highways england

A47/A11 Thickthorn Junction

Scheme Number: TR010037

Volume 6
6.3 Environmental Statement Appendices
Appendix 9.2 – 2018 agricultural survey results

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

March 2021

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

The A47/A11 Thickthorn Junction Development Consent Order 202[x]

ENVIRONMENTAL STATEMENT APPENDICES
Appendix 9.2 – 2018 agricultural survey results

Regulation Number:	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010037
Application Document Reference	TR010037/APP/6.3
BIM Document Reference	HE551492-GTY-EGT-000-RP-LX-30004
Author:	A47/A11 Thickthorn Junction Project Team, Highways England

Version	Date	Status of Version
Rev 0	March 2021	Application Issue

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9. Agricultural Land Classification Survey (2018)

9.1. Introduction and Site Walkover

9.1.1. An agricultural land classification (ALC) survey was undertaken on 21 August 2018 of agricultural land within the Proposed Scheme boundary. An initial site walkover was completed to try and reduce the number of auger locations required by discounting areas due to the field slope, stoniness or microrelief. Any areas where these factors limit the grading of land to below 3B were discounted for further surveys.

9.1.2. A 1x1 hectare grid was laid over all the suitable agricultural land that will be affected by the scheme using ArcMap software. This grid was adjusted to ensure no auger points fell on roads, hedges or other non-applicable ground conditions.

9.1.3. The initial auger positions were compared with utilities maps for the Proposed Scheme to ensure proposed auger locations were not within 5m of any known underground service. (Note, all auger locations were cat scanned before ground was broken).

9.2. Access

9.2.1. Once the auger locations were known, access was organised via the appropriate means for the project. A map of proposed auger points and a full augering methodology was available to landowners on request.

9.3. Augering methodology

9.3.1. The ALC survey was undertaken by a team of three surveyors trained in ALC classification for the analysis. Where a location has been chosen for augering, the survey was undertaken either within tire marks or at the edge of a field to prevent damage to crops. The survey staff were responsible for using a CAT scanner to survey the general area of the auger to try and detect potential unknown underground services using both power and radio. If the scanner returned a positive result, the survey staff moved at least 5m from the location and scanned the ground again.

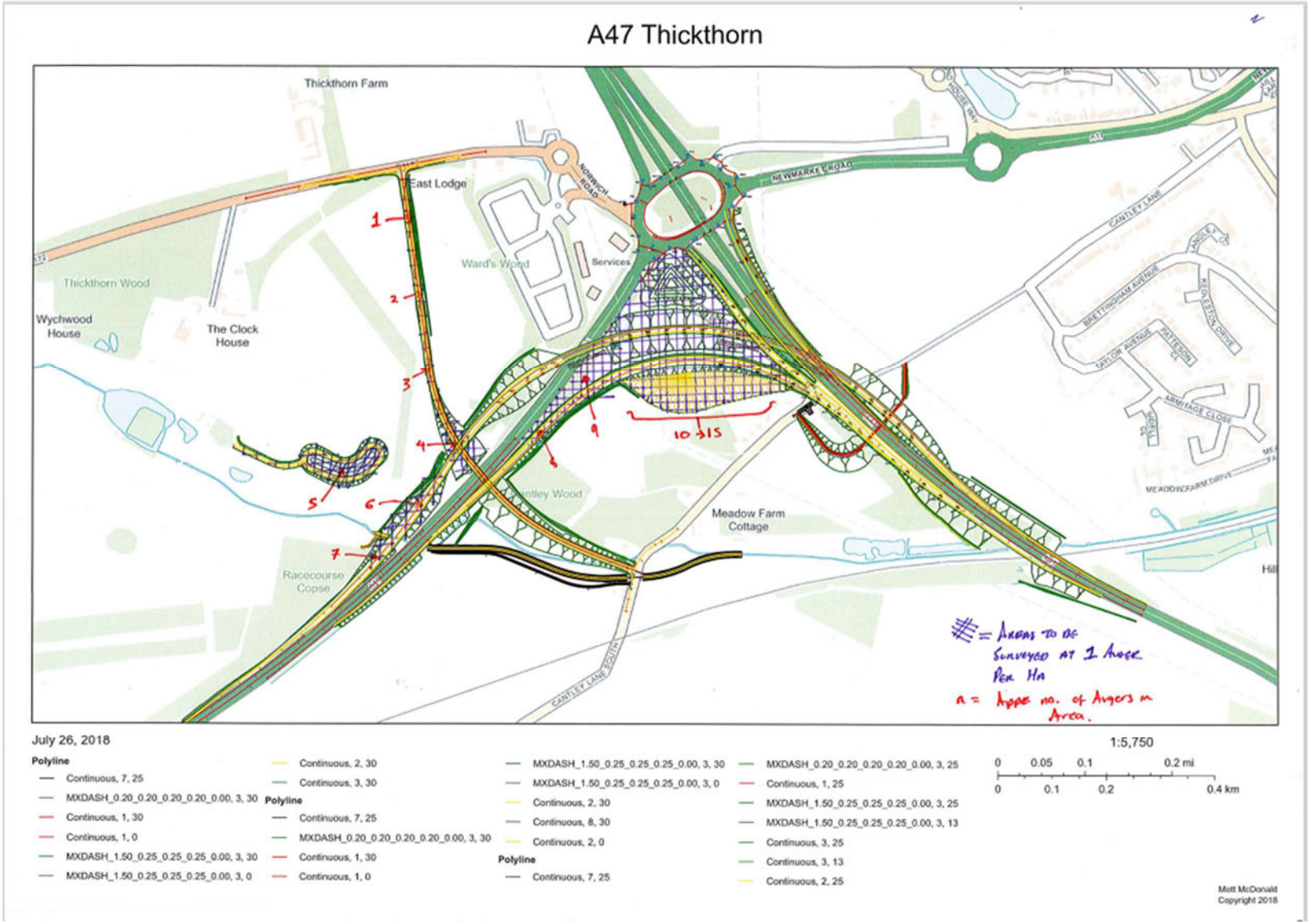
9.3.2. Only low-impact, hand-operated tools were used (auger 7cm diameter) and no excavations were undertaken below 1.2m. During the augering, surveyors excavated carefully, remaining vigilant at all times and halted work if any hard surfaces, marker tape or suspicious changes in soil consistency be encountered. Survey staff would then move to another location 5m from the area. A hand auger allows the soil profile to be sampled in 20 cm segments.

9.3.3. The soil excavated was then arranged in the same order it was excavated on the surface and inspected in situ by the surveyors to the MAFF Agricultural Land Classification of England and Wales 1988 standard. The survey includes visual, tactile and chemical inspection of the soil. This chemical inspection involves assessing the concentration of lime in the soil with 10% concentration of hydrochloric acid (HCL). The HCL was transported to site in an appropriate container and only used by surveyors wearing appropriate PPE (long sleeve clothing, gloves and goggles).

9.3.4. Auger holes were back-filled with materials in the same order they were removed and surface vegetation was replaced on the same day. Minimal disturbance to crops or livestock was ensured by using crop tramlines, and easily accessible areas where possible.

9.3.5. The results of the augering will assist in the determination of preliminary ALC grading across the Proposed Scheme. Where ALC grades change or there are anomalous results, trial pits will be used at a later date to accurately confirm the ALC in a given area.

Annex A – ALC locations plan



Annex B – Soil survey initial results

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Land Evaluation Short Course 13 September 2017

Worksheet 1 for ALC of Cranfield soil

Assessor: [redacted] **Date:** 21/08/18

1.1 SITE (7)

		Blue Book	ALC Grade
Location OS grid			Na
Altitude m a.s.l.			Na
Slope gradient %	5%	Table 1	
Microrelief	Suitable.	p 13	
Surface stones % > 2 cm	0%	Table 5	
Surface stones % > 6 cm	0%	Table 5	
Summer flooding	No	Table 2	
Winter flooding	No	Table 3	
Depth to rock	-	Table 4	
Topsoil pure sand?		p 17 & Footnote 2 Table 6	
Any 3b?			

1.2 CLIMATE from Met Book

ATO		Figure 1
AAR		Figure 1
Climate ALC Grade		
FCD		
MDw		
MDp		

Cranfield University

Land Evaluation Short Course 13 September 2017

Worksheet 2 for ALC of Cranfield soil

PROFILE FEATURES (7)

Horizon depth	Matrix colour	Mottles	Fe conc	Moisture	GLEY?	Texture	Structure		SPL?	Stones 1 (Zero)		Stones 2 (Gravel)		HCl
							Shape	Size		%	Type	%	Type	
0-70	59-11-30	No	No	Slight.	No	LS	Granular	Claim	No	3	Flint	0	—	—
[illegible]														
70-	80-719	No	No	Slight	No	SCL	Blocky	Fine Medium Coarse Claim	No	0	—	0	—	—
0-70cm	59-41-30	No	No	Slight	No	LS	Granular	Claim	No	3	Flint	0	—	—
70-110	80-719	No	No	Slight	No	SCL	Blocky	Fine Medium Coarse Claim	No	0	—	0	—	—
110-120	80-8-23	Yes	No	Slight	No	SC	Blocky	Fine Medium Coarse Claim	No	0	—	0	—	—
									↳ SPL at underoak					

Cranfield University

Land Evaluation Short Course 13 September 2017

Worksheet 1 for ALC of Cranfield soil

Assessor: [redacted] **Date:** 20/9/18

1.1 SITE hole 1 ID 1

		Blue Book	ALC Grade
Location OS grid			Na
Altitude m a.s.l.			Na
Slope gradient %	0	Table 1	
Microrelief	Flat, no relief	p 13	
Surface stones % > 2 cm	2 %	Table 5	
Surface stones % > 6 cm	0	Table 5	
Summer flooding	0/none	Table 2	
Winter flooding	0/none	Table 3	
Depth to rock	200	Table 4	
Topsoil pure sand?	No	p 17 & Footnote 2 Table 6	
Any 3b?	NO		

1.2 CLIMATE from Met Book

ATO		Figure 1
AAR		Figure 1
Climate ALC Grade		
FCD		
MDw		
MDp		

Cranfield University

Land Evaluation Short Course 13 September 2017

Worksheet 2 for ALC of Cranfield soil

PROFILE FEATURES hole 1

Horizon depth	Matrix colour	Mottles	Fe conc	Moisture	GLEY?	Texture	Structure		SPL?	Stones 1		Stones 2		HCl
							Shape	Size		%	Type	%	Type	
0-35/40cm	68,4,7	NO	0%	NO	NO	LS	granular	1mm	NO	1	Stint			—
40-100	24,7,17	NO	0%	No	NO	LS	11	11	11	0	0	0	0	—
100-170	96,4,20	No	0%	Moist	No	SCL	blocky	3-5cm	No	0	0	0	0	—

Cranfield University

Hole2

Land Evaluation Short Course 13 September 2017

Worksheet 1 for ALC of Cranfield soil

Assessor: [redacted] **Date:** 20/08/18

1.1 SITE Thurlton

		Blue Book	ALC Grade
Location OS grid			Na
Altitude m a.s.l.			Na
Slope gradient %	2-3%	Table 1	
Microrelief	Flat, good for Tractors	p 13	
Surface stones % > 2 cm	3%	Table 5	
Surface stones % > 6 cm	2%	Table 5	
Summer flooding	No	Table 2	
Winter flooding	No	Table 3	
Depth to rock	-	Table 4	
Topsoil pure sand?	No	p 17 & Footnote 2 Table 6	
Any 3b?	No		

1.2 CLIMATE from Met Book

ATO		Figure 1
AAR		Figure 1
Climate ALC Grade		
FCD		
MDw		
MDp		

Hole 2

Land Evaluation Short Course 13 September 2017

Worksheet 2 for ALC of Cranfield soil

PROFILE FEATURES

Horizon depth	Matrix colour	Mottles	Fe conc	Moisture	GLEY?	Texture	Structure		SPL?	Stones 1		Stones 2		HCl
							Shape	Size		%	Type	%	Type	
0-50	7.5,3,6	Yes (1%)	Y (1%)	Yes	0	LS	blocky/gran	<1cm	No	5	hand	7 5cm		—
50-100	7.4/7,17	No	No	Yes	0	SCL	blocky	1cm	No	5to	hand	75cm		
Note: digging stopped by stones/rocks.														

Cranfield University

Hole 3

Land Evaluation Short Course 13 September 2017

Worksheet 1 for ALC of Cranfield soil

Assessor: [redacted] **Date:** 20/08/18

1.1 SITE Thickthorn

		Blue Book	ALC Grade
Location OS grid			Na
Altitude m a.s.l.			Na
Slope gradient %		Table 1	
Microrelief	Slight, a few stones	p 13	
Surface stones % > 2 cm		Table 5	
Surface stones % > 6 cm	5%	Table 5	
Summer flooding	No	Table 2	
Winter flooding	No	Table 3	
Depth to rock		Table 4	
Topsoil pure sand?	No	p 17 & Footnote 2 Table 6	
Any 3b?	No		

1.2 CLIMATE from Met Book

ATO		Figure 1
AAR		Figure 1
Climate ALC Grade		
FCD		
MDw		
MDp		

Hole 3

Land Evaluation Short Course 13 September 2017

Worksheet 2 for ALC of Cranfield soil

PROFILE FEATURES

	Horizon depth	Matrix colour	Mottles	Fe conc	Moisture	GLEY?	Texture	Structure		SPL?	Stones 1		Stones 2		HCl
								Shape	Size		%	Type	%	Type	
	0- 45cm	7.5-3-6	No	No	Slightly	No	LS	Granular	<5mm	No	1	Flint	0	—	—
45-75	~~45-75cm~~	7.5-6-13	No	No	Slightly	No	LS	"	"	No	1	Flint	0	-	—
75-90	~~75-90cm~~	8/7.5-9	No	No	Slight	No	SCL	Groovy	3-5cm	No	0	—	—	—	—
90-120cm		8/6-7.5-9	No	No	Yes	No	SC	Blocky	"	No	0	~~Flint~~	1	Flint	—
										↳ Lindy dust above SPL					

Cranfield University

Land Evaluation Short Course 13 September 2017

Worksheet 1 for ALC of Cranfield soil

Assessor: [redacted] **Date:** 2018/15

1.1 SITE 4

		Blue Book	ALC Grade
Location OS grid			Na
Altitude m a.s.l.			Na
Slope gradient %	3%	Table 1	
Microrelief	from the tracks we are guessing! Not together	p 13	
Surface stones % > 2 cm	1%	Table 5	
Surface stones % > 6 cm	0%	Table 5	
Summer flooding	No	Table 2	
Winter flooding	No	Table 3	
Depth to rock		Table 4	
Topsoil pure sand?	Yes	p 17 & Footnote 2 Table 6	
Any 3b?	Yes		

↳ Ruled as 3b due to sand - topsoil + micro relief.

1.2 CLIMATE from Met Book

ATO		Figure 1
AAR		Figure 1
Climate ALC Grade		
FCD		
MDw		
MDp		

Hole 5+6

Land Evaluation Short Course 13 September 2017

Worksheet 2 for ALC of Cranfield soil

PROFILE FEATURES

	Horizon depth	Matrix colour	Mottles	Fe conc	Moisture	GLEY?	Texture	Structure		SPL?	Stones 1		Stones 2		HCl
								Shape	Size		%	Type	%	Type	
Hole 5	0-40	7.5-3-6	No	No	Slight	No	LS	Crumb	1-2mm	No	-	-	1	flint	-
Hole 6	0-35	6.8-6.4	No	No	Slightly	No	LS	Crumb	<2mm	No	-	-	0	-	-
	35-	7.4-7.17	No	No	No	No	LS	Granular	<2mm	No	3%	flint	-	-	-

Annex C – Cranfield extended soil site report 2017

Soil Site Report

Extended Soil Report

144833538

Easting: 618419
Northing: 305185
Site Area: 5km x 5km

Prepared for: Customer Services, Landmark Information Group
Date: 31 Oct 2017

Citation

Citations to this report should be made as follows:

National Soil Resources Institute (2017) Soils Site Report for location 618419E, 305185N, 5km x 5km, National Soil Resources Institute, Cranfield University. Accessed via: https://www.landis.org.uk/sitereporter

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About this report

This Soil Site Report identifies and describes the properties and capacities of the soil at your specified location as recorded in the 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 and 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 Site Soil 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.

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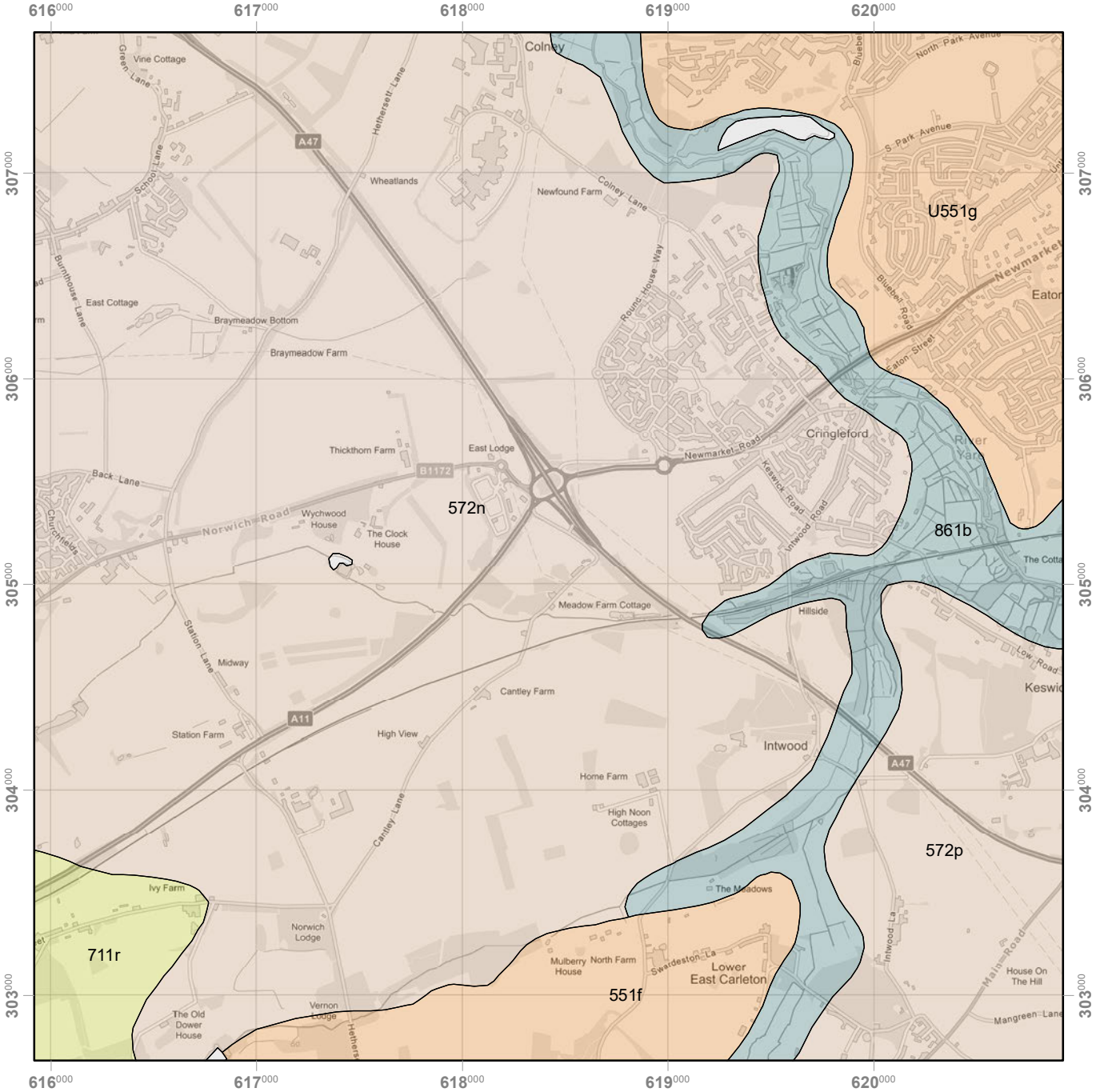
1. Soil Thematic Maps

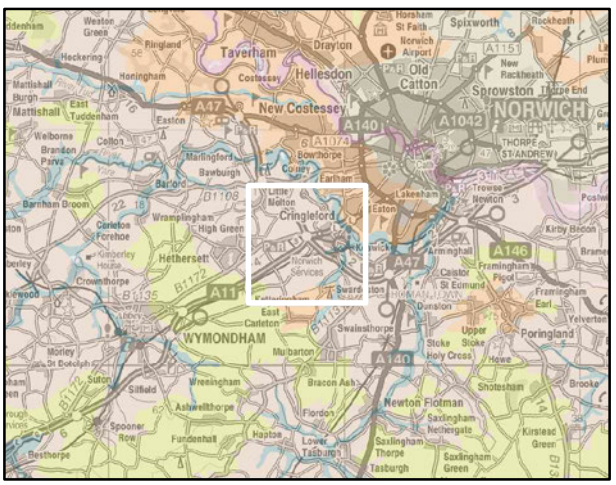
This section contains a series of maps of the area surrounding your selected location, presenting a number of themes relating to the characteristics of the soils. These provide an overview of the nature and condition of the local soil conditions. It is these conditions that may be used to infer the response 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 importance should be given to identifying the best measures aimed towards soil protection, 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

Figure 1: Location of study area

1a Soils - Spatial Distribution





Soils - Spatial Distribution Key

551f Newport 3
Deep well drained sandy and coarse loamy soils.

551g NEWPORT 4
Deep well drained sandy soils.

572n BURLINGHAM 1
Deep coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

572p BURLINGHAM 3
Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

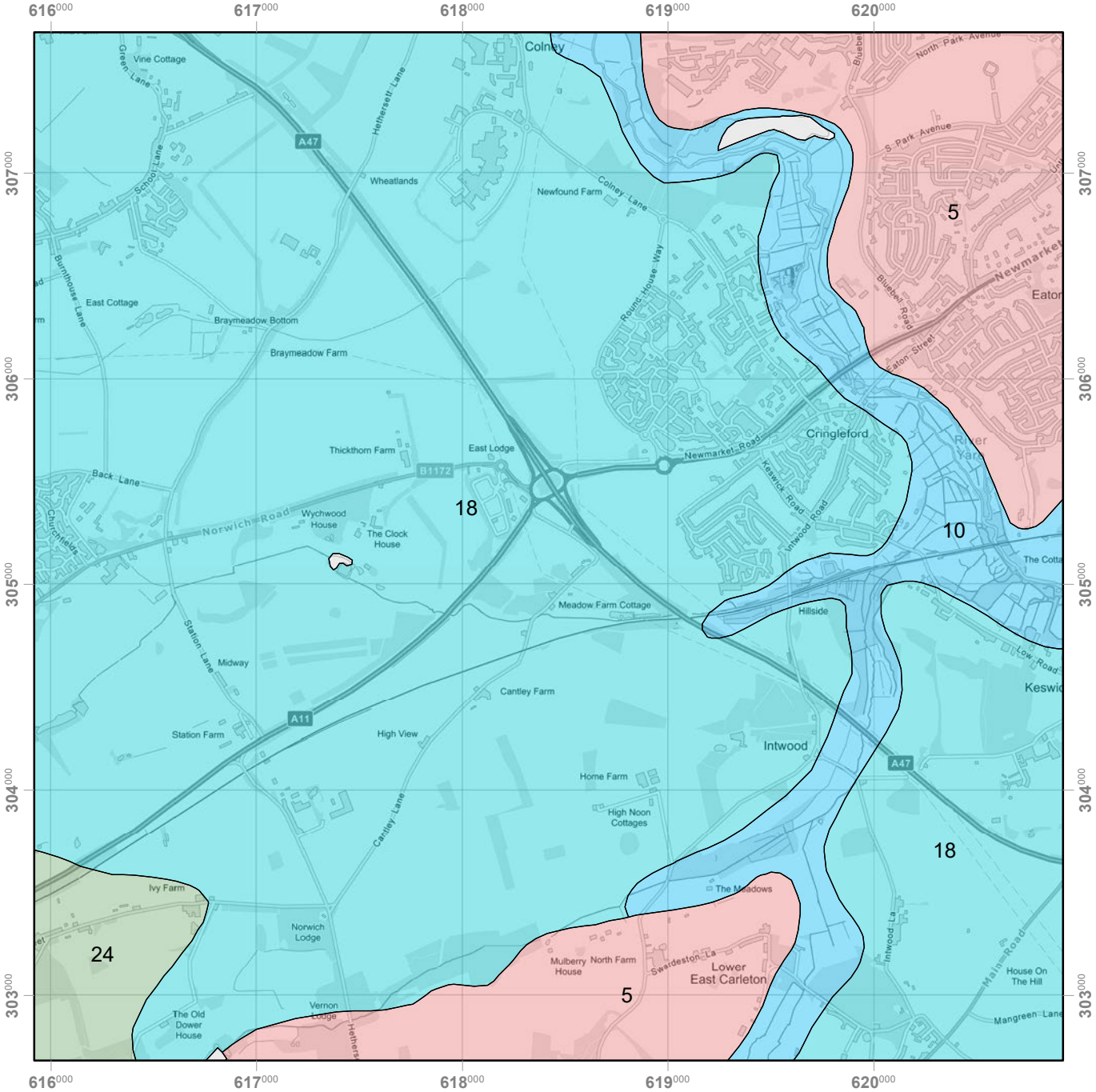
711r BECCLES 1
Slowly permeable seasonally waterlogged fine loamy over clayey soils,

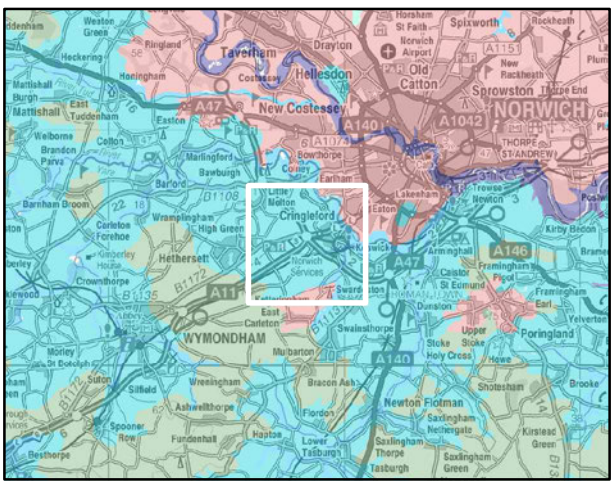
861b Isleham 2
Deep permeable sandy and peaty soils affected by groundwater.

SOIL ASSOCIATION DESCRIPTION

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 (HOST) Key

5 Free draining permeable soils in unconsolidated sands or gravels with relatively high permeability and high storage capacity

10 Soils seasonally waterlogged by fluctuating groundwater and with relatively rapid lateral saturated conductivity

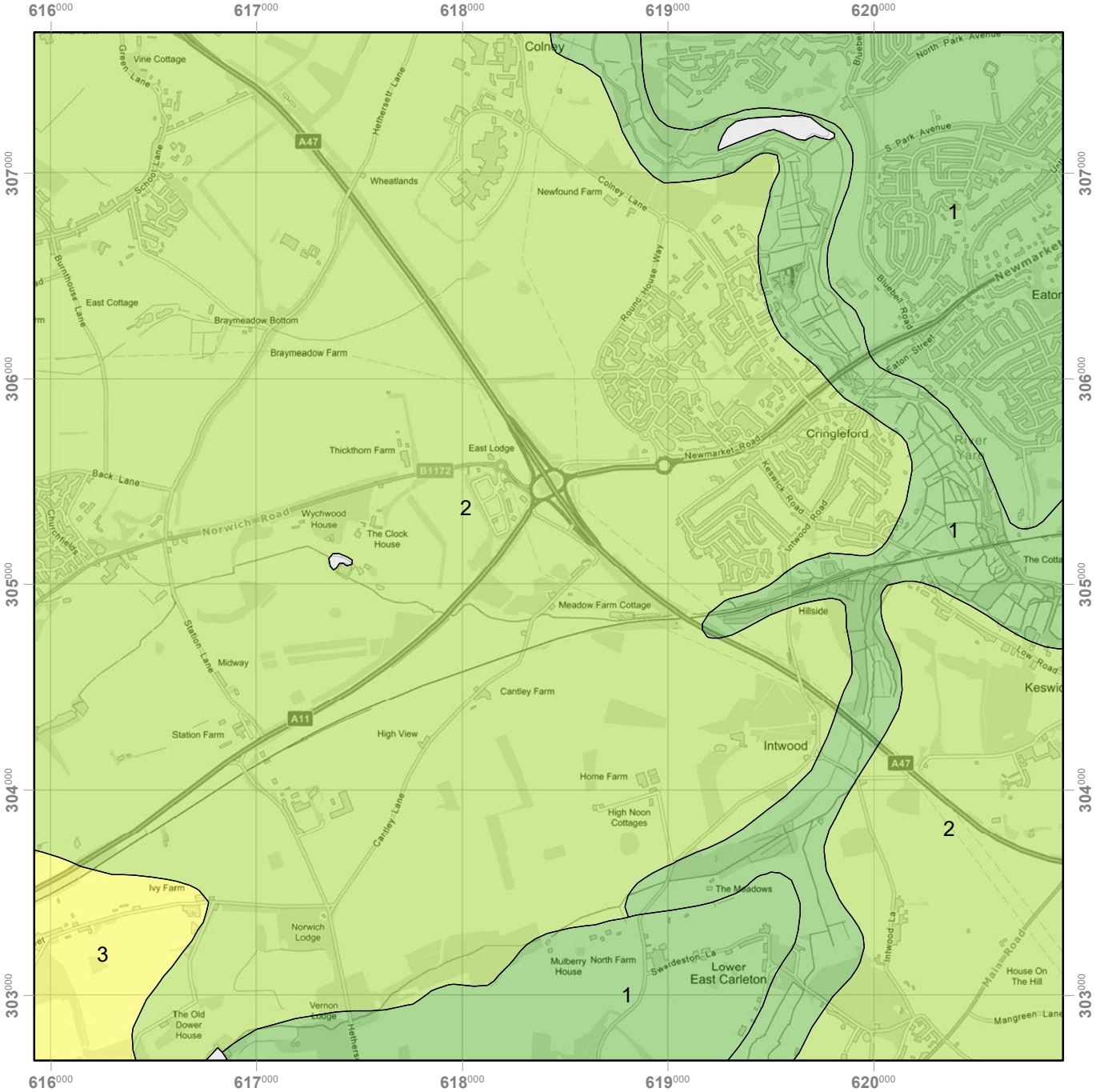
18 Slowly permeable soils with slight seasonal waterlogging and moderate storage capacity over slowly permeable substrates with negligible storage

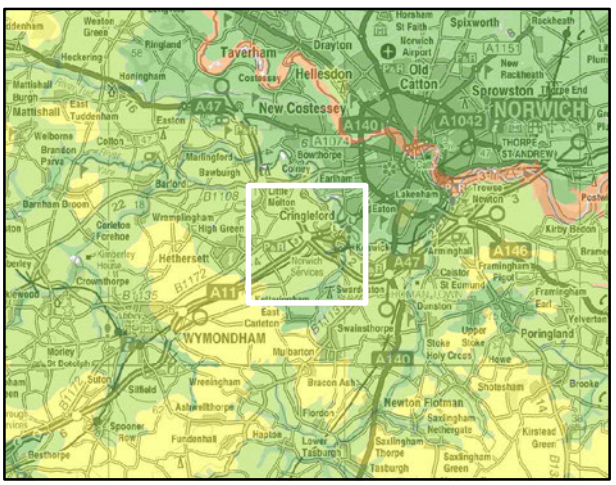
24 Slowly permeable, seasonally waterlogged soils over slowly permeable substrates with negligible storage capacity

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

* 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 less than 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.

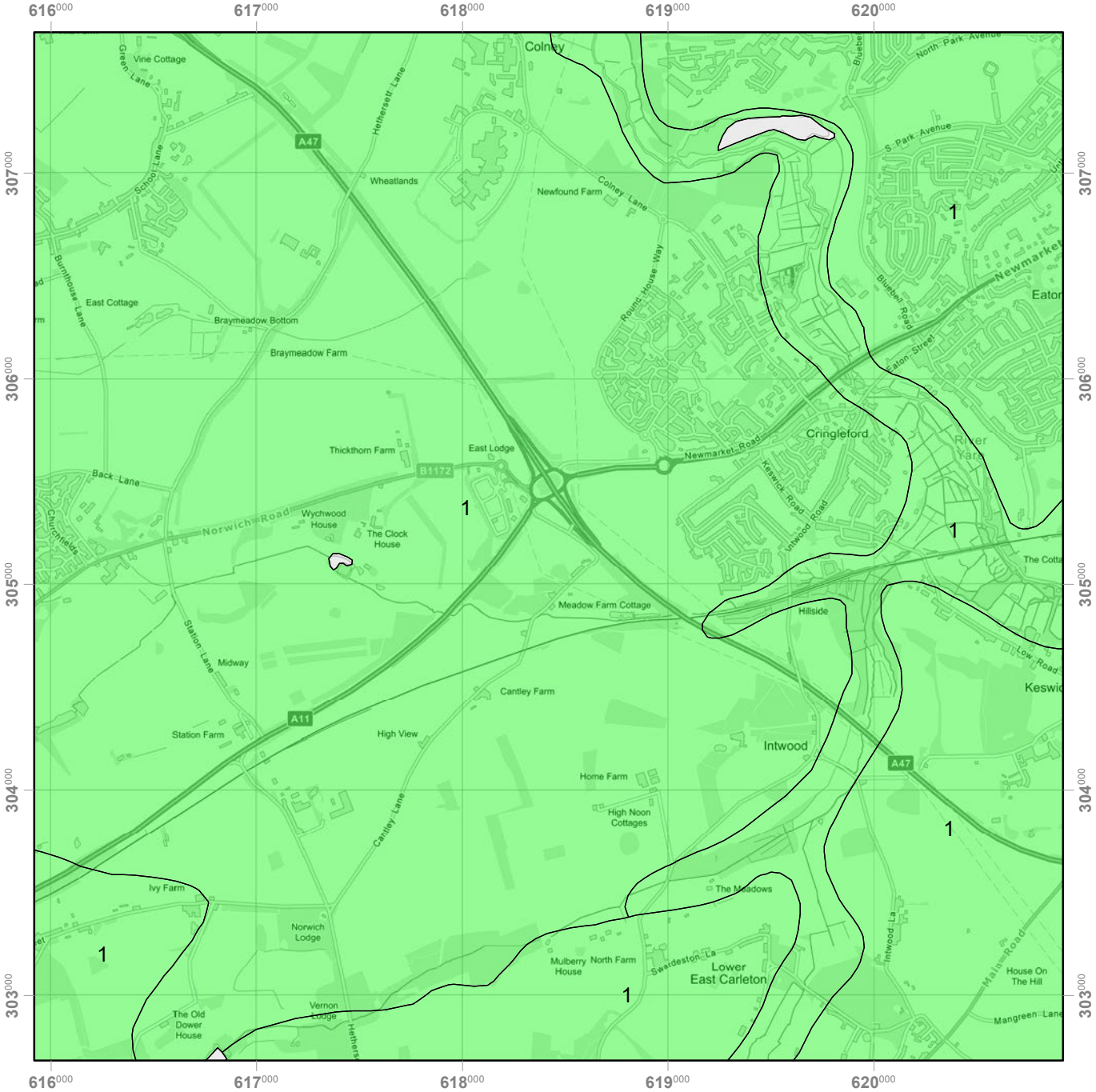
Because clay particles are very small and commonly platy in shape they have an immense surface area onto which water can be attracted, relative to the total volume of the soil material. In addition to surface attraction or inter-crystalline absorption of water, some clay minerals, those with three layers 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.

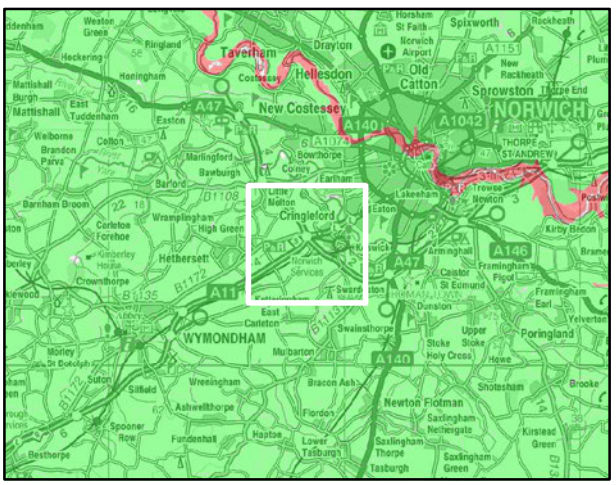
In a natural undisturbed condition, the moisture content of deep subsoil clay does not change greatly through the year and consequently there are no changes in volume leading to shrinkage and swelling. However, when clays are exposed at or near the ground surface and especially when vegetation is rooting 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 Key

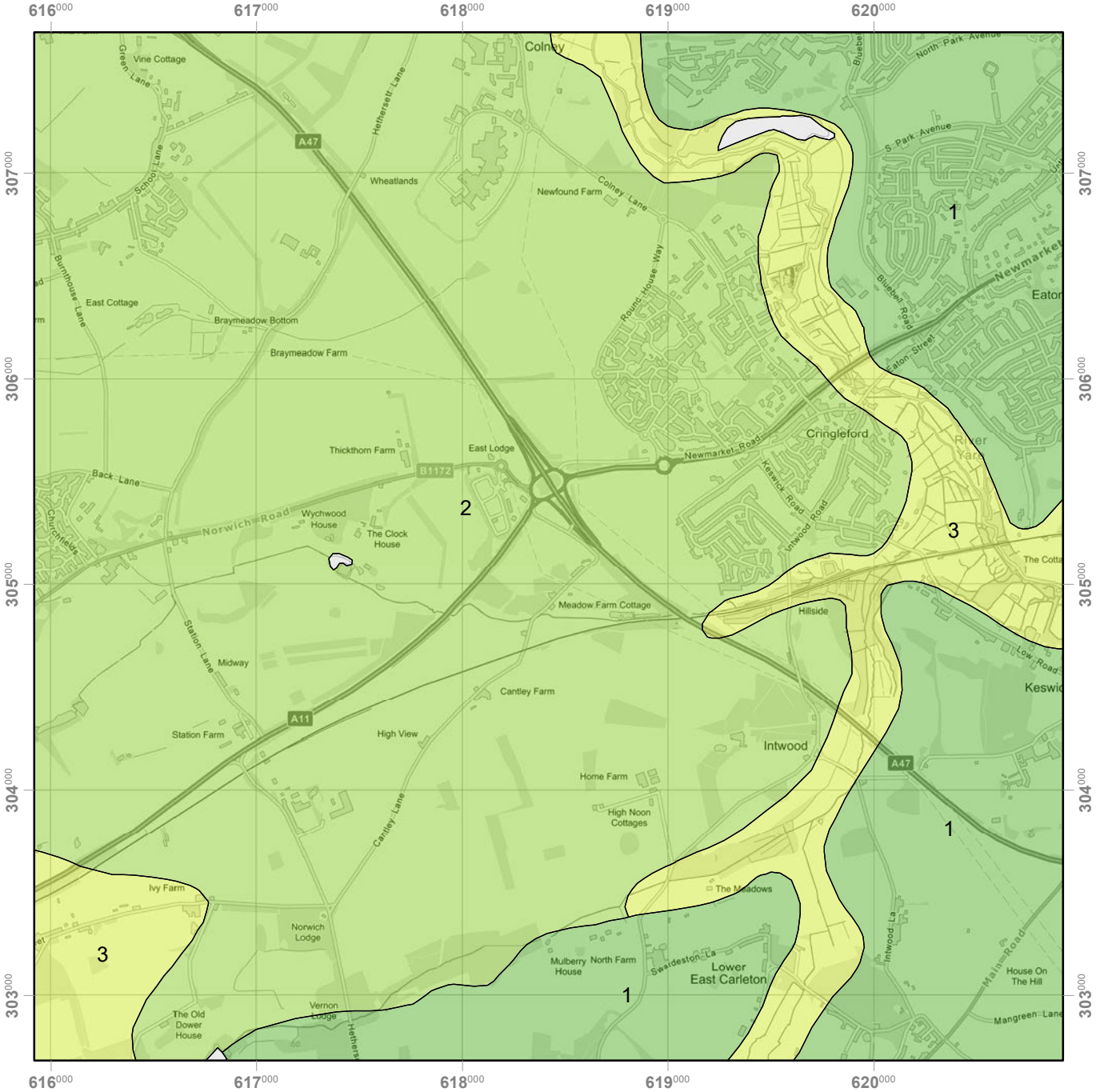
1 Minor risk

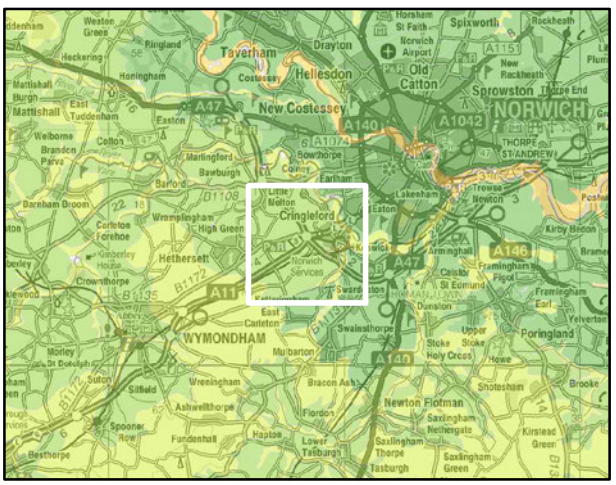
FLOOD VULNERABILITY DESCRIPTION

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

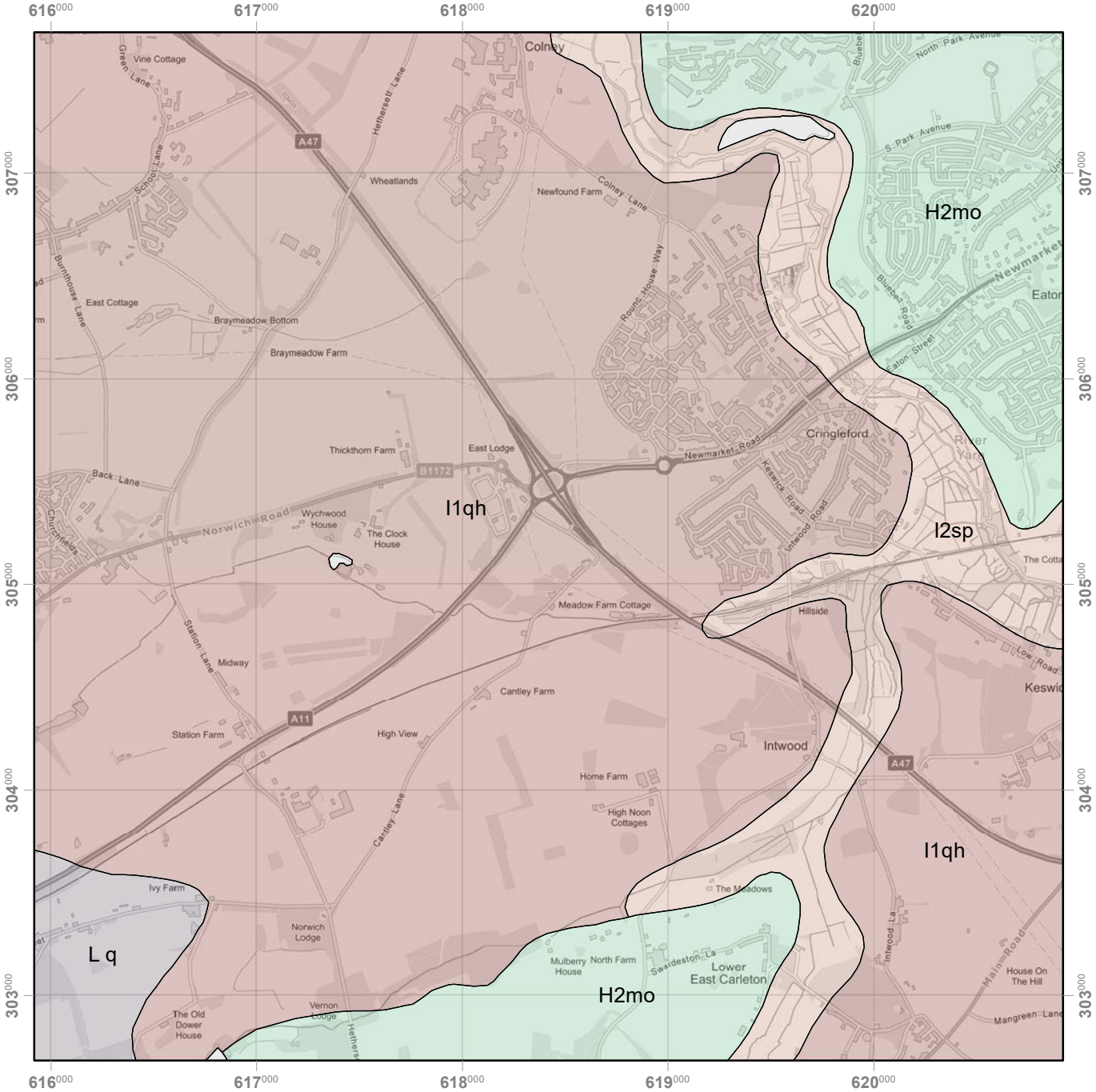
* If a class is starred, it is assumed that there are moderate amounts of sulphate in the soil. If there is abundant sulphate present, the soil may be one class more aggressive. Conversely, if there is very little sulphate, the soil may be one class less aggressive to

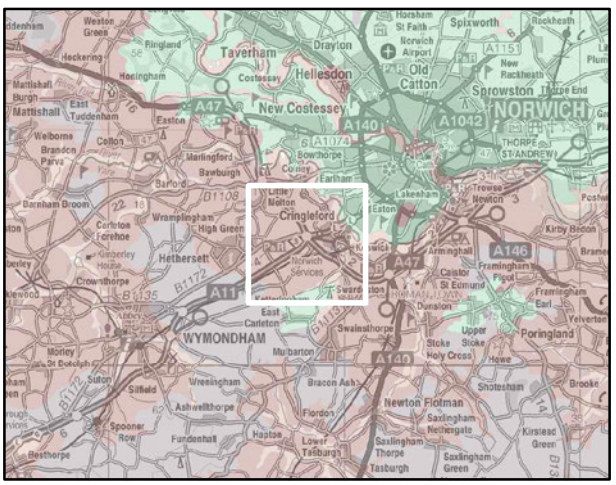
buried ferrous iron.

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 Risk Key

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

I2sp Drained peat and loamy soils with high organic matter; groundwater at shallow 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.

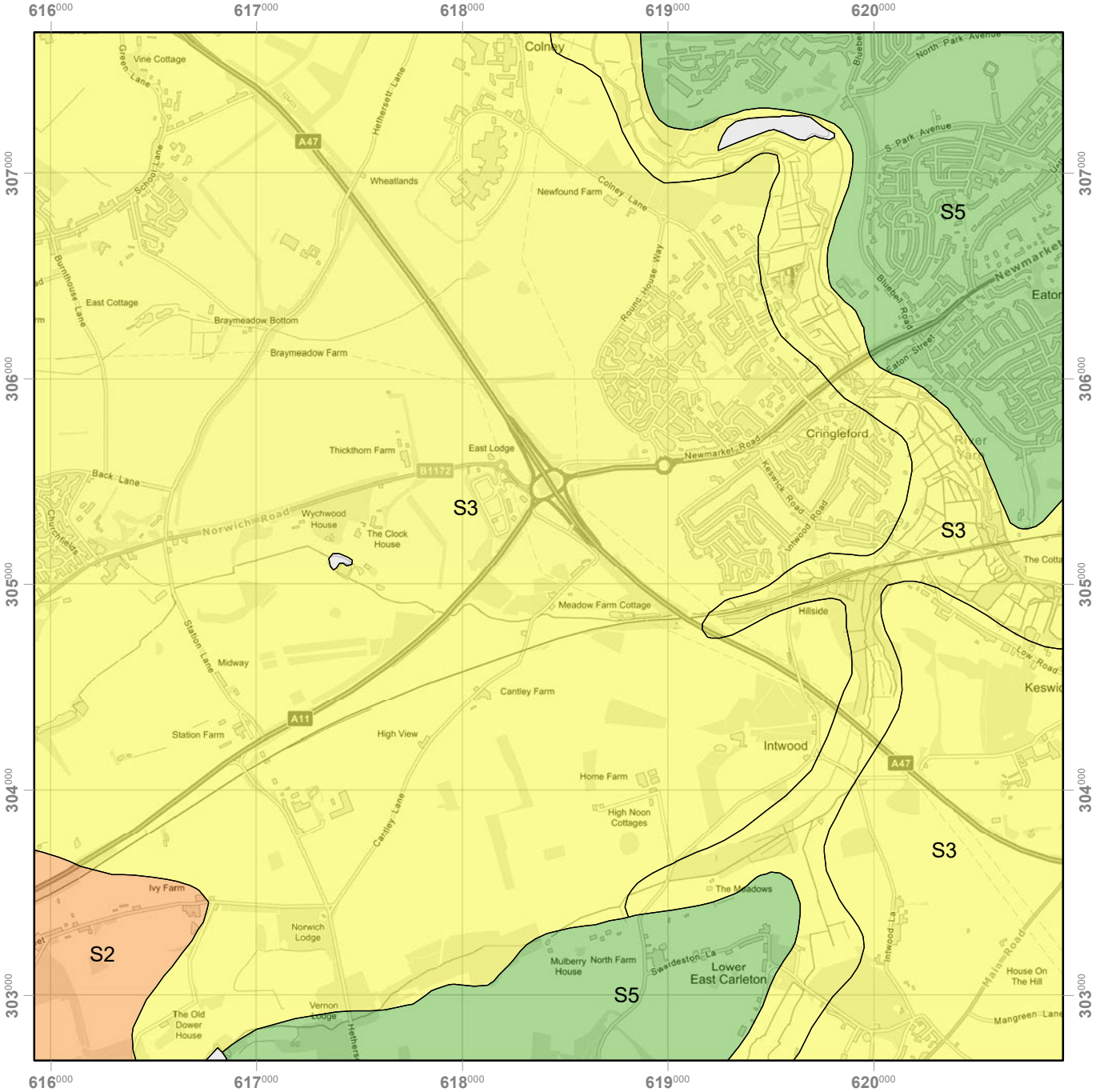
H - Soils of high leaching capacity with little ability to attenuate non-adsorbed pesticide leaching which leave underlying groundwater vulnerable to pesticide contamination.

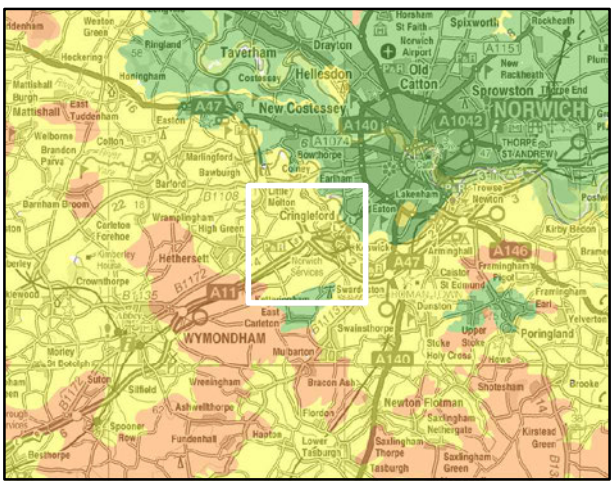
I - Soils of intermediate leaching capacity with a moderate ability to attenuate pesticide leaching.

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

S2 High run-off potential.

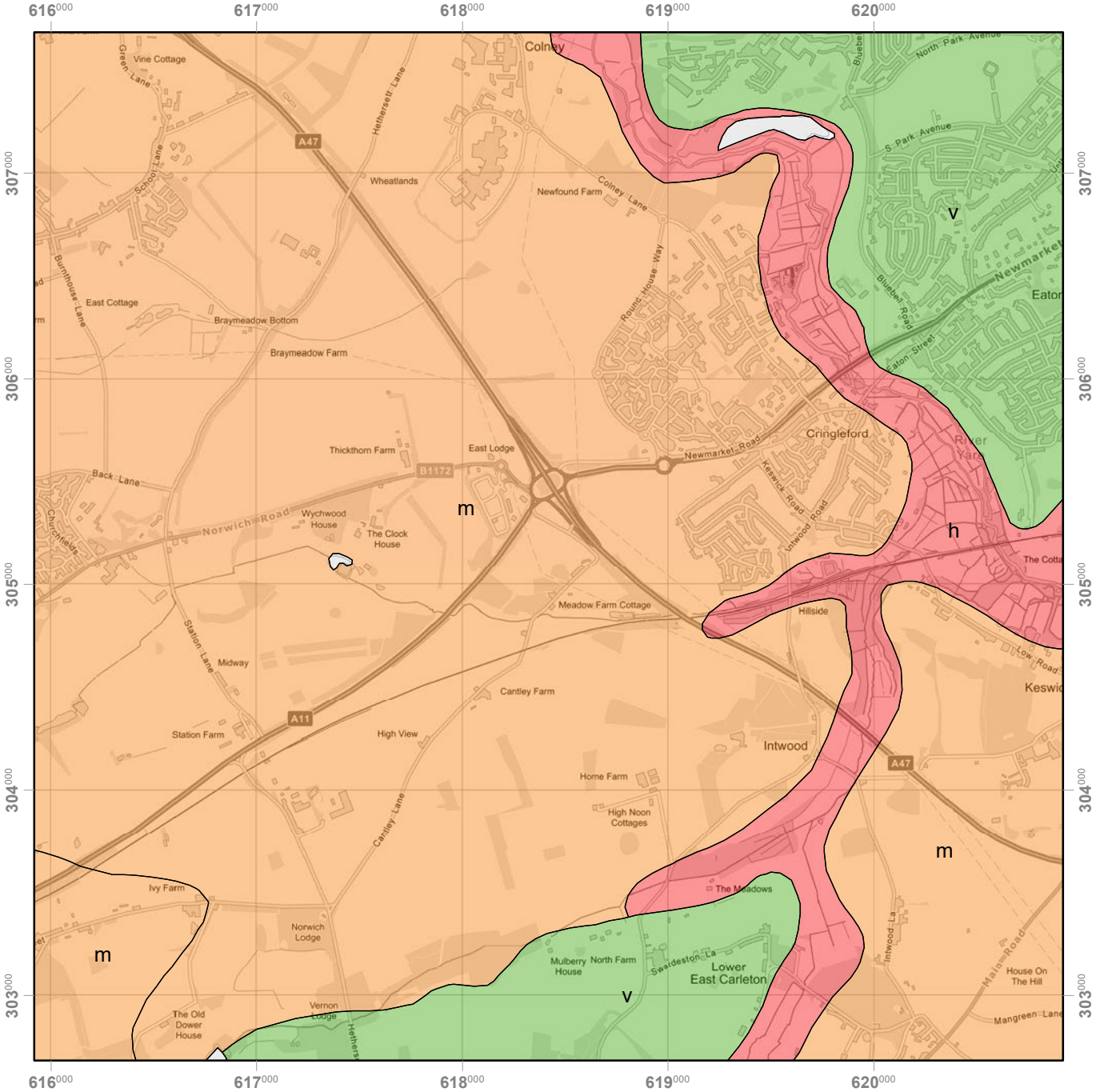
S3 Moderate run-off potential.

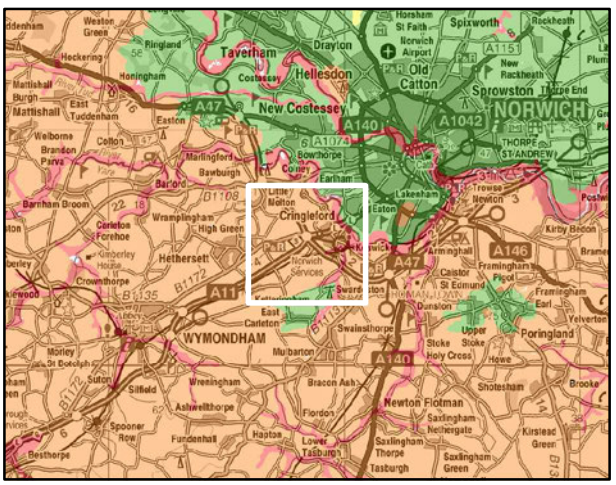
S5 Very low run-off potential.

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.

1h Potential for Pesticide Adsorption





Potential for Pesticide Adsorption Key

h High adsorption potential.

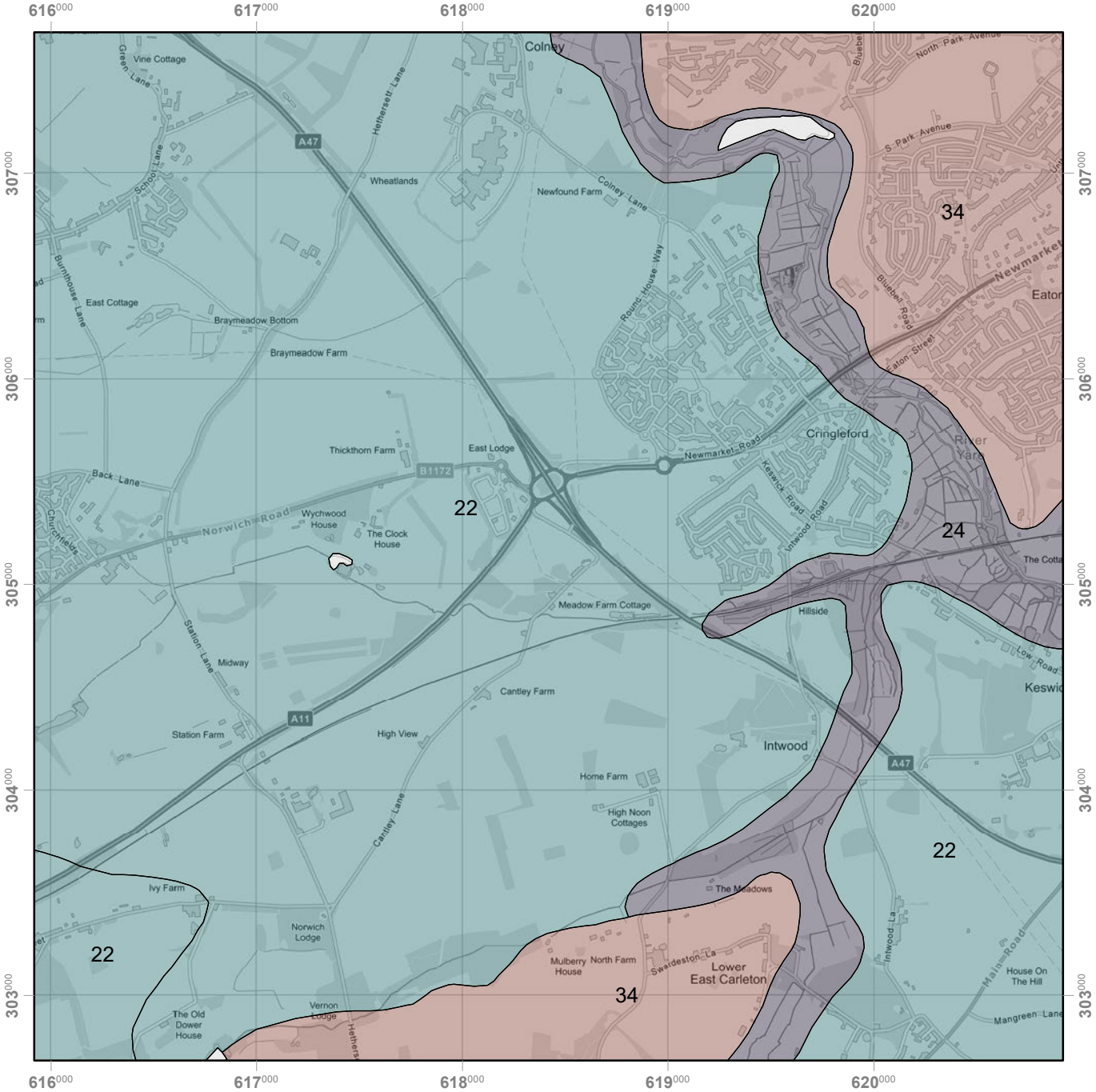
m Moderate adsorption potential.

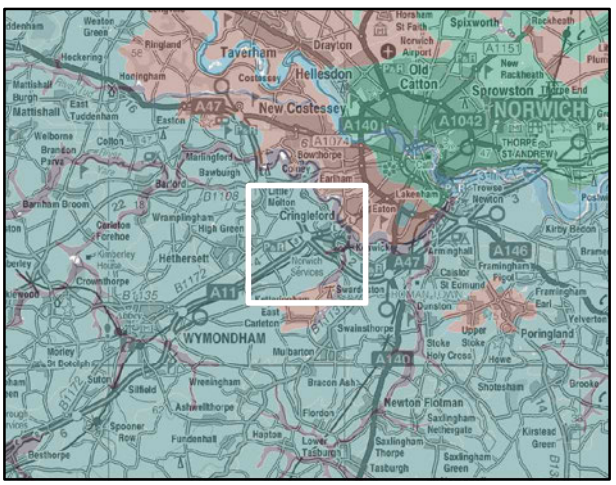
v Very low adsorption potential.

POTENTIAL FOR PESTICIDE ADSORPTION 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). The mineral soil classes are further subdivided according to their potential for pesticide adsorption.

1i Hydrogeological Rock Type





Hydrogeological Rock Type Key


22 till and compact Head

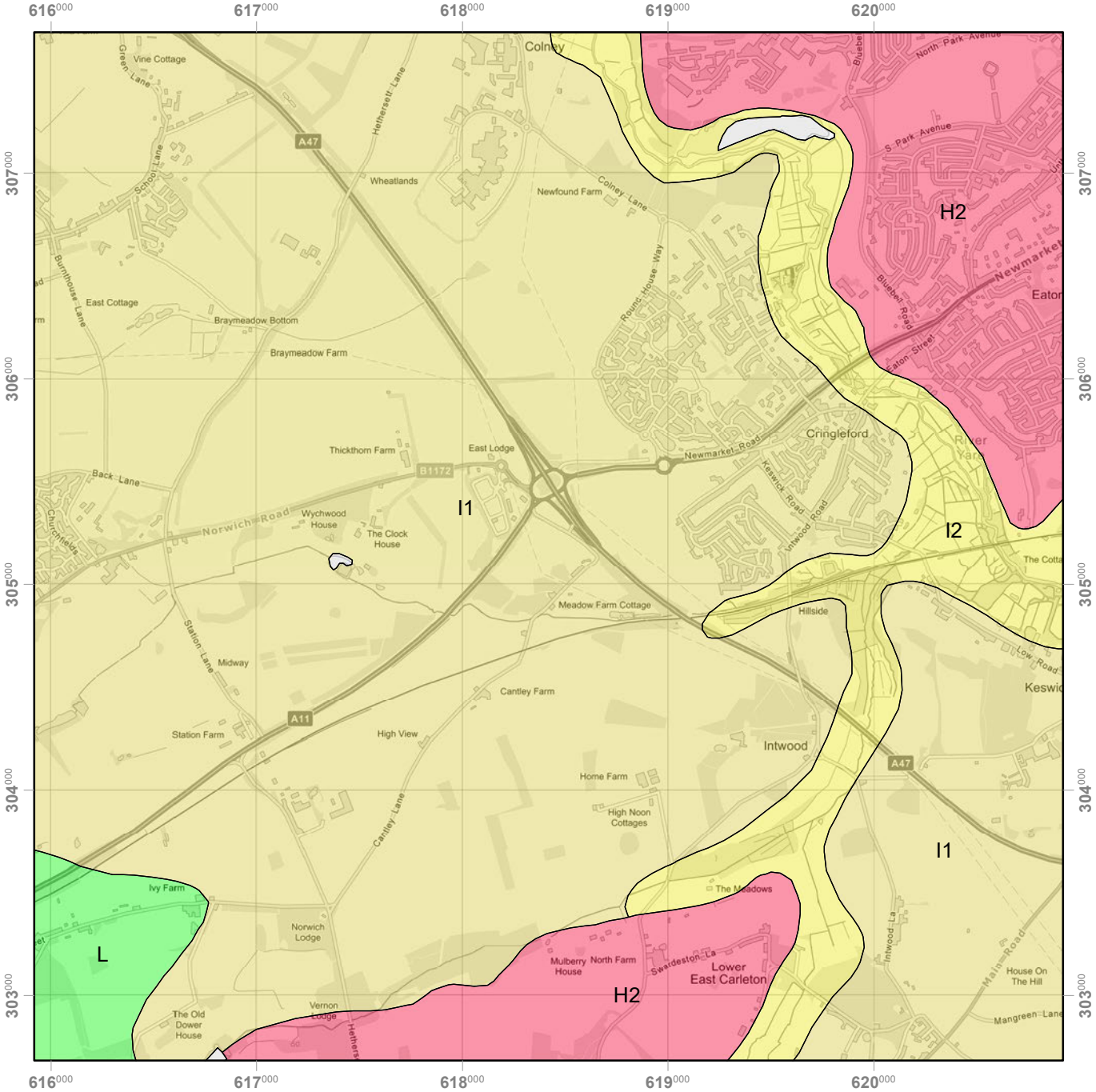

24 gravels

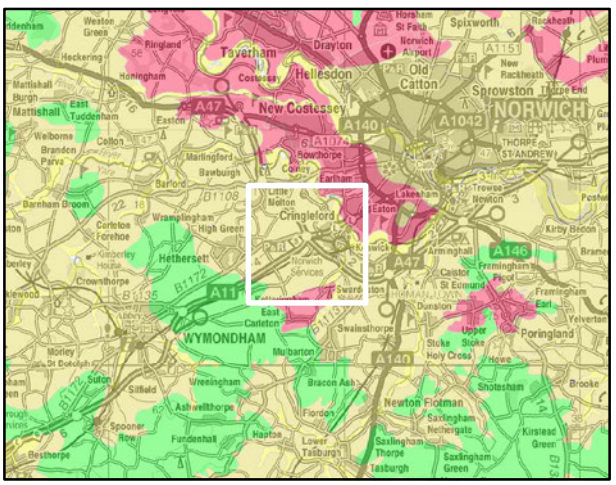

34 sand

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).

1j Ground Water Protection Policy (GWPP)





Ground Water Protection Policy (GWPP) Key

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

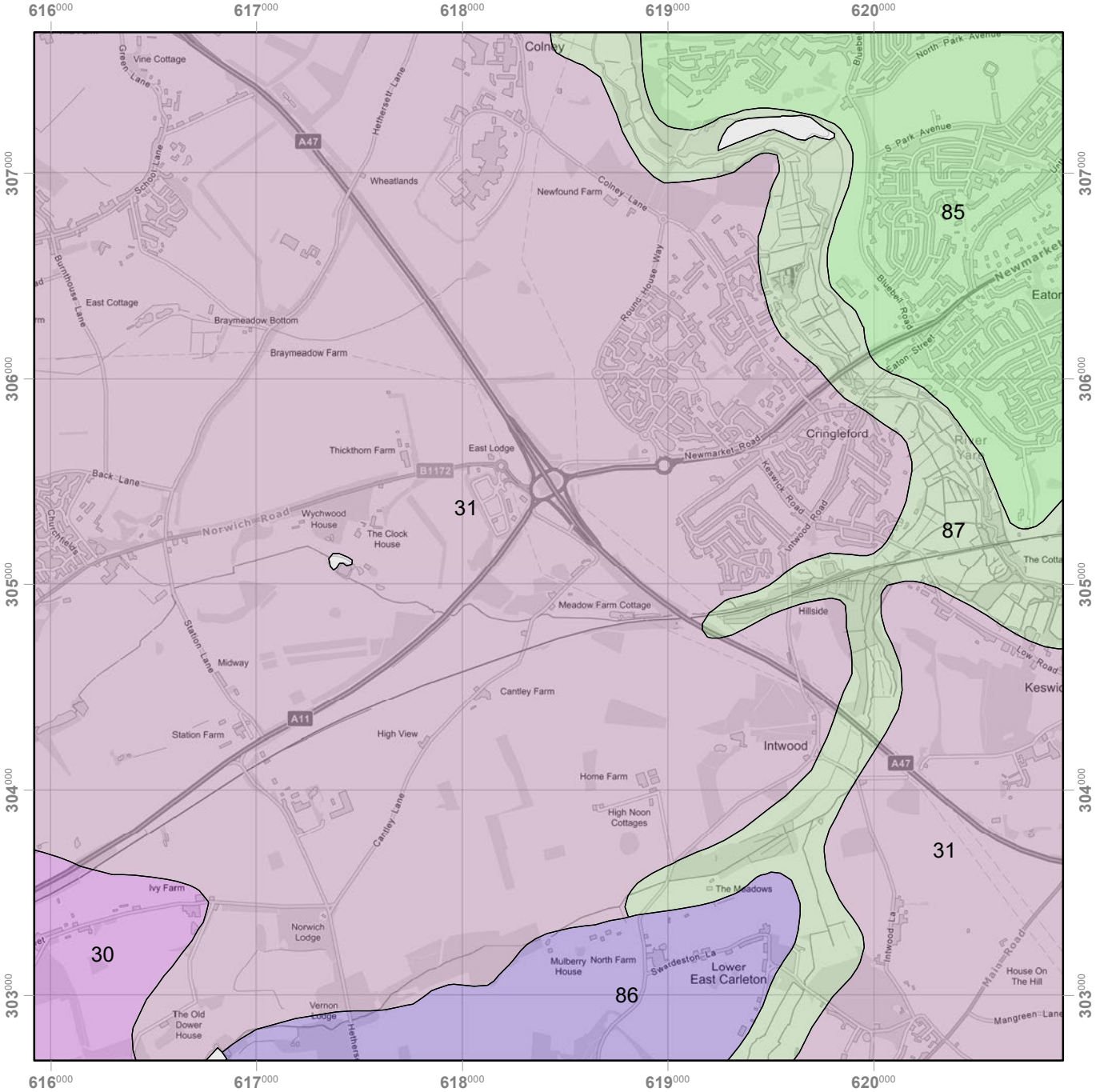
I2 Soils of intermediate leaching potential which could possibly transmit some non-adsorbed pollutants and liquid discharges, but which are unlikely to transmit adsorbed pollutants because of their high adsorption potential

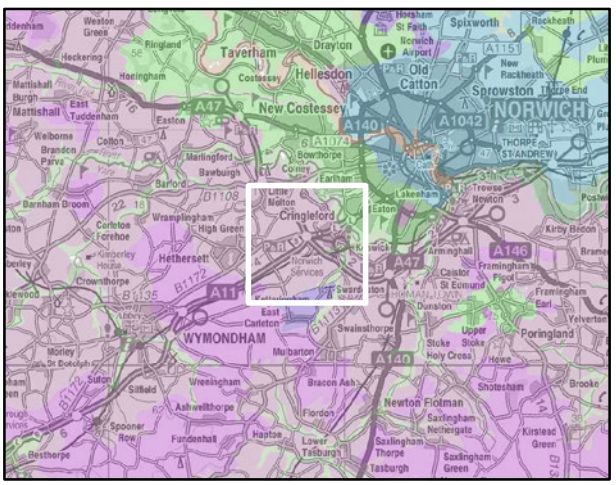
L Soils in which pollutants are unlikely to penetrate the soil layer either because water movement is largely horizontal or because they have a large ability to attenuate diffuse source pollutants

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.

1k Soil Parent Material





Soil Parent Material Key


30 Chalky till


31 Chalky till and glaciofluvial drift


85 Glaciofluvial drift

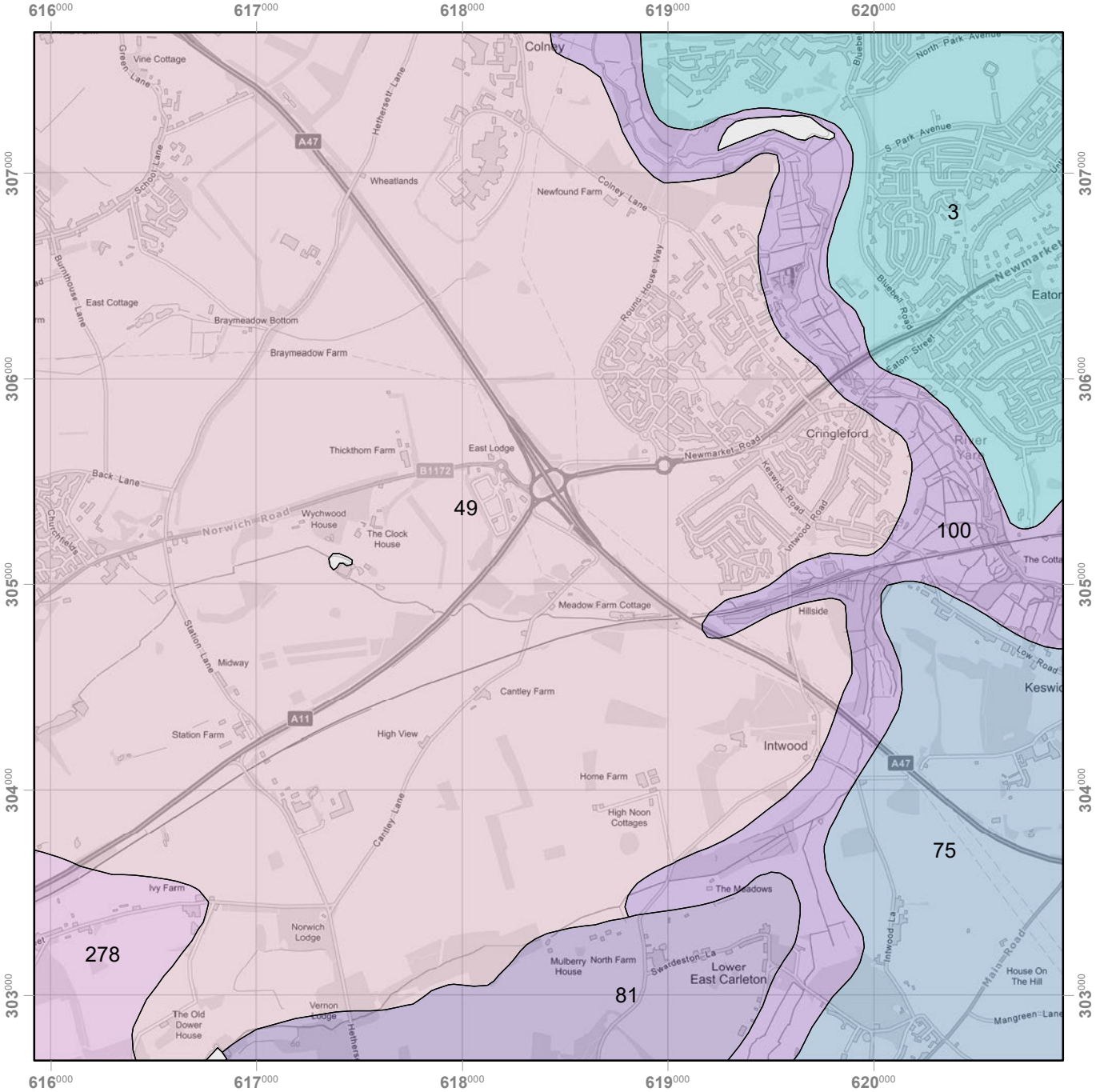

86 Glaciofluvial drift and chalky till

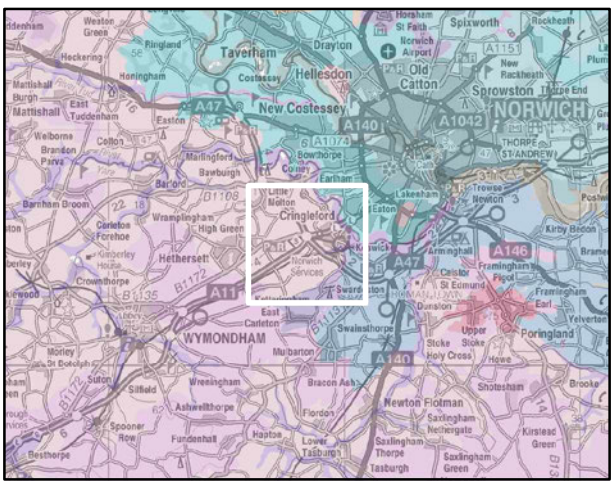

87 Glaciofluvial drift and peat

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.

1l Expected Crops and Land Use





Expected Crops and Land Use Key

3 Barley, other cereals and sugar beet some carrots and potatoes; some coniferous woodland and lowland heath habitats.

49 Cereals, peas and beans and sugar beet.

75 Cereals, sugar beet and other arable crops.

81 Cereals, sugar beet and peas and beans; some short term grassland.

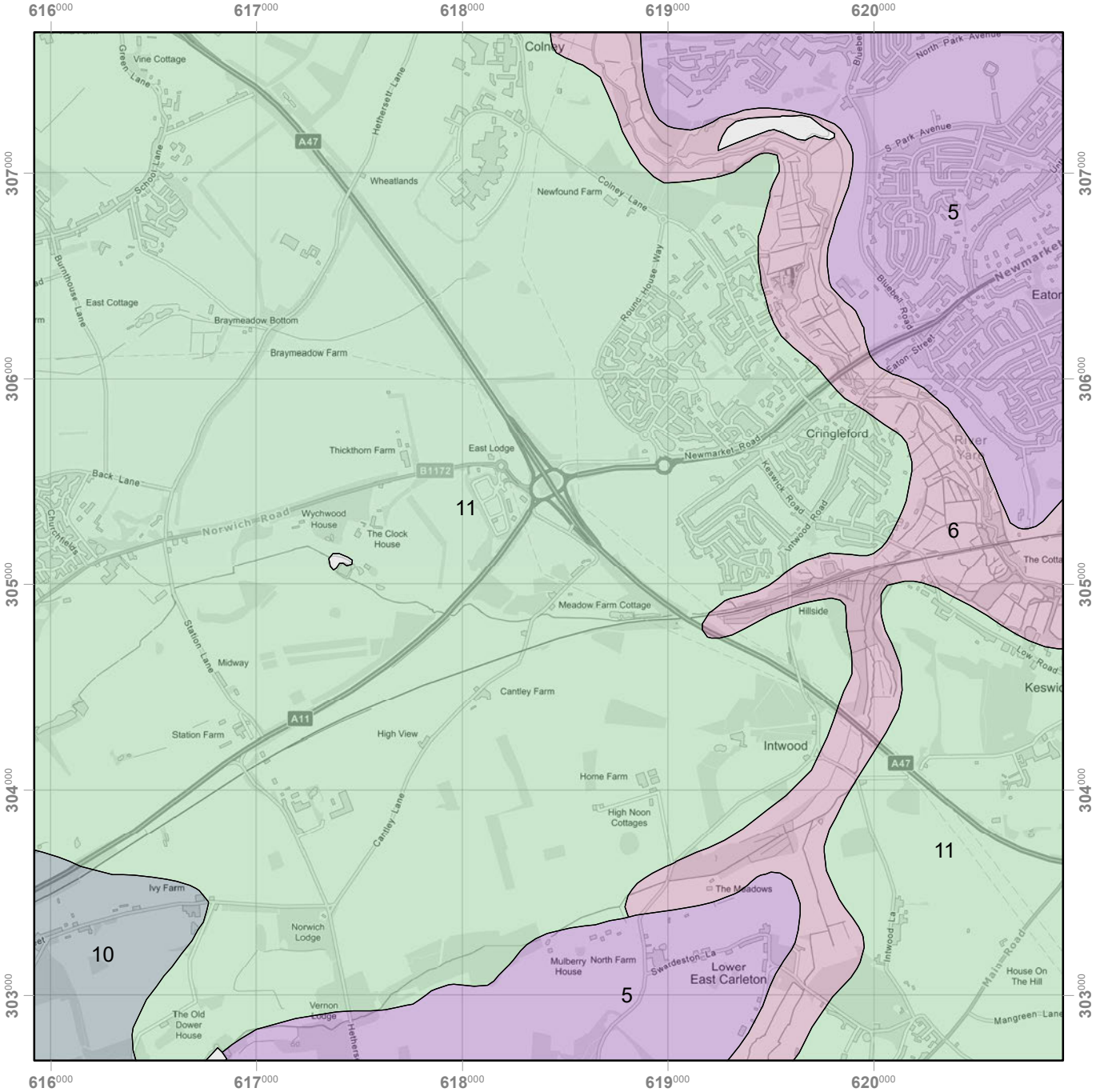
100 Cereals, sugar beet, potatoes and horticultural crops; rough grazing where undrained.

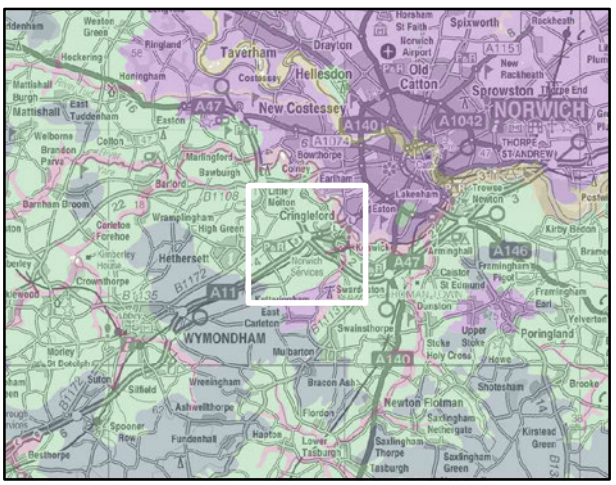
278 Winter cereals, some potatoes and grassland.

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.

1m Natural Soil Fertility





Natural Soil Fertility Key


5 Low


6 Low to high

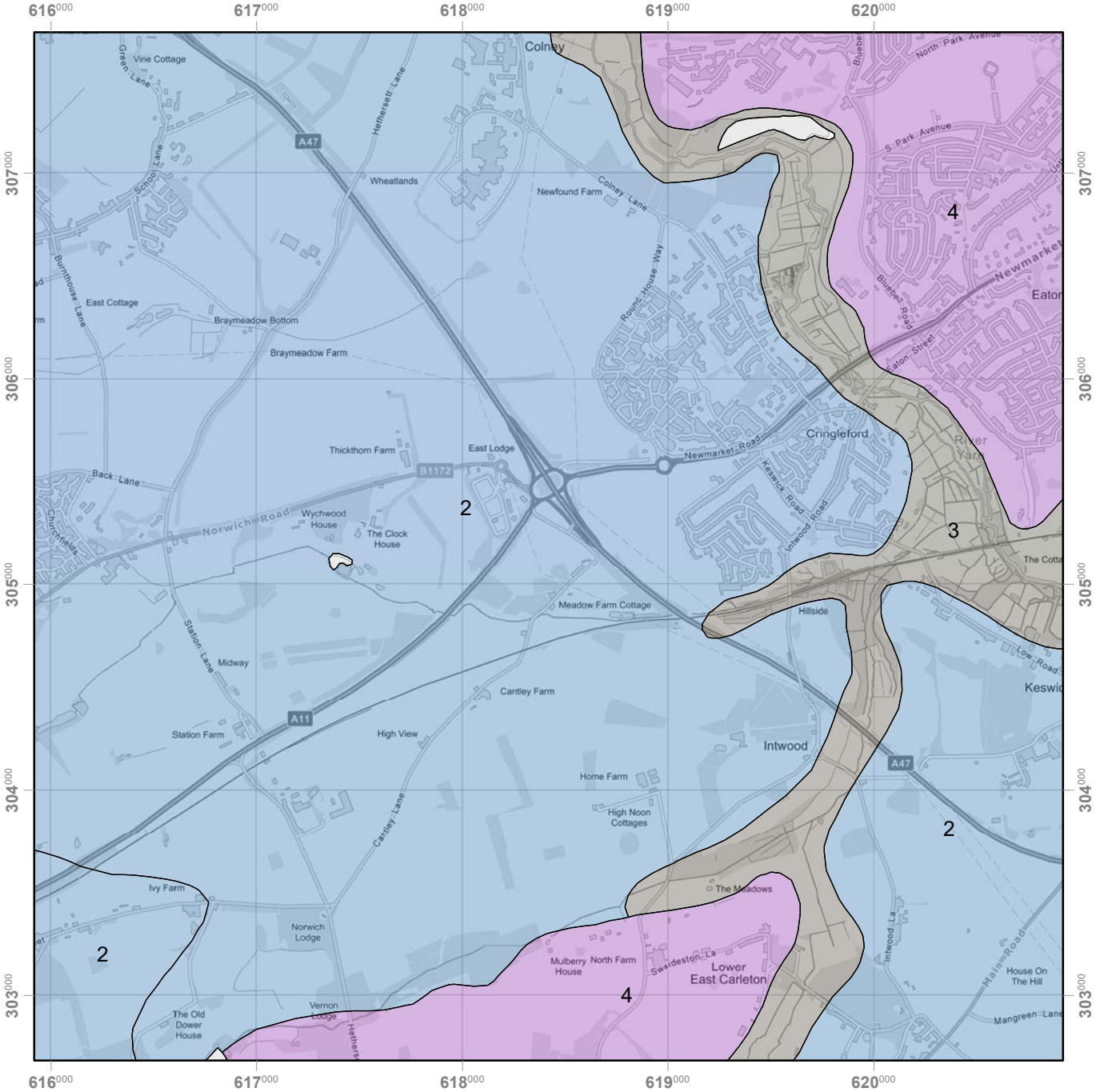

10 Moderate

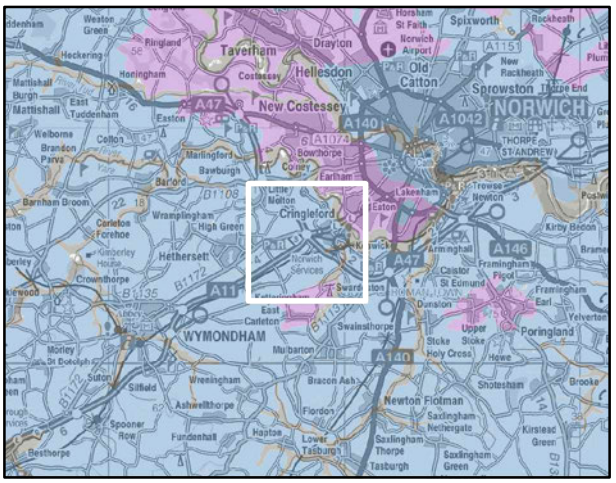

11 Moderate to high

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.

1n Simple Topsoil Texture





Simple Topsoil Texture Key


2 Loamy

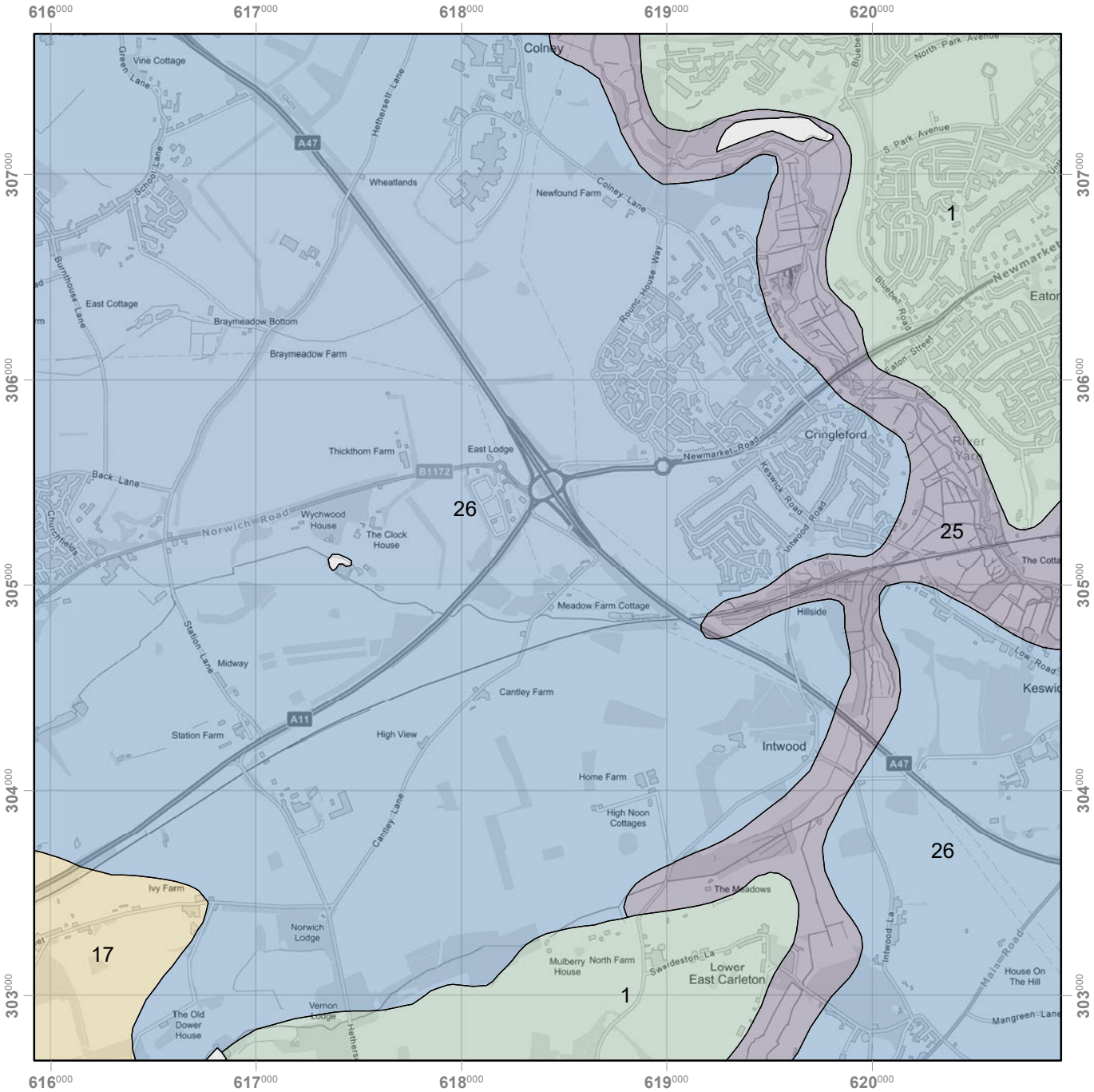

3 Peaty

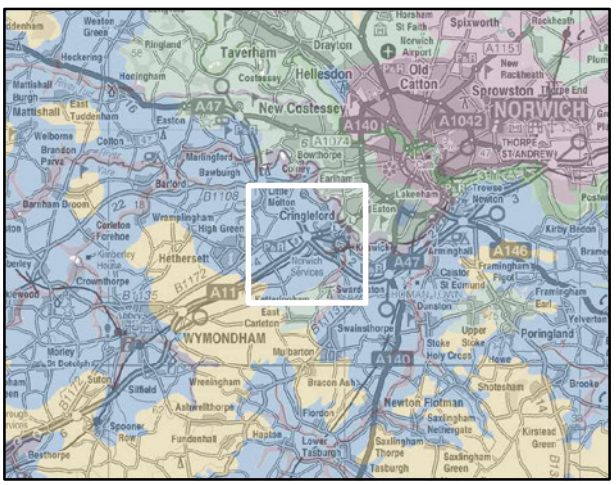

4 Sandy

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.

1o Typical Habitats





Typical Habitats Key


1 Acid dry pastures; acid deciduous and coniferous woodland; potential for lowland heath


17 Seasonally wet pastures and woodlands


25 Wet meadows


26 Wide range of pasture and woodland types

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, 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.

Newport 3 551f
Deep well drained sandy and coarse loamy soils.

NEWPORT 4 551g
Deep well drained sandy soils.

BURLINGHAM 1 572n
Deep coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

BURLINGHAM 3 572p
Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

BECCLES 1 711r
Slowly permeable seasonally waterlogged fine loamy over clayey soils,

Isleham 2 861b
Deep permeable sandy and peaty soils affected by groundwater.

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.

Newport 3 (551f)

Deep well drained sandy and coarse loamy soils.

a. General Description

Deep well drained sandy and coarse loamy soils.Some coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.
The major landuse on this association is defined as Cereals, sugar beet and peas and beans; some short term grassland.

b. Distribution (England and Wales)

The Newport 3 association covers 187 km² of England and Wales which accounts for 0.12% of the landmass. The distribution of this association is shown in figure 2. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

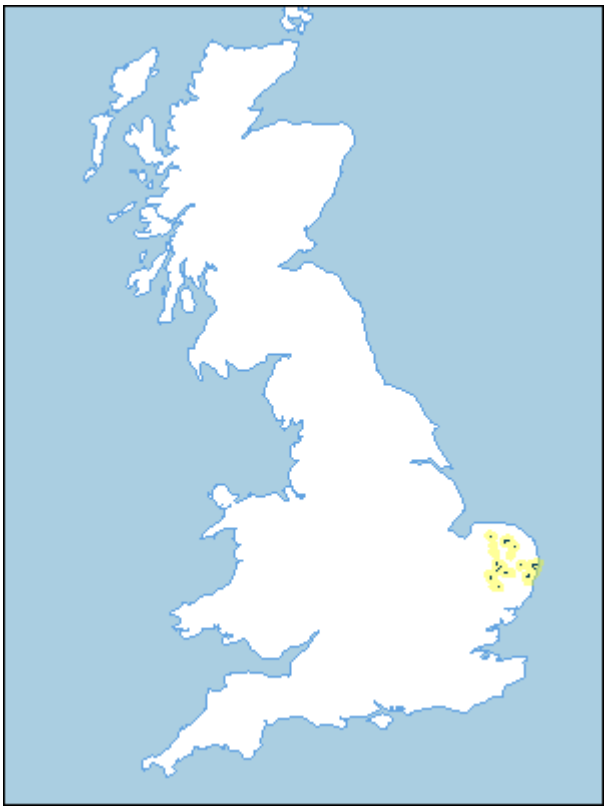


Figure 2: Association Distribution

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the Newport 3 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 endeavoured 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.

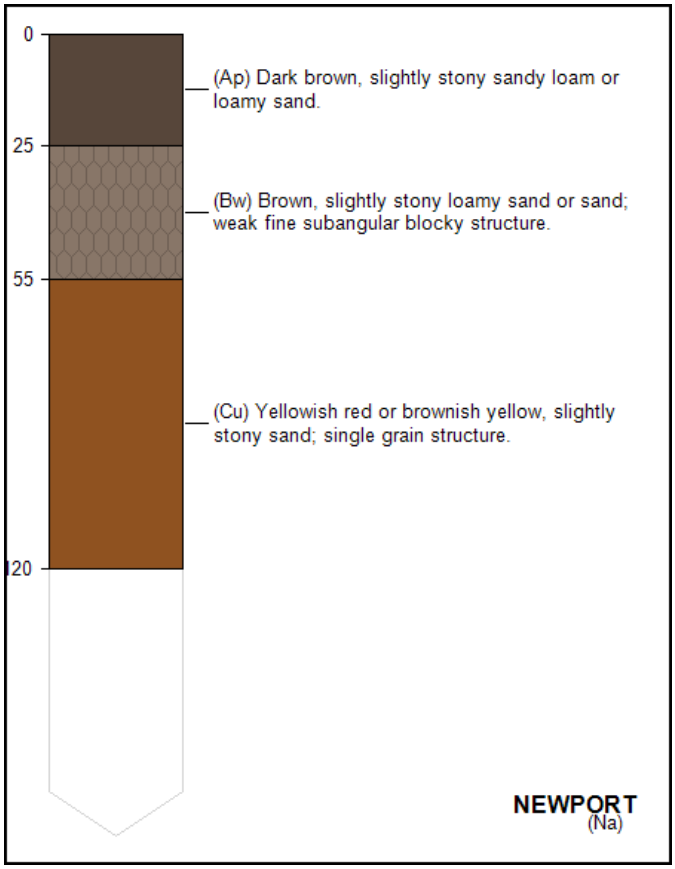
Table 1: The component soil series of the Newport 3 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

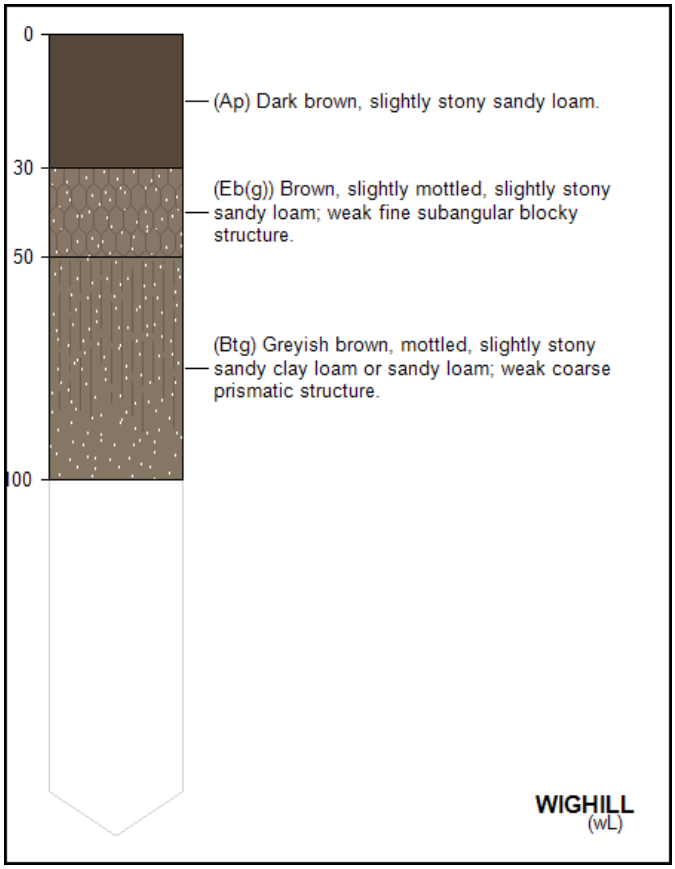
Soil Series	Description	Area %
NEWPORT (Na)	sandy drift with siliceous stones	60%
WIGHILL (wL)	light loamy drift with siliceous stones	40%

Newport 3 (551f)

Deep well drained sandy and coarse loamy soils.

d. Newport 3 Component Series Profiles





NEWPORT 4 (551g)

Deep well drained sandy soils.

a. General Description

Deep well drained sandy soils.Some very acid soils with bleached subsurface horizon especially under heath or in woodland.
The major landuse on this association is defined as Barley, other cereals and sugar beet some carrots and potatoes; some coniferous woodland and lowland heath habitats.

b. Distribution (England and Wales)

The NEWPORT 4 association covers 746 km² of England and Wales which accounts for 0.49% of the landmass. The distribution of this association is shown in figure 3. 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 NEWPORT 4 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 endeavoured 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.

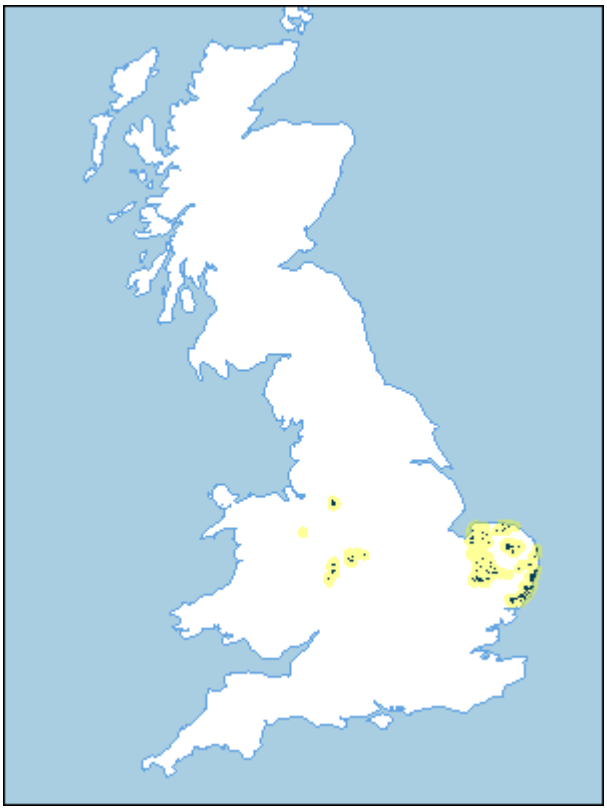


Figure 3: Association Distribution

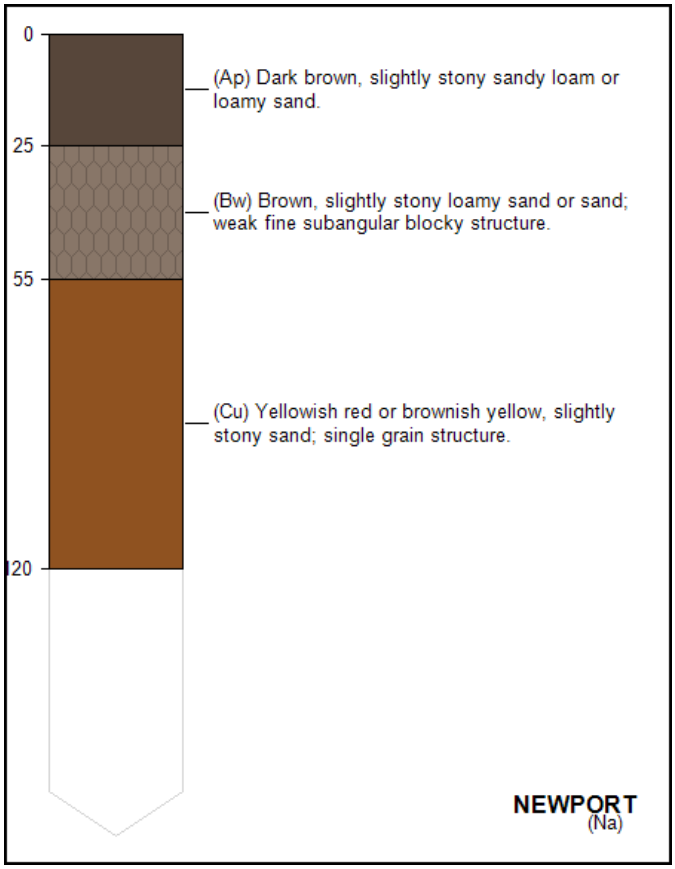
Table 2: The component soil series of the NEWPORT 4 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

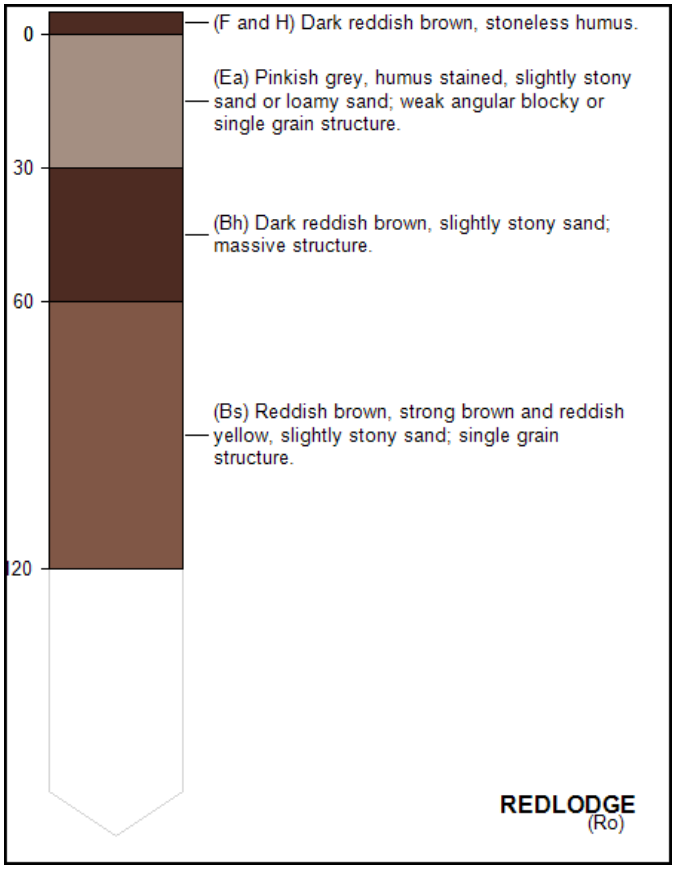
Soil Series	Description	Area %
NEWPORT (Na)	sandy drift with siliceous stones	65%
REDLODGE (Ro)	sandy drift with siliceous stones	20%
OTHER	other minor soils	15%

NEWPORT 4 (551g)

Deep well drained sandy soils.

d. NEWPORT 4 Component Series Profiles





BURLINGHAM 1 (572n)

Deep coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

a. General Description

Deep coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.Some deep well drained coarse loamy and sandy soils.
The major landuse on this association is defined as Cereals, peas and beans and sugar beet.

b. Distribution (England and Wales)

The BURLINGHAM 1 association covers 641 km² of England and Wales which accounts for 0.42% of the landmass. The distribution of this association is shown in figure 4. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

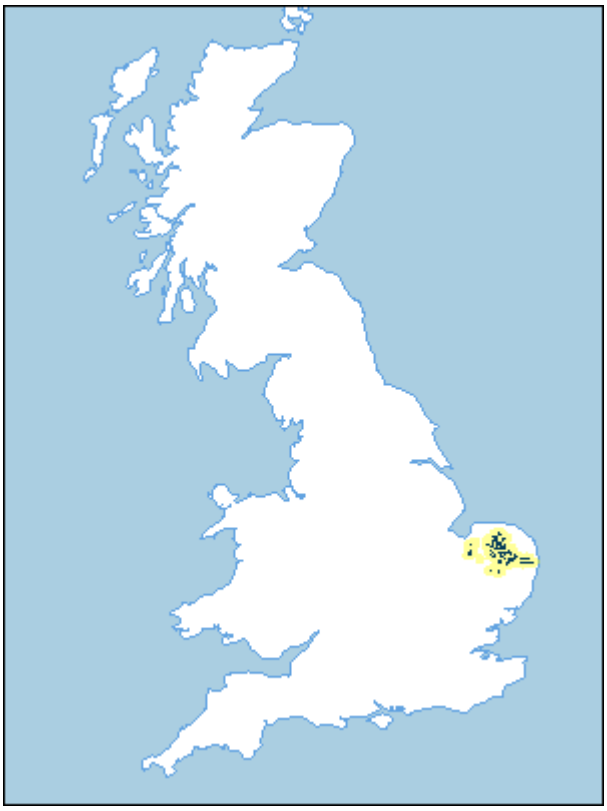


Figure 4: Association Distribution

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the BURLINGHAM 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 endeavoured 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.

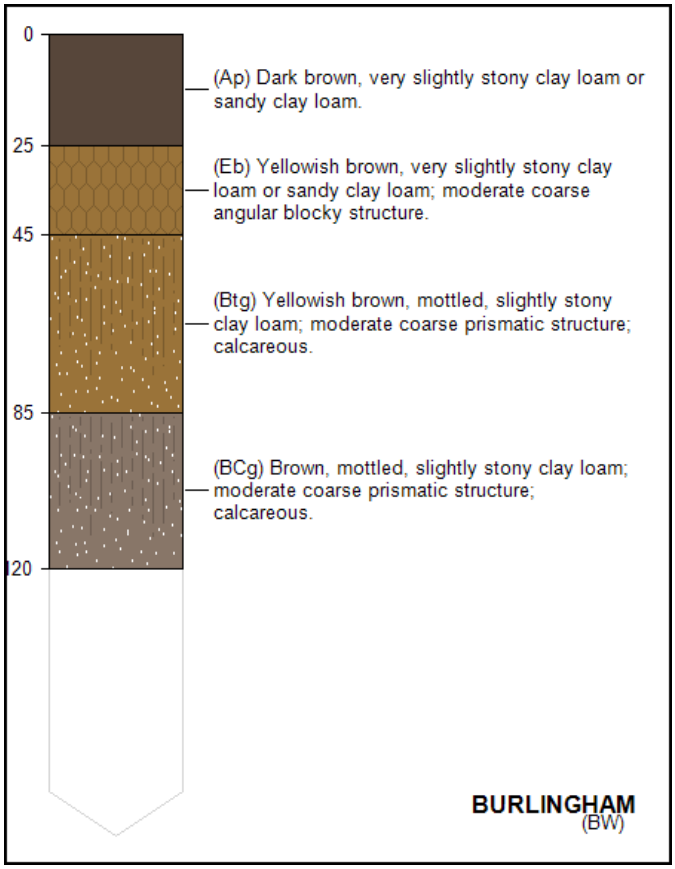
Table 3: The component soil series of the BURLINGHAM 1 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

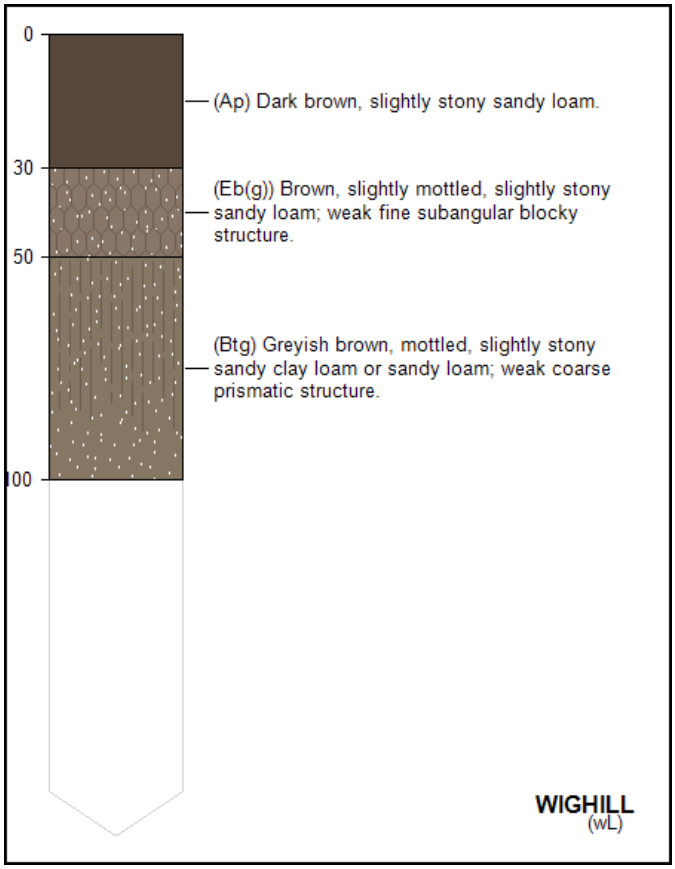
Soil Series	Description	Area %
BURLINGHAM (BW)	medium loamy chalky drift	30%
WIGHILL (wL)	light loamy drift with siliceous stones	20%
NEWPORT (Na)	sandy drift with siliceous stones	15%
WICK (wQ)	light loamy drift with siliceous stones	15%
OTHER	other minor soils	20%

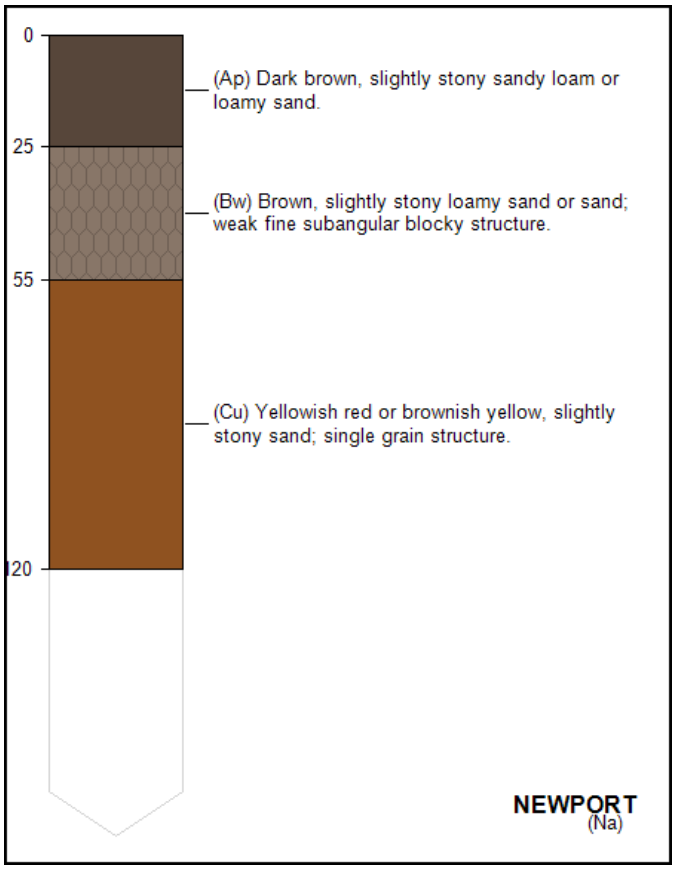
BURLINGHAM 1 (572n)

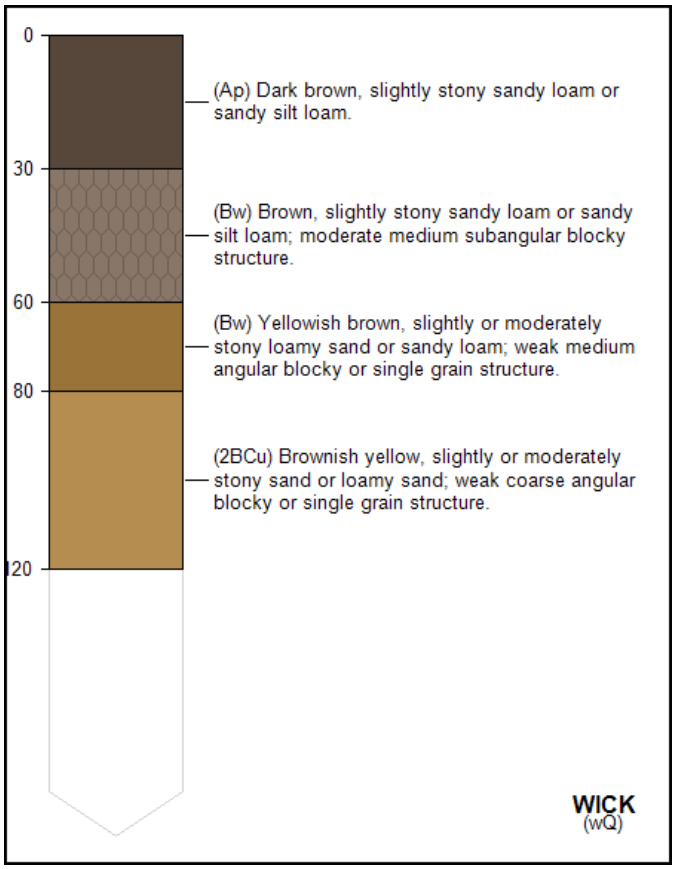
Deep coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

d. BURLINGHAM 1 Component Series Profiles









BURLINGHAM 3 (572p)

Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

a. General Description

Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.Some similar fine or coarse loamy over clayey soils. Some deep well drained coarse loamy over clayey, fine loamy and sandy soils.
The major landuse on this association is defined as Cereals, sugar beet and other arable crops.

b. Distribution (England and Wales)

The BURLINGHAM 3 association covers 291 km² of England and Wales which accounts for 0.19% of the landmass. The distribution of this association is shown in figure 5. 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 BURLINGHAM 3 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 endeavoured 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.

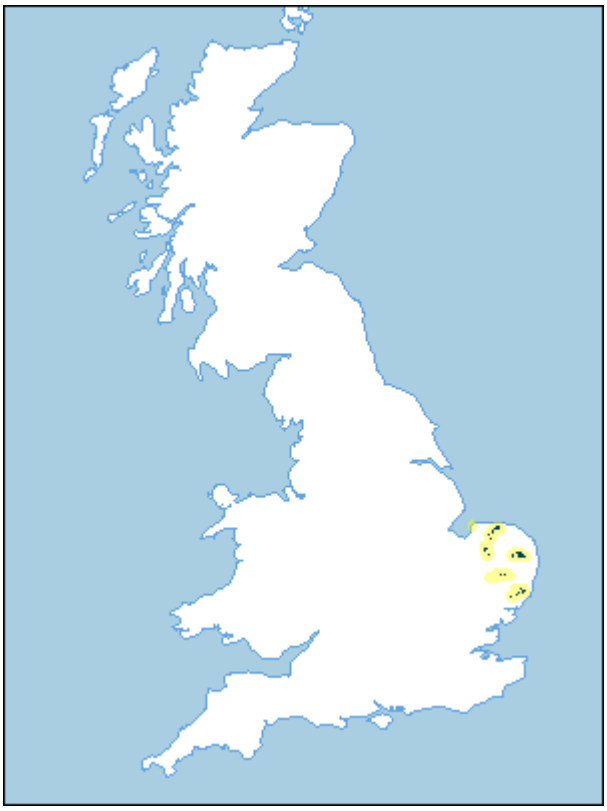


Figure 5: Association Distribution

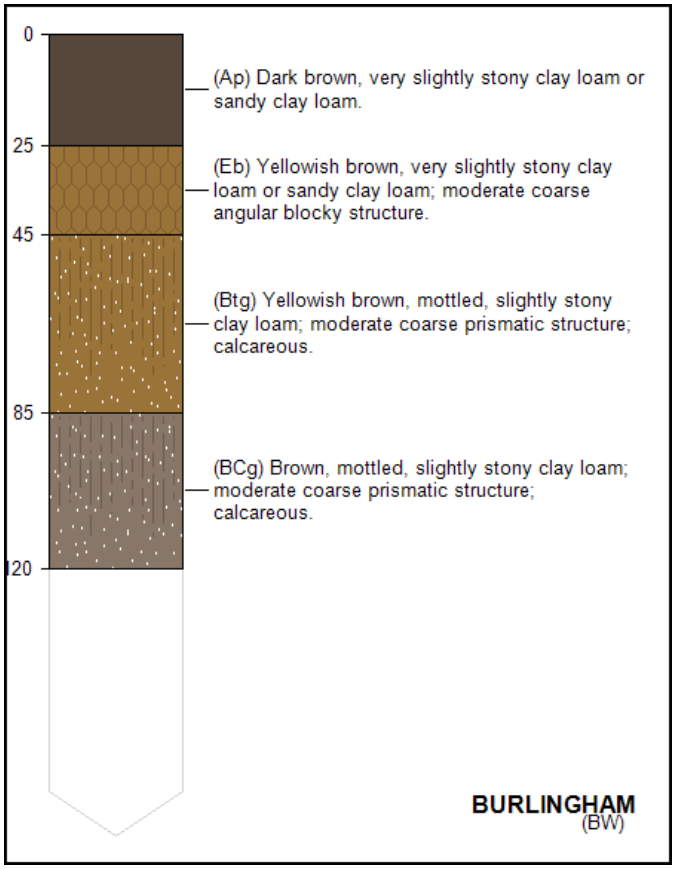
Table 4: The component soil series of the BURLINGHAM 3 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

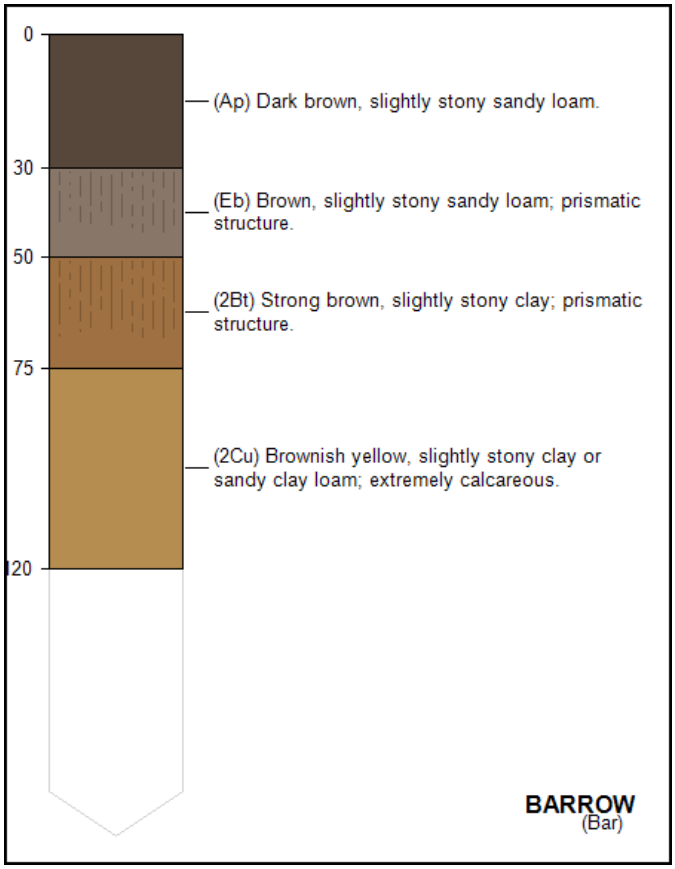
Soil Series	Description	Area %
BURLINGHAM (BW)	medium loamy chalky drift	25%
BARROW (Bar)	light loamy over clayey chalky drift	15%
MAXTED (mT)	light loamy drift with siliceous stones	15%
NEWPORT (Na)	sandy drift with siliceous stones	15%
WIGHILL (wL)	light loamy drift with siliceous stones	10%
WEASENHAM (Wea)	medium loamy chalky drift	10%
ASHLEY (As)	medium loamy over clayey chalky drift	5%
MELFORD (MJ)	medium loamy over clayey chalky drift	5%

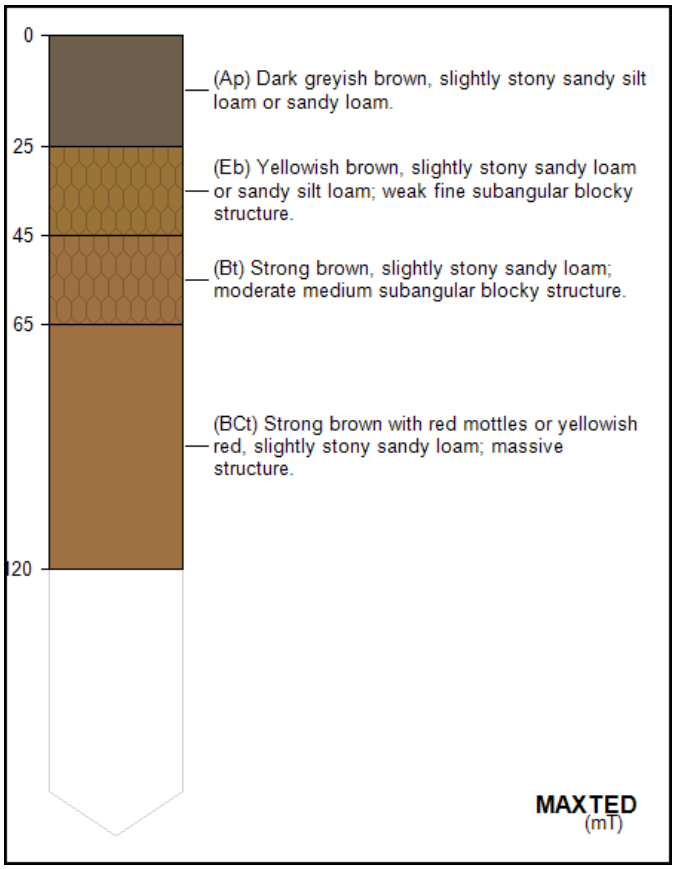
BURLINGHAM 3 (572p)

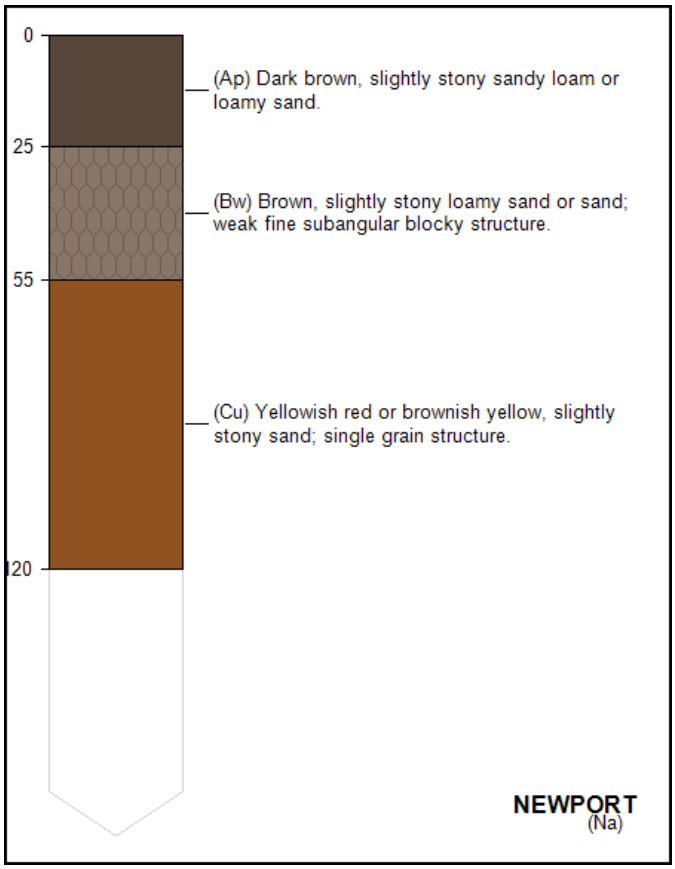
Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

d. BURLINGHAM 3 Component Series Profiles





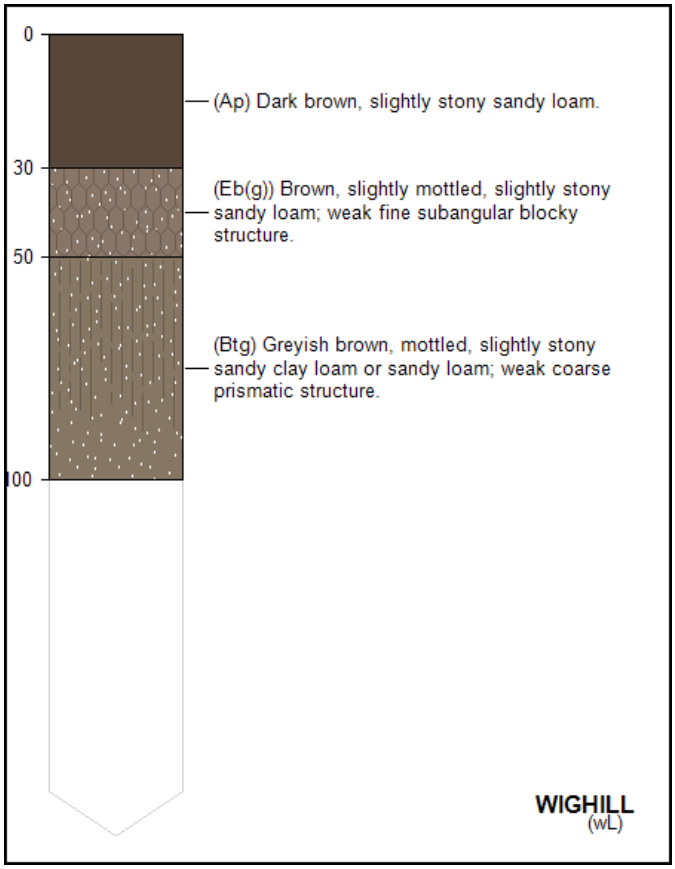


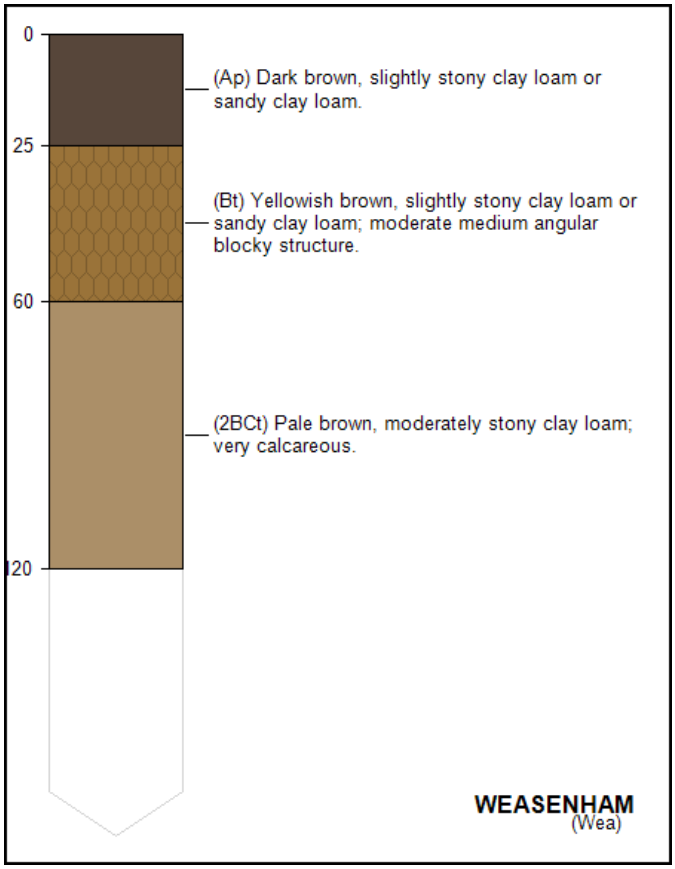


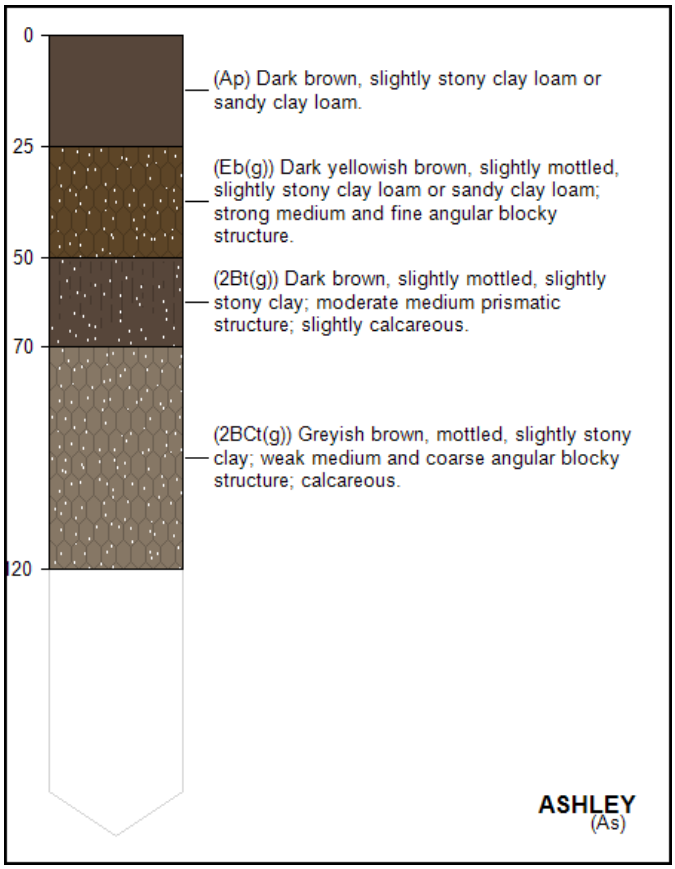
BURLINGHAM 3 (572p)

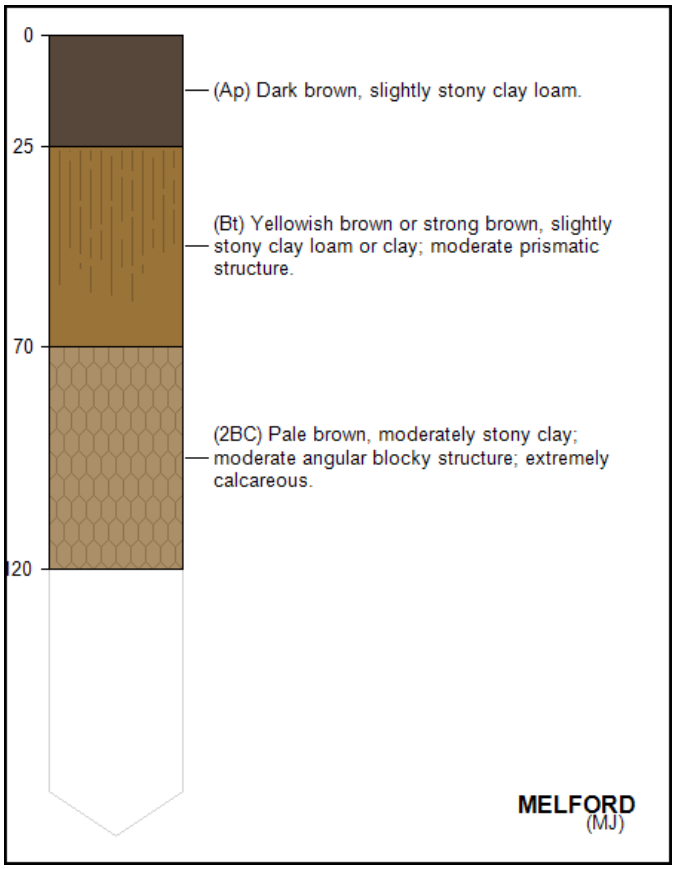
Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging.

d. BURLINGHAM 3 Component Series Profiles continued









BECCLES 1 (711r)

Slowly permeable seasonally waterlogged fine loamy over clayey soils,

a. General Description

Slowly permeable seasonally waterlogged fine loamy over clayey soils,associated with similar clayey soils.
The major landuse on this association is defined as Winter cereals, some potatoes and grassland.

b. Distribution (England and Wales)

The BECCLES 1 association covers 1745 km² of England and Wales which accounts for 1.15% of the landmass. The distribution of this association is shown in figure 6. 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 BECCLES 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 endeavoured 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.

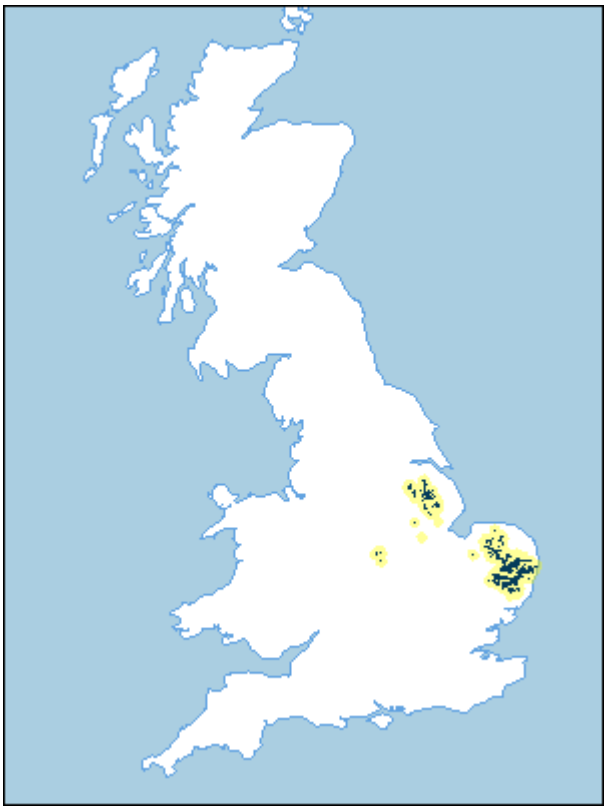


Figure 6: Association Distribution

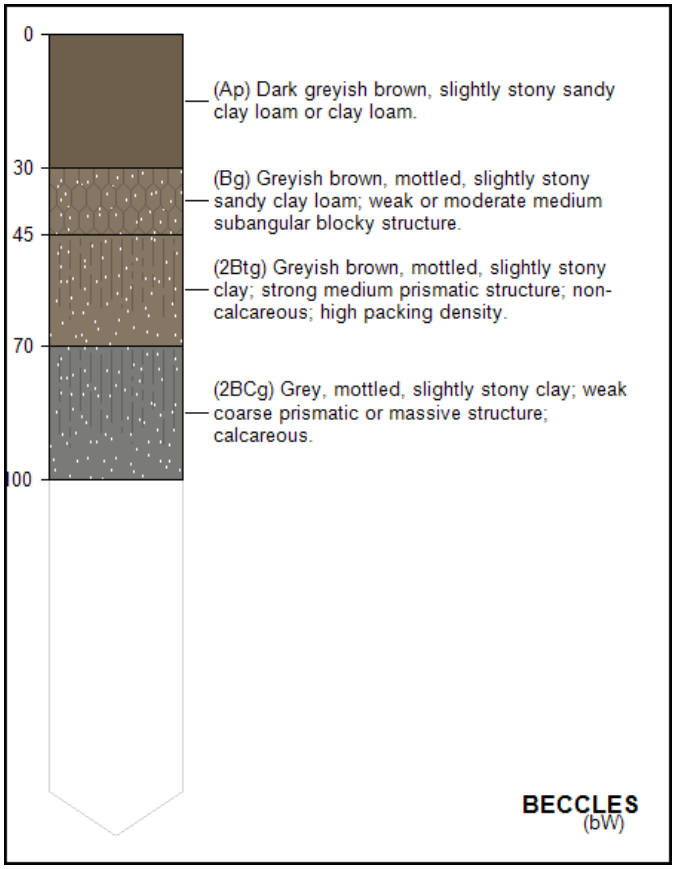
Table 5: The component soil series of the BECCLES 1 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

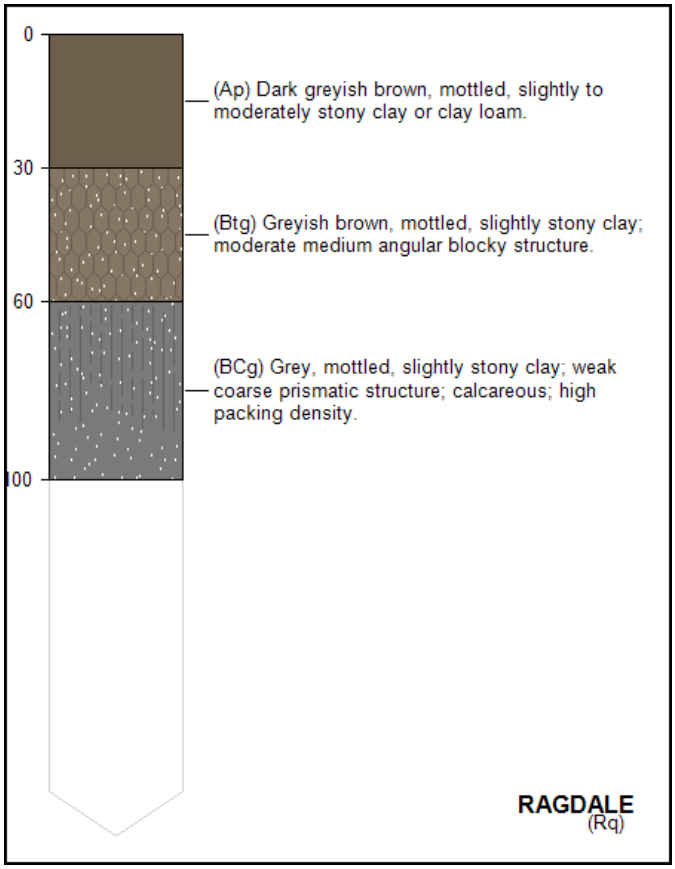
Soil Series	Description	Area %
BECCLES (bW)	medium loamy over clayey chalky drift	55%
RAGDALE (Rq)	clayey chalky drift	30%
OTHER	other minor soils	15%

BECCLES 1 (711r)

Slowly permeable seasonally waterlogged fine loamy over clayey soils,

d. BECCLES 1 Component Series Profiles





Isleham 2 (861b)

Deep permeable sandy and peaty soils affected by groundwater.

a. General Description

Deep permeable sandy and peaty soils affected by groundwater.
The major landuse on this association is defined as Cereals, sugar beet, potatoes and horticultural crops; rough grazing where undrained.

b. Distribution (England and Wales)

The Isleham 2 association covers 524 km² of England and Wales which accounts for 0.35% of the landmass. The distribution of this association is shown in figure 7. Note that the yellow shading represents a buffer to highlight the location of very small areas of the association.

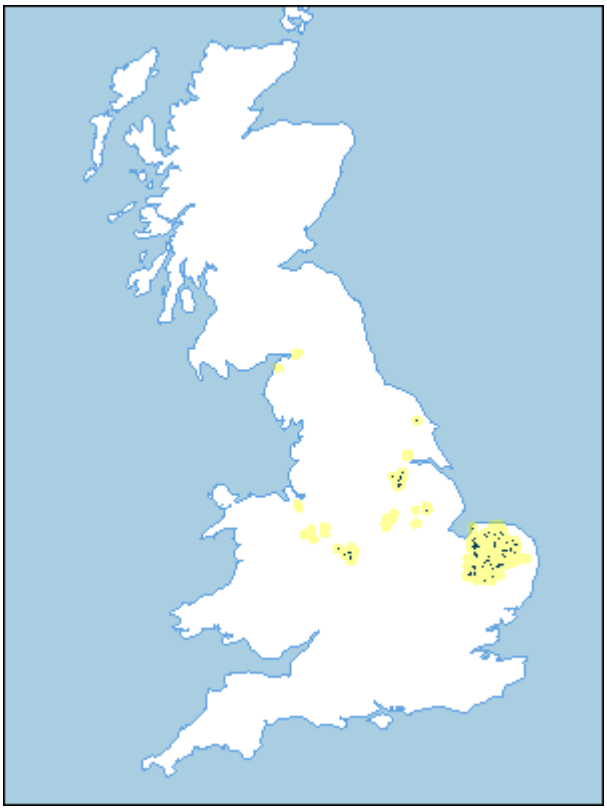


Figure 7: Association Distribution

c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the Isleham 2 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 endeavoured 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.

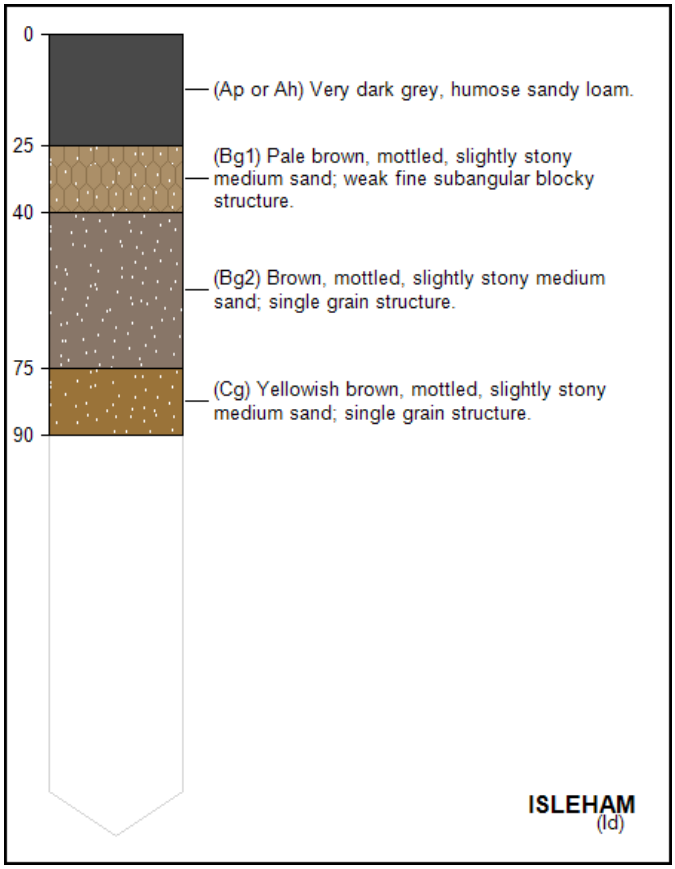
Table 6: The component soil series of the Isleham 2 soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

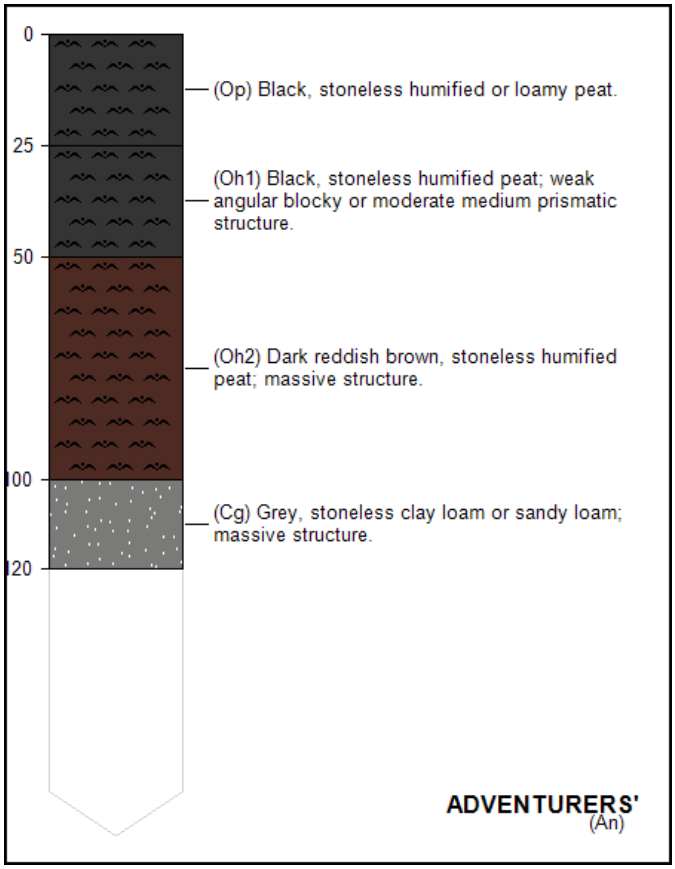
Soil Series	Description	Area %
ISLEHAM (Id)	sandy drift with siliceous stones	31%
ADVENTURERS' (An)	humified peat	29%
BLACKWOOD (bK)	sandy drift with siliceous stones	20%
OLLERTON (Ol)	sandy drift with siliceous stones	20%

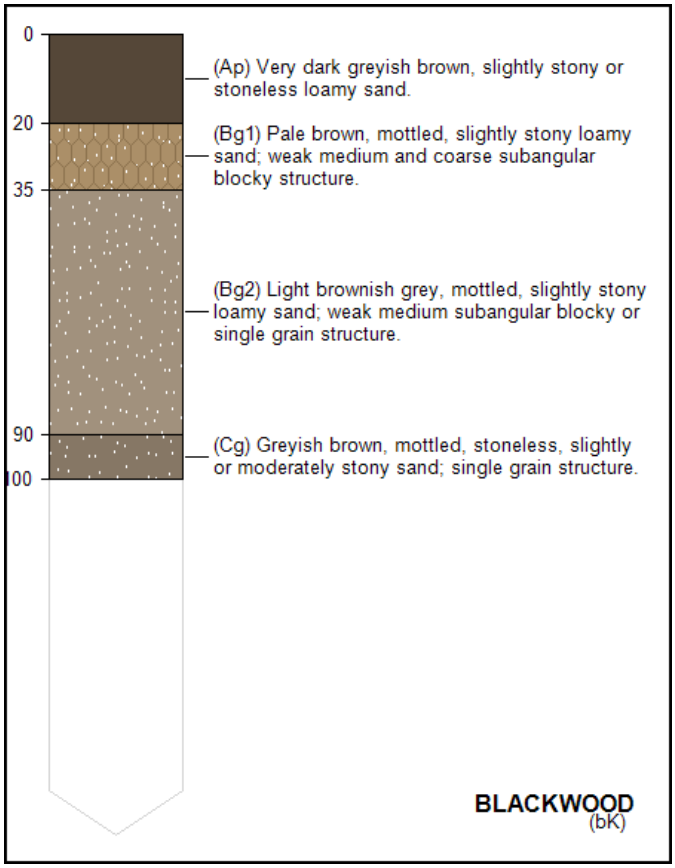
Isleham 2 (861b)

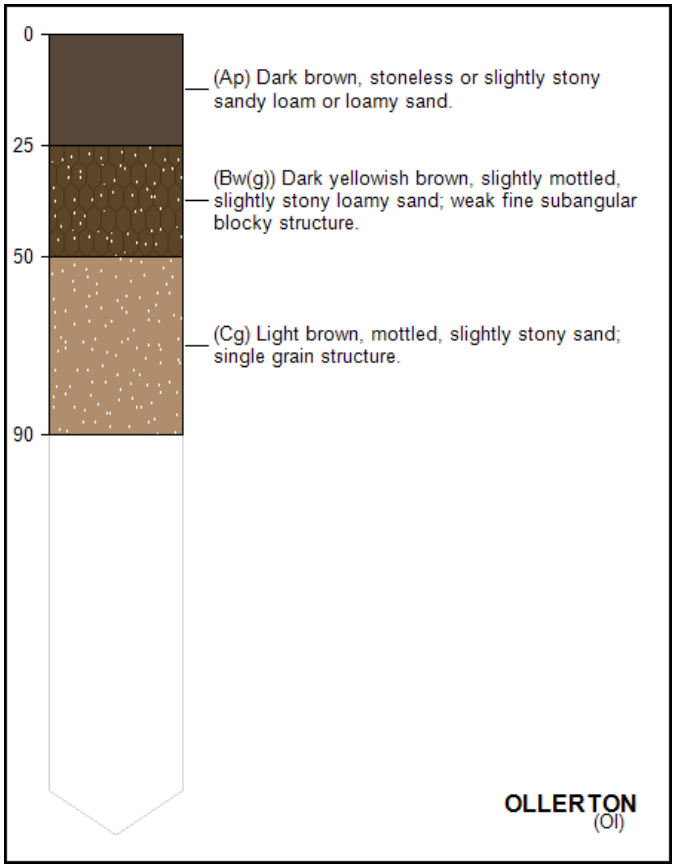
Deep permeable sandy and peaty soils affected by groundwater.

d. Isleham 2 Component Series Profiles









3. Soil Series Properties

The following pages describe the following soil series in more detail:

ADVENTURERS' (An)	humified peat
ASHLEY (As)	medium loamy over clayey chalky drift
BARROW (Bar)	light loamy over clayey chalky drift
BECCLES (bW)	medium loamy over clayey chalky drift
BLACKWOOD (bK)	sandy drift with siliceous stones
BURLINGHAM (BW)	medium loamy chalky drift
ISLEHAM (Id)	sandy drift with siliceous stones
MAXTED (mT)	light loamy drift with siliceous stones
MELFORD (MJ)	medium loamy over clayey chalky drift
NEWPORT (Na)	sandy drift with siliceous stones
OLLERTON (Ol)	sandy drift with siliceous stones
RAGDALE (Rq)	clayey chalky drift
REDLODGE (Ro)	sandy drift with siliceous stones
WEASENHAM (Wea)	medium loamy chalky drift
WICK (wQ)	light loamy drift with siliceous stones
WIGHILL (wL)	light loamy drift with siliceous stones

SOIL PROPERTY DEFINITIONS

The following terms are used in the report.

DROCK (Depth to rock (cm))
Depth (cm) to rock. 999 implies no rock

DGLEY (Depth to gleying (cm))
Depth to gleyed horizon (cm). 999 implies NO gleyed horizon present.

DIMP_DP (Depth to slowly permeable layer (downward percolation) (cm))
Depth (cm) to slowly permeable layer, i.e. in which effectively there is no downward percolation of water - 999 implies NO slowly permeable layer

DIMP_UD (Depth to slowly permeable layer (upward diffusion) (cm))
Depth (cm) to slowly permeable layer - upward diffusion, i.e. in which effectively there is no upward movement of water - 999 implies NO slowly permeable layer

IAC_DP (Integrated air capacity (IAC) (mm))
Integrated air capacity (downward percolation), a measurement of the volume of air in moist soils (0.05 bar suction) integrated from the surface to either an impermeable horizon, bedrock or 1m whichever is the shallowest, used for estimating the water storage potential of a soil

SPR (Standard percentage runoff (SPR) (%))
Standard Percentage Run-off. Dimensionless variable (range 0 to 100 %) that represents the percentage of rainfall that causes the short-term increase in flow at the catchment outlet seen after the storm event

BFI (Base flow index (BFI) (0 to 1))
Baseflow index. Dimensionless variable (range 0 to 1) that expresses the fraction of the average flow volume (in a river), represented by the contribution from groundwater storage

AWC (Available water (AWC) (mm))
Available water to 1m for a specific soil type, water available between suctions 5 and 1500kPa

AP_GRASS (Available water for grass (mm))
Available water (AP) in the profile for grass (mm); water available between suctions 5 and 1500 kPa

AP_CEREAL (Available water for cereal (mm))
Available water (AP) in the profile for cereals (mm); water available between suctions 5 and 1500 kPa

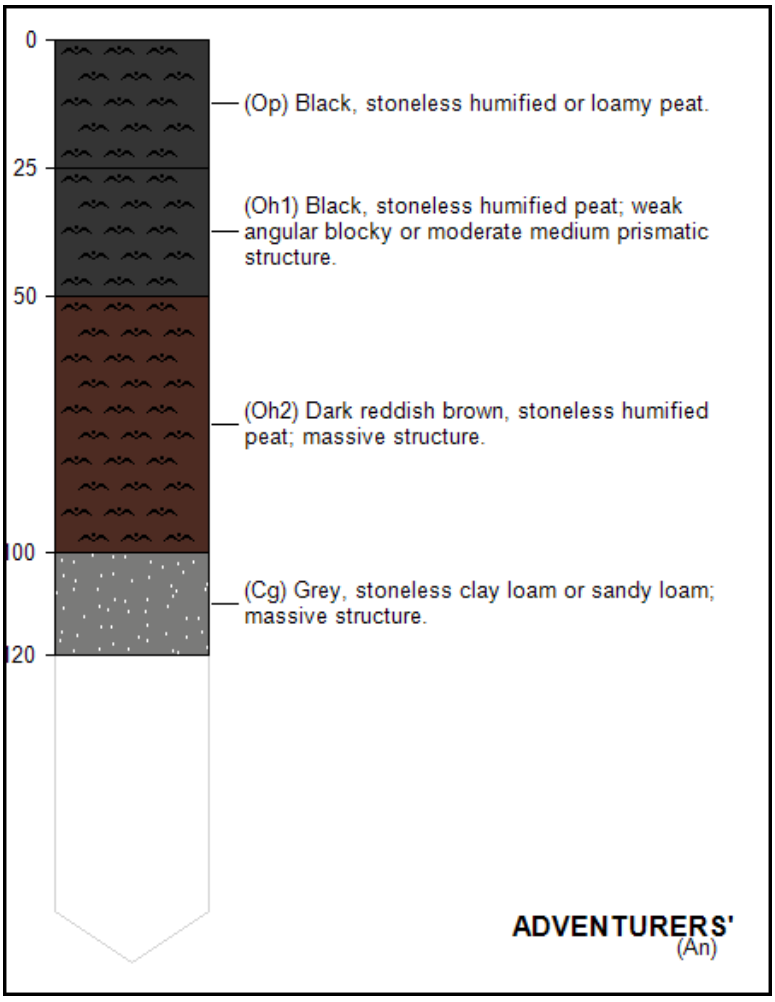
AP_SB (Available water for sugar (mm))
Available water (AP) in the profile for sugar beet (mm); water available between suctions 5 and 1500 kPa

AP_POT (Available water for potatoes (mm))
Available water (AP) in the profile for potatoes (mm); water available between suctions 5 and 1500 kPa

10.24 ADVENTURERS' (An) (4)

Major soil group:	10 peat soils	With more than 40 cm of organic material in the upper 80 cm or with more than 30 cm of organic material over bedrock or very stony rock rubble.
Soil group:	2 earthy peat soils	Normally drained, with a well aerated and structured earthy topsoil or ripened mineral surface layer.
Soil Subgroup:	4 earthy eutro-amorphous peat soils	(mainly humified with pH 4.0 or more in some part)
Soil Series:	Adventurers' series	humified peat

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	0
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	200
Standard percentage runoff (SPR) (%)	2
Base flow index (BFI) (0 to 1)	0.93
Available water (AWC) (mm)	280
Available water for grass (mm)	250
Available water for cereal (mm)	265
Available water for sugar (mm)	330
Available water for potatoes (mm)	200

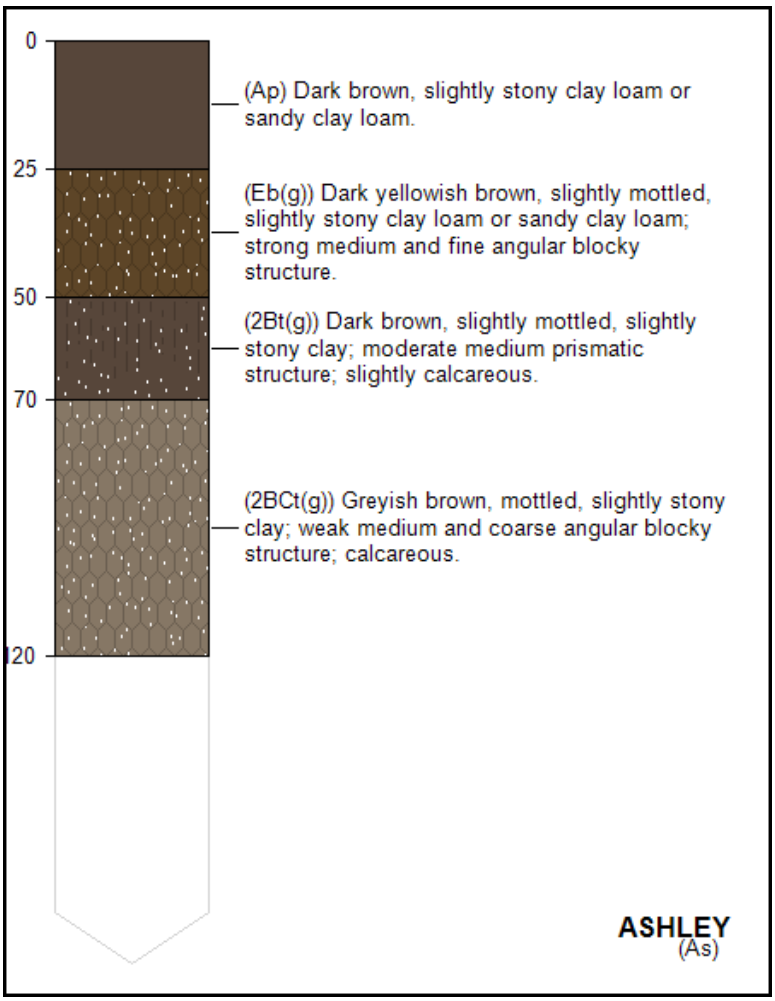


* not present within 150cm

5.72 ASHLEY (As) (25)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	7 argillic brown earths	Loamy or clayey with an ordinary clay-enriched subsoil.
Soil Subgroup:	2 stagnogleyic argillic brown earths	(faintly mottled with slowly permeable subsoil)
Soil Series:	Ashley series	medium loamy over clayey chalky drift

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	60
Depth to slowly permeable layer (downward percolation) (cm)	46
Depth to slowly permeable layer (upward diffusion) (cm)	46
Integrated air capacity (IAC) (mm)	92
Standard percentage runoff (SPR) (%)	47
Base flow index (BFI) (0 to 1)	0.52
Available water (AWC) (mm)	140
Available water for grass (mm)	120
Available water for cereal (mm)	125
Available water for sugar (mm)	155
Available water for potatoes (mm)	105

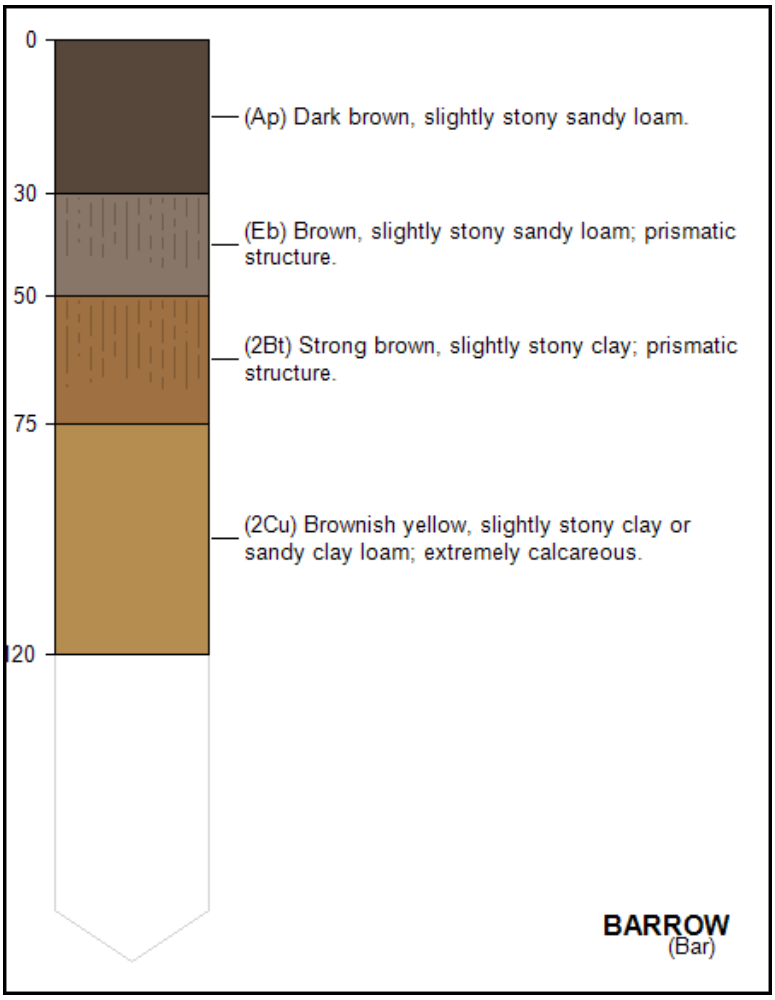


* not present within 150cm

5.81 BARROW (Bar) (173)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	8 paleo-argillic brown earths	Loamy or clayey, with an ancient reddish or reddish mottled, clay-enriched subsoil formed, at least in part, before the last (Devensian) glacial period.
Soil Subgroup:	1 typical paleo-argillic brown earths	(unmottled)
Soil Series:	Barrow series	light loamy over clayey chalky drift

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	131
Standard percentage runoff (SPR) (%)	2
Base flow index (BFI) (0 to 1)	0.98
Available water (AWC) (mm)	140
Available water for grass (mm)	125
Available water for cereal (mm)	120
Available water for sugar (mm)	160
Available water for potatoes (mm)	105

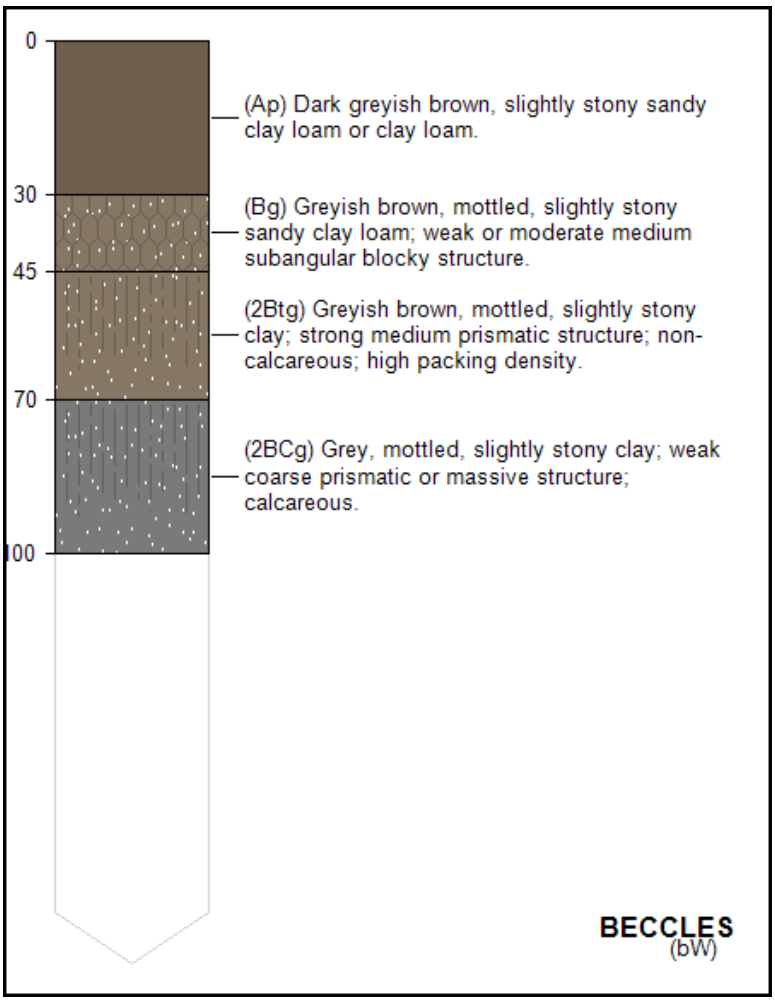


* not present within 150cm

7.11 BECCLES (bW) (112)

Major soil group:	07 surface-water gley soils	Seasonally waterlogged slowly permeable soils, formed above 3 m 0.D. and prominently mottled above 40 cm depth. They have no relatively permeable material starting within and extending below 1 m of the surface.
Soil group:	1 stagnogley soils	With a distinct topsoil. They are found mainly in lowland Britain.
Soil Subgroup:	1 typical stagnogley soils	(with ordinary clay enriched subsoil)
Soil Series:	Beccles series	medium loamy over clayey chalky drift

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	25
Depth to slowly permeable layer (downward percolation) (cm)	38
Depth to slowly permeable layer (upward diffusion) (cm)	38
Integrated air capacity (IAC) (mm)	66
Standard percentage runoff (SPR) (%)	40
Base flow index (BFI) (0 to 1)	0.31
Available water (AWC) (mm)	135
Available water for grass (mm)	120
Available water for cereal (mm)	120
Available water for sugar (mm)	150
Available water for potatoes (mm)	100

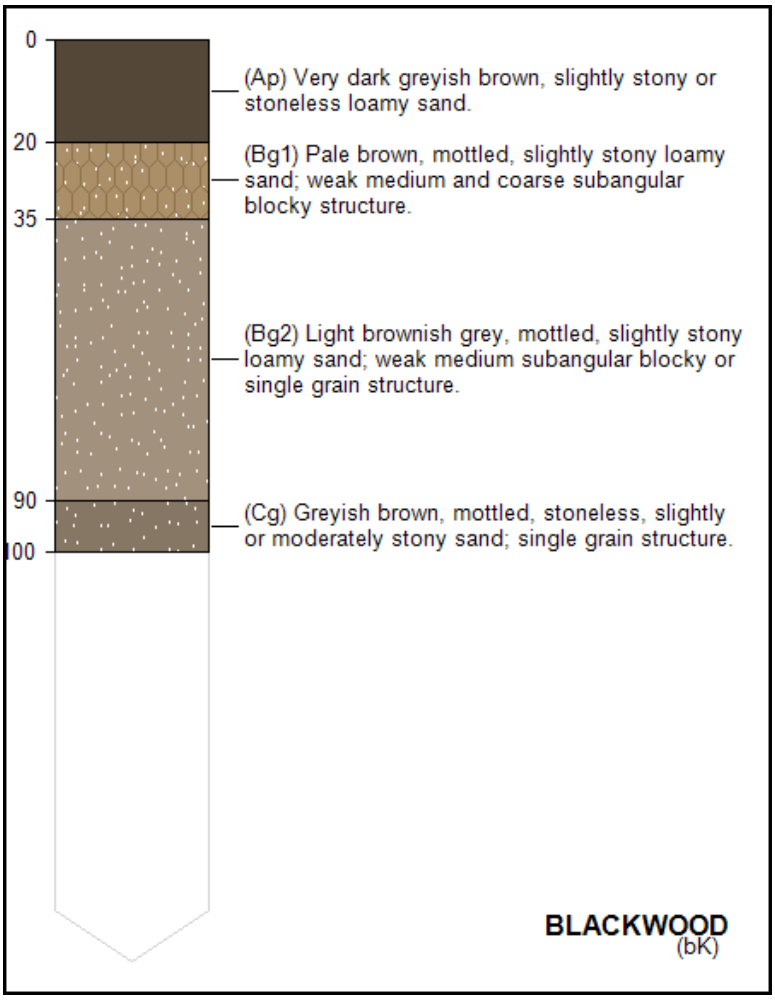


* not present within 150cm

8.21 BLACKWOOD (bK) (124)

Major soil group:	08 ground-water gley soils	Seasonally waterlogged soils affected by a shallow fluctuating groundwater-table. They are developed mainly within or over permeable material and have prominently mottled or greyish coloured horizons within 40 cm depth Most occupy low-lying or depressional sites.
Soil group:	2 sandy gley soils	Sandy, with distinct topsoil and no clay-enriched subsoil.
Soil Subgroup:	1 typical sandy gley soils	(with non calcareous subsoil)
Soil Series:	Blackwood series	sandy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	30
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	208
Standard percentage runoff (SPR) (%)	35
Base flow index (BFI) (0 to 1)	0.52
Available water (AWC) (mm)	130
Available water for grass (mm)	125
Available water for cereal (mm)	125
Available water for sugar (mm)	145
Available water for potatoes (mm)	105

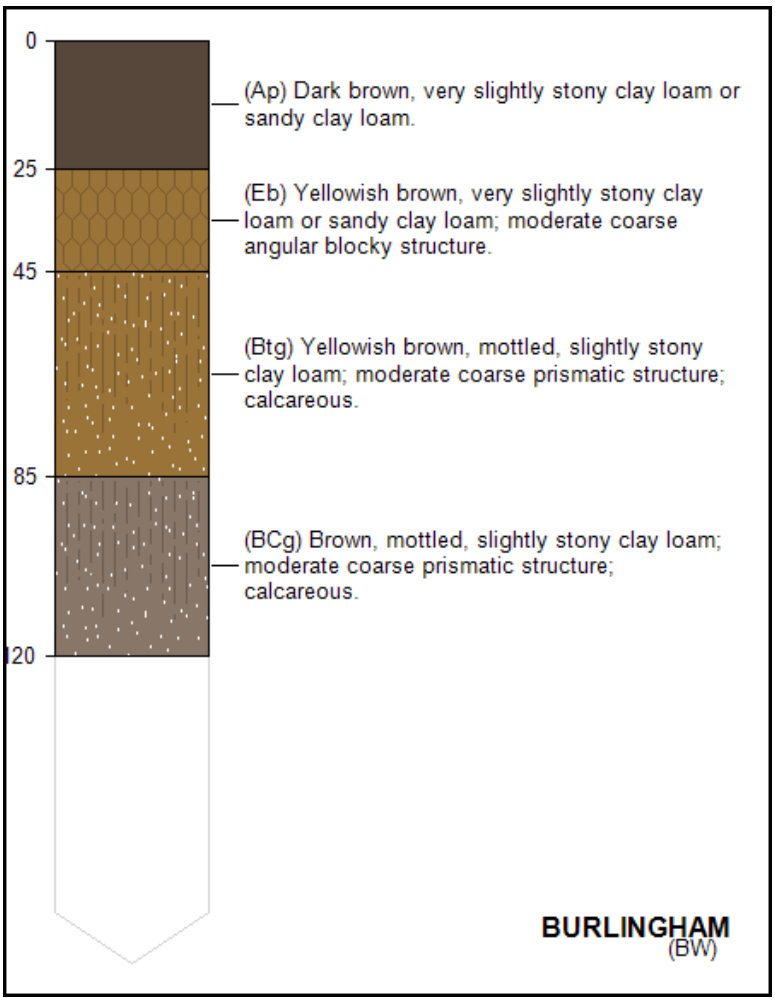


* not present within 150cm

5.72 BURLINGHAM (BW) (170)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	7 argillic brown earths	Loamy or clayey with an ordinary clay-enriched subsoil.
Soil Subgroup:	2 stagnogleyic argillic brown earths	(faintly mottled with slowly permeable subsoil)
Soil Series:	Burlingham series	medium loamy chalky drift

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	50
Depth to slowly permeable layer (downward percolation) (cm)	46
Depth to slowly permeable layer (upward diffusion) (cm)	46
Integrated air capacity (IAC) (mm)	83
Standard percentage runoff (SPR) (%)	47
Base flow index (BFI) (0 to 1)	0.52
Available water (AWC) (mm)	130
Available water for grass (mm)	120
Available water for cereal (mm)	125
Available water for sugar (mm)	145
Available water for potatoes (mm)	100

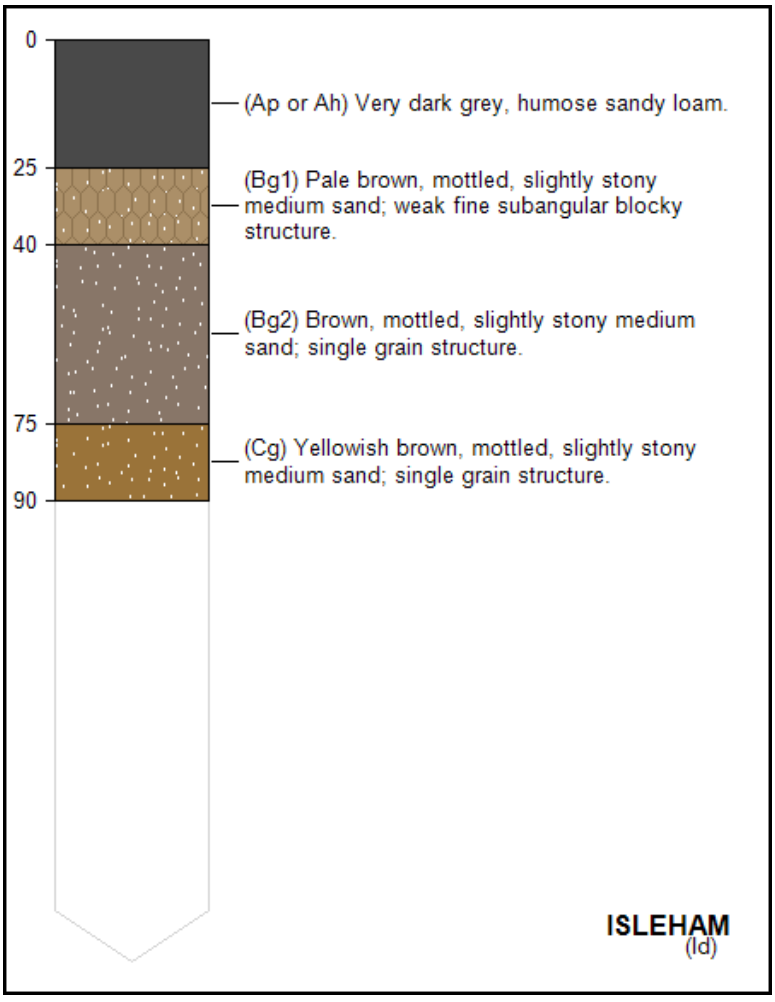


* not present within 150cm

8.61 ISLEHAM (Id) (805)

Major soil group:	08 ground-water gley soils	Seasonally waterlogged soils affected by a shallow fluctuating groundwater-table. They are developed mainly within or over permeable material and have prominently mottled or greyish coloured horizons within 40 cm depth Most occupy low-lying or depressional sites.
Soil group:	6 humic-sandy gley soils	Sandy, with humose or peaty topsoil and no clay-enriched subsoil Intermediate between sandy gley soils and lowland peat soils.
Soil Subgroup:	1 typical humic-sandy gley soils	(with non-calcareous subsoil)
Soil Series:	Isleham series	sandy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	30
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	268
Standard percentage runoff (SPR) (%)	35
Base flow index (BFI) (0 to 1)	0.52
Available water (AWC) (mm)	140
Available water for grass (mm)	135
Available water for cereal (mm)	145
Available water for sugar (mm)	170
Available water for potatoes (mm)	110

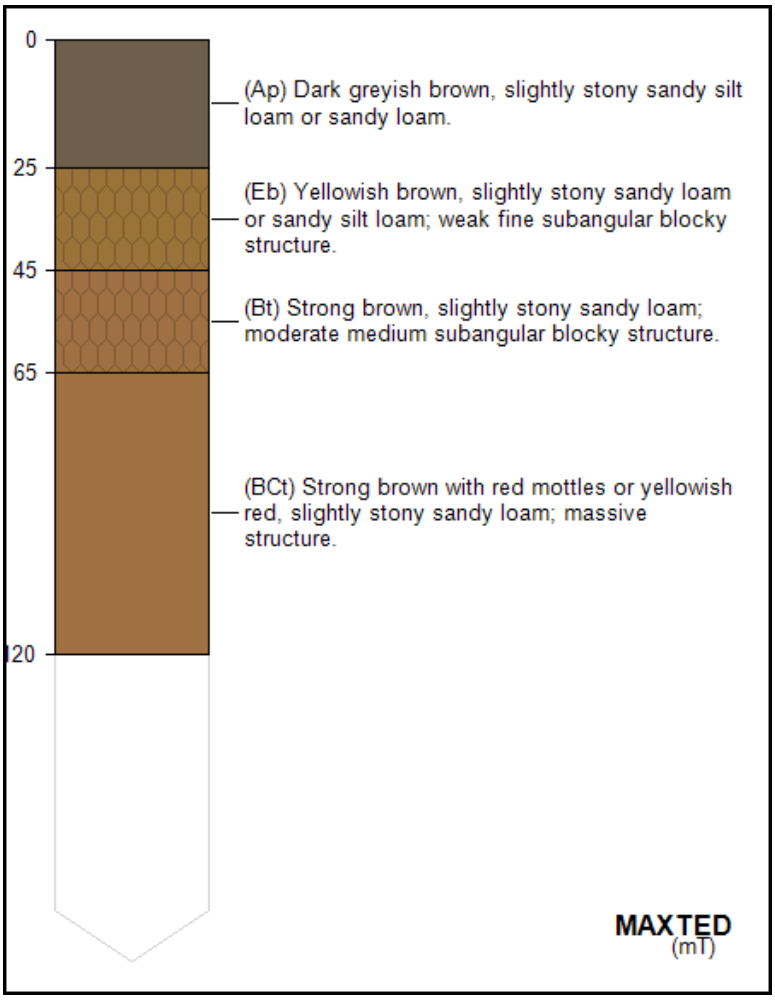


* not present within 150cm

5.81 MAXTED (mT) (1235)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	8 paleo-argillic brown earths	Loamy or clayey, with an ancient reddish or reddish mottled, clay-enriched subsoil formed, at least in part, before the last (Devensian) glacial period.
Soil Subgroup:	1 typical paleo-argillic brown earths	(unmottled)
Soil Series:	Maxted series	light loamy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	134
Standard percentage runoff (SPR) (%)	12
Base flow index (BFI) (0 to 1)	0.88
Available water (AWC) (mm)	145
Available water for grass (mm)	135
Available water for cereal (mm)	130
Available water for sugar (mm)	160
Available water for potatoes (mm)	115

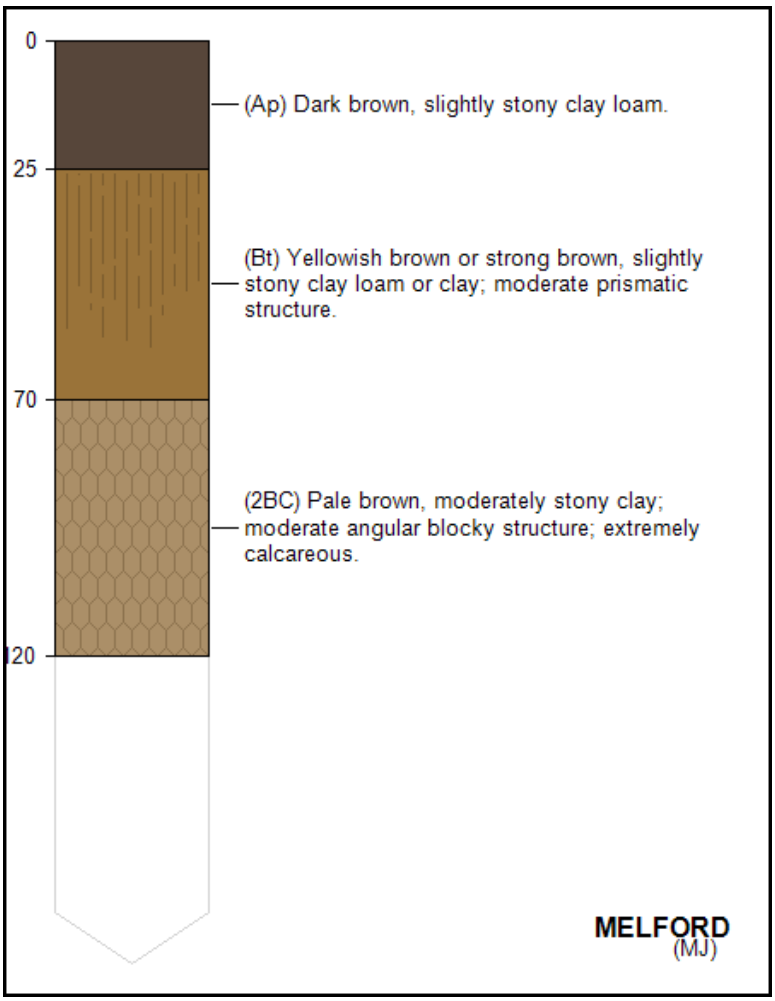


* not present within 150cm

5.71 MELFORD (MJ) (1265)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	7 argillic brown earths	Loamy or clayey with an ordinary clay-enriched subsoil.
Soil Subgroup:	1 typical argillic brown earths	(unmottled)
Soil Series:	Melford series	medium loamy over clayey chalky drift

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	92
Standard percentage runoff (SPR) (%)	2
Base flow index (BFI) (0 to 1)	0.98
Available water (AWC) (mm)	140
Available water for grass (mm)	140
Available water for cereal (mm)	125
Available water for sugar (mm)	155
Available water for potatoes (mm)	105

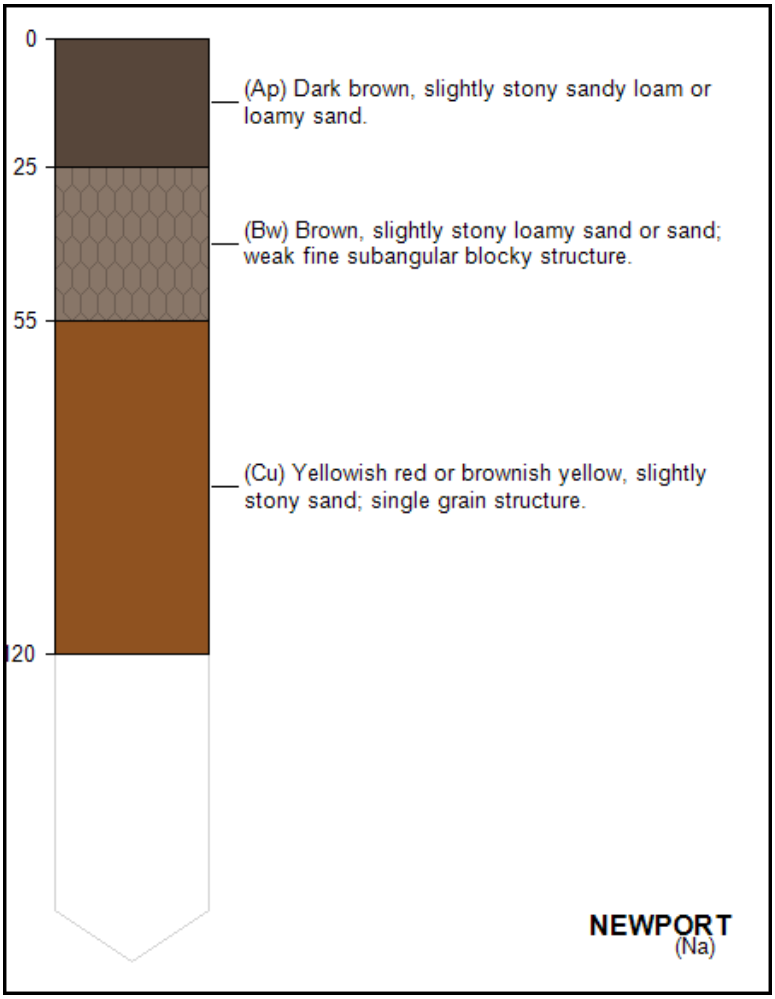


* not present within 150cm

5.51 NEWPORT (Na) (1310)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	5 brown sands	Non-calcareous sandy or sandy gravelly.
Soil Subgroup:	1 typical brown sands	(unmottled with no clay-enriched subsoil)
Soil Series:	Newport series	sandy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	256
Standard percentage runoff (SPR) (%)	12
Base flow index (BFI) (0 to 1)	0.88
Available water (AWC) (mm)	95
Available water for grass (mm)	85
Available water for cereal (mm)	95
Available water for sugar (mm)	110
Available water for potatoes (mm)	70

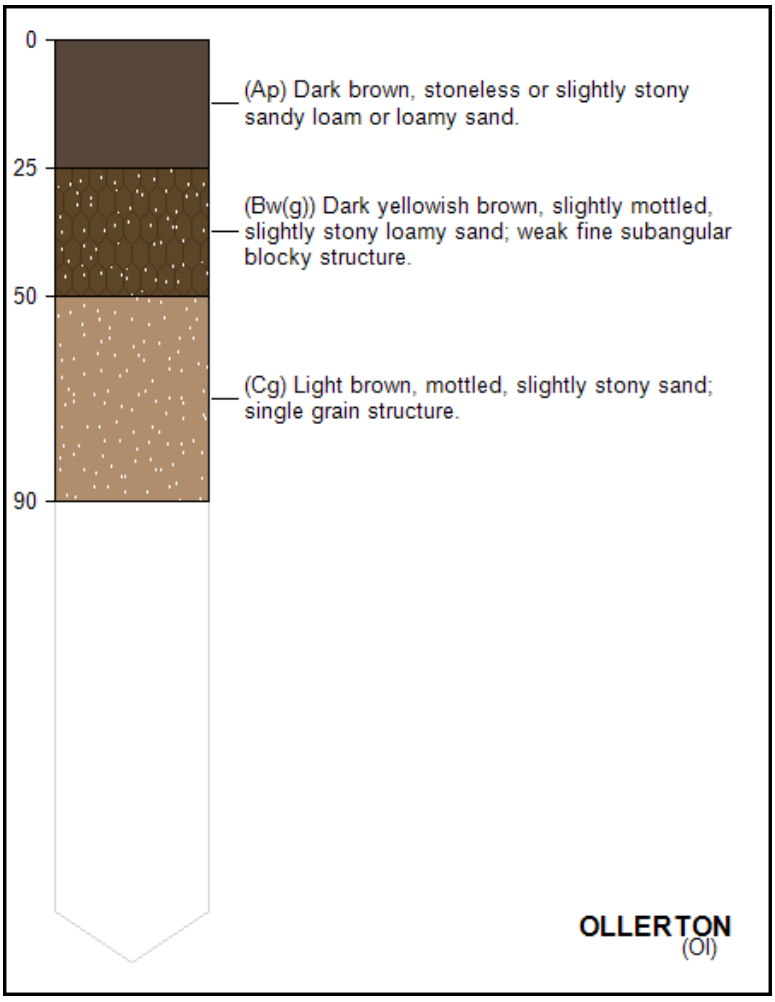


* not present within 150cm

5.52 OLLERTON (Ol) (1405)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	5 brown sands	Non-calcareous sandy or sandy gravelly.
Soil Subgroup:	2 gleyic brown sands	(faintly mottled with permeable subsoil without significant clay enrichment)
Soil Series:	Ollerton series	sandy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	65
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	221
Standard percentage runoff (SPR) (%)	21
Base flow index (BFI) (0 to 1)	0.79
Available water (AWC) (mm)	100
Available water for grass (mm)	90
Available water for cereal (mm)	100
Available water for sugar (mm)	115
Available water for potatoes (mm)	75

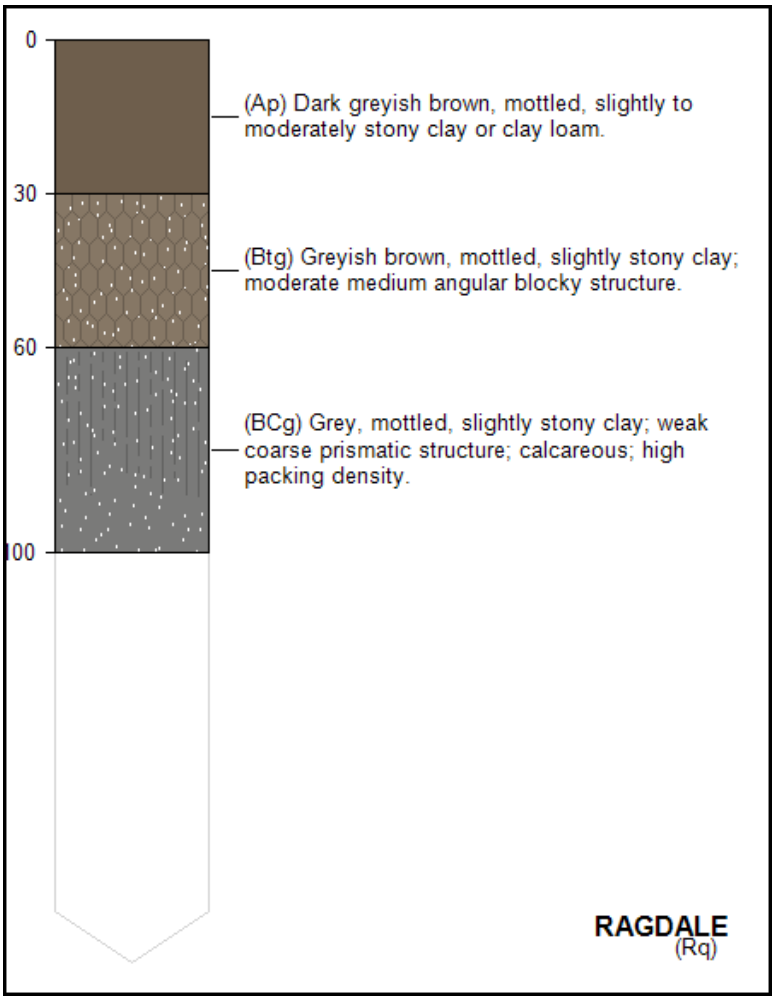


* not present within 150cm

7.12 RAGDALE (Rq) (1702)

Major soil group:	07 surface-water gley soils	Seasonally waterlogged slowly permeable soils, formed above 3 m 0.D. and prominently mottled above 40 cm depth. They have no relatively permeable material starting within and extending below 1 m of the surface.
Soil group:	1 stagnogley soils	With a distinct topsoil. They are found mainly in lowland Britain.
Soil Subgroup:	2 pelo-stagnogley soils	(clayey)
Soil Series:	Ragdale series	clayey chalky drift

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	25
Depth to slowly permeable layer (downward percolation) (cm)	24
Depth to slowly permeable layer (upward diffusion) (cm)	24
Integrated air capacity (IAC) (mm)	40
Standard percentage runoff (SPR) (%)	40
Base flow index (BFI) (0 to 1)	0.31
Available water (AWC) (mm)	130
Available water for grass (mm)	115
Available water for cereal (mm)	115
Available water for sugar (mm)	135
Available water for potatoes (mm)	100

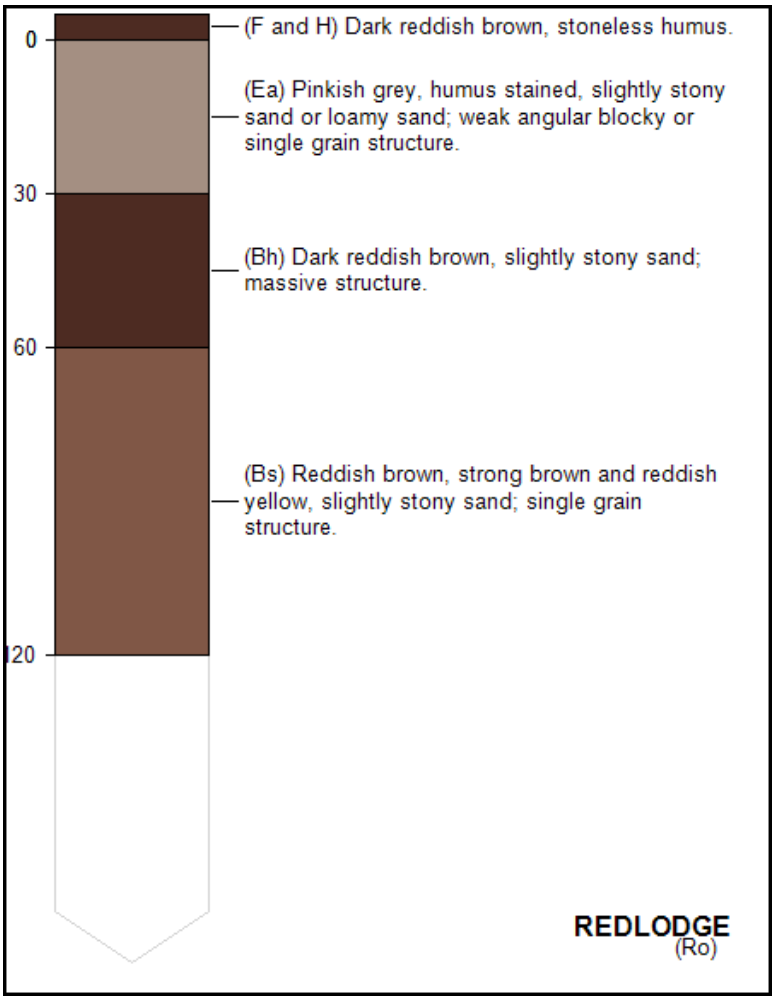


* not present within 150cm

6.31 REDLODGE (Ro) (1705)

Major soil group:	06 podzolic soils	With black, dark brown or ochreous humus and iron-enriched subsoils formed as a result of acid weathering conditions. Under natural or semi-natural vegetation, they have an unincorporated acid organic layer at the surface.
Soil group:	3 podzols	Well drained, with a bleached subsurface horizon and no thin ironpan.
Soil Subgroup:	1 humo-ferric podzols	(with black or dark brown humus and iron-enriched)
Soil Series:	Redlodge series	sandy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	256
Standard percentage runoff (SPR) (%)	12
Base flow index (BFI) (0 to 1)	0.88
Available water (AWC) (mm)	100
Available water for grass (mm)	90
Available water for cereal (mm)	100
Available water for sugar (mm)	115
Available water for potatoes (mm)	75

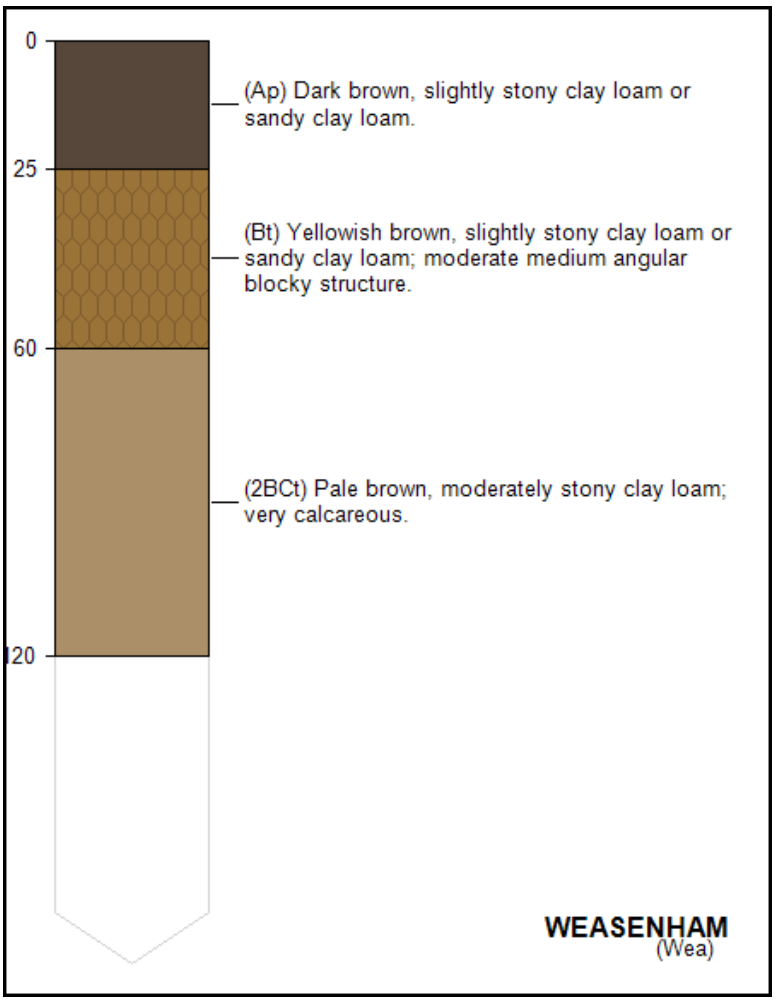


* not present within 150cm

5.71 WEASENHAM (Wea) (2271)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	7 argillic brown earths	Loamy or clayey with an ordinary clay-enriched subsoil.
Soil Subgroup:	1 typical argillic brown earths	(unmottled)
Soil Series:	Weasenham series	medium loamy chalky drift

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	112
Standard percentage runoff (SPR) (%)	2
Base flow index (BFI) (0 to 1)	0.98
Available water (AWC) (mm)	145
Available water for grass (mm)	140
Available water for cereal (mm)	140
Available water for sugar (mm)	160
Available water for potatoes (mm)	120

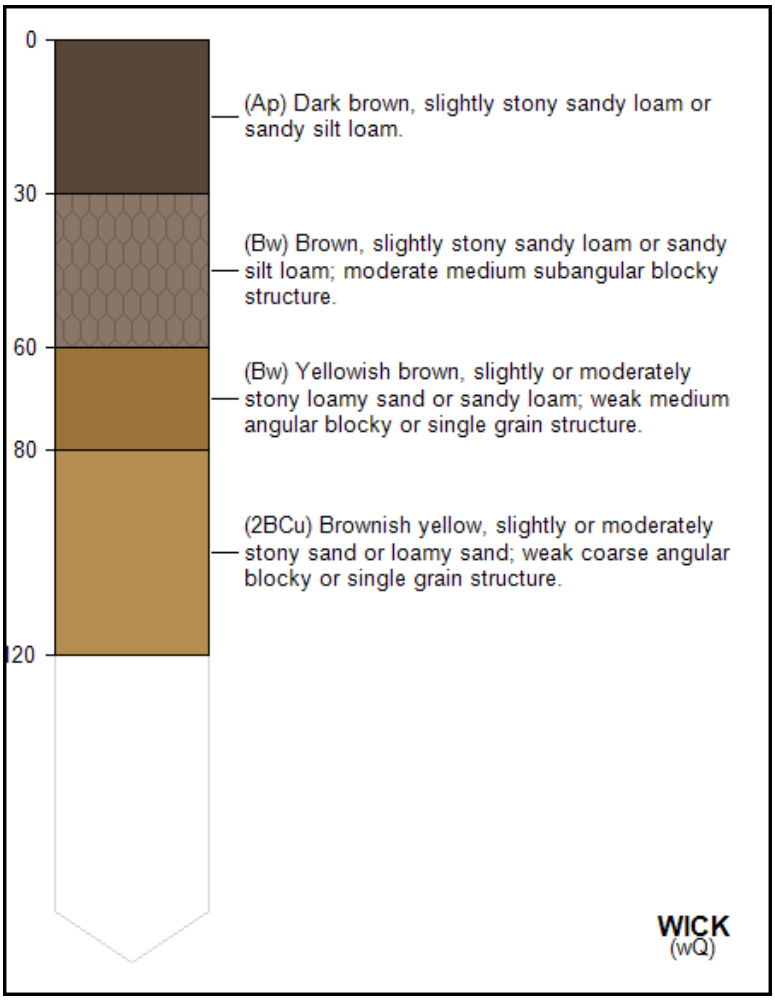


* not present within 150cm

5.41 WICK (wQ) (2225)

Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	4 brown earths	Non-alluvial, with non-calcareous loamy or clayey subsoils without significant clay enrichment.
Soil Subgroup:	1 typical brown earths	(unmottled)
Soil Series:	Wick series	light loamy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	n/a*
Depth to slowly permeable layer (downward percolation) (cm)	n/a*
Depth to slowly permeable layer (upward diffusion) (cm)	n/a*
Integrated air capacity (IAC) (mm)	206
Standard percentage runoff (SPR) (%)	12
Base flow index (BFI) (0 to 1)	0.88
Available water (AWC) (mm)	140
Available water for grass (mm)	130
Available water for cereal (mm)	140
Available water for sugar (mm)	165
Available water for potatoes (mm)	100

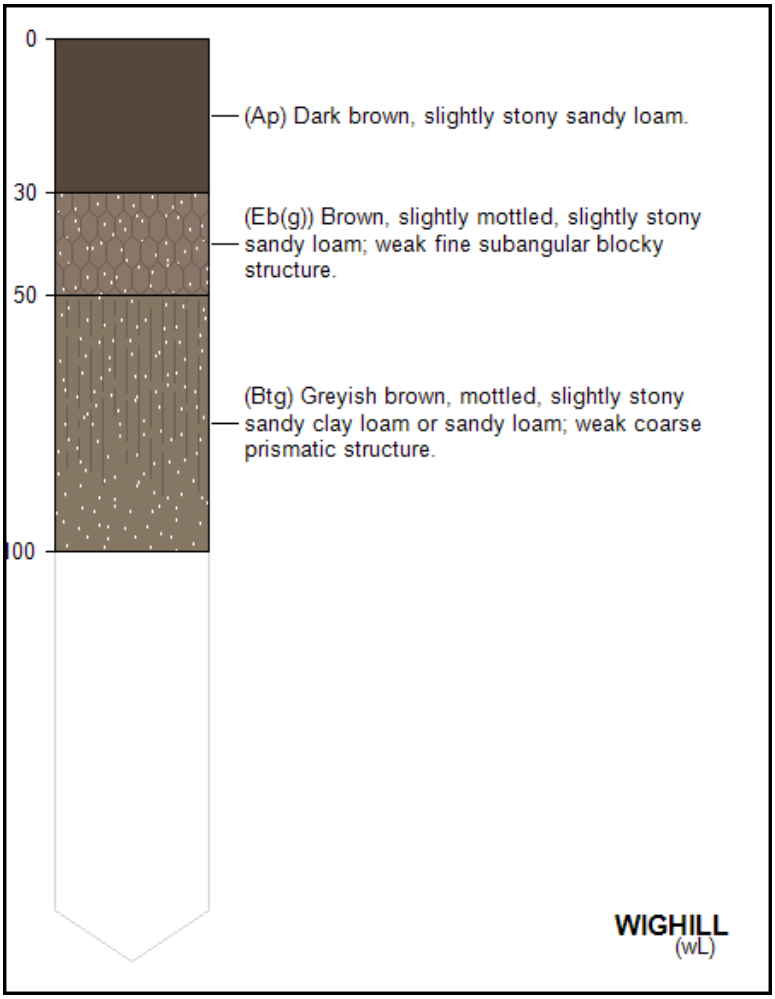


* not present within 150cm

5.72 WIGHILL (wL) (2230)

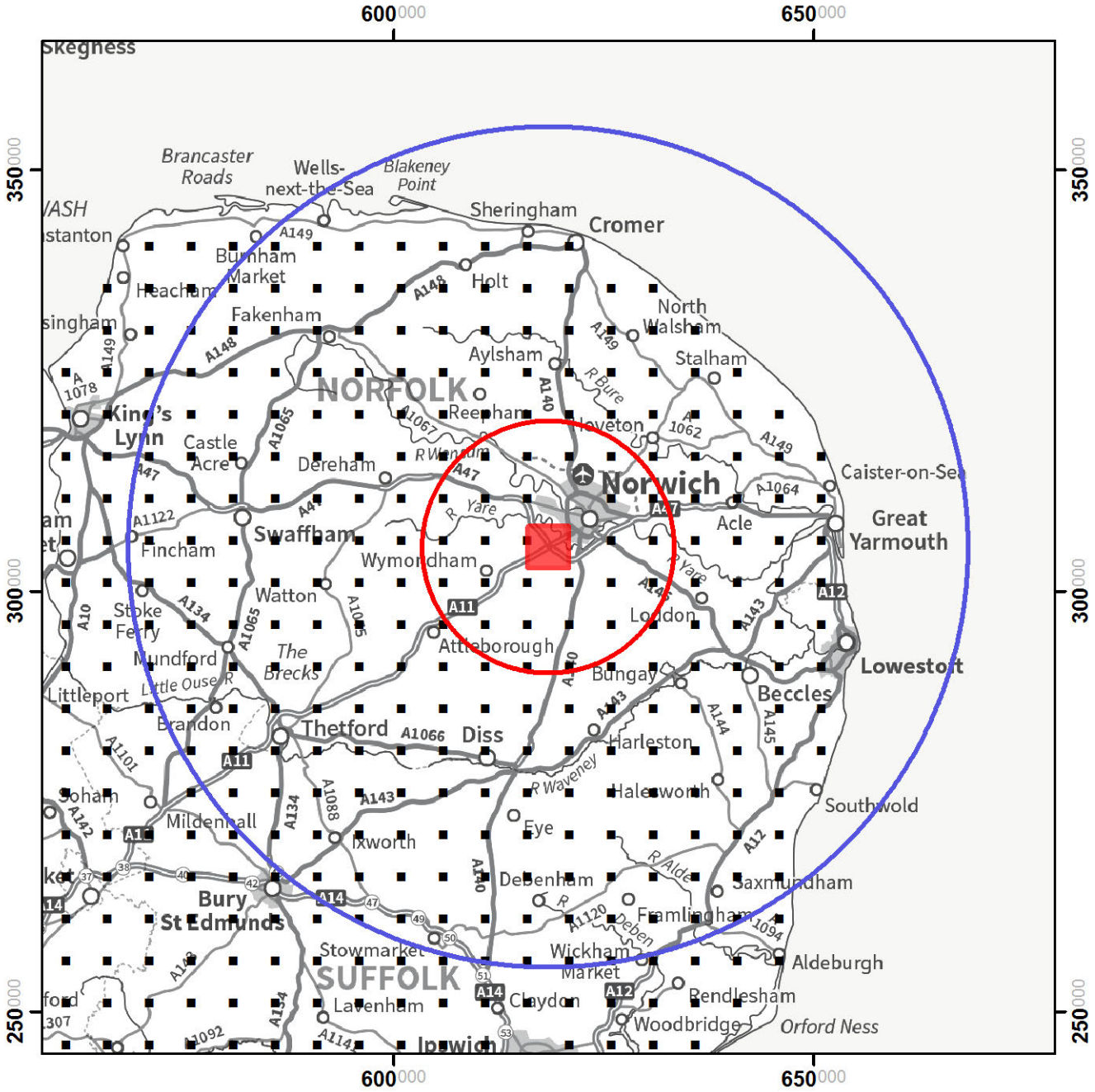
Major soil group:	05 brown soils	With dominantly brownish or reddish subsoils and no prominent mottling or greyish colours (gleying) above 40 cm depth. They are developed mainly on permeable materials at elevations below about 300 m.0.D. Most are in agricultural use.
Soil group:	7 argillic brown earths	Loamy or clayey with an ordinary clay-enriched subsoil.
Soil Subgroup:	2 stagnogleyic argillic brown earths	(faintly mottled with slowly permeable subsoil)
Soil Series:	Wighill series	light loamy drift with siliceous stones

Property	Value
Depth to rock (cm)	n/a*
Depth to gleying (cm)	60
Depth to slowly permeable layer (downward percolation) (cm)	88
Depth to slowly permeable layer (upward diffusion) (cm)	88
Integrated air capacity (IAC) (mm)	122
Standard percentage runoff (SPR) (%)	47
Base flow index (BFI) (0 to 1)	0.52
Available water (AWC) (mm)	145
Available water for grass (mm)	130
Available water for cereal (mm)	130
Available water for sugar (mm)	160
Available water for potatoes (mm)	110



* not present within 150cm

4. Topsoil Element Background Levels



Topsoil Element Background Levels Key

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

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.

a. Analysis Within a 15km Radius (26 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST.DEV
pH (PH)	26	7.0	4.4	8.4	1.2
Carbon (CARBON)	26	1.8	0.7	7.7	1.5
Aluminium (AL_ACID)	26	14124.3	4077.0	37916.0	6846.3
Arsenic (AS_ACID)	7	3.0	1.2	7.2	2.1
Barium (BA_ACID)	26	58.8	24.0	110.0	18.1
Calcium (CA_ACID)	26	8797.7	339.0	115905.0	22170.4
Cadmium (CD_ACID)	26	0.3	0.0	1.3	0.3
Cadmium (Extractable) (CD_EDTA)	26	0.3	0.1	0.8	0.2
Cobalt (CO_ACID)	26	4.9	0.9	8.4	1.7
Cobalt (Extractable) (CO_EDTA)	26	1.0	0.1	2.3	0.6
Chromium (CR_ACID)	26	19.9	5.7	49.7	8.9
Copper (CU_ACID)	26	13.9	2.8	37.6	8.3
Copper (Extractable) (CU_EDTA)	26	5.9	0.8	18.8	3.8
Fluoride (F_ACID)	1	51.5	51.5	51.5	0.0
Iron (FE_ACID)	26	14468.2	4783.0	26586.0	4485.7
Mercury (HG_ACID)	7	0.4	0.0	2.2	0.8
Potassium (K_ACID)	26	2433.0	704.0	6878.0	1237.2
Potassium (Extractable) (K_NITRATE)	26	145.0	70.0	254.0	41.7
Magnesium (MG_ACID)	26	1203.8	257.0	3076.0	575.4
Magnesium (Extractable) (MG_NITRATE)	26	49.1	27.0	126.0	23.5
Manganese (MN_ACID)	26	323.7	50.0	790.0	164.3
Manganese (Extractable) (MN_EDTA)	26	139.8	12.0	597.0	124.9
Molybdenum (MO_ACID)	7	0.3	0.0	1.1	0.4
Sodium (NA_ACID)	26	166.9	89.0	332.0	49.9
Nickel (NI_ACID)	26	13.7	2.1	32.0	6.4
Nickel (Extractable) (NI_EDTA)	26	1.3	0.4	2.8	0.6
Phosphorus (P_ACID)	26	501.2	81.0	1450.0	236.5
Phosphorus (Extractable) (P_OLSEN)	26	37.6	5.0	105.0	22.3
Lead (PB_ACID)	26	40.2	10.0	365.0	68.9
Lead (Extractable) (PB_EDTA)	26	29.4	6.5	427.9	81.6
Selenium (SE_ACID)	7	0.3	0.0	0.4	0.1
Strontium (SR_ACID)	26	25.4	3.0	146.0	26.4
Vanadium (V_ACID)	7	22.6	10.1	32.4	7.6
Zinc (ZN_ACID)	26	46.0	14.0	81.0	14.3
Zinc (Extractable) (ZN_EDTA)	26	6.1	2.1	17.9	3.7

for units, see Analyses Denitions (p70)

b. Analysis Within a 50km Radius (247 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST.DEV
pH (PH)	246	7.0	3.6	8.4	1.1
Carbon (CARBON)	247	2.3	0.5	36.5	3.3
Aluminium (AL_ACID)	247	16451.2	1126.0	53735.0	9589.0
Arsenic (AS_ACID)	62	2.9	0.8	12.0	1.8
Barium (BA_ACID)	247	67.0	12.0	544.0	42.4
Calcium (CA_ACID)	247	11603.8	19.0	179790.0	22413.9
Cadmium (CD_ACID)	247	0.3	0.0	1.3	0.3
Cadmium (Extractable) (CD_EDTA)	247	0.2	0.1	0.8	0.1
Cobalt (CO_ACID)	247	5.6	0.3	16.0	2.5
Cobalt (Extractable) (CO_EDTA)	247	0.8	0.0	3.3	0.6
Chromium (CR_ACID)	247	23.7	2.4	148.7	14.4
Copper (CU_ACID)	247	12.2	0.0	37.6	6.0
Copper (Extractable) (CU_EDTA)	247	4.4	0.5	21.8	3.1
Fluoride (F_ACID)	16	41.5	0.0	98.3	24.6
Iron (FE_ACID)	247	17282.4	1967.0	42434.0	6729.9
Mercury (HG_ACID)	61	0.1	0.0	2.2	0.3
Potassium (K_ACID)	247	2882.2	233.0	11324.0	1875.9
Potassium (Extractable) (K_NITRATE)	246	164.6	21.0	1030.0	103.3
Magnesium (MG_ACID)	247	1628.0	82.0	10535.0	1283.3
Magnesium (Extractable) (MG_NITRATE)	246	74.6	12.0	690.0	84.5
Manganese (MN_ACID)	247	343.9	17.0	1866.0	203.4
Manganese (Extractable) (MN_EDTA)	247	101.5	2.0	697.0	92.2
Molybdenum (MO_ACID)	62	0.5	0.0	4.3	0.8
Sodium (NA_ACID)	247	218.5	41.0	9159.0	580.1
Nickel (NI_ACID)	247	16.3	1.0	73.3	9.5
Nickel (Extractable) (NI_EDTA)	247	1.5	0.1	7.1	1.1
Phosphorus (P_ACID)	247	572.4	77.0	1742.0	241.9
Phosphorus (Extractable) (P_OLSEN)	246	37.1	4.0	185.0	25.7
Lead (PB_ACID)	247	26.4	3.0	365.0	29.0
Lead (Extractable) (PB_EDTA)	247	13.5	1.8	427.9	28.0
Selenium (SE_ACID)	62	0.5	0.0	2.9	0.5
Strontium (SR_ACID)	247	33.3	0.0	297.0	36.4
Vanadium (V_ACID)	64	30.8	4.7	97.4	20.3
Zinc (ZN_ACID)	247	52.4	7.0	208.0	24.1
Zinc (Extractable) (ZN_EDTA)	247	5.8	0.8	116.8	9.1

for units, see Analyses Denitions (p70)

c. National Analysis (5686 Sample Points)

ANALYSES	SAMPLES	MEAN	MIN	MAX	ST.DEV
pH (PH)	5630	6.0	3.1	9.2	1.3
Carbon (CARBON)	5672	6.1	0.1	61.5	8.9
Aluminium (AL_ACID)	5677	26775.3	491.0	79355.0	12772.2
Arsenic (AS_ACID)	2729	4.6	0.0	110.0	5.7
Barium (BA_ACID)	5677	150.0	7.0	3840.0	159.5
Calcium (CA_ACID)	5677	13768.7	0.0	339630.0	37785.0
Cadmium (CD_ACID)	5677	0.7	0.0	40.9	1.0
Cadmium (Extractable) (CD_EDTA)	5655	0.5	0.0	85.0	3.0
Cobalt (CO_ACID)	5677	10.6	0.0	567.0	13.7
Cobalt (Extractable) (CO_EDTA)	5655	1.1	0.0	26.5	1.2
Chromium (CR_ACID)	5677	38.9	0.0	2339.8	43.7
Copper (CU_ACID)	5677	22.6	0.0	1507.7	36.8
Copper (Extractable) (CU_EDTA)	5655	6.4	0.3	431.4	11.1
Fluoride (F_ACID)	3320	58.5	0.0	6307.9	186.2
Iron (FE_ACID)	5677	28147.8	395.0	264405.0	16510.5
Mercury (HG_ACID)	2159	0.1	0.0	2.4	0.2
Potassium (K_ACID)	5677	4727.7	60.0	23905.0	2700.2
Potassium (Extractable) (K_NITRATE)	5609	182.0	6.0	2776.0	151.6
Magnesium (MG_ACID)	5677	3648.1	0.0	62690.0	3284.1
Magnesium (Extractable) (MG_NITRATE)	5609	146.0	1.0	1601.0	147.5
Manganese (MN_ACID)	5677	777.0	3.0	42603.0	1068.8
Manganese (Extractable) (MN_EDTA)	5654	159.4	0.0	3108.0	188.6
Molybdenum (MO_ACID)	4417	0.9	0.0	56.3	2.0
Sodium (NA_ACID)	5677	323.3	17.0	25152.0	572.3
Nickel (NI_ACID)	5677	25.4	0.0	1350.2	29.2
Nickel (Extractable) (NI_EDTA)	5655	1.6	0.1	73.2	2.0
Phosphorus (P_ACID)	5677	792.1	41.0	6273.0	433.9
Phosphorus (Extractable) (P_OLSEN)	5604	27.4	0.0	534.0	25.5
Lead (PB_ACID)	5677	73.3	0.0	17365.0	280.6
Lead (Extractable) (PB_EDTA)	5655	27.8	1.2	6056.5	119.7
Selenium (SE_ACID)	2729	0.6	0.0	22.8	0.8
Strontium (SR_ACID)	5677	42.3	0.0	1445.0	67.8
Vanadium (V_ACID)	4428	41.0	0.0	854.4	33.9
Zinc (ZN_ACID)	5677	90.2	0.0	3648.0	104.4
Zinc (Extractable) (ZN_EDTA)	5655	9.6	0.5	712.0	24.6

for units, see Analyses Denitions (p70)

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	450
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

ANALYSES DEFINITIONS continued

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

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

ANALYSES DEFINITIONS continued

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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