National Soil Resources Institute

Soils Site Report

Full Soil Report

Tim Burrows 1

National Grid Reference: SD5000032000

Easting: 350000

Northing: 432000

Site Area: 5km x 5km

Prepared by
authorised user:

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Cranfield University

10 August 2015

Citations

Citations to this report should be made as follows:

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About this report

This Soils Site Report identifies and describes the properties and capacities of the soil at your specified location as recorded in the 1:250,000 scale National Soil Map for England and Wales. It has been produced by Cranfield University's National Soil Resources Institute.

The National Soil Map represents the most accurate comprehensive source of information about the soil at the national coverage in England and Wales. It maps the distribution of soil mapping units (termed soil associations) which are defined in terms of the main soil types (or soil series) that were recorded for each soil association during field soil survey. Each soil association is named after its principal soil series and these bear the location name from where they were first described (e.g. Windsor). Each of these soil associations have differing environmental characteristics (physical, chemical and biological) and it is by mapping these properties that the range of thematic maps in this report have been produced.

Soil types and properties vary locally, as well as at the landscape scale. It is not possible to identify precisely the soil conditions at a specific location without first making a site visit. We have therefore provided you with information about the range of soil types we have identified at and around your selected location. Schematic diagrams are also provided to aid accurate identification of the soil series at your site.

Whilst an eight-figure national grid reference should be accurate to within 100m, a single rural Postcode can cover a relatively large geographical area. Postcodes can therefore be a less precise basis for specifying a location. The maps indicate the bounded area the reports relate to.

Your Soils Site Report will enable you to:

- identify the soils most likely to be present at and immediately around your specified location;
- understand the patterns of soil variation around your location and how these correlate with changes in landscape;
- identify the nature and properties of each soil type present within the area;
- understand the relevant capacities and limitations of each of the soils and how these might impact on a range of factors such as surface water quality.

For more information visit www.landis.org.uk/reports

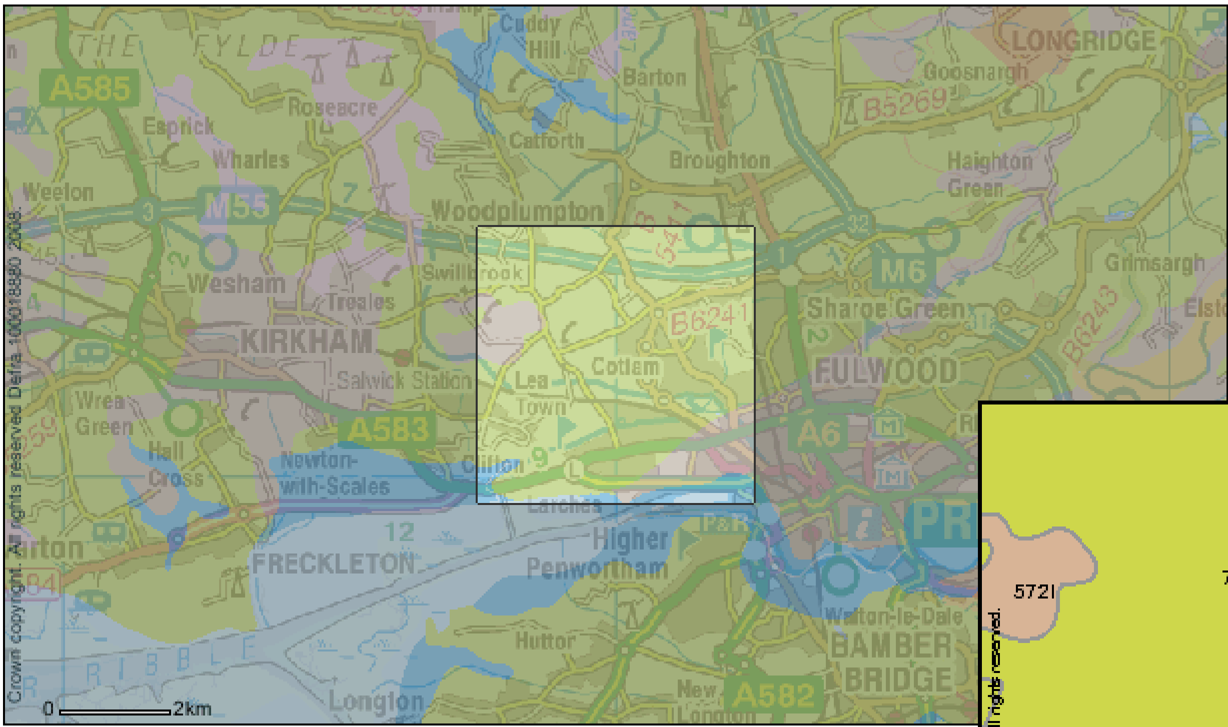
Table of Contents

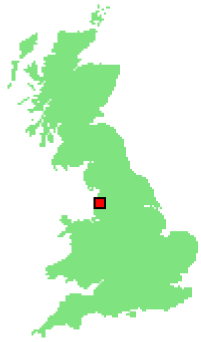
1. SOIL THEMATIC MAPS

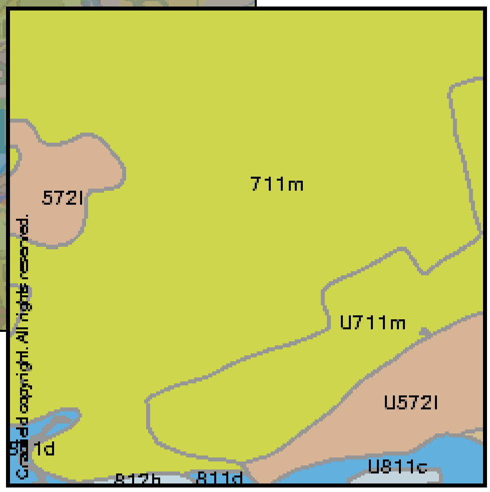
This section contains a series of maps of the area surrounding your selected location, based on the 1:250,000 scale National Soil Map, presenting a number of thematic maps relating to the characteristics of the soils. These provide an overview of the nature and condition of the local soil conditions. It is these conditions that may be used to infer the response of an area to certain events (with the soil as a receptor), such as pollution contamination from a chemical spill, or an inappropriate pesticide application and the likelihood of these materials passing though the soil to groundwater. Other assessments provide an insight into the way a location may impact, by corrosive attack or ground movement, upon structures or assets within the ground, for example building or engineering foundations or pipes and street furniture.

Soil is a dynamic environment with many intersecting processes, chemical, physical and biological at play. Even soils 'sealed' over by concrete and bitumen are not completely dormant. The way soils respond to events and actions can vary considerably according to the properties of the soil as well as other related factors such as land-use, vegetation, topography and climate. There are many threats facing our national soil resource today and forthcoming legislation such as the proposed Soil Framework Directive (SFD) (COM(2006) 232) will seek to identify measures aimed towards soil protection and ensuring the usage of soils in the most sustainable way. This report is therefore a useful snapshot of the soil properties for your given area, providing a summary of a broad range of ground conditions.

1a. SOILS - SPATIAL DISTRIBUTION







SOIL ASSOCIATION MAP UNIT KEY

SALINE 1 220
Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.

WICK 1 541r
Deep well drained coarse loamy and sandy soils locally over gravel.

FLINT 572l
Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

SALOP 711m
Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils

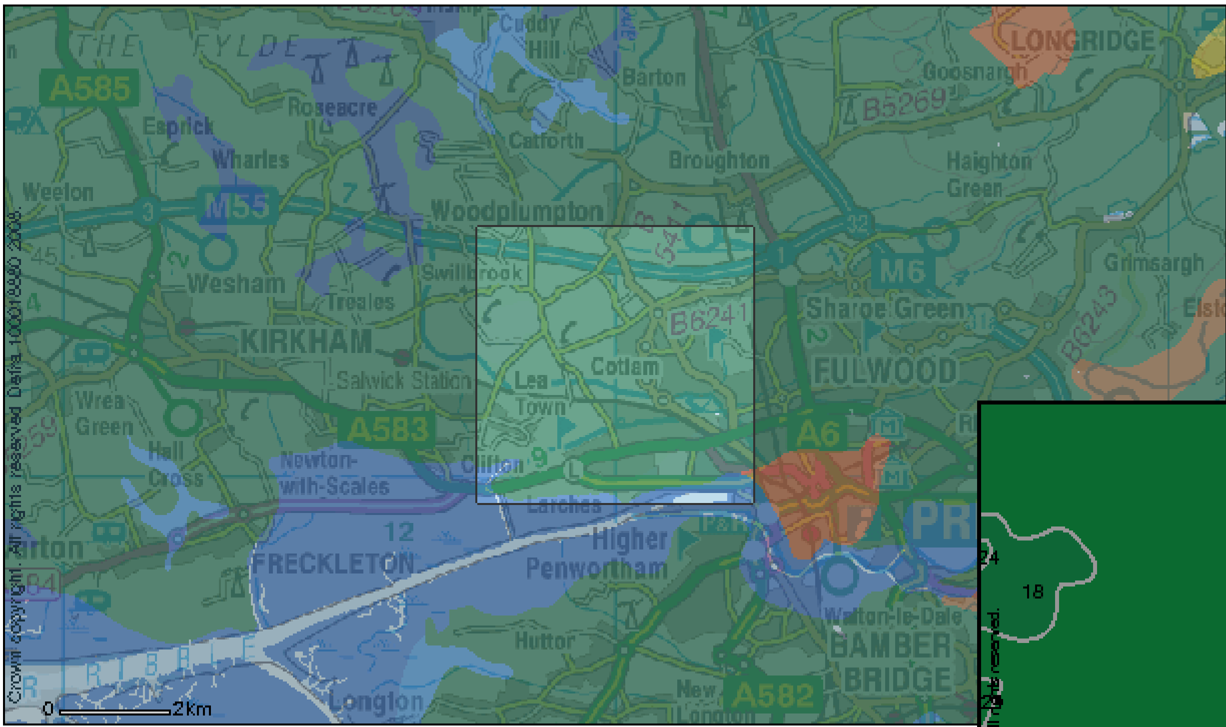
HOLLINGTON 811c
Deep stoneless reddish fine silty and clayey soils variably affected by groundwater.

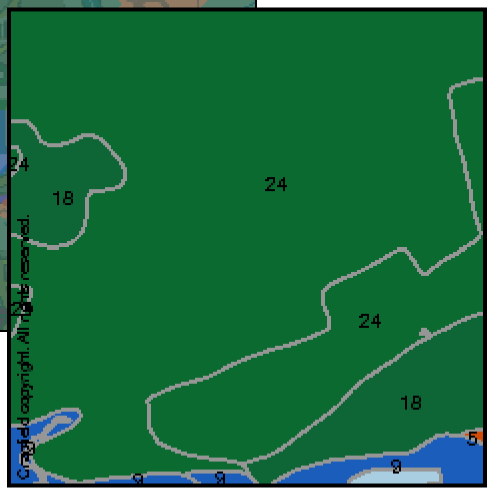
ROCKCLIFFE 811d
Deep stoneless silty and fine sandy soils variably affected by groundwater depending on artificial drainage.

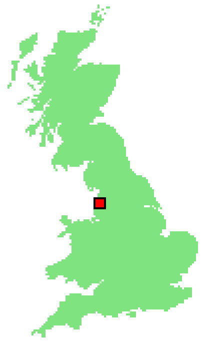
WISBECH 812b
Deep stoneless calcareous coarse silty soils.

Soil associations represent a group of soil series (soil types) which are typically found occurring together, associated in the landscape (Avery, 1973; 1980; Clayden and Hollis, 1984). Soil associations may occur in many geographical locations around the country where the environmental conditions are comparable. For each of these soil associations, a collection of soil types (or soil series) are recorded together with their approximate proportions within the association. Soil associations have codes as well as textual names, thus code '554a' refers to the 'Frilford' association. Where a code is prefixed with 'U', the area is predominantly urbanised (e.g. 'U571v'). The soil associations for your location, as mapped above, are described in more detail in Section 2: Soil Association Descriptions.

1b. HYDROLOGY OF SOIL TYPE (HOST)







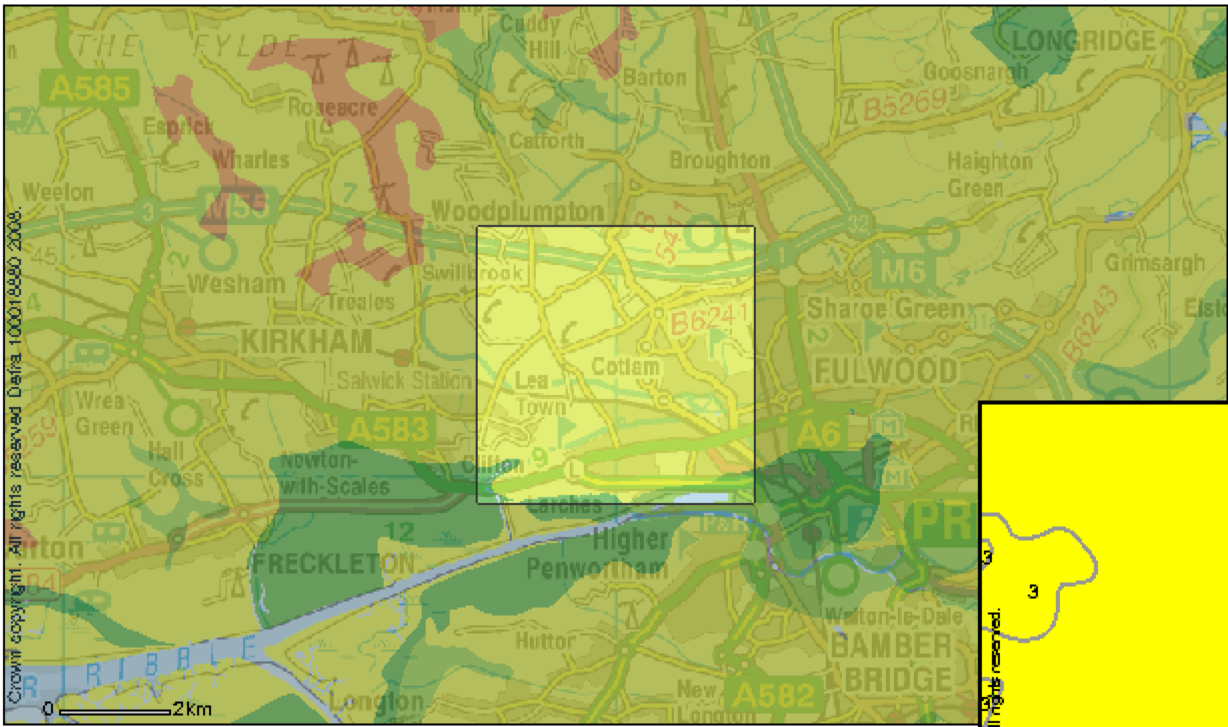
HYDROLOGY OF SOIL TYPE KEY

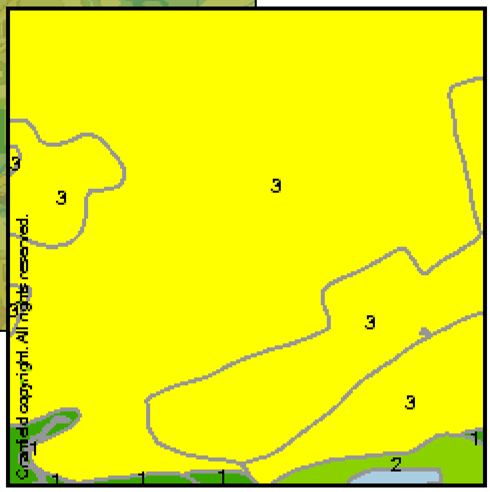
- 18 - *Slowly permeable soils with slight seasonal waterlogging and moderate storage capacity over slowly permeable substrates with negligible storage*
- 24 - *Slowly permeable, seasonally waterlogged soils over slowly permeable substrates with negligible storage capacity*
- 5 - *Free draining permeable soils in unconsolidated sands or gravels with relatively high permeability and high storage capacity*
- 9 - *Soils seasonally waterlogged by fluctuating groundwater and with relatively slow lateral saturated conductivity*

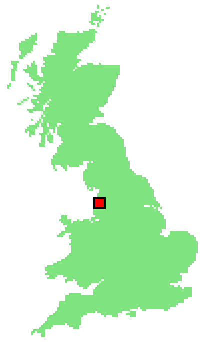
HOST CLASS DESCRIPTION

The Hydrology of Soil Types (HOST) classification describes the dominant pathways of water movement through the soil and, where appropriate, the underlying substrate. Eleven drainage models are defined according to the permeability of the soil and its substrate and the depth to a groundwater table, where one is present (Boorman et al,1995). These are further subdivided into 29 HOST classes to which all soil series have been assigned. These classes identify the way soil water flows are partitioned, with water passing over, laterally through, or vertically down the soil column. Analysis of the river hydrograph and the extent of soil series for several hundred gauged catchments allowed mean values for catchment hydrological variables to be identified for each HOST class, The HOST classification is widely used to predict river flows and the frequency and severity of flood events and also to model the behaviour of diffuse pollutants (Hollis et al, 1995).

1c. GROUND MOVEMENT POTENTIAL







GROUND MOVEMENT POTENTIAL KEY

- 1 - *Very low*
- 2 - *Low*
- 3 - *Moderate*
- 4 - *High*
- 5 - *Very high*

* If a High class is starred, a 'Very High' ground movement potential is likely to be achieved if these soils are drained to an effective depth of at least two metres.

GROUND MOVEMENT POTENTIAL DESCRIPTION

Clay-related ground movement is the most widespread cause of foundation failure in the UK and is linked to seasonal swelling and shrinkage of the clay. The content of clay within the soils of your selected area has therefore a direct bearing upon the likelihood of ground movement.

Among the inorganic particles that constitute the solid component of any soil, clay particles are the smallest and defined as being <0.002 mm - equivalent spherical diameter (esd) in size. Clay particles occur in most kinds of soil but they only begin to exert a predominant influence on the behaviour of the whole soil where there is more than 35 per cent (by weight) of clay-sized material present.

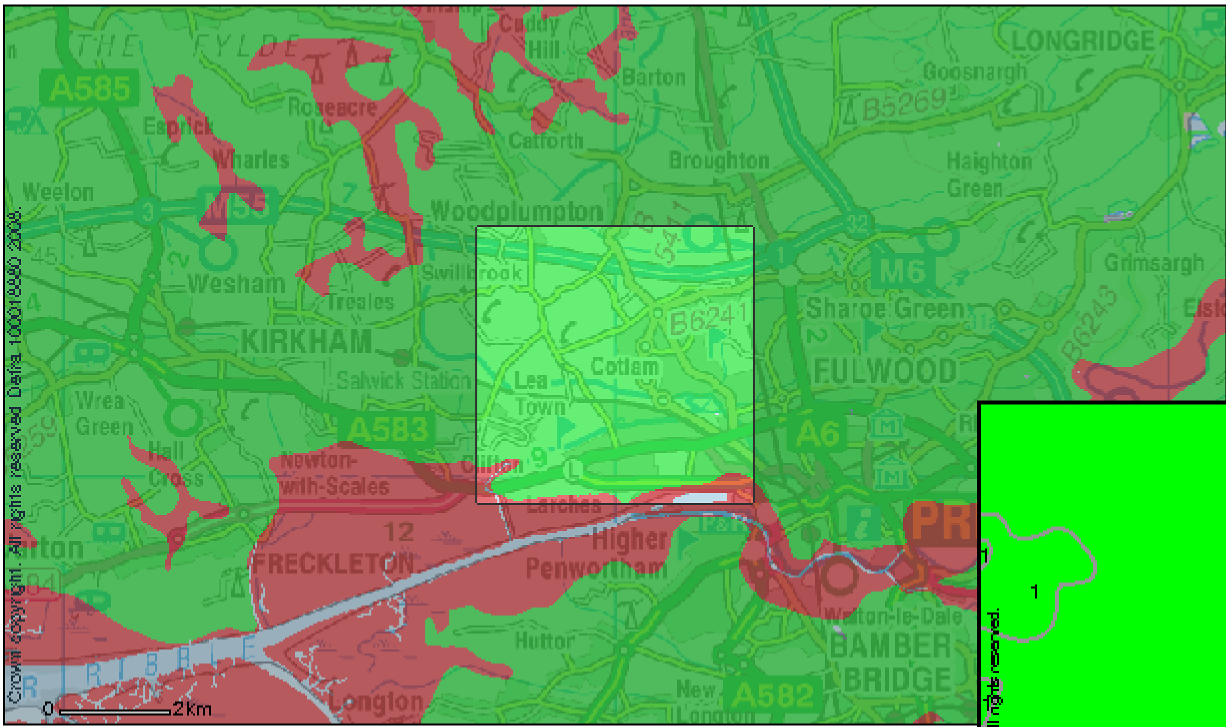
Because clay particles are very small and commonly platy in shape they have an immense surface area onto which water can be attracted, relative to the total volume of the soil material. In addition to surface attraction or inter-crystalline absorption of water, some clay minerals, those with three layers of atoms (most other kinds of clay have only two layers of atoms) are able to absorb and hold additional water between these layers. It is these types of clay mineral, which are widespread in British soils and commonly known as *smectites* that have the greatest capacity to shrink and swell.

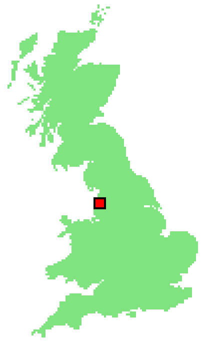
In a natural undisturbed condition, the moisture content of deep subsoil clay does not change greatly through the year and consequently there are no changes in volume leading to shrinkage and swelling. However, when clays are exposed at or near the ground surface and especially when vegetation is rooting in them seasonal moisture and volume changes can be dramatic. Plants and trees transpire moisture from the soil to support their growth and transfer necessary nutrients into their structures. Surface evaporation also takes place from soil and plant structures, and the combination of evaporation from surfaces and transpiration by plants and trees is termed *evapotranspiration*. Thus, the layer of soil material down to 2m depth into which plants will root is critical when assessing the vulnerability of land to subsidence.

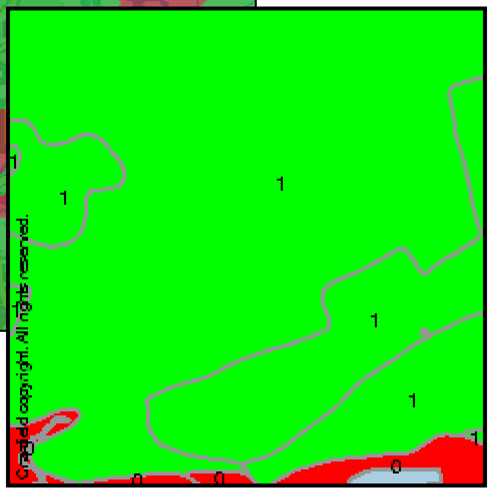
Whenever soil moisture is continuously being replenished by rainfall, the soil moisture reserves will be unaffected by the removal of moisture by plants as there is no net loss. However, in many parts of Britain, particularly in the south and east, summer rainfall is small and is exceeded by evapotranspiration. Water reserves are then not sufficiently replenished by rainfall and so a soil moisture deficit develops. The water removed from a clayey soil by evapotranspiration leads to a reduction in soil volume and the consequent shrinkage causes stress in the soil materials leading in turn to stress on building foundations that are resting in the soil (Hallett, et al, 1994).

The foundations themselves may then move and thus cause damage to building structures. This problem can be exacerbated by the fact that the soil beneath the structure may not dry out uniformly, so that any lateral pressure exerted on the building foundation is made effectively greater. This assessment identifies the likelihood of soil conditions being prone to ground movement given these other factors.

1d. FLOOD VULNERABILITY







FLOOD VULNERABILITY CLASS KEY

0 - *Major risk*

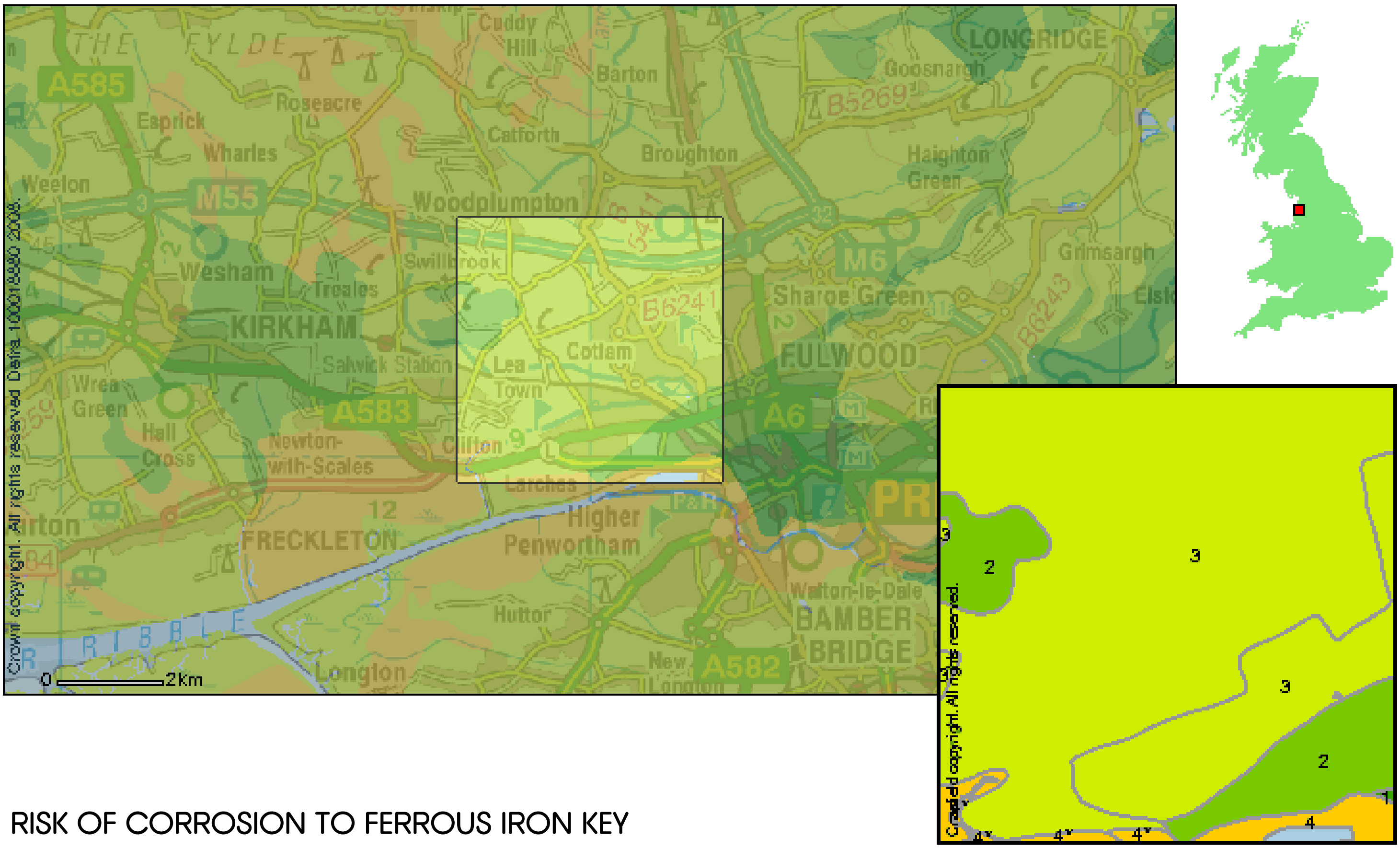
1 - *Minor risk*

FLOOD VULNERABILITY DESCRIPTION

The inundation of properties by flood water can occur in a number of circumstances. Surface run-off can collect on low-lying land from upslope following heavy rainfall. More commonly rivers, lakes and/or the sea extend beyond their normal limits as a result of prolonged or intense rainfall, unusually high tides and/or extreme wind events. Water damage to properties and their contents is compounded by the deposition of sediment suspended in the flood waters. The spatial distribution of such waterborne sediment (or alluvium as defined in soil science) is one basis upon which land that has been subject to historical flooding can be mapped, and this forms a basis for present-day flooding risk assessment.

Both riverine and marine alluvium are identified as distinct soil parent materials within the British soil classifications. Combining soil map units that are dominated by soil series developed in alluvium across Great Britain identifies most of the land that is vulnerable to flooding. This assessment does not account for man-made flood defence measures, showing instead the areas where once water has stood.

1e. RISK OF CORROSION TO FERROUS IRON



RISK OF CORROSION TO FERROUS IRON KEY

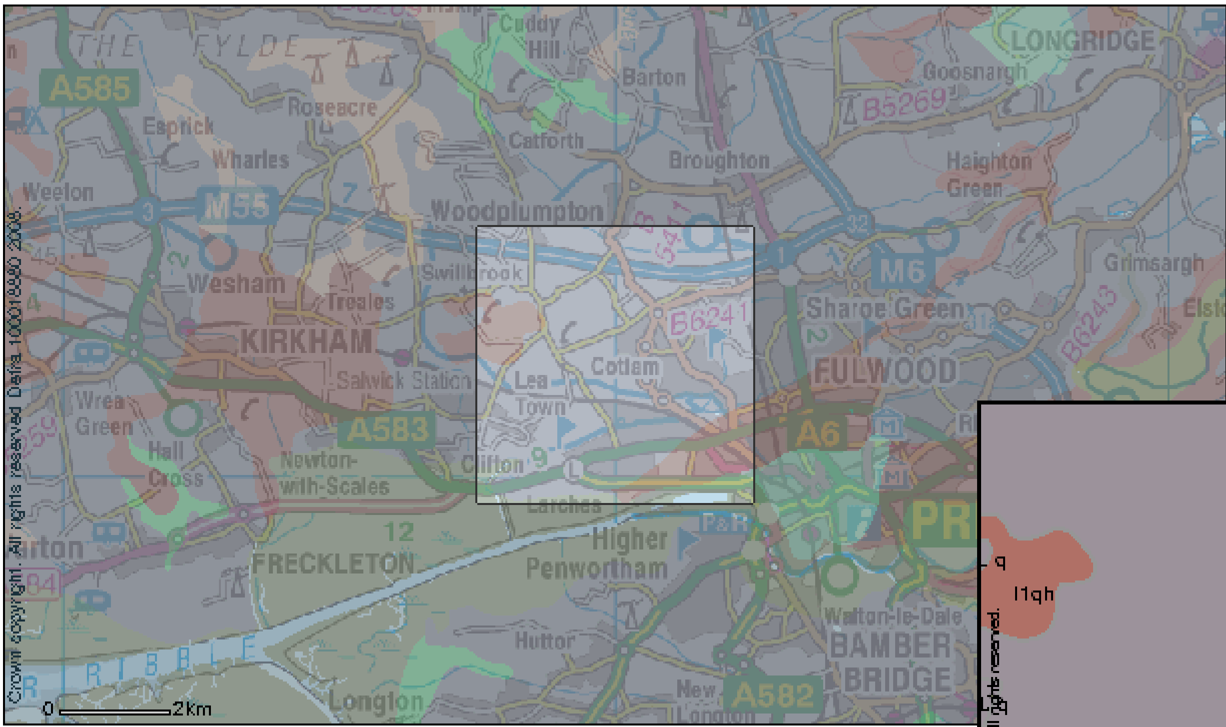
- 1 - *Non-aggressive*
- 2 - *Slightly Aggressive*
- 3 - *Moderately Aggressive*
- 4 - *Highly Aggressive*
- 5 - *Very highly Aggressive*
- 6 - *Impermeable Rock*

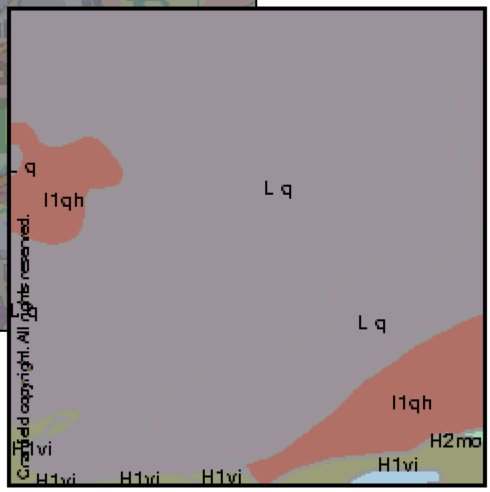
* If a class is starred, it is assumed that there are moderate amounts of sulphate in the soil. If there is abundant sulphate present, the soil may be one class more aggressive. Conversely, if there is very little sulphate, the soil may be one class less aggressive to buried ferrous iron.

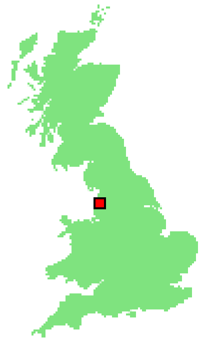
RISK OF CORROSION TO FERROUS IRON DESCRIPTION

Buried iron pipes and other infrastructure corrode at rates that are influenced by soil conditions (Jarvis and Hedges, 1994). Soil acidity, sulphide content, aeration and wetness all influence the corrosivity of the soil. These factors are used to map 5 major classes of relative corrosivity.

1f. PESTICIDE LEACHING RISK







PESTICIDE LEACHING CLASS KEY

- H1vi - *Slowly permeable soil; groundwater at very shallow depth (60cm)*
- H2mo - *Sandy soil with low organic matter; groundwater at moderate depth*
- I1qh - *Slowly permeable soils with relatively high storage capacity over soft substrates of low or negligible storage capacity that sometimes conceal groundwater bearing rocks at depth*
- L q - *Impermeable soils over soft substrates of low or negligible storage capacity that sometimes conceal groundwater bearing rocks at depth*

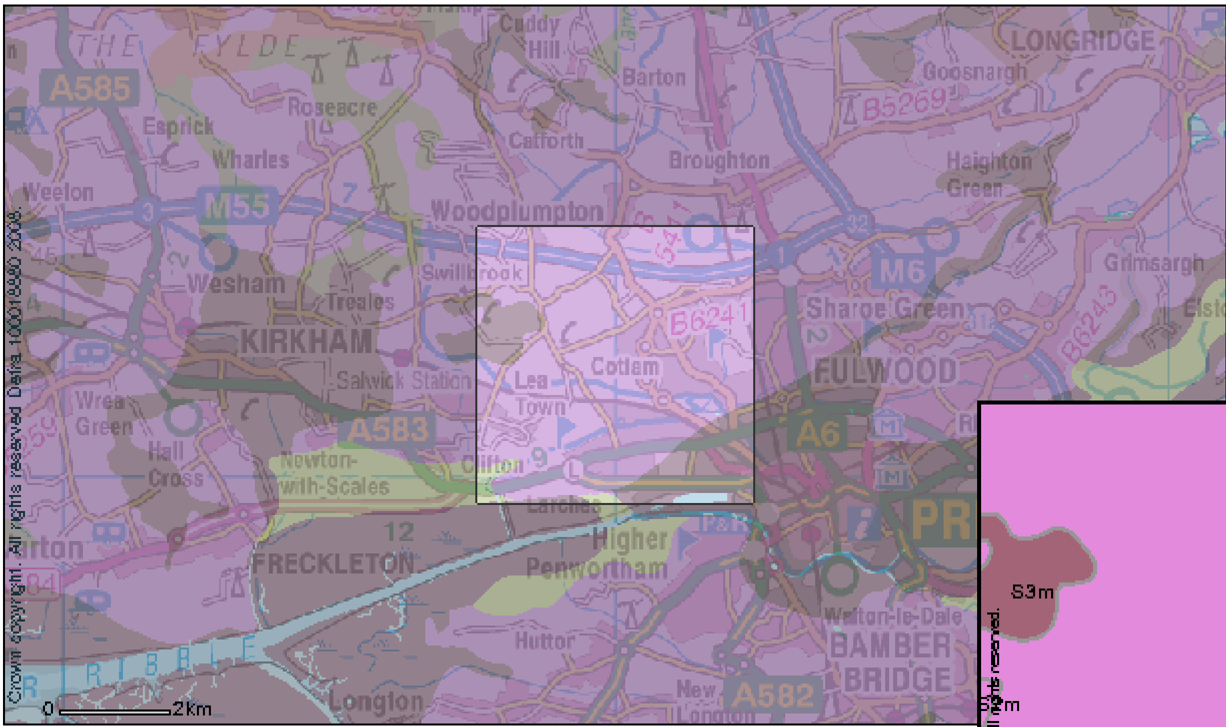
PESTICIDE LEACHING CLASS DESCRIPTION

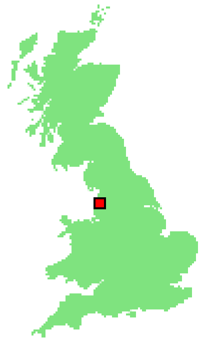
The natural permeability and water regime of soils are influential in determining the fate and behaviour of pesticides applied to the crop and soil surface (Hollis et al, 1995). A system of vulnerability assessment was devised as part of the national system for Policy and Practice for the Protection of Groundwater. This divided soils into three primary vulnerability classes.

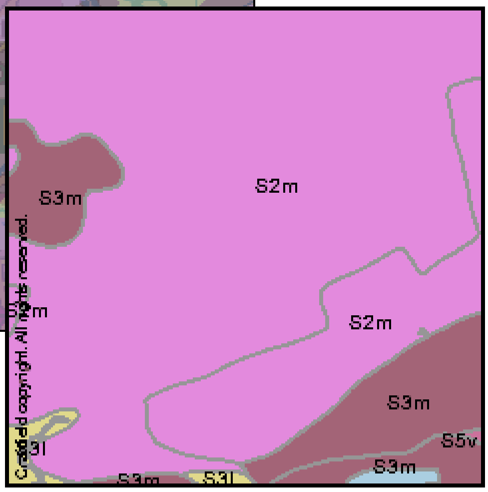
H - Soils of high leaching capacity with little ability to attenuate non-adsorbed pesticide leaching which leave underlying groundwater vulnerable to pesticide contamination.
I – Soils of intermediate leaching capacity with a moderate ability to attenuate pesticide leaching.
L - Soils of low leaching capacity through which pesticides are unlikely to leach.

The primary classes have been further subdivided into nearly forty subclasses. These subclasses, with their descriptions, are mapped above. These classes do not account for differences in land cultivation, which can also have a significant impact on pesticide behaviour.

1g. PESTICIDE RUNOFF RISK







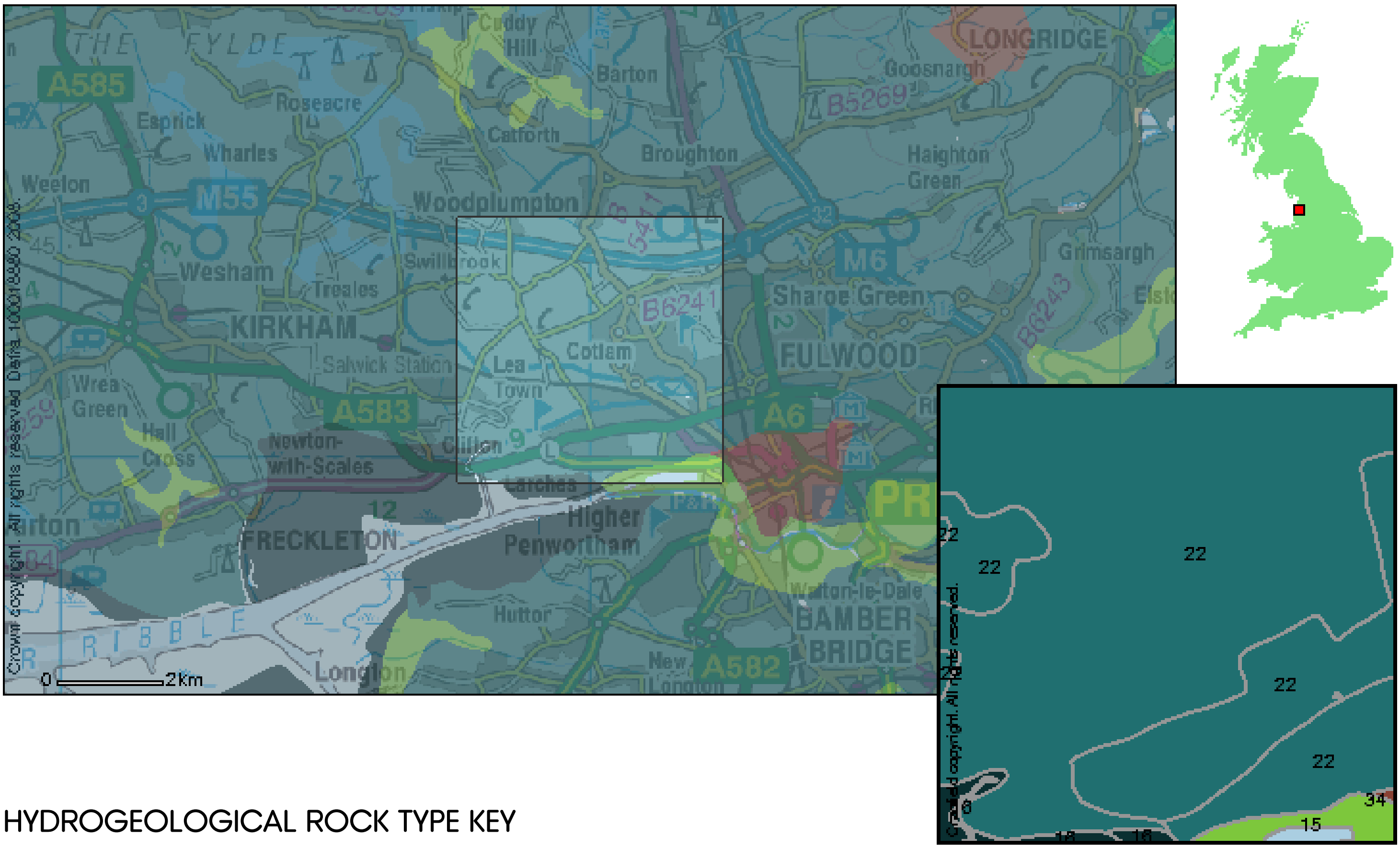
PESTICIDE RUNOFF RISK KEY

- S2m - *Soils with high run-off potential but moderate adsorption potential*
- S3l - *Soils with moderate run-off potential and low adsorption potential*
- S3m - *Soils with moderate run-off potential and moderate adsorption potential*
- S5v - *Soils with very low run-off potential but very low adsorption potential*

PESTICIDE RUNOFF RISK DESCRIPTION

The physical properties and natural water regime of soils influence the speed and extent of lateral water movement over and through the soil at different depths (Hollis et al, 1995). At as result, soils can be classed according to the potential for pesticide run-off. Five runoff potential classes are identified for mineral soils and a further two for peat soils. The mineral soil classes are further subdivided according to the potential for pesticide adsorption.

1h. HYDROGEOLOGICAL ROCK TYPE



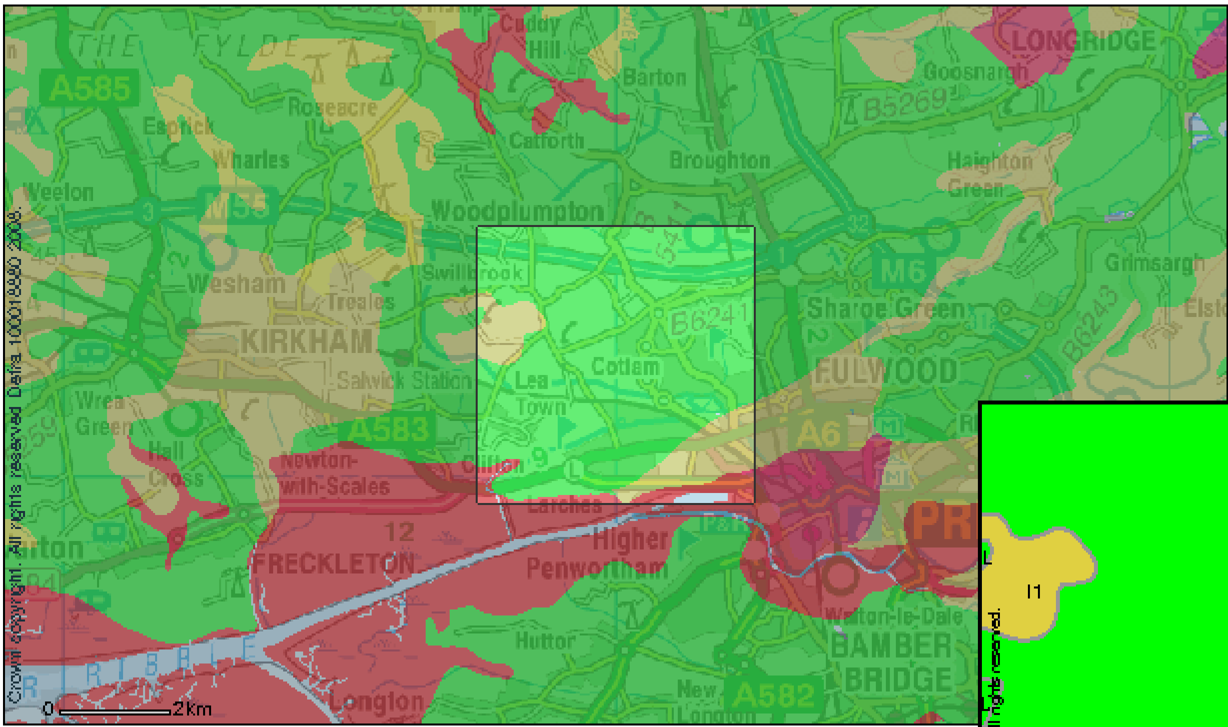
HYDROGEOLOGICAL ROCK TYPE KEY

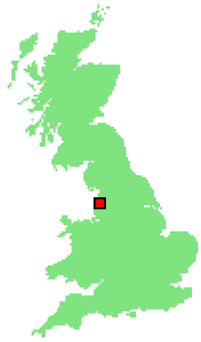
- 15 - *river alluvium*
- 16 - *marine alluvium*
- 22 - *till and compact Head*
- 34 - *sand*

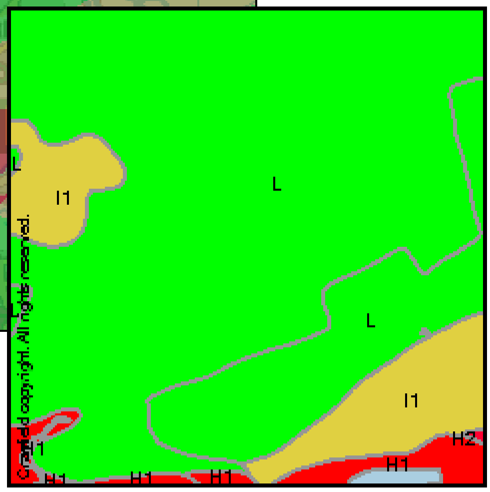
HYDROGEOLOGICAL ROCK TYPE DESCRIPTION

The hydrogeological classification of the soil parent materials provides a framework for distinguishing between soil substrates according to their general permeability and whether they are likely to overlie an aquifer. Every soil series has been assigned one of the 32 substrate classes and each of these is characterised according to its permeability (being characterised as permeable, slowly permeable or impermeable). For further information, see Boorman et al (1995).

1i. GROUND WATER PROTECTION POLICY (GWPP) LEACHING







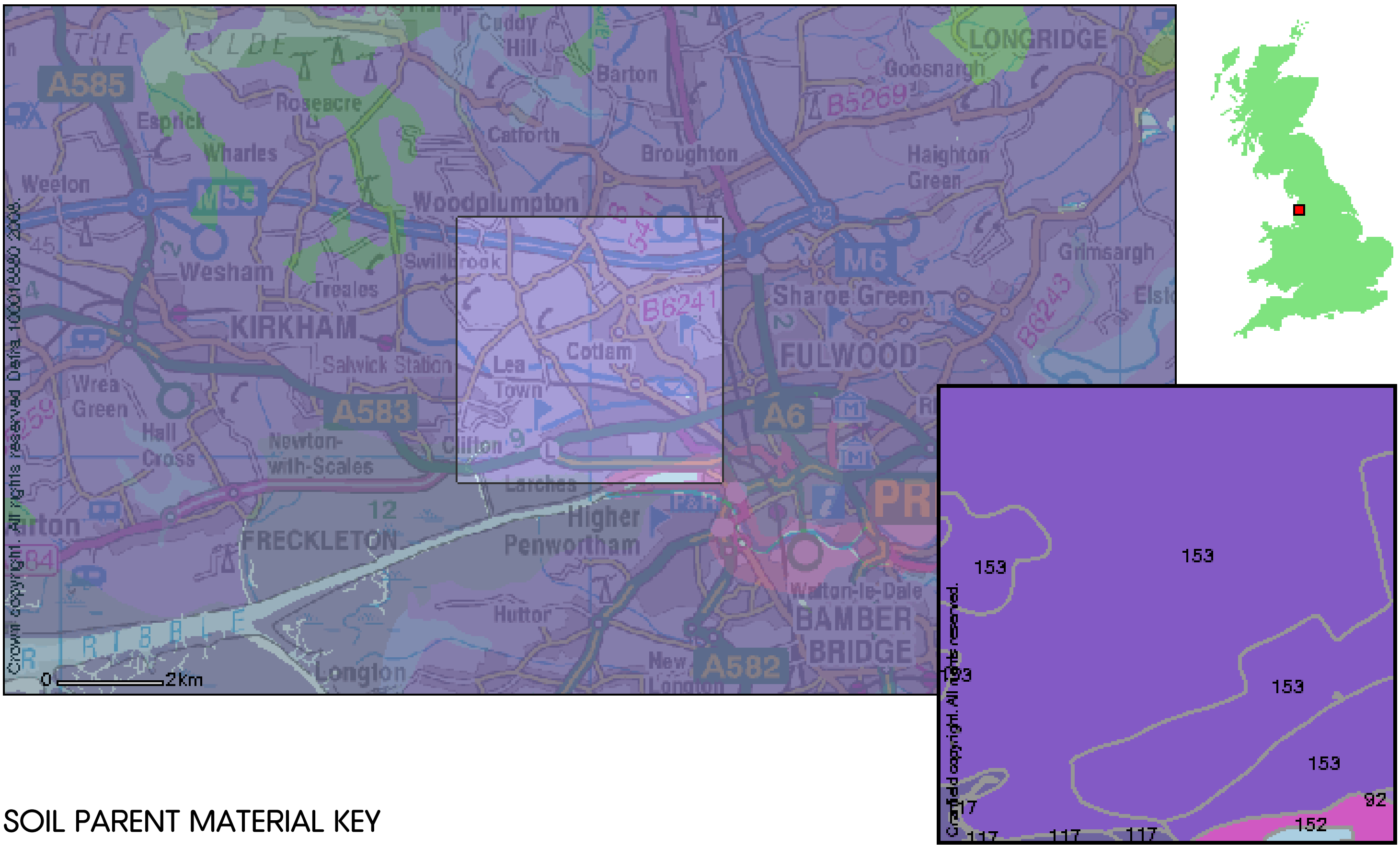
GWPP LEACHING CLASS KEY

- **H1** - *Soils of high leaching potential, which readily transmit liquid discharges because they are either shallow, or susceptible to rapid bypass flow directly to rock, gravel or groundwater*
- **H2** - *Deep, permeable coarse textured soils of high leaching potential, which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential*
- **I1** - *Soils of intermediate leaching potential which have a moderate ability to attenuate a wide range of diffuse source pollutants but in which it is possible that some non-adsorbed diffuse source pollutants and liquid discharges could penetrate the soil layer*
- **L** - *Soils in which pollutants are unlikely to penetrate the soil layer either because water movement is largely horizontal or because they have a large ability to attenuate diffuse source pollutants*

GWPP LEACHING CLASS DESCRIPTION

The Ground Water Protection Policy classes describe the leaching potential of pollutants through the soil (Hollis, 1991; Palmer et al, 1995). The likelihood of pollutants reaching ground water is described. Different classes of pollutants are described, including liquid discharges adsorbed and non-adsorbed pollutants.

1j. SOIL PARENT MATERIAL



SOIL PARENT MATERIAL KEY

117 - *Marine alluvium*

152 - *Reddish river alluvium*

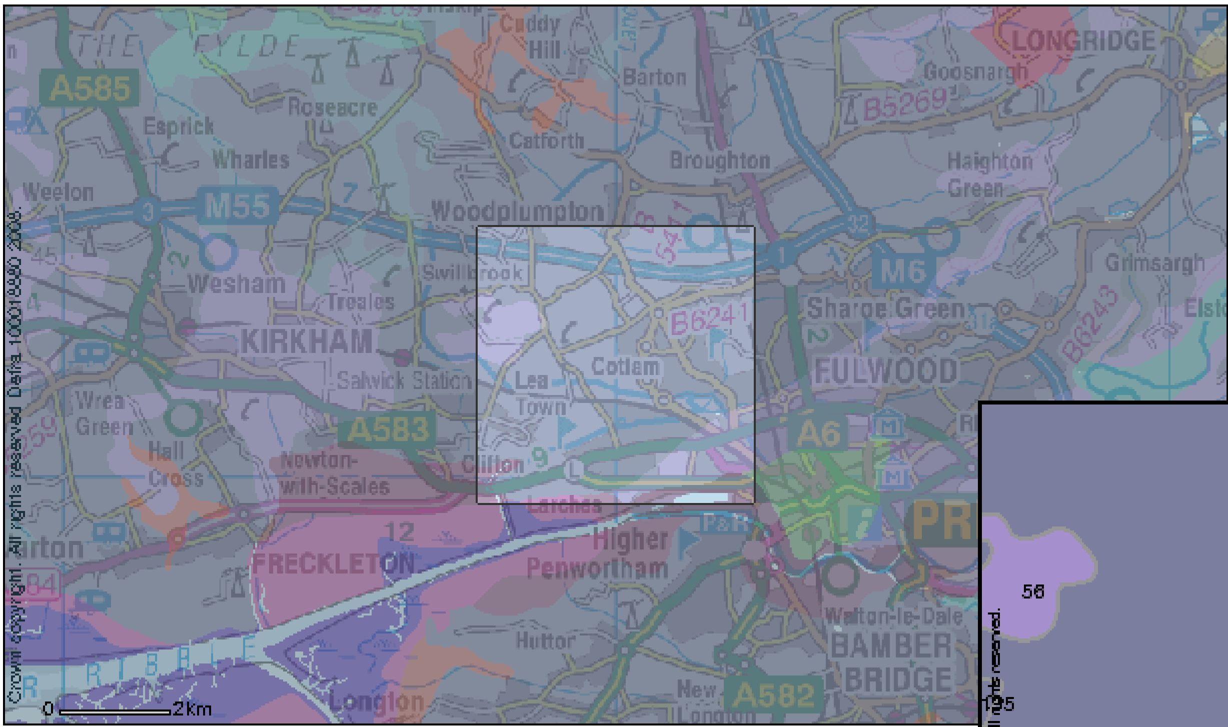
153 - *Reddish till*

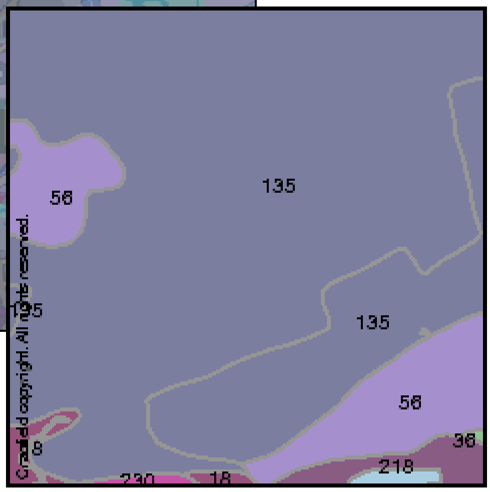
92 - *Glaciofluvial or river terrace drift*

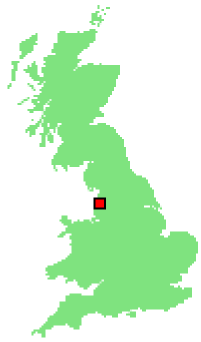
SOIL PARENT MATERIAL DESCRIPTION

Along with the effects of climate, relief, organisms and time, the underlying geology or 'parent material' has a very strong influence on the development of the soils of England and Wales. Through weathering, rocks contribute inorganic mineral grains to the soils and thus exhibit control on the soil texture. During the course of the creation of the national soil map, soil surveyors noted the parent material underlying each soil in England and Wales. It is these general descriptions of the regional geology which is provided in this map.

1k. EXPECTED CROPS AND LAND USE







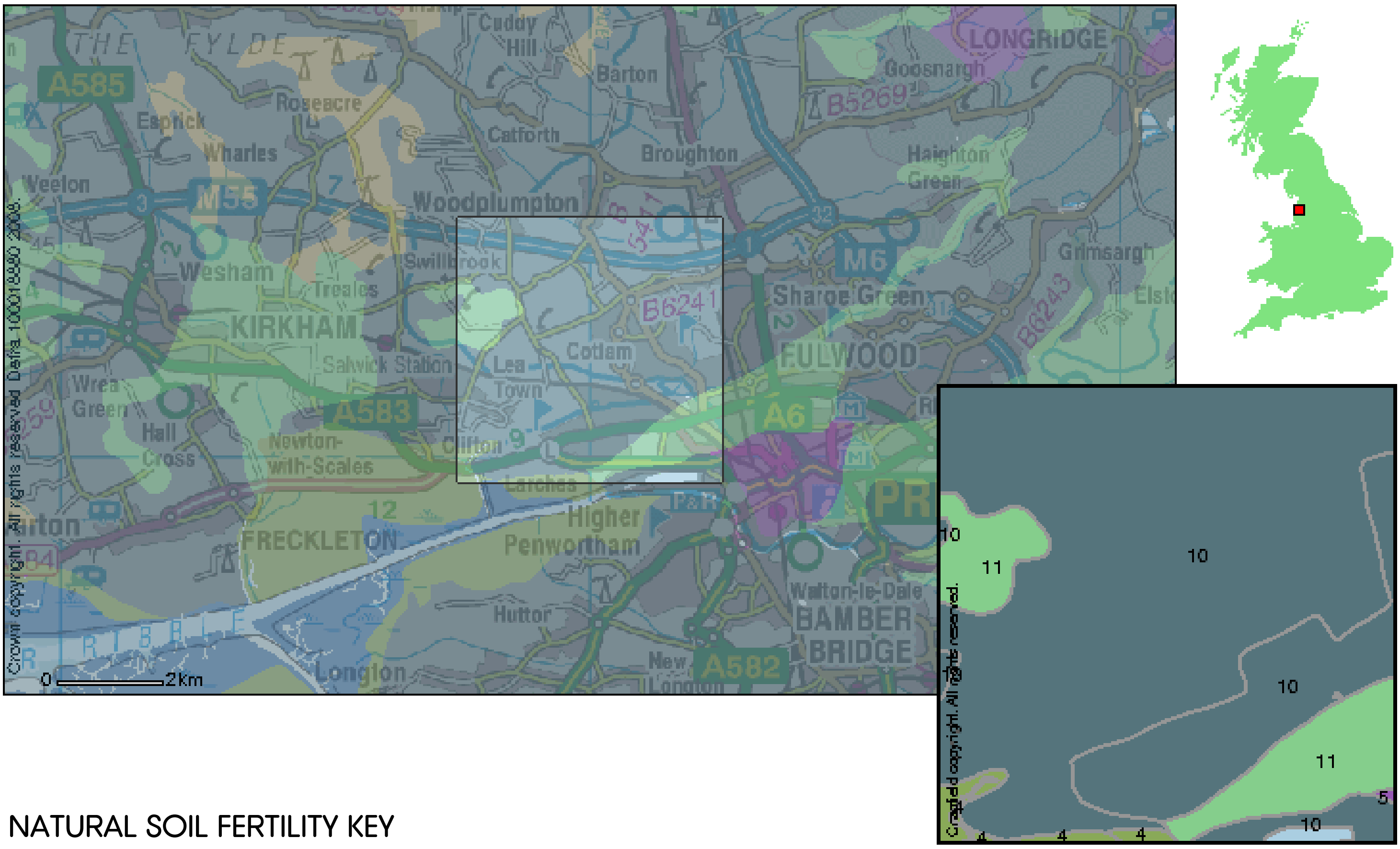
EXPECTED CROPS AND LAND USE KEY

- 135 - *Dairying on short term and permanent grassland, some cereals in drier districts.*
- 18 - *Cereals and permanent and short term grassland in Cumbria, arable and horticultural crops in the Fens.*
- 189 - *Saltmarsh habitats some summer grazing; recreation.*
- 218 - *Stock rearing on permanent grassland.*
- 230 - *Sugar beet, potatoes, field vegetables horticultural crops and cereals in the Fens; grassland and some cereals in mois*
- 36 - *Cereals and some horticultural crops in drier lowlands; stock rearing and dairying in Cumbria.*
- 56 - *Cereals, potatoes and sugar beet and some horticultural crops in drier lowlands, grassland in moist districts.*

EXPECTED CROPS AND LAND USE DESCRIPTION

Individual soils are commonly associated with particular forms of land cover and land use. Whilst the soil surveyors were mapping the whole of England and Wales, they took careful note of the range of use to which the land was being put. This map shows the most common forms of land use found on each soil unit.

11. NATURAL SOIL FERTILITY



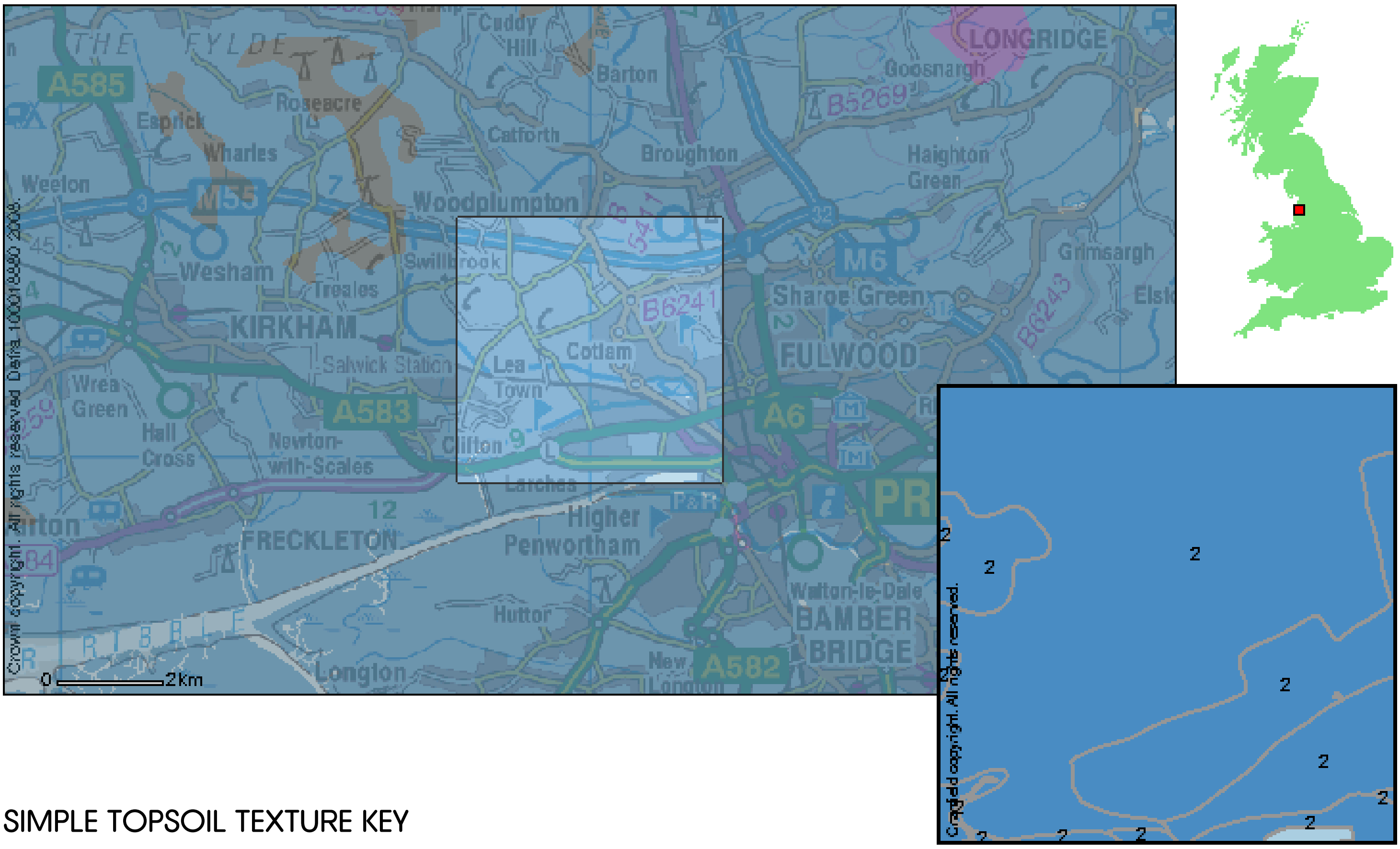
NATURAL SOIL FERTILITY KEY

- 10 - *Moderate*
- 11 - *Moderate to high*
- 3 - *Lime-rich but saline*
- 4 - *Lime-rich to moderate*
- 5 - *Low*

NATURAL SOIL FERTILITY DESCRIPTION

Soil fertility can be greatly altered by land management especially through the application of manures, lime and mineral fertilisers. What is shown in this map, however, is the likely natural fertility of each soil type. Soils that are very acid have low numbers of soil-living organisms and support heathland and acid woodland habitats. These are shown as of very low natural fertility. Soils identified as of low natural fertility are usually acid in reaction and are associated with a wide range of habitat types. The moderate class contains neutral to slightly acid soils, again with a wide range of potential habitats. Soil of high natural fertility are both naturally productive and able to support the base-rich pastures and woodlands that are now rarely encountered. Lime-rich soils contain chalk and limestone in excess, and are associated with downland, herb-rich pastures and chalk and limestone woodlands.

1m. SIMPLE TOPSOIL TEXTURE



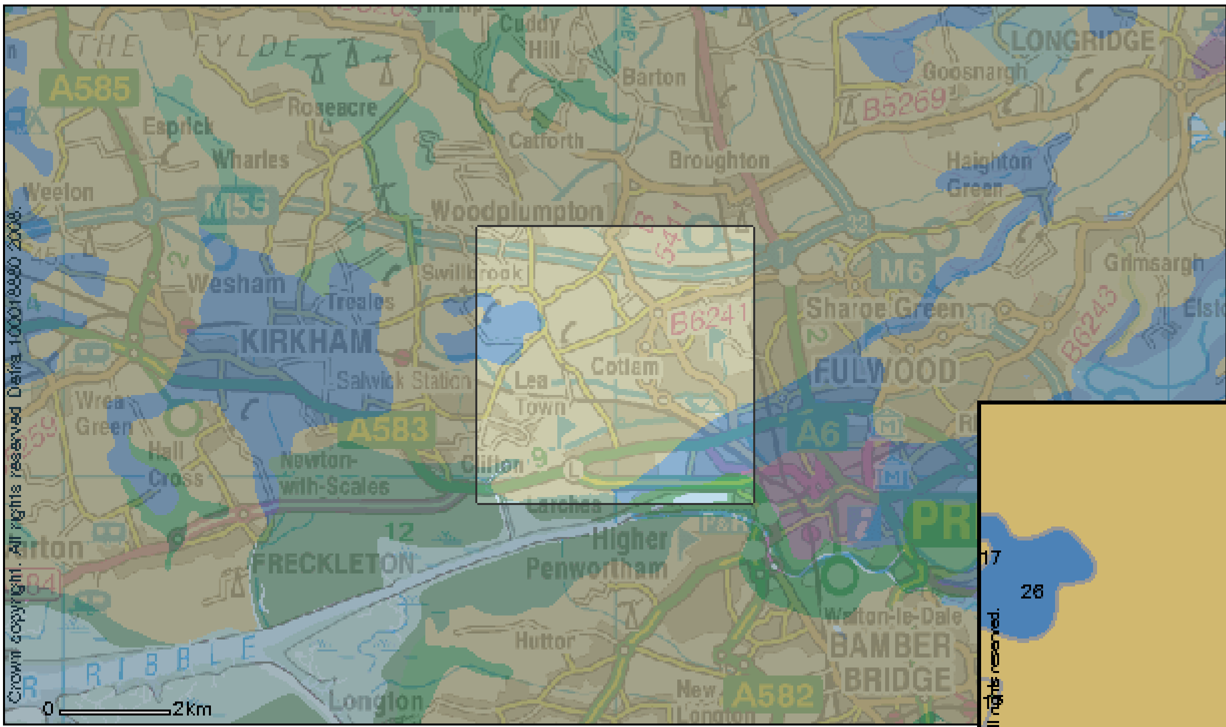
SIMPLE TOPSOIL TEXTURE KEY

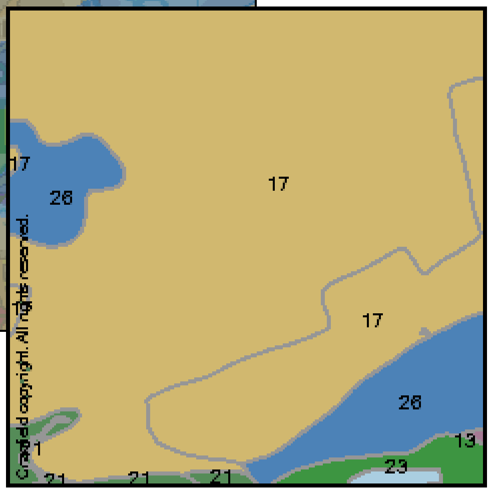
- 1 - *Clayey*
- 2 - *Loamy*
- 3 - *Peaty*
- 4 - *Sandy*

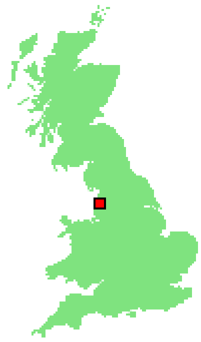
SIMPLE TOPSOIL TEXTURE DESCRIPTION

Soil texture is a term used in soil science to describe the physical composition of the soil in terms of the size of mineral particles in the soil. Specifically, we are concerned with the relative proportions of sand, silt and clay. Soil texture can vary between each soil layer or horizon as one moves down the profile. This map indicates the soil texture group of the upper 30 cm of the soil. 'Light' soils have more sand grains and are described as sandy, while 'heavy' soils have few sand grains but a lot of extremely small particles and are described as clayey. Loamy soils have a mix of sand, silt and clay-sized particles and are intermediate in character. Soils with a surface layer that is dominantly organic are described as Peaty. A good understanding of soil texture can enable better land management.

1n. TYPICAL HABITATS







TYPICAL HABITATS KEY

- 13 - *Neutral and acid pastures and deciduous woodlands; acid communities such as bracken and gorse in the uplands*
- 17 - *Seasonally wet pastures and woodlands*
- 21 - *Wet brackish coastal flood meadows*
- 23 - *Wet flood meadows with wet carr woodlands in old river meanders*
- 26 - *Wide range of pasture and woodland types*
- 5 - *Coastal salt marsh vegetation subject to tidal flooding*

TYPICAL HABITATS DESCRIPTION

There is a close relationship between vegetation and the underlying soil. Information about the types of broad habitat associated with each soil type is provided in this map. Soil fertility, pH, drainage and texture are important factors in determining the types of habitats which can be established. Elevation above sea level and sometimes even the aspect - the orientation of a hillslope - can affect the species present. This map does not take into account the recent land management or any urban development, but provides the likely natural habitats assuming good management has been carried out.

2. SOIL ASSOCIATION DESCRIPTIONS

The following pages describe the following soil map units, (soil associations), in more detail.

SALINE 1 220
Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.

WICK 1 541r
Deep well drained coarse loamy and sandy soils locally over gravel.

FLINT 572l
Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

SALOP 711m
Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils

HOLLINGTON 811c
Deep stoneless reddish fine silty and clayey soils variably affected by groundwater.

ROCKCLIFFE 811d
Deep stoneless silty and fine sandy soils variably affected by groundwater depending on artificial drainage.

WISBECH 812b
Deep stoneless calcareous coarse silty soils.

The soil associations are described in terms of their texture and drainage properties and potential risks may be identified. The distribution of the soils across England and Wales are provided. Further to this, properties of each association's component soil series are described in relation to each other. Lastly, schematic diagrams of each component series are provided for greater understanding and in-field verification purposes.

SALINE 1 (220)

Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.

a. General Description

Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.
The major landuse on this association is defined as saltmarsh habitats some summer grazing; recreation.

b. Distribution (England & Wales)

The SALINE 1 association covers 310km² of England and Wales which accounts for 0.2% of the landmass. The distribution of this association is shown in Figure 1. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the SALINE 1 association are outlined in Table 1 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endevoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 1.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

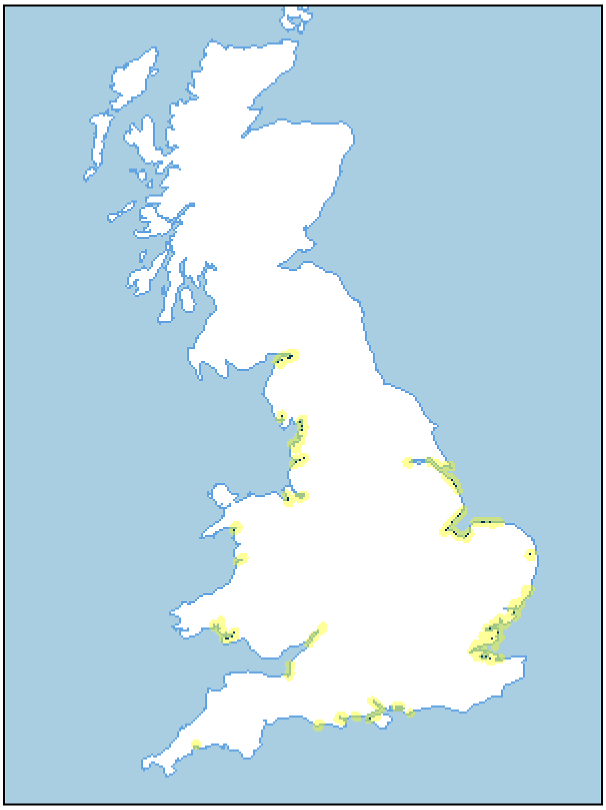


Figure 1. Association Distribution

Soil Series	Description	Area %
CY/CZY SALINE (cSA)	saline clayey over light silty marine alluvium	50%
WOLFERTON (WW)	saline clayey marine alluvium	25%
FRISKNEY (fS)	saline light silty marine alluvium	10%
BRANCASTER (Brn)	saline medium or coarse sandy stoneless drift	5%
NEWCHURCH (N)	clayey marine alluvium	5%
SY SALINE (sSA)	saline medium or coarse sandy stoneless drift	5%

Table 1. The component soil series of the SALINE 1 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

SALINE 1 (220)

Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.

d. SALINE 1 Component Series Profiles

Soil profile diagram not available for this series

Soil profile diagram not available for this series

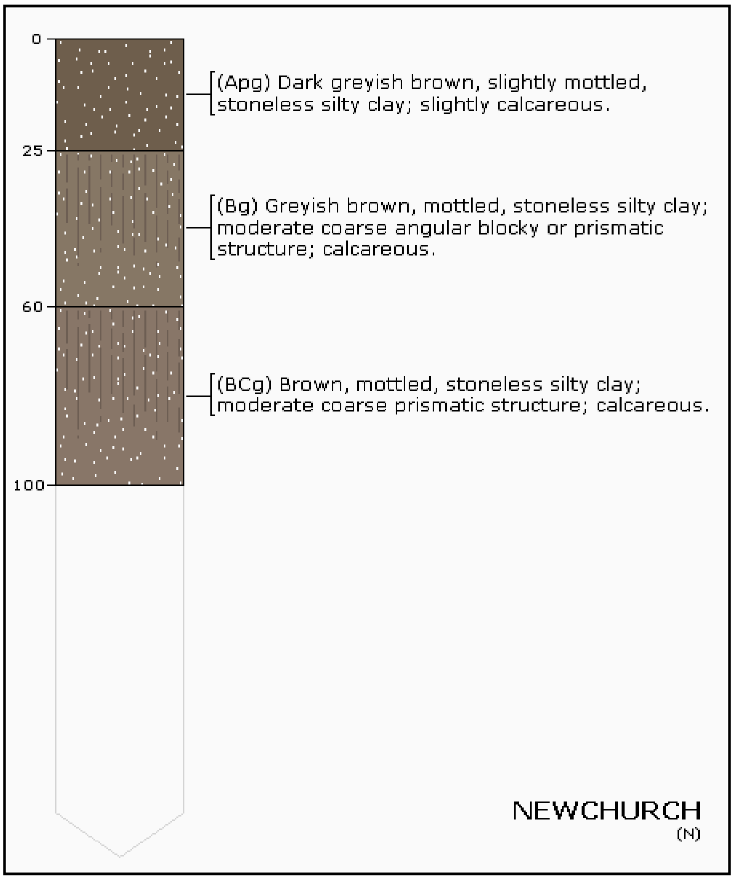
Soil profile diagram not available for this series

Soil profile diagram not available for this series

SALINE 1 (220)

Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.

d. SALINE 1 Component Series Profiles continued



Soil profile diagram not available for this series

SALINE 1 (220)

Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.

e. Soil Properties

This section provides graphical summaries of selected attribute data available for the component series in this association. The blue bars of the graphs presented in this section describe the range of property values for all soils across England and Wales. Superimposed on these graphs are the values for the component soil series in this association. This has been done to provide the reader with an understanding of where each property for each series sits within the national context.

Soil Series	Description	Area %
CY/CZY SALINE (cSA)	saline clayey over light silty marine alluvium	50%
WOLFERTON (WW)	saline clayey marine alluvium	25%
FRISKNEY (fS)	saline light silty marine alluvium	10%
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NEWCHURCH (N)	clayey marine alluvium	5%
SY SALINE (sSA)	saline medium or coarse sandy stoneless drift	5%

Table 1. The component soil series of the SALINE 1 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

e(i). Soil Depth Information and Depths to Important Layers

Depth to rock A mean depth to bedrock or very stony rubble which has been assigned to each soil series based on observed and recorded soil profiles.

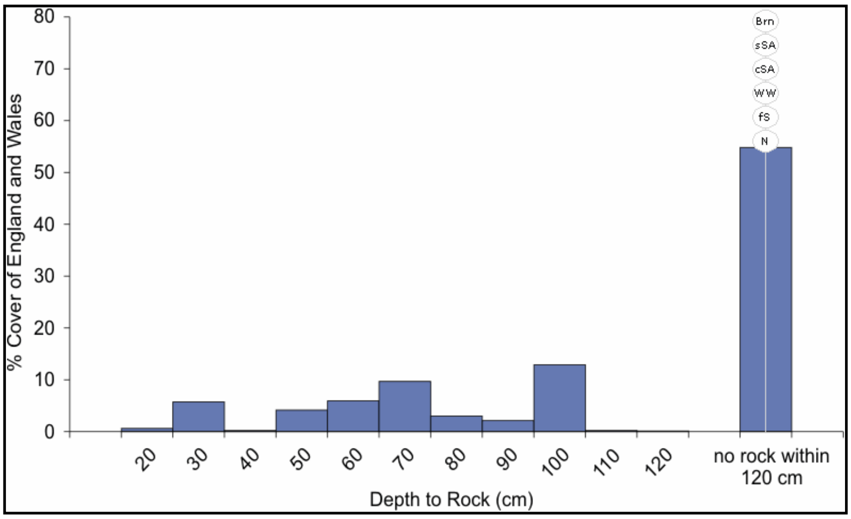


Figure 2. Depth of soil to Rock

Depth to gleying, the presence of grey and ochreous mottles within the soil, is caused by intermittent waterlogging. A mean depth to gleying has been assigned to each soil series based on observed and recorded soil profiles. The definition of a gleyed layer is designed to equate with saturation for at least 30 days in each year or the presence of artificial drainage.

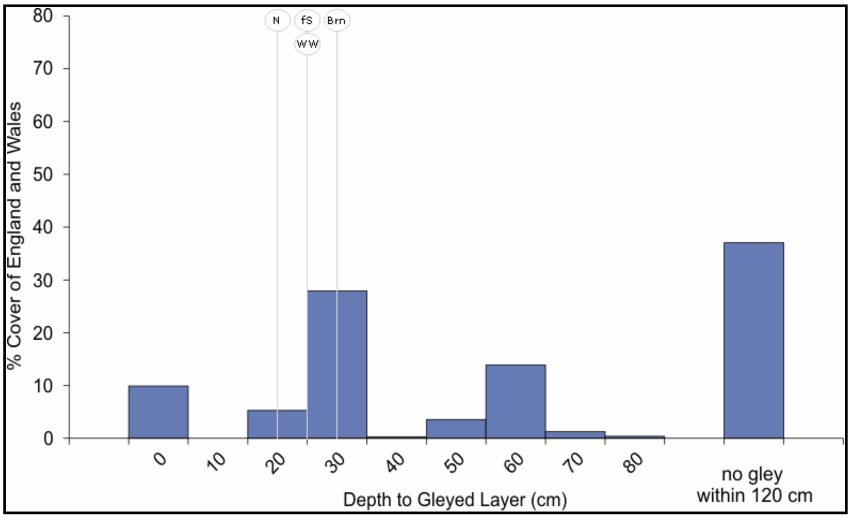


Figure 3. Depth of Soil to Gleying

SALINE 1 (220)

Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.

e(i). Soil Depth Information and Depths to Important Layers continued

Depth to slowly permeable layer (downward percolation) A mean depth to a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede downward percolation of excess soil water. This causes periodic saturation in the overlying soil, reduced storage capacity and therefore increased hydrological response to rainfall events.

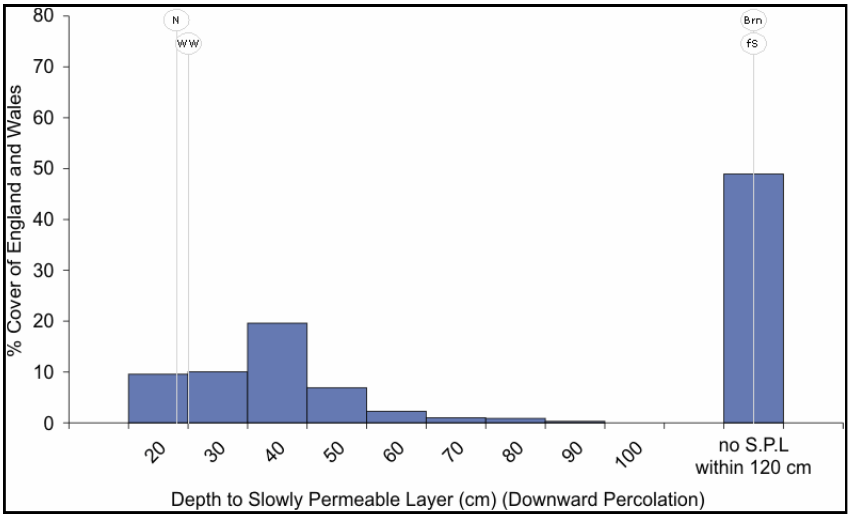


Figure 4. Depth to slowly permeable layer (downward percolation)

Depth to Slowly Permeable Layer (upward diffusion) A mean depth to the bottom of a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede upward diffusion of water and gasses.

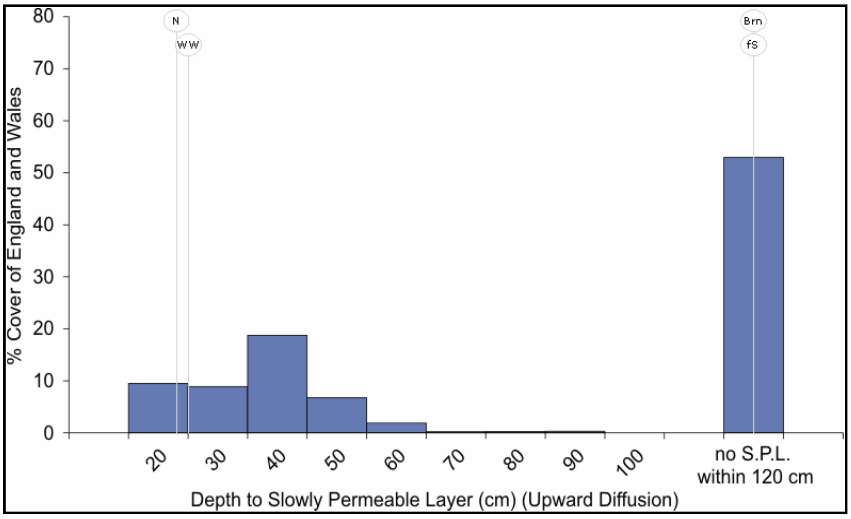


Figure 5. Depth to Slowly Permeable Layer (upward diffusion)

SALINE 1 (220)

Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.

e(ii). Soil Hydrological Information

Integrated air capacity (IAC) is the total coarse pore space (>60 μm diameter) to 1 m depth. This size of pore would normally be air-filled when the soil is fully moist but not waterlogged. A large IAC means that the soil is well aerated. This will encourage root development and, provided near surface soil structure is well developed, will allow rainfall to percolate into the ground thus mitigating against localised flooding.

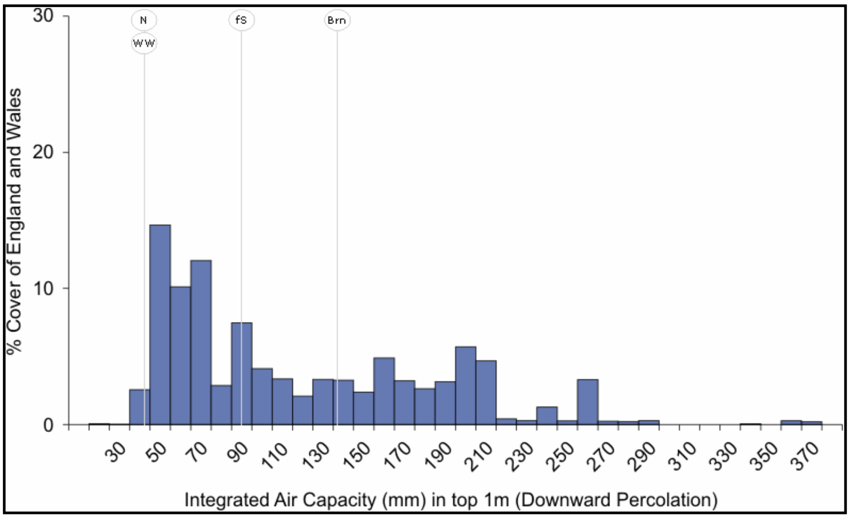


Figure 6. Integrated Air Capacity

Standard Percentage Runoff (SPR) is the percentage of rainfall that causes the short-term increase in flow seen at a catchment outlet following a storm event. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

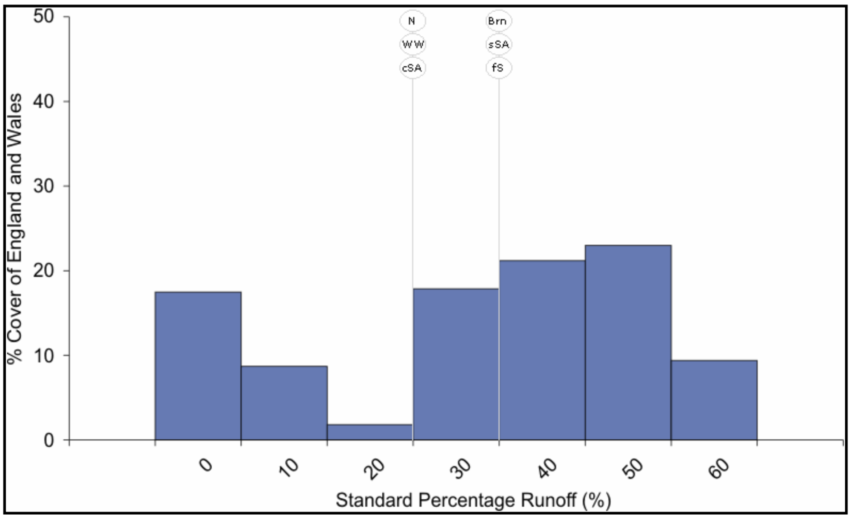


Figure 7. Standard Percentage Runoff

Base flow index is calculated from daily river flow data and expresses the volume of base flow of a river as a fraction of the total flow volume. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

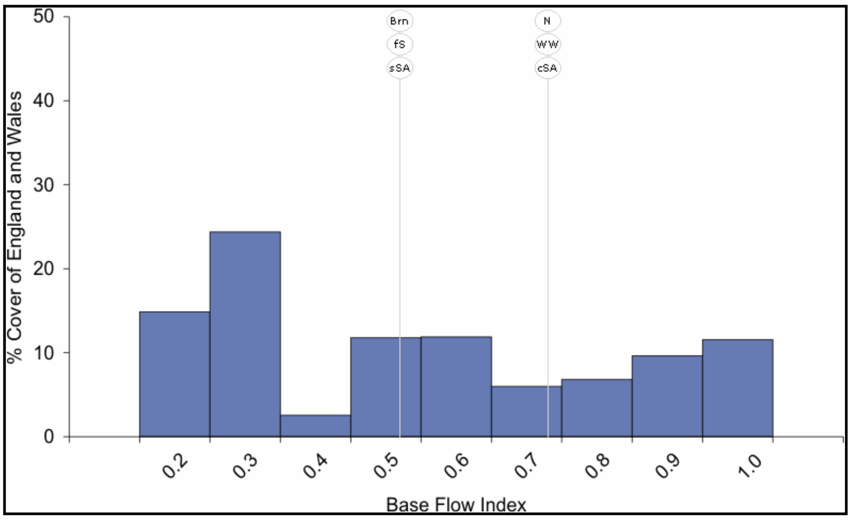


Figure 8. Base Flow Index

SALINE 1 (220)

Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.

e(iii). Available Water Content

Available water content for plants varies depending on a number of factors, including the rooting depth of the plants. Described below are differing available water contents for cereals, sugar beet, grass and potato crops, as well as a generic available water value to 1 m depth.

Available water (by crop) Available water content to 1 m for the specified soil series between suctions of 5 and 1500kPa.

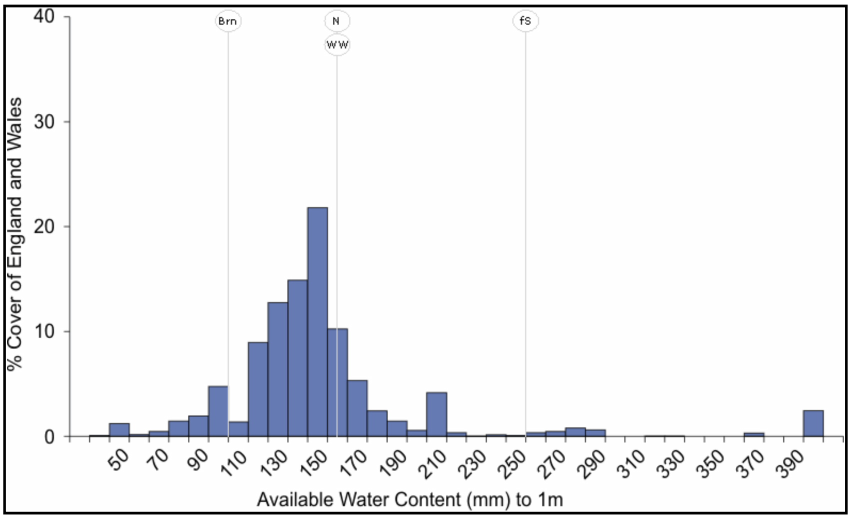


Figure 9. Available Water (by crop)

Available water for grass represents the water that is available to a permanent grass sward that is able to root to 100cm depth.

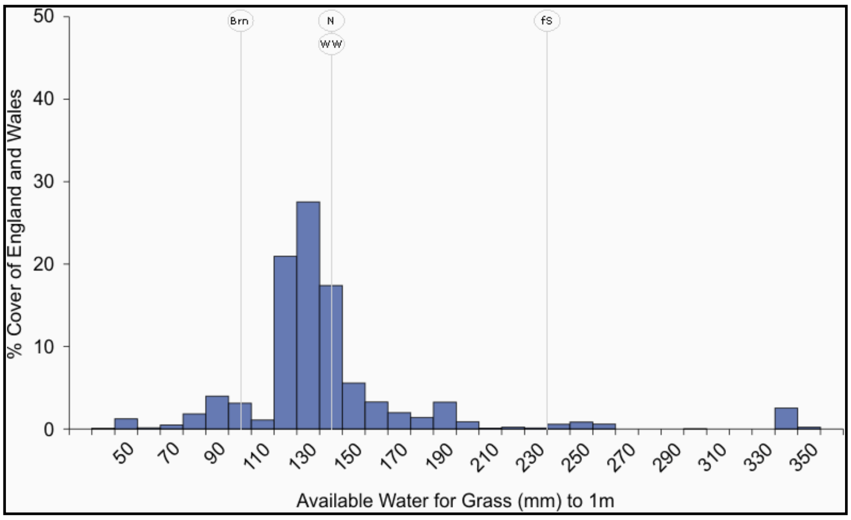


Figure 10. Available Water for Grass

SALINE 1 (220)

Soils of variable texture flooded by high tides. Many are soft and unripened, others, often on higher sites or of sandy texture, are firm and ripened. Frequently calcareous.

e(iii). Available Water Content continued

Available water for cereal represents the water that is available to a cereal crop that is able to root to 120cm depth.

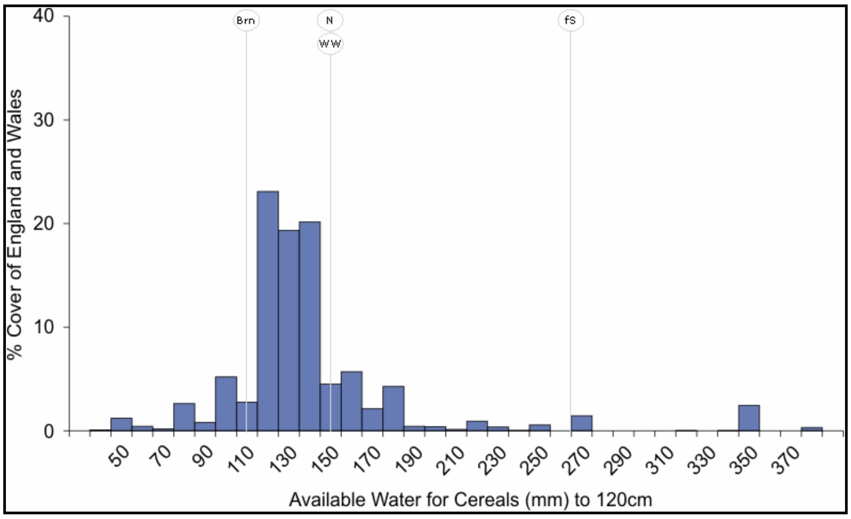


Figure 11. Available Water for Cereal

Available water for Sugar Beet represents the water that is available to a sugar beet crop that is able to root to 140cm depth.

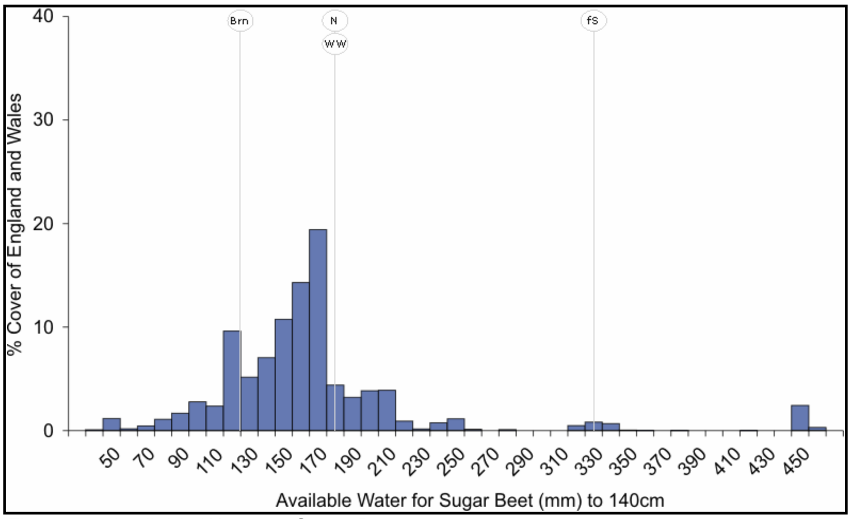


Figure 12. Available Water for Sugar Beet

Available water for Potatoes represents the water that is available to a potato crop that is able to root to 70cm depth.

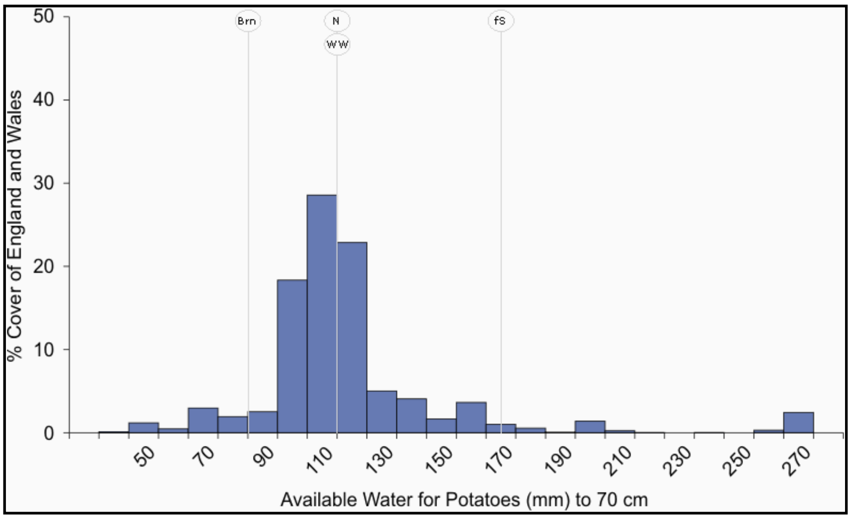


Figure 13. Available Water for Potatoes

WICK 1 (541r)

Deep well drained coarse loamy and sandy soils locally over gravel.

a. General Description

Deep well drained coarse loamy and sandy soils locally over gravel. Some similar soils affected by groundwater. Slight risk of water erosion.
The major landuse on this association is defined as cereals and some horticultural crops in drier lowlands; stock rearing and dairying in cumbria.

b. Distribution (England & Wales)

The WICK 1 association covers 2531km² of England and Wales which accounts for 1.67% of the landmass. The distribution of this association is shown in Figure 14. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the WICK 1 association are outlined in Table 2 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endevoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 2.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

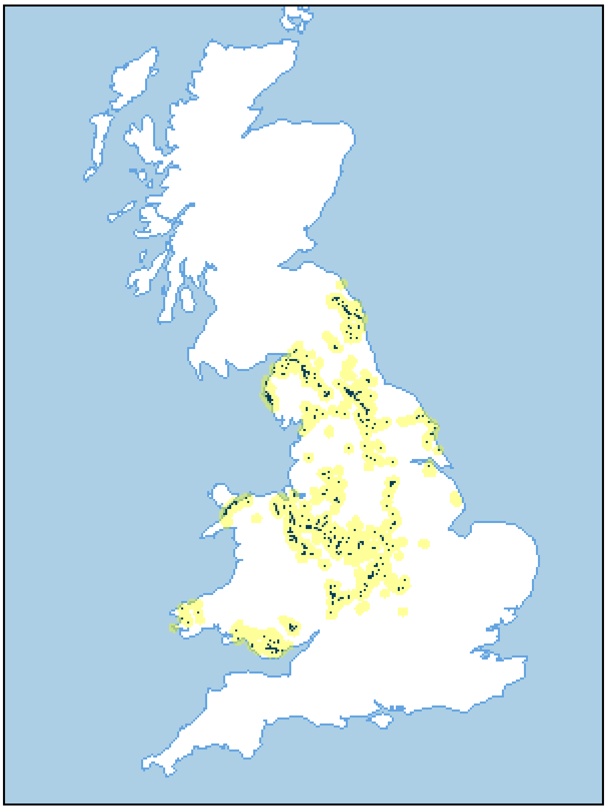


Figure 14. Association Distribution

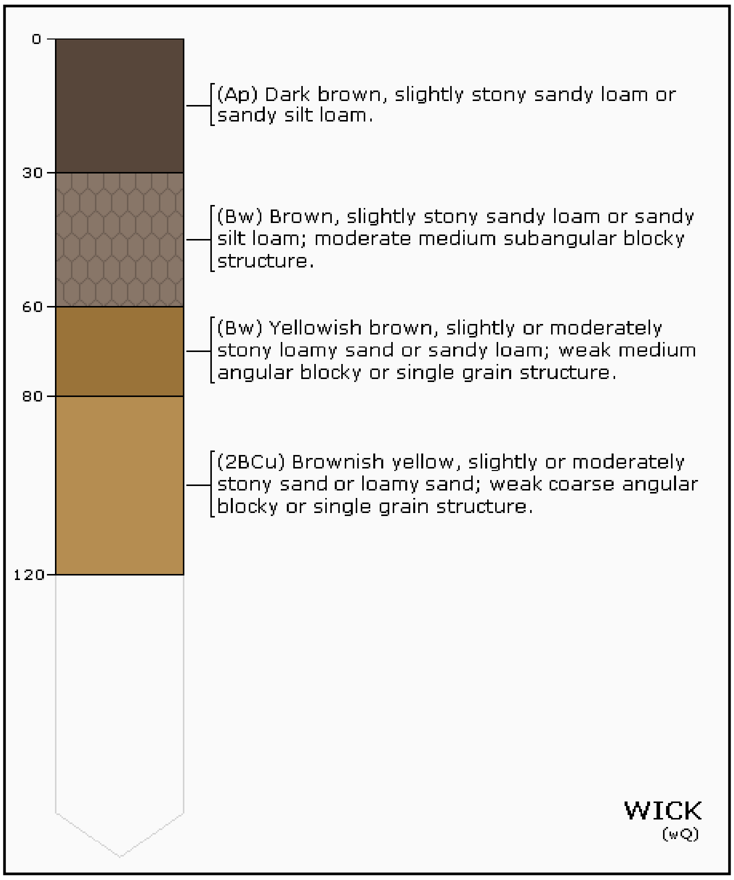
Soil Series	Description	Area %
WICK (wQ)	light loamy drift with siliceous stones	45%
ARROW (aO)	light loamy drift with siliceous stones	20%
NEWPORT (Na)	sandy drift with siliceous stones	15%
OTHER	other minor soils	20%

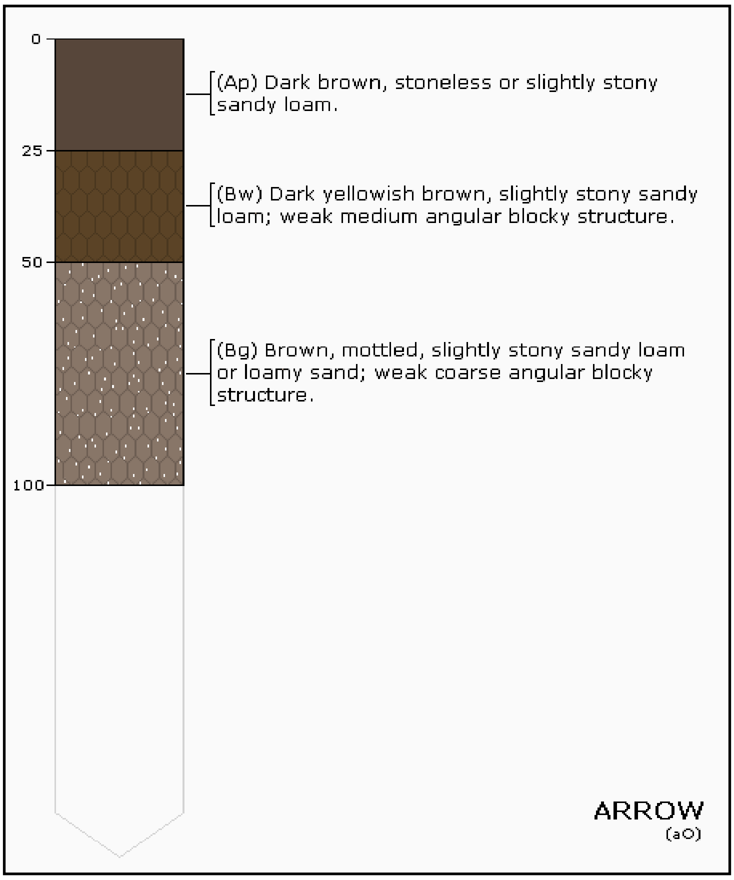
Table 2. The component soil series of the WICK 1 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

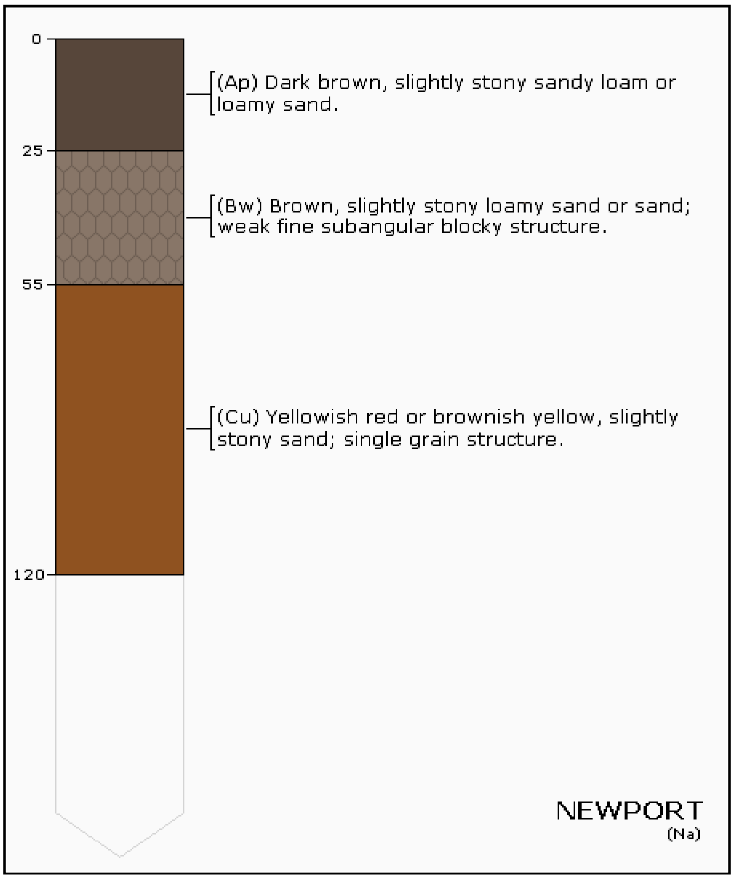
WICK 1 (541r)

Deep well drained coarse loamy and sandy soils locally over gravel.

d. WICK 1 Component Series Profiles







WICK 1 (541r)

Deep well drained coarse loamy and sandy soils locally over gravel.

e. Soil Properties

This section provides graphical summaries of selected attribute data available for the component series in this association. The blue bars of the graphs presented in this section describe the range of property values for all soils across England and Wales. Superimposed on these graphs are the values for the component soil series in this association. This has been done to provide the reader with an understanding of where each property for each series sits within the national context.

Soil Series	Description	Area %
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NEWPORT (Na)	sandy drift with siliceous stones	15%
OTHER	other minor soils	20%

Table 2. The component soil series of the WICK 1 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

e(i). Soil Depth Information and Depths to Important Layers

Depth to rock A mean depth to bedrock or very stony rubble which has been assigned to each soil series based on observed and recorded soil profiles.

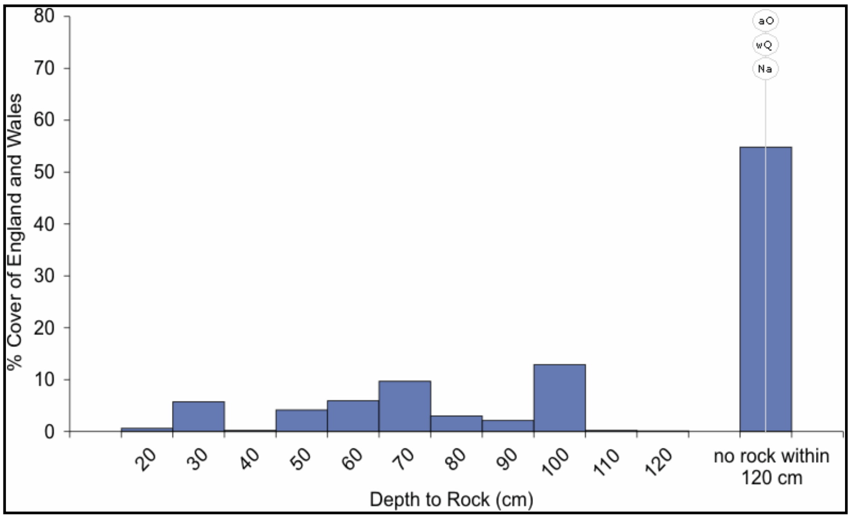


Figure 15. Depth of soil to Rock

Depth to gleying, the presence of grey and ochreous mottles within the soil, is caused by intermittent waterlogging. A mean depth to gleying has been assigned to each soil series based on observed and recorded soil profiles. The definition of a gleyed layer is designed to equate with saturation for at least 30 days in each year or the presence of artificial drainage.

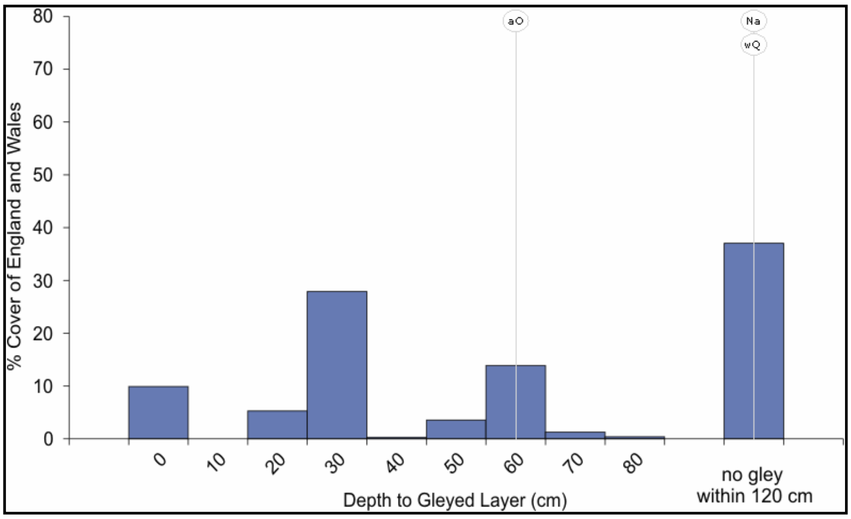


Figure 16. Depth of Soil to Gleying

WICK 1 (541r)

Deep well drained coarse loamy and sandy soils locally over gravel.

e(i). Soil Depth Information and Depths to Important Layers continued

Depth to slowly permeable layer (downward percolation) A mean depth to a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede downward percolation of excess soil water. This causes periodic saturation in the overlying soil, reduced storage capacity and therefore increased hydrological response to rainfall events.

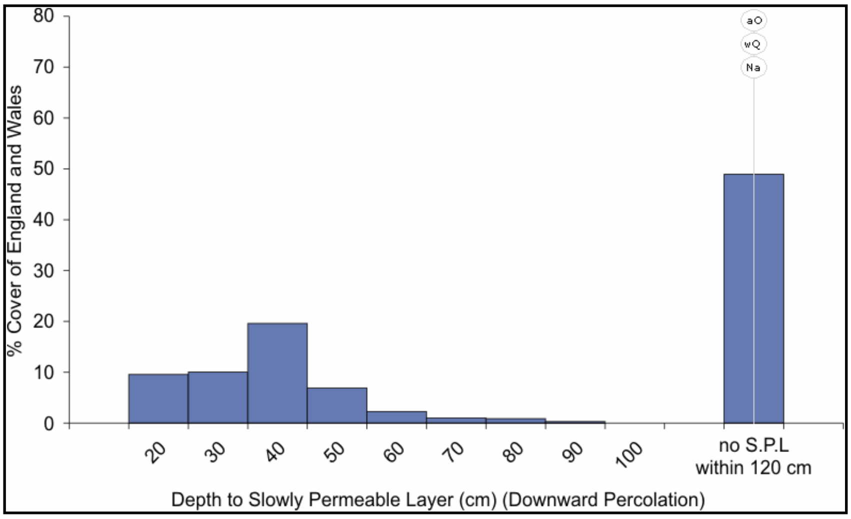


Figure 17. Depth to slowly permeable layer (downward percolation)

Depth to Slowly Permeable Layer (upward diffusion) A mean depth to the bottom of a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede upward diffusion of water and gasses.

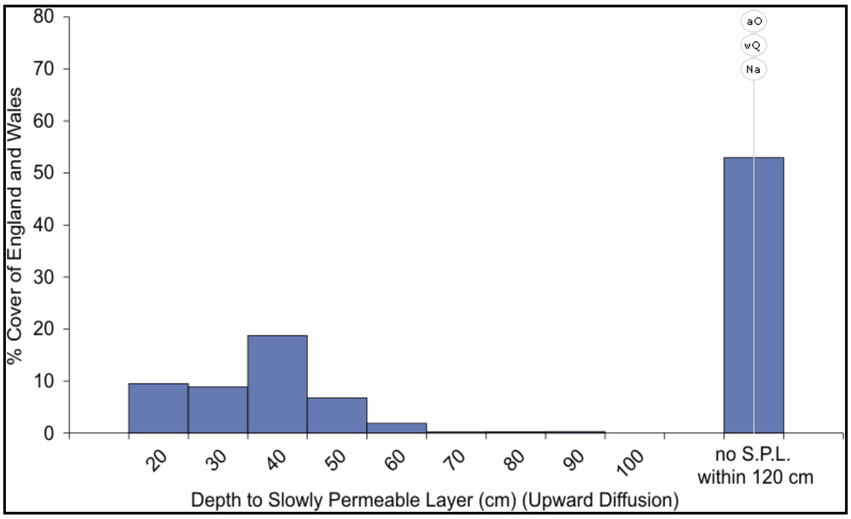


Figure 18. Depth to Slowly Permeable Layer (upward diffusion)

WICK 1 (541r)

Deep well drained coarse loamy and sandy soils locally over gravel.

e(ii). Soil Hydrological Information

Integrated air capacity (IAC) is the total coarse pore space (>60 μm diameter) to 1 m depth. This size of pore would normally be air-filled when the soil is fully moist but not waterlogged. A large IAC means that the soil is well aerated. This will encourage root development and, provided near surface soil structure is well developed, will allow rainfall to percolate into the ground thus mitigating against localised flooding.

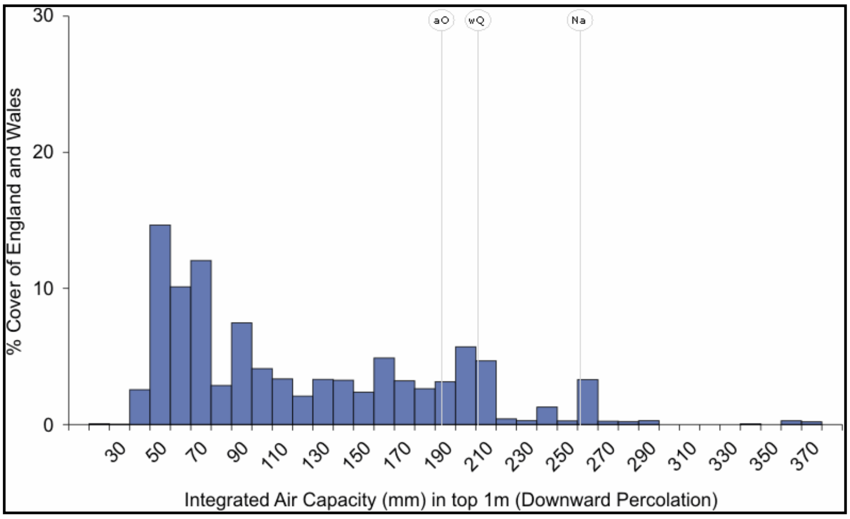


Figure 19. Integrated Air Capacity

Standard Percentage Runoff (SPR) is the percentage of rainfall that causes the short-term increase in flow seen at a catchment outlet following a storm event. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

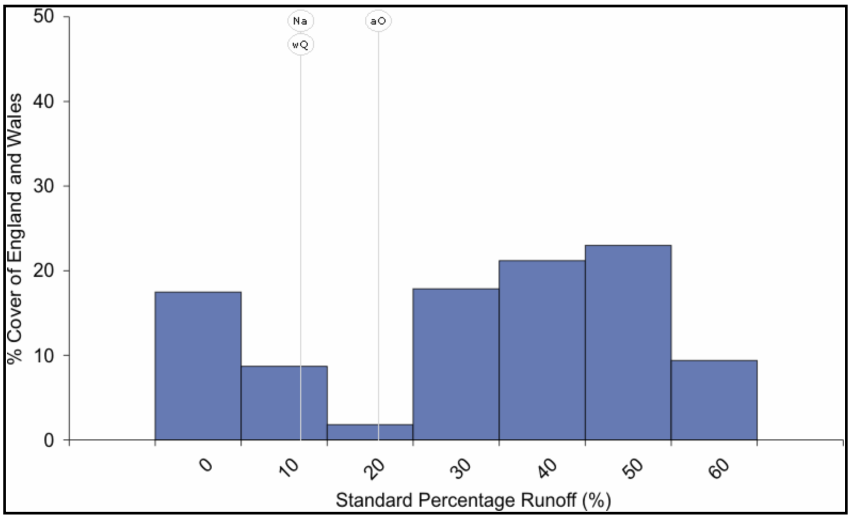


Figure 20. Standard Percentage Runoff

Base flow index is calculated from daily river flow data and expresses the volume of base flow of a river as a fraction of the total flow volume. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

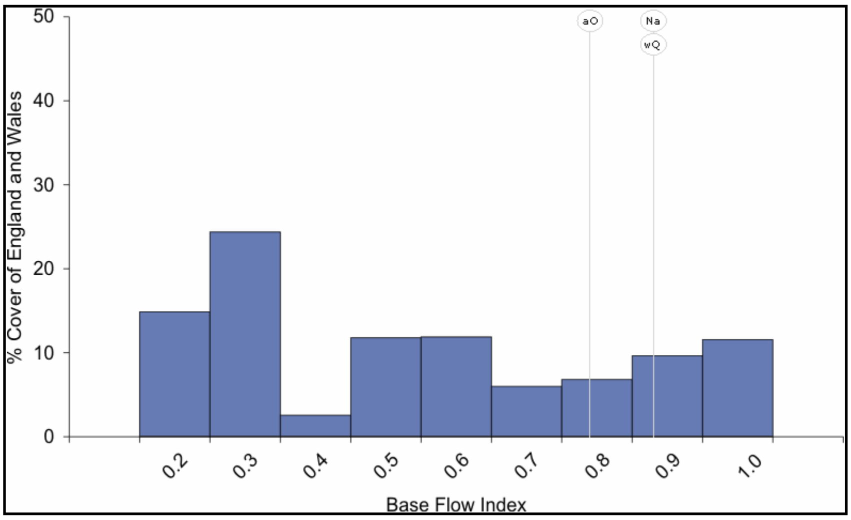


Figure 21. Base Flow Index

WICK 1 (541r)

Deep well drained coarse loamy and sandy soils locally over gravel.

e(iii). Available Water Content

Available water content for plants varies depending on a number of factors, including the rooting depth of the plants. Described below are differing available water contents for cereals, sugar beet, grass and potato crops, as well as a generic available water value to 1 m depth.

Available water (by crop) Available water content to 1 m for the specified soil series between suctions of 5 and 1500kPa.

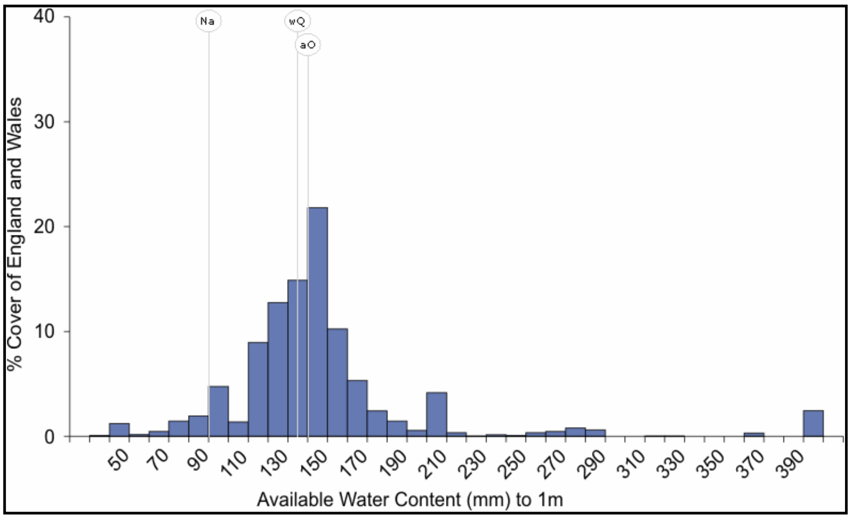


Figure 22. Available Water (by crop)

Available water for grass represents the water that is available to a permanent grass sward that is able to root to 100cm depth.

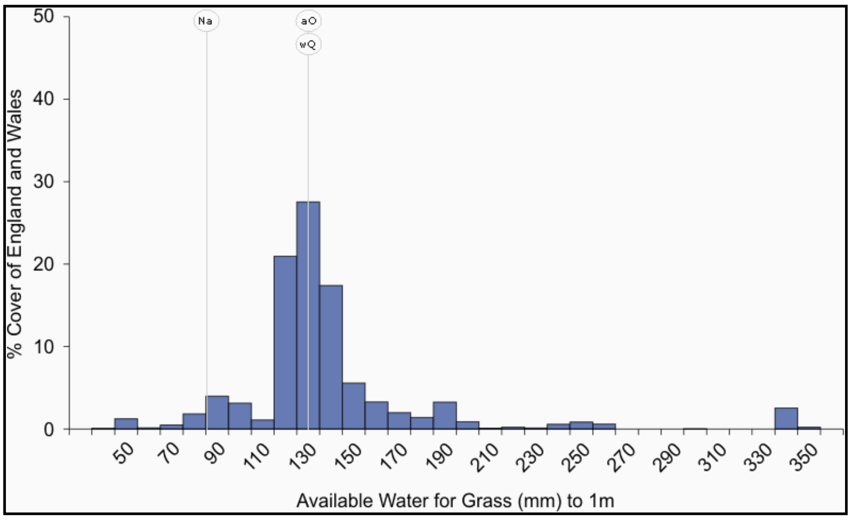


Figure 23. Available Water for Grass

WICK 1 (541r)

Deep well drained coarse loamy and sandy soils locally over gravel.

e(iii). Available Water Content continued

Available water for cereal represents the water that is available to a cereal crop that is able to root to 120cm depth.

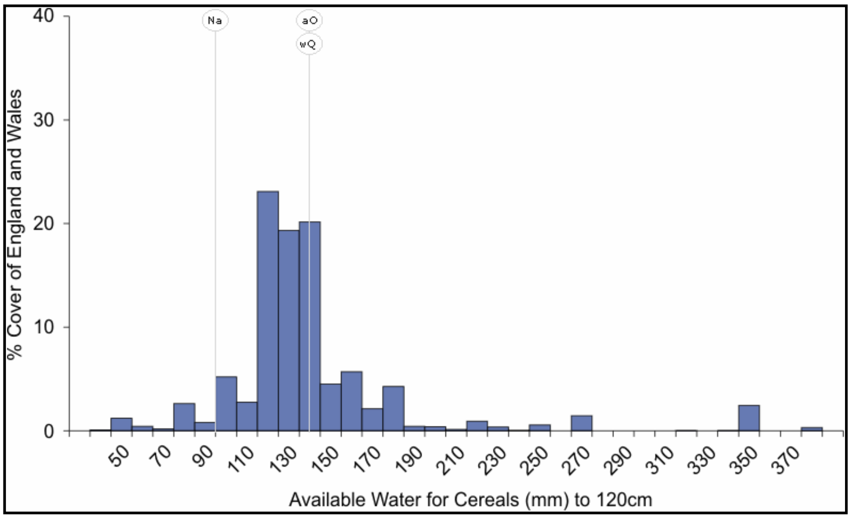


Figure 24. Available Water for Cereal

Available water for Sugar Beet represents the water that is available to a sugar beet crop that is able to root to 140cm depth.

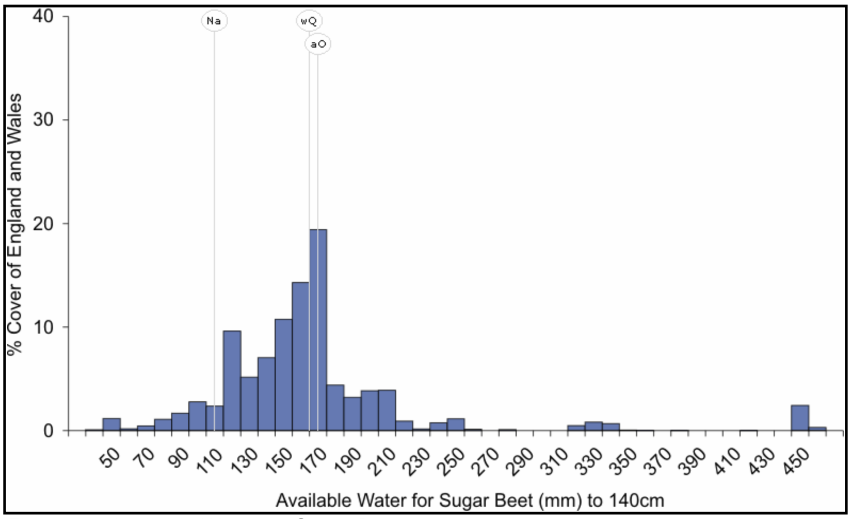


Figure 25. Available Water for Sugar Beet

Available water for Potatoes represents the water that is available to a potato crop that is able to root to 70cm depth.

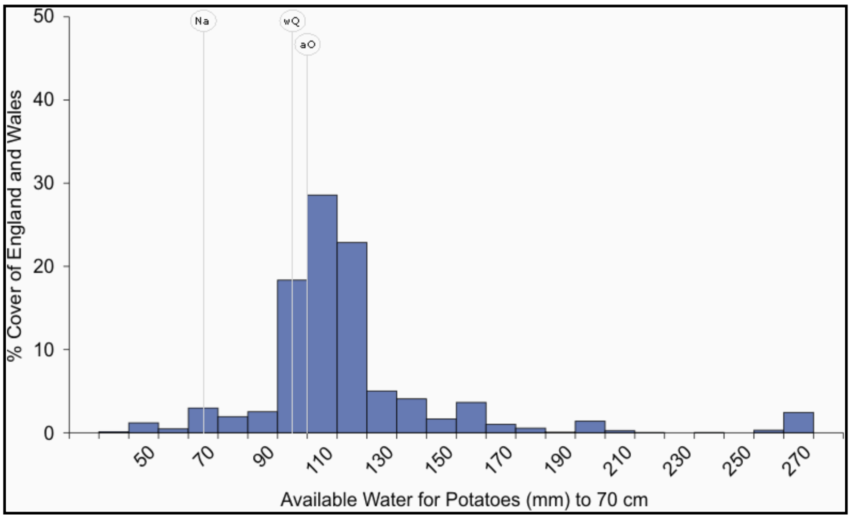


Figure 26. Available Water for Potatoes

FLINT (572l)

Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

a. General Description
Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging. Some similar fine loamy soils and some slowly permeable seasonally waterlogged fine loamy over clayey soils.
The major landuse on this association is defined as cereals, potatoes and sugar beet and some horticultural crops in drier lowlands, grassland in moist districts.

b. Distribution (England & Wales)
The FLINT association covers 393km² of England and Wales which accounts for 0.26% of the landmass. The distribution of this association is shown in Figure 27. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

c. Comprising Soil Series
Multiple soil series comprise a soil association. The soil series of the FLINT association are outlined in Table 3 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endevoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 3.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

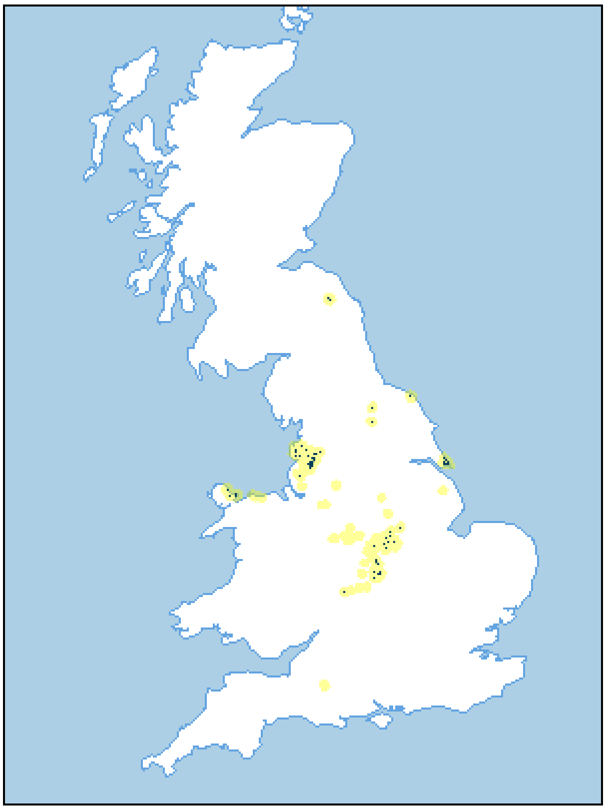


Figure 27. Association Distribution

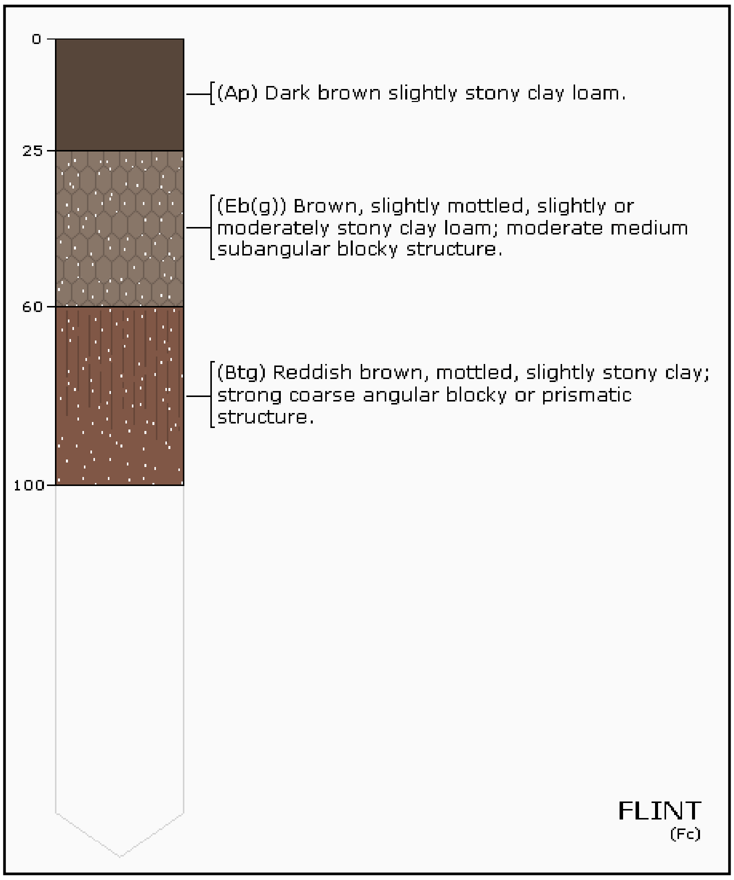
Soil Series	Description	Area %
FLINT (Fc)	reddish medium loamy over clayey drift with siliceous stones	45%
SALWICK (So)	reddish medium loamy drift with siliceous stones	25%
SALOP (Sh)	reddish medium loamy over clayey drift with siliceous stones	10%
OTHER	other minor soils	20%

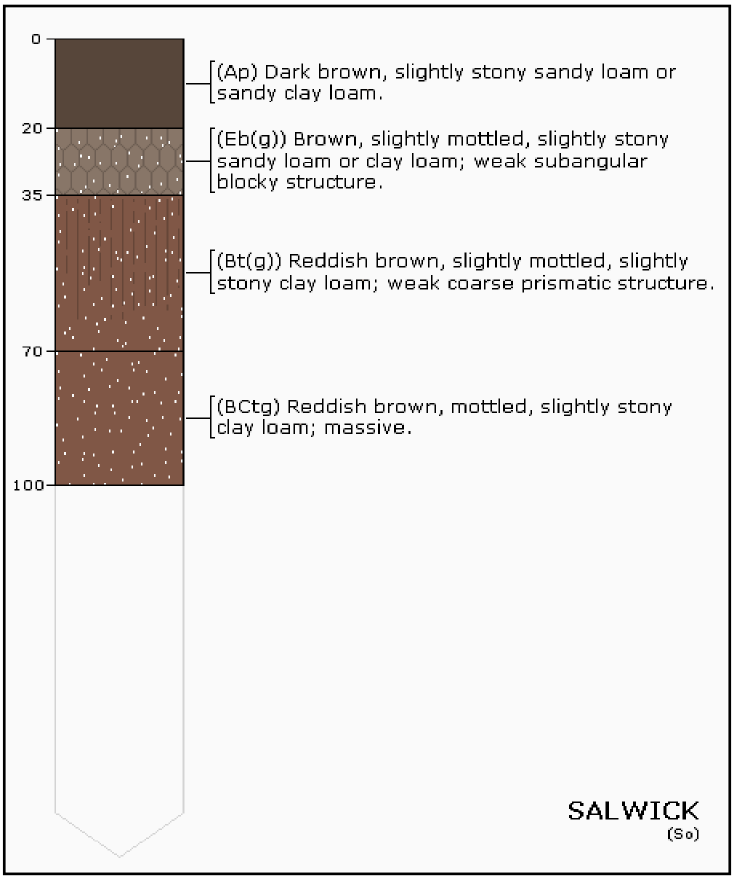
Table 3. The component soil series of the FLINT soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

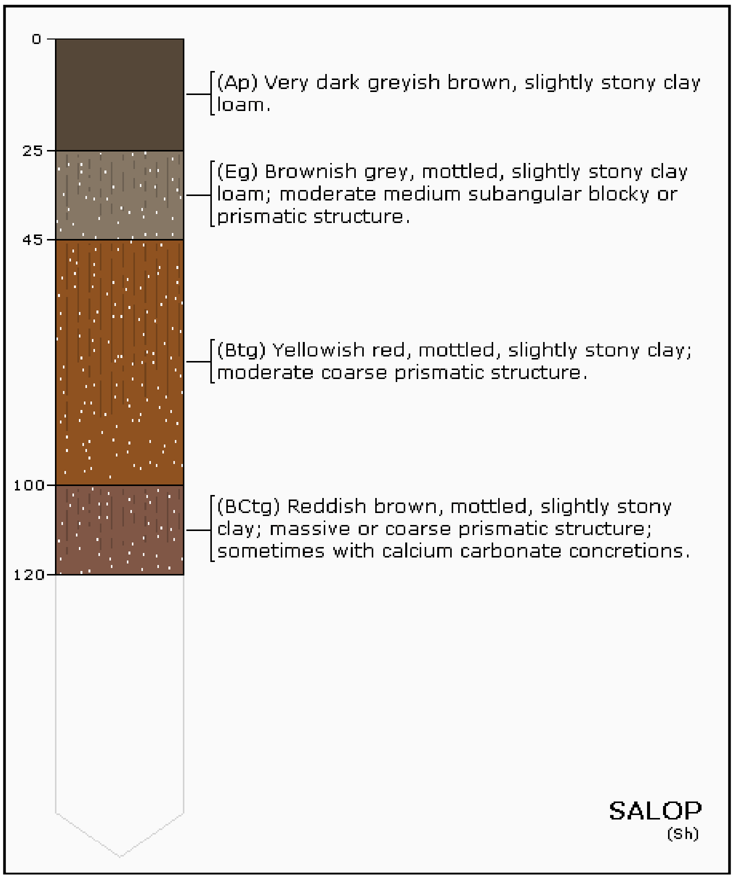
FLINT (572l)

Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

d. FLINT Component Series Profiles







FLINT (572l)

Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

e. Soil Properties

This section provides graphical summaries of selected attribute data available for the component series in this association. The blue bars of the graphs presented in this section describe the range of property values for all soils across England and Wales. Superimposed on these graphs are the values for the component soil series in this association. This has been done to provide the reader with an understanding of where each property for each series sits within the national context.

Soil Series	Description	Area %
FLINT (Fc)	reddish medium loamy over clayey drift with siliceous stones	45%
SALWICK (So)	reddish medium loamy drift with siliceous stones	25%
SALOP (Sh)	reddish medium loamy over clayey drift with siliceous stones	10%
OTHER	other minor soils	20%

Table 3. The component soil series of the FLINT soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

e(i). Soil Depth Information and Depths to Important Layers

Depth to rock A mean depth to bedrock or very stony rubble which has been assigned to each soil series based on observed and recorded soil profiles.

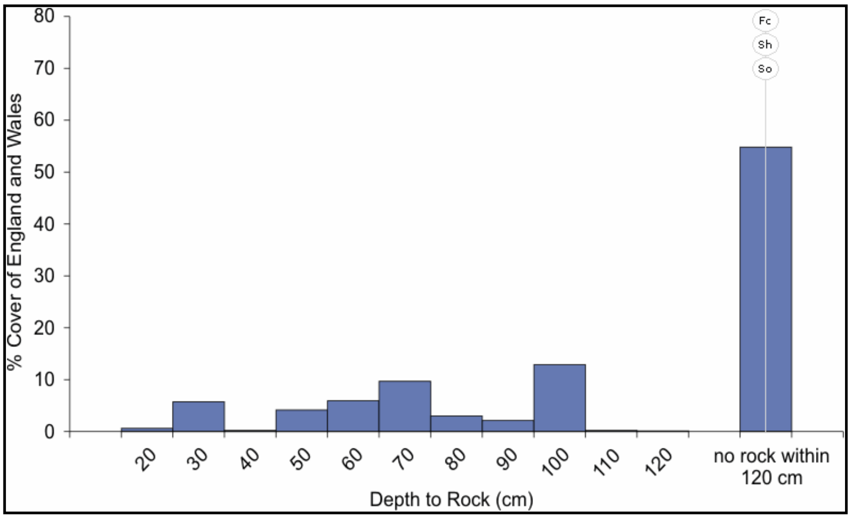


Figure 28. Depth of soil to Rock

Depth to gleying, the presence of grey and ochreous mottles within the soil, is caused by intermittent waterlogging. A mean depth to gleying has been assigned to each soil series based on observed and recorded soil profiles. The definition of a gleyed layer is designed to equate with saturation for at least 30 days in each year or the presence of artificial drainage.

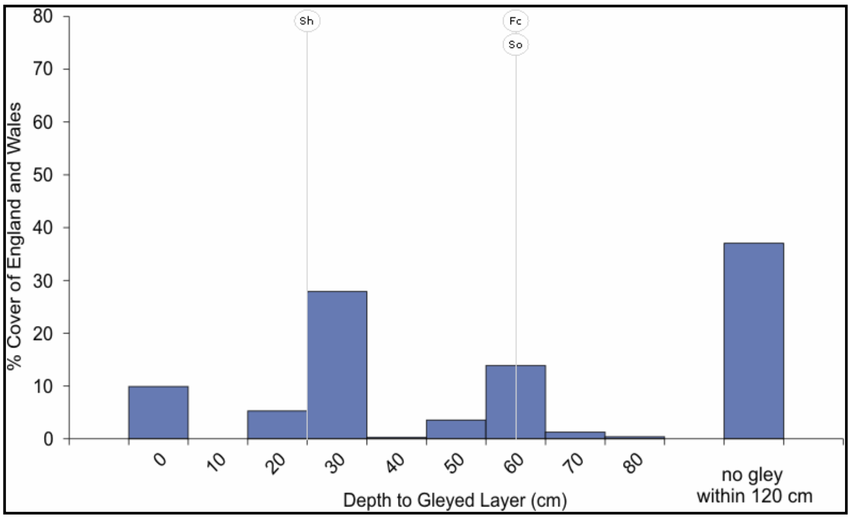


Figure 29. Depth of Soil to Gleying

FLINT (572l)

Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

e(i). Soil Depth Information and Depths to Important Layers continued

Depth to slowly permeable layer (downward percolation) A mean depth to a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede downward percolation of excess soil water. This causes periodic saturation in the overlying soil, reduced storage capacity and therefore increased hydrological response to rainfall events.

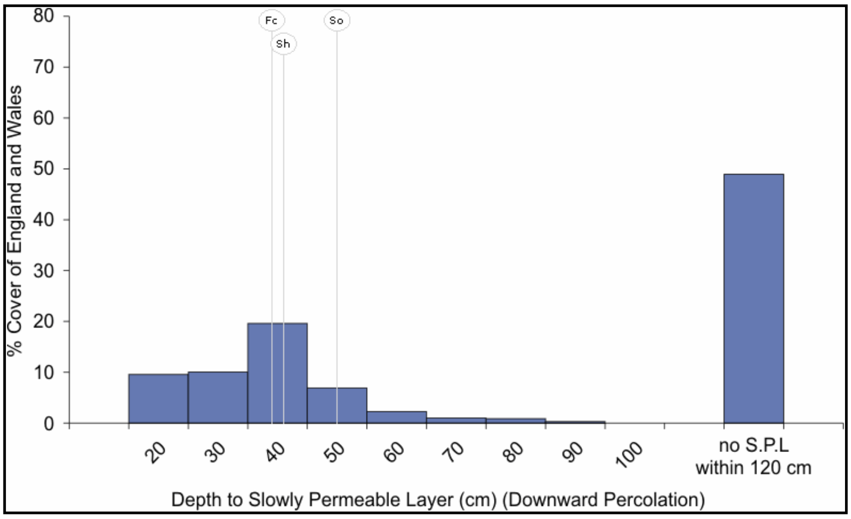


Figure 30. Depth to slowly permeable layer (downward percolation)

Depth to Slowly Permeable Layer (upward diffusion) A mean depth to the bottom of a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede upward diffusion of water and gasses.

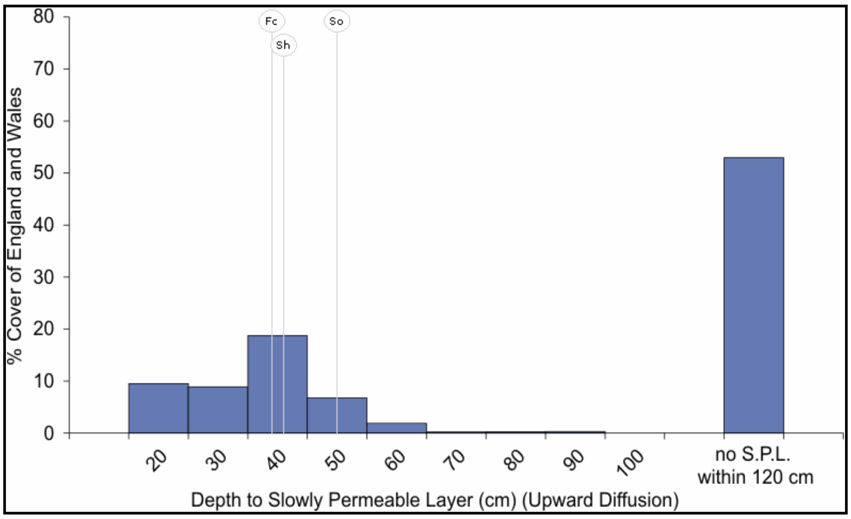


Figure 31. Depth to Slowly Permeable Layer (upward diffusion)

FLINT (572l)

Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

e(ii). Soil Hydrological Information

Integrated air capacity (IAC) is the total coarse pore space (>60 μm diameter) to 1 m depth. This size of pore would normally be air-filled when the soil is fully moist but not waterlogged. A large IAC means that the soil is well aerated. This will encourage root development and, provided near surface soil structure is well developed, will allow rainfall to percolate into the ground thus mitigating against localised flooding.

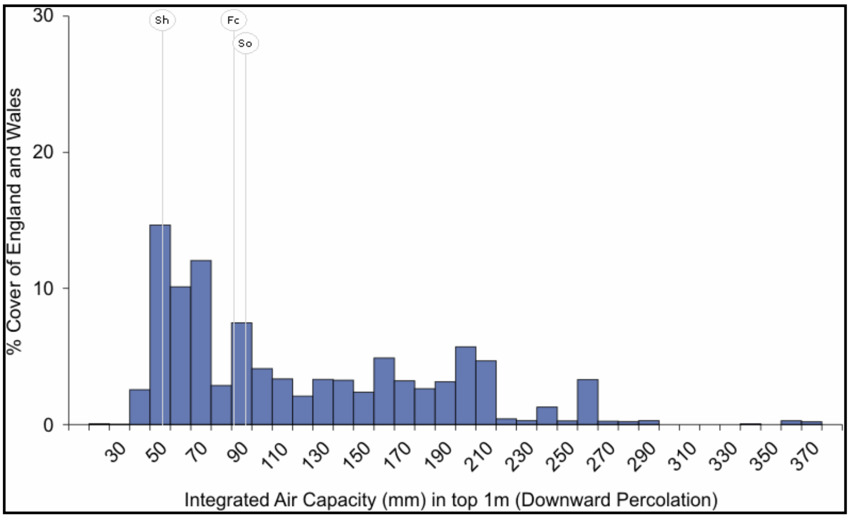


Figure 32. Integrated Air Capacity

Standard Percentage Runoff (SPR) is the percentage of rainfall that causes the short-term increase in flow seen at a catchment outlet following a storm event. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

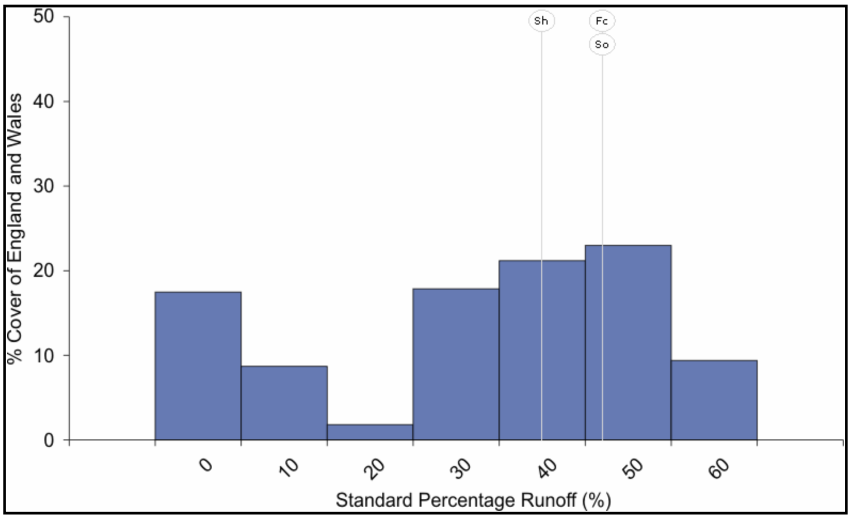


Figure 33. Standard Percentage Runoff

Base flow index is calculated from daily river flow data and expresses the volume of base flow of a river as a fraction of the total flow volume. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

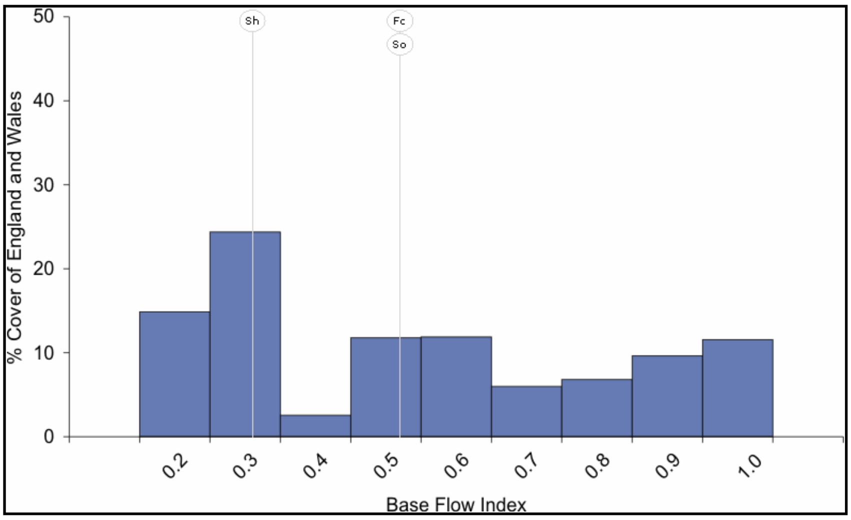


Figure 34. Base Flow Index

FLINT (572l)

Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

e(iii). Available Water Content

Available water content for plants varies depending on a number of factors, including the rooting depth of the plants. Described below are differing available water contents for cereals, sugar beet, grass and potato crops, as well as a generic available water value to 1 m depth.

Available water (by crop) Available water content to 1 m for the specified soil series between suctions of 5 and 1500kPa.

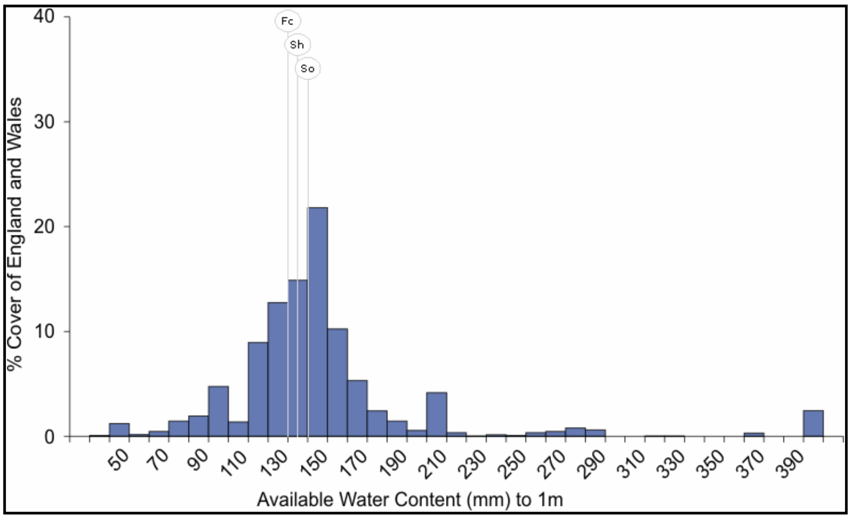


Figure 35. Available Water (by crop)

Available water for grass represents the water that is available to a permanent grass sward that is able to root to 100cm depth.

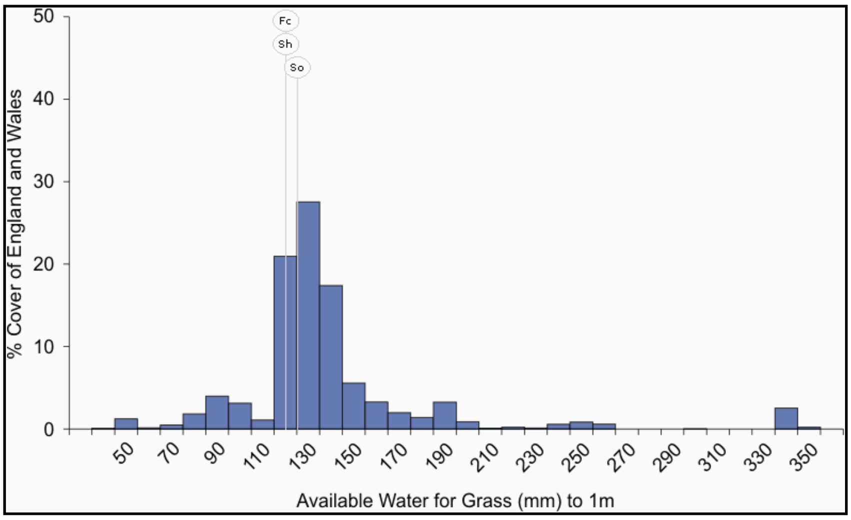


Figure 36. Available Water for Grass

FLINT (572l)

Reddish fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.

e(iii). Available Water Content continued

Available water for cereal represents the water that is available to a cereal crop that is able to root to 120cm depth.

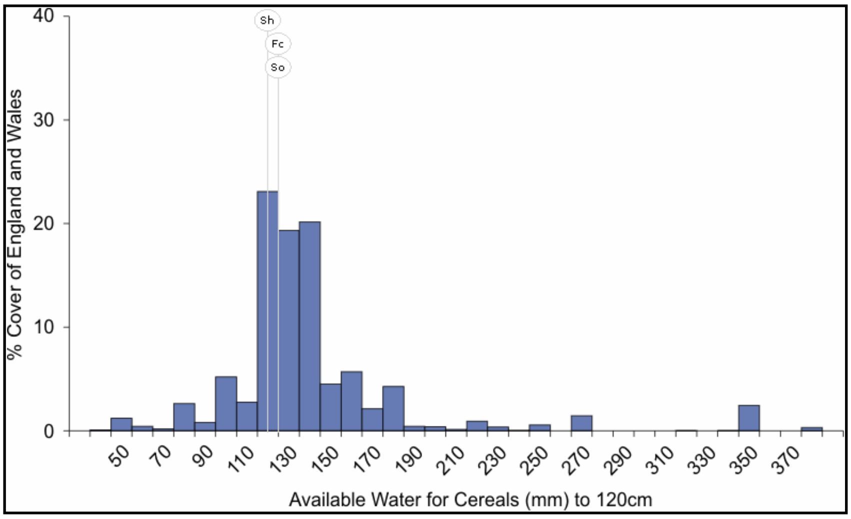


Figure 37. Available Water for Cereal

Available water for Sugar Beet represents the water that is available to a sugar beet crop that is able to root to 140cm depth.

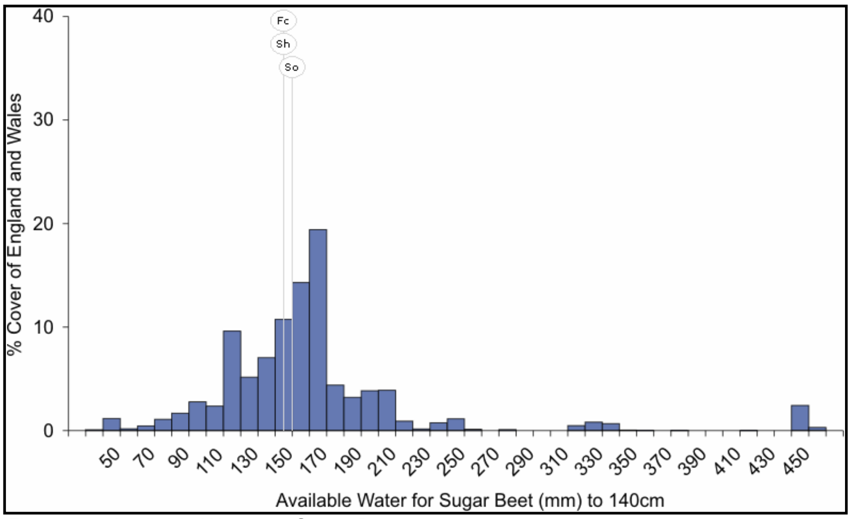


Figure 38. Available Water for Sugar Beet

Available water for Potatoes represents the water that is available to a potato crop that is able to root to 70cm depth.

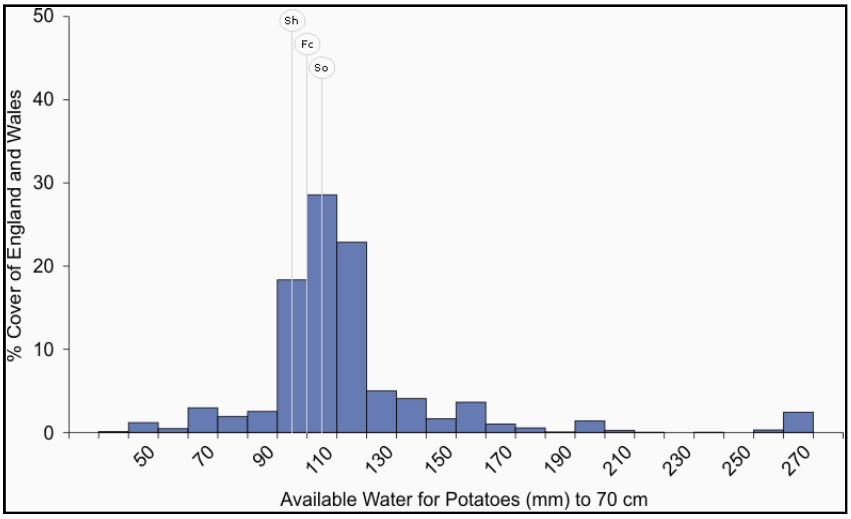


Figure 39. Available Water for Potatoes

SALOP (711m)

Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils

a. General Description

Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils associated with fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging.
The major landuse on this association is defined as dairying on short term and permanent grassland, some cereals in drier districts.

b. Distribution (England & Wales)

The SALOP association covers 3110km² of England and Wales which accounts for 2.06% of the landmass. The distribution of this association is shown in Figure 40. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the SALOP association are outlined in Table 4 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endevoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 4.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

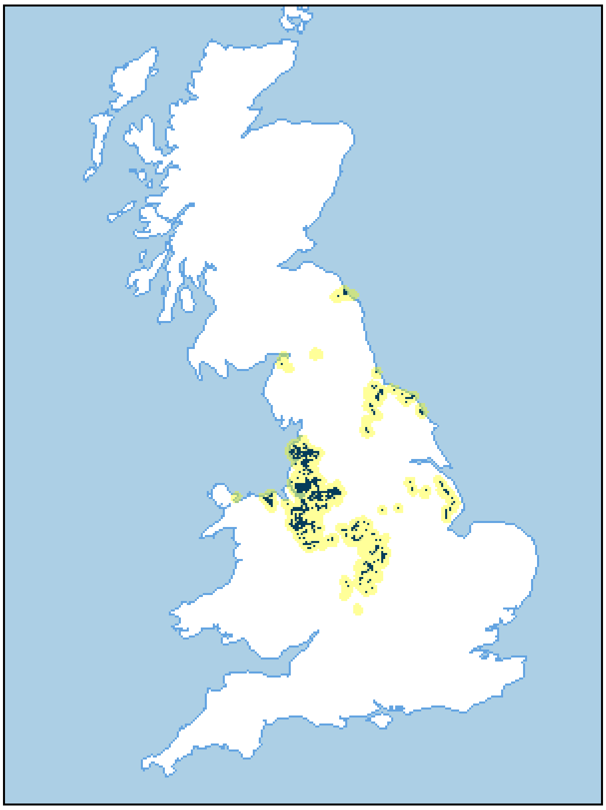


Figure 40. Association Distribution

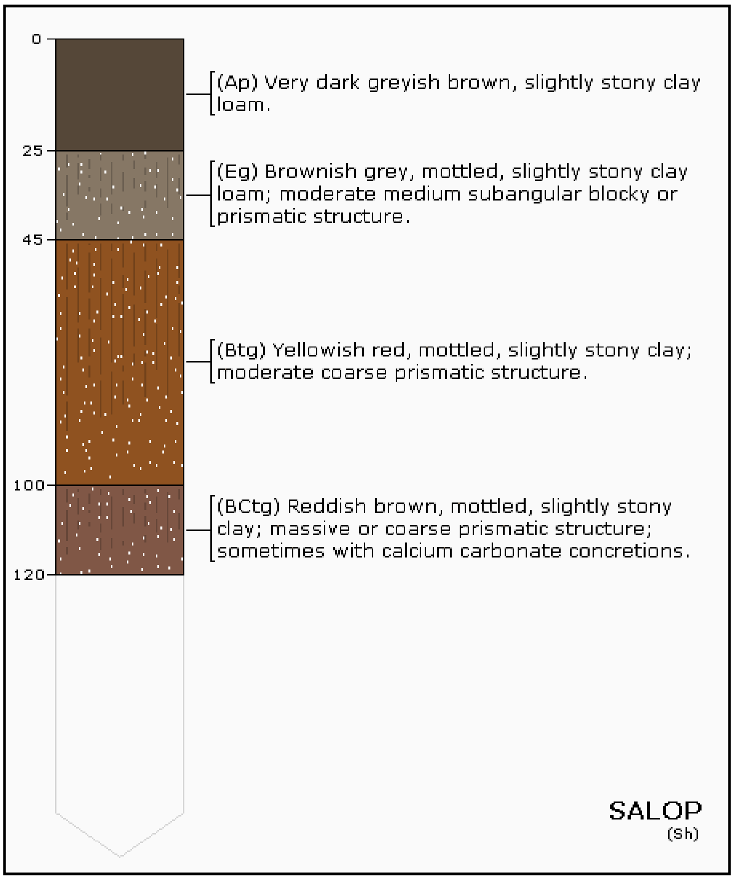
Soil Series	Description	Area %
SALOP (Sh)	reddish medium loamy over clayey drift with siliceous stones	35%
CLIFTON (Cu)	reddish medium loamy drift with siliceous stones	20%
FLINT (Fc)	reddish medium loamy over clayey drift with siliceous stones	15%
CREWE (Cg)	reddish clayey stoneless drift	10%
OTHER	other minor soils	20%

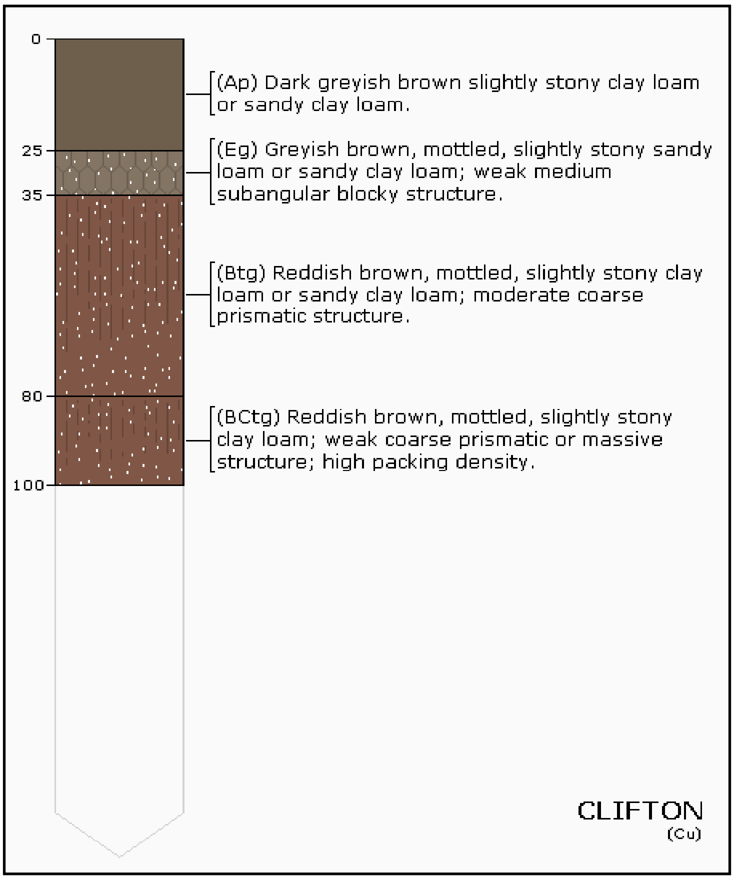
Table 4. The component soil series of the SALOP soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

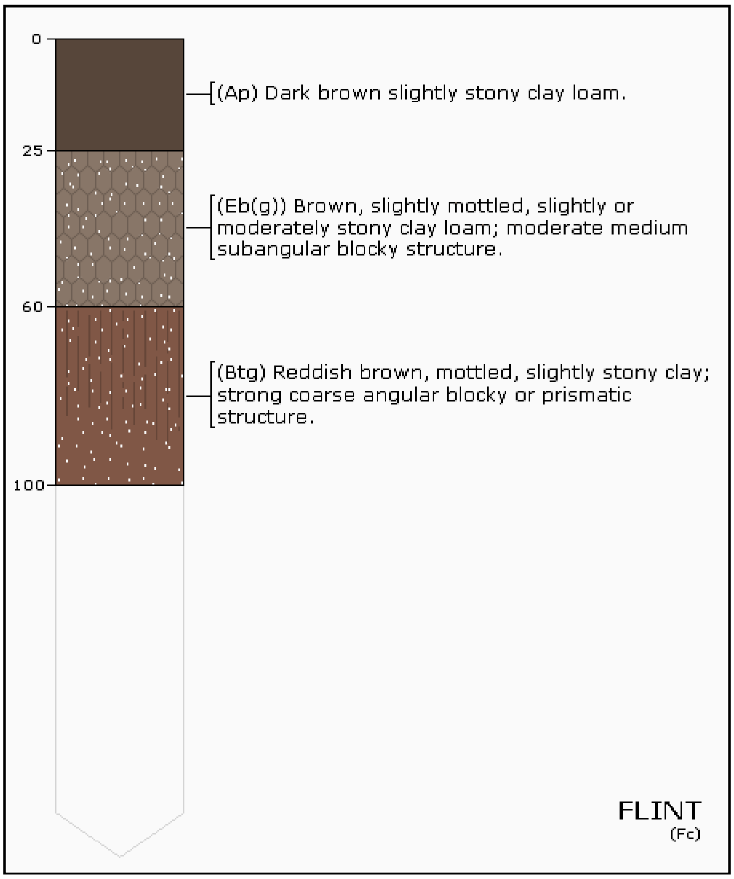
SALOP (711m)

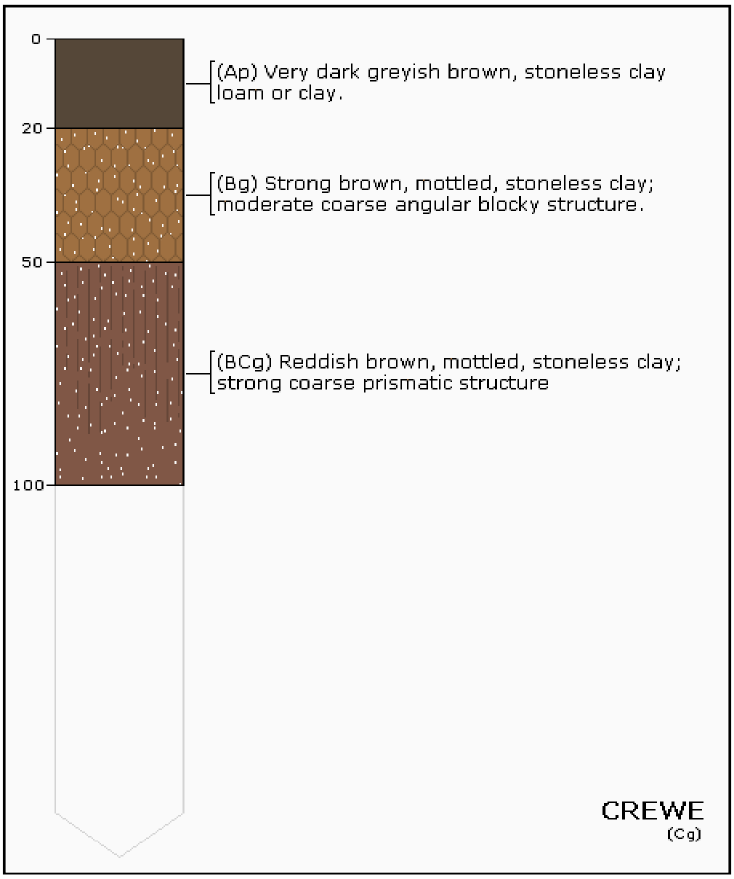
Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils

d. SALOP Component Series Profiles









SALOP (711m)

Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils

e. Soil Properties

This section provides graphical summaries of selected attribute data available for the component series in this association. The blue bars of the graphs presented in this section describe the range of property values for all soils across England and Wales. Superimposed on these graphs are the values for the component soil series in this association. This has been done to provide the reader with an understanding of where each property for each series sits within the national context.

Soil Series	Description	Area %
SALOP (Sh)	reddish medium loamy over clayey drift with siliceous stones	35%
CLIFTON (Cu)	reddish medium loamy drift with siliceous stones	20%
FLINT (Fc)	reddish medium loamy over clayey drift with siliceous stones	15%
CREWE (Cg)	reddish clayey stoneless drift	10%
OTHER	other minor soils	20%

Table 4. The component soil series of the SALOP soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

e(i). Soil Depth Information and Depths to Important Layers

Depth to rock A mean depth to bedrock or very stony rubble which has been assigned to each soil series based on observed and recorded soil profiles.

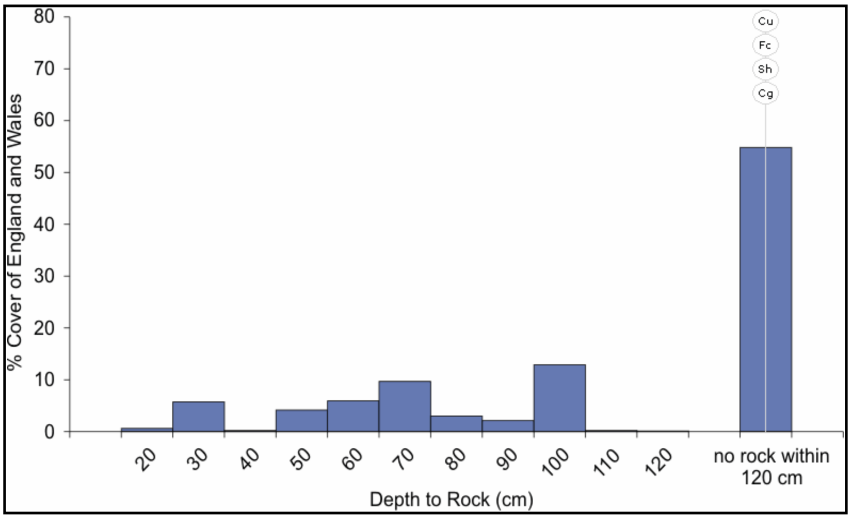


Figure 41. Depth of soil to Rock

Depth to gleying, the presence of grey and ochreous mottles within the soil, is caused by intermittent waterlogging. A mean depth to gleying has been assigned to each soil series based on observed and recorded soil profiles. The definition of a gleyed layer is designed to equate with saturation for at least 30 days in each year or the presence of artificial drainage.

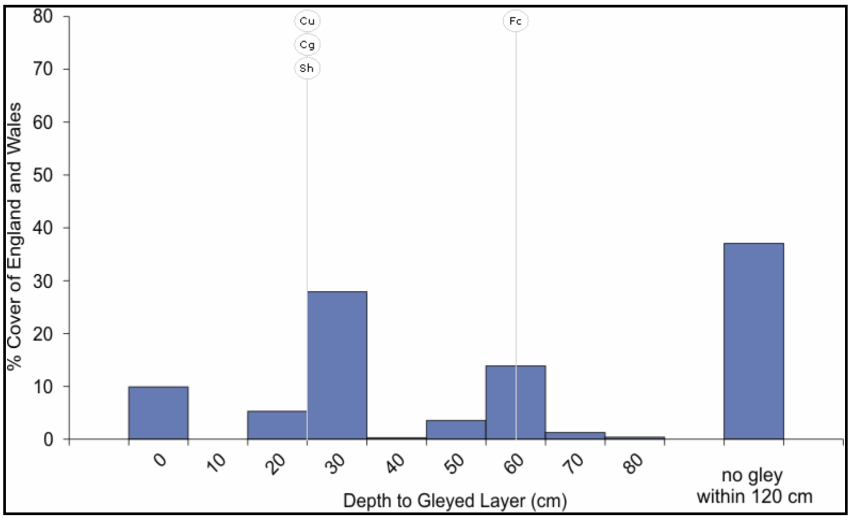


Figure 42. Depth of Soil to Gleying

SALOP (711m)

Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils

e(i). Soil Depth Information and Depths to Important Layers continued

Depth to slowly permeable layer (downward percolation) A mean depth to a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede downward percolation of excess soil water. This causes periodic saturation in the overlying soil, reduced storage capacity and therefore increased hydrological response to rainfall events.

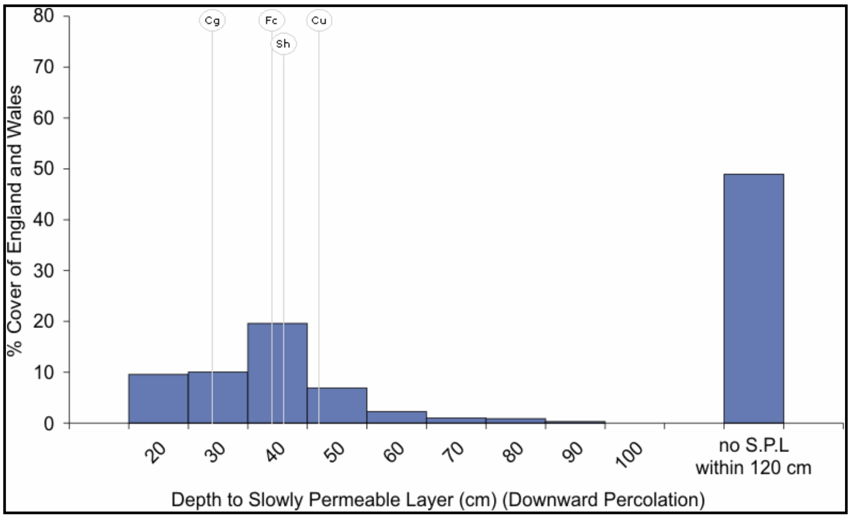


Figure 43. Depth to slowly permeable layer (downward percolation)

Depth to Slowly Permeable Layer (upward diffusion) A mean depth to the bottom of a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede upward diffusion of water and gasses.

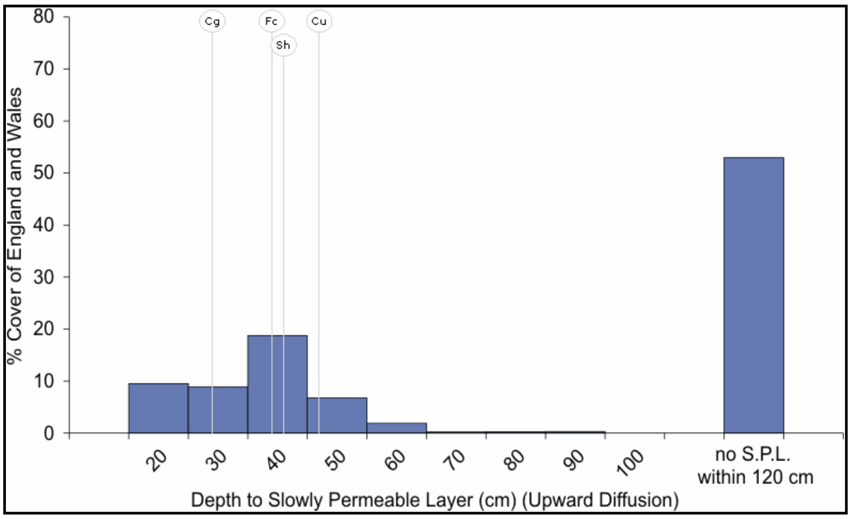


Figure 44. Depth to Slowly Permeable Layer (upward diffusion)

SALOP (711m)

Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils

e(ii). Soil Hydrological Information

Integrated air capacity (IAC) is the total coarse pore space (>60 μm diameter) to 1 m depth. This size of pore would normally be air-filled when the soil is fully moist but not waterlogged. A large IAC means that the soil is well aerated. This will encourage root development and, provided near surface soil structure is well developed, will allow rainfall to percolate into the ground thus mitigating against localised flooding.

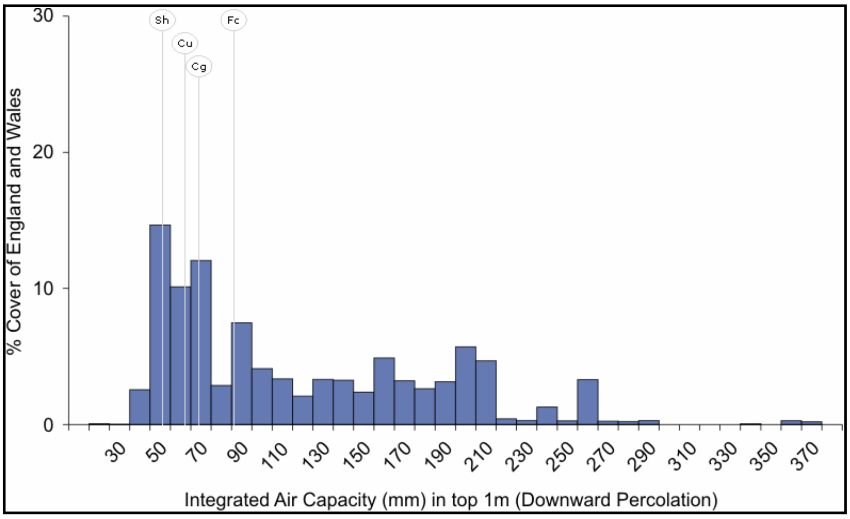


Figure 45. Integrated Air Capacity

Standard Percentage Runoff (SPR) is the percentage of rainfall that causes the short-term increase in flow seen at a catchment outlet following a storm event. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

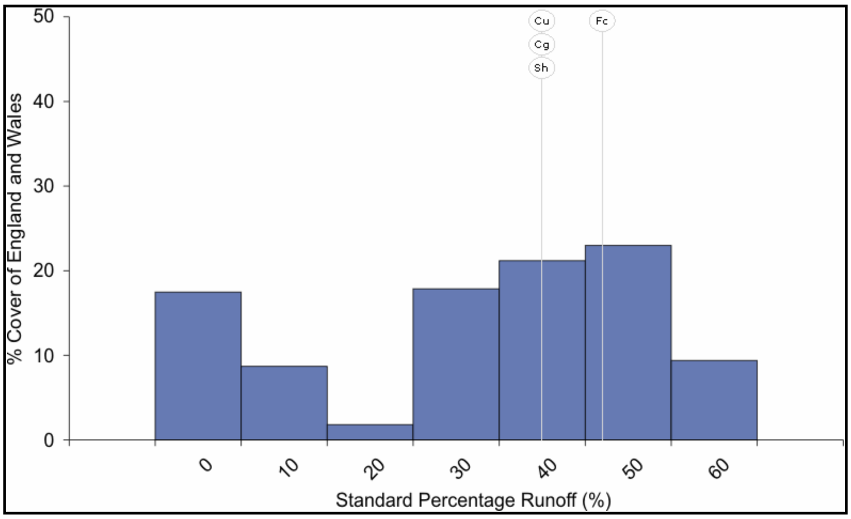


Figure 46. Standard Percentage Runoff

Base flow index is calculated from daily river flow data and expresses the volume of base flow of a river as a fraction of the total flow volume. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

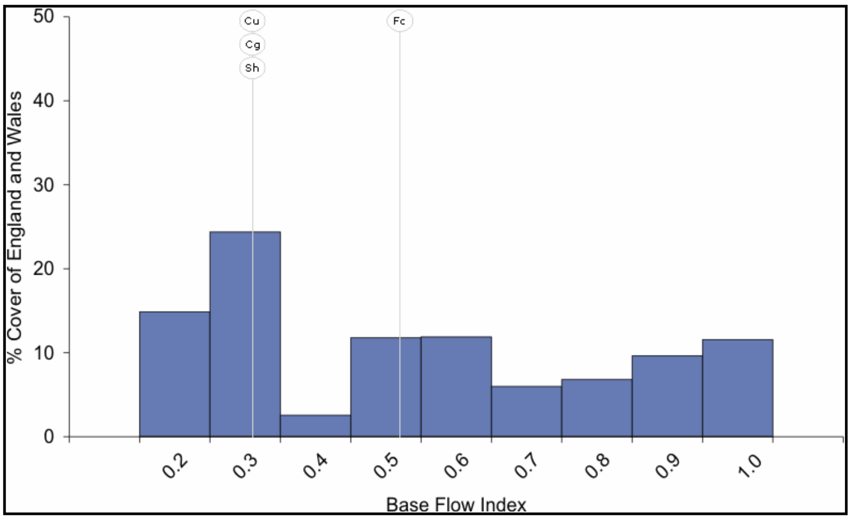


Figure 47. Base Flow Index

SALOP (711m)

Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils

e(iii). Available Water Content

Available water content for plants varies depending on a number of factors, including the rooting depth of the plants. Described below are differing available water contents for cereals, sugar beet, grass and potato crops, as well as a generic available water value to 1 m depth.

Available water (by crop) Available water content to 1 m for the specified soil series between suctions of 5 and 1500kPa.

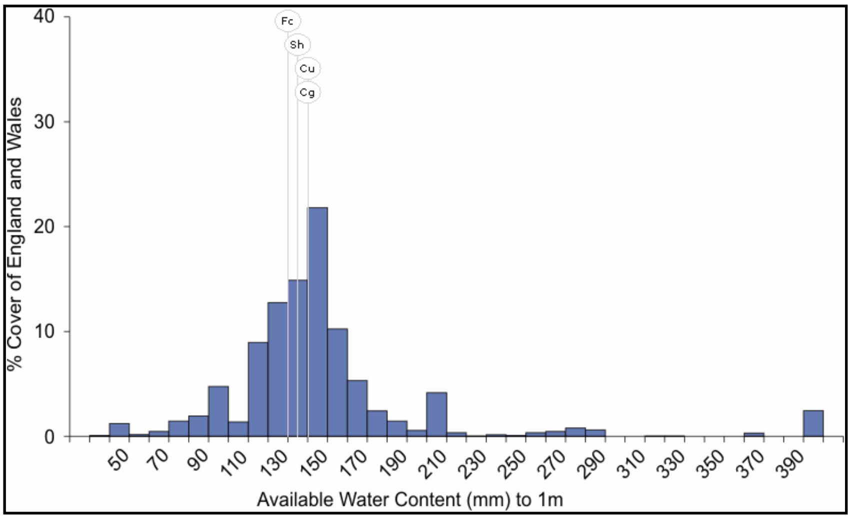


Figure 48. Available Water (by crop)

Available water for grass represents the water that is available to a permanent grass sward that is able to root to 100cm depth.

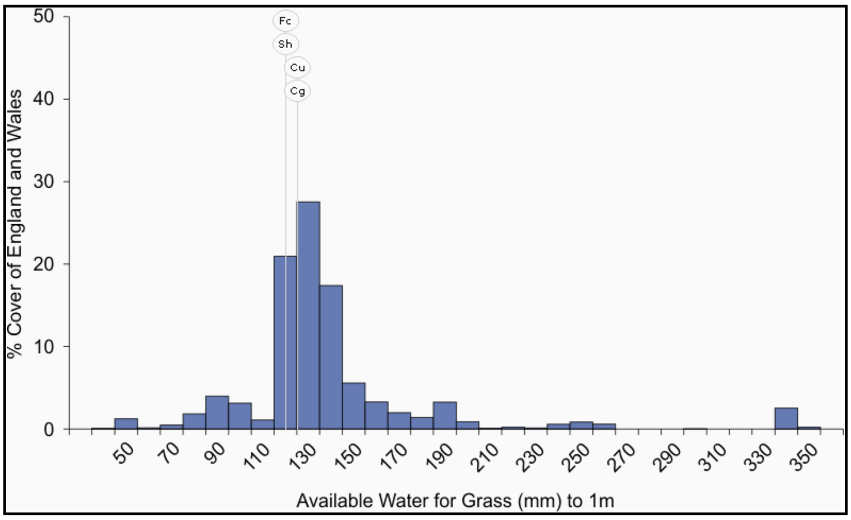


Figure 49. Available Water for Grass

SALOP (711m)

Slowly permeable seasonally waterlogged reddish fine loamy over clayey, fine loamy and clayey soils

e(iii). Available Water Content continued

Available water for cereal represents the water that is available to a cereal crop that is able to root to 120cm depth.

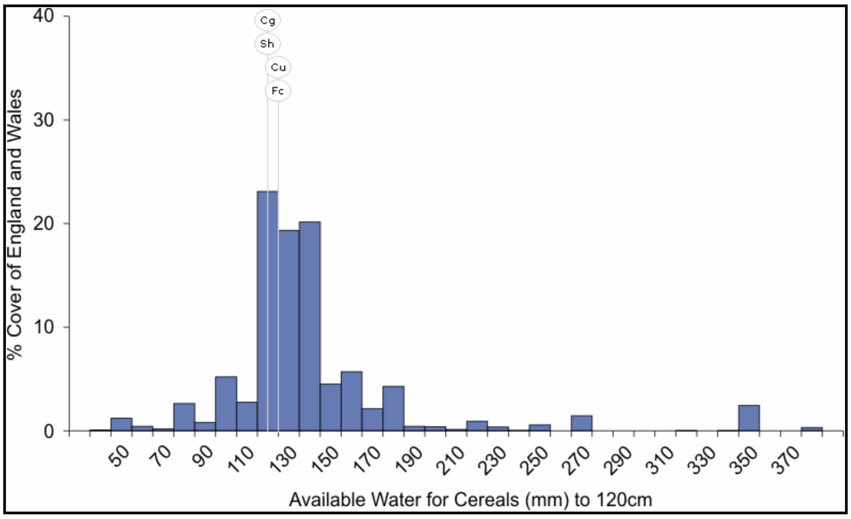


Figure 50. Available Water for Cereal

Available water for Sugar Beet represents the water that is available to a sugar beet crop that is able to root to 140cm depth.

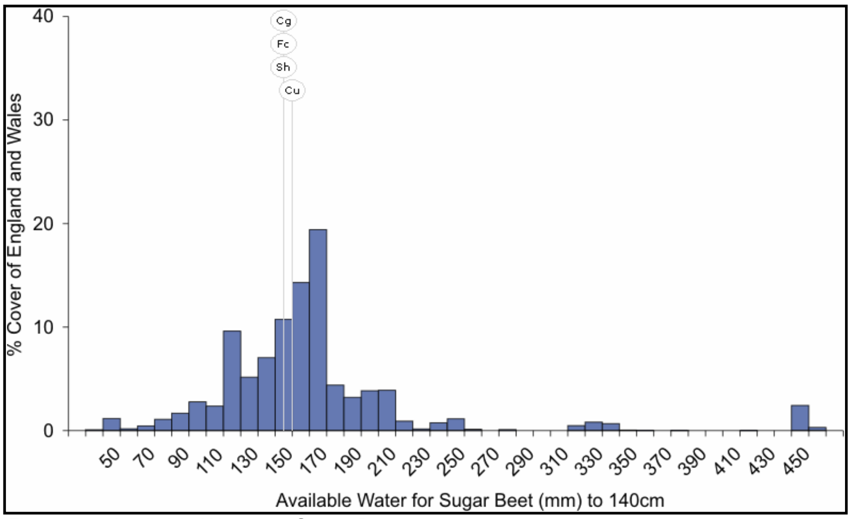


Figure 51. Available Water for Sugar Beet

Available water for Potatoes represents the water that is available to a potato crop that is able to root to 70cm depth.

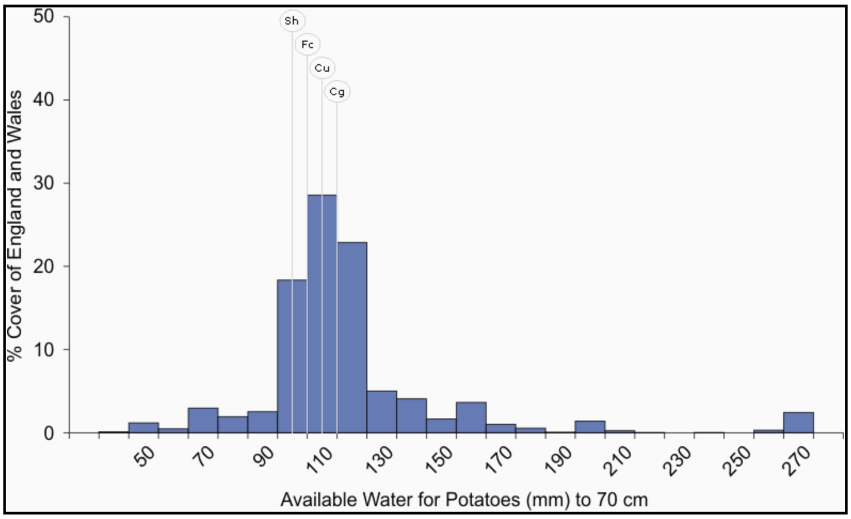


Figure 52. Available Water for Potatoes

HOLLINGTON (811c)

Deep stoneless reddish fine silty and clayey soils variably affected by groundwater.

a. General Description

Deep stoneless reddish fine silty and clayey soils variably affected by groundwater. Flat land. Risk of flooding.
The major landuse on this association is defined as stock rearing on permanent grassland.

b. Distribution (England & Wales)

The HOLLINGTON association covers 104km² of England and Wales which accounts for 0.07% of the landmass. The distribution of this association is shown in Figure 53. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the HOLLINGTON association are outlined in Table 5 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endevoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 5.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

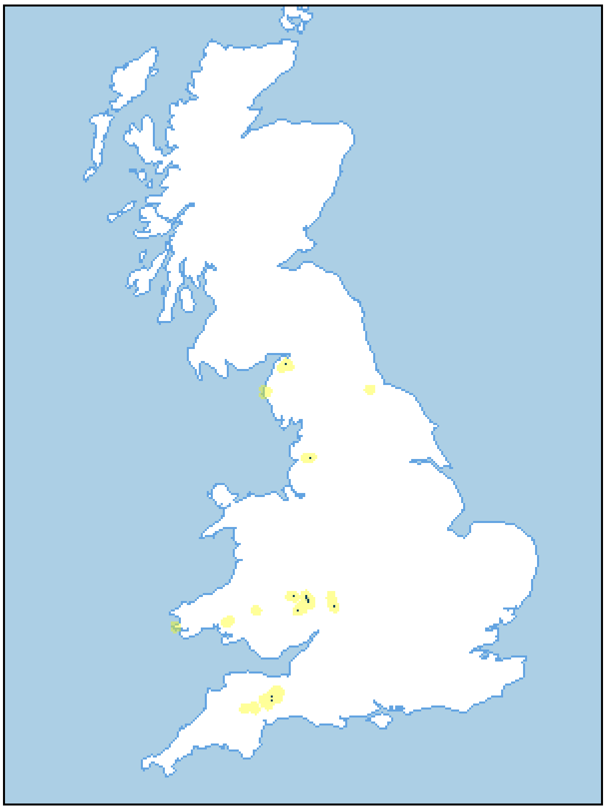


Figure 53. Association Distribution

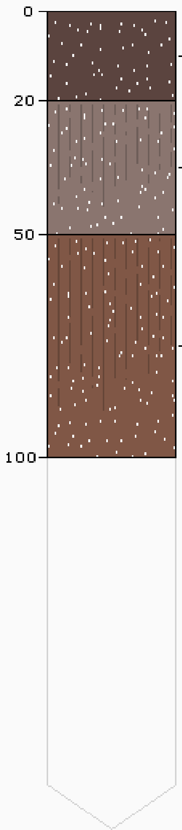
Soil Series	Description	Area %
HOLLINGTON (Hy)	reddish medium silty river alluvium	50%
COMPTON (Ce)	reddish clayey river alluvium	30%
MATHON (MH)	reddish medium silty river alluvium	10%
OTHER	other minor soils	10%

Table 5. The component soil series of the HOLLINGTON soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

HOLLINGTON (811c)

Deep stoneless reddish fine silty and clayey soils variably affected by groundwater.

d. HOLLINGTON Component Series Profiles

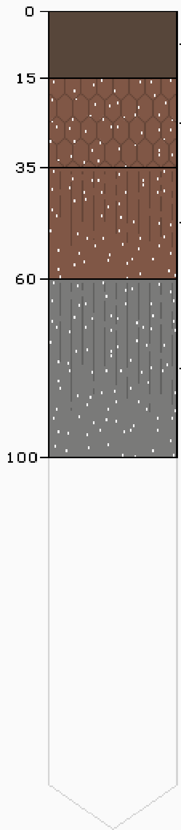


(Ahg) Dark reddish grey, mottled, stoneless silty clay loam.

(Bg1) Reddish grey with many ochreous mottles, stoneless silty clay loam; moderate medium prismatic structure.

(Bg2) Reddish brown with many ochreous mottles, stoneless silty clay loam; weak coarse prismatic structure with ferrimanganiferous concretions.

HOLLINGTON
(Hy)



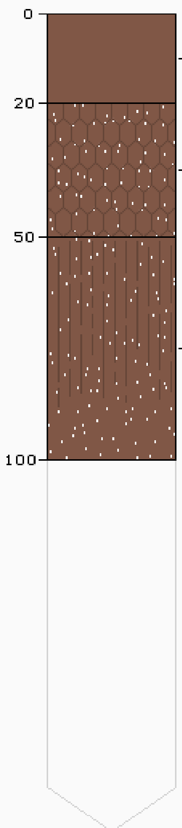
(Ah) Dark brown, stoneless silty clay or clay.

(Bg1) Reddish brown, mottled, stoneless clay or silty clay; moderate medium angular blocky structure.

(Bg2) Reddish brown, mottled, stoneless silty clay or clay; moderate coarse prismatic structure.

(Cg) Grey, mottled, stoneless silty clay, clay, silty clay loam or clay loam; weak coarse prismatic or massive structure.

COMPTON
(Ce)



(Ah) Reddish brown, stoneless silty clay loam.

(Bw(g)) Reddish brown, slightly mottled, stoneless silty clay loam; moderate medium subangular blocky structure.

(Bg) Reddish brown, mottled, stoneless silty clay loam; moderate coarse prismatic structure.

MATHON
(MH)

HOLLINGTON (811c)

Deep stoneless reddish fine silty and clayey soils variably affected by groundwater.

e. Soil Properties

This section provides graphical summaries of selected attribute data available for the component series in this association. The blue bars of the graphs presented in this section describe the range of property values for all soils across England and Wales. Superimposed on these graphs are the values for the component soil series in this association. This has been done to provide the reader with an understanding of where each property for each series sits within the national context.

Soil Series	Description	Area %
HOLLINGTON (Hy)	reddish medium silty river alluvium	50%
COMPTON (Ce)	reddish clayey river alluvium	30%
MATHON (MH)	reddish medium silty river alluvium	10%
OTHER	other minor soils	10%

Table 5. The component soil series of the HOLLINGTON soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

e(i). Soil Depth Information and Depths to Important Layers

Depth to rock A mean depth to bedrock or very stony rubble which has been assigned to each soil series based on observed and recorded soil profiles.

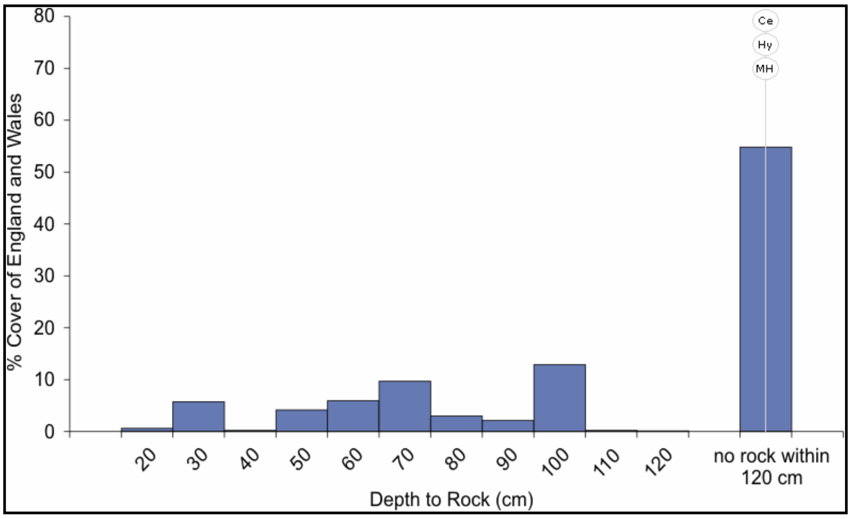


Figure 54. Depth of soil to Rock

Depth to gleying, the presence of grey and ochreous mottles within the soil, is caused by intermittent waterlogging. A mean depth to gleying has been assigned to each soil series based on observed and recorded soil profiles. The definition of a gleyed layer is designed to equate with saturation for at least 30 days in each year or the presence of artificial drainage.

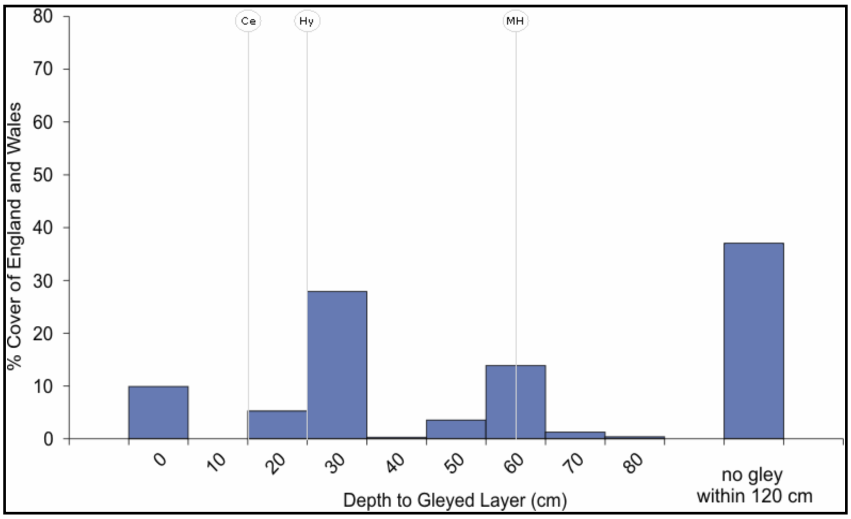


Figure 55. Depth of Soil to Gleying

HOLLINGTON (811c)

Deep stoneless reddish fine silty and clayey soils variably affected by groundwater.

e(i). Soil Depth Information and Depths to Important Layers continued

Depth to slowly permeable layer (downward percolation) A mean depth to a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede downward percolation of excess soil water. This causes periodic saturation in the overlying soil, reduced storage capacity and therefore increased hydrological response to rainfall events.

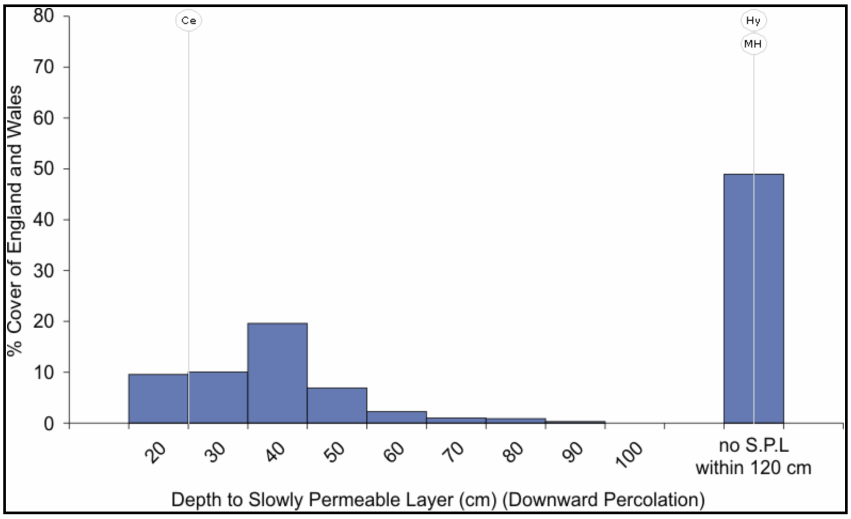


Figure 56. Depth to slowly permeable layer (downward percolation)

Depth to Slowly Permeable Layer (upward diffusion) A mean depth to the bottom of a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede upward diffusion of water and gasses.

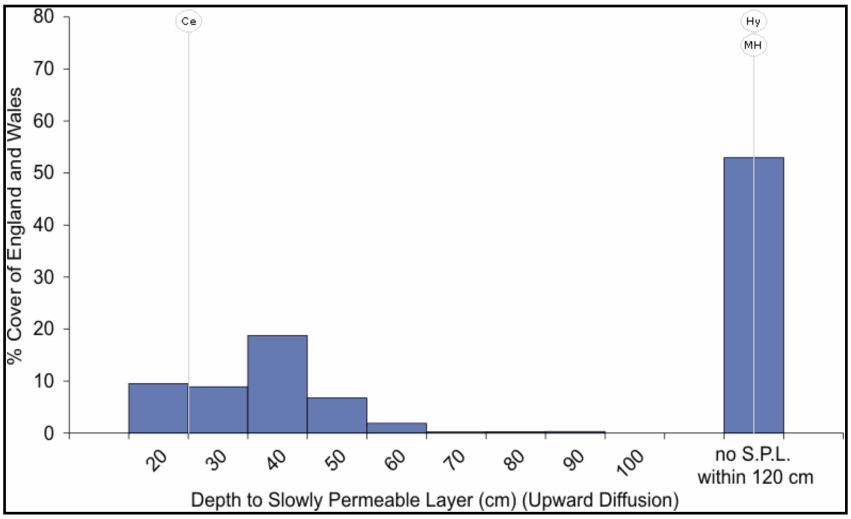


Figure 57. Depth to Slowly Permeable Layer (upward diffusion)

HOLLINGTON (811c)

Deep stoneless reddish fine silty and clayey soils variably affected by groundwater.

e(ii). Soil Hydrological Information

Integrated air capacity (IAC) is the total coarse pore space (>60 μm diameter) to 1 m depth. This size of pore would normally be air-filled when the soil is fully moist but not waterlogged. A large IAC means that the soil is well aerated. This will encourage root development and, provided near surface soil structure is well developed, will allow rainfall to percolate into the ground thus mitigating against localised flooding.

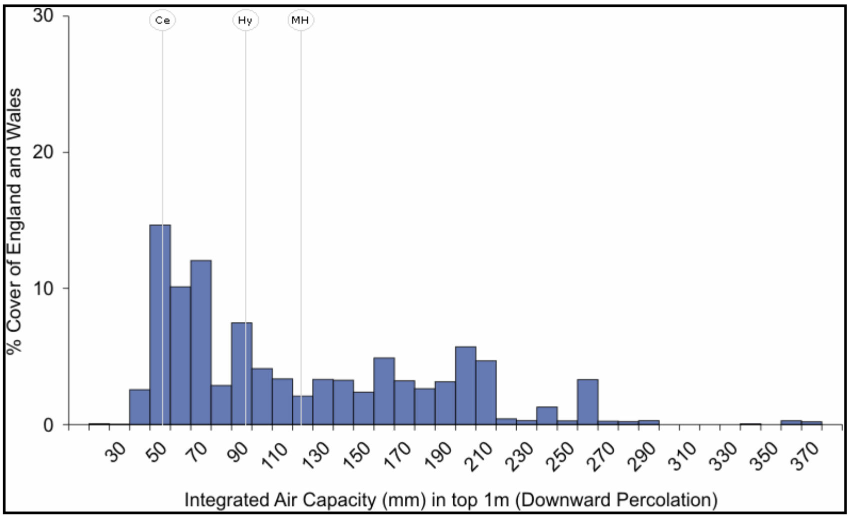


Figure 58. Integrated Air Capacity

Standard Percentage Runoff (SPR) is the percentage of rainfall that causes the short-term increase in flow seen at a catchment outlet following a storm event. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

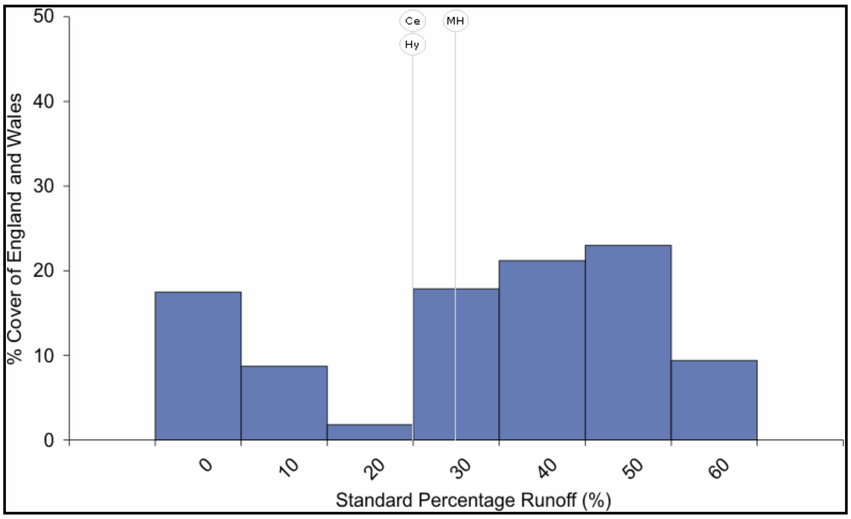


Figure 59. Standard Percentage Runoff

Base flow index is calculated from daily river flow data and expresses the volume of base flow of a river as a fraction of the total flow volume. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

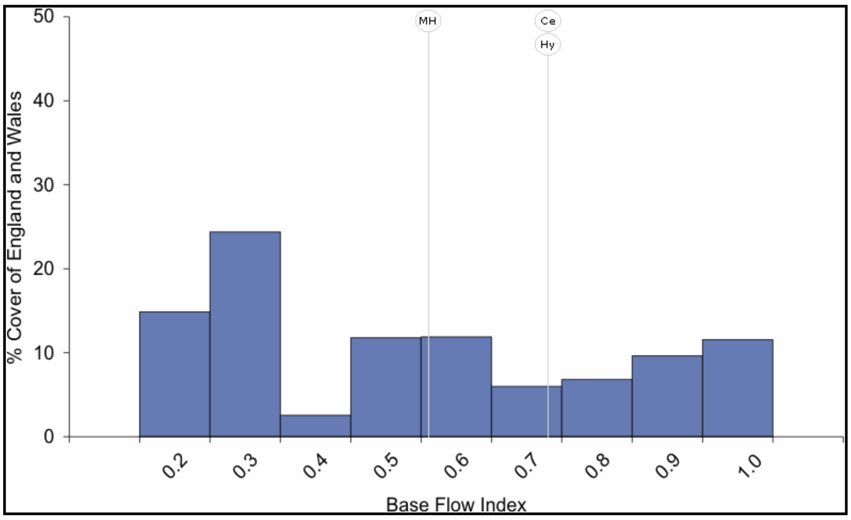


Figure 60. Base Flow Index

HOLLINGTON (811c)

Deep stoneless reddish fine silty and clayey soils variably affected by groundwater.

e(iii). Available Water Content

Available water content for plants varies depending on a number of factors, including the rooting depth of the plants. Described below are differing available water contents for cereals, sugar beet, grass and potato crops, as well as a generic available water value to 1 m depth.

Available water (by crop) Available water content to 1 m for the specified soil series between suctions of 5 and 1500kPa.

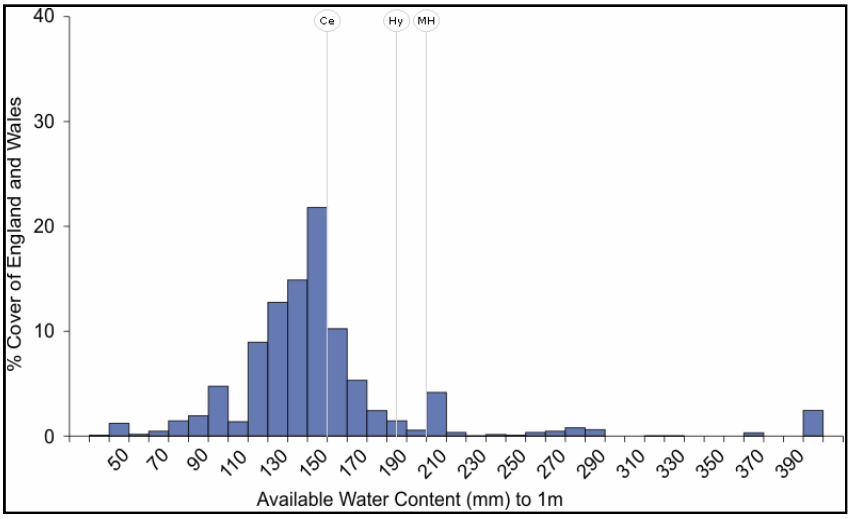


Figure 61. Available Water (by crop)

Available water for grass represents the water that is available to a permanent grass sward that is able to root to 100cm depth.

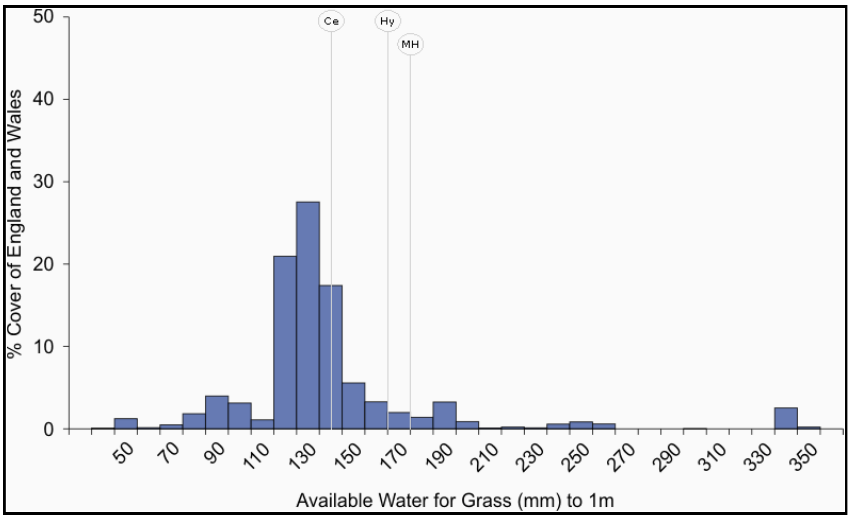


Figure 62. Available Water for Grass

HOLLINGTON (811c)

Deep stoneless reddish fine silty and clayey soils variably affected by groundwater.

e(iii). Available Water Content continued

Available water for cereal represents the water that is available to a cereal crop that is able to root to 120cm depth.

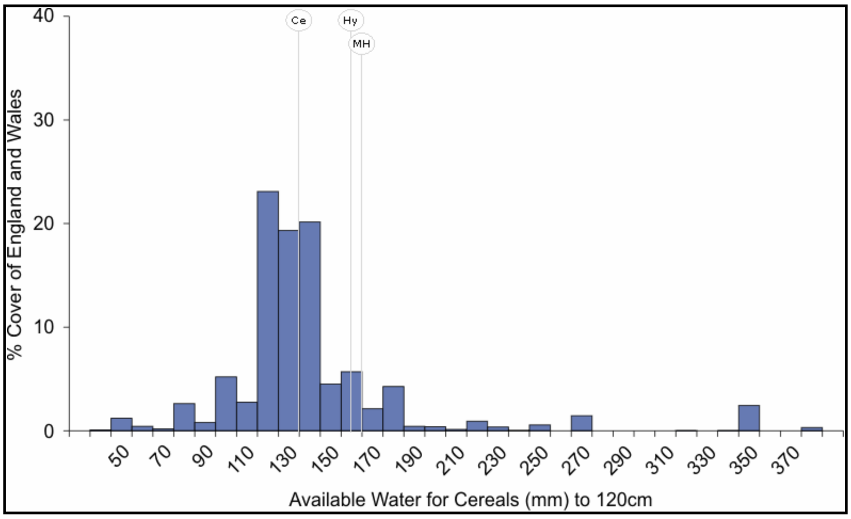


Figure 63. Available Water for Cereal

Available water for Sugar Beet represents the water that is available to a sugar beet crop that is able to root to 140cm depth.

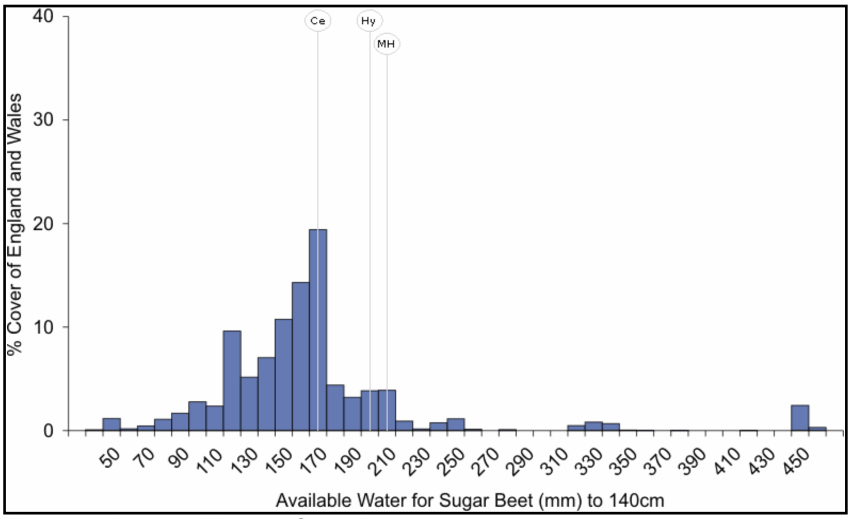


Figure 64. Available Water for Sugar Beet

Available water for Potatoes represents the water that is available to a potato crop that is able to root to 70cm depth.

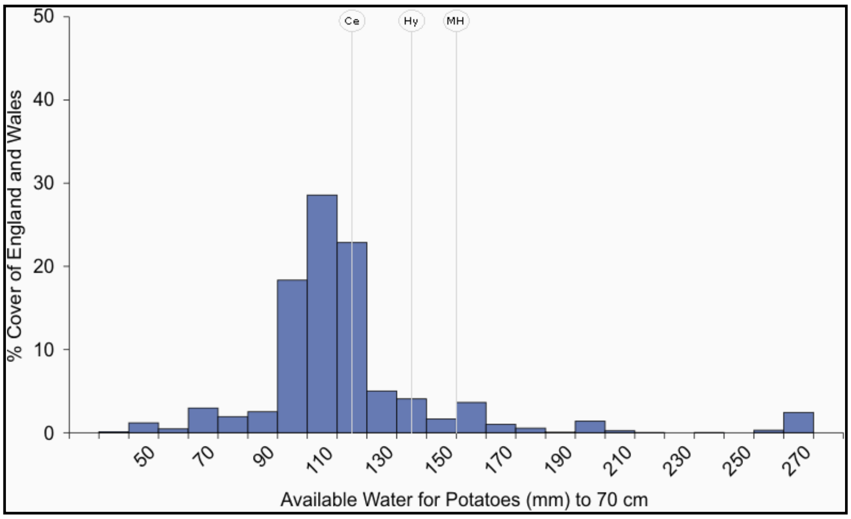


Figure 65. Available Water for Potatoes

ROCKCLIFFE (811d)

Deep stoneless silty and fine sandy soils variably affected by groundwater depending on artificial drainage.

a. General Description

Deep stoneless silty and fine sandy soils variably affected by groundwater depending on artificial drainage. Flat land.
The major landuse on this association is defined as cereals and permanent and short term grassland in cumbria, arable and horticultural crops in the fens.

b. Distribution (England & Wales)

The ROCKCLIFFE association covers 186km² of England and Wales which accounts for 0.12% of the landmass. The distribution of this association is shown in Figure 66. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the ROCKCLIFFE association are outlined in Table 6 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endevoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 6.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

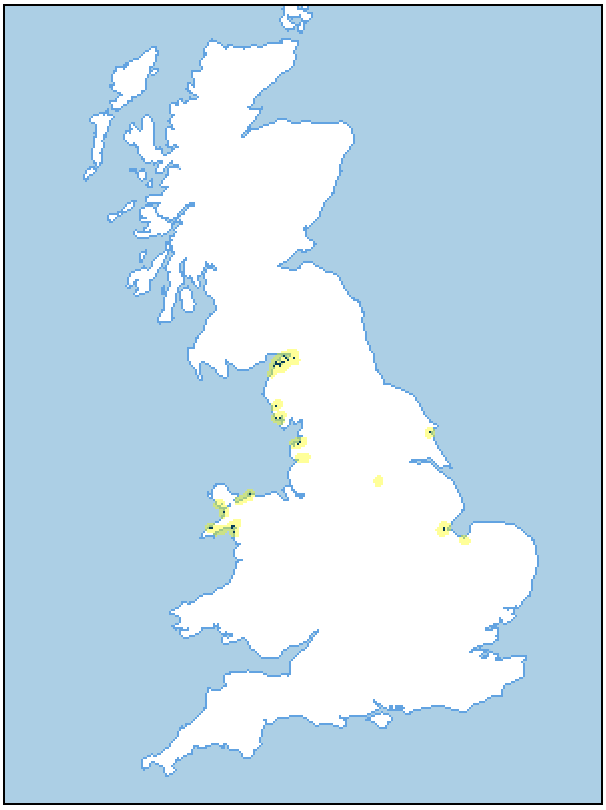


Figure 66. Association Distribution

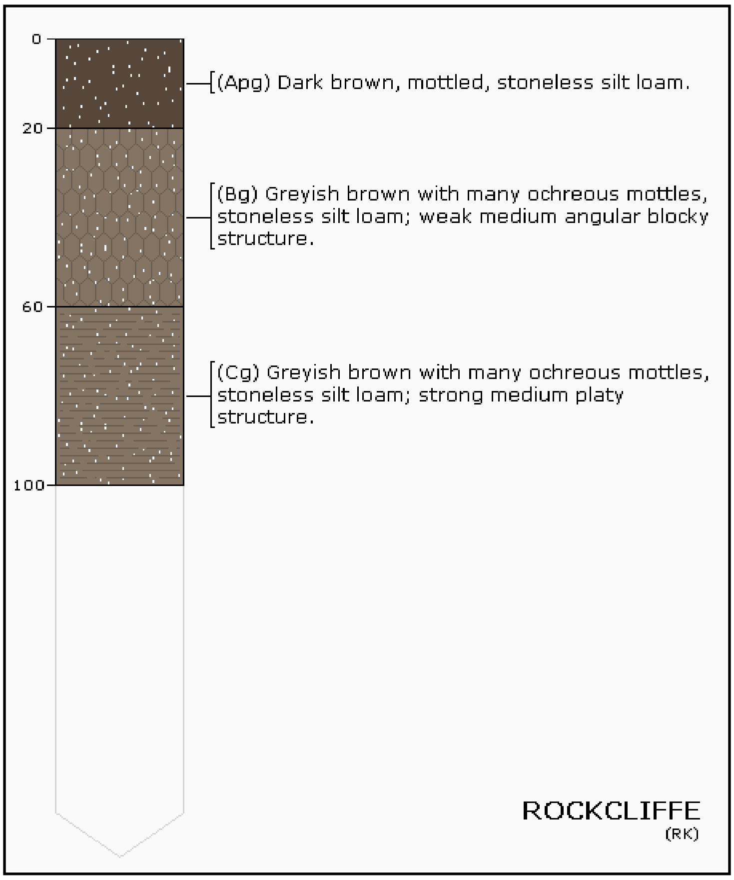
Soil Series	Description	Area %
ROCKCLIFFE (RK)	light silty marine alluvium	50%
TANVATS (T)	medium silty marine alluvium	30%
SNARGATE (S)	light silty marine alluvium	10%
OTHER	other minor soils	10%

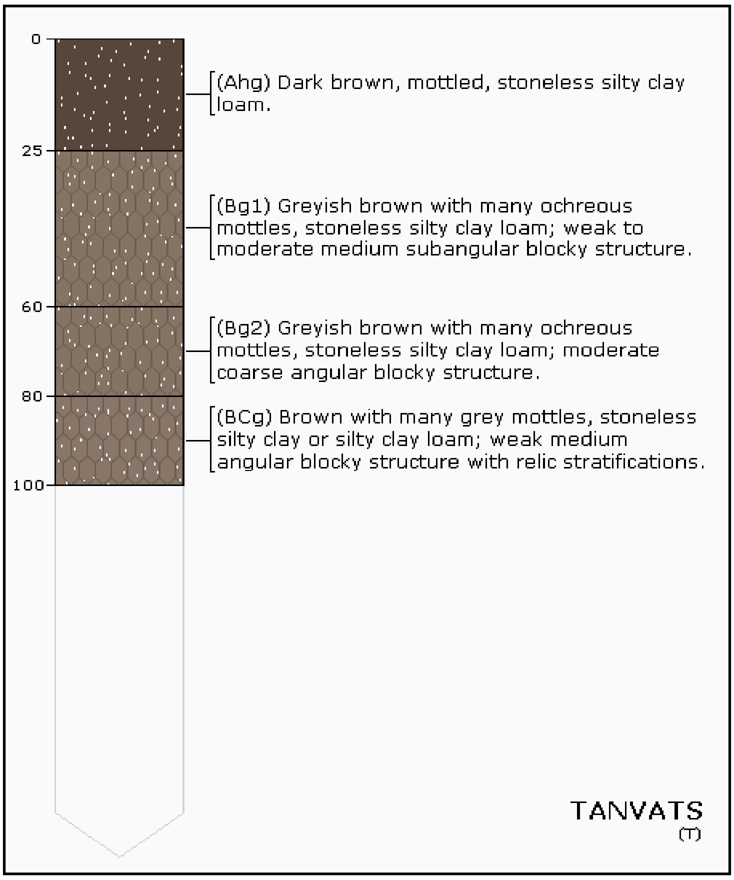
Table 6. The component soil series of the ROCKCLIFFE soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

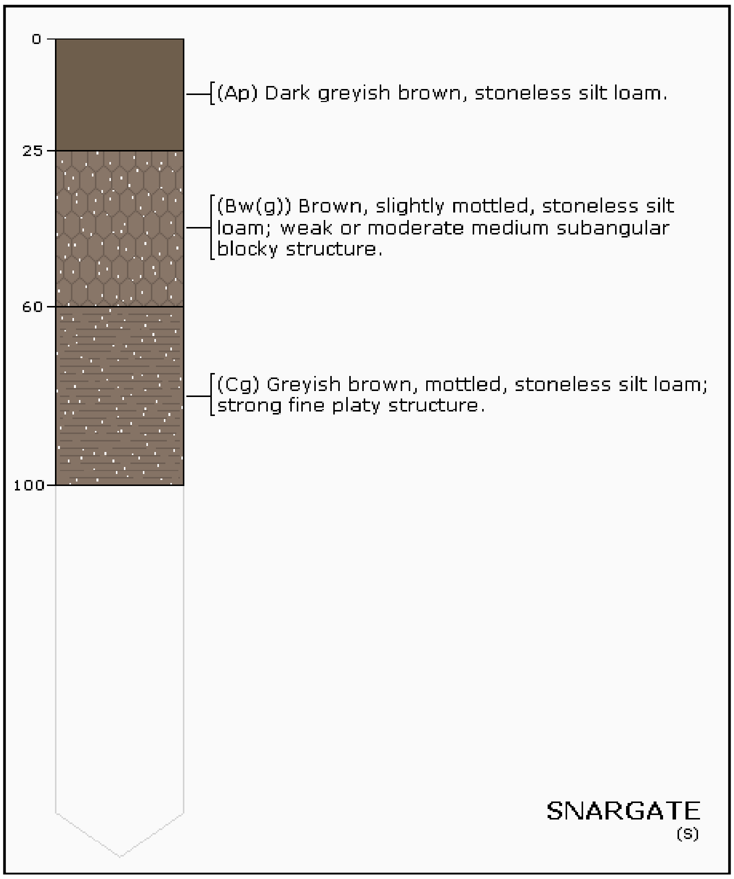
ROCKCLIFFE (811d)

Deep stoneless silty and fine sandy soils variably affected by groundwater depending on artificial drainage.

d. ROCKCLIFFE Component Series Profiles







ROCKCLIFFE (811d)

Deep stoneless silty and fine sandy soils variably affected by groundwater depending on artificial drainage.

e. Soil Properties

This section provides graphical summaries of selected attribute data available for the component series in this association. The blue bars of the graphs presented in this section describe the range of property values for all soils across England and Wales. Superimposed on these graphs are the values for the component soil series in this association. This has been done to provide the reader with an understanding of where each property for each series sits within the national context.

Soil Series	Description	Area %
ROCKCLIFFE (RK)	light silty marine alluvium	50%
TANVATS (T)	medium silty marine alluvium	30%
SNARGATE (S)	light silty marine alluvium	10%
OTHER	other minor soils	10%

Table 6. The component soil series of the ROCKCLIFFE soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

e(i). Soil Depth Information and Depths to Important Layers

Depth to rock A mean depth to bedrock or very stony rubble which has been assigned to each soil series based on observed and recorded soil profiles.

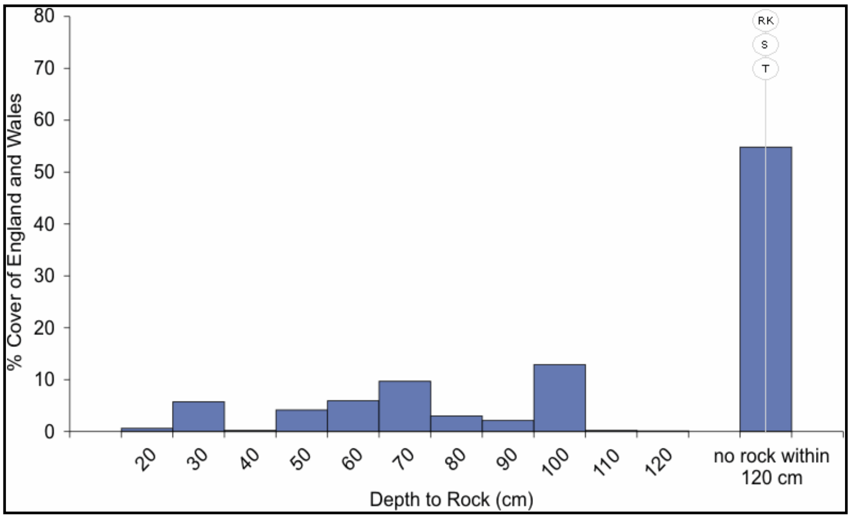


Figure 67. Depth of soil to Rock

Depth to gleying, the presence of grey and ochreous mottles within the soil, is caused by intermittent waterlogging. A mean depth to gleying has been assigned to each soil series based on observed and recorded soil profiles. The definition of a gleyed layer is designed to equate with saturation for at least 30 days in each year or the presence of artificial drainage.

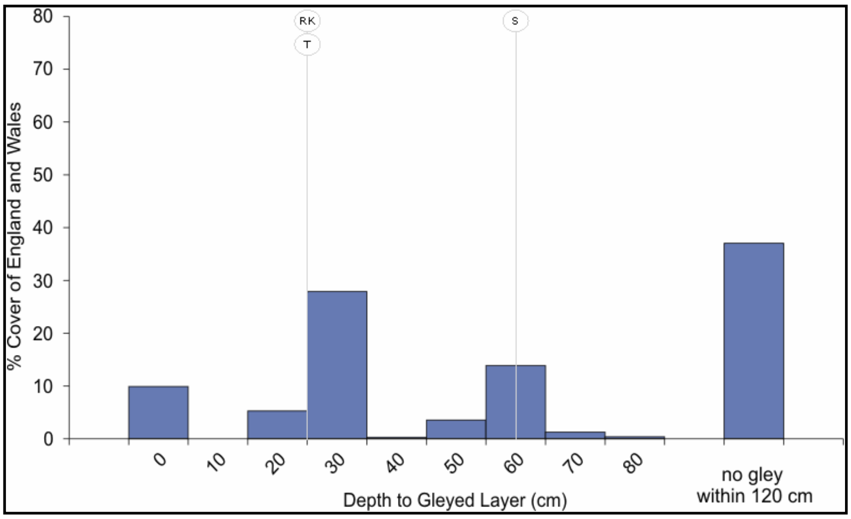


Figure 68. Depth of Soil to Gleying

ROCKCLIFFE (811d)

Deep stoneless silty and fine sandy soils variably affected by groundwater depending on artificial drainage.

e(i). Soil Depth Information and Depths to Important Layers continued

Depth to slowly permeable layer (downward percolation) A mean depth to a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede downward percolation of excess soil water. This causes periodic saturation in the overlying soil, reduced storage capacity and therefore increased hydrological response to rainfall events.

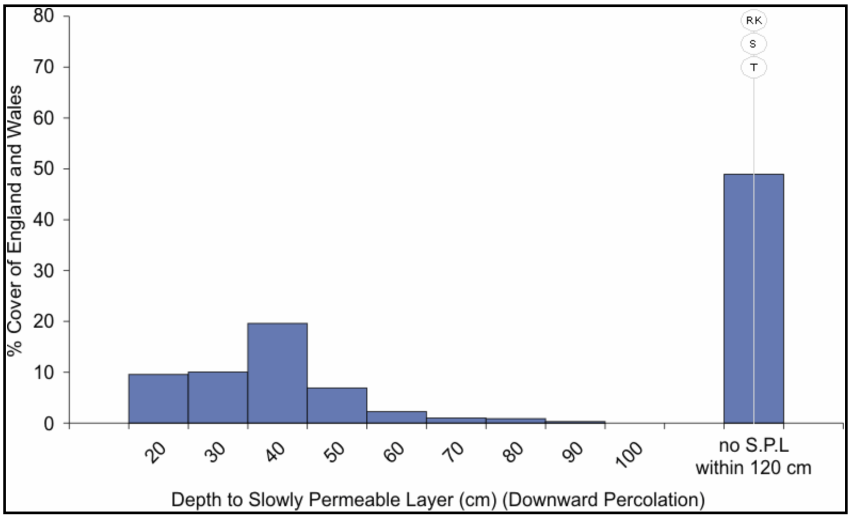


Figure 69. Depth to slowly permeable layer (downward percolation)

Depth to Slowly Permeable Layer (upward diffusion) A mean depth to the bottom of a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede upward diffusion of water and gasses.

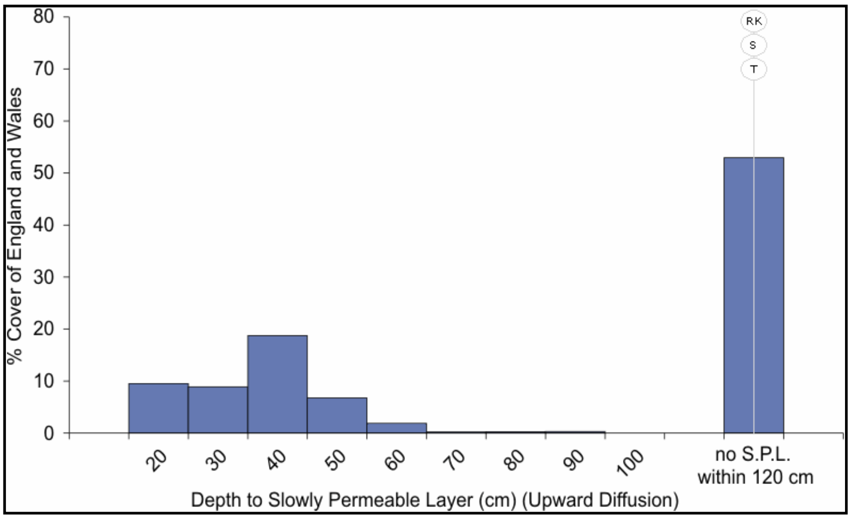


Figure 70. Depth to Slowly Permeable Layer (upward diffusion)

ROCKCLIFFE (811d)

Deep stoneless silty and fine sandy soils variably affected by groundwater depending on artificial drainage.

e(ii). Soil Hydrological Information

Integrated air capacity (IAC) is the total coarse pore space (>60 μm diameter) to 1 m depth. This size of pore would normally be air-filled when the soil is fully moist but not waterlogged. A large IAC means that the soil is well aerated. This will encourage root development and, provided near surface soil structure is well developed, will allow rainfall to percolate into the ground thus mitigating against localised flooding.

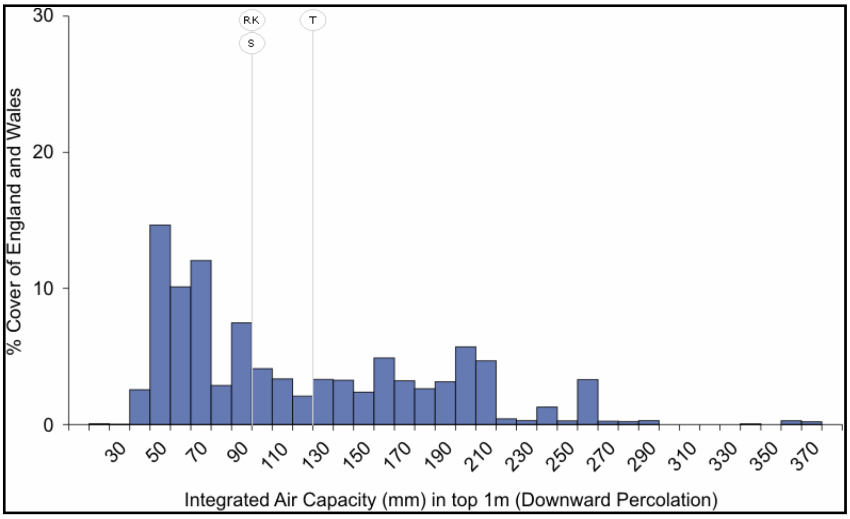


Figure 71. Integrated Air Capacity

Standard Percentage Runoff (SPR) is the percentage of rainfall that causes the short-term increase in flow seen at a catchment outlet following a storm event. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

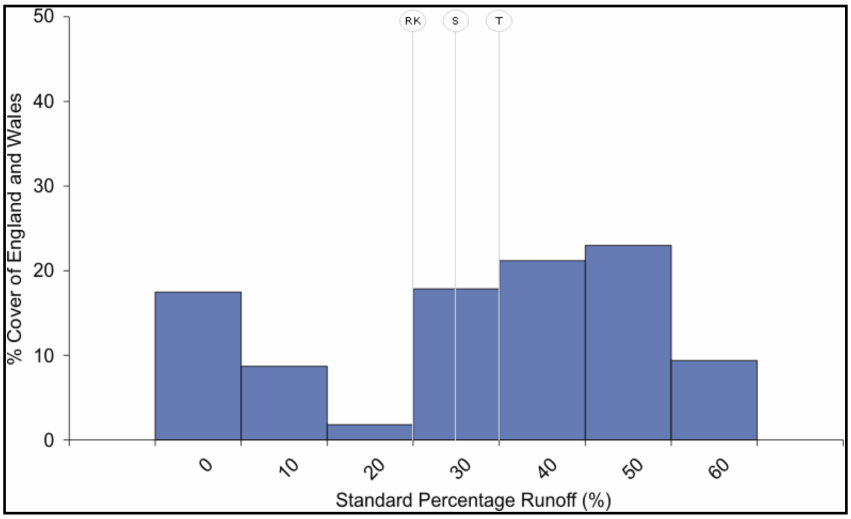


Figure 72. Standard Percentage Runoff

Base flow index is calculated from daily river flow data and expresses the volume of base flow of a river as a fraction of the total flow volume. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

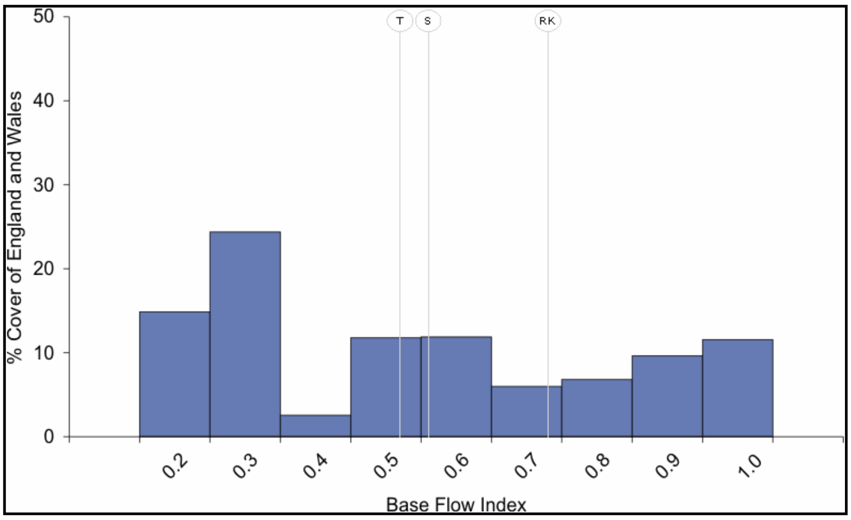


Figure 73. Base Flow Index

ROCKCLIFFE (811d)

Deep stoneless silty and fine sandy soils variably affected by groundwater depending on artificial drainage.

e(iii). Available Water Content

Available water content for plants varies depending on a number of factors, including the rooting depth of the plants. Described below are differing available water contents for cereals, sugar beet, grass and potato crops, as well as a generic available water value to 1 m depth.

Available water (by crop) Available water content to 1 m for the specified soil series between suctions of 5 and 1500kPa.

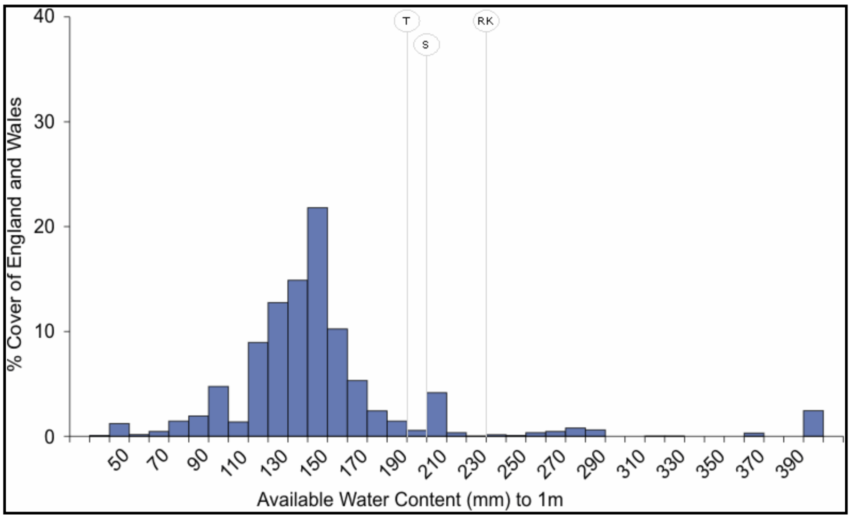


Figure 74. Available Water (by crop)

Available water for grass represents the water that is available to a permanent grass sward that is able to root to 100cm depth.

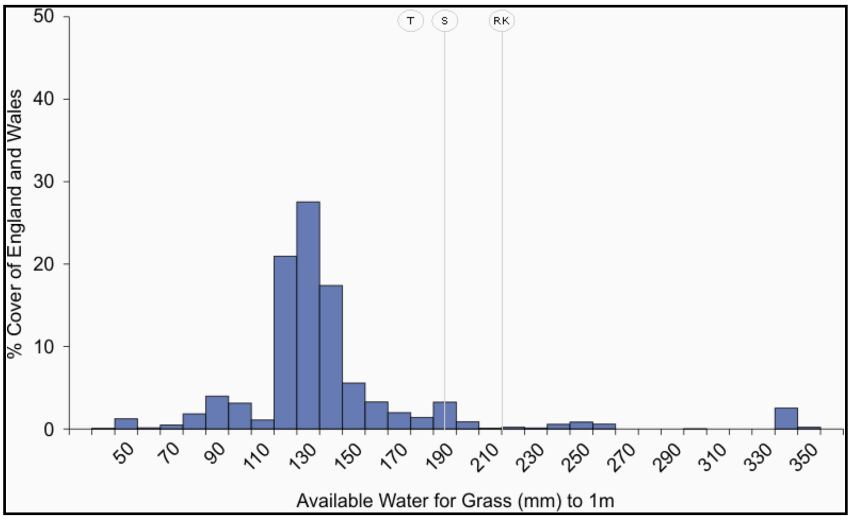


Figure 75. Available Water for Grass

ROCKCLIFFE (811d)

Deep stoneless silty and fine sandy soils variably affected by groundwater depending on artificial drainage.

e(iii). Available Water Content continued

Available water for cereal represents the water that is available to a cereal crop that is able to root to 120cm depth.

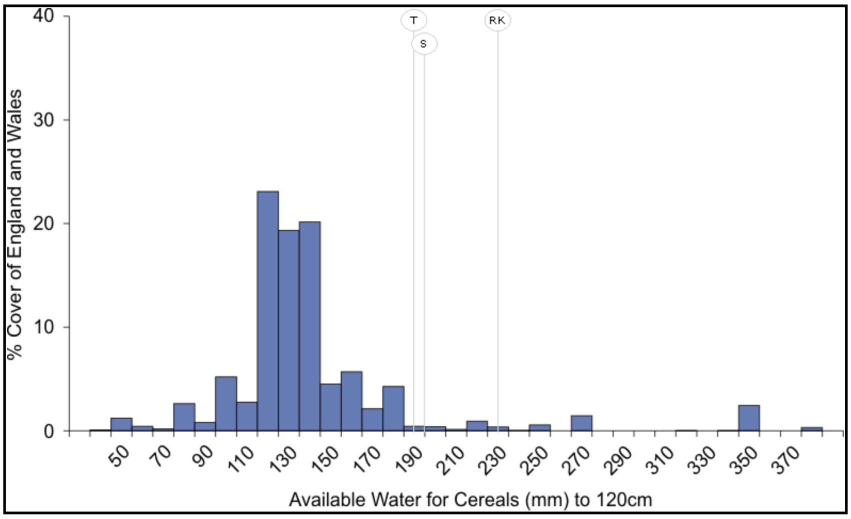


Figure 76. Available Water for Cereal

Available water for Sugar Beet represents the water that is available to a sugar beet crop that is able to root to 140cm depth.

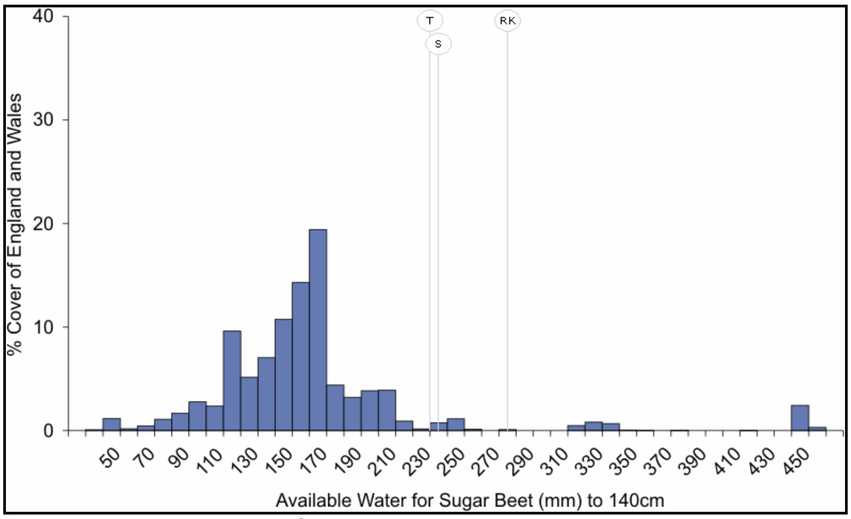


Figure 77. Available Water for Sugar Beet

Available water for Potatoes represents the water that is available to a potato crop that is able to root to 70cm depth.

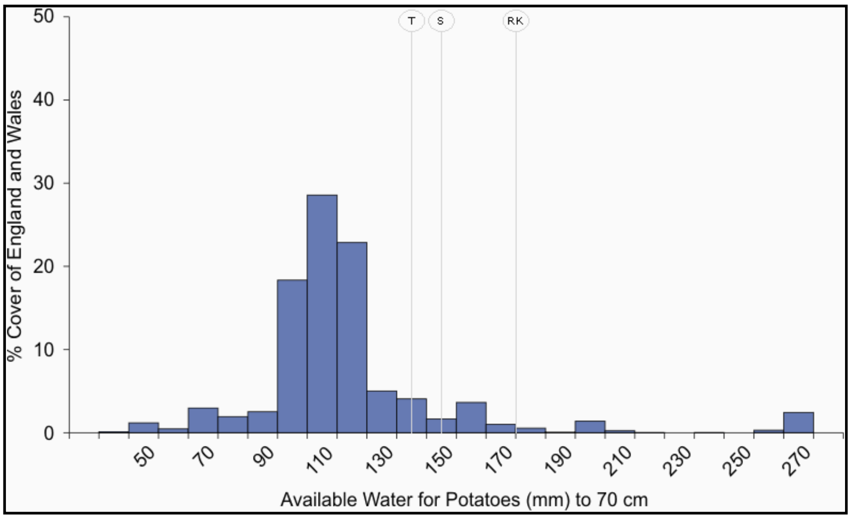


Figure 78. Available Water for Potatoes

WISBECH (812b)

Deep stoneless calcareous coarse silty soils.

a. General Description

Deep stoneless calcareous coarse silty soils. Groundwater usually controlled by ditches or pumps. Flat land with low ridges. Risk of wind erosion locally.
The major landuse on this association is defined as sugar beet, potatoes, field vegetables horticultural crops and cereals in the fens; grassland and some cereals in moist districts.

b. Distribution (England & Wales)

The WISBECH association covers 898km² of England and Wales which accounts for 0.59% of the landmass. The distribution of this association is shown in Figure 79. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the WISBECH association are outlined in Table 7 below. In some cases other minor soil series are present at a particular site, and these have been grouped together under the heading 'OTHER'. We have endevoured to present the likelihood of a minor, unnamed soil series occuring in your site in Table 7.

Schematic diagrams of the vertical soil profile of the major constituent soil series are provided in Section D to allow easier identification of the particular soil series at your site.

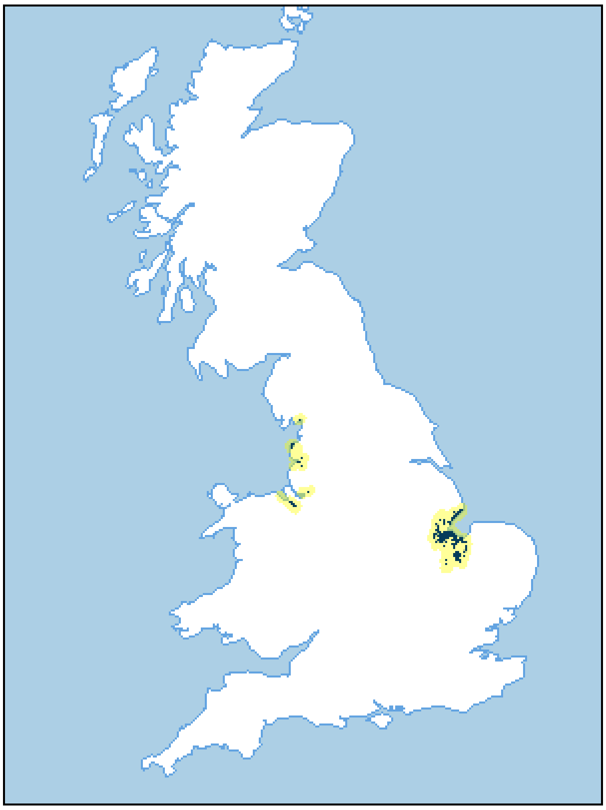


Figure 79. Association Distribution

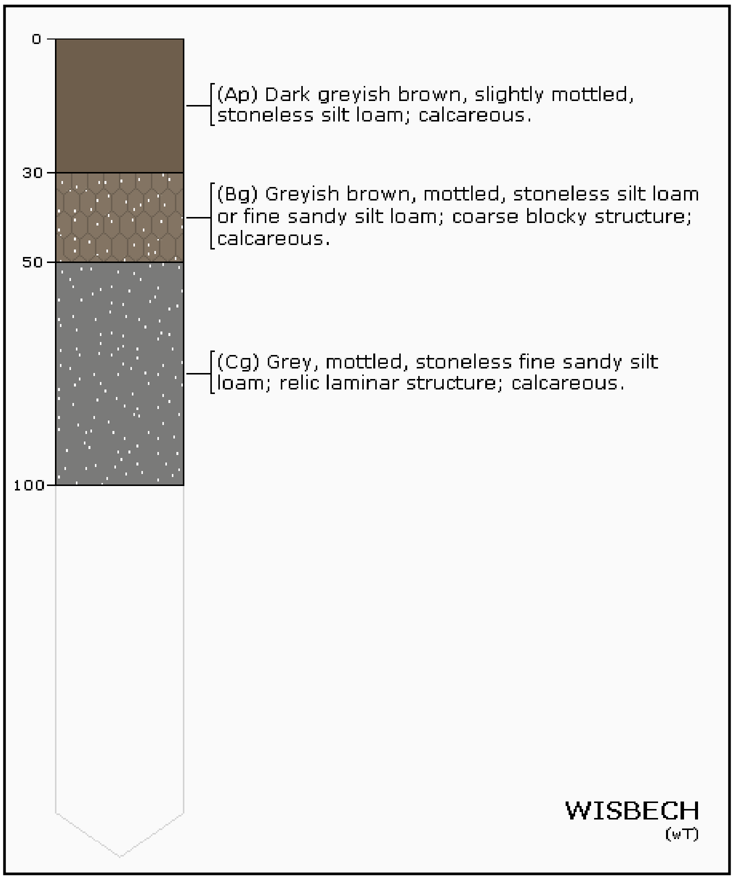
Soil Series	Description	Area %
WISBECH (wT)	light silty marine alluvium	55%
ROMNEY (R)	light silty marine alluvium	25%
OTHER	other minor soils	20%

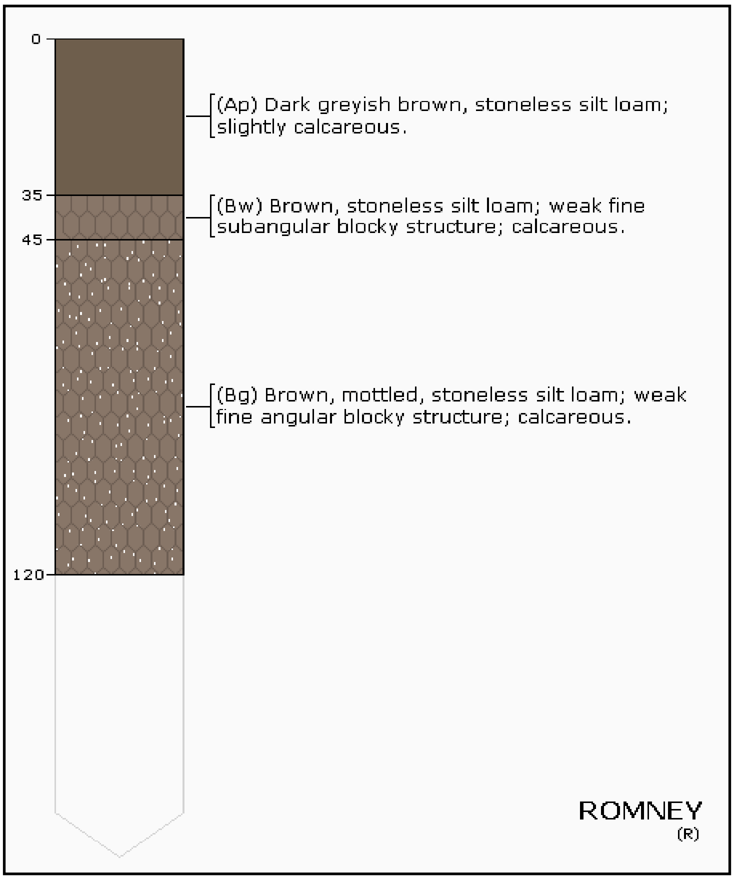
Table 7. The component soil series of the WISBECH soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

WISBECH (812b)

Deep stoneless calcareous coarse silty soils.

d. WISBECH Component Series Profiles





WISBECH (812b)

Deep stoneless calcareous coarse silty soils.

e. Soil Properties

This section provides graphical summaries of selected attribute data available for the component series in this association. The blue bars of the graphs presented in this section describe the range of property values for all soils across England and Wales. Superimposed on these graphs are the values for the component soil series in this association. This has been done to provide the reader with an understanding of where each property for each series sits within the national context.

Soil Series	Description	Area %
WISBECH (wT)	light silty marine alluvium	55%
ROMNEY (R)	light silty marine alluvium	25%
OTHER	other minor soils	20%

Table 7. The component soil series of the WISBECH soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

e(i). Soil Depth Information and Depths to Important Layers

Depth to rock A mean depth to bedrock or very stony rubble which has been assigned to each soil series based on observed and recorded soil profiles.

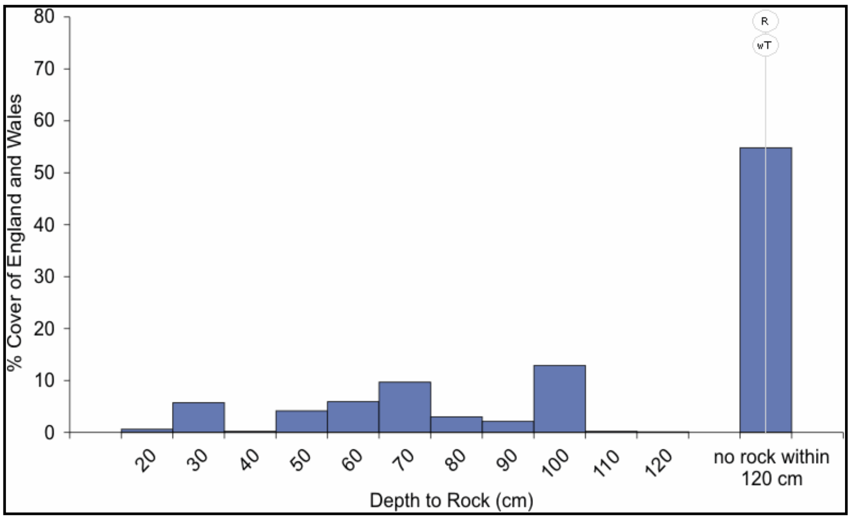


Figure 80. Depth of soil to Rock

Depth to gleying, the presence of grey and ochreous mottles within the soil, is caused by intermittent waterlogging. A mean depth to gleying has been assigned to each soil series based on observed and recorded soil profiles. The definition of a gleyed layer is designed to equate with saturation for at least 30 days in each year or the presence of artificial drainage.

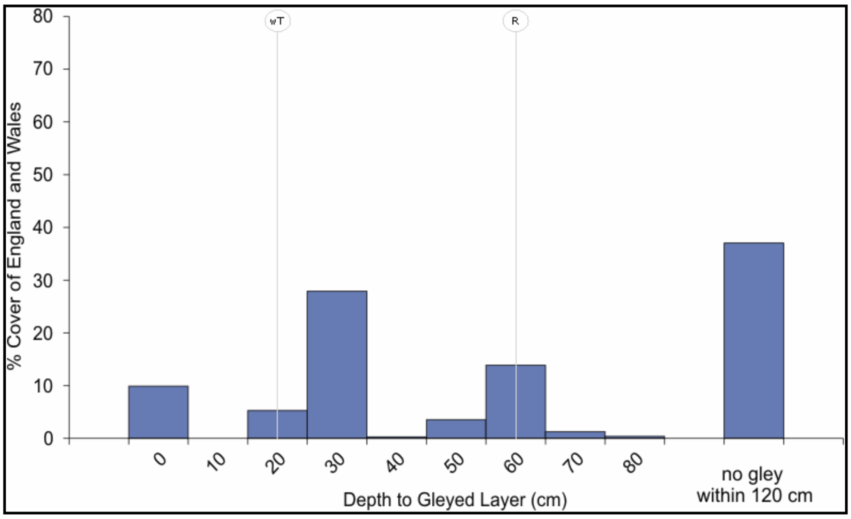


Figure 81. Depth of Soil to Gleying

WISBECH (812b)

Deep stoneless calcareous coarse silty soils.

e(i). Soil Depth Information and Depths to Important Layers continued

Depth to slowly permeable layer (downward percolation) A mean depth to a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede downward percolation of excess soil water. This causes periodic saturation in the overlying soil, reduced storage capacity and therefore increased hydrological response to rainfall events.

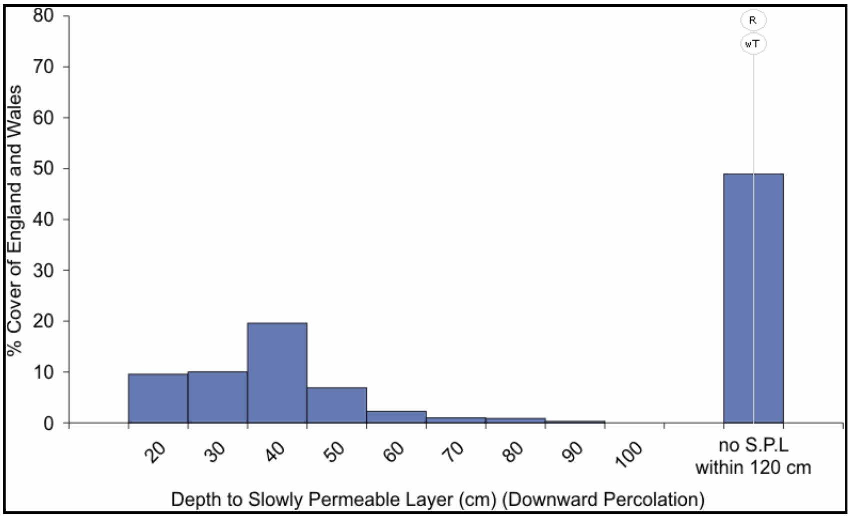


Figure 82. Depth to slowly permeable layer (downward percolation)

Depth to Slowly Permeable Layer (upward diffusion) A mean depth to the bottom of a layer with lateral hydraulic conductivity of <10 cm per day has been assigned to each soil series based on observed and recorded soil profiles. Such layers can be defined in terms of their particular soil textural and structural conditions and impede upward diffusion of water and gasses.

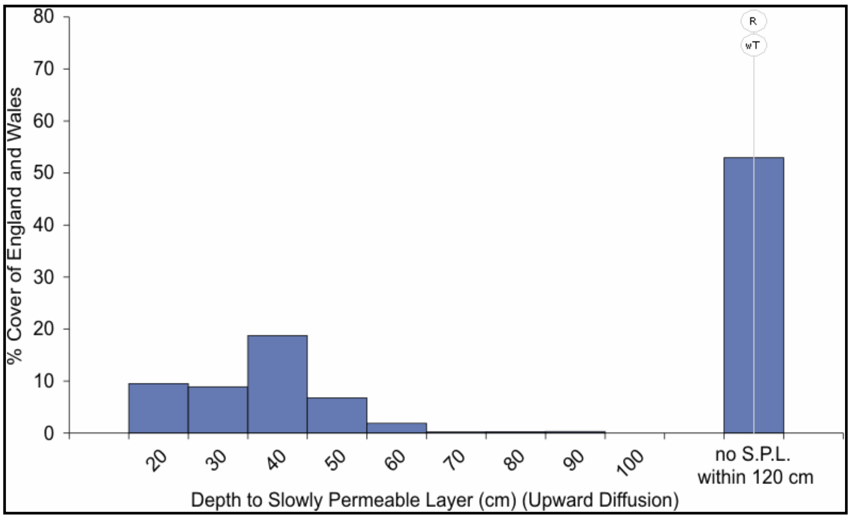


Figure 83. Depth to Slowly Permeable Layer (upward diffusion)

WISBECH (812b)

Deep stoneless calcareous coarse silty soils.

e(ii). Soil Hydrological Information

Integrated air capacity (IAC) is the total coarse pore space (>60 μm diameter) to 1 m depth. This size of pore would normally be air-filled when the soil is fully moist but not waterlogged. A large IAC means that the soil is well aerated. This will encourage root development and, provided near surface soil structure is well developed, will allow rainfall to percolate into the ground thus mitigating against localised flooding.

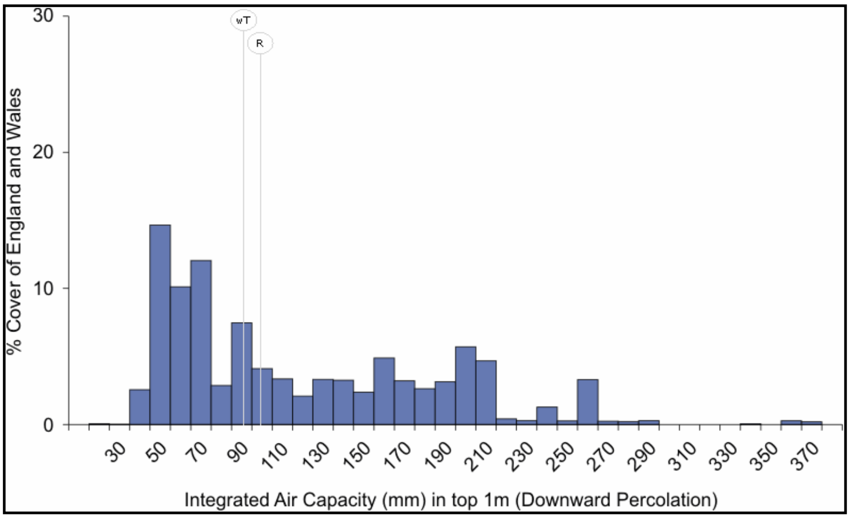


Figure 84. Integrated Air Capacity

Standard Percentage Runoff (SPR) is the percentage of rainfall that causes the short-term increase in flow seen at a catchment outlet following a storm event. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

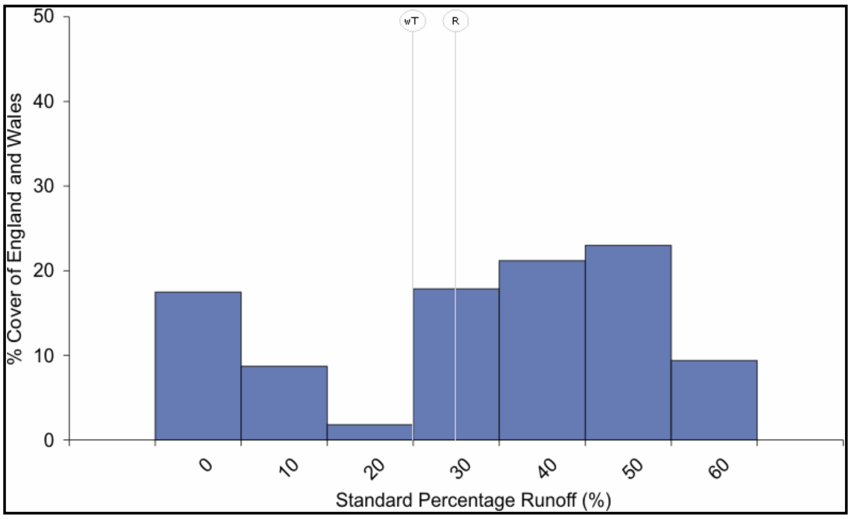


Figure 85. Standard Percentage Runoff

Base flow index is calculated from daily river flow data and expresses the volume of base flow of a river as a fraction of the total flow volume. The values associated with individual soil series have been calculated from an analysis of the relationships between flow data and the soils present within the catchment for several hundred gauged catchments.

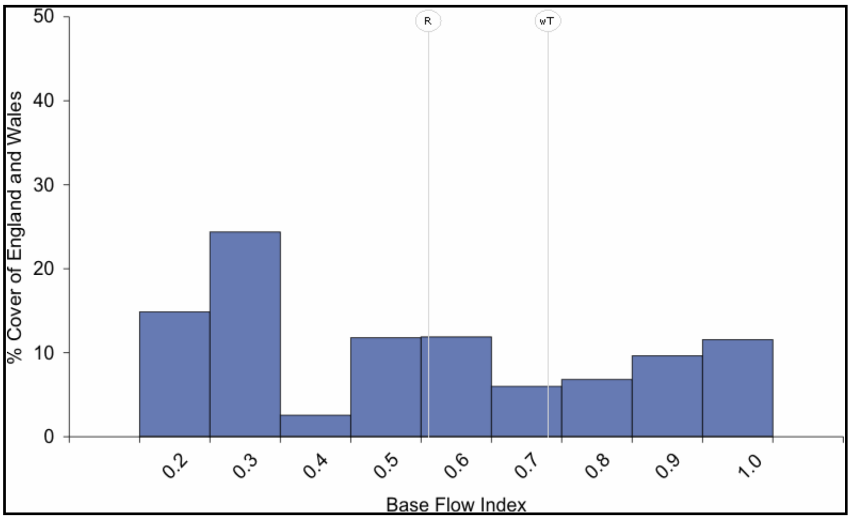


Figure 86. Base Flow Index

WISBECH (812b)

Deep stoneless calcareous coarse silty soils.

e(iii). Available Water Content

Available water content for plants varies depending on a number of factors, including the rooting depth of the plants. Described below are differing available water contents for cereals, sugar beet, grass and potato crops, as well as a generic available water value to 1 m depth.

Available water (by crop) Available water content to 1 m for the specified soil series between suctions of 5 and 1500kPa.

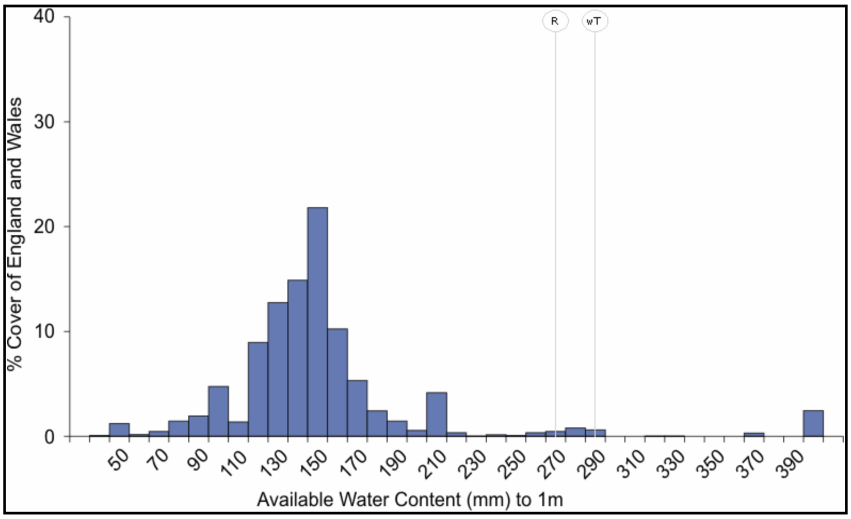


Figure 87. Available Water (by crop)

Available water for grass represents the water that is available to a permanent grass sward that is able to root to 100cm depth.

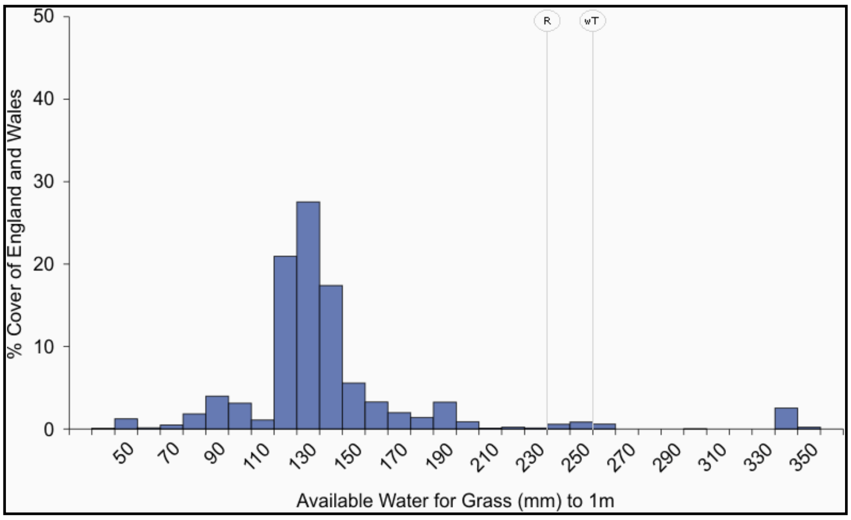


Figure 88. Available Water for Grass

WISBECH (812b)

Deep stoneless calcareous coarse silty soils.

e(iii). Available Water Content continued

Available water for cereal represents the water that is available to a cereal crop that is able to root to 120cm depth.

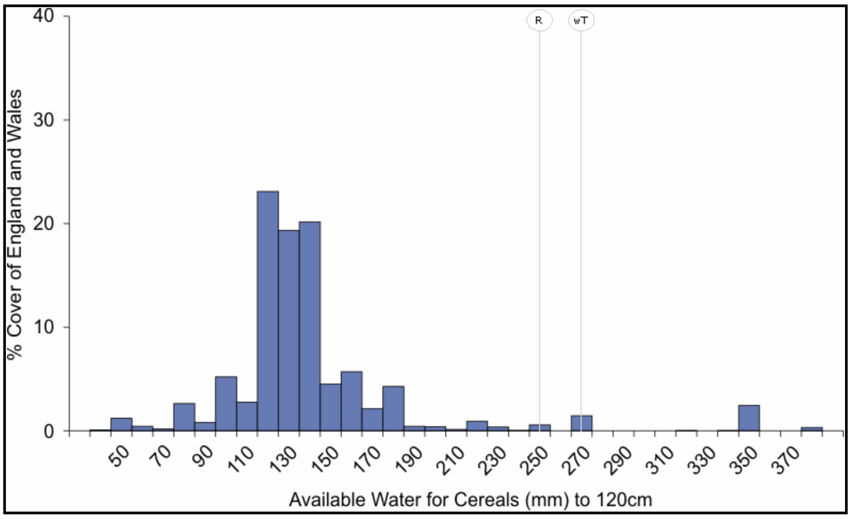


Figure 89. Available Water for Cereal

Available water for Sugar Beet represents the water that is available to a sugar beet crop that is able to root to 140cm depth.

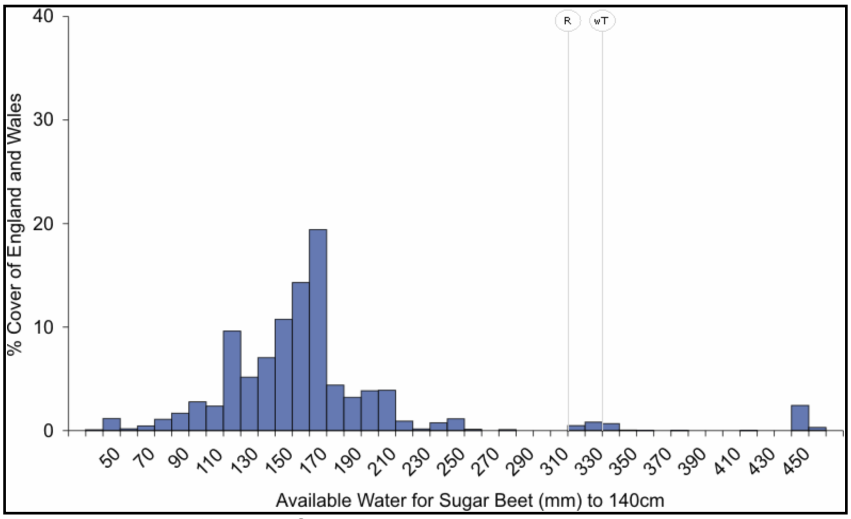


Figure 90. Available Water for Sugar Beet

Available water for Potatoes represents the water that is available to a potato crop that is able to root to 70cm depth.

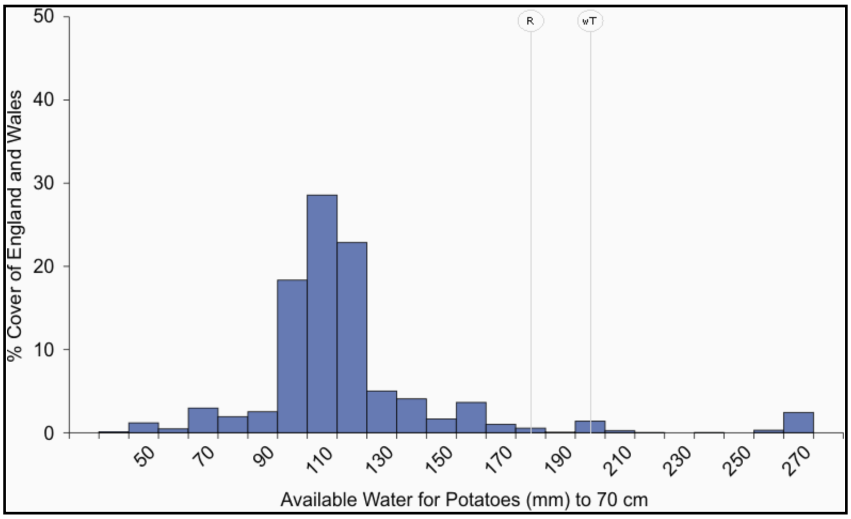
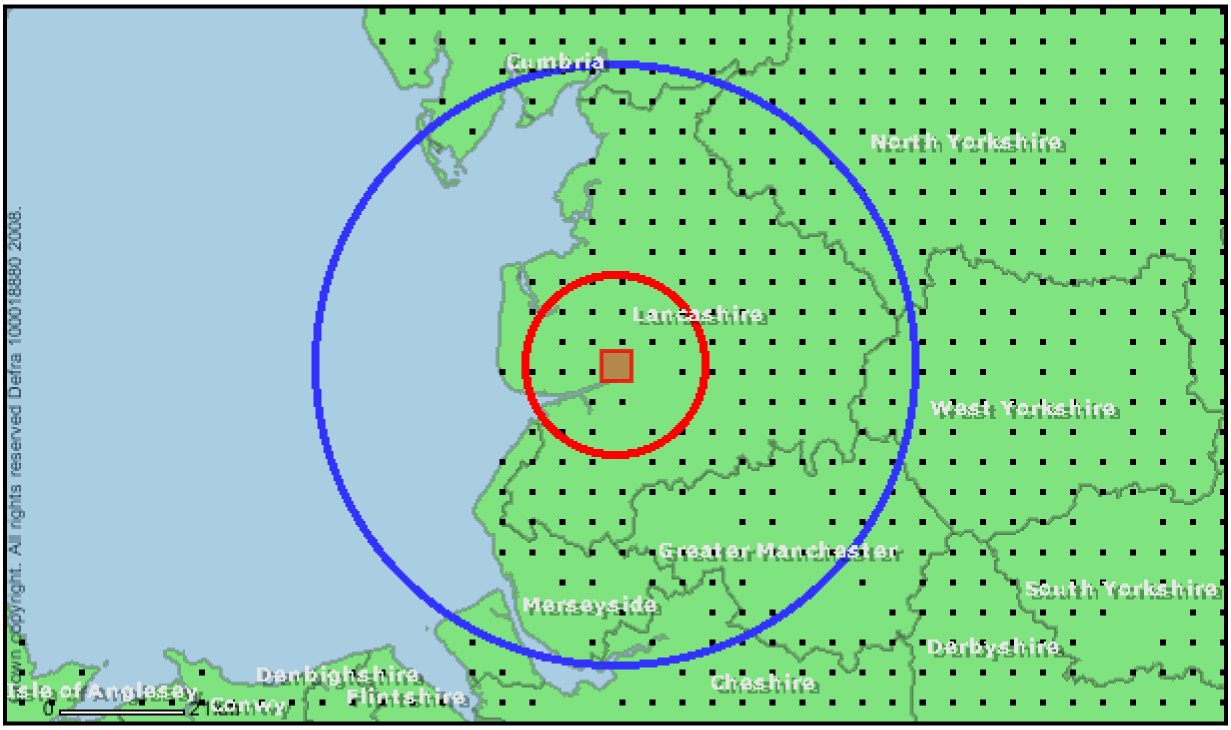
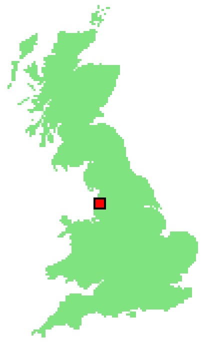


Figure 91. Available Water for Potatoes

3. TOPSOIL ELEMENT BACKGROUND LEVELS





TOPSOIL ELEMENT BACKGROUND LEVELS KEY

- ■ - NSI sample points
- Report area
- 15 km radius - local area
- 50 km radius - regional area

TOPSOIL ELEMENT BACKGROUND LEVELS DESCRIPTION

The National Soil Inventory (NSI) covers 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 England and Wales soils. The original sampling was undertaken around 1980 and there were partial resamplings in the mid-1990s. The most up-to-date data is presented here.

Analysis of the NSI samples provides detailed measurements of over 20 elements from the soils, in addition to pH. This data is summarised over three areas to provide you with an understanding of how your site, and your data for it, sits within the local, regional and national context.

Where available, the soil element levels are compared with the Soil Guideline Values and where a soil sample we have analysed has been found in excess of the SGV guidelines for "residential with plant uptake" land, this is displayed in red in the tables which follow.

SGV levels are provided for the following elements: lead, selenium, nickel, mercury, chromium, cadmium and arsenic.

In the following pages, a number of analyses of the topsoil are provided. The majority of analyses have been performed on the full compliment of sample points, however, in some areas, for some elements, only a few samples were analysed as part of subsequent programmes. In order to present the full suite of possible datasets, and accurately convey the validity of the data, the number of actual measured samples is stated for each analysis. Care should be taken where the number of samples is disproportionately low.

3a. Analyses Within a 15 km Radius (21 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST. DEV
pH (PH)	21	5.9	3.5	9.0	1.2
Carbon (CARBON)	21	5.2	1.2	31.4	6.3
Aluminium (AL_ACID)	21	22,399.3	10,509.0	44,549.0	8,575.8
Arsenic (AS_ACID)	8	3.5	2.4	7.2	1.6
Barium (BA_ACID)	21	237.4	64.0	1,420.0	282.9
Calcium (CA_ACID)	21	6,076.0	213.0	30,713.0	7,718.3
Cadmium (CD_ACID)	21	0.5	0.1	1.4	0.3
Cadmium (Extractable) (CD_EDTA)	21	0.3	0.0	0.5	0.1
Cobalt (CO_ACID)	21	8.7	3.9	18.4	3.2
Cobalt (Extractable) (CO_EDTA)	21	0.7	0.1	2.0	0.4
Chromium (CR_ACID)	21	39.2	0.0	76.0	18.2
Copper (CU_ACID)	21	31.2	12.5	140.8	28.1
Copper (Extractable) (CU_EDTA)	21	12.1	1.2	71.0	14.7
Flouride (F_ACID)	8	50.7	0.0	66.1	21.4
Iron (FE_ACID)	21	21,403.8	9,938.0	30,076.0	4,853.7
Mercury (HG_ACID)	8	0.1	0.0	0.4	0.2
Potassium (K_ACID)	21	4,304.8	1,973.0	7,354.0	1,593.0
Potassium (Extractable) (K_NITRATE)	21	181.7	15.0	440.0	110.0
Magnesium (MG_ACID)	21	4,743.5	1,926.0	9,133.0	2,061.9
Magnesium (Extractable) (MG_NITRATE)	21	135.2	30.0	320.0	70.3
Manganese (MN_ACID)	21	471.2	131.0	980.0	175.6
Manganese (Extractable) (MN_EDTA)	21	98.0	26.0	182.0	44.0
Molybdenum (MO_ACID)	9	0.8	0.0	1.8	0.6
Sodium (NA_ACID)	21	533.4	104.0	5,693.0	1,188.2
Nickel (NI_ACID)	21	26.3	13.7	53.3	11.0
Nickel (Extractable) (NI_EDTA)	21	1.6	0.1	2.8	0.6
Phosphorus (P_ACID)	21	920.0	421.0	1,769.0	318.8
Phosphorus (Extractable) (P_OLSEN)	20	42.7	18.0	106.0	24.4
Lead (PB_ACID)	21	51.4	21.0	145.0	31.9
Lead (Extractable) (PB_EDTA)	21	23.7	2.7	105.1	21.5
Selenium (SE_ACID)	8	0.5	0.0	1.3	0.4
Strontium (SR_ACID)	21	24.5	0.0	110.0	25.5
Vanadium (V_ACID)	9	34.2	7.3	60.1	17.6
Zinc (ZN_ACID)	21	116.5	41.0	581.0	123.1
Zinc (Extractable) (ZN_EDTA)	21	16.3	1.6	82.3	18.7

for units, see Analyses Definitions (p78)

3b. Analyses Within a 50 km Radius (185 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST. DEV
pH (PH)	184	5.3	3.3	9.1	1.2
Carbon (CARBON)	185	9.5	0.1	57.6	11.0
Aluminium (AL_ACID)	185	22,257.3	1,846.0	56,460.0	10,419.4
Arsenic (AS_ACID)	50	3.3	0.0	18.4	2.8
Barium (BA_ACID)	185	158.6	22.0	1,646.0	174.2
Calcium (CA_ACID)	185	4,929.6	8.0	168,655.0	13,593.1
Cadmium (CD_ACID)	185	0.8	0.0	6.3	0.9
Cadmium (Extractable) (CD_EDTA)	185	0.5	0.0	15.0	1.2
Cobalt (CO_ACID)	185	7.8	0.6	56.4	5.8
Cobalt (Extractable) (CO_EDTA)	185	0.6	0.0	7.0	0.7
Chromium (CR_ACID)	185	33.8	0.0	95.8	18.9
Copper (CU_ACID)	185	47.3	2.8	930.0	105.2
Copper (Extractable) (CU_EDTA)	185	13.7	1.1	252.6	29.0
Flouride (F_ACID)	88	52.2	0.0	294.8	62.4
Iron (FE_ACID)	185	23,164.3	1,659.0	75,682.0	12,193.5
Mercury (HG_ACID)	50	0.1	0.0	0.8	0.2
Potassium (K_ACID)	185	3,175.6	104.0	9,135.0	1,704.8
Potassium (Extractable) (K_NITRATE)	182	126.0	11.0	475.0	87.5
Magnesium (MG_ACID)	185	2,871.8	177.0	13,081.0	2,216.0
Magnesium (Extractable) (MG_NITRATE)	182	108.3	17.0	881.0	92.4
Manganese (MN_ACID)	185	531.6	9.0	7,581.0	798.8
Manganese (Extractable) (MN_EDTA)	185	116.4	1.0	1,726.0	181.8
Molybdenum (MO_ACID)	108	1.2	0.0	6.2	1.2
Sodium (NA_ACID)	185	304.2	61.0	11,105.0	901.6
Nickel (NI_ACID)	185	23.4	4.0	79.4	14.8
Nickel (Extractable) (NI_EDTA)	185	1.6	0.1	10.8	1.3
Phosphorus (P_ACID)	185	897.5	149.0	2,939.0	463.9
Phosphorus (Extractable) (P_OLSEN)	181	31.2	2.0	130.0	24.0
Lead (PB_ACID)	185	107.8	3.0	2,660.0	214.1
Lead (Extractable) (PB_EDTA)	185	45.8	2.7	1,983.9	146.6
Selenium (SE_ACID)	50	0.7	0.0	3.6	0.6
Strontium (SR_ACID)	185	19.7	0.0	110.0	18.9
Vanadium (V_ACID)	108	34.3	0.0	156.6	27.1
Zinc (ZN_ACID)	185	111.7	12.0	1,818.0	164.3
Zinc (Extractable) (ZN_EDTA)	185	15.2	1.4	449.0	37.6

for units, see Analyses Definitions (p78)

3c. National Analyses (5686 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST. DEV
pH (PH)	5,630	6.0	3.1	9.2	1.3
Carbon (CARBON)	5,672	6.1	0.1	61.5	8.9
Aluminium (AL_ACID)	5,677	26,775.3	491.0	79,355.0	12,772.2
Arsenic (AS_ACID)	2,729	4.6	0.0	110.0	5.7
Barium (BA_ACID)	5,677	150.0	7.0	3,840.0	159.5
Calcium (CA_ACID)	5,677	13,768.7	0.0	339,630.0	37,785.0
Cadmium (CD_ACID)	5,677	0.7	0.0	40.9	1.0
Cadmium (Extractable) (CD_EDTA)	5,655	0.5	0.0	85.0	3.0
Cobalt (CO_ACID)	5,677	10.6	0.0	567.0	13.7
Cobalt (Extractable) (CO_EDTA)	5,655	1.1	0.0	26.5	1.2
Chromium (CR_ACID)	5,677	38.9	0.0	2,339.8	43.7
Copper (CU_ACID)	5,677	22.6	0.0	1,507.7	36.8
Copper (Extractable) (CU_EDTA)	5,655	6.4	0.3	431.4	11.1
Flouride (F_ACID)	3,320	58.5	0.0	6,307.9	186.2
Iron (FE_ACID)	5,677	28,147.8	395.0	264,405.0	16,510.5
Mercury (HG_ACID)	2,159	0.1	0.0	2.4	0.2
Potassium (K_ACID)	5,677	4,727.7	60.0	23,905.0	2,700.2
Potassium (Extractable) (K_NITRATE)	5,609	182.0	6.0	2,776.0	151.6
Magnesium (MG_ACID)	5,677	3,648.1	0.0	62,690.0	3,284.1
Magnesium (Extractable) (MG_NITRATE)	5,609	146.0	1.0	1,601.0	147.5
Manganese (MN_ACID)	5,677	777.0	3.0	42,603.0	1,068.8
Manganese (Extractable) (MN_EDTA)	5,654	159.4	0.0	3,108.0	188.6
Molybdenum (MO_ACID)	4,417	0.9	0.0	56.3	2.0
Sodium (NA_ACID)	5,677	323.3	17.0	25,152.0	572.3
Nickel (NI_ACID)	5,677	25.4	0.0	1,350.2	29.2
Nickel (Extractable) (NI_EDTA)	5,655	1.6	0.1	73.2	2.0
Phosphorus (P_ACID)	5,677	792.1	41.0	6,273.0	433.9
Phosphorus (Extractable) (P_OLSEN)	5,604	27.4	0.0	534.0	25.5
Lead (PB_ACID)	5,677	73.3	0.0	17,365.0	280.6
Lead (Extractable) (PB_EDTA)	5,655	27.8	1.2	6,056.5	119.7
Selenium (SE_ACID)	2,729	0.6	0.0	22.8	0.8
Strontium (SR_ACID)	5,677	42.3	0.0	1,445.0	67.8
Vanadium (V_ACID)	4,428	41.0	0.0	854.4	33.9
Zinc (ZN_ACID)	5,677	90.2	0.0	3,648.0	104.4
Zinc (Extractable) (ZN_EDTA)	5,655	9.6	0.5	712.0	24.6

for units, see Analyses Definitions (p78)

SOIL GUIDELINE VALUES (SGV)

Defra and the Environment Agency have produced soil guideline values (SGVs) as an aid to preliminary assessment of potential risk to human health from land that may be contaminated. SGVs represent 'intervention values', which, if exceeded, act as indicators of potential unacceptable risk to humans, so that more detailed risk assessment is needed.

The SGVs were derived using the Contaminated Land Exposure Assessment (CLEA) model for four land uses:

1. residential (with plant uptake / vegetable growing)
2. residential (without vegetable growing)
3. allotments
4. commercial / industrial

SGVs are only designed to indicate whether further site-specific investigation is needed. Where a soil guideline value is exceeded, it does not mean that there is necessarily a chronic or acute risk to human health.

The values presented in this report represent those from a number of sample points (given in the "Samples" column in each table) providing local, regional and national background levels. Figures which appear in red indicate that a bulked sample from 20m surrounding a sample point, has at a past date, exceeded the SGV for the 'residential with plant uptake' land use.

It is always advisable to perform site specific investigations.

More details on all the SGVs can be found on the Environment Agency Website.

All units are mg/kg which is equivalent to parts per million (ppm)

SUBSTANCE	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	ALLOTMENTS	COMMERCIAL / INDUSTRIAL
LEAD	450	450	450	750
SELENIUM	35	260	35	8000
NICKEL	50	75	50	5000
MERCURY	8	15	8	480
CHROMIUM	130	200	130	5000
CADMIUM (pH 6)	1	30	1	1400
CADMIUM (pH 7)	2	30	2	1400
CADMIUM (pH 8)	8	30	8	1400
ARSENIC	20	20	20	500

ANALYSES DEFINITIONS

PH (pH)
pH of soil measure after shaking 10ml of soil for 15 minutes with 25ml of water

CARBON (Carbon)
Organic Carbon (% by wt) measured either by loss-on-ignition for soils estimated to contain more than about 20% organic carbon or by dichromate digestion.

AL_ACID (Aluminium)
Total Aluminium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

AS_ACID (Arsenic)
Total Arsenic concentration (mg/kg) determined by Hydride Atomic Absorption Spectrometry (AAS), extracted into hydrochloric acid after digestion with nitric acid and ashing with magnesium nitrate

BA_ACID (Barium)
Total Barium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CA_ACID (Calcium)
Total Calcium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CD_ACID (Cadmium)
Total Cadmium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CD_EDTA (Cadmium Extractable)
Extractable Cadmium concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

CO_ACID (Cobalt)
Total Cobalt concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CO_EDTA (Cobalt Extractable)
Extractable Cobalt concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

CR_ACID (Chromium)
Total Chromium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CU_ACID (Copper)
Total Copper concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

CU_EDTA (Copper Extractable)
Extractable Copper concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

F_ACID (Flouride)
Flouride extracted with 1mol / l sulphuric acid and determined by Ion Selective Electrode (ISE)

FE_ACID (Iron)
Total Iron concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

HG_ACID (Mercury)
Total Mercury concentration (mg/kg) determined by Hydride Atomic Absorption Spectrometry (AAS), digested in a nitric/sulphuric acid mixture

K_ACID (Potassium)
Total Potassium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

K_NITRATE (Potassium Extractable)
Extractable Potassium concentration (mg/l) determined by shaking 10ml of air dry soil with 50ml of 1.0M ammonium nitrate for 30mins, filtering and then measuring the concentration by flame photometry

ANALYSES DEFINITIONS continued

MG_ACID (Magnesium)
Total Magnesium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

MG_NITRATE (Magnesium Extractable)
Extractable Magnesium concentration (mg/l) determined by shaking 10ml of air dry soil with 50ml of 1.0M ammonium nitrate for 30mins, filtering and then measuring the concentration by flame photometry

MN_ACID (Manganese)
Total Manganese concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

MN_EDTA (Manganese Extractable)
Extractable Manganese concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

MO_ACID (Molybdenum)
Total Molybdenum concentration (mg/kg) determined by Atomic Adsorption Spectrometyr (AAS) in an aqua regia digest

MO_EDTA (Molybdenum Extractable)
Extractable Molybdenum concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

NA_ACID (Sodium)
Total Sodium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

NI_ACID (Nickel)
Total Nickel concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

NI_EDTA (Nickel Extractable)
Extractable Nickel concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

P_ACID (Phosphorus)
Total Phosphorus concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

P_OLSON (Phosphorous Extractable)
Extractable Phosphorus concentration (mg/l) determined by shaking 5ml of air dry soil with 100ml of 0.5M sodium bicarbonate for 30mins at 20 deg.C, filtering and then measuring the absorbance at 880 nm colorimetrically with acid ammonium molybdate solution

PB_ACID (Lead)
Total Lead concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

PB_EDTA (Lead Extractable)
Extractable Lead concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

SE_ACID (Selenium)
Total Selenium concentration (mg/kg) determined by Hydride Atomic Absorption Spectrometry (AAS), extracted into hydrochloric acid after digestion with nitric acid and ashing with magnesium nitrate

SR_ACID (Strontium)
Total Strontium concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

V_ACID (Vanadium)
Total Vanadium concentration (mg/kg) determined by Atomic Adsorption Spectrometyr (AAS) in an aqua regia digest

ZN_ACID (Zinc)
Total Zinc concentration (mg/kg) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) in an aqua regia digest

ZN_EDTA (Zinc Extractable)
Extractable Zinc concentration (mg/l) determined by Inductively Coupled Plasma Emission Spectrometry (ICP) after shaking 10ml of soil with 50ml of 0.05M EDTA at pH 7.0 for 1h at 20 deg. C and then filtering

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GIS DATASETS:
The GIS data used in the creation of this report is available to lease for use in projects.
To learn more about, or acquire the GIS datasets used in the creation of this report, please contact the National Soil Resources Institute:

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