



# Soil Site Report

## Environmental Report

## Sample Soil Report 1km

Easting: 482700

Northing: 254441

Site Area: 1km x 1km

Prepared for: Caroline Keay, Cranfield University

Date: 04 May 2017



## Citation

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## About this report

This Site Soil 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.

Provided that this Site Soil Report is not modified in any way, you may reproduce it for a third-party.

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# 1. Soil Thematic Maps

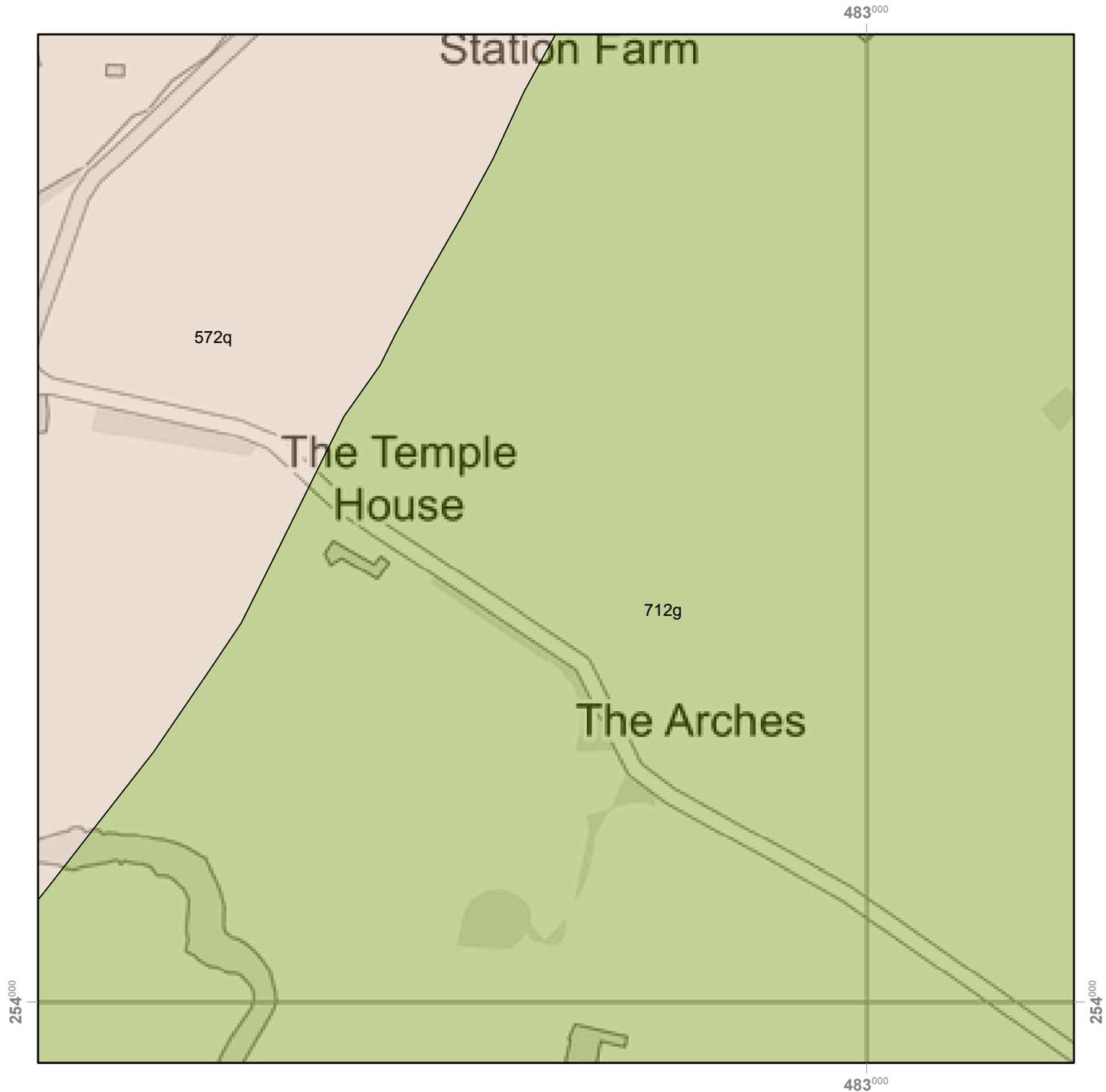
This section contains a series of maps of the area surrounding your selected location, presenting a number of themes relating to the characteristics of the soils. These provide an overview of the nature and condition of the local soil conditions. It is these conditions that may be used to infer the response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



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## Soils - Spatial Distribution Key



572q ASHLEY

*Fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging associated with similar but wetter soils.*



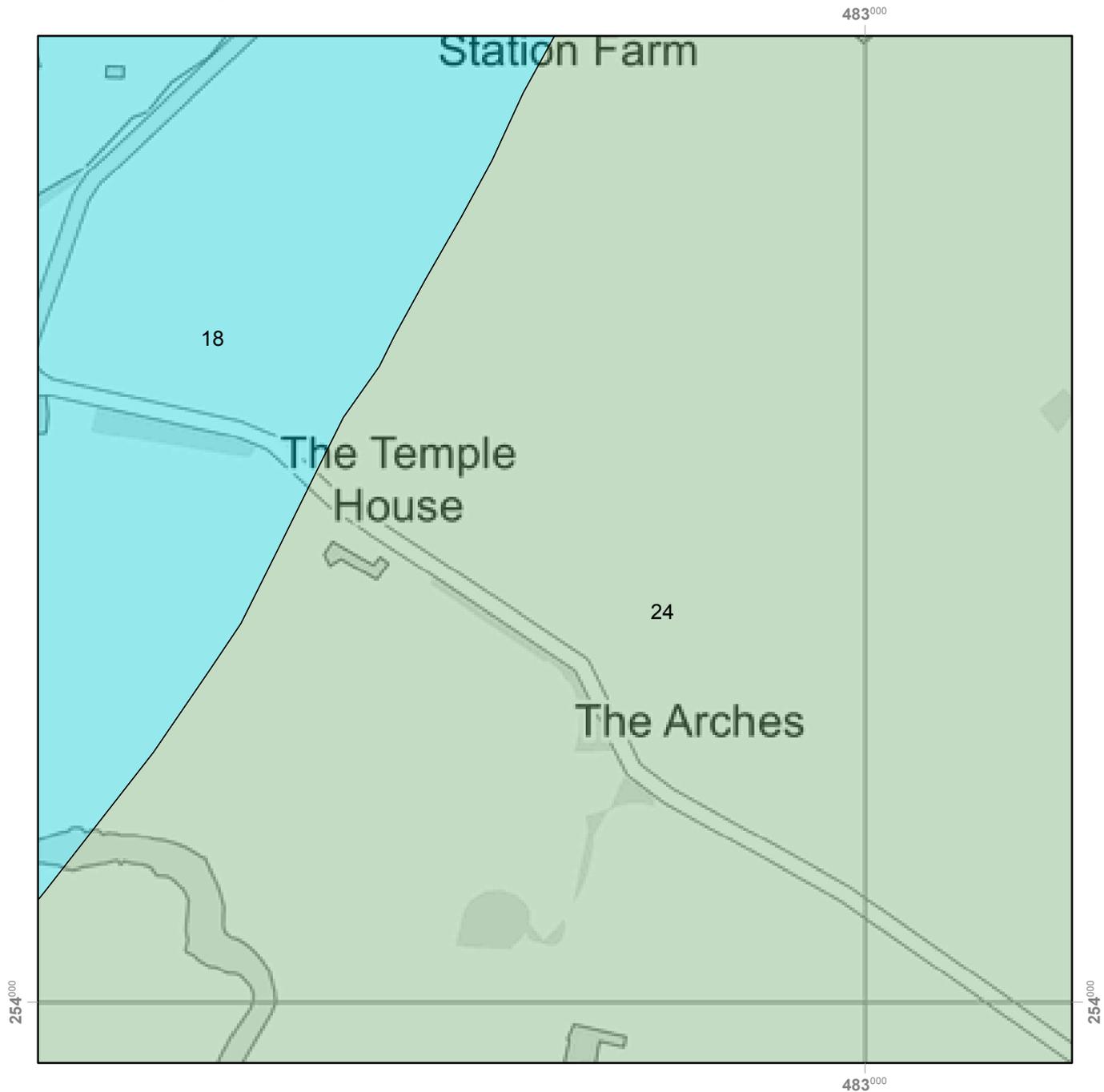
712g RAGDALE

*Slowly permeable seasonally waterlogged clayey and fine loamy over clayey soils.*

## 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)



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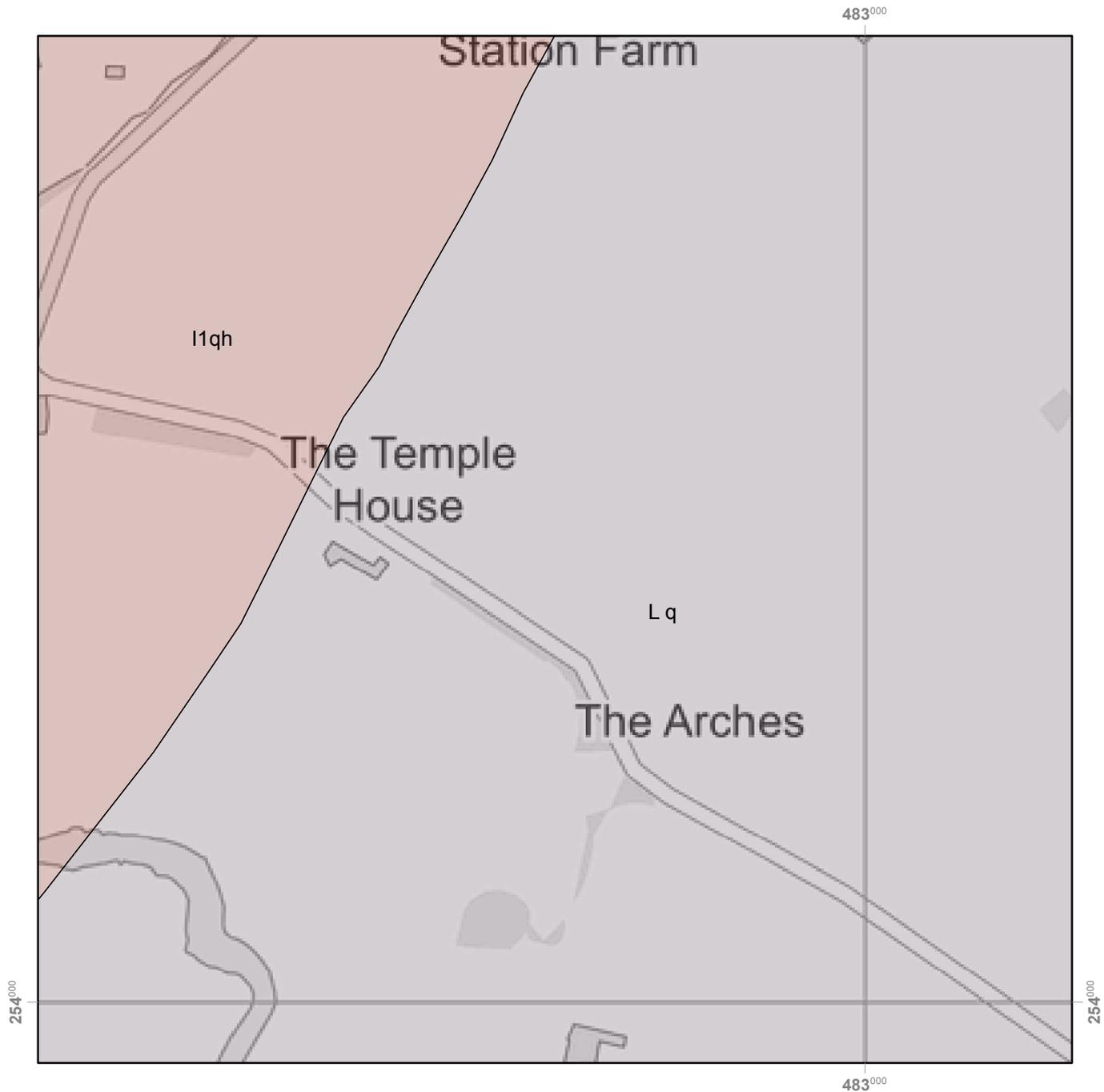
## Hydrology of Soil Type (HOST) Key

-  18 Slowly permeable soils with slight seasonal waterlogging and moderate storage capacity over slowly permeable substrates with negligible storage
  
-  24 Slowly permeable, seasonally waterlogged soils over slowly permeable substrates with negligible storage capacity

### 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 Pesticide Leaching Risk



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## Pesticide Leaching Risk Key

-  I1qh Slowly permeable soils with relatively high storage capacity over soft substrates of low or negligible storage capacity that sometimes conceal groundwater bearing rocks at depth
  
-  L q Impermeable soils over soft substrates of low or negligible storage capacity that sometimes conceal groundwater bearing rocks at depth

### PESTICIDE LEACHING CLASS DESCRIPTION

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

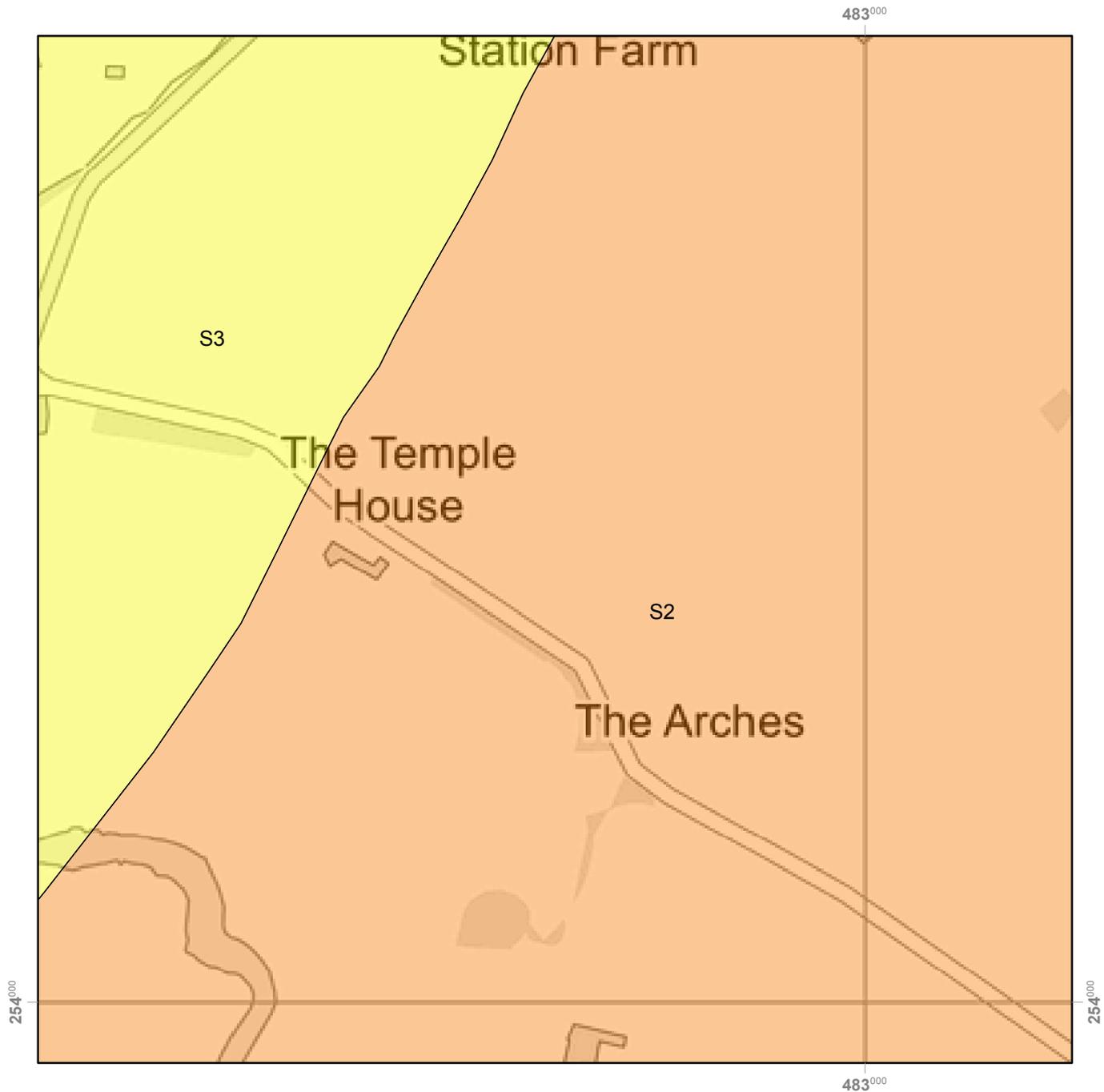
H - Soils of high leaching capacity with little ability to attenuate non-adsorbed pesticide leaching which leave underlying groundwater vulnerable to pesticide contamination.

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

L - Soils of low leaching capacity through which pesticides are unlikely to leach.

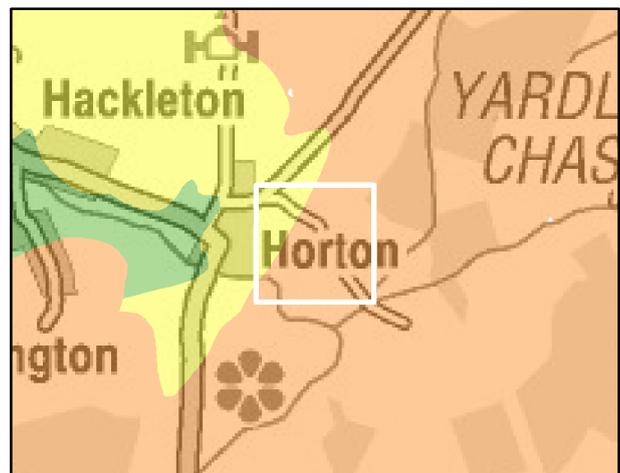
The primary classes have been further subdivided into nearly forty subclasses. These subclasses, with their descriptions, are mapped above. These classes do not account for differences in land cultivation, which can also have a significant impact on pesticide behaviour.

# 1d Pesticide Runoff Risk



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## Pesticide Runoff Risk Key



S2 High run-off potential.

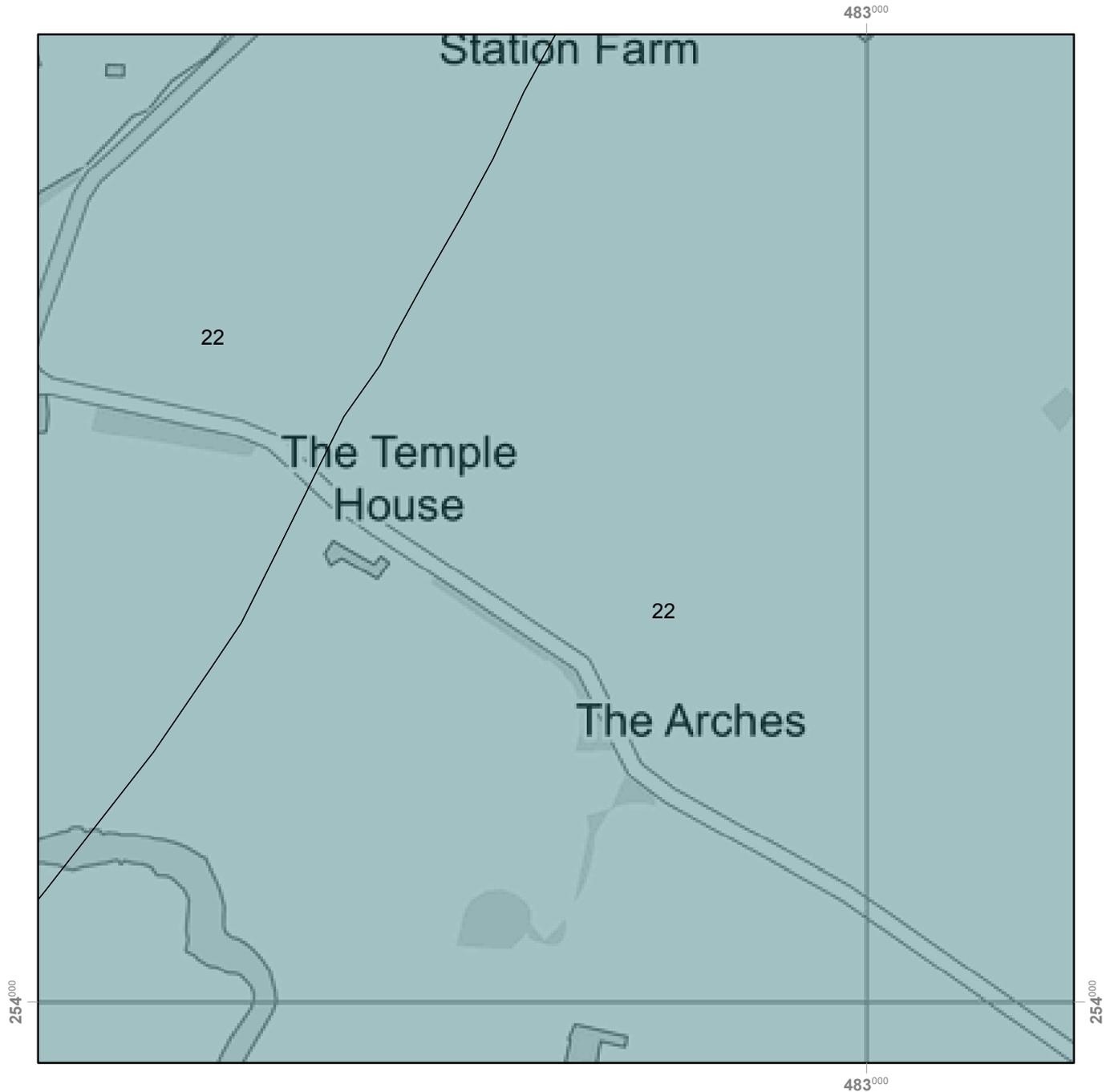


S3 Moderate run-off potential.

## PESTICIDE RUNOFF RISK DESCRIPTION

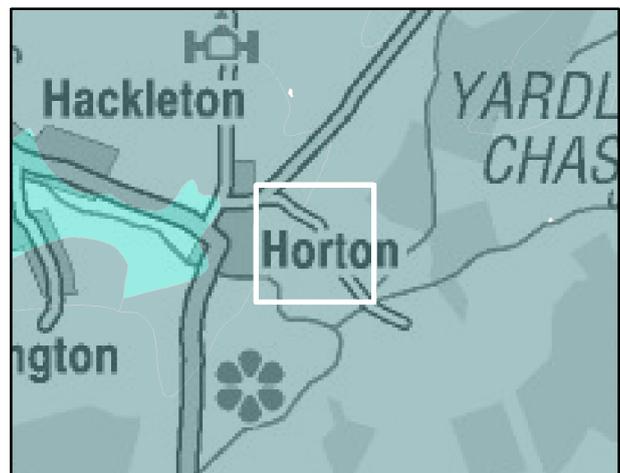
The physical properties and natural water regime of soils influence the speed and extent of lateral water movement over and through the soil at different depths (Hollis et al, 1995). As a result, soils can be classed according to the potential for pesticide run-off. Five runoff potential classes are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

# 1e Hydrogeological Rock Type



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## Hydrogeological Rock Type Key

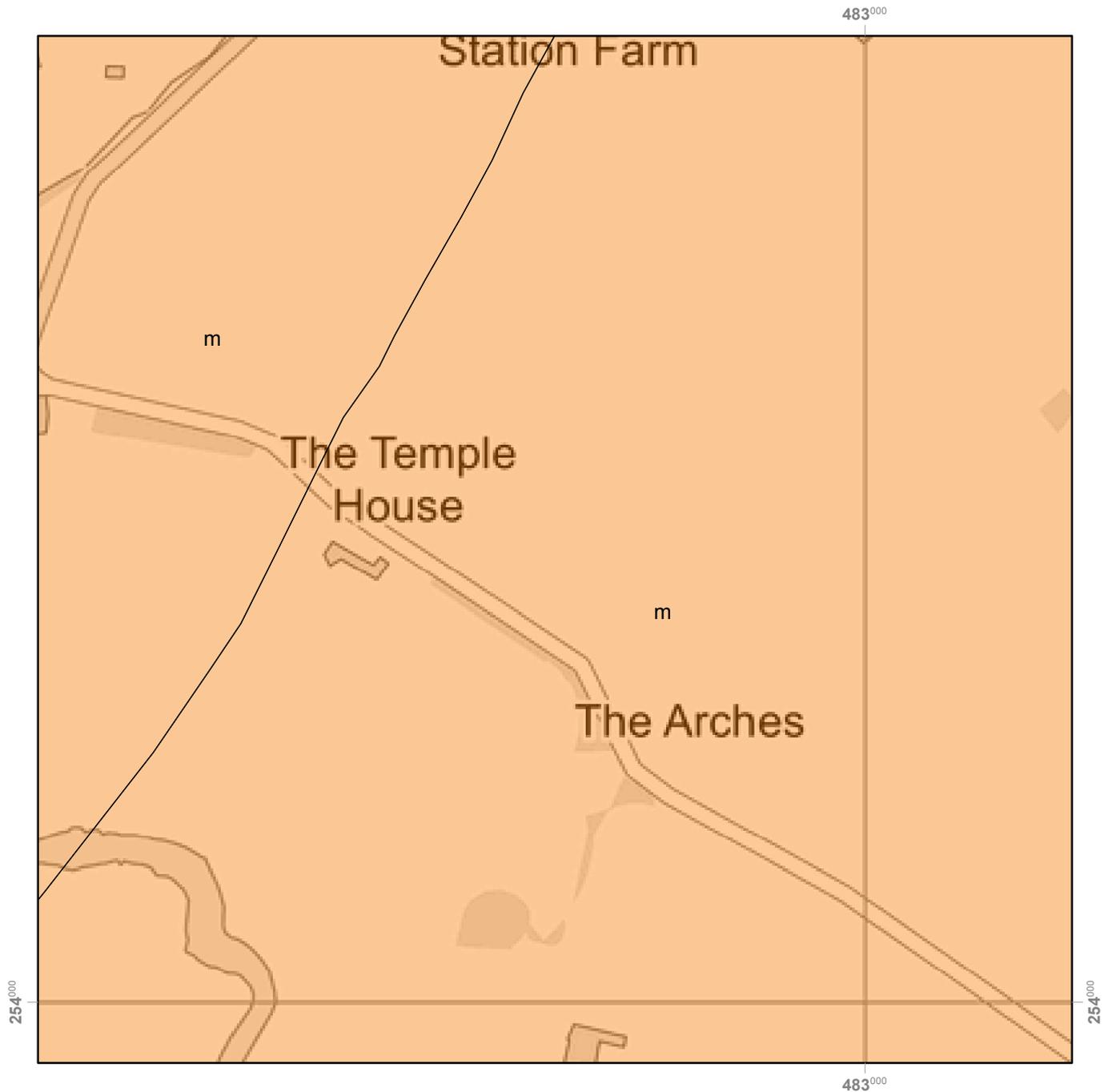


22 till and compact Head

### HYDROGEOLOGICAL ROCK TYPE DESCRIPTION

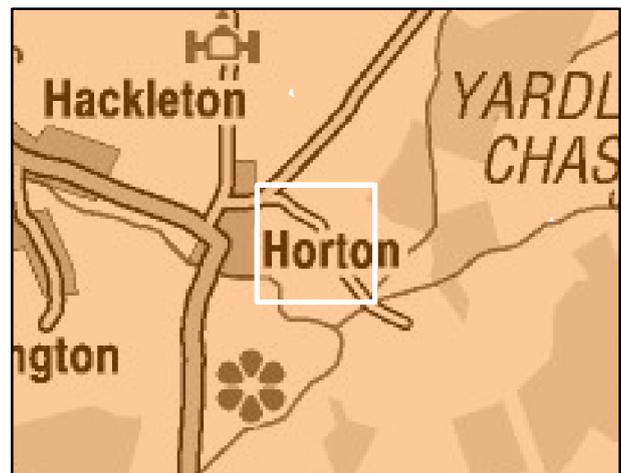
The hydrogeological classification of the soil parent materials provides a framework for distinguishing between soil substrates according to their general permeability and whether they are likely to overlie an aquifer. Every soil series has been assigned one of the 32 substrate classes and each of these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

# 1f Potential for Pesticide Adsorption



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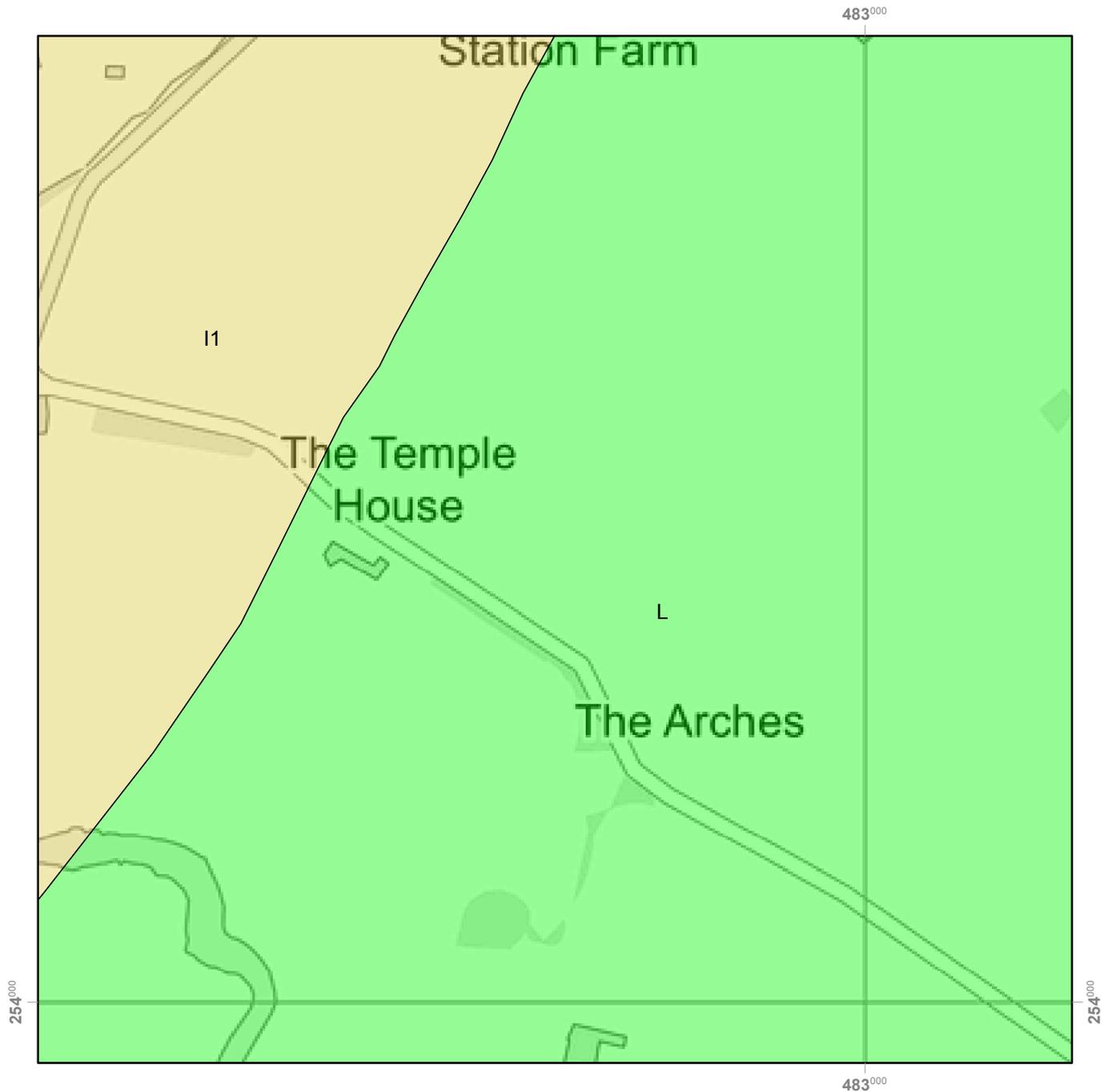
## Potential for Pesticide Adsorption Key

 m Moderate adsorption potential.

### POTENTIAL FOR PESTICIDE ADSORPTION DESCRIPTION

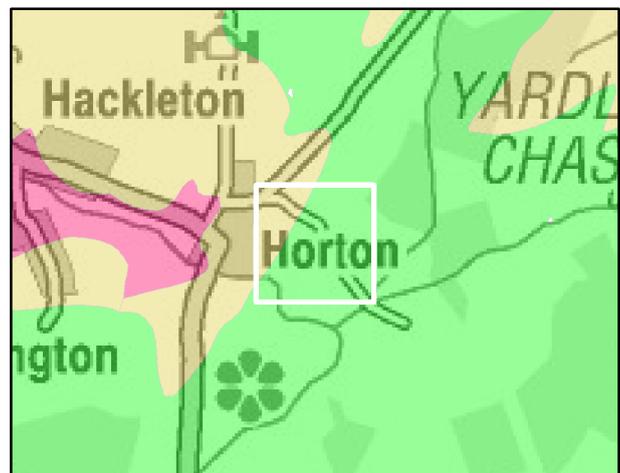
The physical properties and natural water regime of soils influence the speed and extent of lateral water movement over and through the soil at different depths (Hollis et al, 1995). The mineral soil classes are further subdivided according to their potential for pesticide adsorption.

# 1g Ground Water Protection Policy (GWPP)



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## Ground Water Protection Policy (GWPP) Key

-  I1 Soils of intermediate leaching potential which have a moderate ability to attenuate a wide range of diffuse source pollutants but in which it is possible that some non-adsorbed diffuse source pollutants and liquid discharges could penetrate the soil layer
  
-  L Soils in which pollutants are unlikely to penetrate the soil layer either because water movement is largely horizontal or because they have a large ability to attenuate diffuse source pollutants

### GWPP LEACHING CLASS DESCRIPTION

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

## 2. Soil Association Descriptions

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

-  **ASHLEY 572q**  
*Fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging associated with similar but wetter soils.*
-  **RAGDALE 712g**  
*Slowly permeable seasonally waterlogged clayey and fine loamy over clayey soils.*

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

## ASHLEY (572q)

*Fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging associated with similar but wetter soils.*

### a. General Description

Fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging associated with similar but wetter soils. Some calcareous and non-calcareous slowly permeable clayey soils.

The major landuse on this association is defined as Winter cereals and some short term grassland; some sugar beet in the Eastern Region.

### b. Distribution (England and Wales)

The ASHLEY association covers 471 km<sup>2</sup> of England and Wales which accounts for 0.31% 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.

### c. Comprising Soil Series

Multiple soil series comprise a soil association. The soil series of the ASHLEY 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 occurring in your site in Table 1.

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

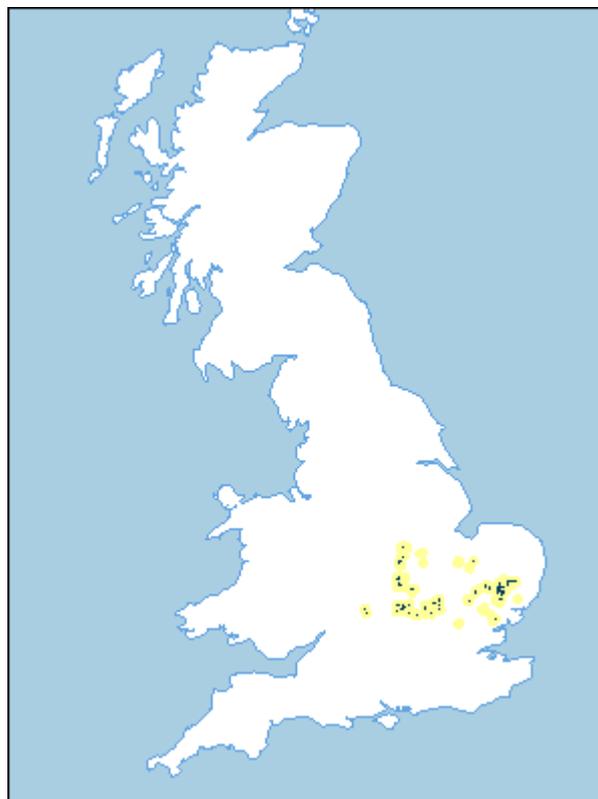


Figure 2: Association Distribution

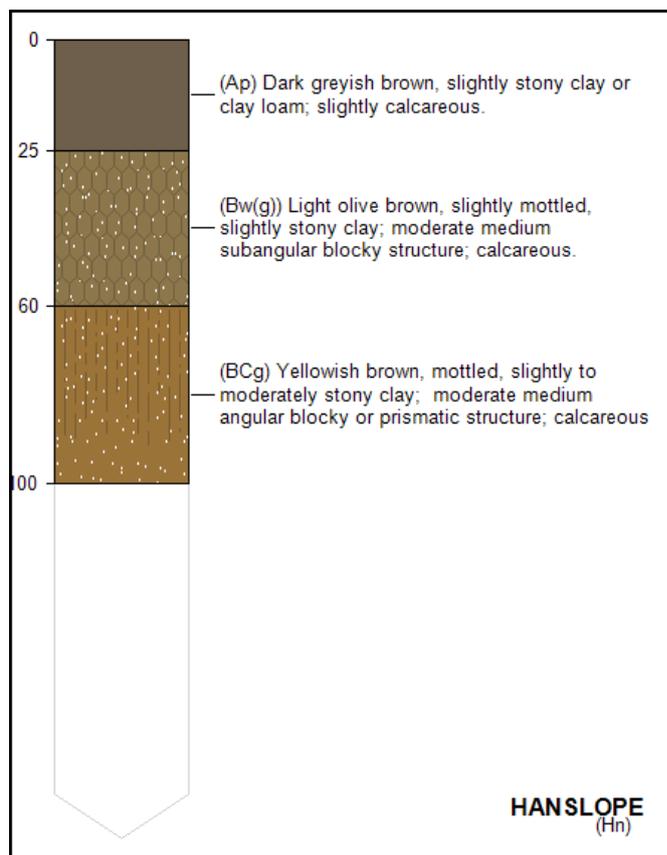
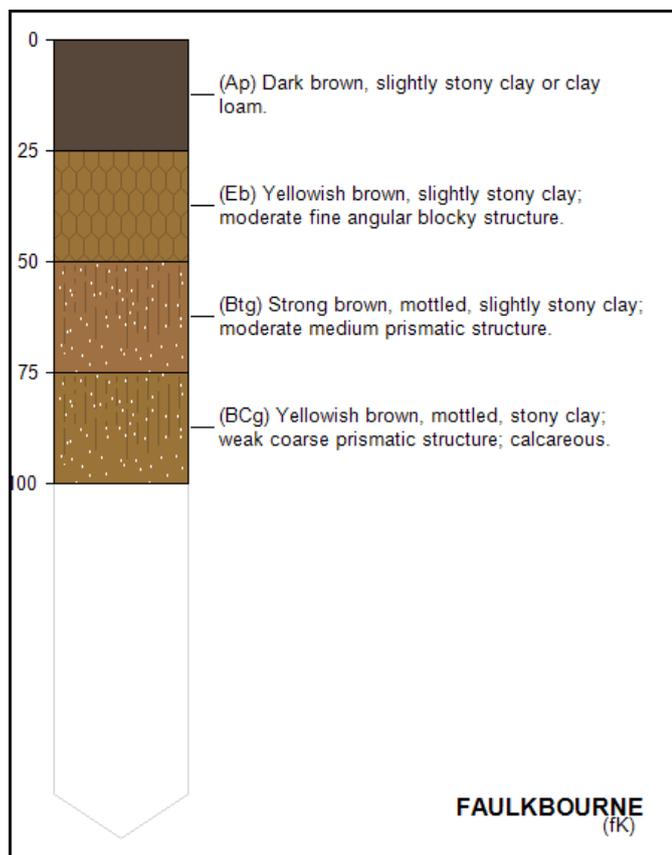
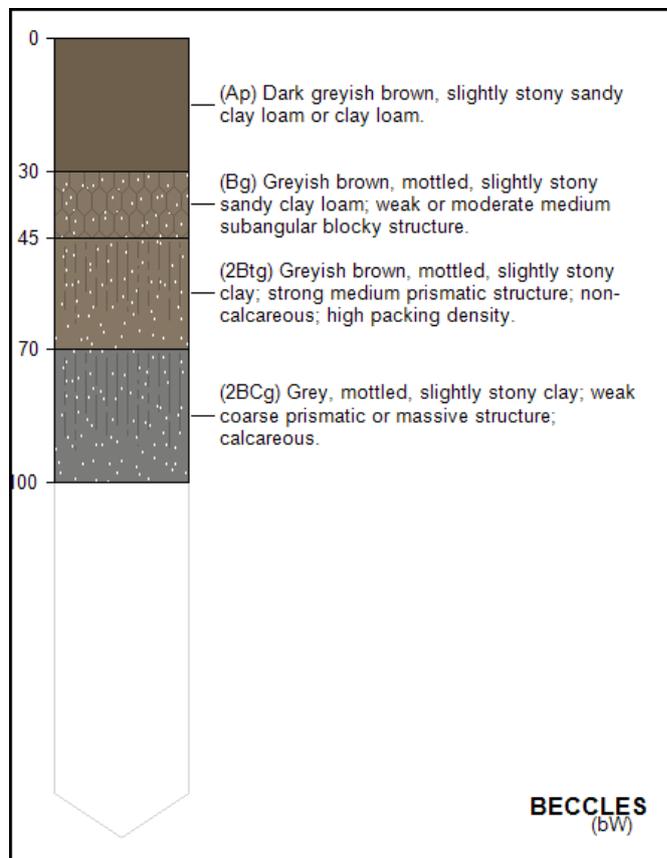
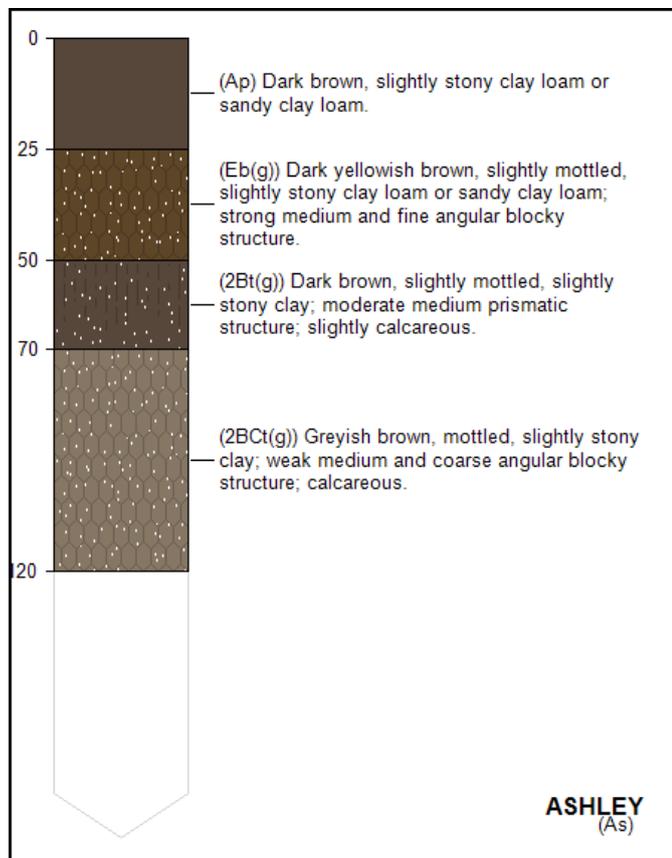
**Table 1: The component soil series of the ASHLEY soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.**

| Soil Series     | Description                           | Area % |
|-----------------|---------------------------------------|--------|
| ASHLEY (As)     | medium loamy over clayey chalky drift | 55%    |
| BECCLES (bW)    | medium loamy over clayey chalky drift | 10%    |
| FAULKBORNE (fK) | clayey chalky drift                   | 10%    |
| HANSLOPE (Hn)   | clayey chalky drift                   | 10%    |
| OTHER           | other minor soils                     | 15%    |

## ASHLEY (572q)

*Fine loamy over clayey soils with slowly permeable subsoils and slight seasonal waterlogging associated with similar but wetter soils.*

### d. ASHLEY Component Series Profiles



## RAGDALE (712g)

*Slowly permeable seasonally waterlogged clayey and fine loamy over clayey soils.*

### a. General Description

Slowly permeable seasonally waterlogged clayey and fine loamy over clayey soils. Some slowly permeable calcareous clayey soils especially on slopes.

The major landuse on this association is defined as Winter cereals in the Eastern Region; more stock rearing and dairying in the Midlands.

### b. Distribution (England and Wales)

The RAGDALE association covers 1291 km<sup>2</sup> of England and Wales which accounts for 0.85% 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 RAGDALE 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 occurring 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.

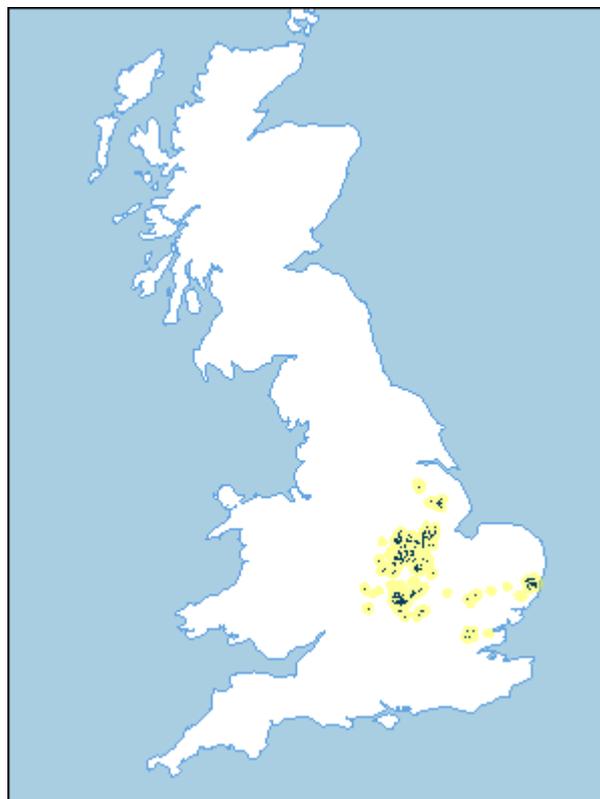


Figure 3: Association Distribution

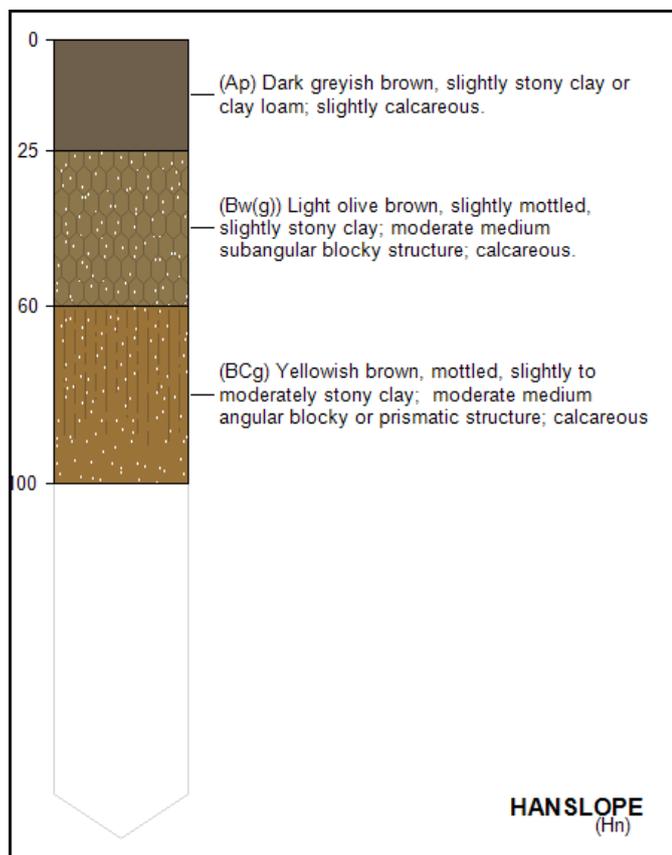
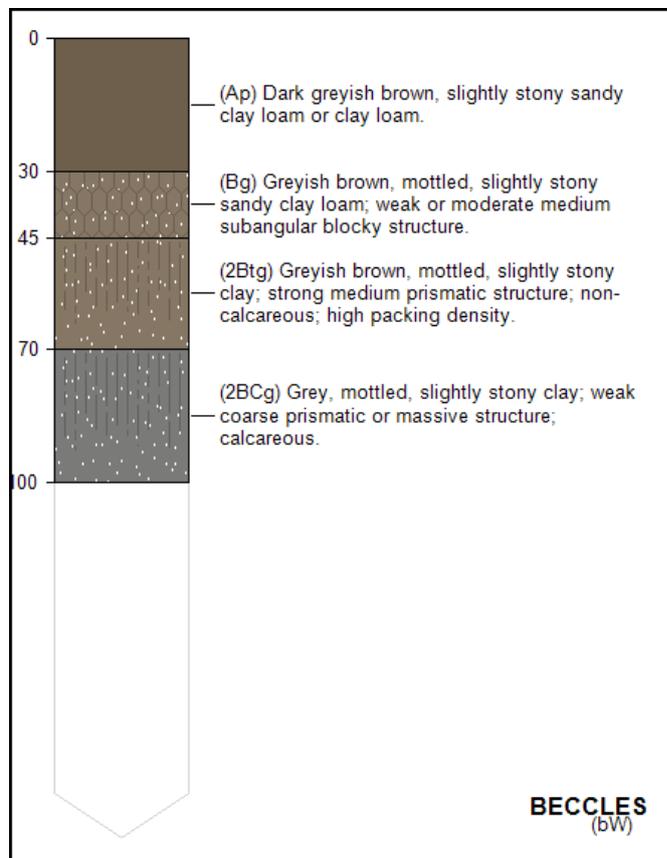
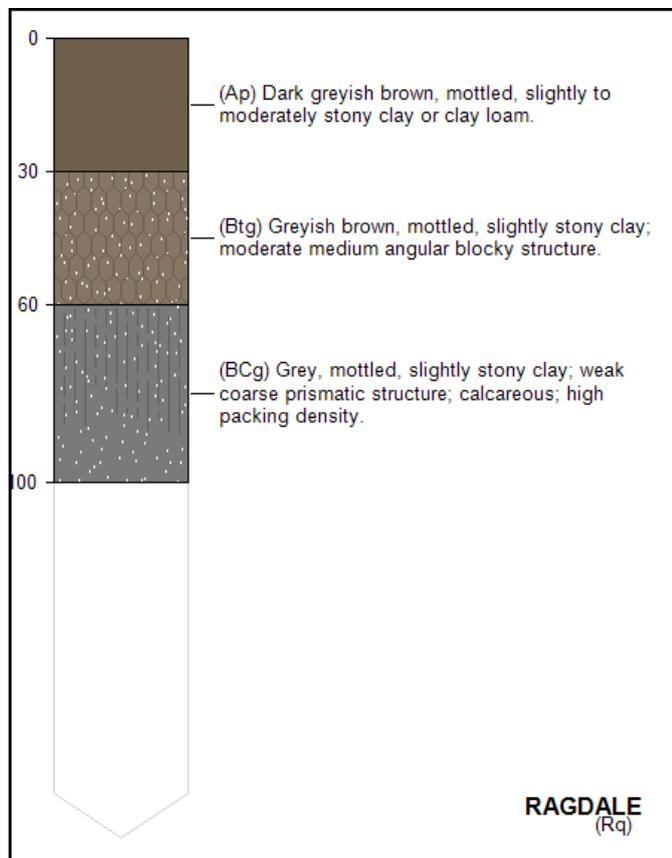
Table 2: The component soil series of the RAGDALE soil association. Because absolute proportions of the comprising series in this association vary from location to location, the national proportions are provided.

| Soil Series   | Description                           | Area % |
|---------------|---------------------------------------|--------|
| RAGDALE (Rq)  | clayey chalky drift                   | 40%    |
| BECCLES (bW)  | medium loamy over clayey chalky drift | 30%    |
| HANSLOPE (Hn) | clayey chalky drift                   | 20%    |
| OTHER         | other minor soils                     | 10%    |

## RAGDALE (712g)

*Slowly permeable seasonally waterlogged clayey and fine loamy over clayey soils.*

### d. RAGDALE Component Series Profiles



## 3. Soil Series Properties

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

|                         |                                       |
|-------------------------|---------------------------------------|
| <b>ASHLEY (As)</b>      | medium loamy over clayey chalky drift |
| <b>BECCLES (bW)</b>     | medium loamy over clayey chalky drift |
| <b>FAULKBOURNE (fK)</b> | clayey chalky drift                   |
| <b>HANSLOPE (Hn)</b>    | clayey chalky drift                   |
| <b>RAGDALE (Rq)</b>     | clayey chalky drift                   |

## 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

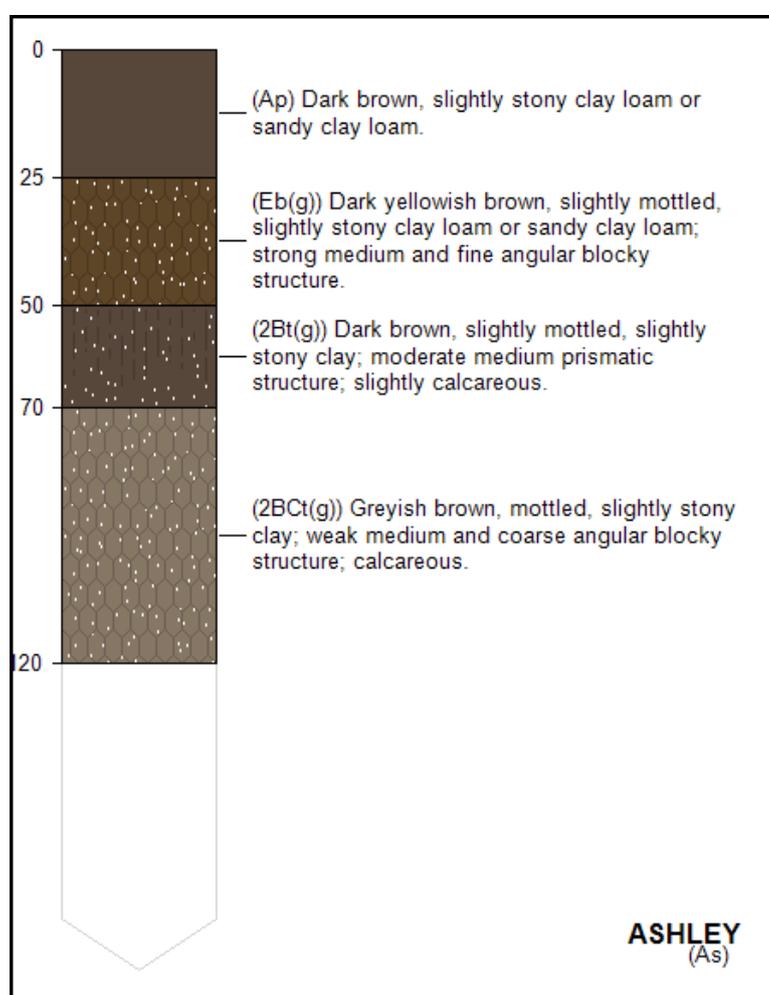
### **AP\_POT (Available water for potatoes (mm))**

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

## 5.72 ASHLEY (As) (25)

|                          |                                      |  |
|--------------------------|--------------------------------------|--|
| <b>Major soil group:</b> | 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.O.D. Most are in agricultural use. |
| <b>Soil group:</b>       | 7 argillic brown earths              | Loamy or clayey with an ordinary clay-enriched subsoil.  |
| <b>Soil Subgroup:</b>    | 2 stagnogleyic argillic brown earths | (faintly mottled with slowly permeable subsoil)  |
| <b>Soil Series:</b>      | 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   |

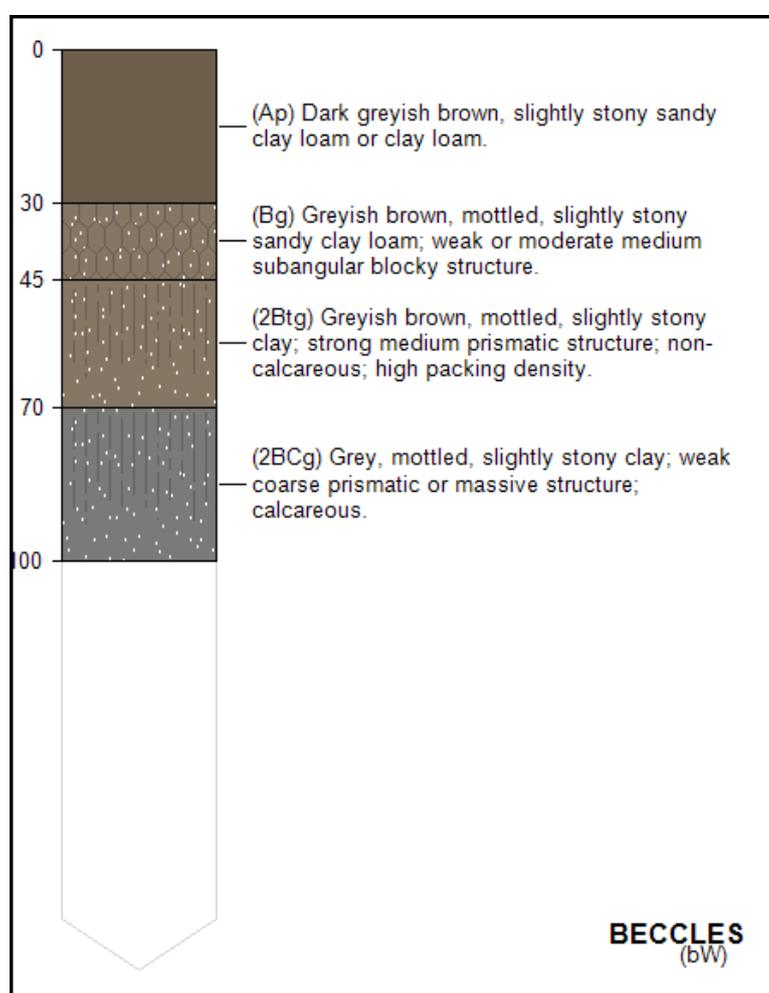


\* not present within 150cm

## 7.11 BECCLES (bW) (112)

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

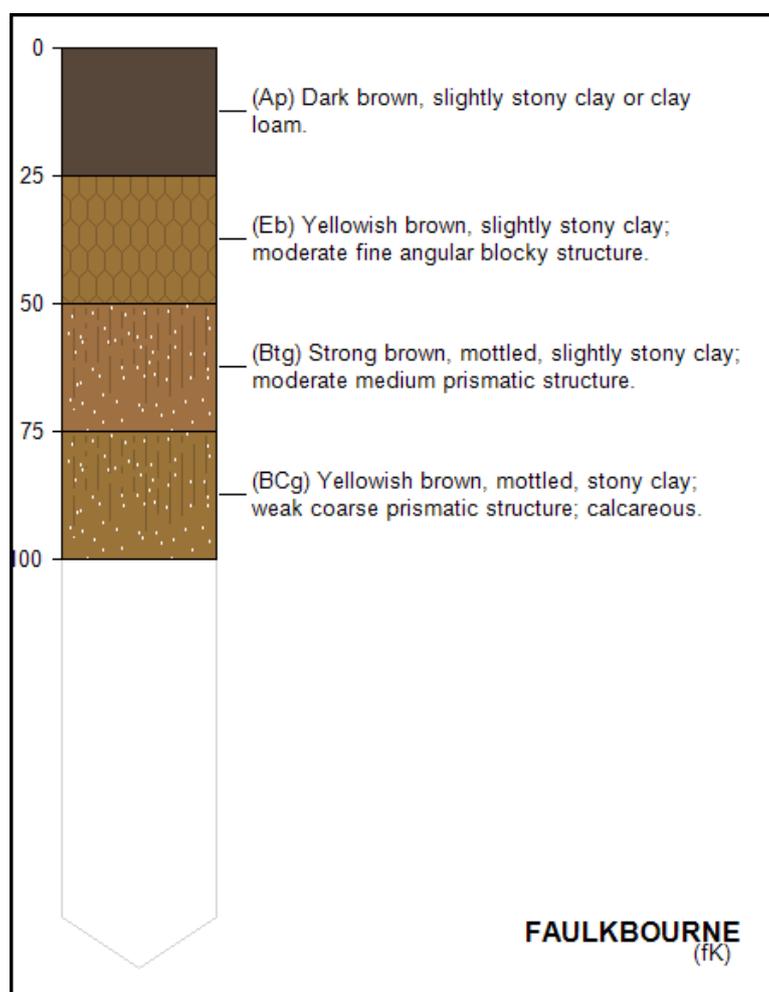


\* not present within 150cm

## 4.31 FAULKBOURNE (fK) (525)

|                          |                             |   |
|--------------------------|-----------------------------|---|
| <b>Major soil group:</b> | 04 pelosols                 | Non-alluvial clayey soils that crack deeply in dry seasons, but are slowly permeable when wet. They have a coarse blocky or prismatic structure and no prominently mottled non-calcareous subsurface horizons within 40 cm depth. |
| <b>Soil group:</b>       | 3 argillic pelosols         | With a clay-enriched subsurface horizon.  |
| <b>Soil Subgroup:</b>    | 1 typical argillic pelosols | (Not subdivided below group level)  |
| <b>Soil Series:</b>      | Faulkbourne series          | clayey chalky drift   |

| Property  | Value |
|---|-------|
| Depth to rock (cm)  | n/a*  |
| Depth to gleying (cm)                                       | 60    |
| Depth to slowly permeable layer (downward percolation) (cm) | 41    |
| Depth to slowly permeable layer (upward diffusion) (cm)     | 41    |
| Integrated air capacity (IAC) (mm)                          | 65    |
| Standard percentage runoff (SPR) (%)                        | 47    |
| Base flow index (BFI) (0 to 1)                              | 0.34  |
| Available water (AWC) (mm)                                  | 125   |
| Available water for grass (mm)                              | 115   |
| Available water for cereal (mm)                             | 115   |
| Available water for sugar (mm)                              | 140   |
| Available water for potatoes (mm)                           | 95    |

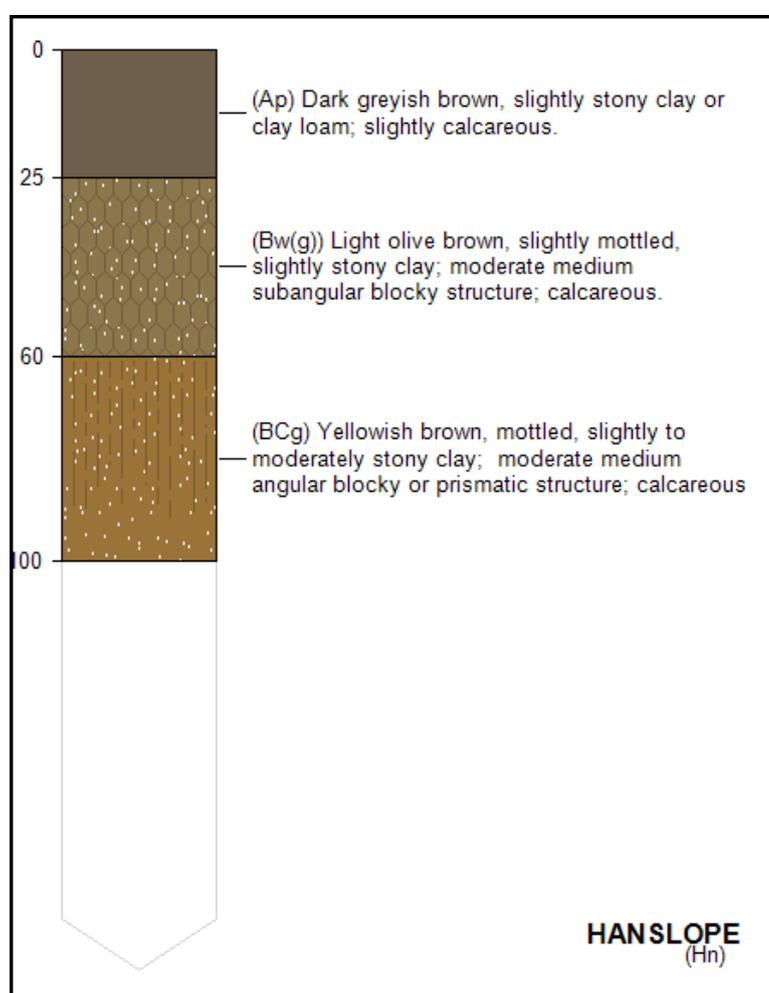


\* not present within 150cm

## 4.11 HANSLOPE (Hn) (707)

|                          |                               |   |
|--------------------------|-------------------------------|---|
| <b>Major soil group:</b> | 04 pelosols                   | Non-alluvial clayey soils that crack deeply in dry seasons, but are slowly permeable when wet. They have a coarse blocky or prismatic structure and no prominently mottled non-calcareous subsurface horizons within 40 cm depth. |
| <b>Soil group:</b>       | 1 calcareous pelosols         | With calcareous subsoil and no clay-enriched subsurface horizon.  |
| <b>Soil Subgroup:</b>    | 1 typical calcareous pelosols | (Not subdivided below group level)  |
| <b>Soil Series:</b>      | Hanslope series               | clayey chalky drift   |

| Property  | Value |
|---|-------|
| Depth to rock (cm)  | n/a*  |
| Depth to gleying (cm)                                       | 60    |
| Depth to slowly permeable layer (downward percolation) (cm) | 21    |
| Depth to slowly permeable layer (upward diffusion) (cm)     | 21    |
| Integrated air capacity (IAC) (mm)                          | 59    |
| Standard percentage runoff (SPR) (%)                        | 47    |
| Base flow index (BFI) (0 to 1)                              | 0.34  |
| Available water (AWC) (mm)                                  | 125   |
| Available water for grass (mm)                              | 115   |
| Available water for cereal (mm)                             | 115   |
| Available water for sugar (mm)                              | 140   |
| Available water for potatoes (mm)                           | 95    |

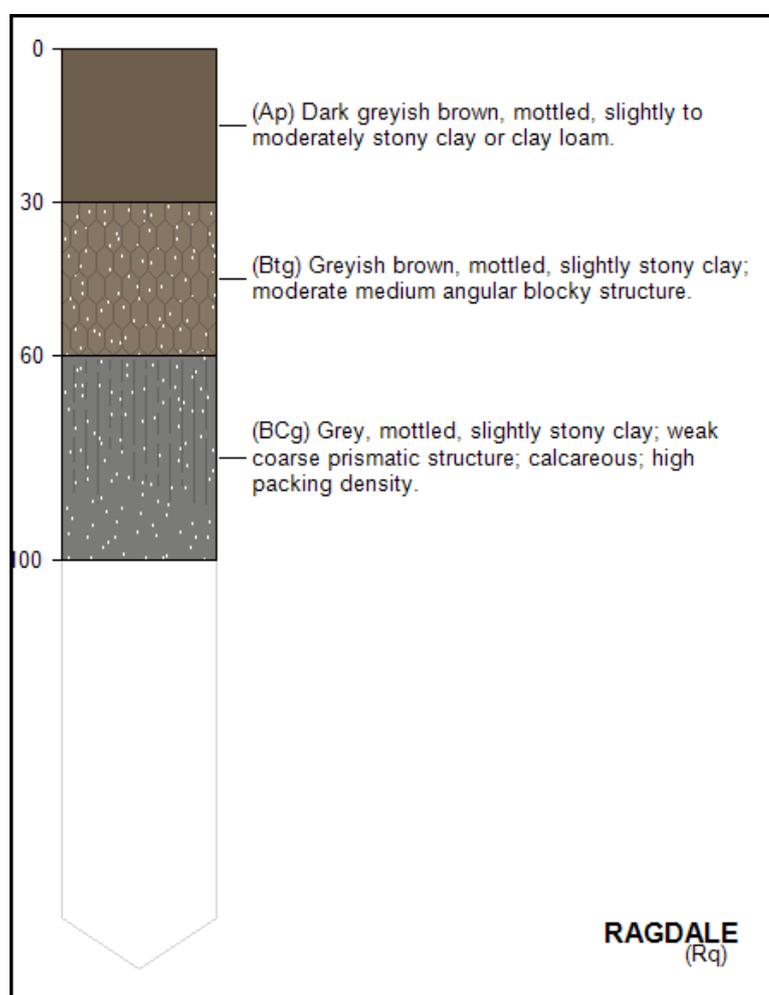


\* not present within 150cm

## 7.12 RAGDALE (Rq) (1702)

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

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