further reading and viewing

**The Fragile Skin: Soil Landscapes of the UK. John Hollis & Allan Lilly (BSSS 2022)[75].**

This book is aimed primarily at soil scientists, both academic researchers and applied practitioners. Its purpose is to demonstrate the great diversity of Britain's soil landscapes, enhance understanding of their differing characteristics and their resulting abilities to sustain a variety of important soil functions. Concerning soil functions, it is worth noting that interest in sustainable soil management is growing among environmentalists, ecologists, land users, the construction industry, even politicians. This book brings some important insights deserving the attention of that wider audience.

**Soil health**

There is increasing recognition among soil scientists, agriculturalists and farmers of the need to restore and maintain the health of our soils.

The concept of soil health is being recognised in policies for environmental protection and is likely to be formally incorporated into the planning system. Therefore, it is essential that the requirements of new policies based on soil health do not exceed our technical and practical abilities to implement them consistently, with meaningful outcomes. A recent Institute of Sustainability and Environmental Professionals (ISEP) Advice Note[76] seeks to achieve these objectives, and it can be considered a supplement to Annex 'D' of the IEMA (now ISEP) *Land and Soil in EIA Guide*[77].

Soil health is a complex and evolving field of knowledge and BSSS has a number of explanatory webinars online that provide a useful introduction to some of the key elements.

- Zoom into Soil: Monitoring Soil Health - British Society of Soil Science[78]
- Zoom into Soil: Soil Security - British Society of Soil Science[79]
- Zoom into Soil: Grassland Soil Health[80]

[75] The Fragile Skin: Soil Landscapes of the UK, John Hollis and Allan Lilly, Cranfield, UK: British Society of Soil Science. 2022. pp. 188. £34.99, paperback. ISBN: 1399922750 - Wright - 2023 - European Journal of Soil Science - Wiley Online Library

[76] New ISEP advice note: Soil health in environmental assessment

[77] 2022-iema_land_and_soils_guidance.pdf

[78] Zoom into Soil: Monitoring Soil Health - British Society of Soil Science

[79] Zoom into Soil: Soil Security - British Society of Soil Science

[80] Zoom into Soil: Grassland Soil Health - British Society of Soil Science

**Soil and ALC surveys for Nationally Significant Infrastructure Projects (NSIPS)**

NSIPS are large scale projects that go to the Secretary of State for decision, rather than the local planning authority; a process known as a Development Consent Order (DCO).

Large scale solar pv installations, aiming to produce more than 100 megawatts and often extending over more than 1000 ha, are classified as NSIPs. ISEP has produced an Advice Note on *Solar PV on Agricultural Land: Essential Components of Environmental Assessments and Reports*[81].

This Advice Note provides a framework for environmental consultants, developers, and local planning authorities assessing large-scale solar projects on farmland. It addresses potential inconsistencies in Environmental Impact Assessments (EIAs) by setting out clear expectations for soil and ALC surveys, biodiversity net gain, pollution risk management, and socio-economic analysis.

Crucially, the Advice Note emphasises the importance of protecting BMV agricultural land and maintaining the reversibility of solar developments. It promotes the use of poorer-quality land wherever possible and calls for independent soil audits following decommissioning to ensure farmland can be restored to good condition.

Natural England is a statutory consultee in the planning process and has published a guide to assessing development proposals on agricultural land (2021)[59], listing relevant government policies and legislation. The guide aims to protect BMV agricultural land from significant, inappropriate or unsustainable development proposals, and all soils by managing them in a sustainable way.

Natural England is also updating TIN049 *Agricultural Land Classification: protecting the best and most versatile agricultural land*[81], which will include a detailed section on survey expectations and sampling density. This will specify the following (E. Reed, Natural England, *pers comm*. 20 May 2026).

*Agricultural Land Classification (ALC) sampling density plays a crucial role in ensuring accurate land assessments for planning and development decisions. The density of sampling refers to the number of observations taken across a given land area, influencing the reliability of classification results. Higher sampling densities provide more detailed insights into soil properties and help improve ALC grade boundary accuracies. Conversely, lower sampling densities may lead to generalised classifications, reduced accuracy of grade boundary locations and potentially overlooking important variations within a site. Optimising sampling density ensures that land classification reflects the true agricultural potential of an area, supporting sustainable land management and policy decisions.*

*In the absence of existing site-specific ALC data (such as Post 1988 ALC surveys), a detailed ALC survey is expected to inform development proposals. A detailed ALC survey is required for the full application site, including where the panels are proposed, cable route, temporary access and any areas of proposed BNG, habitat creation or similar, as well as any areas of permanent sealing. An ALC and soil survey of the agricultural land should be undertaken across the full study area, this should normally be at a detailed density of one auger core per hectare to a depth of 1.2 m, supported by soil pits dug in each main soil type to confirm the physical characteristics to a minimum depth of 1 metre. Soil data collected as part of an ALC survey can also be used to inform the Soil Management Plan (SMP) as set out in the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.*

*Any ALC survey approach that deviates from this detailed survey methodology should be consulted with the Specialists at Natural England. A reduced survey approach of 1 auger per 2 hectares may be agreed on occasion, if considered appropriate. It would be expected for the consultant to provide clear justification where a detailed ALC survey is not proposed across the full site. Any reduced survey density approach would only be considered for land subject to temporary development. Nevertheless, sufficient soil data is still required to inform soil handling, therefore a detailed ALC / soil survey may still be necessary.*

*Reconnaissance surveys would be permitted as noted above at earlier preparatory stages for strategic planning and again, Natural England would expect to see a commitment to carrying out further detailed surveys to inform soil management'.*

**The Soils in Planning and Construction Task Force**[81]

This is a cross-sector body that supports adoption of soil sustainability in practice across planning and development. It hosts webinars and produces reports, particularly with regard to treating soil on construction sites as a resource rather than a waste material, and these can be found here: https://www.soilstaskforce.com/reports

**Artificial intelligence in soil science**

The European Journal of Soil Science (EJSS) published the 2025 Russell Review on '*Artificial Intelligence in Soil Science*' written by Alexandre M.J.-C. Wadoux[82].

This important paper recognises the potential of AI to help soil scientists obtain and process data, integrate and interpret complex datasets, and explore trends in landscapes or with land management to help guide practical decisions on maximising the potential of soils. Wadoux says that *"In the future, it is likely that soil science will be driven by AI-augmented researchers, where AI assists and accelerates nearly all the tasks involved in the scientific process."* However, he also reassures human researchers, stating: *"Ultimately, the vision remains with the human, while the execution increasingly falls to AI."*

[81] Home | Soils Task Force

[82] EJSS Russell Review explores how AI will transform soil science - British Society of Soil Science

# Soils and Land Quality: How to find online maps and data sets

BRITISH SOCIETY OF SOIL SCIENCE

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