Soil Physical Characteristics report for land included in the proposed Landfill Site at Chartley Park Farm, Stafford

1. Introduction

In March 1993 a detailed Agricultural Land Classification (ALC) and a survey of the soil physical characteristics was undertaken at Chartley Park Farm by the Resource Planning Team, Wolverhampton. Soils were augered to 120cm at 100m grid intersections. Soil pits were dug to determine the physical characteristics and some additional profiles were described to determine soil and land quality boundaries.

2. Location

The site lies almost equidistant between Stafford and Uttoxeter , N.G.R (SK020303). It is bounded by the A518 in the south, by Land Leasow Wood in the East and agricultural land in the North and West.

3. Altitude and Relief

In the North land lies at an altitude of approximately 170m, is level or gently sloping and is part of a large plateau. Southwards the site gently dips to 155m. Here small areas with slopes of between 8° -12° were recorded and result in a site limitation. For this site altitude and relief are generally non-limiting.

4. Climate and Rainfall

Assessment of climatic limitation is based upon the Average Annual Rainfall (AAR) a measure of the overall wetness, and the Accumulated Temperature (ATO), a measure of relative warmth. These results reveal that there is a climatic limitation and the site can be classified no better than grade 2. The rainfall is distributed relatively evenly throughout the year with peaks in August-November and a dry spell between February - April. The mean date for the last frost is early May.

5. Geology and Soils

The area is underlain by Keuper Marl and Gypsum. A drift deposit of boulder clay and unbedded gravelly clay covers the entire survey area as shown on B.G.S. sheet 140. The soils generally have organic sandy silt loam topsoils overlying a variable upper subsoil of sandy clay loam, clay loam, sandy silt loam or heavy clay loam which overlies a lower subsoil of clay or sandy clay. Occasional stony or gravelly subsoil horizons are encountered and topsoil stoniness is locally limiting.

6. Interactive Limitations

The interaction between climate, site and soil determines whether a soil will be prone to wetness, droughtiness or erosion. A soils susceptibility to drought is measured by the amount of water the profile can hold (AP) in comparison to the potential soil moisture deficit for the area (MD). For this site the MD for wheat is 82mm and for

potatoes is 95mm. The soils in this survey do not suffer from droughtiness because of the general medium to heavy textures which exist and the high number of field capacity clays.

Seasonal waterlogging affects the soil workability of crop yields, hence wetness is an important parameter in the classification of land. It is measured by reference to climate, particularly field capacity days, soil water and topsoil texture. This site is at field capacity for 191 days. All the soils exhibit gley morphology and most have a slowly permeable layer within 80cm. Soil wetness ranges from wetness Class III to IV.

7. Land Use

At the time of survey cereals intersown with beans were growing throughout the site. A small area of ley and arable is present in the North East.

8. Agricultural Land Classification

8.1 Subgrade 3a

The grade accounts for 22.13 ha and 27.76% of the site. It is mapped as a central unit running West to East and North East. A narrow strip occurs along the South West boundary.

The soils are typically organic sandy silt loams overlying sandy clay or sandy silt loams over clay. Occasionally sandier pockets occurs within this profiles. Wetness is the main limitation of these soils with evidence of gleying above 40cm and a slowly permeable layer encountered below 55cm. These soils fall into wetness class III. Stone content is variable ranging from few to common in the topsoil and subsoil. Locally topsoil stone content can be equally limiting with between 10 and 15% stones recorded. Some isolated profiles of 3b occur within this grade but were too small to map separately at this scale.

8.2 Subgrade 3b

This grade accounts for 57.6ha and 72.24% of the site. It is mapped as a large block in the North and around the periphery of the Southern part of the site.

The soils are typically organic sandy silt loams overlying a variable upper subsoil of medium clay loam, heavy clay loam or sandy clay loam over a lower subsoil of clay or heavy clay loam. These soils are similar in texture to those mapped as subgrade 3a but have slightly heavier subsoils and a slowly permeable layer occurring higher up the profile. Wetness is the main limitation of these soils, which have strong evidence of gleying above 40cm and a slowly permeable layer between 35-50cm. These soils are assigned to wetness class IV. Gradient is limiting just North of Chartley Park Farm. Isolated profiles of 3a occur within this grade but are too small to map separately at this scale. Stone content is again variable ranging from few to common.

Table 1 Area of land in each grade

Grade	Hectares	% of total area	% of agricultural area
3a	22.13	27.76	27.76
3b	57.60	72.24	72.24
Total	79.73	100	100

9. Soil Units

Three soil units have been identified. The site is underlain by a glacial drift geology which has resulted in the subsoil texture of the soils varying over short distances.

9.1 Unit 1

Unit 1 is mapped over the majority of the site accounting for 55.44 ha and 69.56% of the area. Typically 27-30cm of very dark brown (7.5 YR 3/1) organic sand silt loam overlies a pale greyish brown (10 YR 6/3, 7/1) strongly mottled (7.5 YR 6/8) variable upper subsoil of medium clay loam, heavy clay loam, sandy clay loam and occasionally medium sandy silt loam. The lower reddish brown (5 YR 5/4, 5/2) (25 YR 4/3, 4/4) clay or heavy clay loam is encountered at 45-52cm in most profiles and runs to 120cm. Stoniness generally ranges from few-common.

A typical profile for this soil unit type is given below.

Pit 2

0-28cm 7.5 YR 3/1, organic sandy silt loam, moderately well developed medium subangular blocky, few hard rounded stones and common roots.

28-45cm 10 YR 6/3 7/2, heavy clay loam, common mottles 75 YR 6/8, weakly developed medium subangular blocky, firm consistence, porous, common hard rounded stones and rare roots.

45-120cm 25 YR 4/3, 4/4, clay, common mottles 5YR 5/8, 7/1, weakly developed very coarse prismatic, firm consistence, low porosity, few round hard stones.

9.2 Unit 2

This unit is mapped as a central lense in the survey area and in the South West along the site boundary. It accounts for 20.47 ha and 25.68% of the site. This unit differs form Unit 1 in that the subsoil textures are lighter and there is a greater depth to the slowly permeable layer (clay). Typically 28-30cm of organic sandy silt loam (75 YR 3/1) overlies a medium sandy silt loam or sandy clay loam (10 YR 6/3, 7/1) to approximately 60-70cm. The lower reddish clay or sandy clay (25 YR 4/3) runs to 120cm.

Some isolated pockets of medium sandy loams and loamy medium sands occur within the subsoil profiles. Topsoil stoniness ranges from few to common but occasional stony layers with up to 25% hard rock are found in some profiles at depths below 30cm. A typical profile is given below:

Pit 4

0-28cm 75 YR 3/1 organic sandy loam, moderately developed medium subangular blocky, common hard round stones, common roots.

28-60cm 10 YR 6/3, 7/2 medium sandy silt loam, common mottles, 75 YR 6/8 , friable, porous, many hard round stones and few roots.

60-120cm 25 YR 4/3 7/1, clay, massive, very firm, low porosity, few hard round stones.

9.3 Soil Unit 3

Unit 3 is mapped in the south of the site and accounts for 3.78 ha 4.72% of the site. Typically 30cm of brownish (10 YR 3/3, 4/3) medium sandy silt loam overlies an ocherous mottled sandy clay loam (75 YR 5/6, 4/2) . Reddish brown (5 YR 5/4, 4/6) clay or sandy clay occurs between 48-65cm and in most profiles extends to 120cm. Stones are common in the topsoil and increase to many in the subsoil. A typical profile is given below.

Pit 6

0-28 10 YR 4/3 Medium sandy silt loam, moderately developed medium subangular blocks, common rounded hard stones and abundant roots.

28-63 5YR 5/3. 55/6 sandy clay loam, weakly developed coarse subangular blocky, friable, porous, many rounded hard stones and common roots.

63-120 5YR 8/4, 5/6 clay, weakly developed coarse prismatic, very firm, low porosity, many rounded hard stones, manganese staining and concretions. Common mottled (75 YR 5/6).

10. Summary

The majority of the site is typified by organic sandy silt loams overlying sandy clay loams, sandy silt loams, medium clay loams or heavy clay loams which overlie a lower subsoil of clay or sandy clay. Most of the site is of moderate quality 72.24% of grade 3b with 27.76% of good quality agricultural land, 3a. Three soil units have been identified, Unit 1 = 69.56%, Unit 2 = 25.68% and Unit 3 = 4.72% of the site.

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