

4FCS 7653

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PHYSICAL CHARACTERISTICS REPORT FOR THE PROPOSED
GRAVEL AND SAND PIT AT BROMFIELD

Following the request for detailed information on the physical characteristics of soil at Bromfield, the site was visited in February 1992. An ALC survey was undertaken and soils augered to 120cm (where possible) and soil pits were dug to determine the physical characteristics.

Location, Altitude and Relief

The site lies west of Bromfield in between the River Onny to the north and the A49 to the south. The altitude of the site is not a limiting factor with the land at a height of 95 to 100 metres above sea level. The land is level over most of the site, except on a small area on the eastern edge of the site where a slope of 8° occurs thus limiting the land to 3b here. Although close to the River Onny, the land lies well above it, with a gentle bank opposite; thus flooding is not a limitation.

Climate and Rainfall

The main parameters used in the assessment of the climatic limitations are average annual rainfall (AAR) and accumulated temperature (ATO). For this site the figures are 782mm and 1395°C respectively indicating that there are no climatic limitations on this site. The field capacity days figure for the site is 186 days. The mean last frost occurs in mid-May.

Geology and Soils

Silty soils overlie gently undulating fluvioglacial terraces of gravel which lie usually less than one metre from the surface. Towards the River Onny alluvial deposits form deeper and less stony soils. Typically silty loam overlies silty clay loam over gravel; or silty clay loam over silty clay loam.

Land Use

One large ploughed arable field comprises most of the site, with permanent pasture forming the western end of the site.

Agricultural Land Classification

The majority of the site consists of high quality agricultural land.

Grade 2

Grade 2 is mapped over 23.08ha and 66.5% of the site. A 30cm topsoil of sandy silt loam, silty loam, sandy clay loam or silty clay loam overlies sandy clay loam or silty clay loam to a depth of at least 60cm where a stony impenetrable layer may occur or sandy clay loam or silty clay loam may continue until 120cm or more.

Soil droughtiness limits the land to grade 2 where the combination of a stony impenetrable layer at 60cm or more depth, plus in some cases the level of stones within the profile limits the available water capacity of the soil.

Soil wetness limits the land to grade 2, even though the soils fall into Wetness Class I due to the lack of gleying and slowly permeable layers. This is due to the combination of fairly heavy rainfall which is reflected in the figure of 186 field capacity days and the preponderance of medium textured topsoils such as silty loam, sandy clay loam and silty clay loam.

Soil stoniness limits the land to grade 2 where more than 5% of the topsoil stones (greater than 2cm diameter) occur.

The soil droughtiness and wetness limitations are found together in most of the borings limited to grade 2, with the soil stoniness limitation alone only applying to a smaller areas.

Grade 3a

Grade 3a is mapped over 9.7ha and 27.9% of the site.

Soil droughtiness is the main grade 3a limitation where the combination of a stony impenetrable layer at 40-80cm, and a high percentage of stones within the profile limits the available water capacity of the soil, limiting it to grade 3a.

Soil stoniness limits the land to 3a locally where more than 15% of stones (greater than 2cm diameter) occur in the topsoil such as adjacent to the A49, or where more than 5% of the topsoil stones are greater than 6cm in diameter as occurs within the small triangle of grade 3a surrounded by grade 2 near the centre of the site.

Grade 3b

Grade 3b is mapped over 1.91ha and 5.5% of the site. It is due mainly to the occurrence of topsoil stones greater than 6cm diameter occupying more than 10% of the topsoil. Elsewhere the land is graded as 3b due to gradient as on the eastern boundary and soil depth (near the western boundary).

Non-Agricultural Land

A small area of recently planted trees occurs in the north west corner of the site.

Breakdown of ALC Grades

Grade	Area	%
2	23.08	66.5
3a	9.70	27.9
3b	1.91	5.5
Non-Ag	0.03	0.1
TOTAL:	34.72	100.0

Soil Units

With this site there is little variation in soil texture; instead it is soil stoniness and the depth to it that provides the main variation and therefore the main criteria for describing the soil units.

In general the soils are less stony towards the river and more stony towards the road. This is reflected in the Soil Unit map, though it must be stressed that some variation in stoniness occurs within each soil unit. Evidence of this local variation is shown at the western end of the site where a meander in the River Onny has cut into the bank, producing erosion and exposing the soil profile. Over a distance of less than 100 metres the depth to the stony layer varies from 20 to over 120cm. This shows the potential for variation in the depth to a stony layer for the site as a whole, though on the rest of the site the minimum depth to a stony layer is 40, not 20cm.

Unit 1

Unit 1 consists of soils which are the least stony on the site. Typically a dark brown (7.5 YR 3/3) sandy silt loam, silty loam, sandy clay loam or silty clay loam topsoil extends to 30cm. The upper subsoil extends to 70cm and is typically a dark brown (7.5 YR 4/3) silty clay loam. The lower subsoil consists of dark brown (7.5 YR 4/3) sandy clay loam or silty clay loam either to 120cm + or to a stony layer below 70cm, consisting of hard gravel pebbles and small soft siltstone gravel. Elsewhere the profiles in Unit 1 are stoneless or have occasional stones.

The topsoils have a weakly developed subangular blocky structure which in the subsoil becomes a moderately developed coarse angular blocky structure. All the horizons are porous and well drained with few signs of gleying and no slowly permeable layers. Plant roots are common in the topsoil and a few extend down to 60cm.

Unit 2

Unit 2 has been split into parts a and b. Unit 2a covers most of the site and has a stony layer coming in between 20 and 60cm depth, which is much closer to the surface than those that may occur in Unit 1. Unit 2b is similar, but it is distinguished by its high percentage of surface stones (10-20%).

Typically 25cm of dark brown (75 YR 3/3) sandy silt loam, silty loam, sandy clay loam or silty clay loam overlies dark brown (75 YR 3/3) sandy clay loam or silty clay loam to a depth of about 50cm. Beneath this lies hard gravel pebbles and smaller softer siltstone gravel, with variations in particle size of 3mm to 20cm in diameter, with some soil particles in between.

Unit 2a has 3-7% surface stones, compared with 10-20% surface stones in Unit 2b. Both the subunits have similar stones in the subsoil (0-40% in the upper subsoil) and the lower subsoil in both contains more gravel with depth.

The topsoils of Unit 2 have a weakly developed medium to coarse subangular blocky structure over a weakly or moderately developed medium angular blocky or medium to coarse subangular blocky structure in the upper subsoil. The lower subsoil consists of gravel with apedal single grain soils in between the small gravel particles. All the horizons are porous and well drained with few signs of gleying and no slowly permeable layers present. Plant roots are usually common in the topsoil and upper subsoil and sometimes extend into the fine gravel layer below.

Typical Soil Descriptions

Unit	Depth (cms)	Texture	% Stones
Unit 1	0- 30	SZL-ZL-ZCL	3%
	30- 70	ZCL	0%
	70-120	SCL-ZCL	0- 70%
Unit 2a	0- 25	SZL-ZL-ZCL	3- 7%
	25- 50	SCL-ZCL	0- 40%
	50-120	LS-SL	10-100%
Unit 2b	0- 25	SZL-ZL	10- 20%
	25- 50	SCL-ZCL	0- 40%
	50-120	LS-SL	35-100%

Summary

Similar medium textured soils occur throughout the site such as silty loams and silty clay loams. These soils form high quality land due to their good drainage and also the lack of soil droughtiness due to the relatively high rainfall of the area. Topsoil stones provide a mechanical limitation over small areas of the site and stones throughout the area can contribute to soil droughtiness due to their relative abundance within soil profiles. Unit 1 represents the least stony and therefore the best soils on the site; Unit 2a covers the majority of the area, representing the gravel layer coming in at about 50cm; Unit 2b represents smaller areas similar to 2a but with more surface stones, providing a mechanical limitation.

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STATEMENT OF PHYSICAL CHARACTERISTICS BROMFIELD, WEST EXTENSION

Most of the site was surveyed by the Resource Planning Team in February 1992. A further 5 ha at the western end of the site between the A49 road and the River Onny and extending to a stream marking a parish boundary, was surveyed in September 1992. At that time the land was under permanent pasture.

Climate

Average annual rainfall 782 mm.
Accumulated temperature above 0°C January to June 1395 day °C.
Field capacity days 186.
Moisture deficit wheat 93 mm.
Moisture deficit potatoes 81 mm.

Site

Most of the land is level at an altitude of about 100 m. The land alongside the stream is about 2 m lower and separated from the remainder of the field by a short, steep bank. Land adjacent to the river and in a former river bed is irregular with hollows and banks.

Soil

Silty soils overlie fluvio glacial gravel terraces and alluvium.

Agricultural Land Classification

Grade 2

Most of this field has been mapped as Grade 2 with stoneless silt loam or silty clay loam topsoils overlying silty clay loam. Fine gravelly impenetrable layers occur below 75 cm over the higher part of the area. Soil wetness is the main factor limiting the agricultural use of these soils.

Grade 3b

A small area has been mapped as Grade 3b where irregular banks and hollows are a limitation.

Soil Units

This area all falls within soil unit 1 with silty clay loam topsoil to about 30 cm over silty clay loam subsoils. Subsoils extend either to below 100 cm with no or very few stones, or to stony layers below 75 cm consisting of very small hard gravel and soft siltstone.