

Agricultural Land Classification & Soil Resource Assessment

Land at Eastfield, Shepley

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1.0 INTRODUCTION

- 1.1 LDC has been asked by Banks Property to undertake a soil resource and Agricultural Land Classification assessment of 4.74 ha of land located to the southeast of Eastfield Road and west of the A629 Shepley, West Yorkshire. The extent of the site and proposed red line planning boundary is shown on the plan at Appendix 1.
- 1.2 The site, known as Land at Eastfield, Shepley, is proposed for the development of residential dwellings. The site is centered over OS National Grid Reference SE 19719 09695. The project will impact 4 fields in agricultural use, and for the purpose of this report have been split into Field 1, Field 2, Field 3 and Field 4.
- 1.3 This report has been prepared in support of a planning application for the proposed development and is authored by Catherine Peacock and verified by Amy Sales of LDC.

2.0 REPORT OBJECTIVES

- 2.1 The objectives of this report are to:
 - Describe the distribution of Soil Types over the proposed site,
 - Provide a pre-working record of soil characteristics in each enclosure,
 - Determine the Agricultural Land Classification (ALC) grading of land within the site.

3.0 SURVEY METHODOLOGY

Desktop Study

- 3.1 LDC completed a desktop study for the site to collate and review data sourced from:
 - Ordnance Survey 1:10,000 mapping,
 - Agroclimatic datasets from the UK Met Office (1961-1988),
 - Soil Survey 1:250,000, Sheet 1 Soils of Northern England,
 - Cranfield's LANDIS website,
 - Provisional ALC data and Post 1988 Published ALC held on Defra's MAGIC website,
 - British Geological Survey (BGS) Website (1:50,000 mapping),
 - Aerial photographs referenced from Google Earth, and
 - Environment Agency flood risk information

Field Survey

- 3.2 A soil survey and land quality assessment was undertaken by LDC during August 2025. Soils were examined across the site using a hand-held Dutch auger and spade to a maximum depth of 1.20m. A total of 7 auger borings were completed, at 100m intervals, at points predetermined by the Ordnance Survey National Grid and located in the field using a handheld GPS.
- 3.3 Information on topsoil and subsoil depth, texture, stone content and drainage characteristics were collected at each point. At the time of survey, the site was in cereal stubble.

Soil Sampling and Analysis

- 3.4 Topsoil samples were collected from each field to a depth of 0-200mm for arable use in accordance with the sampling procedures outlined in The Nutrient Management Guide, DEFRA/AHDB, 2022.
- 3.5 Samples were tested to provide detail on topsoil texture (particle size distribution by laser diffraction), organic matter content (by LOI) and pH status, which are factors in assessing agricultural land quality. Where stones were considered to be a determining factor in ALC grade, representative topsoil samples were taken and calculated for stone content across 3 size fractions.
- 3.6 Topsoil samples were also tested to provide information on nutritional characteristics including available phosphorus, potassium and magnesium.
- 3.7 Topsoil and subsoil samples were collected from the soil pit and tested for particle size distribution (sedimentation) to confirm hand texturing in the field and stone content.

Laboratory Testing

- 3.8 Soil samples were analysed at a suitably accredited laboratory (NRM Ltd.) who are UKAS accredited for soil, sludge and sediment analyses and participate in proficiency testing schemes including CONTEST (contaminated land soils and leachates), MCERTS, Aquacheck (waters, soils and sludges), FPAS (nitrate in leafy vegetables) and WEPAL (nutrients in agricultural soils).

Interpretation

- 3.9 Soil survey information has been combined with site information to grade the quality of the land in accordance with the method described in "Revised Guidelines and Criteria for Grading the Quality of Agricultural Land" (MAFF 1988).
- 3.10 Field survey information and analytical data have been used to characterise the soils on site into representative soil mapping units.

Guidance

- 3.11 The following guidance has been used in providing this report:
- Agricultural Land Classification of England and Wales. Revised guidelines and Criteria for Grading the Quality of Agricultural Land (MAFF, 1988),
 - Agricultural Land Classification: protecting the best and most versatile agricultural land: Technical Information Note TIN049, (Natural England, 2012),
 - Guide to Assessing Development Proposals on Agricultural Land (Natural England, 2018),
 - The Code of Practice for the Sustainable Use of Soils on Construction Sites, (Defra, 2009),
 - The Soil Survey Field Handbook, Technical Monograph No 5, (Harpenden, 1974),
 - Good Practice Guide for Handling Soils, (MAFF, April 2000),
 - Soil Texture: Technical Information Note TIN037, (Natural England, 2008),
 - The Nutrient Management Guide, (ADHB/Defra. 2017),
 - Guidance for Successful Reclamation of Mineral and Waste Sites (Defra, 2004),
 - Protecting our Water, Soil and Air, A Code of Practice, (Defra, 2009), and
 - Safeguarding our Soils, A Strategy for England, (Defra, 2009).

Appendices

- 3.12 The following Appendices are included:
- Appendix 1: Soil Survey information plans
 - Appendix 2: Soil Type distribution plans
 - Appendix 3: ALC distribution plans

- Appendix 4: Description of individual soil auger borings
- Appendix 5: Soil sample analytical report sheets
- Appendix 6: Trial pit description
- Appendix 7a: Provisional ALC data
- Appendix 7b: Post 1988 detailed ALC data
- Appendix 8: Flood risk sensitivity

4.0 FINDINGS

Location

- 4.1 The site is located southwest of Shepley, West Yorkshire and centred over OS National Grid Reference SE 19715 09675. The site is bordered to the south by an area of broadleaved woodland and to the northwest by houses of Knowle Park Avenue and Stonecroft Gardens. Eastfield Road dissects through the centre of the site to connect to existing farm buildings that occupy the centre of the site.

Land Use

- 4.2 The site occupies a single agricultural enclosure which, for sampling purposes, has been further divided and labelled as Field 1, Field 2 Field 3 and Field 4, as shown in Appendix 1. The site is under an arable rotation and at the time of survey was cropped in cereal stubble.

Climate and Relief

- 4.3 This area has a mean annual rainfall of 872mm and The Accumulated Temperature above 0°C between January and June is 1,199 day C. This provides a relatively long and ° mild growing season. The land is typically at field capacity (when the land is wet and field drains would be expected to flow), for 213 days (or 7-8 months) in a normal year.
- 4.4 The site is very gently sloping with a 2-4% slope. Moderate north facing, 5–7-degree slopes occupy Field 4.

Geology

- 4.5 Solid geology is mapped primarily, by the British Geological Survey (BGS, 1:50000 website), as the Grenoside Sandstone Formation. This fine-grained sandstone is thinly bedded with mudstone and formed between 319 and 318 million years ago during the Carboniferous Period. A tract of the Pennine Lower Coal Measures Formation cuts through the south of the site, composed of interbedded sandstone, siltstone and mudstone also formed during the Carboniferous Period.
- 4.6 According to the British Geological Survey (BGS, 1:50000 website), the site is absent of any superficial deposits.

Soils

- 4.6 Soils in the area are mapped in Figure 1 and described by the Soil Survey of England and Wales as the Dale Association. These soils are typically poorly drained, fine loams and clayey textured soils, often stoneless as derived from clays and shale. Dale soils are susceptible to seasonal waterlogging (Wetness Class IV) where undrained. As a result, these soils are only suited to grassland, with cereals only suitable in some areas.
- 4.7 Neighbouring soils are contrastingly mapped as that of the Rivington Soil Association. These soils are typically well drained, coarse loamy soils overlying sandstone.



Agricultural Land Classification

- 4.8 ALC grading was mapped (MAGIC website) provisionally by MAFF in 1988 at a scale of 1:250,000, an extract is shown in Appendix 7a. Whilst these maps are based on a now obsolete ALC grading system, they provide an indication of potential grade in this geographical area as predominantly as good to moderate quality ALC Grade 3, with no further division on subgrades, and an area of poor quality ALC Grade 4 along the southwest boundary of the site.
- 4.9 An extract from the MAGIC website at Appendix 7b shows that a number of detailed ALC surveys have been completed in this area. Within a 10km area of the site, land has been graded as predominantly ALC subgrade 3b and Grade 4, with smaller inclusions of subgrade 3a to the northeast and Grade 5 to the southwest.

Detailed Soils Description

- 4.10 Information collected from the soil survey has been used to map the soils according to the soil classification for England and Wales, fully described by Avery (1980) and Clayden and Hollis (1984). This is a general-purpose classification that groups soils that behave in a similar way, in response to normal management practices. A group of soils, or Soil Association, has a limited and defined range of diagnostic properties that differentiate it from other Soil Types. Associations are further sub divided into component Soil Series. Detailed descriptions of individual Soil Types are outlined in 'Soils and Their Use in Northern England', (Harpenden, 1984).
- 4.11 The site is occupied by three soil types which are described below and mapped in Appendix 2.

Soil Type 1: Heavy textures (2.40 ha or 53% of the proposed site)

- 4.12 This soil type was found across the majority of the site. This soil represents a variant of the Dale soil association. It is mapped as dark brown in Appendix 2. A typical profile is described at TP1 of Appendix 6.
- 4.13 The topsoil was dark greyish brown (10YR 4/2) and dark brown (10YR 3/3) heavy clay loam and heavy silty clay loam at a depth of 20-32cm (average 26cm), with many (3-15%) hardstones and sandstones and rare manganese.
- 4.14 The upper subsoils were yellow (10YR 8/6), yellowish red (5YR 5/8), dark greyish brown (10YR 4/2) and yellowish brown (10YR 5/8) heavy clay loam and heavy silty clay loam, with common to abundant manganese, ochreous and grey mottles. Where present, the lower subsoil was light to dark grey (10YR 7/1 and pale red (2.5YR 7/2) clay and silty clay from 50-80cm depth. This horizon had abundant grey (10YR 6/1), manganese (10YR 2/1) and ochreous (7.5YR 3/4) mottles and was absent of any stones.

- 4.15 This soil type was capable of moderate quality ALC subgrade 3b, with moderate wetness limitations.

Soil Type 1.1: Disturbed soils (0.15 ha or 3% of the proposed site)

- 4.16 This soil type was found in a small area found immediately northeast of existing farm buildings at auger boring 7. It is mapped in hatched brown in Appendix 2. This area is naturally occupied by Soil type 1, however has been subject to additions of topsoil generated from the construction of nearby farm buildings. As such profiles were resolved profiles evident of man-made disturbance.
- 4.17 Topsoil was similar dark brown (10YR 3/3) heavy clay loam with a depth of 28cm. Topsoils were slightly stoney, containing few (1-2%) sandstones.
- 4.18 The subsoil was light yellowish brown (10YR 6/4) heavy clay loam found to depth. This horizon contained abundant manganese (5YR 2/1), grey (10YR 6/1) and ochreous (7.5YR 3/4) mottles, with rare (<1%) sandstones.
- 4.19 It is proposed that soils from this area can be stripped and stored alongside soils from Soil type 1 however, should horizons with considerable with increased proportion of rubble or differing physical characteristics be resolved, these should be stripped and stored separately.
- 4.20 This soil type is of moderate quality land, capable of ALC subgrade 3b, as a result of a limitation of soil wetness. Due to heavy textured subsoils and mottling above 40cm depth resulting in a Wetness Class of IV.

Soil Type 2: Fine loamy shallow soils (0.15 ha or 3% of the proposed site)

- 4.21 This soil type was found along the northern boundary of the site, immediately north and northwest of existing farm buildings, at auger borings 1, 2 and 4. This soil represents typical soils of the Rivington Soil association, influenced by neighbouring Dale deposits.
- 4.22 It is mapped in pale yellow in Appendix 2 and a typical profile is described in TP2 at Appendix 6.
- 4.23 Topsoil was dark greyish brown (10YR 3/2) heavy clay loam with a depth of 28cm. Topsoils contained abundant sandstones (10-20%).
- 4.24 The subsoil, where present, was composed of dark yellowish brown (10YR 6/4) heavy clay loam. This horizon contained abundant manganese (5YR 2/1), grey (10YR 6/1) and ochreous (7.5YR 3/4) mottles, with extremely abundant (30+%) sandstones.
- 4.25 Topsoils were often underlain directly by shallow occurrence of jointed sandstone bedrock typical of the Rivington Soil Association. This resulted in better drained profiles of Wetness Class I. However, limitations in this soil type were imposed by stone content, with land of moderate quality, capable of ALC subgrade 3b.
- 4.26 When stripping shallow soils, it is important to keep the soil separate from any rubble generated, as this would degrade the quality.

No soil resource (0.55 ha or 12% of the proposed site)

- 4.26 A section of the area is mapped as no soil resource and consists of a farm track and farm buildings. It is mapped in grey at Appendix 2.
- 4.27 A summary of the soil types found across the site is shown in Table 1.

Table 1: Land at Eastfield, Shepley: Summary of Soil Types		
Soil Type	Area (ha)	% Site Area
1: Heavy textured soils	2.40	53
1.1 Disturbed area	0.15	3
2: Fine loamy shallow soils	1.63	34
No soil Resource	0.55	12
Total	4.73	100.0

Topsoil analysis results (refer to Appendix 2 & 5)

Topsoil pH

- 4.28 The optimum pH for mineral soils in arable use is 6.50. The pH range of the topsoil was 6.3- 6.8, All Fields except Field 1 are considered above the optimum for arable cropping.

Phosphorus, potassium and magnesium

- 4.29 Concentrations of soil phosphorus (P) were satisfactory (index 3) across the site.
- 4.30 Levels of available Potassium (K) were satisfactory (Index 3) across the site.
- 4.31 Available magnesium (Mg) was satisfactory (Index 3) in all fields.
- 4.32 These results are indicative of the soils and farming system in place and typical of moderate intensity agricultural land using modest inputs of fertiliser and/or manures.

Particle size distribution, organic matter and calcium carbonate equivalence

- 4.33 The topsoil contained between 27%-39% clay (laser technique), this determines the topsoil texture to be heavy clay loam to clay. A typical sample of topsoil was analysed for stone content in Fields 2 and 3 and resolved 43.2 and 50.5% stones in the topsoil, of which the majority (31.2% and 38.2%) exceeded >50mm in size.

Agricultural Land Classification

General

- 4.34 Land quality assessments have been made using the method described in “Revised Guidelines and Criteria for Grading the Quality of Agricultural Land” (MAFF, 1988). This system grades agricultural land according to the degree to which its physical characteristics impose long-term limitations on agricultural use and cropping flexibility.
- 4.35 The principal physical factors which influence land quality and agricultural production are climate, particularly temperature and rainfall; site, including gradient, micro-relief and flood risk, and soil characteristics such as texture, structure, depth, stoniness and erosion potential. These factors, including the interaction between them, form the basis of classifying land into one of five ALC grades with Grade 3 being subdivided into subgrades 3a and 3b. ALC grades 1, 2 and 3a are defined as the best and most versatile (BMV), subgrade 3b as being of moderate quality with Grade 4 land being poor and Grade 5 being of very poor quality.

Climatic limitations

- 4.36 Climate has an overriding influence on crop production and hence land flexibility and quality. It is assessed in the ALC system by considering rainfall and the sum of daily air temperatures above 0°C between January and June (Accumulated Temperature). The climatic regime described at 4.3-4.4 places a limitation on cropping flexibility in this area to ALC grade 1 as a result of moderate rainfall and moderate temperature.

Site limitations

- 4.37 Interrogation of the Environment Agency flood risk maps, shown in Appendix 8, shows that both the site occupies flood zone 1, at low risk of flooding. Therefore, flood risk does not moderate ALC grade across this site.
- 4.38 Gradients across the site are low (1-7 degrees) and do not produce any limitations to agricultural machinery, and thus ALC grade at this site.

Soil limitations

- 4.39 Figure 1 shows this site to be mapped as the Dale Soil Association. Limitations to ALC grading on this soil type are typically imposed by wetness, impacting productivity.
- 4.40 Topsoil and subsoil depths across the site were not adequate for continuous arable or grass production and limitation to ALC grade.

- 4.41 Soil profile stone content was high (over 50% in places) across the site and poses limitation to ALCs.
- 4.42 Particle size distribution (PSD) analysis showed heavy textures with 33-39% clay content. Topsoil texture has some overriding limitation on ALC grading and it interacts with climate and drainage to form the primary moderating influence on ALC grade at this site.
- 4.43 Topsoil pH was satisfactory (6.3-6.8). Profiles were considered non-calcareous, mineral soils containing moderate levels (<10%) of organic matter.
- 4.44 The subsoils contained a high clay content, indicating they are slowly permeable and not freely draining. Soil wetness therefore does exert some additional limitation to plant growth.

Interactive Limitations

- 4.45 The physical limitations which result from the interactions between climate, site and soil were found to be wetness and stone content. This area has high annual rainfall, and the soils will typically be at field capacity, when land drains would normally be expected to flow, for 213 days per year, i.e. around 7-8 months in a typical year.
- 4.46 Soil wetness expresses the extent to which excess water restricts crop growth, workability, and cultivation. The soil type profile was seasonally waterlogged (Wetness Class IV), and wetness has bearing on ALC. With auger borings 3-7 being limited to ALC subgrade 3b due to wetness resulting from their heavy topsoil texture and gleying present immediately below the topsoil.
- 4.47 Soil droughtiness indicates the degree to which a shortage of soil water influences the range of crops that may be grown, and the level of yield which may be achieved. Summer moisture deficits at this site are 68 mm for wheat and 49 mm for potatoes, meaning drought is not a limiting factor at this site.

Agricultural Land Classification Grades

Grade 3b: Moderate quality agricultural land (4.18 ha or 88.4%)

- 4.48 This grade occupies the whole of the site of the site and comprises of profiles from all Soil Types (described at 4.16-4.20).
- 4.49 Soil profiles consist of both poorly drained profiles, composed of fine clay loam topsoil, overlying slowly permeable heavy textured subsoil (Wetness Class IV). This land was found predominantly south of the existing farm buildings, and its limited by soil wetness and workability.

- 4.50 Along the northern boundary of the site, adjacent to existing housing, soils were shallow and better draining (Wetness Class I) despite heavy textured topsoils; however land was limited by stone content and in places soil depth as a result of shallow occurrence of underlying sandstone bedrock.
- 4.55 Land of ALC 3b is of moderate quality. It is suited to permanent grassland and a narrow range of cereal crops. In wetter years, land to the south of the site is likely to yield more poorly than that of land to the north of the site.

Urban (0.55 ha or 11.6%)

- 4.56 This category is occupied by agricultural buildings, farmyard and tracks associated with the farm.
- 4.57 A summary of the ALC grades found across the site is shown in Table 2.

Table 2: Land at Eastfield, Shepley: Summary of ALC grade distribution		
ALC Grade	Area (ha)	% Site Area
Subgrade 3b	4.18	88.4
Urban	0.55	11.6
Total	4.73	100.0

5.0 CONCLUSIONS

Soils

- 5.1 Site development has the potential to impact on up to 4.74 ha of land and soils, of which 4.18 ha are moderate quality agricultural land and 0.55 ha are occupied by urban farm buildings and trackway.
- 5.2 The site is occupied by two soil types; Soil Type 1 composed of heavy clay loam profiles and Soil Type 2 comprising of shallow fine loamy soils over sandstone. Heavy textured topsoils occupy the majority of the site, allowing topsoils to be removed as a single unit. However where subsoil occurs, heavy textures results in soils that are susceptible to damage due to soil wetness and will necessitate careful soil management practices to be employed during stripping and storage should the development proceed.
- 5.3 Topsoil analysis indicates that the soils are typical of medium to high intensity agricultural land use with a slightly alkaline pH combined with satisfactory levels of available major nutrients.
- 5.4 Soils on site should be retained, conserved and re-used as far as reasonably practicable within softer landscaping proposed within the development proposal. Soil handling should be undertaken during drier periods of the year, usually between April and

October and to an agreed plan. Compliance with legislation, guidance and the adoption of good practice guidance and techniques during construction and re-instatement of impacted land will mitigate many of the issues associated with soils handling, storage and re-instatement.

- 5.5 It will be important to ensure that mitigation is appropriately secured, implemented and monitored. In this instance, this might be achieved through a combination of legislative compliance supported by planning conditions, site working practices, a construction-based soil management plan and oversight by trained personnel employed by the Applicant.

Agricultural Land Classification

- 5.6 The development has the potential to impact up to 4.74 ha of agricultural land, none of which is considered Best and Most Versatile. Comprised of 4.18 Ha ALC subgrade 3b and 0.55 Ha urban area. ALC grades resolved are typical of those found within the geographical area and are less than the 20 ha threshold regarded as significant impact by Natural England.
- 5.7 Land is limited by soil wetness in Soil type 1, and soil stone content and depth as resolved in shallow stone soils of Soil type 2.