A66 Northern Trans-Pennine Project
TR010062

3.4 Environmental Statement Appendix 9.5 Agricultural Land Classification (ALC) Factual Soil Survey Report

APFP Regulations 5(2)(a)

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A66 Northern Trans-Pennine Project Development Consent Order 202x

3.4 ENVIRONMENTAL STATEMENT APPENDIX 9.5 AGRICULTURAL LAND CLASSIFICATION (ALC) FACTUAL SOIL SURVEY REPORT

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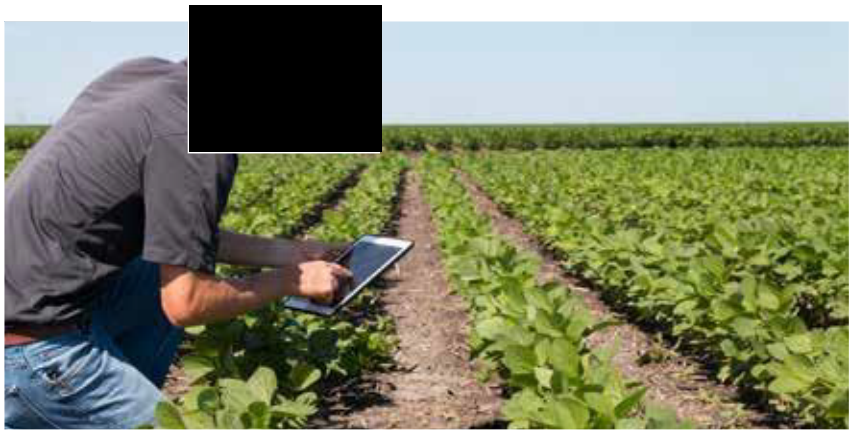
9.5 Agricultural Land Classification Report

National Highways



A66 Northern Trans-Pennine

PEIR - 10. Agricultural Land Classification

Date

ADAS

ADAS GENERAL NOTES

Project No.: [Project Number-Report Number (Issue No.)] i.e. 12345-1 (00)

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Date:		Date:	

Executive Summary

ADAS was instructed by Amey in consultation with Structural Soils Ltd to undertake an Agricultural Land Classification (ALC) survey on the land take for seven proposed road improvement schemes to the A66 between the M6 Junction 40 in the west to Carkin Moor in the east. The survey work was carried out in February and March 2022. Summaries of the survey results for each scheme are given below.

M6 Junction 40 to Kemplay Bank

Well drained sandy and loamy soils were found across the scheme. Climate limited land quality to respectively subgrade 3a in the west and grade 2 in the east of the scheme. The areas (percentages) recorded of grade 2, grade 3a and urban land were respectively 11.2ha (20%), 3.0ha (6%) and 31.1ha (57%) with 7.8ha (14%) not surveyed. Considered as a percentage of the agricultural land surveyed for this scheme grade 2 and subgrade 3a land represented respectively 79% and 21% of this area.

Penrith to Temple Sowerby

The soils across this scheme are predominantly well drained sandy soils except for occasional locations where the drainage is imperfect due to a higher clay content. The land across the scheme is predominantly grade 2 due to an overall climatic limitation with occasional locations down graded to subgrade 3a because of a soil wetness or droughtiness limitation. The areas (percentages) recorded of grade 2, subgrade 3a, non-agricultural and urban land were respectively 86.8ha (64%), 9.8ha (7%), 3.3ha (2%) and 21.7ha (16%) with 15.2ha (11%) not surveyed. Considered as a percentage of the agricultural land surveyed for this scheme grade 2 and subgrade 3a land represented respectively 90% and 10% of this area.

Temple Sowerby to Appleby

The soils across this scheme vary from predominantly well drained sandy soils in the west to imperfectly or poorly drained loamy and clayey soils in the centre and east of the scheme. Climate limits land to respectively grade 2 and subgrade 3a on the western and eastern parts of the scheme. Land is predominantly grade 2 on the western side with the sandy soils and subgrade 3b on the eastern side with clayey soils and a mix of grade 2, subgrades 3a and subgrade 3b in the centre. The areas (percentages) recorded of grade 2, subgrade 3a, subgrade 3b, non-agricultural and urban land were respectively 75.8 (31%), 47.7ha (20%), 58.8ha (24%), 7.5ha (3%) and 32.0ha (13%) with 22.7ha (9%) not surveyed. Considered as a percentage of the agricultural land surveyed for this scheme grade 2, subgrade 3a, subgrade 3b and grade 4 land represented respectively 42%, 26%, 32% and <1% of this area.

Appleby to Brough

The soils across this scheme were found to be very variable ranging from sandy to clayey resulting in drainage status's of well drained, imperfectly drained and poorly drained. Climate limited grade to subgrade 3a in the west and centre and subgrade 3b towards the east of the scheme. Depending on the degree of wetness limitation, land along the scheme is classified as subgrade 3a, subgrade 3b and grade 4 because of wetness. Gradient limits land to grade 4 in some areas and flooding/very poor drainage limits land to grade 5 in a few locations. The areas (percentages) recorded of subgrade 3a, subgrade 3b, grade 4, grade 5, non-agricultural and urban land were respectively 63.9ha (29%), 67.4ha (31%), 28.5ha (13%), 6.0ha (3%), 18.2ha (8%) and 32.0 ha (15%) with 14.7ha (7%) not surveyed. Considered as a percentage of the agricultural land surveyed for this scheme subgrade 3a, subgrade 3b, grade 4 and grade 5 land represented respectively 39%, 41%, 17% and 4% of this area.

Bowes Bypass

An overall climatic limitation limited the land to subgrade 3b quality across this scheme. The soils are loamy over clayey so soil wetness is also a limitation. The areas (percentages) recorded of subgrade 3b and urban land were respectively 37.5ha (64%) and 21.3ha (36%). Considered as a percentage of the agricultural land surveyed for this scheme subgrade 3b represented 100% of this area.

Cross Lanes to Rokeby

Only a limited number of locations were surveyed across this scheme and all but one of the surveyed locations were at the west of the scheme. The soils for the locations surveyed are loamy over clayey with poor drainage. Wetness limited the land to subgrade 3b. The areas (percentages) recorded of subgrade 3b and urban land were respectively 7.2ha (8%) and 17.8ha (21%) with 60.3ha (71%) not surveyed. Considered as a percentage of the agricultural land surveyed for this scheme subgrade 3b represented 100% of this area.

Stephen Bank to Carkin Moor

Typically soils along this scheme are loamy or clayey topsoils over clayey subsoils with imperfect or poor drainage. Soil wetness limited land to subgrade 3a, subgrade 3b or grade 4 quality. The areas (percentages) recorded of subgrade 3a, subgrade 3b, grade 4, non-agricultural and urban land were respectively 8.0ha (7%), 56.9ha (47%), 24.8ha (21%), 6.6ha (6%) and 21.5ha (18%) with 2.1ha (2%) not surveyed. Considered as a percentage of the agricultural land surveyed for this scheme subgrade 3a, subgrade 3b and grade 4 represented respectively 9%, 63% and 28% of this area.

Summary

The agricultural land land quality varied from predominantly grade 2 (very good) west from the centre of the Temple Sowerby to Appleby scheme and predominantly subgrade 3b (moderate quality) east of the centre of this scheme. Across all schemes the areas (percentages) recorded of grade 2, subgrade 3a, subgrade 3b, grade 4, grade 5, non-agricultural and urban land were respectively 173.8 (19%), 132.4ha (14%), 227.8ha (25%), 53.7ha (6%), 6.0ha (1%), 37.4ha (4%) and 166.4ha (18%) with 122.8ha (13%) not surveyed. Climate precluded any land from being classified as grade 1 (excellent). The land recorded as urban is predominantly existing roads. Considered as a percentage of the agricultural land surveyed for all the schemes grade 2, subgrade 3a, subgrade 3b, grade 4 and grade 5 land represented respectively 29%, 22%, 38%, 9% and <1% of this area.

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APPENDICES

1 Introduction

1.1 Background

The Project comprises the improvement of the A66 between the M6 at Penrith and the A1(M) at Scotch Corner, comprising of the following eight individual schemes:

M6 Junction 40 to Kemplay Bank
Penrith to Temple Sowerby
Temple Sowerby to Appleby
Appleby to Brough
Bowes Bypass
Cross Lanes to Rokeby
Stephen Bank to Carkin Moor
A1(M) Junction 53 Scotch Corner.

ADAS were instructed by Amey in consultation with Structural Soils Ltd to undertake an agricultural land classification survey. This report provides information on the soils and agricultural quality of the seven schemes of the A66 Northern Trans-Pennine upgrade project requiring land take. The report is based on a soil survey of the land undertaken during February and March 2022.

The ALC was devised and introduced in the 1960s and Technical Report 11 (MAFF,1966) outlined the national system, which forms the basis for advice given by the then Ministry of Agriculture, Fisheries and Food (MAFF) and Welsh Office Agriculture Department (WOAD) on land use planning matters. Following a review of the system, criteria for the sub-division of Grade 3 into Subgrade 3a (good quality agricultural land) and Subgrade 3b (moderate quality agricultural land) were published in Technical Report 11/1 (MAFF,1976). The classification is well established and understood in the planning system and provides an appropriate framework for determining the physical quality of the land at national, regional and local levels as most recently described in the second edition of the Natural England Technical Information Note TIN049 (December 2012).

The report is divided into a number of sections with brief overarching descriptions of the surface and underlying solid geology as well as the likely soil types present using the National Soils Map, a classification showing geographic soil associations identified by both the most frequently occurring soil series and by combinations of ancillary series.

The 'Geology and Soils' desk study has previously identified and characterised the schemes in terms of the likely soil associations present. This report draws from that study to include a brief reference to any existing information which is then followed by details of the field soil survey work carried out including a brief description of the soils in each scheme. This then allows allocation to the relevant grades.

1.2 Site Environment

The A66 Northern Trans-Pennine upgrade project entails the realignment or widening of eight sections of the A66 between Penrith and Scotch Corner. This report describes the soil and land quality ascertained by field soil survey work carried out during February and March 2022.

1.3 Agricultural Use

The land affected by the project is predominantly cropped with grass with small areas of arable cropping. The schemes are described from the west to east. The

western schemes are at lower altitudes with consequent better climate. The agricultural land on these schemes tends to have greater versatility and any areas of cropping are in the western schemes. Those schemes towards the centre and east of the project tend towards higher altitude land with consequent wetter and cooler climate which favours grass production only and at times borders moorland (Appleby to Brough). Heavier soils impact drainage and alongside microrelief and slope tend to reduce cropping versatility and possibilities of growing a wider variety of crops.

1.4 Geology

The 1:50,000 scale BGS[1] geology maps of the area show that the sites are underlain by Stainmore Formation in the west of the project, the M6 Junction 40 to Kemplay Bank scheme, and in the Bowes Bypass scheme as far east as the junction with the A67. This Carboniferous deposit consists of sandstones, siltstones and mudstones and is overlain by a Glacial Till in which the soils have formed.

The Penrith Sandstone deposit lies to the east of Kemplay Bank roundabout in M6 Junction 40 to Kemplay Bank scheme as well as throughout the Penrith to Temple Sowerby, Temple Sowerby to Appleby and Appleby to Brough schemes. These Permian deposits consist of sedimentary and wind blow sands; they are overlain by Glacial Till with some glaciofluvial sands and gravels on the sides of valleys and Alluvium on valley floors.

The Yordale Group limestones occur in Bowes Bypass scheme to the east of Bowes as bands of Great Limestone, Alston Formation Limestone and Four Fathoms Limestone and throughout the Cross Lanes to Rokeby and Stephen Bank to Carkin Moor schemes as Great Limestone and Alston Formation Sandstone. This group consists of limestones, sandstones and mudstones deposited in the Carboniferous Period; they occur at the surface in the west of Cross Lanes to Rokeby scheme and are underlain by Glacial Till in the east. In Stephen Bank to Carkin Moor scheme the solid geology is predominantly covered by Glacial Till but there are isolated pockets where the solid geology occurs at the surface.

1.5 Soils

The published soils information is from the national soils map[2] published at 1:250,000 scale. The information indicates the western schemes of the project as having soils that are light to medium textured and well to moderately well drained. This potentially high quality land includes the following soil associations:

Newbiggin: typically a well-drained medium textured soil formed in reddish drift overlying limestone. The soils are typically medium clay loam over a clay loam subsoil; they are well drained and fall into WC 1 or 2; Newbiggin occurs in association with Salwick a similar textured but less well drained soil. The medium soil textures hold a good supply of water and the soils are not generally prone to drought. In this part of the country these soils are typically mapped as ALC Grade 3a. They occur throughout M6 Junction 40 to Kemplay Bank scheme.

Wick 1: typically a well-drained light textured soil formed in glaciofluvial and river terrace deposits. The soils are typically medium sandy loam over a medium sandy

[1] [redacted]

[2] *Soil Survey of England and Wales; 1983. Soils and their use in Northern England*. Soil Survey of England and Wales; Harpenden.

loam subsoil; they are well drained and fall into WC 1; Wick 1 occurs in association with Arrow a similar textured soil affected by groundwater and with Newport a more sandy soil which is also well drained. The light loam soil textures hold an adequate supply of water and the soils are only slightly prone to drought. In this part of the country these soils are typically mapped as ALC Grade 2 and 3a. They occur throughout the west of the Junction 40 to Kemplay Bank scheme and Cross Lanes to Rokeby schemes and also in parts of Penrith to Temple Sowerby, Temple Sowerby to Appleby, Appleby to Brough and Stephen Bank to Carkin Moor schemes.

Newport 1: typically a well drained light textured soil formed in glaciofluvial drift deposits. The soils are typically loamy medium sand or over loamy sand or sand subsoil; they are well drained and fall into WC 1; Newport 1 occurs in association with Wick (see above) and similar textured soils affected by groundwater e.g. Blackwood. The light sandy soil textures make the soils prone to drought unless they are affected by groundwater but in this cool and wet part of the country these soils are typically mapped as ALC Grade 2 and 3a. They occur throughout Penrith to Temple Sowerby scheme.

Crannymoor: typically a well drained sandy textured soil formed in glaciofluvial drift. The soils are typically medium sand over a sand subsoil and are very acidic; they are well drained and fall into WC 1; Crannymoor occurs in association with Newport (see above) and similar textured soils affected by groundwater e.g. Blackwood. The light sandy soil textures make the soils prone to drought unless they are affected by groundwater but in this cool and wet part of the country drought is not an overriding limitation. However their elevated position is likely to limit their land quality to Grade 3a at best. They occur only at the western end of Appleby to Brough scheme.

In the centre and eastern schemes some of the soils are heavier textured. This potentially lower quality land includes the following soil associations:

Clifton: typically a medium to heavy textured soil, with a slowly permeable subsoil, formed in Glacial Till. The soils typically have a medium textured topsoil over clayey subsoil; typically they are poorly drained and fall into WC 4; Clifton occurs in association with Salwick a similar textured but imperfectly drained soil. The soils hold a good supply of water and are not generally prone to drought. A detailed survey undertaken at the western end of Temple Sowerby to Appleby scheme indicate that they are of a higher quality than is typical, being mapped predominantly as Grade 3a.

Brickfield 2: typically a medium textured soil, with a slowly permeable subsoil, formed in Glacial Till. The soils typically have a medium textured topsoil over medium textured subsoil; typically they are imperfectly to poorly drained and fall into WC 4 or WC 3 if under drained; Brickfield 2 occurs in association with Nercwys and East Keswick soils which are of a similar texture but better drained, typically falling into WC 3 and 1 respectively. The soils hold a good supply of water and are not generally prone to drought. They are likely to be mapped as Grade 3b due to a wetness limitation. They occur over the eastern part of Stephen Bank to Carkin Moor scheme.

Brickfield 3: typically a medium textured soil, with a slowly permeable subsoil, formed in Glacial Till. The soils typically have a medium textured topsoil over clayey subsoil; typically they are poorly drained and fall into WC 4; Brickfield 3 occurs in association with Dunkeswick and Hallsworth soils which are of a similar or heavier texture. The soils hold a good supply of water and are not generally prone to drought. In this cool and wet part of the country wetness is an overriding limitation and the soils are likely to be Grade 3b or 4. They occur over the western half of Bowes Bypass scheme.

Dunkeswick: typically a medium textured soil, with a slowly permeable subsoil, formed in Glacial Till. The soils typically have a medium textured topsoil over clayey subsoil; typically they are poorly drained and fall into WC 4; Dunkeswick occurs in association with Brickfield and Hallsworth soils which are of a similar or heavier texture. The soils hold a good supply of water and are not generally prone to drought. In this cool and wet part of the country wetness is an overriding limitation and the soils are likely to be Grade 3b or 4. They occur over the eastern half of Bowes Bypass scheme.

1.6 Geology and Soils on a Scheme Basis

M6 Junction 40 to Kemplay Bank: Deposits of Glacial Till which were laid down in ice age conditions cover most of the site with glaciofluvial sands and gravels on the southern boundary of the scheme area. These superficial deposits overlie Carboniferous deposits of Stainmore Formation mudstones and sandstones in the west and Permian deposits of Penrith Sandstone Formation in the east. The resulting soils which are mapped as Newbiggin Association in the extreme west and Wick 1 Association over the majority of the site, typically have well drained fine loamy to coarse loamy soils with some rock or gravel at depth. They are typically well to moderately well drained and in this part of the country fall into Wetness Class (WC) 1 or 2 and so into ALC Grade 3a.

Penrith to Temple Sowerby: Deposits of Glacial Till with Alluvium in valleys were laid down in ice age conditions, overlie Penrith Sandstone Formation, Permian wind-blown sands. The resulting soils are mapped as Newport 1 Association. They are typically well drained deep sandy and coarse loamy soils and in this part of the country fall predominantly into WC 1 (ALC Grade 2) but contain 10% of subordinate soils (i.e. Blackwood) which, where drained fall into WC 1 and where undrained fall into WC 3 and 4 (ALC Grade 3a/b). In the north western corner of the scheme areas of Wick 1 Association are mapped. They typically have deep well drained coarse loamy soils and are well to moderately well drained and in this part of the country fall into WC 1 or 2 and so into ALC Grade 2.

Temple Sowerby to Appleby: Deposits of Glacial Till with Alluvium in valleys were laid down in ice age conditions, overlie Penrith Sandstone Formation, Permian wind-blown sands, close to boundary with Eden Shale Mudstone which was laid down in the Permian. The resulting soils are mapped mainly as Clifton Association. They are typically slowly permeable clayey soils and in this part of the country fall into WC 4 (ALC Grade 3b or Grade 4) but contain 30% of subordinate soils (i.e. Salwick and Quarndon), which are better drained and fall into WC 2 and 3 and so ALC Grade 2 and 3a. In the central areas of the scheme Enborne and Wick 1 Association are mapped. Enborne Association are typically slowly permeable clayey soils in valleys, and in this part of the country fall into WC 3 and 4 (ALC Grade 3a/b or 4). Wick 1 Association typically have deep well drained coarse loamy soils and are well to moderately well drained and in this part of the country fall into WC 1 or 2 and so into ALC Grade 2.

Appleby to Brough: Deposits of Glacial Till with Alluvium in the valleys and River Terrace in the south east were laid down in ice age conditions, overlie Permian deposits of Penrith Sandstone.

The soils are mapped as Wick 1 Association across the majority of the scheme. They typically have deep well drained coarse loamy soils and are well to moderately well drained and in this part of the country fall into WC 1 or 2 and so into ALC Grade 3a for the western and central areas of the scheme and Grade 3b for the eastern end of the scheme. A small area to the west is mapped as Crannymore. These soils are well

drained sandy soils and can be affected by groundwater. They typically fall into WC 1 (ALC Grade 3a) when they are drained and the regional watertable has been lowered and WC 4 (ALC Grade 3b) if undrained. To the east of the scheme a small area of Clifton Association is mapped close to Langrigg. These soils are typically slowly permeable clayey soils which fall into WC 4 (ALC Grade 3b or 4) but contain 30% of subordinate soils (i.e. Salwick and Quarndon) which are better drained and fall into WC 2 and 3 (ALC Grade 3b or 4).

Bowes Bypass: Deposits of Glacial Till which were laid down in ice age conditions, overlie Carboniferous deposits of Stainmore Formation mudstones, siltstones and sandstones in the west, and Four Fathom Limestone Member in the east.

The resulting soils to the west are mapped as Brickfield 3 they typically consist of slowly permeable seasonally waterlogged fine loamy over clayey soils and in this part of the country are likely to fall into WC 4 and so into ALC Grade 3b or 4. The soils to the east of the area are mapped as Dunkeswick. They typically consist of slowly permeable seasonally logged fine loamy over clayey soils and are likely to fall into WC 4 and into ALC Grade 3b or 4.

Cross Lanes to Rokeby: Deposits of Glacial Till which were laid down in ice age conditions, overlie Carboniferous deposits of Great Limestone Member with Alston Formation sandstone on southern boundary.

The soils are mapped as Wick 1 Association. They typically have deep well drained coarse loamy soils and are well to moderately well drained and in this part of the country fall into WC 1 or 2 and so into ALC Grade 3a for the majority of the area, ALC Grade 2 in the far east of the scheme and ALC Grade 3b in the far west of the scheme.

Stephen Bank to Carkin Moor: Deposits of Glacial Till which were laid down in ice age conditions, overlie Carboniferous deposits of Yordale Group Limestones including Four Fathom Limestone in the west, Alston Formation limestones, mudstones and sandstones in the centre of the scheme and Alston Formation sandstones in the east.

Across the majority of the area to the west the soils are mapped as Wick 1 Association. They typically have deep well drained coarse loamy soils and are well to moderately well drained and in this part of the country fall into WC 1 or 2 and so into ALC Grade 2. To the far east of Stephen Bank to Carkin Moor (dualling and junctions, bypass) the soils are mapped as Brickfield 2 Association. These soils typically consist of slowly permeable, seasonally waterlogged fine loamy soils and largely fall into WC 4 when undrained (ALC Grade 3b or 4) and WC 3 with artificial drainage (ALC Grade 3a/b).

1.7 Previous Agricultural Land Classification

The Provisional ALC maps do not subdivide Grade 3 land in Subgrade 3a (good) and Subgrade 3b (moderate) quality agricultural land. This division was introduced in 1988.

M6 Junction 40 to Kemplay Bank: The Provisional ALC maps show predominantly urban land uses over much of the site with areas of Grade 3 in the east and to the south of the road. There are no detailed post 1988 ALC surveys undertaken within the study area.

Penrith to Temple Sowerby: The Provisional ALC maps show the Penrith to Temple Sowerby area as urban land over roads surrounded by areas of Grade 2 with small areas of Grade 3 around Swine Gill Plantation and at the eastern end of the scheme. A detailed post 1988 classification of the eastern end of the scheme found an area of

Grade 3a with some Grade 2 and a small area of Grade 3b. This indicates that some of the land mapped as Grade 3 on the Provisional ALC maps is likely to be Best and Most Versatile Land (BMV) land.

Temple Sowerby to Appleby: The Provisional ALC maps show the Temple Sowerby to Appleby area as urban land over roads surrounded by areas of Grade 2 in west and centre of the scheme, with Grade 3 in east and on the proposed bypass to the north of Kirkby Thore. Post 1988 surveys have been undertaken at the western end of the scheme indicating that the majority of the land in this area is Grade 3a with some Grade 2; and to the south of the proposed route, on the eastern outskirts of Kirkby Thore where a mix of Grade 2, 3a and 3b have been mapped.

Appleby to Brough: The Provisional ALC maps show the area as urban land over roads surrounded by areas of Grade 3 with some very small pockets of Grade 4 to the west. There are no detailed post 1988 ALC surveys undertaken within the study area.

Bowes Bypass: The Provisional ALC maps show the area as urban land over roads surrounded by areas of Grade 4. There are no detailed post 1988 ALC surveys undertaken within the study area.

Cross Lanes to Rokeby: The Provisional ALC maps show the area as urban land over roads surrounded by areas of Grade 3. There are no detailed post 1988 surveys undertaken within the study area.

Stephen Bank to Carkin Moor: The Provisional ALC maps show the area as urban land over roads surrounded by areas of Grade 3. There are no detailed post 1988 ALC surveys undertaken within the study area.

2 Methodology

A detailed soil survey was carried out from 7th February to 15th March 2022. The survey was based generally on observations at 100m intervals along the proposed road corridor or on a 100m grid for larger blocks of land, such as road junctions or areas of temporary land take, for example areas for use as compounds during construction. The approximate sampling density was one observation per hectare.

During the survey, soils were examined via a combination of auger borings and soil description pits to a maximum depth of 1.2m. Soils were described using hand texturing to determine the soil type. Texture class is determined by the relative proportions of sand, silt and clay particles and the amount of organic matter in a soil horizon and may be assessed in the field by hand texturing or measured in a laboratory by particle-size distribution analysis.

Soil texture is key in determining the available water capacity of a soil profile.

Soil wetness is assessed in the field by identifying the depth to any slowly permeable soil horizon, which is defined in terms of soil texture, structure and gleying and relating this to the texture of the top 25cm.

A soil wetness limitation exists where the soil water regime adversely affects plant growth or imposes restrictions on cultivations or grazing by livestock. For ALC purposes the soil wetness assessment takes account of: i) the climatic regime ii) the soil water regime and iii) the texture of the top 25cm of the soil.

The influence of climate on soil wetness is assessed by reference to median field capacity days (FCD), the number of days water is likely to drain from the soil profile in a typical year. FCD ranges are specified within which similar soils are expected to have similar degrees of wetness limitation. The spatial distribution of FCD has been mapped at a scale of 1:1 million by the SSLRC (Jones and Thomasson, 1985) and there is also a gridpoint dataset.

Following the initial survey using auger borings every 100m, the land can be mapped according to grade with each grade further characterised by excavation of a soil profile pit in a representative area of the soil type/grade. Soil samples are also taken at this stage on a 'horizon' basis and submitted for sand, silt and clay as well as organic matter content to confirm the soil texture.

The detailed data from both the auger borings and soil pits is then used to map the areas. A log of the details of each observation point and an ALC map showing the distribution of grades across the schemes is given in a separate appendix for each scheme attached to this report.

The Appendices pertaining to each scheme are as follows:-

1 M6 Junction 40 to Kemplay Bank

2 Penrith to Temple Sowerby

3 Temple Sowerby to Appleby

4 Appleby to Brough

5 Bowes Bypass

6 Cross Lanes to Rokeby

7 Stephen Bank to Carkin Moor

3 Soils

Details of the auger borings on a scheme basis are provided in Appendix 1 to 7. Brief generic descriptions of the soils found by the field survey for each scheme are given below together with an example detailed soil profile description for a pit, if dug, in the scheme.

3.1 M6 Junction 40 to Kemplay Bank

To the west of the M6 Junction soils with 30-40cm brown or dark brown medium clay loam topsoil over similarly coloured mainly medium or heavy clay loam subsoil sometimes moderately stony below 40-70cm were found. The soils are well drained showing no greyish or pale colours or ochreous mottling.

In the centre of this scheme soils with 25-35cm brown or dark brown sandy clay loam topsoil over similarly coloured sandy clay loam subsoil sometimes moderately stony below 28-60cm were found. The soils are well drained showing no greyish or pale colours or ochreous mottling.

On the east of the scheme soils with variable topsoil as well as variable subsoil texture were found. The topsoil textures identified were dark brown medium sandy loam, coarse sandy loam, sandy clay loam or medium clay loam topsoil over dark brown or brown medium sandy loam, medium clay loam or sandy clay loam upper subsoil over similarly coloured loamy sand, medium sand, coarse sand or coarse sandy loam subsoil. The soils are well drained showing no greyish or pale colours or ochreous mottling except for some ochreous mottling evident in one profile.

Profile Pit Description: Near auger boring 28 (east Penrith) pit to establish subsoil stone content. Wetness Class I, ALC Grade 3a (limitation topsoil stone content >6cm)

Grid Reference: 352900 529300

Crop: Grass

Depth (cm) Description

0-25	Dark brown coarse sandy loam (7.5YR3/3); total hard rounded stone 9% (visual estimate) >2cm 9% >6cm 6%; friable; weakly developed medium subangular blocky; >0.5% biopores >0.5mm diameter; common roots.
25-40	Reddish brown (5YR4/3) coarse sandy loam; 10% hard rounded stones (visual estimate); very friable; weakly developed granular and loose structure; >0.5% biopores >0.5mm diameter; common roots.
40-100	Reddish brown (5YR4/3) coarse sandy loam; total stone 20%; few roots 20-30cm; stopped due to stone.

3.2 Penrith to Temple Sowerby

The soils predominantly have medium sandy loam and occasionally loamy sand or sandy clay loam topsoils which are dark brown in colour and 20-40cm deep. The subsoil texture is predominantly medium sand or medium loamy sand (particularly the upper subsoil). The subsoil colour is predominantly brown and subsoil depth extended to 120cm plus deep. Because of their sandy texture the soils are well drained. The exception is when top and subsoil are sandy clay loam in texture and drainage is imperfect. The topsoil and subsoil are occasionally very slightly stone with occasionally the lower subsoil being moderately stony.

Profile Pit Description: Near auger boring 40 (east of Brougham) to establish soil characteristics below 70cm. Wetness Class I, ALC Grade 2 (limitation climate).

Grid Reference: 354600 528700

Crop: Grass

Depth (cm) Description

0-30	Dark brown (7.5YR3/3) medium sandy loam; total hard rounded stone 10% (visual estimate) >2cm 10% >6cm 6%; weakly developed medium/fine subangular blocky; >0.5% biopores >0.5mm diameter; many roots.
30-43	Brown (7.5YR4/4) loamy medium sand; weakly developed fine subangular blocky; few roots.
43-70	Strong brown (7.5YR4/6) coarse sand; total stone 20% hardstones; loose structure
70-110	Strong brown (7.5YR4/6) medium sand; loose structure.

3.3 Temple Sowerby to Appleby

The soils vary across this section with soils in the western half generally being lighter in texture than those in the eastern half. A typical lighter soil has a brown medium sandy loam topsoil 30-43cm deep over upper and lower subsoils extending to 120cm plus depth which have variable textures of brown medium sand, medium sandy loam, sandy clay loam and sandy clay. The topsoil tends to be very slightly stony and the lower subsoil moderately stony. The soils are mostly well drained.

Profile Pit Description: Near auger boring 210 Wetness Class I, Grade 2 (limitation climate)

Grid Reference: 363650 526100

Crop: Fallow after cereal

Depth (cm) Description

0-45	Dark brown (7.5YR3/3) medium sandy loam; total stone content 0-25cm 5% (visual estimate) >2cm 5% >6cm 1%; weakly developed fine subangular blocky; friable; common roots.
45-70	Dark Brown (7.5YR3/3) loamy medium sand; total stone content 20%; occasional large stone below 60cm; weakly developed fine granular; friable; few roots.
70-100	Dark brown (7.5YR3/2) loamy medium sand; total stone content 20%; weakly developed fine subangular block.

Profile Pit Description: Near auger boring 213 Wetness Class III, Grade 3a (limitation wetness)

Grid Reference: 363700 526300

Crop: Fallow

Depth (cm) Description

0-40	Dark brown (7.5YR2.5/3) medium sandy loam; stoneless; weakly developed fine subangular blocky; friable; few roots.
40-55	Reddish Brown (5YR4/4) medium sandy loam; fine subangular blocky; friable.
55-60	Dark reddish brown (5YR3/4) sandy clay loam; total stone content 10%; large stones present at 60cm 20%; weakly developed medium subangular blocky; porosity >0.5%.

Profile Pit Description: Near auger boring 249 Wetness Class III, Grade 3a

Grid Reference: 364500 526100

Crop: Ley

Depth (cm) Description

0-25	Very dark brown (7.5YR2.5/2) sandy clay loam; weakly developed fine subangular blocky; friable
25-40	Very dark brown (7.5YR2.5/2) sandy clay loam; weakly developed fine subangular blocky; friable.
40-50	Reddish brown (5YR4/3) clay with common (10YR5/6) mottles; 10% small stones; firm; weakly developed coarse angular blocky; few fine roots.
50-55	Reddish brown (5YR4/3) clay with many (10YR5/6) mottles; 10% small stones; pale (5Y6/3) ped faces; weakly developed coarse angular blocky; porosity <0.5% biopores >0.5mm; dolerite boulders present at 50cm with clay between the boulders (rootable soil); water seeping into pit at 50cm

A typical heavier soil in the east of the scheme has a grey brown medium clay loam or sandy clay loam topsoil varying in depth from 20-35cm. The upper subsoil is typically grey brown or dark brown sandy clay loam with ochreous mottles extending to variable depth over mainly pale brown or pale reddish brown heavy clay loam or occasionally clay, sandy clay or sandy loam lower subsoil extending to 100cm plus. These soils are either imperfectly or poorly drained.

3.4 Appleby to Brough

The survey found the soils in this scheme to be very variable and it is not possible to give any meaningful generic description of a soil profile in the scheme. The soils vary from well drained to poorly drained. The sandy textures and colours vary in well drained profiles across the scheme as do the clayey textures and colours in imperfectly and poorly drained profiles.

Location:	**Appleby to Brough, near auger boring 383**
OS Grid Reference:	NY 72547 17451
Land Use:	Permanent Grass (very patchy ground cover)
Aspect:	7-11° slope, south, south west facing
AOD:	145 m
Soil type:	Sandy topsoil overlying a moderately freely draining light and medium textured subsoil (Wetness Class II).
Land Quality:	Limited to ALC Subgrade 3b by slope

Soil Profile	**Depth (cm)**	**Description**
	**0-30**	Dark brown (10YR 3/3) loamy medium sand with few, (1-5%), small and medium rounded sandstones and dolerite erratics; slightly moist; moderately developed surface layer (5-10cm) with fine sub-angular blocky structure, below 10cm weakly developed medium and coarse angular blocky, (mechanical cultivation affected); moderate packing density; friable above 10cm, slightly firm below; common fine fissures above 10cm, rare below, few fine and medium pores; abundant fine fibrous roots becoming common below 10cm; common medium earthworms; clear, wavy boundary.
	30-100	Yellowish red (5YR 4/6) loamy medium sand, probably transitioning to sandy clay loam with depth; many, large and very large sub-rounded dolerite boulders; moist, wet below 75cm; weak, medium and coarse angular blocky structure, moderate packing density, slightly friable; few fine fissures, common fine and rare medium pores; rare fine fibrous roots; rare large earthworms and channels. Sub-surface water channel at 75cm
Large dolerite boulders in subsoil ->		

Location:	**Appleby to Brough, between auger borings 456 and 458**
OS Grid Reference:	NY 75365 15778
Land Use:	Permanent Grass
Aspect:	Near flat, (exposed stream embankment)
AOD:	145 m
Soil type:	Slightly stony medium silt/sandy loam topsoil over a slowly permeable heavy clay loam subsoil.
Land Quality:	ALC Subgrade 3b, (Wetness Class IV plus possible groundwater effect)

Soil Profile	**Depth (cm)**	**Description**
	**0-30**	Very dark brown (10YR 2/2) sandy silt loam with few, (1-5%), small rounded quartz sandstone gravels; very moist, (recent rain); moderately developed fine and medium sub-angular blocky structure; low packing density; friable; common fine fissures, common fine and medium pores; common fine and medium fibrous roots; common small and medium earthworms; clear, wavy boundary.
	30-55	Reddish yellow (5YR 6/6) medium sandy loam with few, medium and large sub-rounded sandstones; few, fine faint, yellowish brown (10YR 6/8) mottles; moist; weak, medium and coarse angular blocky structure, moderate packing density, slightly friable; common fine and rare medium fissures, few fine and medium pores; rare fine fibrous roots; rare large earthworms and channels, gradual, irregular boundary.
	55-80+	Yellowish brown (10YR 5/4), heavy clay loam with common medium and large hard and soft weathered sandstones; many, coarse, distinct yellowish brown (10YR 5/8) and light yellowish brown (10YR6/4) mottles with common blackish iron and manganese concretions; moist; weakly developed coarse angular blocky and blocky structure; high packing density; firm, slowly permeable; rare fine and medium fissures, rare fine and medium pores, very rare fine fibrous roots, rare large earthworms.

3.5 Bowes Bypass

The soils on this scheme have dark or very dark greyish brown medium clay loam, silty clay loam or sandy clay loam, sometimes organic, topsoil varying from 15-30cm deep over brown heavy or medium clay loam upper subsoil with ochreous mottles to 38-50cm depth over greyish brown or grey heavy clay loam or clay lower subsoil with ochreous mottles to 100cm plus depth. The soils are imperfectly or poorly drained.

3.6 Cross Lanes to Rokeby

The limited amount of surveying on this scheme was at the west end with one location towards the east end. The surveyed locations had dark grey or greyish brown medium clay loam or silty clay loam topsoil with a few ochreous mottles which are 24-30cm over yellow brown or light brown medium clay loam upper soil with ochreous, light grey and yellow mottles down to 32-50cm deep over very dark grey heavy clay loam or clay lower subsoil with ochreous and yellow mottles to 100cm plus depth. The soils are poorly drained.

3.7 Stephen Bank to Carkin Moor

The soils on this scheme typically have very dark or dark grey brown medium or heavy clay loam topsoil to 28-30cm depth over light grey and yellow heavy clay loam or clay subsoil with ochreous, grey and yellow mottles to 100cm plus depth. The soils are poorly drained.

Location:	**Stephen Bank to Carkin Moor, near to boring 614**
OS Grid Reference:	NZ 14100 09600
Land Use:	Permanent Grass
Aspect:	1-3° easterly
AOD:	163 m
Soil type:	Slightly stony medium sandy loam topsoil over moderately stony, sandy clay loam, imperfectly drained subsoil.
Land Quality:	ALC Grade 3a, (Wetness Class III)

Soil Profile	**Depth (cm)**	**Description**
	**0-27**	Dark greyish brown (10YR 3/2) slightly organic medium clay loam with few, (1-5%), small and medium rounded sandstones; moist; moderately developed small and medium sub-angular blocky structure; low packing density; friable; common fine and rare medium fissures, common fine pores; common fine fibrous and rare fleshy roots; common small and medium and rare large earthworms with common channels; clear, smooth boundary.
	27-60	Dark yellowish brown (10YR 4/6) medium sandy loam with common, (6-15%), medium and few large angular sandstones; few, fine faint, yellowish brown (10YR 6/8) mottles; moist; weak, medium and coarse angular blocky structure, moderate packing density, friable; few fine fissures, few fine pores; few, fine fibrous roots; rare medium and large earthworms and channels, gradual, irregular boundary.
	60-100	Yellowish brown (10YR 5/6), sandy clay loam with common medium and large weathered sandstones, locally abundant, (36-70%): many, fine, distinct light brownish grey (10YR 6/2) and brownish yellow (10YR6/8) mottles with common iron and manganese concretions; moist; weakly developed medium and coarse angular blocky and prismatic structure; moderate packing density; friable, potentially seasonally slowly permeable; rare fine fissures, rare fine pores, rare fine fibrous roots, very rare large earthworms and earthworm channels.

Location:	**Stephen Bank to Carkin Moor, near to boring 644**
OS Grid Reference:	NZ 15407 08812
Land Use:	Winter Cereal
Aspect:	1-3° easterly
AOD:	143m
Soil type:	Slightly stony medium clay loam topsoil over moderately stony, heavy clay loam, weakly structured and poorly drained subsoil.
Land Quality:	ALC Grade 3b, (Wetness Class IV)

Soil Profile	**Depth (cm)**	**Description**
	**0-30**	Dark greyish brown (10YR 4/2) medium clay loam with few, (1-5%), small and medium rounded sandstones; moist; weakly developed medium and coarse sub-angular blocky structure; moderate packing density; plastic at the surface where wet, slightly friable below; few fine fissures, rare fine and medium pores; few fine fibrous roots; rare medium earthworms and channels; abrupt, smooth boundary.
	30-42	Gray (10YR 6/1) heavy clay loam with few, medium and large angular sandstones; abundant, distinct, yellow (10YR 7/8) and yellowish brown (10YR 5/8) mottles; slightly moist; moderate, medium and coarse angular blocky structure and slightly prismatic, high packing density, very firm; rare fine and medium fissures, few fine pores; few, becoming rare, fine fibrous roots particularly in fissures and earthworm channels; rare large earthworms and channels, clear, irregular boundary.
	42-100	Very dark grey (2.5Y 3/1), heavy clay loam or clay with common medium and large sandstones with few small shale and coal fragments: abundant, distinct grey (10YR 6/1) and yellowish brown (10YR5/8) mottles; moist; weakly developed very coarse angular blocky and prismatic structure; high packing density; firm, slowly permeable; few fine and rare medium fissures, rare fine pores, rare fine fibrous roots, very rare large earthworms.

4 Agricultural Land Classification

4.1 The Agricultural Land Classification System

The land was classified using the system outlined in the Ministry of Agriculture, Fisheries and Food (MAFF, now Defra) publication: 'Agricultural Land Classification of England and Wales - Revised guidelines and criteria for grading the quality of agricultural land' (October 1988). A more recent reference to the classification system was made in a second edition of the Natural England Technical Information Note TIN049 (Dec 2012).

The Agricultural Land Classification (ALC) system provides a framework for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. The limitations can operate in one or more of four principal ways. They may affect:

1. The range of crops which can be grown
2. The level of yield
3. The consistency of yield
4. The cost of obtaining the crop

The classification system gives considerable weight to flexibility of cropping, whether actual or potential. The ability of some land to produce consistently high yields of a somewhat narrower range of crops is also taken into account.

The principal physical factors influencing agricultural production are climate, site (including relief) and soil. By assessing these factors, it is possible to assign land into one of five land classification grades, Grade 1 land being the highest quality and Grade 5 the lowest quality land. Grade 3 is subdivided into Grades 3a and 3b, to identify good quality agricultural land from moderate quality land.

The ALC classifications, with reasons, for the schemes are given in separate sections for each scheme.

4.2 Climate

The agricultural climate is an important factor in assessing the agricultural quality of land, and the agricultural climate of this site has been calculated using the Climatological Data for Agricultural Land Classification[3].

The climatic data used in the ALC classification of each scheme is given in the sections below for each scheme. Along the A66 route from the M6 Junction 40 to Carkin Moor climate limited the ALC grade at best to Grade 2 with some parts of the route limited to Subgrade 3a or 3b by climate.

4.3 Agricultural Land Classification for the Schemes

The results of the soil survey described in section 3 were used in conjunction with the agro-climatic data given in the sections for each scheme below to classify the land according to the revised guidelines for Agricultural Land Classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food (now Defra)[4].

[3] Meteorological Office, (1989). *Climatological Data for Agricultural Land Classification*.
[4] MAFF, (1988). *Agricultural Land Classification for England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land*.

Along the route the field survey identified agricultural land of Grade 2, Subgrade 3a, Subgrade 3b, Grade 4 and Grade 5 quality. The principal limitation to agricultural use of the land is climate, soil wetness and in limited areas gradient.

4.4 M6 Junction 40 to Kemplay Bank

Agroclimatic data

Grid reference	Altitude (m)	Average Annual Rainfall (mm)	January to June Accumulated Temperature (day °C)	Field Capacity Days (mm)	Moisture Deficit Wheat (mm)	Moisture Deficit Potatoes (mm)	Climatic grade
NY 510 289	150	920	1,223	225	67	47	3a
NY 518 289	130	877	1,246	220	73	54	2
NY 526 293	120	862	1,257	218	76	58	2

The field survey identified land of Grade 2 and Subgrade 3a with some urban and non-agricultural land. Six out of 29 locations could not be surveyed due to access being denied.

4.4.1 Grade 2

The land surveyed (11.2ha) between the M6 Junction 40 and Kemplay Bank was classified as Grade 2. The soils are well drained and medium or sandy textured but limited to Grade 2 by a climatic limitation.

4.4.2 Grade 3a

The land surveyed (3.0ha) to the west of the M6 Junction 40 was classified as Subgrade 3a due to a climatic limitation.

4.5 Penrith to Temple Sowerby

Agroclimatic data

Grid reference	Altitude (m)	Average Annual Rainfall (mm)	January to June Accumulated Temperature (day °C)	Field Capacity Days (mm)	Moisture Deficit Wheat (mm)	Moisture Deficit Potatoes (mm)	Climatic grade
NY542290	110	853	1,268	216	78	62	2
NY591286	120	820	1,255	210	81	64	2

There is an overall climatic limitation limiting the land to at best Grade 2. Eighteen of 130 locations could not be surveyed due to access being denied. After the soil survey was completed nine of the not surveyed locations (138, 142, 143, 145, 147, 150, 151, 152 and 153) plus one other location (136) were designated as out of scope due to a boundary change.

4.5.1 Grade 2

This was the predominant grade across this scheme with 86.8ha being classified as Grade 2. The land with this grade has deep well drained sandy soils.

4.5.2 Grade 3a

Occasional locations across this scheme were classified as Subgrade 3a. This was due to imperfect drainage (Wetness Class III) due to a sandy clay loam subsoil resulting in a slowly permeable layer or a droughtiness limitation at some locations

where the subsoil texture was sand immediately beneath a loamy sand topsoil. 9.8ha were classified as Subgrade 3a.

4.6 Temple Sowerby to Appleby

Agroclimatic data

Grid reference	Altitude (m)	Average Annual Rainfall (mm)	January to June Accumulated Temperature (day °C)	Field Capacity Days (mm)	Moisture Deficit Wheat (mm)	Moisture Deficit Potatoes (mm)	Climatic grade
NY 616 264 west / 1	120	847	1256	214	80	62	2
NY 677 215 east / 2	150	891	1223	218	71	52	3a
NY 658 229 central/ 3	140	898	1234	220	74	55	2 on 3a boundary

Land to east of NY658229 is generally too cool and wet to be classified higher than Grade 3a. In the west of the scheme the field survey identified the land as predominantly Grade 2 with limited areas of Subgrades 3a and 3b. In the centre of the scheme the field survey identified the land as a mix of Grade 2 and Subgrades 3a and 3b. In the east of the scheme the field survey identified land of Subgrade 3b quality. Eleven of 210 locations could not be surveyed due to access being denied. These eleven locations were in the centre of the scheme.

4.6.1 Grade 2

This was the predominant grade across the west of this scheme. In the centre of the scheme west of NY658229 Grade 2 land occurs in roughly in equal proportion with Subgrade 3a/b land. The Grade 2 land has deep well drained sandy soils covering 75.8 ha in total.

4.6.2 Grade 3a

If climate is not the reason for limiting the land to Subgrade 3a (in the east of the scheme) it is imperfect drainage caused by a sandy clay loam upper subsoil over lying a clay lower subsoil leading to a slowly permeable layer (Wetness III when slowly permeable layer starts below 58cm with 214 Field Capacity Days). 47.7ha were classified as Subgrade 3a.

4.6.3 Grade 3b

This is the predominant grade across the east of the scheme. The soils are poorly drained (Wetness Class 4) as a result of clayey subsoils causing the soils to be slowly permeable (Wetness IV when slowly permeable layer starts above 59cm with 218 Field Capacity Days). 58.8ha were classified as Subgrade 3b.

4.7 Appleby to Brough

Agroclimatic data

Grid reference	Altitude (m)	Average Annual Rainfall (mm)	January to June Accumulated Temperature (day °C)	Field Capacity Days (mm)	Moisture Deficit Wheat (mm)	Moisture Deficit Potatoes (mm)	Climatic grade
NY 718 181 west/1	150	908	1223	220	70	51	3a
NY 787 149 east/2	170	1076	1201	246	61	38	3b
NY 757 156 central/3	150	917	1224	222	67	48	3a

The field survey identified land of Subgrade 3a and 3b, Grade 4 and Grade 5 quality. Climate limited the grade to Subgrade 3a at the west and centre of the scheme and to 3b at the east of the scheme. Eleven out of 159 locations were not surveyed due to access being denied.

4.7.1 Grade 3a

There are 63.9ha of this subgrade which covers the second largest part of the scheme. It is present throughout and is graded in this way due to climate and imperfect drainage (Wetness Class III) soils with non-calcareous medium or coarse sandy clay loam topsoils over sandy loam, sandy clay loam or heavy clay loam subsoils. The principal limitations to agriculture are climate and soil wetness due to a slowly permeable layer starting below *c*60cm but above 80cm.

4.7.2 Grade 3b

There are 67.4ha of this subgrade which covers the largest part of the scheme. It is present throughout and is graded in this way due to slope in the west and imperfect or poor drainage (Wetness Class III and IV) soils with non-calcareous medium or coarse sandy clay loam topsoils over sandy clay loam or heavy clay loam subsoils. The principal limitations to agriculture are soil wetness due to a slowly permeable layer starting above *c*60cm and/or high groundwater and slope to the west of the scheme.

4.7.3 Grade 4

There are 28.5ha of this grade occurring in patches throughout the scheme due to slope in the west and imperfect or poor drainage (Wetness Class III and IV) soils with non-calcareous heavy clay loam topsoil over clay subsoil. The principal limitations to agriculture are soil wetness due to a slowly permeable layer starting above *c*60cm and/or high groundwater and slope in the west of the scheme.

4.7.4 Grade 5

This grade is restricted to a small number of small patches mainly towards the centre of the scheme covering about 6.0ha. The Grade 5 allocation is due to possible flood risk and/or very poorly drained (Wetness Class 5) soils with non-calcareous clay topsoil over clay subsoil. The principal limitation to agriculture is soil wetness.

4.8 Bowes Bypass

Agroclimatic data

Grid reference	Altitude (m)	Average Annual Rainfall (mm)	January to June Accumulated Temperature (day °C)	Field Capacity Days (mm)	Moisture Deficit Wheat (mm)	Moisture Deficit Potatoes (mm)	Climatic grade
NY986135 West/1	280	928	1,071	227	57	32	3b
NZ014136 East/2	265	901	1,087	223	60	36	3b

The field survey identified land of Subgrade 3b quality. Observations were made at 16 locations.

4.8.1 Grade 3b

There are 37.5ha of this subgrade covering the whole of the scheme. It is graded in this way due to climate and imperfect drainage or poor drainage (Wetness Class III or IV). The soils have non-calcareous medium clay loam, medium silty clay loam or sandy clay loam topsoil over heavy clay loam and clay subsoil. The principal limitations to agriculture are climate and soil wetness due to a slowly permeable layer starting within *c*61cm (Wetness Class IV) or starting below *c*61cm but within 80cm depth (Wetness Class III)

4.9 Cross Lanes to Rokeby

Agroclimatic data

Grid reference	Altitude (m)	Average Annual Rainfall (mm)	January to June Accumulated Temperature (day °C)	Field Capacity Days (mm)	Moisture Deficit Wheat (mm)	Moisture Deficit Potatoes (mm)	Climatic grade
NZ 049 138 West/1	210	851	1149	215	68	48	3b
NZ 081 136 East/2	150	812	1217	208	79	62	2
NZ 065 137 Central/3	190	846	1172	214	72	52	3a

The locations surveyed identified land of Subgrade 3b quality. Fifty two out of 61 locations could not be surveyed due to access being denied. Of the 9 locations surveyed 8 were at the west end of the scheme.

4.9.1 Grade 3b

The limited area of this scheme surveyed identified 7.2ha of this subgrade. It is graded in this way due to climate and imperfect or poor drainage (Wetness Class III or IV). The soils had non-calcareous medium clay loam or silty clay loam topsoil over heavy clay loam and clay subsoil. The principal limitation to agriculture is soil wetness due to a slowly permeable layer starting within *c*58cm (Wetness Class IV) or starting below *c*58cm but within 80cm depth (Wetness Class III)

4.10 Stephen Bank to Carkin Moor

Agroclimatic data

Grid reference	Altitude (m)	Average Annual Rainfall (mm)	January to June Accumulated Temperature (day °C)	Field Capacity Days (mm)	Moisture Deficit Wheat (mm)	Moisture Deficit Potatoes (mm)	Climatic grade
NZ 123 106 West/1	140	805	1,229	206	84	67	2
NZ 165 080 East/2	150	770	1,218	197	84	68	2

The field survey identified land of predominantly Subgrade 3b and Grade 4 with a very limited area of Subgrade 3a quality. Three out of 85 locations were not surveyed.

4.10.1 Grade 3a

There are 8.0ha of this subgrade which covers a small part of the scheme. This grade is allocated due to imperfectly drained (Wetness Class III) soils with non-calcareous medium clay loam topsoils over variable sandy, medium or heavy clay loam subsoils. The principal limitation to agriculture is soil wetness due to a slowly permeable layer starting below *c*54cm but within 80cm.

4.10.2 Grade 3b

There are 56.9ha of this subgrade which covers the largest part of the scheme. It is present throughout and is graded as such due to poor drainage (Wetness IV) soils with non-calcareous medium clay loam topsoils over medium or heavy clay loam subsoils which maybe sandy in places. The principal limitation to agriculture is soil wetness due to a slowly permeable layer starting above *c*54cm.

4.10.3 Grade 4

There are a number of areas totalling to 24.8ha of this grade tending towards the centre of the scheme. The areas allocated this grade have poorly drained (Wetness Class IV) soils with non-calcareous heavy clay loam topsoil over heavy clay loam or clay subsoil. The principal limitation to agriculture is soil wetness due to a slowly permeable layer starting above *c*54cm.

4.11 Summary

ALC, Non-agricultural, Urban and Not-surveyed Areas by Scheme (Area (ha) and %)

A summary of the land areas. Agricultural land has been classified according to Grades 2-5. Grade 1 is excluded due to a climate limitation.

The % in brackets is the proportion of agricultural land surveyed.

Scheme	Grade 2		Subgrade 3a		Subgrade 3b		Grade 4		Grade 5		Non-agricultural		Urban		Not surveyed	
	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
M6 Junction 40 to Kemplay Bank	11.24	20.5 (78.7)	3.04	5.5 (21.3)							1.81	3.3	31.05	56.6	7.75	14.1
Penrith to Temple Sowerby	86.75	63.5 (89.9)	9.76	7.1 (10.1)							3.25	2.4	21.67	15.9	15.23	11.1
Temple Sowerby to Appleby	75.78	30.9 (41.5)	47.66	19.5 (26.1)	58.76	24.0 (32.1)	0.46	0.2 (0.3)			7.54	3.1	31.95	13.1	22.7	9.3
Appleby to Brough			63.86	29.1 (38.5)	67.37	30.7 (40.7)	28.46	13.0 (17.2)	5.97	2.7 (3.6)	18.24	8.2	21.11	9.6	14.7	6.7
Bowes Bypass					37.52	63.8 (100)						0.0	21.31	36.2	0.00	0.0
Cross Lanes to Rokeby					7.20	8.4 (100)						0.0	17.82	20.9	60.27	70.7
Stephen Bank to Carkin Moor			8.04	6.7 (9.0)	56.90	47.4 (63.4)	24.81	20.7 (27.6)				6.6	21.50	17.9	2.12	1.8
Total All Schemes	173.8	18.9 (29.3)	132.4	14.4 (22.3)	227.8	24.7 (38.4)	53.7	5.8 (9.1)	6.0	0.7 (1.0)	37.42	4.1	166.42	18.1	122.78	13.3

Appendix 1: M6 Junction 40 to Kemplay Bank - Auger boring descriptions and ALC map

Auger Boring Descriptions

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type					
1	350700 528750	LEY	35 70 120	mcl mcl mcl	7.5YR3/4 5YR3/4 5YR3/4			20			hr			I	3a	skirsgill points 1-5 overall climatic limitation 3a FCD 225 stone at 70cm
2	350700 528650	LEY	40 90 120	mcl mcl mcl	5YR3/4 5YR4/4 5YR4/4									I	3a	augered to 90cm
3	350756 528576	PGR	30 40 85 120	scl mcl hcl c	5YR5/4 5YR4/4 5YR3/4 5YR3/4									i	3a	topsoil sample
4	350834 528494	PGR	30 40 120	mcl hcl hcl	5YR3/4 5YR4/4 5YR4/4			15			hr			I	3a	
5	351030 528790	PGR	30 50 70 120	scl mcl msl msl	7.5YR3/4 7.5YR3/3 7.5YR4/4 7.5YR4/4			5 5 20			hr hr hr			I	3a	augered to 70cm
6	351169 529039	Urban	28	mcl	10YR3/3										Urban	difficult to auger 28cm. In hotel grounds (FCD 225) Climatic limitation 3a
11	351700 528800	PGR	30 40 50 120	scl mcl mcl mcl	10YR3/3 10YR3/3 7.5YR3/3			3 3 15	3		hr hr hr hr			I	2	augered to 50cm stone (FCD 220) soil mounds close Climatic limitation nearby Grade 2
12	351800 528900	PGR	30 40 120	scl mcl mcl	7.5YR2.5/3 7.5YR3/3 7.5YR3/3			20			hr			I	2	horses- stone stopped auger at 40cm
13	351900 528900	PGR	30 38 120	scl scl scl	7.5YR2.5/3 7.5YR5/3 7.5YR5/3			20			hr			I	2	bank feature slope to south 12 degrees- Grade 4

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type					
14	351911 529087	PGR	30 40 60 120	scl scl scl scl	7.5YR2.5/3 7.5YR3/3 5YR3/3 5YR3/3			20			hr			I	2	horse
15	352000 528900	PGR	35 40 45 120	scl scl scl scl	7.5YR2.5/3 7.5YR2.5/3 7.5YR3/3 7.5YR3/3			20			hr			I	2	stone at 45cm
16	352050 528950	PGR	28 120	msl msl	7.5YR2.5/3 7.5YR2.5/3			20			hr			I	2	droughtiness checked (MB=Grade 1)
17	35275529091	NA	38 40 50 120	scl scl scl scl	10YR4/2 7.5YR4/3 7.5YR4/3			15 15			 hr hr			I	NA	School playing field FCD 218 NEARBY NY526293
18	352100 529000	PGR	25 120	scl scl	7.5YR3/3 7.5YR3/3			20			hr			I	2	stone at 25cm difficult to auger
19	352199 529228	PGR	20 40 120	msl msl msl	7.5YR3/2 7.5YR3/2			5 15			MBw=76			I	2	Droughtiness check MBw 64 MBp 42 FCD 218 NEARBY NY526293 climate limitation grade 2
20	352278 529234	PGR	20 60 120	msl scl scl	7.5YR3/3 7.5YR3/3			5 5 15			hr hr hr			I	2	
23	352500 528900	PGR	38 40 120	msl msl lms	7.5YR3/3 5YR3/3			5 5 15			hr hr hr	38		III	3a	GRAVEL AT 40CM
24	352540 529000	PGR	38 60 75 100	scl scl lms ms	7.5YR3/3 5YR4/3			15			hr			I	2	difficult to auger 60cm stone
25	352560 529100	PGR	38 75 80 120	mcl scl lms ms	5YR4/3 7.5YR5/3 5YR5/3	7.5YR5/6 7.5YR5/6 7.5YR5/6	c c c							II	3a	augered to 90cm gravelly at 90cm table 13 used

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type					
26	352660 529300	PGR	40 75 120	scl lms cs	10YR3/3			15			hr			I	2	augered to 40cm stone
27	352700 529300	PGR	30 50 120	mcl mcl	7.5YR3/3 7.5YR3/3									I	2	auger stopped at 50cm stone
28	352800 529300	PGR	30 40 120	csl csl csl	7.5YR2.5/3 5YR4/4			5 15 15			hr hr			I	2	augered to 40cm stone MBw =66 MBp =44
29	352900 529300	PGR	35 40 60 120	msl scl csl cs	7.5YR3/3 7.5YR4/3 7.5YR4/4 7.5YR4/4			2			hr			I	3a	River area flood risk auger stopped at 70cm

Highways England

A66 Northern Trans-Pennine

M6 Junction 40 to Kemplay Bank Agricultural Land Classification (ALC) Survey Results

- Order Limits
- Auger locations

ALC

- 2
- 3a
- 3b
- 4
- 5
- Non-ag
- Urban
- Not surveyed

Drawn by Paul Taylor 29/04/2022, Verified by John Grylls 29/04/2022

N W E S

0 100 200 300 400

Metres

Scale: 1:10,000 at A3 size

ADAS, Unit 14, Newton Court, Pendeford Business Park,
Wolverhampton. WV9 5HB. Tel +44(0)1902 271300

ADAS

1050859

Document Path: C:\aa Covid_19\Highways_Eng xlA3L_ALC_Auger_Maps_ALTS_28April2022.mxd

Appendix 2: Penrith to Temple Sowerby - Auger boring descriptions and ALC map

Auger Boring Descriptions

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
30	354000 529095	PGR	38 65 120	msl ms ms	7.5YR3/3 2.5YR4/6			5 10			hr hr			I	2		FCD climatic limitation grade 2
31	354150 528975	PGR	40 65 120	msl ms ms	10YR3/3			5 15			hr hr			I	2		augered to 40cm stone
32	NY 54478, 29202	PGR	40 60	slt org msl msl	vr dk br gry br			3-5 10-20		fw	mx sst	40		2	2		TS OM and dark colour decreases markedly with depth, impenetrable below 60cm, elevated river terrace.
33	354499 528921	PGR	38 40 50 120	scl scl scl scl	10YR4/2 7.5YR4/3 7.5YR4/3			 15 15			 hr hr			I	2		FCD 218 NEARBY NY526293
34	NY 54501, 29302	PGR	30 60	fsl msl	dk br br			5-10 >50		fw	sst + mx mx			1	2		River floodplain, flat, very subtle TS-SS colour change, impenetrable below 60cm, possibly disturbed?
35	354500 528800	PGR	99 45 60 120	msl lms ms ms	7.5YR3/3 7.5YR4/4 7.5YR4/6			2 5			hr hr			I	2		stone at 50cm difficult t0 auger 60cm gravel fragments 60cm
36	354600 529300	PGR	35 65 75 120	mcl mcl cs cs	7.5YR3/3 5YR3/4 5YR4/6			3 3 5			hr hr hr			I	2		
37	354600 529200	PGR	35 43 65 120	scl scl scl cs	7.5YR3/3 7.5YR4/4			5 5 15			hr hr hr			I	2		GRAVEL AT 43CM
38	354600 528930	PGR	40 120	msl ms	7.5YR3/4			5			hr			I	2		STONE AT 4CM
39	354600 528930	PGR	33 40 100	lms lms cs	5YR3/4 5YR4/6 5YR4/6									I	2		difficult to auger 60cm stone

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
			120	cs													
40	3592790 528790	PGR	38 43 70 120	lms lms cs cs	7.5YR4/4 7.5YR4/6 7.5YR4/6			2			hr			I	2		ohp
41	354600 528700	PGR	40 50 120	msl lms ms	7.5YR4/4 7.5YR4/4			2			hr			I	2		stone at 50cm
42	354699 528709	PGR	40 45 65 120	msl lms lms ms	7.5YR3/3 7.5YR3/3 5YR4/6			3 5			hr hr			I	2		gravel at 90cm
43	NY 54700, 29200	PGR	26 60 80	lms lms lms / ms	br red br red / ye br			< 1 3-5 5-10			 peb & grvl grvl	60+ ?		1	2		Rolling undulating landscape, 4-7° slope, impenetrable gravel at 80cm.
44	NY 54700, 29100	PGR	26 45 100	msl lms lms->ms	br red br lt yel br	 red br red br & ye br		5-10 10-20 1-3			sst hd sst qz hd sst & qz	45-60		2	2		Very subtle colour change TS-SS
45	354700 528900	PGR	40 120	msl ms	7.5YR3/3 7.5YR5/3	7.5YR5/6 7.5YR5/6	c c	20			hr			i	2		pipeline difficult to auger 40cm - gravel
46	354700 528800	PGR	40 45 60 120	msl msl lms ms	7.5YR3/4 7.5YR3/4 7.5YR3/4			5 15			hr hr hr			I	2		stone stopped auger 60cm
47	NY 54800, 29200	PGR	25 45 100	lms lms scl	dk oran br re ye ye rd & pk	 oc & Fe oc, gr & Fe	r lg c c	1-3 5-10 10-20			 sst	25	GW	3	3a		Bottom of slope of dry valley feature, wet - GW below 45cm, sandy lenses/bands between 60-80cm.
48	NY 54800, 29100	PGR	28 70 100	scl scl msl ts!	dk gr br pk rd dk gr br	 lt br & gr br	 f	3-5 5-10 1-3			rd sst + mx hrd, r lg cob sst	28	45?	III?	3a		Disturbed, possibly worked for minerals, (sand and gravel), impenetrable at 95cm
49	NY 54800, 29000	PGR	25 50	msl scl	dk gr br rd br	oc gr	r c	3-5 20-30			sst + mx mx	30	45	IV	3b		Disturbed, 10m from A66 boudry, wet 40cm, impenetrable below 50cm
50	354800 528800	PGR	35 70	msl lms	7.5YR3/3 7.5YR3/3			3 5			hr hr			I	2		

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
			120	ms													
51	354800 528900	PGR	30 39 45 120	csl lms ms ms	7.5YR3/3 7.5YR3/3 5YR4/6			3 15			hr hr			I	2		gravel present 45cm
52	NY 54900, 29200	PGR	30 55	fsl scl	dk gr br dk gr br			3-5 10-20			hd sst sst			3	3a		Flat area next to stream, impenetrable below 55cm
53	NY 54900, 29019	PGR	30 50	slt org msl msl	dk br br + ye			10-20 50		fw	sst + mx, & lg cob hd sst		>50	3	3a		Impenetrable below 50cm
54	354900 528900	PGR	20 75 80 120	csl lms ms cs	7.5YR3/4 7.5YR4/6 5YR4/4			3			hr			I	2		
55	354900 528800	PGR	30 65 120	msl lms ms	7.5YR3/3 5YR4/4 5YR4/4			3			hr			I	2		
56	NY 55000, 29000	PGR	20 40 80	msl lms ms	dk br gr lt gr	 oc & lt gr distinct oc	 c c	5-10 5-10 1-3			sst + mx, & lg cob hd sst hd sst	20	>80	2	2		Impenetrable at 85cm
57	355000 528900	PGR	35 40 60 120	msl msl lms ms	7.5YR3/4 7.5YR3/4 7.5YR3/4 5YR3/4			3 15			hr hr			I	2		augered to 70cm stone
58	335100 528900	PGR	39 60 80 120	msl lms omsl ms	7.5YR3/3 7.5YR3/3 7.5YR2.5/2 5YR5/2			2 2			hr hr			I	2		some wet areas nearby- exposed drainage pipe
59	NY 55100, 29000	PGR	24 45 60	fsl lms lms	dk br gr br gr		 c	5-10 3-5 5-10			sst + mx, & lg cob hd sst hd sst	50		1	2		4-7° slope, reddish yellow below 50cm, impenetrable below 60cm, very high pebble content.
60	355200 528900	PGR	39 50 80 120	msl lms ms ms	7.5YR3/3 7.5YR4/3 10YR5/2 10YR5/2	 10YR5/6	 c	2			hr	50		I	2		TABLE 13
61	NY 55200, 29000	PGR	30 75	lms lms	dk br dk ye rd	 lt ye rd & gr	 c > 40cm	3-5 10-20		fw	pebl & cob pebl & grvl	40		II	I		Top of a hill, impenetrable at 75cm

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
62	355300 528900	PGR	38 40 120	csl ms ms	7.5YR3/3 5YR4/6 5YR4/6			20			hr			I	2		difficult to auger 40cm gravel
63	355300 528986	PGR	30 120	msl cs	7.5YR3/3 7.5YR3/3			20			hr			I	2		difficult to auger 30cm see 68 (14/2)
67	355400 529000	PGR	30 40 120	csl lms cs	7.5YR3/3 7.5YR3/3 7.5YR3/3			20			hr			I	2		difficult to auger 40cm
68	355400 528900	PGR	30 120	csl cs	7.5YR3/3			20			hr			I	2		droughtiness inspection pit
69	355400 528800	PGR	35 45 50 120	csl lms ms ms	7.5YR3/3 7.5YR3/3 7.5YR4/6 7.5YR4/6			5 5			hr hr			I	2		
73	355500 529000	PGR	30 39 50 120	csl lms ms ms	7.5YR3/3 7.5YR4/4 5YR4/4 5YR4/4			20			hr			I	2		difficult to auger 50cm+
74	355500 528900	PGR	30 120	csl cs	7.5YR3/3			20			hr			I	2		
75	355500 528800	PGR	38 45 70 120	lcs lcs cs cs	7.5YR2.5/2 7.5YR2.5/3 7.5YR4/6 7.5YR4/6			2			hr			I	2		wet sand at 70cm
79	355621 528989	PGR	30 40 50 70 120	mzcl mzcl hzcl scl ms	7.5YR4/3 7.5YR5/2 7.5YR4/2 7.5YR4/2 7.5YR5/2	c	7.5YR5/6					40	40	III	3a		near stream; wet S at 70cm;flood risk FCD<225
80	355683 529293	RGR	30 70	msl lms	7.5YR3/3 7.5YR3/4									I	3b		FLOOD RISK 3-CLOSE TO R EAMONT

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
			120	ms	7.5YR3/4												
81	355700 529000	PGR	20 40 120	csl lms ms	5YR4/4 5YR3/4 5YR3/4			20			hr			I	2		check droughtiness
82	355800 528960	PGR	30 55 80 120	msl scl msl scl	7.5YR3/4 5YR3/4 5YR4/4 5YR4/4									I	2		no stone
83	355900 529000	PGR	30 40 60 120	msl scl scl scl	7.5YR3/4 5YR3/4 5YR3/4 5YR3/4			20			hr			I	2		stone stopped auger at 60cm
84	355900 528885	PGR	39 90 120	msl scl scl	7.5YR3/3 5YR4/4 5YR4/4			2			hr			I	2		soil wet at 80cm
85	356000 528950	WC	20 35 70 120	msl lms scl scl	7.5YR3/3 7.5YR3/3 5YR3/4 5YR3/4			6	6	3	hr			I	2		soil wet at 70cm
86	356101 528874	PGR	38 50 80 120	msl lms scl scl	7.5YR3/3 5YR4/4 5YR4/4 5YR4/4			10			hr			I	2		
87	356200 528925	WC	35 100 120	msl ms ms	7.5YR3/4 5YR3/4 5YR3/4			5	5		hr			I	2		
88	356295 529127	WC	35 60 75 120	msl lms ms ms	7.5YR3/4 5YR3/4 5YR4/4 5YR4/4			5 20	5		hr hr			I	2		auger stopped at 75cm stone
89	356300 528860	PGR	38 48 58 120	msl lms ms scl	7.5YR3/3 5YR4/4 5YR4/4 5YR4/4			10			hr			I	2		
90	356341 529035	WC	30 38	msl msl	7.5YR3/4 5YR3/4			5	5		hr			I	2		auger stopped at 48cm

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
			48	lms	5YR4/4			20			hr						
			120	ms	5YR4/4												
91	356400 528950	WC	40	msl	7.5YR3/3			3	3		hr			I	2		soil moist at 90cm
			80	lms	5YR3/4												
			90	ms	5YR4/4												
			120	ms	5YR4/4												
92	356500 529000	WC	33	msl	7.5YR3/4			5	5					I	2		stone at 70cm
			55	lms	5YR3/4												
			70	scl	5YR3/4												
			120	ms	7.5YR4/2			20			hr						
94	356500 528800	WC	38	msl	7.5YR3/3			5	5		hr			I	2		FCD 216 climate limitation G2
			65	ms	2.5YR4/6			10			hr						
			120	ms													
95	356510 528714	WC	40	msl	10YR3/3			5	5		hr			I	2		augered to 40cm stone
			65	ms				15			hr						
			120	ms													
96	356600 528900	WC	40	msl	7.5YR3/4			3	3		hr			I	2		
			110	ms	5YR4/6												
			120	ms	5YR4/6												
97	356600 528800	WC	38	scl	10YR4/2			5	5					i	2		FCD 218 NEARBY NY526293
			40	scl	7.5YR4/3												
			50	scl	7.5YR4/3			15			hr						
			120	scl				15			hr						
98	356600 528700	WC	35	mcl	7.5YR3/3			3			hr			I	2		
			65	mcl	5YR3/4			3			hr						
			75	cs	5YR4/6			5			hr						
			120	cs													
99	356700 528900	WC	35	MSL	7.5YR3/4			3	3		hr			I	2		check droughtiness
			48	lms	7.5YR3/4												
			100	ms	5YR3/4												
			120	MS	5YR3/4												
100	356700 528800	WC	35	scl	7.5YR3/3			5	5		hr			I	2		GRAVEL AT 43CM
			43	scl	7.5YR4/4			5			hr						
			65	scl				15			hr						
			120	cs													
101	356700 528700	WC	40	msl	7.5YR3/4			5			hr			I	2		STONE AT 4CM
			120	ms				15			hr						

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
102	356800 529100	PGR	38 43 75 120	lms lms ms ms	7.5YR4/4 7.5YR4/6 5YR4/6 5YR4/6									I	2		augered to 75cm stony at 75cm
103	356800 528900	WC	38 40 80 120	msl ms ms ms	7.5YR3/4 5YR3/4 5YR4/4 5YR4/4			5	5		hr			I	2		soil wet at 80cm field drainage problem?
104	356800 528800	WC	33 40 100 120	csl lms cs cs	5YR3/4 5YR4/6 5YR4/6			3 5 3	3		hr hr hr			I	2		difficult to auger 60cm stone;droughtiness checked Grade 2
105	356800 528700	WC	40 120	msl ms	7.5YR3/3 7.5YR5/3			3 10	3		hr hr			i	2		difficult to auger 40cm - gravel
106	356900 529100	PGR	30 45 80 120	msl lms ms ms	7.5YR3/3 7.5YR3/3 5YR4/4 5YR4/4									I	2		
107	356900 529000	PGR	38 55 70 120	lms ms ms ms	7.5YR2.5/3 7.5YR2.5/3 7.5YR3/3 7.5YR3/3			20			hr			I	2		
108	356900 528900	PGR	28 120	lms ms	7.5YR4/4			20			hr			I	2		auger stopped at 28cm several attempts stone; droughtiness MBw +6 MBp +4
109	356900 528800	WC	38 100 120	lms ms ms	7.5YR3/4 5YR4/6			3	3		hr			I	2		
110	356900 528700	WC	35 60 90 120	msl ms ms ms	7.5YR3/4 5YR4/4 2.5YR4/6 2.5YR3/6			3	3		hr			I	2		
111	356980 528800	WC	42 90 120	msl ms ms	7.5YR3/3 5YR4/6			5	5		hr			I	2		augered to 100cm
112		WC	38	msl	7.5YR3/3			2	2		hr			I	2		

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
	356980 528700		110 120	ms ms	5YR4/6						hr						FCD 216 climate limitation G2
113	356991 529100	PGR	30 43 60 120	msl lms lms scl	7.5YR3/3 7.5YR3/3 7.5YR4/3 5YR4/4									I	2		augered to 90cm no stone
114	357000 529000	PGR	45 60 80 120	lms ms ms ms	7.5YR2.5/3 7.5YR3/3 7.5YR3/4 5YR4/6									I	2		
115	357011 528899	PGR	28 120	msl ms	7.5YR3/4 7.5YR3/4									I	2		
116	357100 529100	PGR	38 48 60 120	msl lms ms ms	7.5YR3/4 7.5YR3/4 5YR4/4 5YR4/4			20			hr			I	2		
117	357100 529000	PGR	30 60 70 120	msl lms ms ms	7.5YR3/3 7.5YR3/3 5YR3/4 5YR3/4			20			hr			I	2		auger stopped at 70cm
118	357100 528900	PGR	39 90 120	lms ms ms	7.5YR3/3 2.5YR3/6 2.5YR3/6									I	2		
119	357100 528800	WC	39 100 120	lms ms ms	7.5YR3/4 2.5YR3/6			2	2		hr			I	2		
120	357100 528700	WC	40 50 120	lms ms ms	7.5YR3/2 5YR4/6			2 10	2		hr hr			I	2		stone at 50cm 3 attempts
121		PGR	30	msl	7.5YR4/4												

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
	357200 529000		120	ms	7.5YR4/4			20			hr						stone stopped auger at 40cm
122	357200 528800	WC	39 90 120	msl ms fs	7.5YR4/4 7.5YR4/6 7.5YR4/6			3			hr			I	2		
123	357200 528700	WC	35 58 100 120	msl msl ms ms	7.5YR3/3 7.5YR2.5/2 5YR4/6			5			hr hr			I	2		
124	357212 528899	PGR	38 120	msl lms	7.5YR3/4 5YR4/4									I	2		soil moist at 50cm and saturated below 60cm
125	357300 528900	WC	30 120	msl ms	7.5YR4/4 5YR3/4			20			hr			I	2		auger stopped at 30cm 2 attempts
126	357300 528800	WC	35 60 100 120	msl lms lms ms	7.5YR3/4 7.5YR3/4 7.5YR3/4			5			hr			I	2		
127	357300 528700	WC	39 50 100 120	csl lms ms ms	7.5YR3/4 5YR4/4 5YR4/4			3	3		hr hr hr			I	2		
128	357300 528600	WC	38 50 110 120	msl lms ms ms	7.5YR3/3 7.5YR4/3 5YR4/6			3	3		hr			I	2		
129	357400 528700	PGR	39 55 80 120	msl lms ms ms	7.5YR3/3 5YR4/4 5YR4/4			3	3		hr			I	2		
130			38	lms	7.5YR3/4			5	5	2	hr			I	2		

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
	357500 528700	GREEN COVER CROP	50 120	ms ms	5YR4/6 5YR4/6			20			hr						overall climate limitation Grade 2;
131	357515 528800	GREEN COVER CROP	38 43 70 120	lms lms ms ms	7.5YR3/3 5YR3/4 5YR4/6 5YR4/6			5 20	5	1	hr hr			I	2		auger stopped 70cm
132	357600 528800	GREEN COVER CROP	38 50 120	lms ms ms	7.5YR3/3 5YR4/6 5YR4/6			3 20	3		hr hr			I	3a		auger stopped 50cm droughtiness limitation
133	357600 528700	GREEN COVER CROP	38 40 50 120	lms ms ms ms	7.5YR3/4 7.5YR5/6 7.5YR4/6 7.5YR4/6			3 20	3	1	hr hr			I	3a		Droughtiness checked 3a
134	357700 528785	GREEN COVER CROP	30 38 70 120	msl lms ms ms	7.5YR3/4 7.5YR3/3 2.5YR3/6 2.5YR3/6			6 20	6	3	hr hr			I	2		
135	357700 528700	GREEN COVER CROP	30 38 60 120	msl lms ms ms	7.5YR3/3 7.5YR3/4 5YR4/4 2.5YR4/6			5	5	2	hr			I	2		augered to 90cm no stone
137	357900 528750	GREEN COVER CROP	30 43 80 120	msl ms scl scl	7.5YR2.5/3 7.5YR5/4 2.5YR4/4 2.5YR4/4	c	10YR5/6					43		II	2		saturated at 60cm augered to 80cm pockets of pale S +och motts below 40cm
139	358100 528725	GREEN COVER CROP	30 50 120	msl hcl hcl	7.5YR3/3 5YR4/4 5YR4/4			6 20	6	4	hr hr			IV	3b		saturated at 50cm assume spl >50cm augered stopped at 60cm ; figure 7; surface soft to walk over
140	358160 528600	GREEN COVER CROP	40 60 120	lms ms ms	7.5YR3/4 2.5YR3/6 2.5YR3/6			4 20	4	1	 hr			I	2		auger stopped at 60cm stone droughtiness checked Grade 2
141	358160 528500	GREEN COVER CROP	30 70 120	lms ms ms	7.5YR3/4 2.5YR4/6 2.5YR4/6			4 20	4	1	 hr			I	3a		auger stopped at 70cm stone
144			40	msl	7.5YR3/4			2	2		hr			I	2		

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
	358400 528700	stubble turnips	48 55 120	lms ms ms	7.5YR3/4 5YR4/6 5YR4/6												
146	359600 528675	stubble turnips	40 50 120	msl ms ms	7.5YR3/3 7.5YR4/4 7.5YR4/4			2	2		hr			I	2		droughtiness checked- Grade 2
148	358761 528577	PGR	20 50 120	msl scl scl	7.5YR3/4 7.5YR3/3 7.5YR3/3			20			hr			II	3a		stone at 50cm; saturated at 50cm ; subsoil assumed to be scl to depth
149	358800 528645	PGR	25 40 45 120	scl scl scl scl	10YR4/2 7.5YR4/3 5YR4/4 5YR4/4	10YR5/6	C					25		III	3a		mottles present at 25cm; soil saturated at 40cm; field drainage issue?
669		Arable	35 73 100	CSL CSL LCS	7.5YR43 Br 7.5YR62 Pi Gr 7.5YR42 Pi Gr		 c c	3 4 2		1	 hr hr	35		II	2		
670		Arable	28 58	CSL CSL	7.5YR43 Br 7.5YR53 Br		C	3 5		1	hr hr	28		II	2		Impenetrateable by stone at 58cm
671		Arable	23 58 100	MSL CSL CSL	5YR42 Dk rd gr 2.5YR64 Li Rd Br 2.5YR64 Li Rd Br		 C C	4 4 4		1	hr hr hr	23		II	2		
672		Arable	24 56 77	MSL SCL SCL	7.5YR53 Br 2.5YR64 Li Rd Br 2.5YR64 Li Rd Br		 C C	4 4 4		1	hr hr hr	24		II	2		Impenetrateable by stone at 58cm
673		Arable	30 63 80 100	CSL LCS CSL CSL	5YR52 Rd Gr 2.5YR53 Rd Br 2.5YR54 Rd Br 2.5YR64		 C C C	4 4 4 2		1	hr hr hr hr	30		II	2		Watertable at 80cm
674		Arable	26 43 65 100	OrgCSL LCS CS CS	7.5YR53 V Dk Gr 7.5YR63 Lt Br 2.5YR42 Wk Rd 7.5YR53 Br		 C C					26		II	2		Watertable at 70cm

Highways England

A66 Northern Trans-Pennine

Penrith to Temple Sowerby
Agricultural Land Classification (ALC) Survey Results

- Order Limits
- Auger locations

ALC

- 2
- 3a
- 3b
- 4
- 5
- Non-ag
- Urban
- Not surveyed

Drawn by Paul Taylor 29/04/2022, Verified by John Grylls 29/04/2022

N W E S

0 100 200 300 400
Metres

Scale: 1:20,000 at A3 size

ADAS, Unit 14, Newton Court, Pendeford Business Park,
Wolverhampton. WV9 5HB. Tel +44(0)1902 271300

1050859

Document Path: C:\aa Covid_19\Highways_Eng xlA3L_ALC_Auger_Maps_ALTS_28April2022.mxd

Appendix 3: Temple Sowerby to Appleby - Auger boring descriptions and ALC map

Auger Boring Descriptions

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
154	361600 526400	PGR	39	msl	7.5YR3/6			5			hr			I	2		augered to 90cm no stone
			58	msl	5YR4/4												
			80	scl	5YR4/4												
			120	ms	5YR4/6												
155	361600 526300	PGR	38	msl	7.5YR3/3			5			hr			I	2		Augered to 50cm stone stopped auger
			50	scl	5YR4/4												
			120	scl	5YR4/4			20			hr						
156	361600 526200	PGR	38	scl	7.5YR3/3			5									
			60	scl	5YR5/3	7.5YR5/6	c					38	>80	III	3a		soil saturated at 60cm table 13; stone at 60cm
			120	scl	5YR3/3			20			hr						
157	361700 526300	PGR	39	msl	7.5YR3/3			5			hr						
			50	scl	5YR4/4									I	2		stone at 50cm
			120	scl	5YR4/4			20			hr						
158	361700 526200	PGR	43	lcs	7.5YR2.5/3			5			hr						
			90	cs	2.5YR3/6									I	3a		augered to 90cm no stone droughtiness checked 3a
			120	cs	2.5YR3/6												
159	361800 526300	PGR	35	msl	7.5YR2.5/3			5			hr						
			80	ms	5YR4/4									I	2		soil moist at 60cm augered tom90cm
			90	scl	5YR4/3												
			120	scl	5YR4/3												
160	361900 526300	PGR	39	msl	7.5YR3/4			5			hr						
			43	ms	2.5YR3/6									I	2		auger stopped at 43 cm stone ; 2 droughtiness
			120	ms	2.5YR3/6			20			hr						
161	362000 526345	PGR	30	msl	7.5YR4/4			5	5	1	hr						
			39	msl	7.5YR4/4			15			hr			I	2		difficult toauger 30cm stone; stone assessment from cutting at edge of field ; droughtiness checked Grade 2
			120	ms	2.5YR3/6			20			hr						
162	362100 526240	LEY	40	msl	7.5YR4/4			5			hr						
			50	scl	5YR3/4									I	2		augered to 50cm stone (ley- dairy)
			120	scl	5YR3/4			20			hr						
163	362200 526200	LEY	38	msl	7.5YR3/3			5			hr						
			45	scl	7.5YR3/2												
			60	scl	7.5YR5/2	10YR5/6	c					60	65	III	3a		Augered to 65cm stone stopped auger
			120	c	5YR5/4			20			hr						

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
164	362300 526150	LEY	30 40 70 120	scl scl scl c	7.5YR3/3 7.5YR4/4 5YR4/4 5YR4/4			5 20			 hr			III	3a		soil saturated at saturated at 65cm- assume C as per AB163
165	362400 526200	LEY	30 40 60 120	msl msl msl scl	5YR3/3 5YR3/3 5YR4/3 5YR4/3			5 20			hr hr			I	2		stone at 60cm 60cm msl/scl
166	362400 526100	LEY	40 120	scl scl	5YR3/3 5YR3/3			5 20			hr hr			I	2		
167	362500 526200	LEY	39 65 120	msl sc sc	5YR3/3 2.5YR3/6 2.5YR3/6			5 20			hr hr		39	IV	3b		augered to 65cm stopped stone; red soil assume spl fig 7
168	362510 526110	LEY	38 70 120	msl c c	5YR3/3 5YR4/4 5YR4/4	10YR5/6	m	5			hr			IV	3b		saturated at 50cm pockets of mottled sand 38cm
169	362600 526300	LEY	40 86 110 120	lms lms ms ms	7.5YR4/4 7.5YR2.5/3 2.5YR3/6 2.5YR3/6			5	5		hr hr hr			I	2		augered to 110cm no stone
170	362600 526200	LEY	39 80 120	lms ms ms	7.5YR2.5/3 2.5YR3/6 2.5YR3/6			5 20			hr hr			I	2		augered to 80cm stopped stone
171	362600 526100	PGR	40 90 100 120	msl lms ms ms	7.5YR3/2 7.5YR3/3 2.5YR3/3 2.5YR3/3									I	2		augered to 100 no stone
172	362700 526100	PGR	35 40 70 120	msl lms ms ms	7.5YR3/3 7.5YR4/4 5YR4/4 5YR4/4			 20			 hr			I	2		stone stopped auger at 70cm
173	362700 526000	PGR	30 40 90 120	msl lms ms ms	7.5YR3/3 7.5YR3/3 5YR3/3 5YR3/3			 20			 hr			I	2		stone stopped auger at 90cm

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
174	362799 525916	PGR	39 42 120	msl ms ms	7.5YR3/3 5YR4/4 5YR4/4			 15 20			 hr hr			I	2		sand and gravel at 42cm
175	362800 526100	PGR	35 40 70 120	msl lms ms ms	7.5YR2.5/3 5YR3/3 5YR4/3 5YR4/3			5 20	5	3	hr hr			I	2		sheep stubble turnips- soil moist at 70cm
176	362800 526000	PGR	35 50 80 120	msl scl ms ms	7.5YR2.5/3 5YR3/4 5YR4/4 5YR4/4			 20			 hr			I	2		stony at 80cm
177	362900 526100	PGR	40 70 80 120	msl lms ms ms	7.5YR4/4 7.5YR3/4 5YR3/4 5YR3/4			 20			 hr			I	2		stone at 80cm
178	362900 526000	PGR	43 70 120	msl scl scl	7.5YR3/3 5YR4/4 5YR4/4			 20			 hr			I	2		stone at 70cm
179	362910 526200	PGR	30 40 45 120	msl lms ms ms	7.5YR3/2 7.5YR3/2 5YR4/4 5YR4/4			 20			 hr			I	2		sand and gravel at 45cm
180	363000 526200	LEY	35 40 80 120	msl lms lms ms	7.5YR3/3 5YR3/4 5YR3/4 5YR3/4			5 10 20	5	1	hr hr hr			I	2		auger stopped at 40cm stone
181	363000 526100	PGR	38 43 50 120	msl lms ms ms	7.5YR3/3 7.5YR3/2 5YR3/4 5YR3/4			 20			 hr			I	2		stone at 50cm
182	363000 526000	LEY	35 70 80 120	msl msl lms ms	7.5YR2.4/2 5YR3/2 7.5YR3/4 7.5YR3/4			5 20	5	1	hr hr			I	2		augered to 80cm stopped by stone
183	363100 526200	WC	38 78 100 120	msl lms ms ms	7.5YR2.5/2 7.5YR2.5/3 2.5YR2.5/3 2.5YR2.5/3			3 	3		hr 			I	2		augered to 100cm

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
184	363100 526100	LEY	38 50 80 120	msl lms lms ms	7.5YR2.5/3 7.5YR3/4 7.5YR3/4 7.5YR3/4			5 15 20	5	1	hr hr hr			I	2		auger stopped at 50cm
185	363100 526000	LEY	35 45 75 120	msl msl lms ms	7.5YR3/3 5YR3/3 5YR3/4 5YR3/4			5 20	5	1	hr hr			I	2		auger stopped at 80cm
186	363100 525900	LEY	35 65 80 120	msl msl lms ms	7.5YR2.5/3 5YR3/3 5YR3/2 5YR3/2			5 20	5	1	hr hr			I	2		auger stopped at 80cm
187	363200 526200	WC	38 58 90 120	msl msl scl scl	7.5YR2.5/3 7.5YR3/3 7.5YR4/4 7.5YR4/4			3	3		hr			I	2		
188	363200 526100	LEY	35 43 80 120	msl scl scl scl	7.5YR3/3 7.5YR3/3 5YR4/4 5YR4/4			5 10	5	1	hr hr			I	2		augered to 80cm no stone, no mottling
189	363200 526000	LEY	40 80 120	msl lms ms	5YR3/4 5YR3/4 5YR3/4			5 5 20	5	1	hr hr hr			I	2		auger stopped at 40cm by stone:2xs
190	363200 525900	LEY	35 43 60 120	msl msl lms ms	7.5YR2.5/3 7.5YR3/4 2.5YR3/4 2.5YR3/4			5 20	5	1	hr hr			I	2		augered to 70cm stone present
191	363300 526300	FAL	38 40 55 120	msl lms ms ms	7.5YR2.5/3 5YR3/4 7.5YR4/4 5YR4/4			3	3	1	hr			I	2		
192	363300 526200	FAL	38 80 120	msl scl scl	7.5YR3/4 2.5YR3/4 2.5YR3/4									III	3a		common Manganese below 38cm Table 13 FCD 213
193	363300 526100	LEY	35 80 120	msl scl scl	7.5YR3/3 7.5YR3/4 7.5YR3/4			5 10	5	1	hr hr			I	2		augered to 80cm (heavy rain shower and wind)
194	363350 526000	LEY	35 80 120	msl scl scl	7.5YR3/4 5YR4/4 5YR4/4			5 10	5	1	hr hr			I	2		point above a low lying part (archaeological pit) with standing water.

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
195	363400 526700	PGR	35 40 120	msl scl scl	7.5YR2.5/3 7.5YR3/3 7.5YR3/3			20			hr			II	2		stone at 40cm stopped auger no gleying <40cm table 13
196	363400 526600	PGR	30 35 120	scl hcl hcl	5YR3/4 7.5YR5/3 7.5YR5/3	c	10YR5/6	15			hr			III	3a		difficult to auger 35cm stone
197	363400 526400	PGR	38 50 70 120	scl scl hcl hcl	7.5YR2.5/3 5YR4/6 5YR3/4 5YR3/4								50	IV	3b		assume spl 50+ red soil fig 7.
198	363400 526300	PGR	40 50 80 120	msl scl scl scl	7.5YR3/4 7.5YR3/4 7.5YR4/4 7.5YR4/4									I	2		no stone, soil wet at 80cm
199	363400 526200	FAL	38 40 70 120	msl scl hcl c	7.5YR4/4 5YR4/4 5YR4/4 2.5YR3/6			3 10	3		hr hr		70	III	3a		spl 70cm fig 8
200	363401 526085	LEY	38 40 70 120	msl msl scl hcl	7.5YR3/3 7.5YR3/3 7.5YR5/3 5YR4/4	7.5YR5/6	m	5 10	5	1	hr hr	70	>80	II	2		
201	363500 526600	LEY	39 60 100 120	scl scl scl scl	7.5YR3/4 7.5YR4/3 5YR4/3 5YR4/3			10			hr			I	2		augered to 100cm sl.stony at 70cm
202	363500 526500	LEY	40 55 120	scl scl scl	7.5YR3/3 7.5YR4/3 7.5YR4/3			3	3		hr			I	2		augered to 55cm
203	363500 526400	LEY	38 70 75 120	scl scl c c	7.5YR4/4 7.5YR3/4 5YR3/4 5YR3/4			5			hr		70	III	3a		manganese present 70cm assume spl
204	363500 526300	PGR	40 80 90 120	msl scl scl scl	7.5YR3/4 7.5YR3/3 7.5YR4/4 7.5YR4/4									I	2		
205	363500 526200	FAL	25 50 100 120	msl scl scl scl	7.5YR3/3 2.5YR3/6 2.5YR3/6 2.5YR3/6			20			hr			I	2		grass sprayed off after cereal crop

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
206	363500 526100	FAL	38	msl	7.5YR3/4								60	III	3a	3a	
			48	lms	5YR3/4												
			60	c	2.5YR3/4			10			hr						
			120	c	2.5YR3/4												
207	363600 526400	FAL	39	msl	7.5YR2.5/3			3	3		hr			I	2		augered to 100cm
			80	msl	5YR4/4												
			100	msl	7.5YR3/4												
			120	msl	7.5YR3/4												
208	363600 526300	FAL	38	msl	7.5YR2.5/3			3	3		hr			I	2		augered to 40cm stone present
			40	msl	7.5YR3/3												
			70	lms	7.5YR3/3			15			hr						
			120	ms	7.5YR3/3												
209	363615 526185	FAL	35	msl	7.5YR3/2			5	5	1	hr			I	2		augered to 55cm stopped by gravel
			55	msl	7.5YR3/3												
			80	lms	7.5YR3/3			10			hr						
			120	ms	7.5YR3/3			20			hr						
210	363650 526100	FAL	30	msl	7.5YR3/2			5	5	1	hr			I	2		augered to 100cm
			58	msl	7.5YR3/2												
			100	lms	7.5YR3/3												
			120	ms	7.5YR3/3			20			hr						
211	363660 526490	FAL	35	msl	7.5YR2.5/3			3	3		hr			I	2		auger stopped at 80cm by stone
			60	msl	7.5YR3/4												
			80	ms	7.5YR3/3												
			120	ms	7.5YR3/3			20			hr						
212	363700 526400	FAL	38	msl	7.5YR2.5/3									I	2		augered to 55cm stone
			40	lms	7.5YR4/4												
			55	ms	5YR4/6												
			120	ms	5YR4/6			20			hr						
213	363700 526300	FAL	38	msl	7.5YR2.5/3								60	III	3a		red soil stone at 63cm stopped auger
			55	scl	7.5YR3/3												
			60	scl	5YR4/4												
			120	c	5YR4/4			20			hr						
214	363700 526200	LEY	35	msl	7.5YR2.5/2			5	5	1	hr			I	2		augered to 100cm
			80	lms	7.5YR2.5/3												
			100	ms	5YR4/6												
			120	ms	5YR4/6			20			hr						
215	363800 526400	FAL	35	msl	7.5YR2.5/3			3			hr		60	III	3a		auger stopped at 50cm stone
			50	scl	7.5YR3/2												
			60	scl	5YR4/4			20			hr						
			120	c	5YR4/4												
216	363800 526300	FAL	38	msl	7.5YR2.5/3			3			hr						
			40	scl	7.5YR3/3												
			60	ms	5YR4/3	c	7.5RY5/6					60	>80	I	2		augered to 60cm stone
			120	ms	5YR4/3			20			hr						

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
217	363800 526200	LEY	40 60 120	msl scl scl	7.5YR2.5/3 7.5YR3/4 7.5YR3/4									I	2		soil saturated at 80cm and wet soil 60cm+ (WCI)
218	363885 526400	LEY	35 55 70 120	msl lms ms ms	7.5YR3/3 7.5YR3/4 7.5YR3/4 7.5YR3/4			20			hr			I	2		stone at 70cm
219	363900 526300	LEY	38 58 80 120	msl msl scl scl	7.5YR3/3 7.5YR3/4 7.5YR4/4 5YR4/4			20			hr			I	2		stone at 90cm+
220	363900 526200	LEY	39 68 90 120	msl msl c c	7.5YR3/4 7.5YR4/3 2.5YR3/4 2.5YR3/4							68	68	III	3a		>68cm manganese and mixed colours
221																	Not Surveyed
222	364000 526300	LEY	25 78 80 120	msl scl c c	7.5YR3/3 5YR4/4 5YR4/6 5YR4/6								78	II	2		marginal WCII/III
223	364000 526200	LEY	38 75 80 120	msl msl ms ms	7.5YR2.5/3 5YR3/3 5YR3/4 5YR3/4									I	2		soil moist below 80cm
224	364100 526500	LEY	20 30 50 120	mcl mcl c c	7.5YR4/2 7.5YR4/2 5YR4/3 5YR4/3	10YR5/6 10YR5/6	m m					20	30	IV	3b		wet on surface. Near gypsum works- geology gypsum bedrock and till deposits
225	364100 526300	LEY	35 40 68 120	msl msl scl c	7.5YR2.5/3 7.5YR3/3 5YR3/3 5YR4/4			20			hr		68	III	3a		stone at 70cm
226	364100 526200	LEY	35 50 60 120	msl scl c c	5YR3/3 5YR3/3 5YR5/4 5YR5/4	7.5YR5/6	c	20			hr	35	50	IV	3b		topsoil msl/scl stone at 60cm
227	364100 526100	LEY	40 60 120	msl scl c	7.5YR2.5/2 7.5YR3/3 5YR5/4			20			hr		60	III	3a		difficult to auger 60cm

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
228	364190 526500	LEY	35 65 120	mcl c c	5YR4/3 5YR4/6 5YR4/6	10YR5/6	m					35	35	IV	3b		wet on surface. Near gypsum works- overburden waste??
229	364200 526400	LEY	33 50 120	mcl c c	7.5YR4/2 5YR4/3 5YR4/3								33	IV	3b		
230	364200 526300	LEY	30 40 70 120	scl scl scl scl	7.5YR3/4 7.5YR3/3 7.5YR4/4 7.5YR4/4									I	2		stone at 70cm
231	364200 526200	LEY	40 68 75 120	msl scl c c	7.5YR3/2 7.5YR3/4 5YR4/4 5YR4/4	10YR5/6	m	20			hr	68	68	III	3a		stone at 80cm
232	364200 526100	LEY	30 48 50 120	scl scl scl c	7.5YR3/4 7.5YR3/3 5YR4/3 5YR4/3			20			hr		50	III	3a		stone at 50cm gravel in soil.
233	364200 526000	LEY	36 50 120	scl c c	7.5YR3/3 5YR3/3 5YR3/3	10YR5/6	c	20			hr	36	36	IV	3b		stone at 50cm
234	364300 526500	LEY	33 70 120	mcl c c	5YR4/2 5YR5/3 5YR5/3	7.5YR5/6	c					33	33	IV	3b		wet at surface
235	364300 526300	LEY	38 45 90 120	msl scl scl c	7.5YR4/4 7.5YR4/3 5YR4/3 5YR4/3	10YR5/6	c					75	>80	II	2		augered to 90cm mottling 70cm +
236	364300 526200	LEY	38 75 80 120	msl msl ms ms	7.5YR2.5/3 5YR3/3 5YR3/4 5YR3/4									I	2		soil moist below 80cm
237	364300 526100	LEY	35 40 68 120	msl msl scl c	7.5YR2.5/3 7.5YR3/3 5YR3/3 5YR4/4			20			hr		68	III	3a		stone at 70cm
238	364300 526000	LEY	35 50 60 120	msl scl c c	5YR3/3 5YR3/3 5YR5/4 5YR5/4	7.5YR5/6	c	20			hr	35	50	IV	3b		topsoil msl/scl stone at 60cm

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
239	364300 525900	Non Ag															caravan storage area with hardcore and soil bund for stripped soil. Classified as Non agricultural land- could be returned to agricultural use.
241	364400 526200	LEY	40 60 120	msl scl c	7.5YR2.5/2 7.5YR3/3 5YR5/4			20			hr		60	III	3a		difficult to auger 60cm
242	364400 526000	LEY	35 40 60 120	msl msl lms ms	7.5YR3/3 7.5YR3/4 7.5YR4/3 7.5YR4/4			20			hr			I	2		
243	364400 525900	LEY	40 60 80 120	msl msl lms ms	7.5YR2.5/3 7.5YR3/4 5YR3/4 5YR3/4			20			hr			I	2		stone at 80cm
245	364411 526099	LEY	35 55 65 120	msl scl scl c	7.5YR2.5/3 7.5YR2.5/3 5YR4/3 5YR5/4	 10YR5/6 10YR5/6	 c c					65	65	III	3a		
249	364500 526100	LEY	35 40 60 120	msl scl hcl c	7.5YR2.5/3 7.5YR3/3 5YR5/3 5YR4/4	 10YR5/6	 c	20			hr	40	60	III	3a		stone at 70cm
250	364500 526000	LEY	35 60 120	mcl hcl c	7.5YR3/3 7.5YR4/3 5YR4/4								60	III	3a		stone at 60cm
251	364500 525900	LEY	30 45 85 120	msl lms ms c	7.5YR2.5/3 7.5YR3/2 7.5YR4/3 5YR4/4								85	I	2		
252																	Not Surveyed
253	364508 525700	LEY	38 75 120	scl scl scl	7.5YR3/4 5YR5/6 5YR5/6			10			hr			III	3a		some manganese 38cm gravel fragments at 75cm table 13 used
254	364532 526338	LEY	30 40 70	scl scl scl	7.5YR3/4 7.5YR3/3 7.5YR4/4									I	2		stone at 70cm

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
			120	scl	7.5YR4/4												
255	364600 525900	LEY	35 50 120	msl lms c	7.5YR3/3 5YR3/3 5YR3/3			10			hr		50	III	3a		
256	364600 525600	LEY	38 70 120	msl lms scl	7,5YR2.5/3 5YR4/3 5YR4/4			10			hr			I	2		stone at 80cm
257	364600 525600	LEY	38 50 120	msl scl scl	7.5YR3/4 7.5YR3/3 7.5YR3/3			20			hr			I	2		stone at 50cm
258	364600 525500	LEY	38 43 90 120	scl scl scl scl	5YR3/4 5YR4/3 5YR4/4 5YR4/4									I	2		
259	364600 525404	WC	30 80 100 120	msl lms scl scl	7.5YR3/3 5YR3/4 5YR4/4 5YR4/4			3	3	1	hr			I	2		
260																	Not Surveyed
261																	Not Surveyed
262	364700 526000	LEY	30 35 80 120	mcl hcl c c	7.5YR3/3 7.5YR4/3 5YR5/3 5YR5/3	10YR5/6	m					35	35	IV	3b		
263	364700 525200	WC	30 70 120	msl ms fs	7.5YR3/3 2.5YR4/6 2.5YR3/6									I	2		droughtiness checked moisture balance grade 1
264																	Not Surveyed
265																	Not Surveyed

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
266																	Not Surveyed
268	364723 525823	LEY	35	msl	7.5YR3/3									I	2		augered to 100cm
			45	msl	7.5YR3/2												
			70	lms	7.5YR3/3												
			120	ms	2.5YR3/6												
269	364800 525900	LEY	35	mcl	7.5YR3/2	10YR5/6	c	20			hr	40	>80	II	3a		stone at 65cm
			40	hcl	7.5YR4/3												
			60	scl	5YR4/3												
			120	msl	5YR3/4												
270																	Not Surveyed
271																	Not Surveyed
276	364829 525263	WC	38	scl	7.5YR3/4								45	IV	3b		red soil fig 7 used
			45	scl	7.5YR4/4												
			80	c	5YR4/6												
			120	c	5YR4/6												

Highways England

A66 Northern Trans-Pennine

Temple Sowerby to Appleby Agricultural Land Classification (ALC) Survey Results

Order Limits

Auger locations

ALC

- 2
- 3a
- 3b
- 4
- 5
- Non-ag
- Urban
- Not surveyed

Drawn by Paul Taylor 29/04/2022, Verified by John Grylls 29/04/2022

N W E S

0 100 200 300 400

Metres

Scale: 1:25,000 at A3 size

ADAS, Unit 14, Newton Court, Pendeford Business Park,
Wolverhampton. WV9 5HB. Tel +44(0)1902 271300

ADAS

1050859

Temple Sowerby

Kirkby Thore

Crackenthorpe

Appleby

A66

361000 361500 362000 362500 363000 363500 364000 364500 365000 365500 366000 366500 367000 367500 368000

527500 527000 526500 526000 525500 525000 524500 524000 523500 523000 522500 522000 521500 521000

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Appendix 4: Appleby to Brough - Auger boring descriptions and ALC map

Auger Boring Descriptions

Soil Profile												Agricultural Land Classification						Notes
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Litho'	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)	
364	0 - 23 23 - 43 43 - 81 81 - 102	Dk Rd Gr Rd Br Rd Br Rd	CSL CS CS CS	- xxx xxx xxx	- no no no		0 0 0 0				organic	15	II	2		4	GR,MR	severely undulating microrelief, gullies, moorland
366	0 - 31 31 - 58 58 - 104	Dk Yl Br Rd Br Rd Br	CSL LCS CS	- xx x	- no no		1 2 2			2 2 2		8	I	2		3a	CL	
367	0 - 28 28 - 46	Br Br	CSL CSL	- xxx	- no		5 12			2 2	SBS at 46cm	10	II	2		3b	GR	
368	0 - 36 36 - 85 85 - 105	Rd Br Rd Br Rd Br	CSL CSL CS	- o o	- no no		0 0 0					10	I	1		3b	MR	
369	0 - 24 24 - 57 57 - 103	Br Rd Br Dk Rd Br	CSL LCS CSL	- xx xxx	- no no		2 1 1			2 2 1		3	I	1		3a	CL	
370	0 - 25 25 - 72 72 - 103	Rd Br Rd Br Rd Br	CSL CSL CSL	- x x	- no no		0 0 0					15	I	1		4	GR	
375	0 - 33 33 - 74 74 - 102	Rd Br Rd Br Rd Br	CSL CSL CSL	- xxx xxx	- no no		2 5 5			2 2 2	inclusions of scl	15	II	2		4	GR	
377	0 - 28 28 - 48 48 - 85	Rd Br Rd Br Rd Br	CSL CSL LCS	- xxx xxx	- no no		2 3 8			2 2 2	SBS aat 85cm	15	II	2		4	GR	
379	0 - 23 23 - 53 53 - 102	Dk Br Dk Gr Br Rd Br	MCL CSL CSL	- xxx xxx	- no no		0 0 0				scl in places	15	II	2		4	GR	saturated profile from 23cm, side of steep banking above road, spring line?

Soil Profile												Agricultural Land Classification						Notes
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Litho'	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)	
381	0 - 26 26 - 78 78 - 105	Br Br Yl Rd	MCL CSL CSL	- xxx xxx	- no no		2 0 0			2		15	II	2		4	GR,MR	saturated profile from 26cm, disturbed? soil store? microrelief mounds, coarse grasses, side of steep banking, spring line?
395	0 - 31 31 - 43 43 - 102	Br Rd + Br Rd	CSL CSL CSL	- o o	- no no		2 2 5			2 2 2		8	I	1		3b	GR	
396	0 - 32 32 - 39 39 - 103	Br Rd + Br Rd	CSL CSL CSL	- o o	- no no		2 2 5			2 2 2		8	I	1		3b	GR	
404	0 - 36 36 - 53 53 - 102	Br Br + Rd Br Rd Br	CSL SCL SCL	- xx x	- no no		2 2 5			2 2 2		10	I	1		3b	GR	
489	0 - 22 22 - 41 41 - 61 61 - 100	Dk Rd Gr Dk Rd Gr Dk Rd Gr Li Rd Br	Fib Pt SF Pt Hum Pt CSL	- x xx xxx	- no no no		0 0 0 0					15	V	5		5	WE,GR MR, CL	very variable slope, flat at boring, 15 deg 10m north, anaerobic, sphagnum prevalent
490	0 - 29 29 - 74 74 - 103	Br St Br Rd Br	CSL CSL SCL	- xx xxx	- no no		2 1 0			2 2		8	I	2		3b	CL,GR	
492	0 - 22 22 - 44 44 - 62 62 - 100	Br Gr Gr Gr	MCL HCL LCS CS	- xxx xxx xxx	- no no no		1 0 0 0			2		0	II	3a		3b	MR,GR,CL	
495	0 - 28 28 - 56 56 - 100	Br Rd Br Rd Br	CSL CSL CSL	- x xxx	- no no		0 4 0			2	nearly SBS	7	II	3a		3b	CL	
501	0 - 23 23 - 62 62 - 102	Br Br Br + Li Gr	FSZL FSZL FSL	- xxx xxx	- no no		1 2 1			2 2 2		4	II	3a		3b	MR,CL,GR	variable slope

Soil Profile												Agricultural Land Classification						Notes
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Litho'	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)	
502	0 - 27 27 - 100	Rd Gr Rd Br	FSL CSL	- x	- no		1 1			2 2		15	I	2		3b	MR,GR	near base of small valley
503	0 - 31 31 - 56 56 - 102	Dk Rd Gr Rd Gr Rd Br + Li Rd Br	MSL SCL SCL	- xxx xxx	- yes yes		2 3 5			2 2 2		7	IV	3b		3b	WE,MR	
504	0 - 28 28 - 62 62 - 102	Dk Rd Gr Gr Gr	MSL SCL SCL	- xxx xxx	- yes yes		2 3 5			2 2 2		8	IV	3b		3b	WE,GR,MR	
505	0 - 23 23 - 102	Dk Rd Gr Li Rd Br + Li Gr	MCL SCL	- xxx	- yes		1 5			1 2	light	6	IV	3b		3b	MR,WE	
507	0 - 32 32 - 102	Dk Rd Gr Rd Br	SCL SCL	- xxx	- yes		2 5			1 1		15	IV	3b		3b	WE,GR	
508	0 - 32 32 - 104	Dk Gr Li Rd Br + Li Gr	SCL SCL	- xxx	- yes		1 2			1 2	evidence of gleying sandy at depth	5	IV	3b		3b	WE	
511	0 - 28 28 - 56 56 - 102	V Dk Gr Rd Gr Rd Gr	MCL SCL SCL	- xxx xxx	- no yes		1 3 1			1 1 1	organic, light cl, sandy saturated below 56cm	11	IV	3b		3b	MR,GR,WE	
512	0 - 28 28 - 102	Rd Br Rd Br	MSL CSL	- xxx	- no		2 5			2 1	organic, some mottles SBS on first boring at 45cm	6	II	2		3b	CL, MR	significant microrelief undulation

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
365	371861	517680	PGR	30	msl	very dark grayish brown -> light gray	ochre gray	cm >15	<1			ssst			GW	GW	3b	Light	Water sitting on topsoil/subsoil boundary, saturated filling with water. Very high water table. 1m above quarry floor.
				50	lms	very light gray	light gray ochreous	fw	<1			ssst							
				100	lms	very light gray	liquid soil slurry		20-40			ssst							
371	372000	517900	PGR	32	msl	dark reddish brown			1-2			assorted hd st, s&m, r l	32		III	CL	3a	Light-Medium	Top of slope, near flat relief.
				82	lms	reddish brown	mn & pink	fw	<1										
				100	scl	dark reddish brown	dark gray	fw	<1										
372	372000	517800	PGR	26	scl(very sandy)	dark brown			5-10			assorted hd st, s&m, r l	40		III	CL	3a	Light-Medium	7-11° slope. Impenetrable stone at 45cm.
				45	msl	reddish brown	rare ochre	cm >40	5-10			assorted hd st, s&m, r l							
												assorted hd st, s&m, r l							
373	372000	517700	PGR	42	msl	very dark brown	o	fw >30	1-2			ssst	42		III	CL	3a	Light	4-7° slope, deep topsoil possibly due to soil storage from adjacent historic quarry.
				60	msl	gray brown	pale brown & dark yellowish brown	cm	3-5			ssst							
				80	msl & lms lenses	yellowish brown	ochre strong brown & gray	cm	5-10			ssst							
				100	lms	pale brown	very pale brown, gray, light reddish brown	cm	5-10			ssst							
374	372100	517638	PGR	28	msl	dark gray brown	ochre yellowish brown	cm	<1			ssst	28	60	IV	CL	3b	Light-Medium	Wet at 50cm, perched water table at 60cm, loamy sand bands 50-60cm. Completed after rainstorm. 1m above quarry ground level. SPL on border between 3a/3b for 220 FCD.
				50	msl	dark yellowish brown	ochre yellowish brown	m	<1			ssst							
				70	scl	dark yellowish brown	ochre yellowish brown	ab	<1			ssst							
				95	hcl & sandy lenses	dark reddish brown	pale brown		<1			ssst							
				100	ms	dark reddish brown	pale brown		<1			ssst							
376	372200	517800	F	28	msl	reddish brown			3-5			assorted hd st, s&m, r l	28	60	III/IV	CL	3a/3b	Light-Medium	10-15 m from road edge, located on top of shallow valley sides. Impenetrable stones at 70cm. SPL on border between 3a/3b for 220 FCD - edge mapping required.
				60	scl	light reddish brown	mn black & fe nodules	cm-> ab	10-20			assorted hd st, s&m, r l							
				70	hscl	dark reddish brown	mn	ab	20-40			assorted hd st, s&m, r l							

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
378	372293	517523	PGR	30	mcl	gray brown	ocreous gray	fw	<1				<35		III	CL	3a	Light	AB located in basin of previously excavated area for quarrying, stoneless topsoil created from quarry washing. Offset 7m south due to a compacted field pathway. Mixed pale ms and dark brown at 75cm inidcative of a relic topsoil. Impenetrable due to stone or bedrock at 95cm.
				75	scl	palegray	reddish brown & rare ochreous	cm-> ab (<40)	<1										
				95	lms mixed mcl relic topsoil.	palegray			<1										
380	372455	517561	F	28	scl	very dark brown			5-10			assorted hd st, s&m, r l			III	CL	3a	Medium	Undulating landscape with assorted hard stones likely originating from glacial morraine. Subsoil in topsoil in hill crests. Impenetrable due to stones at 60cm.
				50	scl	reddish brown			5-10										
				60	scl	reddish brown			30-50										
382	372524	517364	PGR	29	msl	dark gray brown			3-5			ssst		no obvious spl	III	CL	3a	Light	Heavy slurry applications, Ab located at the top of the crest of hill, possible dune or sand hill morraine.
				70	lms	dark yellowish brown			1-2			ssst							
				100	ms	pale brown	streaky black mn	fw >90	1-2			ssst							
383	372550	517450	PGR	36	msl	very dark brown			3-5			grvl	50	no obvious spl	III	CL	3a	Light	Ab located mid way up 7-11° slope. Saturated >80cm. Erosion risk due to gradient and soil texture, signs of gullying where crop cover is poor.
				50	lms	reddishbrown			1-2										
				100	msl	gray brown	yellowish brown & light gray	cm	1-2										
384	372600	517600	PGR	26	zl (o)/ pty	very dark brown			5-10			ssst	26		GW	Slope	4	Light	22° + slope with signs of slippage , severely poached containing water, saturated. Podzol soil
				45	lms	light gray	ochre strong brown	cm	5-10			ssst							
				70	msl	yellowish brown			5-10			ssst							
				100	scl	yellowish brown	liquid slurry		5-10			ssst							
385	372748	517507	PGR	25	mcl	dark brown	pale brown	fw	1-2			ssst	25	60	GW	GW	3b	Medium	Adjacent to permanent wet area/ pond. Indistinct ts/ss boundary. gw at 60cm.
				60	mcl	reddish brown	ochre	fw	1-2			ssst							
				100	scl	reddish brown	yellow & pale brown	m	1-2			ssst							

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
386	372778	517409	PGR	28	scl	dark gray brown	mn & fe	fw >22	1-2			ssst	22	no obvious spl	III	CL	3a	Light-Medium	marginal scl/msl topsoil. AB location near to field entrance. Podzol turning light reddish brown @50cm, 5cm band of finer textured scl from 60cm and at 100cm. Wet/ saturated>60 cm. Altitude 5m from 3b Climate threshold.
				100	lms	bleached light gray - >pinkish gray	yellowish brown distinct	fw	10-20			l hd ssst							
387	372900	517427	PGR	27	scl	dark reddish brown			3-5			ssst	28	75	III	CL	3a	Medium	Offset 5m to avoid historic trackway. Soil characteristics for these soils justify an ALC sub-grade 3a but they lie very close to the climatic limit to sub-grade 3b due to their altitude on the border between 3b and 3a climatic limitations.
				75	msl	reddish brown / red	pink & strong brown & gray & mn black	fw	3-5										
388	373000	517286	PGR	30	scl	very dark gray			3-5			ssst	40	no obvious spl	III	CL	3a	Medium	10-15m from road edge, 3m below road height. 7-11° slope top. Altitude 5m from 3b Climate threshold.
				70	scl	pale reddish brown	mn & fe, pale yellowybrown and light gray	cm/m	1-2			ssst							
				100	msl	pale reddish brown	yellowybrown and light gray		1-2			ssst							
389	373200	517150	PGR	30	msl (sl o)	very dark grayish black			1-2			ssst	35	50	IV	W	3b	Light-Medium	Series of muck heaps between previous boring. Likely podzol. Very wet at depth. Standing water across large areas and tractor wheelings abundant.
				50	lms	light gray	yellowish brown & pale brown & grayish brown	cm	1-2			ssst							
				100	scl	dark reddish brown	yellowish brown	ab	1-2			ssst							
390	373300	517213	PGR	30	msl	dark gray brown			1-2			hd ssst	40	60?	III	CL	3a	Light-Medium	In woodland shade - coniferous. Soil characteristics for these soils justify an ALC sub-grade 3a but they lie very close to the climatic limit to sub-grade 3b due to their altitude on the border between 3b and 3a climatic limitations.
				55	lms	dark reddish brown	mn light reddish brown	fw	1-2			ssst							
				100	scl & sandy lenses	light reddish brown													

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
391	373300	517100	PGR	27	msl (sl o)	very dark gray			1-2			ssst	35		III	CL	3a	Light-Medium	Ab located at the top of an embankments of a shallow sided valley. Surface layer is compacted, trafficked by tractors traversing to nearby muck heaps, wet underfoot and standing water accross field. Abundant mottles above 60cm but no clear spl.
				75	msl	dark reddish brown	pale red and mn black	cm	1-2			ssst							
				100	scl	pale reddish brown			1-2			ssst							
392	373300	517000	PGR	27	szl (sl o)	very dark gray			5-10			ssst	27	45	IV	W	3b	Medium-Heavy	Erosion risk due to light textured topsoil and 7-11° slope.
				40	scl	pale red	yellowish brown & light gray	cm	5-10			ssst							
				100	hcl	reddish brown	strong brown & pale brown.	m	5-10			ssst							
393	373400	517200	PGR	30	msl (app sandy)	very dark brown			3-5			grvl			GW	GW	3b	Light	Saturated from 30cm.
				50	lms	gray			3-5										
				>50	liquid slurry														
394	373400	517000	PGR	27	msl (sl o)	very dark gray			1-2			hd ssst	60	60	III/IV	W	3a/3b	Light-Medium	Saturated at 70cm due to recent rain, temporary water table at 60cm. Clay content increasing with depth >80cm. 4-7° slope. Erosion risk as evident from rills in adjacent archeological pit run off.
				60	lms	reddish brown			1-2			hd ssst							
				100	scl	reddish brown	mn black	fw	3-5			hd ssst							
397	373520	517100	PGR	28	msl (app sandy)	very dark gray/ black			1-2			grvl			GW	GW	3b	Light	In woodland shade - coniferous. Saturated at 60cm, water table
				100	lms	pale brown	ochre large distinct	cm	1-2			grvl							
399	373663	517027	PGR	26	msl	black			1-2			grvl	40		GW	GW	3b	Light-Medium	Located in woodland shade - coniferous. Saturated at 60cm, water table
				60	lms	light gray brown	brown and dark gray, fe & mn (black and strong brown)	cm	1-2			grvl							
				90	msl & scl	light gray brown			1-2										
				100	scl	dark gray brown			1-2										

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
400	373701	516728	PGR	51	msl	5yr 2.5/2			1-2			ssst	51		III	CL	3a	Light	Very dark/ black topsoil with indistinguishable topsoil subsoil boundary - flat area adjacent to warehouse development therefore likely a flattened area of disturbance.
				100	lms	5yr 4/4	5yr 5/8	cm	<1			ssst							
401	373769	516910	PGR	26	mcl/ scl	dark gray brown			5-10			hd ssst	26	35	IV	CL	3b	Medium-Heavy	7-11° slope, roots observed at 90cm.
				100	hcl	dark reddish brown	gray, black mn fe	cm	5-10			hd ssst							
403	373805	516696	PGR	31	scl	5yr 2.5/2	7.5yr 5/6	fw	1-2			ssst hdsst	41	41?	III or IV	CL	3a or 3b	Light-Medium	Offset 5m due to existing gravel field entrance. SLP confirmation requires pit for structural identification.
				41	msl -> lms	5yr 4/4			1-2			ssst hdsst							
				80	scl	5yr 4/4	7.5yr 5/8 &5/3	m	1-2			ssst hdsst							
				90	msl	5yr 4/4			1-2			ssst hdsst							
406	373920	516820	PGR	29	msl	dark grayish brown			3-5			hd ssst	40	40	IV	GW	3b	Medium-Heavy	Located on 3-4m raised plateau above and 10-15 m from carriageway, base of 7-11° slope. Wet from 30cm.
				40	scl	pinkish gray			3-5										
				100	hcl	pinkish gray	black mn & fe, stong brown ochre	cm-> ab											
407	374000	516700	PGR	20	scl/msl	5yr 2.5/2	7.5yr 5/8	fw	1-2			ssst hdsst			GW	CL	3a	Medium	Ground water at 60cm, increasing clay content with depth. Indistinct topsoil/subsoil boundary.
				100	scl	5yr 4/4			3-5			ssst hdsst							
410	374200	516500	PGR	25?	5yr 3/3	scl			1-2			ssst	85		III	CL	3b	Light-Medium	Just off crest of the hill, base of 4-7° slope of hummocly landscape. Topsoil/subsoil boundary very indistinct. Moderated to 3b due to FCD >225 at 171m AOD.
				100	5yr 3/3	msl - scl	mn >85 cm	fw	3-5			ssst							
412	374286	516585	PGR	25	scl	7.5Yr 4/2	7.5Yr 4/6	fw	1-2			ssst	49	70	III	W	3a or 3b	Medium	ALC grade debated due to 160m AOD on boundary of FCD >225
				49	scl	7.5Yr 4/3	7.5Yr 4/4&5/4	fw	3-5			ssst							
				70	scl	7.5Yr 2/2	7.5Yr 5/4	cm	3-5			ssst							
				100	scl	5yr 5/6	5yr 5/8	ab	1-2			ssst							

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
413	374300	516790	PGR	10	zcl	dark grayish	ochre	cm faint	<1			ssst	10	35 (10)	V	GW	4	Heavy	Offset 10m south due to abundant wetness and rush area. Saturated from the surface, rushes dominate vegetation. Wet slurry in top 10cm. Recieving site in low lying basin. Impenetrable at 45cm due to rock.
				40	hcl	dark grayish gley 1			<1			ssst							
				50	c	dark grayish gley 1			<1			ssst							
				100	scl wth pty inclusions <70cm	very light gray & dark brown			5-10			ssst							
414	374300	516700	PGR	29	scl	grayish brown			3-5			hd ssst	29		III	Slope	4	Medium	22°+ slope limited.
				80	scl	light grayish brown	light gray, yellowish brown	fw	3-5			hd ssst							
415	374318	516511	PGR	28	scl	7Yr 3/2			1-2			ssst			III	CL	3a	Light-Medium	Mid 4-7° slope, faint indistinct dark greyish brown mottles but freely draining within 1m.
				100	msl/ lms	7Yr 4/6			3-5			ssst							
417	374296	516308	PGR	25	msl (sl o)	5YR 3/3			<1			ssst			III	CL	3a	Light	Offset 10m due to possible disturbance and field gateway on 3-4° slope.
				100	msl -> lms	5YR 5/6			3-5			ssst							
419	374400	516500	PGR	30	mcl	2.5Y 4/1	7Yr 5/8 & mn	m	<1			ssst	30	35?	GW	GW	5	Medium	Adjacent to area of field dominated by rush. Very wet underfoot and poached. Surface waterlogging related to contours, AB at base of 3-4° slope. Clay content increasing with depth, likely clay below. Bright colourful olive green mottles.
				70	scl	7Yr 5/8	5Y 6/6	ab	3-5			ssst							
				100	scl	5Yr 5/6	5Yr 6/3	ab	<1			ssst							
428	374600	516200	PGR	27	mzcl	2.5Y 3/2			<1			ssst	30	40	GW	F	4	Medium-Heavy	Adjacent to field gateway. Ground water from 50-60cm, distinct abundantly mottled and gleyed. Increasingly yellowish brown above 80cm.
				100	mcl -> c	7.5YR 5/8	7.5YR 6/8 & 5/1 & 7/2 &7/6	ab	<1			ssst							
425	374500	516200	marsh	29	mcl (sl o)	2.5yr 3/2	saturated		<1			ssst	? GW	? GW	GW	F	5	Medium	Ground water affected beyond 50cm, Saturation disguising any mottles. Positioned in area of field dominated by rushes and standing water.
				95	fscl	2.5yr 5/2	saturated		<1			ssst							
				100	scl	2.5yr 4/6	saturated		<1			ssst							

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
424	374500	516300	PGR	24	hcl	7.5Yr 4/3	7.5Yr 5/8	cm	<1			ssst	24	35	IV	F	4	Heavy	Standing water in field, gleying between 24 -35 but absent below, common ochre mottling in sandier red matrix.
				35	hcl	7.5Yr 5/2	gley 7/5pb & 7.5YR 7/8	ab	<1			ssst							
				100	hcl/ c/ sc	10Yr 6/4	10Yr 5/8	m	<1			ssst							
422	374500	516500	PGR	25	hcl	10Yr 4/3	7.5Yr 4/6	cm	<1			ssst	26	35? Definitely at 55	IV	W	4	Medium-Heavy	Standing water in field, wet under foot. Obvious ground water not encountered.
				40	hcl	10Yr 5/3	7.5Yr 4/6	cm	<1			ssst							
				55	scl	10Yr 5/3	2.5Yr 6/8 7.5Yr 5/6&6/2	m	<1			ssst							
				80	c with sandy lenses	10Yr 4/3	gley 7/5pb & 2.5YR 5/8	ab	<1			ssst							
				100	scl	10Yr 4/3	2.5Yr 6/8	cm	<1			ssst							
429	374617	516421	PGR	28	mcl	2.5Y 3/2			1-2				28	36	IV	W	3b	Medium-Heavy	Offset due to field wet patch likely a result of adjacent archeology workings. Gleyed lacustrine clay at depth.
				55	hcl	2.5Y 4/2	2.5Y 5/6 & 7/3	ab	1-2										
				75	scl	10Yr 5/6	10Yr 7/6	m	3-5			gvl							
				100	c	gley 1 5/10y	gley 1 5/10y	ab	<1										
430	374700	516500	PGR	30	hcl	10Yr 5/3	10Yr 4/6	ab	<1			ssst	15	35	IV	CL & F	4	Heavy	Moderately poached at surface, adjacent to rush vegetation and farm yard entrance
				60	hcl-> c	10Yr 5/3	10Yr 6\8 & 5/1	ab	<1			ssst							
				100	pty l -> p	5.5yr 2.5/2			<1			ssst							
435	374790	516289	PGR	20	scl	7.5Yr 3/3			1-2			lst	20		III	CL	3a	Medium	Clay content increases with depth. Around topsoil/Subsoil boundary navy blue and shiny black concretions, coal and basalt. Sandy lenses throughout. Mid 4-7• slope.
				60	scl	5Yr 3/3	blck	fw	3-5			lst							
436	374800	516400	PGR	30	mcl	7.5Yr 3/2	10Yr 4/6	cm	<1			ssst	25		III	CL	3a	Medium	Better drained, red sandy variant subsoil
				100	scl	7.5Yr 5/3	7.5Yr 5/6	cm	<1			ssst							
437	374800	516200	PGR	25	fszl	7.5Yr 3/3			1-2			lst	25		III	CL	3a	Medium	Clay content increasing up tp 80cm, greater proportion of sandy lenses 80-90 cm.
				100	scl	5Yr 4/4	7.5Yr 3/2 & mn	fw	3-5			lst							
440	374890	516290	PGR	24	(o) scl	v dk b	mn	cm	1-2			ssst	45		II	CL	3a	Medium	Common manganese concretions at base of topsoil boundary. Impenetrable due to stones stone @55.
				45	scl	reddish brown			3-5			ssst							
				55	mcl	reddish brown	dark greyish	fw	3-5			ssst							

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
439	374885	516439	PGR	30	mcl	reddish brown	ochre red& n <15	fw	1-2			hd sst	40	80	III	Slope	3b	Medium	Located at base of 11-16° slope
				80	mcl	reddish brown	mn faint pink and pale brown	fw	1-2			hd sst							
				100	mcl	pale red	mn faint pink and pale brown	cm	1-2			hd sst							
443	374900	516000	PGR	19	scl				<1			ssst	25	40	IV	W	3b	Medium	Adjacent to wet area of standing water parrallel to field boundary.
				40	mcl	7.5YR 4/3	mn & 7.5YR 6/6	fw	<1			ssst							
				60	hcl	7.5YR 6/6	mn & 7.5YR 5/8	cm	<1			ssst							
				100	fsl				<1			ssst							
445	375000	516000	PGR	22	light scl	7.5Yr 3/3	7.5Yr 5/6 & 2/5 & mn	fw	1-2			ssst	20	45	III	CL	3a	Medium	SPL unlikely - pit confirmation. Soft weathered sandstones throughout forming ochreous mottling around sandy lenses.
				80	scl	7.5Yr 4/3 5YR 5/6	7.5Yr 6/8 & 5/1	com	1-2			ssst							
				100	fscl	5YR 5/6	2.5YR 5 /8	fw	1-2			ssst							
447	375100	516065	PGR/ playing field	20	scl	7.5YR 4/3	7.5YR 4/6	fw	1-2			ssst	<10		GW	F	3a?	Medium	Ochreous mottling around roots in top 10cm, absent in the remainder of the topsoil. Saturated gw (?) below 55cm, mottles undistinguishable. The boundary between topsoil and subsoil indistinct.
				55	scl	10Yr 4/4	7.5YR 4/3	fw	1-2			ssst							
				80	scl	10Yr 4/4	Saturated	Saturated	10-20			ssst							
452	375200	515900	PGR/ playing field	28	fscl	7.5YR 4/4			1-2			ssst	60		III	CL	3a	Medium	Better drained profilem field wet underfoot with standing water in places.
				100	fscl -> fsl	7.5YR 4/4	7.5YR 3/1 & 5/8	fw	1-2			ssst							
455	375300	515900	PGR	33	scl	10YR 5/1	5YR 4/6	cm	1-2			hdsst	<10	35	IV	GW	3b	Medium	Standing water in historic wheelings. Ochreous mottling around roots in topsoil.
				100	mcl appr. sandy	10YR 6/6	2.5Y 7/1 & 5YR 4/6	m	1-2			hdsst							
457	375300	515600	PGR	26	scl	7.5YR 4/3			<1			ssst	30		III	CL	3a	Medium	Well drained to depth, faint mottling indistinct against red matrix. Raised sandier area adjacent to disused railway.
				60	msl	5YR 5/8			<1			ssst							
				100	scl	5YR 5/8	2.5YR 4/6	fw	<1			ssst							
460	375500	515700	PGR	30	scl	7.5 Yr 2.5/2			3-5			hdsst ssst	50	none	III	CL	3a	Medium	Clay lenses above 90cm. Pale sandier variant immediately above.
				50	scl	5Yr 5/8	5YR 2.5/1	fw	3-5			hdsst ssst							
				89	msl -> lms	5Yr 6/8			3-5			hdsst ssst							
				100	scl	5Yr 5/8			3-5			hdsst ssst							

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
466	375600	515600	PGR	30	scl	7.5Yr 3/2			3-5			hdsst ssst	40	none	III	CL	3a	Medium	Red matrix diguising mottles, clay content increasing with depth.
				70	scl	2.5YR 4/8			5-10			hdsst ssst							
				100	mcl appr. sandy	2.5YR 4/8	5YR 6/6 & 5YR 2.5/1	cm	3-5			hdsst ssst							
469	375800	515500	PGR	15	scl	5YR 3/4			10-15	5-10	1-2	hd r		none	III	MR	5	Medium	Disturbed by MOD activity, poor agricultural use limited to grazing. Impenetrable at 60cm due to stones.
				60	scl	2.5YR 4/8	7YR 2.5/1	fw	10-15	5-10	1-2	hd r							
473	376010	515435	PGR	23	scl	5YR 3/3			3-5			hd r	55	none	III	CL	3b	Medium	Confirm altitude, 3-4° slope.
				55	scl	2.5Y 5/6	7YR 5/3	fw	5-10			hd r							
				100	scl	2.5Y 5/6	5YR 6/8	m	5-10			hd r							
474	376100	515380	PGR	23	scl	5YR 3/3			3-5			hd r		none	III	CL	3b	Medium	Saturated at 60cm, evidence of a possible spring line.
				100	msl	2.5Y 5/6			3-5			hd r							
476	376200	515200	PGR	30	msl				5-10			hdsst ssst	30	none	III	Gradient	4	Light	Marginal climatic limitation.
				100	msl	10YR 6/8	7.5Yr 5/8 & 5/3	cm	5-10			hdsst ssst							
479	376313	515053	PGR	20	mzcl app s	7.5 Yr 3/4			1-2			hd r		none	III	FR	3b	Light-Medium	AB located in a wet area of the flat field - standing water. ALC Moderated due to flood risk. Farmer says rarely floods, current water present for more than 4days.
				50	scl	7.5 Yr5/6			1-2			hd r							
				100	msl/lms	7.5 Yr5/4			3-5			hd r							
480	376400	515265	PGR	23	msl				3-5			hd r	45	none	III	CL	3b	Light	Red clay lenses between 51-56cm - ungleyed.
				51	msl	2.5Y 5/6			3-5			hd r							
				100	msl	2.5Y 5/6	o g	cm	3-5			hd r							
485	376600	515100	Rough g	27	scl				1-2			hd r	54	none	III	CL	3b	Medium	Top of steep embankment from previous quarry (?). Proportion of fine sediment increases above 80cm.
				54	scl	2.5Y 5/6			1-2			hd r							
				100	scl	2.5Y 5/6	2.5Y 5/8 & 5/2	cm	1-2			hd r							
487	376700	515100	Marsh	60	pty l/ o mzcl				1-2			hd r		none	GW	MR	5	Peat	AB located on a rough grazing plateau at the base of steep slope, possible historic quarry and adjacent to marsh land and water coarse. Area dominated by rushes. Soil saturated from surface.

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
496	377100	515000	PGR	31	msl	dark brown			1-2			hd st	40?		III	FR	3b	Light	Lower subsoil, streaky yellow sand mixed with upper subsoil reddish brown, unlikely true mottling rather mixing of bleached sand and upper subsoil. Impenetrable at 75cm due to stone. Ab located to river bank and EA flood mapping show location within high risk flood zone - Flood risk and groundwater effects have been deemed sufficient to limit these soils to sub-grade 3b.
				52	msl-> lms	dark reddish brown	light reddish brown, mn, yellow	fw	1-2			hd st							
				75	lms	pale brown	yellowish white, pale yellow, yellowish brown	ab	1-2			hd st							
497	377188	515082	PGR	29	szl (sl o)	dark brown			1-2			hd st	40		III / Gw	GW	3a	Light	Wet above 55cm, saturated at 80cm-GW, on flat area adjacent to Lowgill Beck water course. Small rounded gravels - flood plain? Impenetrable due to stones at 80cm. Flood risk and groundwater effects may be sufficient to limit these soils to sub-grade 3b in some
				55	lms	brown	pale brown, mn, pale red	cm	1-2			hd st							
				80	lms/ ms	dark reddish brown	yellowish brown, yellow	cm	5-10			hd st							
498	377200	515200	PGR	31	scl	brown			1-2			hd st	70		III	CL	3a	Light	Flat plateu on top of slope above flood plain adjacent to road. Grade 2 soils, 3a climate. Soil characteristics for these soils justify an ALC sub-grade 3a but they lie very close to the altitudinal climatic limit to sub-grade 3b.
				70	msl	reddish brown			3-5			hd st							
				100	fsl	pale reddish orange brown	mn	fw	3-5			hd st							

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
499	377300	515200	PGR	29	szl / zcl	dark brown			1-2			assorted sm hd st	50		III	CL	3a	Light-Medium	Adjacent to water course, not within mapped flood risk zone. Soil characteristics for these soils justify an ALC sub-grade 3a but they lie very close to the altitudinal climatic limit to sub-grade 3b.
				70	msl/scl	dark reddish brown	nn	fw	3-5			assorted sm hd st							
				100	scl & sandy lenses	pale reddish brown	mn	fw	3-5			assorted sm hd st							
500	377400	515200	PGR	15	mzcl	dark grayish brown			1-2			ssst	15	40	IV	CL	3b	Medium-Heavy	Adjacent to wet area of field entrance flat area of field at base of 7-11° slope, hcl high sand content, sandy clay gleyed at depth.
				40	scl & clay bands	grayish brown	dark gray, pale brown	cm	1-2			ssst							
				70	hcl	light grayish brown	gray, yellowish brown, yellow	ab	1-2			ssst							
				100	clay with sandy lenses	light gray	ochre and red	fw	1-2			ssst							
506	378050	515250	PGR	27	scl (sl o)	dark brown	ochre	fw >20	3-5			hd st	27	40	IV	CL + W	3b	Medium-Heavy	7-11° slope of south of valley. Mottles increasing in distinctness with depth.
				100	hcl	pale yellowish brow n	yellow, light gray, mn, ochre strong brown	ab	10-20			hd st							
509	378267	515195	PGR	25	mcl	dark brown			3-5			hd st	35	50	IV	CL + W	3b	Medium-Heavy	Seasonal SPL if present. HCL contained high sand content.
				50	hcl	pale reddish brown	pale brown, mn black	cm	3-5			hd st							
				100	hcl	pale red	light red, yellow, mn	cm	1-2			hd st							
510	378469	515168	PGR	25	scl	dark reddish brown			<1			hd sst			III	CL + W	3a	Medium	Recently reseeded and annuals sprayed off. Indistinct ts/ss boundary, reduction in OM content at 25cm, small increase in paleness with depth. Grade 1 soil limited to 3b by climate.
				100	scl	dark brown			<1			hd sst							
513	378688	515018	PGR	29	scl	dark brown			1-2			hd st	29	35	IV	CL + W	3b	Medium	Clay bands containing abundant ovhreous and manganese mottling. Impenetrable at 70cm due to stones.
				70	scl & clay bands	reddish brown	yellow & mn black	ab	1-2			hd st							

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
	x	y				Munsell	Musell	Ab.	Total (%)	>2cm	>6cm	Type							
514	378754	514932	PGR	30	szl (sl o)	dark reddish brown			3-5			hd st	30	50	IV	CL + W	3b	Medium-Heavy	10m from road edge 5m above road level, road cut out?
				50	mcl	dark red brown	mn & pale brown & light gray	m	3-5			hd st							
				100	hcl	dark red brown	mn & pale brown & light gray	ab	5-10			hd st							
515	378910	514839	PGR	30	o zcl	very dark gray / black			<1			hd st	65		Gw or III	CL + GW	3b	Medium	Likely flood plain due to unmottled surface and deep dark stoneless layers. Gw at 70cm. No flood risk according to EA flood models.
				65	fscl	dark brown			<1										
				100	scl	brown	pale brown i distinctly	fw	1-2			sm r gvl							

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC Limitation	ALC	SOIL TYPE	COMMENTS
						Colour	Ab.	Total (%)	>2cm	>6cm	Type							
398	NY73580, 16770	PGR	32 80 100	slt org msl scl c	v dk br dk rd br dk red br	oc >~24cm ye, rd & gr ye, rd & gr	c c->ab ab	1-3 3-5 1-3		fw	sst sst sst	35	35	4	CL & W	3b	md	Flattish, close to factory site boundary. Upper ss compact and SP, (ts very wet and ss only moist)
402	NY 673793, 16612	PGR	30 60 100	slt org msl msl msl	v dk br dk rd br rd br	 ye, rd & gr ye rd & gr	 c c->ab	3-5 3-5 3-5		fw	sst sst sst	30	no clear SPL	2	CL	3a	lt/md	Subsoil relatively well drained
405	NY 73897, 16718	PGR	35 90 100	slt. Org. msl msl & scl bands msl & gvl	v dk br v dk rd br v dk rd br	 gr & lt rd 	 ab 	1-3 5-10 50+		fw	sst sst sst & qz	35	no clear SPL	2	CL	3a	md	4-7° slope, close to the reinforced, (stone gabions) road embankment.
408	NY 74099, 16604	PGR	27 45 80	scl scl hcl	dk br yel br ple red br	 lt br & lt gr ye, lt rd & Mn/Fe	 f c	5-10% 3-5% 5-10%	com		sst sst sst	30	45	4	CL, W & Gr	4	md	impenetrable below 80cm, 11-18° slope
409	NY 74190, 16590	PGR	20 45 60	scl/msl scl scl	dk br dk rd br gr br	 oc & ye oc & ye	 c c	5-10 50+	com		sst sst	25	no clear SPL	2	CL & Gr	3b	md	7-11 slope°, saturated SS below 45, impenetrable stones >60cm
411	NY 74202, 16405	PGR	22 70 70+	msl lms & msl bands lms & gvl	dk br dk red br 	 	 	5-10 10-20 50+	com		sst gvl & peb sst peb sst peb	none	none	2	CL & M-Rel	3b	lt	4-7° slope as above, large badger set se of this boring
416	NY 74300, 16406	PGR	26 45 100	scl msl lms	v dk br dk ye br lt ye br	 oc	 c	5-10 10-20 3-5	com		sst peb sst peb gvl	30	none	2	CL & Gr	3b	lt	7-11 slope° , complex micro-relief, glacial moraine
418	NY 74374, 16590	PGR	30 45 60 100	scl scl scl scl	v dk br ye br lt rd br gr br	 lt rd ye & lt rd ye, rd & gr	 f c c	3-5 5-10 3--5 3-5	fw		blue shl & sst sst sst sst	30	60	3	CL & W	3a	md	4-7° slope, saturated below 60cm
420	NY 74400, 16405	PGR	29 60 100	mcl / zycl gritty scl c	dk gr lt gr br lt gr	oc dist faint oc & ye oc & ye	c f ab	<1% <1% <1%	fw		sst sst sst	0	60	4 GW	CL & W	3b	m/h	large areas of standing water, soil is gleyed to surface, water tble at 40cm
421	NY 74401, 16302	PGR/ RUSHES	15 100	hcl c	v dk gr br dk gr	oc oc , ye, ol & lt gr	ab ab	<1 <1	fw		sst sst	0	0	5 GW	W & Flood Rsk	5	hvy	Probably lacustrine, very flat. flooded over majority of field, veg dominated by rush. Possibly non-Ag
423	NY 74506, 16415	PGR	26 60 100	hcl c banded	v dk gr br dk gr see comments	oc oc , ye, ol & lt gr 	m ab 	<1 <1 <1	fw		sst sst sst	0	25	4	CL & W	4	hvy	Probable lacustrine origins. Below 60cm alternate narrow bands of c, cs and peat, repeating.

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC Limitation	ALC	SOIL TYPE	COMMENTS
						Colour	Ab.	Total (%)	>2cm	>6cm	Type							
426	NY 75495, 16500	PGR	24 45 70 80 100	mcl scl hcl/c c scl	v dk gr br dk gr ye br ye br dk gr br	oc oc & gr oc & gr oc & gr oc, gr & ye	c ab ab ab ab	1-3 1-3 3-5 5-10 10-20		fw	sst sst sst sst sst	24	45	4	CL & W	3b	m/h	Surface saturated with widespread standing surface water
427	NY 74602, 16310	PGR	26 75 100	scl/msl scl gritty hcl	v dk br dk rd br dk rd	 lt rd br & Mn lt rd br & Mn	 c c	1-3 1-3 1-3	fw		sm gvl sst sst	30	75	3	CL & W	3a	md	4-7° slope, very subtle ts/ss colour change. Saturated >70cm.
431	NY 74706, 16404	PGR	25 60 100	mcl hcl/c c + fine peaty inclusions	v dk gr br ye br v dk gr br	oc lt gr, ye & oc	c ab	1-3 1-3 1-3		fw fw	sst sst sst	25	25	4	CL & W	3b	m/h	Gently undulating landscape, widespread standing surface water.
432	NY 4691, 16300	PGR	23 45 100	org szl mcl scl	v dk br dk red br dk red br	 lt rd br & Mn lt rd br & Mn	 c c	1-3 1-3 1-3	fw		sm gvl sst sst	30	45?	3/4	CL & Gr	3b	md	7-11° slope, large glacial moraine on valley floor. Dark red colours in ss makes mottling and gleying hard to see. No clear SPL
433	NY 74702, 16210	PGR	28 85 100	scl scl gritty hcl	v dk br dk red br dk red br	 lt rd br & Mn lt rd br & Mn	 c c	1-3	fw		sm gvl sst sst	30	60+	3	CL & Gr	4	md	side of moraine, 11-18° slope, as above re colors & SPL
434	NY 74702, 16102	PGR	27 35 55 95 100+	fscl fscl hcl bands of scl, fscl & fsl c	v dk br dk rd br dk rd br dk rd br dk gr	 ye & Mn Mn ye & oc	 c f ab	1-3 1-3 1-3 1-3 1-3			sst & qz sst sst sst sst	35	35	4	CL & W	3b	md	flat valley bottom, prob alluvial influence.
444	NY 75000, 16100	PGR	30 80	scl msl	dk br ye br	 ye	 f	ls <1% ls <1%			 sst	30		3	CL & W	3a	med	flat ground, wet, saturated with coarse sandy lenses, impenetrable blw 80cm
448	NY 75097, 16007	Amenity grass	29 45 65 100	fscl mcl hcl msl/lms	br lt gr dk gr dk gr	oc oc & ye oc & ye oc & ye	r c ab ab	<1%			sst	30	45	GW / 4	CL & W	3b	m/h	very wet at surface, saturated > 65cm, **NB unstable wet sand >65**
449	NY 75105, 15900	PGR	26 60 85	msl msl scl	dk br rd br dk rd br	 oc too red to tell	 c	3-5 1-3 1-3			gvl sst sst	30	60	3	CL & W	3a	lt/m	4-7° slope, subsoil too dark red to see mottles. Close to stream on the edge of the flood plain.
450	NY 75200, 16000	Amenity grass	30 45	scl fscl	br lt gr	oc ye, lt gr & oc	f c	<1%				30	not found	GW /3	CL & W	3a	alluv	Impenetrable at 45cm. Flat floodplain, large areas of standing water
453	NY75196, 15701	PGR	32 60	msl msl > scl blw 60cm	vr dk br rd br	 pale rd & lt br	 c	<1% 5-10%			ssd	30	none	3	CL & W	3a	md	Slightly raised area in comparison to rest of field

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC Limitation	ALC	SOIL TYPE	COMMENTS
						Colour	Ab.	Total (%)	>2cm	>6cm	Type							
454	NY75203, 15604	PGR	35 90 100	lms fsl/fscl lfs	dk br dk rd br lt br	black Mn	c	<1%			gvl	35	none	GW / 3	CL & W	3a	lt	Slightly undulating with standing water in low lying area wet below 50cm
456	NY 75308, 15803	PGR	28 40 70 100	zycl mcl hcl fscl	dk rd br rd ye ye br gr	 oc oc, gr, rd, Mn	 c ab	<1 1-3 1-3 1-3	r		sst & qz sst sst sst	28	40	4 GW	CL, W & Flood Risk	3b	alluv	Flood plain. Common, localised flooding and surface ponding, sev gleyed / permanently waterlogged below 70, Ground Water
465	NY 75600, 15700	PGR	32 60 100	org szl lms lms / msl	v dk br pale rd pale rd	 dk rd br streaks	 f	1-3 1-3 1-3	fw		sst sst sst	60	60?	3	CL & W	3a	lt	near flat, close to the road. Dark reddish colours in ss make mottling hard to see
468	NY 75700, 15600	PGR	30 60 100	org szl msl scl	v dk br pale rd pale rd	 dk rd br dk rd br	 f ab	1-3 3-5 3-5	fw		sst sst sst	30	60	3	CL & W	3a	lt/m	4-7° slope
470	NY 79500, 19400	PGR	32 60	lms lms	dr br lt rd			5-10 5-10 5-10	com		sst, grvl sst sst	none	none	1	CL	3a	lt	Disturbed, severe micro relief interspersed with tarmac/concrete
475	NY 76200, 15337	PGR	26 60	org msl lms/msl	v dk br rd br			3-5 3-5	fw		sst, grvl sst	none	none	1	CL	3a	lt	Top of hill, moderately severe micro-relief, impenetrable stone at 60cm.
478	NY 76300, 15155	PGR	28 80 100	org lms lms scl + hcl	v dk br lt br rd	 oc & gr gr	 m c	1-3 1-3 1-3	r		sst sst sst	30	80	3	CL, W & Gr	4	lt	Limited by severe slope,11-18° although farmer is clearly spreading slurry. Faint mottles in lower SS barely visible due to red colour.
482	NY 76500, 15235	PGR	24 50 60	org msl lms lms	v dk br ye br ds rd	 oc, lt gr & Mn	 f	1-3 3-5 20+	fw	fw	gvl gvl gvl	50		1	CL	3a	lt	4-7° slope, very faint, subtle mottling in lower SS. Impenetrable stone at 60cm
483	NY 76500, 15100	PGR	28 100	org msl lms	v dk br pale br	 lge oc streaks & Mn/Fe	 c	1-3 1-3	fw	fw	mx mx	40		2	CL & Gr	4	lt	Limited by severe slope, 11-18°
486	NY 76700, 15200	PGR	26 100	org msl lms	v dk br dk br	 oc & gr	 c	5-10 3-5	fw	fw	mx sst	50		2	CL & Gr	3b	lt	Limited by moderate slope, 7-11°

BORE NO.	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type							
477		PGR	0-23	msl	7.5YR 4/3			3-5			hdsst gr	65	No SPL	II	CL	3b	Light-Medium	Check climate @ 173m AOD. Wet >60cm - likely sprimgs in area due to permeable soils
			23-65	msl	2.5YR 5/6	7.5YR 5/3	c	5-10			hdsst							
			65-100	scl	2.5YR4/6	7.5 YR 4/4 Mn	c	5-10			hdsst ssst							
484		PGR	0-20	msl	7.5 YR 4/4			5-10			hdsst grvl	>70	No SPL	I	CL	3b	Light	Stony at base of topsoil. Check climate @168m AOD - 3b. AOD. Freely drained
			2045	lms	7.5YR 5/8			1-2			hdsst hr							
			45-70	lms	5YR5/6	7.5YR 4/4	f	3-5			hdsst hr							
481		PGR	0-23	msl(sl o)	7.5YR 4/4			3-5			hdssr q gr	>70	No SPL	I	GR > 11°	4	Light	Variable microrelief - locally steep > 11°
			23-60	lms	7.5YR 5/6	10YR 4/4		5-10			hdsst ssst q							
			60-100	lms	7.5 YR 5/3			10-15			hdsst ssst q							
461		PGR	0-24	lms	7.5YR 4/3			3-5			hdsst gr	70	No SPL	II	CL	3a	Light-Medium	Check climate limitation @ 150 AOD
			24-45	lms	7.5YR 5/6			3-5			hdsst ssst gr							
			45-100	scl	10R 5/6	10YR5/2	c	3-5			hdsst q gr							
458		PGR	0-30	scl	10YR 3/3			3-5			hdsst hr	30	55	IV	WT	3b	Medium-Heavy	Alluvial - boring offset 15m to south due to stream. Pit nearby on exposed bank of watercourse
			30-55	scl	10YR 6/2	10YR 6/8	c	3-5			hdst hr gr							
			55-100	mcl/hcl	10YR 7/2	10 YR 6/8	ab	3-5			hdsst hr							
494		PGR	0-27	msl	5YR 3/4			3-5			hdsst grvl q	80	No SPL	I	CL	3b	Light-Medium	Check climate limtation. Boring offset 10m due to slight cable reading. Stony at base of topsoil
			27-60	msl	5YR 5/8			5-10			hdsst grvl							
			60-80	msl	5YR 6/6			5-10			hdsst grvl							
			80-100	scl	2.5 YR 5/6	2.5YR7/2		5-10			hdst grvl q							
491		PGR	0-28	msl	2.5 YR 4/3			3-5			hdsst grvl q hr	80	No SPL	I/II	CL	3b	Light-Medium	Check climate 3a soils. Steep slope to south - possible old quarry/restored? Grade 4
			28-60	msl	5YR 5/6	7.5YR 3/3	c	5-10			hdsst grvl q hr							
			60-80	msl	5YR 6/3			5-10			hdsst grvl q hr							
			80-100	scl	2.5 YR 5/6	2.5 YR 7/2	m	5-10			hdsst grvl q hr							
488		PGR	0-30	msl	5 YR 3/4			3-5			hdsst grvl q	30	No SPL	I	CL	3b	Medium-Heavy	improed drainage on upslope 4-5° S 3a soils check climate rabbit burows
			30-55	lms	5YR 5/4	7.5 YR 4/4	c	3-5			hdsst grvl q							
			55-100	lms	5YR5/8	10YR3/3	ab	3-5			hdsst grvl q							
493		PGR	0-28	msl	5YR 3/4			3-5			hdsst grvl q	55	No SPL	I	CL	3b	Light	Improved drainage on upslope 4-5° S. 3a soils but check check climate. Rabbit burrows or poss badger impen >75cm due to stones
			28-55	lms	5YR 5/6			3-5			hdsst grvl q							
			55-75	lms	2.5 YR 5/6	2.5 YR 5/2	c	5-10			hdsst grvl q							

Soil Profile												Agricultural Land Classification						Notes
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Litho'	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)	
675	0 - 28	Rd Br	CSL	-	-		0					15	II	2		4	GR	0
	28 - 51	Wk Rd	CSL	xxx	no		1			2								
	51 - 78	Rd Br	CSL	xxx	no		1			2								
	78 - 100	Wk Rd	SCL	xxx	no		3			2								
676	0 - 27	Rd Br	LCS	-	-		0					15	II	3a		4	GR	0
	27 - 70	Rd Br	LCS	xx	no		0											
	70 - 100	Rd Br	CS	xxx	no		0											
677	0 - 30	Br	CSL	-	-		0				Near brow of hill	4	I	1		3a	CL	Near brow of hill
	30 - 48	Rd Br	CSL	xx	no		1			2								
	48 - 74	Rd Br	CSL	xx	no		1			2								
	74 - 100	Li Rd Br	CSL	xxx	no		1			2								
678	0 - 29	Rd Gr	CSL	-	-		2			2	Variable slope	3	III	3a		3a	CL,MR	Variable slope
	29 - 78	Li Rd Br + Rd Gr	SCL	xxx	no		2			2								
	78 - 87	Rd Br	SCL	xxx	no		5			2	Impenetrable due to stone at 87cm							
679	0 - 39	Dk Rd Gr	CSL	-	-		3			2	Undulating microrelief Reeds present at edge of field wet area.	4	II	2		3a	CL,MR	Undulating microrelief. Reeds present at edge of field wet area.
	39 - 78	Rd Br + Rd Gr	CSL	xxx	no		2			2								
	78 - 100	Rd Br	CSL	xxx	no		6			2								
680	0 - 36	Dk Rd Gr	CSL	-	-		5			2	Undulating microrelief	3	II	2		3a	CL,MR	Undulating microrelief
	36 - 64	Rd Br	CSL	xxx	no		5			2								
681	0 - 38	Dk Rd Gr	CSL	-	-		3			2	Undulating microrelief	5	II	2		3a	CL,MR	Undulating microrelief
	38 - 78	Li Rd Br + Rd Gr	LCS	xxx	no		3			2								
	78 - 100	Rd Br	CSL	xxx	no		1			2								

Highways England

A66 Northern Trans-Pennine

Appleby to Brough
Agricultural Land Classification (ALC) Survey Results

Order Limits

Auger locations

ALC

- 2
- 3a
- 3b
- 4
- 5
- Non-ag
- Urban
- Not surveyed

Warcop

A66

Brough

Drawn by Paul Taylor 29/04/2022, Verified by John Grylls 29/04/2022

N W E S

0 100 200 300 400

Metres

Scale: 1:25,000 at A3 size

ADAS, Unit 14, Newton Court, Pendeford Business Park,
Wolverhampton. WV9 5HB. Tel +44(0)1902 271300

1050859

Document Path: C:\aa Covid_19\Highways_Eng xlA3L_ALC_Auger_Maps_ALTS_28April2022.mxd

Appendix 5: Bowes Bypass - Auger boring descriptions and ALC map

Auger Boring Descriptions

Soil Profile													Agricultural Land Classification							Notes	Droughtiness Calculator																	
							Stones (%)														Grade		Climate		Soil					Stones				Wheat (mm)			Potatoes (mm)		
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	CaCO3	Total	>2cm	>6cm	Litho'	Notes	(°)	WC	WE grade	DR grade	Overall grade	Limit(s)		W	P	MDW	MDP	Depth*	Text'	Struct'	TAv	EAv	Total*	Lith'	TAv	EAv	AP	Σ AP	MB	AP	Σ AP	MB
521	0 - 26	V Dk Gr Br	MZCL	-	-		2			2	organic	3	IV	3b		3b	WE	0	#N/A	#N/A			26			#N/A		2	2	3		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	26 - 35	Br	MCL	xxx	no		2			2									*#N/A*	*#N/A*			35					2	2	3	2	#VALUE!			#VALUE!		
	35 - 68	Gr	HCL	xxx	yes		1			2													68					1	2	3	2	#VALUE!			#VALUE!		
	68 - 102	Gr	C	xxx	yes		1			2													102					1	2	3	2	#VALUE!			#VALUE!		
526	0 - 30	Dk Gr Br	MZCL	-	-		2			2		4	IV	3b		3b	WE	0	#N/A	#N/A			30			#N/A		2	2	3		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	30 - 102	Gr	C	xxx	yes		2			2	HCL in places								*#N/A*	*#N/A*			102					2	2	3	2	#VALUE!			#VALUE!		
529	0 - 23	Dk Gr Br	MZCL	-	-		1			2	high watertable, very wet at surface	5	IV	3b		3b	WE	high watertable, very wet at surface	#N/A	#N/A			23			#N/A		1	2	3		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	23 - 100	Gr	C	xxx	yes		6			2									*#N/A*	*#N/A*			100					6	2	3	2	#VALUE!			#VALUE!		
531	0 - 29	Dk Gr Br	MZCL	-	-		2			2	organic	4	IV	3b		3b	WE	0	#N/A	#N/A			29			#N/A		2	2	3		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	29 - 38	Br	HCL	xxx	no		3			2									*#N/A*	*#N/A*			38					3	2	3	2	#VALUE!			#VALUE!		
	38 - 100	Pl Br	HCL	xxx	yes		5			2		0	0										100					5	2	3	2	#VALUE!			#VALUE!		
532	0 - 22	Br	MZCL	-	-		2			2	organic	9	IV	3b		3b	WE	0	#N/A	#N/A			22			#N/A		2	2	3		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	22 - 38	Br	HCL	xxx	no		2			2	disturbed								*#N/A*	*#N/A*			38					2	2	3	2	#VALUE!			#VALUE!		
	38 - 102	Gr	HCL	xxx	yes		2			2		0	0										102					2	2	3	2	#VALUE!			#VALUE!		

BORING NUMBER	NGR	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type						
516	398760 513589	PGR	25 58 65 120	mcl mcl hcl c	10YR4/2 10YR4/3 10YR5/3 10YR5/3	 10YR5/6 10YR5/6 10YR5/6	 f m M	10	10		hr	65	65	III	3b		FCD 227 (NY986 135) augered to 85cm
517	398854 513431	PGR	30 50 60 120	mcl hcl c c	10YR3/3 10RY5/3 10YR5/2 10YR5/2	 10YR5/6 10YR5/6 10YR5/6	 c c c	10	10		hr	30	60	IV	3b		
518	399028 513679	PGR	30 40 120	mcl hcl hcl	10YR3/2 10YR5/3 10YR5/3	 10YR5/6 10YR5/6	 c c	10			ssst	30	>80	III	3b		weathered sandstone: auger stopped at 40cm stone.
519	399200 513735	PGR	30 40 90 120	mcl mcl hcl hcl	10YR3/1 10YR4/3 2.5Y4/2	 10YR5/6	 c	5	5		hr	40	40	IV	3b		assume SPL in hcl
520	399360 513802	PGR	15 38 60 120	mcl mcl hcl hcl	10YR3/2 10YR3/2 10YR4/1	 10YR5/6 10YR5/6	 m m	10			hr	38	60	IV	3b		stone at 60cm

BORE NO.	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS	FCD	DATE
					Munsell	Munsell	Ab.	Total	>2cm	>6cm	Type									
523		PGR	0-23	scl (sl o)	10YR 3/3			1-2	1-2	1-2	hdsst ssst	23	60	IV	CL	3b	Medium	Wet/saturated > 60cm	223-227	07/02/2022
			23-40	scl	10YR 6/2	7.5YR 5/6	m	1-2			hdsst ssst									
			40-60	msl	10YR 7/4	10YR 6/8	ab	1-2			hdsst ssst									
			60-100	hcl	10YR 6/1	10YR 6/8	ab	1-2			hdsst ssst									
525		PGR	0-22	mzcl	10YR 3/4	7.5YR 5/6	c	3-5	1-2	1-2	hdsst ssst	15	55	IV	CL	3b	Medium-Heavy	Pronounced rigg and furrow to centre & west. Microrelief limiting to min 3b	223-227	07/02/2022
			22-55	mcl	10YR 4/4	10YR 6/6	c	3-6			hdsst ssst									
			55-100	hcl	10YR 6/4 Mn	10YR 6/8	m	3-7			hdsst ssst									
530		PGR	0-12	mzcl (sl o)	10YR 3/3	7.5YR 5/6	c	3-5	1-2	1-2	hdss ssst	15	35	IV	CL	3b	Medium-Heavy	Shallow rigg & furrow. FYM applied recently. A2 topsoil 15-28cm	223-227	07/02/2022
			12-28	scl	10YR 4/6	10YR 5/2	m	3-6			hdsst grvl									
			28-40	scl	10YR 6/2	10YR 5/4	ab	3-7			hdsst grvl									
			40-90	hcl	10YR 7/2	10YR 5/6	ab	3-8			hdsst grvl									

BORING NUMBER	NGR (actual)	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC Limitation	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total (%)	>2cm	>6cm	Type							
522	99600, 13700	PGR	24 35 50 100	hum zycl mcl mcl c	bl dk gr br gr br gr	oc oc oc gr oc gr	r f f ab	1-2 5-10 3-5 3-5		fw	sst gvl sst& shl sst sst, shl & cl	35	50	4	CL + W	3b	m/h	slightly raised area, near flat, bounded by roads on 2 sides. common small coal and shale below 80cm
524	99800, 13815	PGR	25 50 90	org zycl mcl hcl	v dk gr br gr br gr	oc oc oc, ye & lt gr	r c ab	3-5 5-10 5-10		fw	sst sst sst	25	50	4	CL + W	3b	m/h	flattish, possibly disturbed in the topsoil, 20m from A66 fence
528	00750, 13700	PGR	25 40 100	org fscl mcl hcl	v dk gr br gr br gr & v dk gr	oc oc, ye & lt gr oc, ye & lt gr	r c ab	1-2 3-5 1-2->5-10 > 70cm		fw	sst sst w sst	25	40	4	CL + W	3b	m/h	flat, below 70cm com weathered sandstone, with shale & coal

Highways England

A66 Northern Trans-Pennine

Bowes Bypass
Agricultural Land Classification (ALC) Survey Results

- Order Limits
- Auger locations

ALC

- 2
- 3a
- 3b
- 4
- 5
- Non-ag
- Urban
- Not surveyed

Drawn by Paul Taylor 29/04/2022, Verified by John Grylls 29/04/2022

N W E S

0 100 200 300 400

Metres

Scale: 1:12,500 at A3 size

ADAS, Unit 14, Newton Court, Pendeford Business Park,
Wolverhampton. WV9 5HB. Tel +44(0)1902 271300

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Appendix 6: Cross Lanes to Rokeby - Auger boring descriptions and ALC map

Auger Boring Descriptions

BORE NO.	OS GRID REF	OS GRID REF	LAND USE	DEPTH (cm)	TEXTURE	Soil Colour	MOTTLES		Stones				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC LIMITATION	ALC	SOIL TYPE	COMMENTS	DATE
	x	y				Munsell	Munsell	Ab.	Total (%)	>2cm	>6cm	Type								
535	404500	513650	PGR	28	zl (sl o)	10Yr 3/2			<1			ssst	24	35	IV	W	3b	Medium	Adjacent to watercourse, field saturated underfoot. Soil wetness due to surface water rather than ground water. Sandy lenses due to soft weathered sandstone in fscl, impenetrable at 70cm due to a stone but likely heavier at depth.	21/02/2022
				45	mcl	10Yr 4/3	10Yr 4/1 &6/6	ab	1-2			ssst								
				65	fscl	7.5Yr 5/3	7.5Yr 5/1 & 5/8 & 3/1	ab	3-5			ssst								
				70	hcl	7.5Yr 4/1	7.5Yr 5/1 & 5/8 & 3/1	ab	3-5			ssst								
538	404700	513650	PGR	27	zcl	10Yr 3/2	7.5yr 2.5/1 <25	fw	1-2			ssst	25	35	IV	W	3b	Medium	Clay content increasing with depth, a band of medium sand around 50cm. Increasing content of fine material above, manganese mottles >70cm	21/02/2022
				45	mcl	7.5Yr 4/3	7.5Yr 4/1 & 5/8		1-2			ssst								
				55	scl	7.5Yr 4/3	7.5Yr 4/1 & 5/8		1-2			ssst								
				100	fscl-> hcl	7.5Yr 4/3	7.5Yr 4/1 & 5/8 & 2.5/1	cm faint <70	1-2			ssst								

Soil Profile											Agricultural Land Classification						Notes
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Litho'	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)	
536	0 - 33 33 - 102	Br Br + Gr	MZCL HCL	- xxx	- yes		1 3			1 1		7	IV	3b		3b	WE	0
537	0 - 29 29 - 56 56 - 102	Br Gr + Br Gr	MZCL HCL C	- xxx xxx	- no yes		1 1 1			1 1 1		7	IV	3b		3b	WE	0
579	0 - 28 28 - 56 56 - 100	Br V Dk Gr + Gr Gr	MZCL MCL HCL	- xxx xxx	- no yes		2 4 5			2 2 2	subsoil/topsoil mix?	4	IV	3b		3b	WE	disturbed, mixing between layers, variable slope, standing water nearby, paddock near house

BORING NUMBER	NGR (actual)	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS		ALC	SOIL TYPE	COMMENTS
						Colour	Ab.	Total (%)	>2cm	>6cm	Type							
539	NZ 04762, 13582	PGR	24 34 50 100	mcl mcl hcl->c c	v dk gr br ye br dk gr v dk gr	oc oc, lt gr & ye oc, lt gr & ye oc & ye	f c ab ab	1-3 3-5 5-10 5-10	fw		sst sst sst sst	35	50	4	CL & W	3b	m/h	4-7° slope soft, weathered sandstone in upper ss
542	NZ 04800, 13770	PGR/ Outdoor pigs	26 32 50 100	mcl mcl hcl->c c	v dk gr br ye br dk gr v dk gr	oc oc, lt gr & ye oc, lt gr & ye oc & ye	f c ab ab	1-3 1-3 5-10 5-10	fw		sst sst sst sst	32	50	4	CL & W	3b	m/h	4-7° slope, has been used for free-range pigs and poultry, soft weathered sanstones in upper SS
543	NZ 04805, 13659	PGR	26 50 75	mcl hcl hcl->c	v dk gr br ye br v dk gr	 oc & ye oc, lt gr & ye	 ab ab	1-3 3-5 5-10	fw		sst sst sst	30	50	4	CL & W	3b	m/h	Near flat, soft weathered sandstone in upper ss, >50% stone >70cm, impenetrable >75cm
20m W of 544	NZ 04874, 13755	PGR/ Outdoor pigs	30 50 85	zycl mcl hcl->c	dk gr br lt br v dk gr	oc oc, lt gr & ye oc & ye	c >20cm c ab	1-3 3-5 5-10	fw		sst sst sst	30	50	4		3b	m/h	4-7° slope, has been used for free-range pigs and poultry. impenetrable stone at 85cm

Highways England

A66 Northern Trans-Pennine

Cross Lanes to Rokeby
Agricultural Land Classification (ALC) Survey Results

Order Limits

Auger locations

ALC

- 2
- 3a
- 3b
- 4
- 5
- Non-ag
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Appendix 07: Stephen Bank to Carkin Moor - Auger boring descriptions and ALC map

Auger Boring Descriptions

BORING NUMBER	NGR (actual)	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC Limitation	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total (%)	>2cm	>6cm	Type							
595	NZ 12187, 10295	wet carr ,reeds, NON-AG	12 55 100	fib lp pl c	bl bl dk gr			<1				12	12	5	W	non-ag	bog	low-lying, felled woodland. waterlogged, wet carr
596	NZ 12500, 10492	WW	30 100	mcl hcl	v dk gr br gr	lt gr, ye, oc, & Mn/Fe	ab	5-10 3-5		few	sst & lst sst	30	30	4	CL & W	3b	m / h	<20m from A66
597	NZ 12600, 10450	WW	30 55 70	mcl mcl/scl hcl->c	v dk gr br gr gr	 lt gr, oc, & ye lt gr, oc, & ye	 c ab	5-10 3-5 3-5	few	few	sst & lst sst & lst	30	55	4	CL & W	3b	m / h	slightly better drained upper SS
598		WW	29	mcl	10YR 4/3			5-10			ssst	29	35 or 60?	III or IV	W	3b or 3a	Medium-Heavy	Better drained profile relative to AB599. Transitionary boring to better drained AB597.
			60	scl	7.5YR 6/8 & 5/4	7.5YR 5/1	com	1-2			ssst							
			100	hcl appr. sandy	7.5YR 4/3	7.5YR 5/1 5/8 8/3	ab	1-2			ssst							
599		WW	24	mcl	10YR 4/2			5-10			ssst	24	35	IV	W	3b	Medium-Heavy	OC mottling around soft sand stones. Soft weathered sandstone gravels above 50cm. Impenetrable due to stones at 65cm.
			50	hcl & sandy lenses	10YR 4/3	7.5YR 5/8 7/8 41 6/1 & 10YR 4/1	ab	5-10			ssst							
			65	mcl & sandy lenses	10YR 4/3	10YR 4/1	m	10-20			sst gvl							
601		WW	27	mcl	7.5YR 3/2	7.5YR 4/4	fw	5-10			ssst	28	35	IV	W	3b	Medium-Heavy	Offset due to proximity of muck heap. Sandy loam texture resulting from soft wearhered ssst. Increasing manganese mottles below 80cm.
			100	hcl & sandy lenses	7.5YR 4/2	7.5YR 5/8 7/8 & 4/1 & 6/1 10YR 4/1	ab	5-10			ssst							
610	NZ 13800, 09700	WW	22 45 100	mcl hcl c	dk gr br dk br br	 ye & gr oc, ye & gr	 c c	3-5 3-5 3-5	few	few	sst sst sst	45	45	4	CL & W	3b	m/h	4-7° slope, mottling in upper SS very faint, common weathered sandstone in SS.
611	As per schedule	PGR	0-23	mcl	10YR 3/2			3-5	1-2	1-2	hdsst grvl ssst	30	42	IV	W	3b	Medium-Heavy	Slightly organic topsoil to 15cm. Very slightly improved upper subsoil drainage to 35cm
			23-42	hcl	10YR 4/4	10YR 5/2 6/6 Mn	ab	3-5			hdsst grvl							
			42-100	c	10YR 6/2	7.5YR 5/6 10YR6/1	ab	3-5			hdsst ssst							
612	As per schedule		0-23	mcl	10YR 3/2	7.5YR 5/6	fw	3-5	1-2	1-2	hdsst grvl q	20	35	IV	W	3b	Medium-Heavy	Very strongly gleyed clay @45cm - dk bluish gtey to v dk grey. Less stony at depth
			23-45	hcl	10YR 5/3	10YR 5/2 6/6 Mn	ab	5-10			hdsst ssst							
			45-100	c	G2 3/1	10YR 6/6	m	1-2			hdsst ssst hr							
613	NZ 14000, 09575	WB	40 65 100	mcl mcl hcl	v dk gr br ye br dk gr br	 oc, gr & Mn/Fe lt gr & ye	 c ab	3-5 5-10 5-10		few	sst sst sst	40	65	3	CL & W	3a	m/h	Near flat at top of hill, unusual TS depth, right in corner of field so possibly disturbed

BORING NUMBER	NGR (actual)	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC Limitation	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total (%)	>2cm	>6cm	Type							
614	As per schedule	PGR	0-26	mcl (o)	10YR 3/2	7.5YR 5/6 Mn	r	3-5	1-2	1-2	hdsst grvl ssst	65	no SPL	II	W	3a	Medium	Stonier with improved drainage on upslope. See pit description
			26-65	sl	10YR 4/4	10YR 5/6 Mn	f	5-10			hdsst grvl ssst							
			65-100	scl	10YR 5/3	10YR 5/2 6/6 Mn	c	5-10			hdsst ssst zst							
615		CER	33	mcl	10Yr 4/4			1-2				33	50	IV	W	3b	Medium-Heavy	Adjacent to road and site of archeological pit. Relief beginning to rise in 3-4 ° slope. Impenetrable at 80cm due to stone. Surface stone content 3-5
			65	hcl	10YR 4/4	7.5r 5/8 & (10yr 3/1 >55)	mn >55	1-2										
			80	c	10YR 3/3	10yr 2/1 (&7/8 weathered ssst)	ab	3-5			ssst gravels							
616	NZ 14199, 09400	WB	31	hcl	v dk gr br	oc, rdye & lt gr		1-3	few	few	sst & lst	32	55	4	CL & W	4	hvy	4-7° slope. Technically ALC grade 4 but being farmed at a higher standard, at least partially due to field drains. Clay tile at 75 cm.
			55	hcl	ye br		ab	1-3			sst & lst							
			75	c	dk gr	oc & ye	ab	5-10			sst							
617	As per schedule	WB	0-25	mcl/hcl	10YR 3/2			5-10	3-5	1-2	hdst ssst lst	45	65	II	W	3a	Medium	
			25-65	hcl	10YR 4/4	10YR 5/6 Mn	fw	5-10			hdsst grvl chk							
			65-100	hcl	10YR 5/2	10YR 5/2 6/8	m	5-10			hdsst ssst							
618		CER	33	hcl	10Yr 3/2			1-2				33	35	IV	W	4	Heavy	Satellite imagery indicating an area of previous possible disturbance? very dark grey/ black >80cm, reduced ochreous mottling. Impenetrable due to stone at 90cm.
			55	hcl	10YR 4/3	10YR 5/8 &6/1	m-> ab	1-2										
			90	hcl & sandy lenses	10YR 4/4	10YR 5/8 &7/8 & 3/1	ab	3-5			ssst gravels							
619	NZ 14300, 09500	WW	28	mcl	dk gr br			5-10		com	sst & lst	28	35	4	CL & W	3b	m/h	flattish, weathered sandstone in subsoil
			100	hcl - c	lt gr & ye	oc & ye	ab	5-10			sst & lst							
620	NZ 14500, 09600	WW	28	mcl	dk gr br			3-5		com	lst & sst	28	35	4	CL & W	3b	m/h	stones becoming common below 70, impenetrable stone at 90
			100	c	gr	ye & ol	ab	3-5			sst							
621	NZ 14500, 09500	WW	38	hcl	dk gr br	oc	r	3-5		com	sst	45	45	4	CL & W	4	hvy	flattish area
			45	c	gr br	ye + ol	ab	3-5			sst							
			100	hcl	gr	oc, lt gr& ye	ab	3-5			sst							
622	As per schedule	WB	0-26	hcl	10YR 4/3			5-10	3-5	1-2	hdsst lst q p	28	35	IV	W	4	Heavy	Marginally lighter topsoil 5-10% subsoil in topsoil
			26-50	hcl	10YR 5/2	7.5YR 5/6 Mn	m	3-5			hdsst grvl q							
			50-100	c	2.5YR 4/4	10YR 5/2 6/6 Mn	ab	3-5			hdsst grvl ssst							
623	As per schedule	WB	0-25	hcl	10YR 3/3			5-10	3-5	1-2	hdsst hr lst	25	35	IV	W	4	Heavy	Marginally lighter topsoil
			25-60	hcl	10YR 5/2	10yr 5/4 6/6 Mn	ab	5-10			hdsst ssst q							
			60-100	c	10YR 5/1	10YR 7/1	ab	3-5			hdsst ssst							
624	As per schedule	WB	0-27	hcl/mcl	10YR 3/3			3-5	1-2	1-2	hdsst hr lst	55	55	III	W	3b	Medium-Heavy	Improved upper subsoil drainage strong mn mottles 50-55 marginal 3a
			27-55	mcl	10YR 4/4	10YR 6/6	f	3-5			hdsst ssst							
			55-100	hcl	10YR 5/3	75YR 5/6 Mn	m	3_5			hdsst ssst							
625	414900 509363	WB	0-28	hcl	10YR 4/3			3-5	1-2	1-2	hdsst ssst	28	35	IV	W	4	Heavy	Few large sandstones in topsoil to 200mm size
			28-40	hcl	10YR 5/4	10YR 6/6 Mn	ab	5-10			hdsst ssst							
			40-100	c	10YR 5/2	10YR 7/1 Mn	ab	3-5			hdsst sst							

BORING NUMBER	NGR (actual)	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC Limitation	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total (%)	>2cm	>6cm	Type							
626	As per schedule	WB	0-30	hcl	10YR 3/3			3-5	1_2	1-2	hdsst	30	40	IV	W	4	Heavy	Heavy topsoil. Grade 4 slightly harsh but to guidance as heavy topsoil and WC4
			30-40	hcl	10YR 5/3	10YR6/1 Mn	ab	5-10			hdsst ssst							
			40-100	hcl	10YR 5/2	10YR 6/6 Mn	ab	5-10			hdsst ssst							
627	As per schedule	WB	0-27	hcl	7.5YR 4/3			1-2	1-2	1-2	hdsst	27	38	IV	W	4	Heavy	Stony topsoil on eastern headland- field stone pickings?. Good earthworm numbers
			27-38	hcl	10YR 5/4	7.5YR 5/6 Mn	ab	5-10			hdsst ssst							
			38-100	c	10YR 5/2	10YR 6/1 Mn	ab	3-5			hdsst ssst							
630	NZ 15100, 09000	PGR	24	org zycl	dk gr br			3-5			sst	24	40	4	CL & W	3b	m/h	weathered sandstone in ss
			40	hcl	lt gr & ye	gr & ye	ab	3-5			sst							
			100	hcl/c	dk gr, oc & ye	oc, gr & ye	ab	5-10			sst, shl & cl							
631		WB	0-27	mcl	10YR 4/3			3-5	1-2	1-2	hdsst hr gr	27	36	IV	W	3b	Medium-Heavy	Rare large and v large hdsst in topsoil to 150mm size. Moderate slope 3-4° W
			27-45	c	10YR 6/2	10YR 6/6 6/8	ab	3-5			hdsst ssst							
			45-100	hcl	10YR 6/6	10YR6/1 6/6 Mn	ab	3-5			hdsst ssst							
632	NZ 15200, 09000	WB	29	scl	dk gr br			3-5			sst	29	35	4	CL & W	3b	m/h	weathered sandstone in ss
			60	hcl	lt gr & ye	gr & yel	ab	3-5			sst							
			100	hcl/c	dk gr, oc & ye	oc, gr & ye	ab	5-10			sst, shl & cl							
633	NZ 15200, 08910	WB	30	mcl	dk gr br			3-5			sst	30	35	4	CL & W	3b	m/h	boring adjusted northwards to avoid road, field headland. weathered sandstone in ss
			50	hcl	lt gr & ye	gr & ye	ab	3-5			sst							
			100	hcl/c	dk gr, oc & ye	oc, gr & ye	ab	5-10			sst, shl & cl							
634	As per schedule	WB	0-28	mcl	10YR 3/3			3-5	1-2	1-2	hdsst hdlst hr	30	43	IV	W	3b	Medium-Heavy	Poorer drainage at base of slope - 3-4 SSW
			28-43	mcl	10YR 6/4	7.5YR 6/8 Mn	c	3-5			hdsst lst							
			43-80	c	10YR5/3	10YR 6/2 6/6	ab	3-5			hdsst lst							
635	As per schedule	WB	0-23	hcl	10YR 4/3			1-2	1-2	1-2	hdsst grvl	23	35	IV	W	4	Heavy	Wetter at bottom of slope adjacent woodland. Heavy topsoil
			23-35	hcl	10YR 5/2	10YR 6/6	ab	1-2			hdsst ssst							
			35-100	c	2.5Y 4/3	10YR 6/2	ab	1-2			hdsst ssst							
636	NZ 15300, 09100	WB	30	hcl	dk gr br			3-5			sst	30	35	4	CL & W	4	hvy	v dk gr in ss with common soft weathered sandstone. Impenetrable stone at 70
			70	hcl/c	dk gr, oc & ye	oc, gr & ye	ab	5-10			sst, shl & cl							
637	NZ 15300, 09000	WB	30	mcl	dk gr br			3-5			sst	30	35	4	CL & W	3b	m/h	weathered sandstone in ss
			50	hcl/c	lt gr & ye	gr & ye	ab	3-5			sst							
			100	hcl/c	dk gr, oc & ye	oc, gr & ye	ab	5-10			sst, shl & cl							
638	NZ 15300, 08900	WB	30	hcl	dk gr br			3-5			sst	30	35	4	CL & W	4	hvy	ts wet and gleyed, weathered sandstone in ss,
			100	hcl/c	dk & lt gr	oc, ye & gr	ab	3-5			sst							
640	As per schedule	WB	0-30	mcl	10YR 3/3			1-2	1-2	1-2	hdsst q shz	30	70?	III	W	3a	Medium	Less tony silty profile to depth
			30-65	mzcl	10YR 7/4	7.5YR 5/6	ab	1-2			hdsst sssr grvl							
			65-100	mzcl	10YR 8/6	7.5YR 6/8 Mn	ab	1-2			hdsst grvl							
641	As per schedule	WB	0-27	hcl	10YR 4/4			1-2	1-2	1-2	hdsst grvl	27	70	III	W	3b	Medium-Heavy	Sandy very pale yellow upper subsoil strongly gleyed but not SPL. Heavy topsoil
			27-70	scl	2.5Y 7/2	7.5YR 5/6	ab	1-2			hdsst ssst							
			70-100	hcl	2.5Y 7/3	10YR 6/6	ab	1-2			hdsst ssst							

BORING NUMBER	NGR (actual)	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC Limitation	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total (%)	>2cm	>6cm	Type							
642	NZ 15400, 09000	WB	30 50 70	hcl c hcl/c	dk gr br oc, ye & lt gr v dk gr & ye	 oc & ye oc, ye & gr	 ab ab	3-5 3-5 3-5			sst sst sst & shl	30	35	4	CL & W	4	hvy	ts wet and gleyed, weathered sandstone in ss, impenetrable stone at 70
643	As per schedule	WB	0-22	hcl	10YR 4/4			3-5	1-2	1-2	hdsst grvl q	23	35	IV	W	4	Heavy	Rare large hard ssts in topsoil to 150mm Suze
			22-50	hcl	10YR 5/3	10YR 6/6	ab	3-5			hdsst grvl q							
			50-100	c	10YR 5/2	7.5YR 5/6 Mn	ab	3-5			hdsst ssst c							
644	NZ 15400, 08810	WB	30 45 100	mcl hcl hcl/c	dk gr br gr gr & v dk gr/bl	 oc & gr oc & ye	 c ab	3-5 3-5 10-20			sst sst & shl sst, shl & cl	30	35	4	CL & W	3b	m/h	shallow valley feature, soft weathered sst and shale in ss
646	As per schedule	WB	0-28	hcl	10YR 4/4			1-2	1-2	1-2	hdsst	28	35	IV	W	4	Medium-Heavy	Soft sandstone fragments in lower subsoil
			28-42	hcl	10YR 5/3	10YR 5/6	ab	1-2			hdsst grvl							
			42-100	c	10YR 5/2	10YR 5/6	ab	1-2			ssst							
647	As per schedule	WB	0-32	mcl	10YR 4/4			3-5	1-2	1-2	hdsst ssst	32	65	III	W	3a	Medium-Heavy	Slightly improved drainage on elevated area of field Impen @65
			32-65	hcl	10YR 5/2	7.5YR 5/6 Mn	c	3-5			hdsst							
			65-100	c	10YR 5/3	7.5YR 5/6 Mn	ab	1-2			hdsst							
648	NZ 15500, 08900	WB	35 60 100	hcl c hcl/c	dk gr br dk gr v dk gr br	 ye & gr oc, ye & lt gr	 ab ab	3-5 3-5 10-20			sst sst & shl sst, shl & cl	35	35	4	CL & W	4	hvy	ts wet and gleyed, weathered sandstone in ss
649	As per schedule	WB	0-23	mcl/hcl	10YR 3/3			3-5	1-2	1-2	hdsst grvl	23	35	IV	W	4	Heavy	Rare large hard ssts in topsoil to 150mm size
			23-50	hcl	10YR 5/6	10YR 6/6 5/1	ab	3-5			hdsst grvl							
			50-100	c	10YR 5/4	10YR 5/2 6/8	ab	3 -5			hdsst grvl							
650	NZ 15600, 09000	WB	33 50 65	hcl c hcl/c	dk gr br dk gr v dk gr br	 oc, ye & gr ye & gr	 ab ab	3-5 3-5 5-10			sst sst sst & shl	33	35	4	CL & W	4	hvy	ts wet and gleyed, weathered sandstone in ss, impenetrable stone at 65
651	As per schedule	wb	0-24	m/hcl	10YR 4/4			1-2	1-2	1-2	hdsst grvl q	26	35	IV	W	3b	Medium-Heavy	Marginally lighter topsoil. 5-10% subsoil in topsoil
			26-45	hcl	10YR 6/2	7.5YR 5/6 10YR 6/1	ab	1-2			hdsst ssst							
			45-100	c	10YR 5/3	7.5YR 5/6 Mn	ab	1-2			hdsst ssst							
652	NZ 15600, 08700	PGR	30 35 100	hcl hcl hcl	v dk gr br gr lt gr	none fe Mg oc and yell	 ab ab	3-5 5-10 5-10		fw	lst lst & sst lst & sst	30	40	4	CL & W	4	hvy	moved to grid square corner,impenetrable stone at 80
653	NZ 15700, 08800	PGR	29 60 100	hcl hcl c	dk gr br lt gr gr	none oc, Mn & ye lt br & oc	 ab ab	3-5 3-5 3-5		fw	sst sst sst	30	35	4	CL & W	4	hvy	weathered sst, below 60 new
654	NZ 15790, 08650	WW	29 45 70	mcl/scl gritty hcl hcl	v dk gr br rd br dk gr/ bl	 oc & ye oc & ye	 ab ab	3-5 3-5 5-10		fw	sst & lst sf sst hd & sf sst	35	35	4	CL & W	3b	m/h	bottom of slope, as above, impenetrable stone at 70cm
655	NZ 15875, 08546	WW	26 45 100	hcl hcl c	v dk gr br lt gr dk gr	 oc, ye & Fe/Mn oc & ye	 ab ab	3-5 3-5 5-10		fw	sst sf sst hd & sf sst	25	35	4	CL & W	4	hvy	25 m from A66, weathered sst in ss

BORING NUMBER	NGR (actual)	LAND USE	DEPTH (cm)	Texture	Soil Colour	MOTTLES		STONES				DEPTH TO GLEYING (cm)	DEPTH TO SPL (cm)	WETNESS CLASS	ALC Limitation	ALC	SOIL TYPE	COMMENTS
					Munsell	Munsell	Ab.	Total (%)	>2cm	>6cm	Type							
657	NZ 15901, 08425	WW	50	mcl stones + mcl	v dk gr br dk gr br	oc & ye	r	3-5 10+			sst sst			3 ?	CL & W	3a	Dist.	Topsoil-like material to depth? impenetrable stone at 50cm. 3 different locations tried with a 10m radius with the same result.
658	NZ 15963, 08367	WW	28 50 100	mcl? c c / hcl	v dk gr br lt gr dk gr	oc & ye lt gr & ye	ab c	3-5 5-10 20+		fw	sst sst red sst	28	35	4	CL & W	3b	m/h	soft weathered sst in ss
659	As per schedule	WB	0-35	mcl/hcl	10YR3/3			3-5	1-2	1-2	hdsst	35	62	III	W	3b	Medium-Heavy	Deeper topsoil. Sandier upper subsoil strongly gleyed throughout and marginal SPL. Borderline hcl topsoil so grade as 3b
			35-62	scl	10YR5/3	10YR 5/2 6/6	ab	3-5			hdsst vsst							
			62-100	c	10YR6/2	10YR 6/1 Mn	ab	3-5			hdsst lst							
661	As per schedule	WOSR	0-35	mcl	10YR 4/3			3-5	3-5		hdsst grvl p g	35	80	III	W	3a	Medium	Sandy colluvium at base of slope. Strongly gleyed grey sandy subsoil >60cm. Likely receiving area for uplsope run off - vert wet to south of boring
			35-60	scl	10YR 5/3	10YR 6/6 7/1	ab	1-2			hdsst ssst hdlst							
			60-80	msl	10YR 5/1	7.5YR 5/6 Mn	ab											
			80-100	hcl	10YR 5/2	7.5YR 5/6 10YR 7/1	ab	3-5			hdsst							
663		PGR	28	mcl	2.5Y 3/1	7.5YR 5/8	fw	3-5			ssst	<10	35	IV	W	3b	Medium-Heavy	Field moist underfoot. Mottles increasingly dark blue grey below 60cm. Impenetrable to auger due to stones at 85cm.
			85	hcl & sand lenses	2.5Y 5/3	7.5YR 5/8 &5/1 & 2.5/1 & 10R 4/8	m	3-5			ssst							
664		WOSR	0-30	m/hcl	10YR 4/3			3-5	1-2	1-2	hdsst hr lst	30	35	IV	W	3b	Medium-Heavy	Marginal 4 if heavy topsoils. 3b more likely
			30-60	hcl	10YR 6/2	10YR 7/1 Mn	ab	3-5			hdsst ssst							
			60-100	hcl	10YR 5/3	10YR 7/2 Mn	ab	3-5			hdst ssst							
666	NZ 16500, 08200	PGR	30 45 100	mcl mcl hcl	dr gr br lt gr dr gr br	 ye & lt br oc & gr	 c c	1-3% 3-5% 3-5%		r	sst sst sst	30	45	4	CL & W	3b	m / h	7-11° degrees slope, wet at 80cm

Soil Profile												Agricultural Land Classification						Notes
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Litho'	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)	
600	0 - 33 33 - 53 53 - 103	Br Gr Gr	MZCL HCL C	- xxx xxx	- borderline yes		1 2 1			2 2 2	sandy in places	4	IV	3b		3b	WE	
602	0 - 25 25 - 44 44 - 100	Dk Yl Br Gr Gr	MCL HCL HCL	- xxx xxx	- yes yes		5 4 8			2 2 2		8	IV	3b		3b	WE	variable slope over distance
603	0 - 20 20 - 48 48 - 100	Dk Gr Br Gr Gr	MCL C C	- xxx xxx	- yes yes		8 8 5			2 2 2		4	IV	3b		3b	WE	
604	0 - 24 24 - 80	Br Gr + Br	MCL HCL	- xxx	- yes		8 8			2 2	SBS 80cm	3	IV	3b		3b	WE	
605	0 - 32 32 - 54 54 - 100	Dk Yl Br V Pl Br Gr	SCL SCL HZCL	- xxx xxx	- no yes		3 3 3			1 1 1		3	III - IV	3a - 3b		3a - 3b	WE	
606	0 - 22 22 - 41 41 - 83 83 - 100	Br Li Gr Pl Br + Gr Br	MZCL HCL HCL MCL	- xxx xxx xxx	- borderline yes yes		1 1 0 2			1 1 1		8	IV	3b		3b	WE	variable slope
607	0 - 31 31 - 51 51 - 78 78 - 100	Dk Gr Br Yl Br + Gr Br + Gr Gr	MZCL MCL HCL C	- xxx xxx xxx	- no yes yes		1 3 3 3			1 1 1 1		5	IV	3b		3b	WE	variable slope
608	0 - 31 31 - 74 74 - 102	Br Gr Gr	MCL C C	- xxx xxx	- yes yes		2 1 1			1 2 1		5	IV	3b		3b	WE	
609	0 - 30 30 - 52 52 - 78 78 - 100	Dk Gr Br Br Gr Gr	MZCL MCL HCL C	- xxx xxx xxx	- no yes yes		1 5 3 3			1 1 1 1	Stoney layer at 40cm	6	IV	3b		3b	WE	variable slope

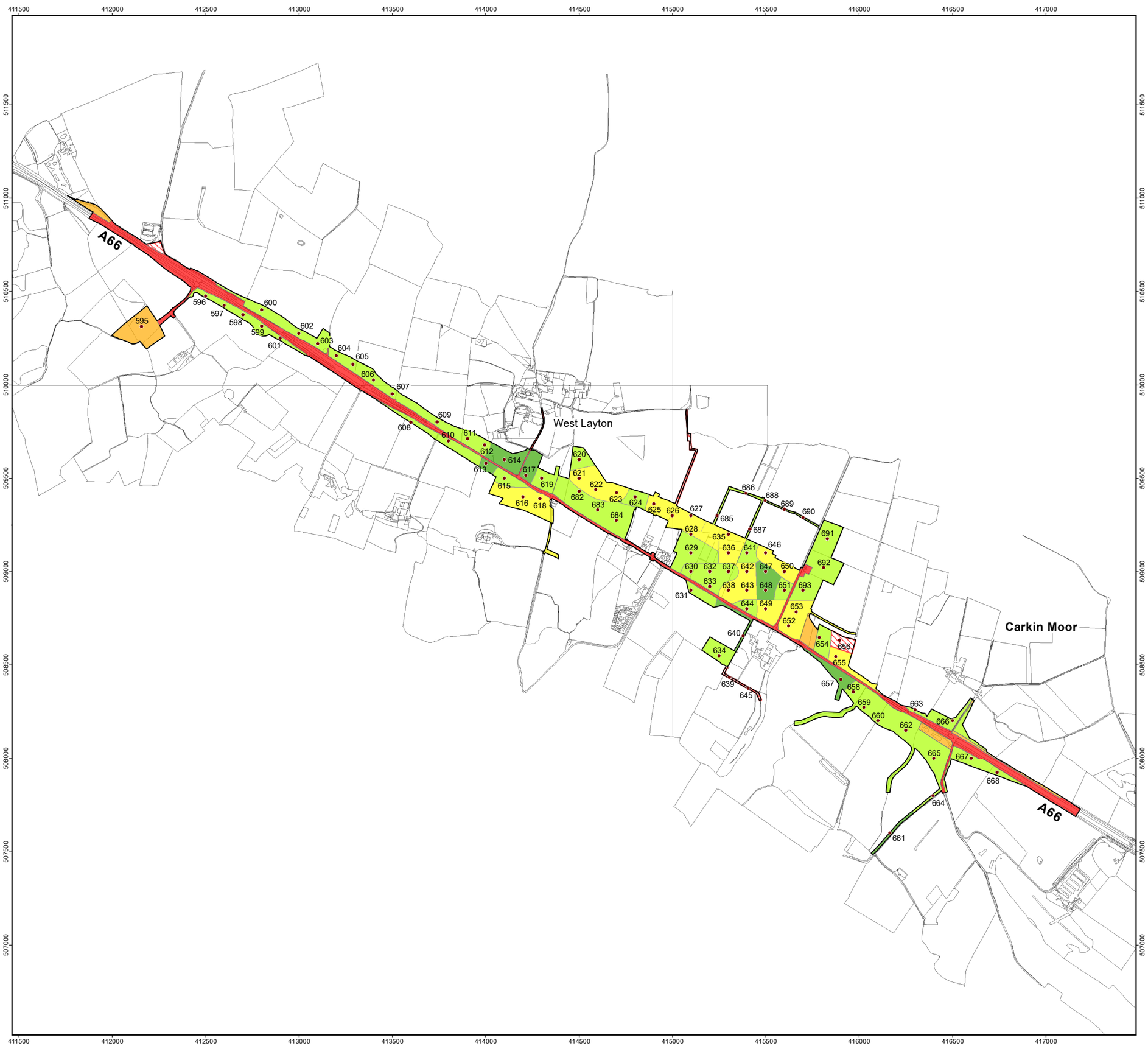
Soil Profile												Agricultural Land Classification						Notes
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Litho'	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)	
660	0 - 40 40 - 51 51 - 102	Br Br Gr Br	MCL HCL HCL	- xxx xxx	- yes yes		2 5 6			2 2 2	 sandy in places	5	IV	3b		3b	WE	variable slope
662	0 - 31 31 - 71 71 - 102	Br Gr Br Dk Gr Br	MCL HCL HCL	- xxx xxx	- yes yes		2 1 2			2 2 2		3	IV	3b		3b	WE	
665	0 - 33 33 - 76 76 - 100	Br Br Gr Br	HCL HCL HCL	- xxx xxx	- yes yes		3 8 8			2 2 2		4	IV	3b		3b	WE	
667	0 - 33 33 - 50 50 - 100	Br Br Gr	MCL MCL SCL	- o xxx	- no yes		1 1 2			1 1 1		8	IV	3b		3b	WE & GR	
668	0 - 35 35 - 60 60 - 100	Br Br Pl Br	MCL MCL MCL	- o xx	- no no		0 0 0				 lighter than topsoil lighter and gritty in places	5	II	2		2	CL	
682	0 - 27 27 - 42 42 - 70	Br Gr Gr	MCL HCL C	- xxx xxx	- yes yes		2 2 2			2 2 2	 Impenetrable due to stone at 70cm.	2	IV	3b		3b	WE	
683	0 - 27 27 - 46 46 - 100	Br Gr Gr	MCL HCL HCL	- xxx xxx	- no yes		2 4 4			2 2 2		6	IV	3b		3b	WE	
684	0 - 30 30 - 53 53 - 100	Br Gr Gr + Br	MCL HCL HCL	- xxx xxx	- no yes		3 4 4			2 2 2		6	IV	3b		3b	WE	
685	0 - 27 27 - 53 53 - 100	Gr Br Gr Gr + Gr	M-HCL HCL C	- xxx xxx	- no yes		1 2 4			2 2 2	Mottled	4	IV	3b		3b	WE	

Soil Profile												Agricultural Land Classification						Notes
Auger	Depth (cm)	Colour	Texture	Mottling	SPL	$CaCO_3$	Stones (%) Total	>2cm	>6cm	Litho'	Notes	(°)	W C	WE grade	DR grade	Overall grade	Limit(s)	
686	0 - 29 29 - 61 61 - 100	Gr Br Li Yl Br Gr	HCL SCL C	- xxx xxx	- no yes		2 2 2			2 2 2		4	III	3b		3b	WE	
687	0 - 30 30 - 51 51 - 100	Gr Br Gr Gr	MCL HCL C	- xxx xxx	- no yes		1 2 5			2 2 2		4	IV	3b		3b	WE	
688	0 - 32 32 - 45 45 - 100	Br Li Ol Br Gr	MCL HCL HCL	- xxx xxx	- yes yes		1 3 5			2 2 2		0	IV	3b		3b	WE	
689	0 - 32 32 - 46 46 - 66	Gr Br Gr Gr	HCL HCL C	- xxx xxx	- yes yes		1 1 3			2 2 2	Impenetrable due to stone at 66cm.	2	IV	4		4	WE	
690	0 - 32 32 - 84	Dk Gr Br Gr Br + Gr	HCL HCL	- xxx	- yes		1 2			2 1	Impenetrable by stones at 84cm.	4	IV	4		4	WE	Undulating microrelief
691	0 - 32 32 - 68 68 - 100	Dk Gr Br Li Gr Bu Gr	MZCL HCL C	- xxx xxx	- yes yes		1 2 2			2 2 2	Sandy	4	IV	3b		3b	WE	Variable slope, rolling field
692	0 - 32 32 - 53 53 - 100	Gr Br Gr Gr	MZCL HCL C	- xxx xxx	- no yes		1 1 0			2 2	Sandy	4	IV	3b		3b	WE	Variable slope across field
693	0 - 28 28 - 45 45 - 100	Dk Gr Br Gr Gr	MZCL C C	- xxx xxx	- yes yes		1 1 1			2 2 2		4	IV	3b		3b	WE	Slope variable . over distance

Highways England

A66 Northern Trans-Pennine

Stephen Bank to Carkin Moor
Agricultural Land Classification (ALC) Survey Results



Order Limits

Auger locations

ALC

- 2
- 3a
- 3b
- 4
- 5
- Non-ag
- Urban
- Not surveyed

Drawn by Paul Taylor 29/04/2022, Verified by John Grylls 29/04/2022

N W E S

0 100 200 300 400

Metres

Scale: 1:20,000 at A3 size

ADAS, Unit 14, Newton Court, Pendeford Business Park,
Wolverhampton. WV9 5HB. Tel +44(0)1902 271300

1050859

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Appendix 8: Key to soil auger boring abbreviations

Topsoil and Subsoil Texture			Soil Colour/Mottles		
zc	-	silty clay	bl	-	black
c	-	clay	br	-	brown
hcl	-	heavy clay loam	fe	-	Iron concretions
hzcl	-	heavy silty clay loam	g	-	grey
mcl	-	medium clay loam	lt	-	light
mzcl	-	medium silty clay loam	mn	-	manganese concretions
scl	-	sandy clay loam	o	-	ochrous
msl	-	medium sandy loam	ol	-	olive
mszl	-	medium sandy silt loam	p	-	pale
scl	-	sandy clay loam	pk	-	pinkish
csl	-	coarse sandy loam	r	-	red
msl	-	medium sandy loam	y	-	yellow
mszl	-	medium sandy silt loam	**Abundance (Mottles)**		
fsl	-	fine sandy loam	r	-	rare
fszl	-	fine sandy silt loam	f	-	few
zl	-	silt loam	c	-	common
lcs	-	loamy coarse sand	m	-	many
lms	-	loamy medium sand	ab	-	abundant
lfs	-	loamy fine sand	**Cropping/Land Use**		
cs	-	coarse sand			
ms	-	medium sand	A	-	arable (unspecified)
fs	-	fine sand	CULT	-	cultivated (awaiting drilling)
o	-	prefix 'o' = organic	F	-	fallow
pl	-	peaty loam	CER	-	cereals
p	-	peat	NON AG	-	non agricultural
Stone type			POT	-	Potatoes
br	-	brick	PLO	-	ploughed
chk	-	chalk	PGR	-	permanent grassland
c	-	coal	WOSR	-	winter oilseed rape
g	-	glass	RGR	-	rough grassland
grvl	-	gravel	WW	-	winter wheat
hdsst	-	hard sandstones			
mdst	-	mudstone	**Other**		
p	-	pottery			
peb	-	pebbles	Impen	-	impenetrable to auger
q	-	quartzite pebbles	pok	-	pockets
sch	-	schist	occ	-	occasional
ssst	-	soft/weathered sandstones	OB	-	overburden
t	-	tile fragments	OM	-	organic matter
slst	-	soft limestone	SPL	-	slowly permeable layer
zlst	-	siltstone	W	-	Weathering

Colour	Texture	Mottling	$CaCO_3$
Bk - black **Br** - brown(ish) **Bu** - blue(ish) **Dk** - dark **Du** - dusky **Gn** - green(ish) **Gr** - grey(ish) **Li** - light **Ol** - olive **Pi** - pink(ish) **Pl** - pale **Rd** - red(dish) **St** - strong **V** - very **Wk** - weak **Yl** - yellow(ish)	**C** - clay **ZC** - silty clay **SC** - sandy clay **CL** - clay loam (H-heavy, M-medium) **ZCL** - silty clay loam (H-heavy, M-medium) **SCL** - sandy clay loam **SZL** - sandy silt loam (F-fine, M-medium, C-coarse) **ZL** - silt loam **SL** - sandy loam (F-fine, M-medium, C-coarse) **LS** - loamy sand (F-fine, M-medium, C-coarse) **S** - sand (F-fine, M-medium, C-coarse) **Org** - organic (S-sand, L-loam, C-clay) **Pty** - peaty (S-sand, L-loam) **Pt** - peat (S-sandy, L-loamy, H-humified, SF-semi-fibrous, F-fibrous) **R** - bedrock	**o** – unmottled soil; **x** – a few (<2%) *ochreous* mottles; **xx** –common (2-20%) to many (20-40%) *ochreous* mottles OR *greyish* or *pale* soil, typically with a few *ochreous* mottles; **xxx** – *greyish* or *pale* colours dominant in matrix and/or ped faces and common to very many (>40%) *ochreous* mottles OR if *reddish* colours are dominant in the matrix, > 2% *greyish*, *brownish* or *ochreous* mottles or ferri-manganiferous concentrations, and dominantly *pale* coloured ped faces (**gleyed horizon**); **xxxx** – dominantly grey soil, often with some *ochreous* mottles (**gleyed horizon**). '*greyish*', '*pale*' '*brownish*', '*ochreous*' and '*reddish*' colours are assessed in the field using a Munsell Soil Colour Book and defined according to Appendix 3 of the ALC Guidelines.	**non** - non-calcareous **v sl ca** - very slightly calcareous **sl ca** - slightly calcareous **ca** - calcareous **v ca** - very calcareous **Stone lithology** **1** - all hard rocks or stones **2** - soft, medium or coarse grained sandstones **3** - soft 'weathered' igneous or metamorphic rocks or stones **4** - soft oolitic or dolomitic limestones **5** - soft fine grained sandstones **6** - soft, argillaceous or silty rocks or stones **7** - chalk or chalk stones **8** - gravel with non-porous stones **9** - gravel with porous stones

SPL	Notes
yes - a slowly permeable layer. **borderline** - a borderline slowly permeable layer. **no** - not a slowly permeable layer.	**FMCs** – ferri-manganiferous concentrations

Principal Limitation(s) to Agriculture				
CL - climate	**DE** - depth	**DR** - droughtiness	**ER** - erosion	**FL** - flooding
GR - gradient	**MR** - microrelief	**ST** - stoniness	**TX** - texture	**WE** - wetness

Droughtiness Calculation
MDW - moisture deficit wheat (mm); **MDP** - moisture deficit potatoes (mm); **MBW** - moisture balance wheat (mm); **MBP** - moisture balance potatoes (mm); **Grade W** - droughtiness grade for wheat; **Grade P** - droughtiness grade for potatoes.
Descriptions and classifications are made in accordance with *Soil Survey Field Handbook* (Hodgson, J.M., 1997), *Technical Information Note TIN037: Soil Texture* (Natural England, 2008) and *Agricultural Land Classification of England and Wales: Revised guidelines and criteria for grading the quality of agricultural land* (MAFF, 1988).

In the auger boring descriptions sometimes the Munsell Soil Colour Code was used to record soil colour. Greyish, pale, brownish, ochreous and reddish colours are relevant to establishing if a soil horizon is gleyed i.e. has greyish, pale and ochreous soil colouring indicative of waterlogging). Munsell colours are defined as follows:-

- Greyish is Munsell soil colour of any hue with a chroma 2 or less and a value more than 3 e.g. in the Munsel colour code 10YR6/1 10YR is the hue, 6 is the value and 1 is the chroma (in a word the soil colour is grey).
- Pale is Munsell soil colour of any hue with *either* chroma 3 and a value more than 4 *or* chroma 4 and value more than 5 e.g.10YR6/4 is light yellowish browny (considered a pale colour for ALC purposes).
- Brownish is Munsell soil colour of hues 7.5YR to 10YR with *either* chroma 3 and value 4 *or* chroma 4 and value 4 or 5 e.g. 7.5YR3/3 is dark brown.
- Ochreous is Munsell soil colour of 10YR or redder with chroma more than 4 and value less 7 e.g. 7.5YR4/6 is strong brown.
- Reddish is Munsell soil colour of hue 5YR or redder e.g. 5YR4/3 is reddish brown.

Soil surveyors carry Munsell Soil Colour Charts to assign soil colours whilst carrying out surveys.

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Appendix 9: Laboratory Particle Size Distribution Results

ANALYTICAL REPORT

Report Number	93590-22	F912	KEVIN BROOK	**Client** KEVIN BROOK
Date Received	03-MAR-2022		RSK ADAS LTD	
Date Reported	17-MAR-2022		UNIT 1 RUBICON SQUARE	
Project	1010891 SOIL		4205 PARK APPROACH	
Reference	KEVIN BROOK		THORPE PARK	
Order Number			LEEDS LS15 8GB	

Laboratory Reference		SOIL550062	SOIL550063	SOIL550064	SOIL550065						
Sample Reference		A66 B383 TOPSOIL	A66 B383 UPPERSUB	A66 B832 T/S 0-23	A66 B832 UPPERSUB						
Determinand	**Unit**	SOIL	SOIL	SOIL	SOIL						
Sand 2.00-0.063mm	% w/w	82	86	53	38						
Silt 0.063-0.002mm	% w/w	9	5	25	27						
Clay <0.002mm	% w/w	9	9	22	35						
Organic Matter LOI	% w/w	5.2	0.9	6.4	3.7						
Textural Class **		LS	LS	SCL	C/HCL						

Notes

Analysis Notes	The sample submitted was of adequate size to complete all analysis requested. The results as reported relate only to the item(s) submitted for testing. The results are presented on a dry matter basis unless otherwise stipulated.
Document Control	**This test report shall not be reproduced, except in full, without the written approval of the laboratory.**

** Please see the attached document for the definition of textural classes.

Reported by *Myles Nicholson*

Natural Resource Management, a trading division of Cawood Scientific Ltd.
Coopers Bridge, Braziers Lane, Bracknell, Berkshire, RG42 6NS
Tel: 01344 886338
Fax: 01344 890972
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ANALYTICAL REPORT

Report Number	93591-22	F912	KEVIN BROOK	Client	KEVIN BROOK
Date Received	03-MAR-2022		RSK ADAS LTD		
Date Reported	17-MAR-2022		UNIT 1 RUBICON SQUARE		
Project	1010891 SOIL		4205 PARK APPROACH		
Reference	KEVIN BROOK		THORPE PARK		
Order Number			LEEDS LS15 8GB		

Laboratory Reference		SOIL5500GS
Sample Reference		A66 B341 LS01
Determinand	**Unit**	**SOIL**
Sand 2.00-0.063mm	% w/w	66
Silt 0.063-0.002mm	% w/w	16
Clay <0.002mm	% w/w	18
Textural Class **		SCL/SL

Notes

Analysis Notes	The sample submitted was of adequate size to complete all analysis requested. The results as reported relate only to the item(s) submitted for testing. The results are presented on a dry matter basis unless otherwise stipulated.
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ANALYTICAL REPORT

Report Number	91606-22	K437	KIRK HILL
Date Received	22-FEB-2022		RSK ADAS LTD
Date Reported	07-MAR-2022		ADAS ROSEMAUND
Project	KIRK HILL 1010891		PRESTON WYNNE
Reference	A66		HEREFORD
Order Number			HR1 3PG

Laboratory Reference		SOIL548014	SOIL548015	SOIL548016	SOIL548017	SOIL548018	SOIL548019	SOIL548020	SOIL548021	SOIL548022	
Sample Reference		SCHEME 6 WEST 458 TS	SCHEME 6 WEST 458 SS	B644 TS	B644 UPSS	B614 TS	B614 USS	SCHEME 6 W SS 55-100	SCHEME 3 AB40 TS	SCHEME1/2 PIT AB28	
Determinand	**Unit**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	
Sand 2.00-0.063mm	% w/w	72	64	50	44	50	51	46	78	70	
Silt 0.063-0.002mm	% w/w	15	20	25	25	27	33	27	13	15	
Clay <0.002mm	% w/w	13	16	25	31	23	16	27	9	15	
Textural Class **		SL	SL	SCL/MCL	HCL	SCL/MCL	SL	HCL	LS	SL	

Notes

Analysis Notes	The sample submitted was of adequate size to complete all analysis requested. The results as reported relate only to the item(s) submitted for testing. The results are presented on a dry matter basis unless otherwise stipulated.
Document Control	**This test report shall not be reproduced, except in full, without the written approval of the laboratory.**

** Please see the attached document for the definition of textural classes.

Reported by *Myles Nicholson*

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ANALYTICAL REPORT

Report Number	94040-22	K437	KIRK HILL
Date Received	04-MAR-2022		RSK ADAS LTD
Date Reported	17-MAR-2022		ADAS ROSEMAUND
Project	1010891 A66 2402 TO 0203		PRESTON WYNNE
Reference	KIRK HILL		HEREFORD
Order Number			HR1 3PG

Laboratory Reference		SOIL550282	SOIL550283	SOIL550284	SOIL550285	SOIL550286	SOIL550287				
Sample Reference		A66 198 TS	A66 210 TS	A66 3 TS	A66 213 TS	A66 AB 249 TOPSOIL	A66 AB 249 SUBSOIL				
Determinand	**Unit**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**	**SOIL**				
Sand 2.00-0.063mm	% w/w	76	79	55	78	67	52				
Silt 0.063-0.002mm	% w/w	12	11	26	11	18	21				
Clay <0.002mm	% w/w	12	10	19	11	15	27				
Textural Class **		SL	SL	SCL	SL	SL	SCL				

Notes

Analysis Notes: The sample submitted was of adequate size to complete all analysis requested.
The results as reported relate only to the item(s) submitted for testing.
The results are presented on a dry matter basis unless otherwise stipulated.

** Please see the attached document for the definition of textural classes.

Reported by: *Myles Nicholson*
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Technical Information

ADAS (UK) Textural Class Abbreviations

The texture classes are denoted by the following abbreviations:

Class	Code
Sand	S
Loamy sand	LS
Sandy loam	SL
Sandy Silt loam	SZL
Silt loam	ZL
Sandy clay loam	SCL
Clay loam	CL
Silt clay loam	ZCL
Clay	C
Silty clay	ZC
Sandy clay	SC

For the *sand, loamy sand, sandy loam* and *sandy silt loam* classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

- vf Very Fine (more than 2/3's of sand less than 0.106 mm)
- f Fine (more than 2/3's of sand less than 0.212 mm)
- c Coarse (more than 1/3 of sand greater than 0.6 mm)
- m Medium (less than 2/3's fine sand and less than 1/3 coarse sand).

The subdivisions of *clay loam* and *silty clay loam classes* according to clay content are indicated as follows:

- M medium (less than 27% clay)
- H heavy (27-35% clay)

Organic soils i.e. those with an organic matter greater than 10% will be preceded with a letter O.

Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter P.

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Appendix 10: Description of ALC Grades

The ALC grades and subgrades are described below in terms of the types of limitation which can occur, typical cropping range and the expected level and consistency of yield. The *'best and most versatile agricultural land'* falls into grades 1, 2 and subgrade 3a – which collectively comprises about one-third of the agricultural land in England and Wales. About half the land in England and Wales is either of moderate quality (subgrade 3b) or poor quality (grade 4). Although less significant on a national scale, such land can be locally valuable to agriculture and the rural economy where poorer farmland predominates. The remainder is very poor quality land in grade 5, which mostly occurs in the uplands.

Grade 1 – excellent quality agricultural land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2 – very good quality agricultural land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

Grade 3 – good to moderate quality land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.

> ***Subgrade 3a – good quality agricultural land***
>
> Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.
>
> ***Subgrade 3b – moderate quality agricultural land***
>
> Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4 – poor quality agricultural land

Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 – very poor quality agriculture land

Land with very severe limitations which restrict use to permanent pasture or rough grazing, except for occasional pioneer forage crops.