

**SOIL RESOURCES
AND AGRICULTURAL QUALITY
OF LAND SOUTH OF DEARNE VALLEY PARKWAY
GOLDTHORPE**

Report 2068/1

19th February 2023

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Report 2068/1
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1.0 Introduction

1.1 This report provides information on the soils and agricultural land quality of land south of Dearne Valley Parkway, Goldthorpe, Barnsley. The land is proposed for industrial development and associated landscaping and SUDS.

1.2 Land Research Associates were commissioned to investigate:

The suitability of soils for use in gardens and allotments, and in landscaping including:

- Amenity grass
- Wildflower grassland areas
- Attenuation pond areas
- Woodland/thicket/ native hedge areas
- Ornamental planted areas
- Trees pits

1.3 The assessment also covers agricultural land quality.

2.0 Site description

2.1 The site comprises a contiguous block in arable use, bordered to the north by Dearne Valley Parkway, to the south by Carr Head Lane, to the east by a distribution depot, to the south-east by a school and residential development, and to the west and north-east by adjoining agricultural land.

2.2 The land is situated on the southern side of a minor valley which is bisected by Carr Dike. The southern land is situated on the northern flanks of a sandstone ridge, with the central land on the valley floor and floodplain, and the northern and eastern margins on gentle valley slopes. Average elevation is approximately 30 m AOD.

PUBLISHED INFORMATION

2.3 British Geological Survey 1:50,000 scale information shows the geology to the south of Carr Dike as Carboniferous sandstone of the Mexborough Formation. The land to the north is recorded as Pennine Middle Coal Measures. The lowest-lying areas either side of Carr Dike are recorded to have a cover of Quaternary river alluvium.

2.4 The National Soil Map (published at 1:250,000 scale)¹ shows the land as Bardsey Association: mainly fine loamy soils with impeded drainage over Carboniferous mudstones and shales, with some freely-draining loamy soils over sandstone.

2.5 Agricultural Land Classification studies as part of a wider survey were made between 1993 and 1995 by ADAS Leeds Statutory Group on behalf of MAFF (Natural England report reference: L009/95). This shows the land as mainly a mixture of Subgrades 3a and 3b, with a small area of Grade 2. The report is included as an appendix.

2.6 Mining records show parts of the site north of Carr Dike were subject to opencast workings in 1997.

¹Jarvis, R.A., *et al.*, 1984. *Soils and their use in Northern England*. Soil Survey of England and Wales Bulletin No. 10, Harpenden.

3.0 Soils investigation

- 3.1 The site was visited in January 2023. During the visit spade/hand auger borings were conducted to a maximum depth of 1.2 m in order to determine topsoil/subsoil depth, drainage and other properties relevant to soil resource suitability for landscaping, as well as to determine agricultural land quality. Auger observations were conducted at intersects of a 100 m grid, giving a sampling density of one observation per hectare. (see Map 1 in an appendix to this report).
- 3.2 At six selected sample points (see Map 1) pits were hand-excavated in order to conduct more detailed observations of subsoil structural conditions and obtain subsoil samples for laboratory analysis.
- 3.3 Representative topsoil samples were taken on a per field basis (see Map 2).
- 3.4 The distribution of generalised soil types is shown by Map 2 in an appendix to this report. Three soil types were identified.

SHALLOW COARSE LOAMY SOILS OVER SANDSTONE (SOIL TYPE A)

- 3.5 These soils are found on higher ground in the south of the site. They comprise sandy loam or sandy clay loam topsoil, usually with low stone content, over thin stony coarse loamy subsoils, which grade to sandstone bedrock, typically at depths of 40-60 cm (although shallower and lacking subsoil in places, particularly on upper slopes).

DEEP MEDIUM LOAMS (SOIL TYPE B)

- 3.6 These soils are found on lower north-facing slopes on the margins of the sandstone ridge, as well as in alluvial deposits on the floodplain. They comprise sandy clay loam or medium clay loam topsoil and upper subsoil, either over sandstone or extending to depth. They are well structured and permeable, but are often groundwater-affected due to their topographic position.

SLOWLY PERMEABLE FINE LOAMS AND FINE LOAMS OVER CLAY (SOIL TYPE C)

- 3.7 These soils are found in the north of the site, and in places on the central flood plain. They comprise clay loam or sandy clay loam topsoil, over dense poorly structured heavy clay loam or clay, often with a thin moderately structured upper subsoil. These soils are naturally subject to drainage impedance due to perching of water above the poorly structured lower layers.
- 3.8 In places, particularly in the north-east, the soils are disturbed, as evidenced by mixed topsoil/subsoil layers and inclusions of artificial material (brick and coal fragments).
- 3.9 Full pit descriptions are included in an appendix to this report.

4.0 Agricultural land quality

- 4.1 To assist in assessing land quality, the Ministry of Agriculture, Fisheries and Food (MAFF) developed a method for classifying agricultural land by grade according to the extent to which physical or chemical characteristics impose long-term limitations on agricultural use for food production. The MAFF ALC system classifies land into five grades numbered 1 to 5, with grade 3 divided into two subgrades (3a and 3b). The system was devised and introduced in the 1960s and revised in 1988.
- 4.2 As the northern half of the site is likely to have been at least partially affected by opencast workings since the MAFF survey of the site was conducted (1993-1995), a new Agricultural Land Classification assessment was made in 2023 (points 1 to 35 of Map 1). The MAFF survey results are retained for the southern part of the site.
- 4.3 The agricultural climate is an important factor in assessing the agricultural quality of land and has been calculated using the Climatological Data for Agricultural Land Classification². The relevant site data for a central point at grid reference SE 4431,0377 (northern section) and an average elevation of 25 m is given below.
- Average annual rainfall: 622 mm
 - January-June accumulated temperature >0°C 1399 day°
 - Field capacity period 131 days
(when the soils are fully replete with water) late Nov-early Apr
 - Summer moisture deficits for: wheat: 108 mm
potatoes: 99 mm
- 4.4 The survey described in the previous section was used in conjunction with the agro-climatic data above to classify the site using the revised guidelines for ALC issued in 1988 by MAFF³. There are no climatic limitations at this locality.

RISK OF FLOODING

- 4.5 Higher ground in the north adjoining Dearne Valley Parkway is not judged to be at significant risk of flooding. A significant part of the remainder of the site is flat and adjacent to Carr Dike and feeding drains; this land falls within Environment Agency Flood Zone 3. The channel is not subject to flood protection measures, although it is relatively

²Meteorological Office, (1989). *Climatological Data for Agricultural Land Classification*.

³MAFF, (1988). *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*.

deep, which makes it less likely to breach the banks when in spate. The soils are fine textured and often slowly permeable at depth: flood duration is likely to be medium (2-4 days). Summer flooding is judged to be rare, with winter flooding occasional. This land is therefore judged to be limited to a maximum of subgrade 3a. However, most of the land at risk of flooding is more limited by other factors.

SURVEY RESULTS

- 4.6 The agricultural quality of the land is primarily determined by wetness/workability, and in places by flood risk. Other factors have been assessed but do not affect the land grade. Land of grades 2 and 3 has been identified.

Grade 2

- 4.7 This land comprises deep medium loamy soils found on slightly elevated ground either side of Carr Dike. The soils are permeable but affected by fluctuating groundwater (Soil Wetness Class II), which is likely to result in some restrictions to machinery operations in winter.

Subgrade 3a

- 4.8 This land occurs on the boundary between the permeable loamy soils described above and the heavy slowly permeable soils described below. They have moderate drainage restrictions (Soil Wetness Class III) and moderately high topsoil clay content. Under the local climate this combination is likely to restrict land access for cultivations in winter and early spring, although late spring (as well as autumn) sowings are usually possible.
- 4.9 Some low-lying areas with permeable soils are judged to be limited to this subgrade by flood risk: this is likely to cause some damage to crops and restricted access for machinery in late winter/early spring.

Subgrade 3b

- 4.10 This land has high topsoil clay content and moderate to severe drainage restrictions (Soil Wetness Class III to IV). Under the local climate this combination means that spring access for cultivations is rare and arable cropping is mainly limited to autumn sowings.
- 4.11 Parts of the site in the north-east have disturbed soils with lighter topsoils but poor drainage (Soil Wetness Class IV) resulting from artificial compaction to shallow depth.

Other land

- 4.12 This land comprises waterways and wooded areas.

Grade areas

- 4.13 The land grades are shown on Map 3 and the areas occupied shown below.

Table 1: Areas occupied by the different land grades

<i>Grade/subgrade</i>	<i>New survey (N) Area (ha)</i>	<i>MAFF survey (S) Area (ha)</i>	<i>Total</i>	<i>% of the land</i>
Grade 2	5.6	3.0	8.6	12
Subgrade 3a	5.7	17.5	23.2	31
Subgrade 3b	23.6	16.7	40.3	54
Other land	2.2	0	2.2	3
Total	37.2	37.1	74.3	100

5.0 Soil laboratory analysis

NUTRIENTS AND ORGANIC MATTER

(See Tables 5.1 and 5.2 for summary)

- 5.1. All of the topsoils are of neutral pH with relatively high organic matter concentrations. At the time of sampling (January 2023) the topsoils of the majority of the land to the north of the Carr Dyke had low phosphate concentrations, while the land to the south had high levels.
- 5.2. The subsoils were found to have neutral pH and low phosphate concentrations.
- 5.3. Full laboratory certificates are appended to this report.

Table 5.1: Topsoil nutrient status

Field ID*	pH	Loss on ignition %	P	K	Mg
			MAFF indices		
A	7.0	4.0	2	2+	3
B	7.4	4.0	3	2+	3
C	7.1	4.2	2	2+	3
D	7.3	6.6	0	2-	4
E	6.8	7.9	0	1	6
F	6.6	8.1	0	1	6
G	7.3	7.3	2	4	6
H	7.6	8.1	1	3	5
I	7.6	7.4	0	2-	5

*See Map 1

Table 5.2: Subsoil nutrient status

Pit ID*	pH	Loss on ignition %	P	K	Mg
			MAFF indices		
32	7.9	3.8	0	0	4
43	7.1	2.6	0	1	3
67	8.1	1.5	0	2-	2
72	7.7	1.5	1	1	2

*See Map 1

6.0 Available soil resources

- 6.1. The distribution of topsoil and subsoil resources is shown on Map 2 in the appendix to this report. Two topsoil and three subsoil resources have been identified. The available resources are described below.

TOPSOIL

- TS1** This resource comprises the coarse and medium-textured topsoils found on the southern slopes. They are relatively easy to handle due to their low clay content, with low stone content. They represent a high quality resource for reuse in landscaping.

Estimated yield 130,000 m³ (if all stripped)

- TS2** This resource comprises the heavier topsoils found in the north. Their relatively high clay content makes them more difficult to handle with machinery. They represent a moderate quality resource for reuse in landscaping.

Estimated yield 75,000 m³ (if all stripped)

SUBSOIL

- SS1** These subsoils occur below TS1 in south. They comprise thin stony coarse loams with good structure. They are a moderate quality resource for reuse in landscaping, their main limitation being variable depth to bedrock and high stone content.

- SS2** These subsoils form the layer below TS1 on lower slopes and areas around Carr Dike. They are a high quality resource for reuse in landscaping. They are well structured medium loams, but become more weakly structured and often waterlogged below 60 cm depth; it is recommended that where stripped, the upper 300 mm is separated from lower quality deeper material.

- SS3** These subsoils comprise the subsurface layer of the slowly permeable soils in the north, and the deeper layer of the permeable loamy soils either side of Carr Dike. They are difficult to handle with machinery and naturally poorly structured; they are a low quality resource for reuse in landscaping.

7.0 Soil suitability assessment

- 7.1. The suitability of the identified on-site resources has been evaluated against the proposed landscaping uses. General suitability assessment is summarised in Table 7.1 and described in more detail below.

Table 7.1: soil suitability assessment

After use	Soil resource				
	TS1	TS2	SS1	SS2	SS3
Tree pit planting	✓	✓ ¹	✓ ³	✓	✗
Shrubs, hedges and thicket	✓	✓	-	-	-
Ornamental planting	✓	✓	-	-	-
Amenity grassland	✓	✓	✓	-	-
Wildflower grassland	✓ ²	✓ ²	✓ ^{3,4}	✓ ⁴	✗
Wetland planting	✗	✗	✗	✓	✓
Embankment (core) formation	✗	✗	✓	✓	✓

✓ well suited ✓ moderately suitable ✗ not suitable

¹High clay content makes soil handling difficult. Soils used for this purposes must be maintained in good structural condition and carefully replaced without compaction.

²Some areas to the north of Carr Dike had low nutrient concentrations at the time of testing

³High stone content may affect performance

⁴Used as topsoil

⁵Would require retesting prior to landscaping

TREE PIT PLANTING

- 7.2. The topsoils are suitable for tree pit planting (emplaced as a 200-300 mm surface layer). Tree pit planting subsoils need to be well structured (friable) and permeable to depth. Both SS1 and SS2 are suitable for this purpose if maintained in good structural condition.

SHRUB, THICKET AND HEDGEROW PLANTING

- 7.3. A layer of topsoil 200-450 mm in depth may be emplaced over in-situ subsoil which has been thoroughly loosened/ripped to remove compaction before topsoil is emplaced.

AMENITY GRASSLAND

- 7.4. A layer of topsoil should be emplaced 200-450 mm in thickness (using the greater depth to use surplus material if appropriate) over in-situ subsoil which has been thoroughly loosened/ripped to remove compaction before topsoil is emplaced.

WILDFLOWER GRASSLAND

- 7.5. Topsoils found to the north of Carr Dike were found to have low phosphate concentrations, which have potential to support species-rich grassland. This is a relatively unusual property in soils used for intensive agriculture and retesting is recommended prior to groundworks to verify that nutrient status has not been changed by fertiliser use in the intervening period. A layer of Topsoil A or B derived from low nutrient areas (see Table 5.1 and Map 1) should be emplaced to a minimum of 150 mm.

WETLAND

- 7.6. Topsoil should not be used in the creation of open water wetland, due to the adverse effects of dissolved soil-derived nutrients in aquatic habitats, and topsoil should also be removed from at least the 5 m area surrounding open water to prevent in-flows. SS2 and SS3 are well suited to form an impermeable layer below wetland; compacting/puddling with a digger bucket is likely to be beneficial to reduce permeability. Emergent vegetation such as reeds can be planted directly into subsoil.

EMBANKMENT FORMATION

- 7.7. Topsoils should be limited to use in the outer 500 mm layer of screening bunds. All of the subsoils are suitable for core formation.

8.0 Soil handling

8.1 Soils with a high clay content and are easily compacted by machine handling. Soil handling should not take place when these soils are in a plastic state. This can be assessed with a simple field test to establish whether the soil can be rolled into a thread 3 mm in diameter. If this is the case, soils should not be handled with machinery and drier conditions should be awaited before repeating the test. Soils to be used to form the core of embankments need not be subject to this condition.

8.2 The location of stockpiles of different resources (i.e. TS1 & 2; SS1-3) should be recorded and retained to avoid mixing or loss during extended construction works.

TOPSOILS

8.3 Topsoils should be stripped and stockpiled from designated roadways prior to the commencement of groundworks. Vehicle traffic should be kept to designated roadways as far as possible to avoid damage to soil resources.

8.4 Topsoil should be stripped from areas to be used for subsoil stockpiles.

8.5 Topsoils should be stripped and stored separately according to resources Map 2 in the appendix to this report. Care should be taken to ensure that the soils are stripped to the correct depth to prevent dilution with underlying subsoil. Stripping depth should be checked carefully (e.g. by a banksman).

8.6 Topsoil resources should be stockpiled in windrows no more than 3 m in height to minimise settling damage to structure and to facilitate drying prior to reinstatement. Stockpiles to be left in-situ for greater than six months should be seeded with grass to increase stability.

SUBSOILS

8.7 Subsoil resource SS2 is moderately well structured (friable) and is a higher quality resource than the underlying layer. It is essential that the two materials are carefully separated to avoid degradation of SS1. Subsoil resources SS1 and SS2 should be stockpiled in windrows no more than 3 m in height to minimise settling damage to structure and to facilitate drying prior to reinstatement.

8.8 In-situ upper subsoils compacted during construction should be loosened/ripped prior to topsoil reinstatement to improve drainage and aeration.

APPENDIX

DETAILS OF OBSERVATIONS

MAPS

SELECTED DROUGHTINESS CALCULATIONS

LABORATORY TESTING

ADAS/MAFF ALC REPORT 1995

GOLDTHORPE: SOIL RESOURCES SURVEY– DETAILS OF AUGER OBSERVATIONS AT EACH SAMPLING POINT

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	ALC Grade	Limiting Factor
	Depth (cm)	Texture	Hard stones >20mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling				
1	0-25	vslstMCL	<5	<u>25</u> -50+	slstHCL/SCL	xxx				2	IV	3b	W
2	0-50+	MCL/HCL(dist)	<5							0	-	-	-
3	0-33	HCL	<5	33-55	SCL	xxx	<u>55</u> -90+	SCL	xxx	2	III	3b	W
4	0-32	HCL	<5	<u>32</u> -63	HCL(dist)	-	<u>63</u> -90+	HCL	xxx	1	III	3b	W
5	0-24	HCL	<5	<u>24</u> -90+	HCL	xxx				1	IV	3b	W
6	0-37	HCL	<5	37-65+	HCL/SCL	xxx				0	II/III	3a/3b	W
7	0-51	vslstMCL	<5	<u>51</u> -90+	HCL(dist)	-				2	-	-	-
8	0-24	vslstHCL	<5	24-32	slstHCL	xxx	<u>32</u> -50+	HCL(dist)	-	2	IV	3b	W
9	0-32	HCL/MCL	<5	<u>32</u> -50	HCL	xxx	50-90+	SCL	xxx	1	III	3b/3a	W
10	0-31	MCL	<5	31-60	MCL	xxx	<u>60</u> -90+	HCL	xxx	0	III	3a	W
11	0-35	HCL	<5	35-55	HCL	xxx	<u>55</u> -100+	C	xxx	0	III	3b	W
12	0-30	HCL	<5	30-40	SCL	xxx	<u>40</u> -50+	HCL	xxx	0	III	3b	W
13	0-26	HCL	<5	<u>26</u> -90+	C	xxx				0	IV	3b	W
14	0-31	HCL	<5	<u>31</u> -50	HCL	xxx	50+	Waterlogged		0	IV	3b	W
15	0-31	vslstMCL	<5	<u>31</u> -44	HCL/SCL	xxx	44+	Waterlogged		1	IV	3b	W
16	0-32	vslstHCL	<5	32-54	HCL	xxx	<u>54</u> -100+	HCL	xxx	1	III	3b	W
17	0-33	HCL	<5	33-50	HCL	xxx	<u>50</u> -80+	HCL	xxx	1	III	3b	W
18	0-25	MCL	<5	25-67	SCL/MCL	xxx	<u>67</u> -90+	SCL	xxx	1	II	3a	F
19	0-30	HCL	<5	30-65	mstSCL	xxx	65+	Stopped on stones		1	II	3a	F
20	0-31	MCL/HCL	<5	31-48	SCL	xxx	<u>48</u> -75 75+	HCL Stopped on stones	xxx	0	III	3a/3b	W
21	0-30	HCL	<5	30-40	HCL	xxx	<u>40</u> -80+	C	xxx	0	III	3b	W
22	0-27	HCL/MCL	<5	27-40	HCL/MCL	xxx	<u>40</u> -90+	HCL	xxx	0	III	3b/3a	W
23	0-30	vslstMCL	<5	30-90+	MCL	xxx				2	II	2	W
24	0-22	mstSCL	10	<u>22</u> -50+	SCL(compact)	-				3	IV	3b	W
25	0-26	MCL	<5	26-55	SCL	xxx	<u>55</u> -90+	SCL	xxx	1	III	3a	W
26	0-26	MCL	<5	26-75	MSL(dist?)	xxx	<u>75</u> -90+	SCL	xxx	1	II	2	W
27	0-26	vslstSCL	<5	26-60	SCL	xxx	60+	Stopped on stones		1	II	2?	W
28	0-35	ZC	0	<u>35</u> -80+	C	xxx				0	IV	3b	W
29	0-29	HCL	<5	29-90+	SCL	xxx				0	II	3a	W
30	0-29	SCL	<5	29-70+	SCL	xxx				3	II	2	W
31	0-27	MCL	<5	27-41	SCL	xxx	41+	Stopped on stones		1	II?	2?	W
32	0-38	MCL	<5	38-70	SCL	xxx	<u>70</u> -100+	HCL	xxx	1	II	2	W
33	0-21	HCL	<5	<u>21</u> -45	C	xxx	45+	Waterlogged		1	IV	3b	W
34	0-28	HZCL	<5	<u>28</u> -50	C	xxx	50-90+	SCL	xxx	0	IV	3b	W
35	0-30	MCL/SCL	<5	30-90+	SCL	xxx				0	II	2	W

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	ALC Grade	Limiting Factor
	Depth (cm)	Texture	Hard stones >20mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling				
36	0-29	vslstSCL	<5	29-52	SCL	xxx	52+	SST		2			
36A	0-34	FSL	0	34-53	FSL	o	53-90+	FSL	xx(x)	1			
37	0-34	HCL	<5	34-45	HCL	xxx	45-90+	C	xxx	0			
38	0-34	vslstHCL	<5	34-60	HCL	xxx	60+	Waterlogged		0			
39	0-28	MCL	<5	28-52	MCL	xxx	52-90+	SCL	xxx	2			
40	0-31	MCL/SCL	<5	31-90+	MCL/SCL	o				2			
41	0-26	SCL/MSL	<5	26-40	MSL	o	40+	SST		2			
42	0-30	MSL	<5	30-38	MSL	o	38+	SST		2			
43	0-28	MSL	<5	28-43	MSL	o	43-85 85+	slstMSL SST	o	2			
44	0-24	slstMSL	<5	24-36	slstMSL	o	36+	SST		3			
45	0-23	slstMSL	<5	23+	SST	o				3			
46	0-31	vslstMSL	<5	31-42	slstMSL	o	42+	SST		4			
47	0-27	vslstMSL	<5	27-59	MSL	o	59+	SST		3			
48	0-33	vslstMSL	<5	33-57	MSL	o	57+	SST		3			
49	0-30	vslstMSL	<5	30-59	slstMSL	o	59+	SST		4			
50	0-30	vslstMSL	<5	30-66	vslstMSL	o	66-86 86+	mstMSL SST	o	3			
51	0-24	slstMSL	<5	24-57	slstMSL	o	57+	SST		3			
52	0-25	SCL/MSL	<5	25-41	MSL	o	41-50 50+	MSL SST	o	3			
53	0-20	vslstMSL	<5	20-28	broken SST	-	28+	SST		3			
54	0-31	vslstSCL/MSL	<5	31-52	vslstSCL/MSL	x	52+	SST		3			
55	0-26	vslstMSL	<5	26-73	MSL	o	73+	SST		3			
56	0-30	mstMSL	<5	30+	SST					6			
57	0-22	slstMSL	<5	22-63	slstMSL	xxx	63+	SST		5			
58	0-24	vslstMSL	<5	24-43	SCL	o	43+	SST		3			
59	0-25	vslstMSL/SCL	<5	25-90+	SCL	xxx				3			
60	0-31	vslstSCL	<5	31-40	SCL/MSL	xx	40+	SST		3			
61	0-27	vslstSCL/MSL	<5	27+	SST					3			
62	0-28	vslstSCL	<5	28-90+	SCL	xxx				3			
63	0-27	vslstMSL	<5	27-56	mstMSL	o	56+	SST		2			
64	0-29	vsstSCL/MSL	<5	29-52	SCL/MSL	xx	52+	Stopped on stones		3			
65	0-25	vslstMSL/SCL	<5	25+	SST					1			
66	0-26	vslstSCL	<5	26-59	SCL	o	59+	SST		3			
67	0-28	vslstMSL	<5	28-53	mstMSL	o	53+	SST		3			
68	0-24	vslstSCL	<5	24-90+	SCL	xx(x)				3			
69	0-25	vslstMSL	<5	25-35	slstLMS	xx	35+	SST		3			
70	0-30	slstMSL	<5	30-75	slstMSL	x	75+	Stopped on stones		4			

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	ALC Grade	Limiting Factor
	Depth (cm)	Texture	Hard stones >20mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling				
71	0-28	vslstSCL	<5	28-75	SCL	xxx	75+	Stopped on stones		3			
72	0-30	vslstMSL	<5	30-42	slstMSL	o	42+	SST		3			
73	0-30	vslstSCL/MSL	<5	30-55	vslstSCL/MSL	o	55+	SST		3			

Key to table

Gley indicators¹

o	unmottled
x	1-2% ochreous mottles and brownish matrix (or a few to common root mottles (topsoils)) ³
xx	>2% ochreous mottles and brownish matrix and/or dull structure faces (slightly gleyed horizon)
xxx	>2% ochreous mottles and greyish or pale matrix (gleyed horizon) or reddish matrix and >2% greyish, brownish or ochreous mottles and pale ped faces mottles or f-m concentrations (gleyed horizon)
xxxx	dominantly blueish matrix, often with some ochreous mottles (gleyed horizon)

Slowly permeable layers⁴

a depth underlined (e.g. 50) indicates the top of a slowly permeable layer

A wavy underline (e.g. 50) indicates the top of a layer borderline to slowly permeable

¹Gley indicators in accordance with Hodgson, J.M., 1997. Soil Survey Field Handbook (third edition). Soil survey technical monograph No. 5

²Texture in accordance with particle size classes in Hodgson (1997)

³ Occasionally recorded in the texture box

⁴Permeability is estimated for auger borings and must be confirmed by full pit observations in accordance with the definitions in: Revised Guidelines for grading the quality of Agricultural Land (Maff 1988)

⁵Soil Wetness Classes are defined in Hodgson (1997)

⁷calcareous classes as defined in Hodgson (1997)

Texture²

C	clay
ZC	silty clay
SC	sandy clay
CL	clay loam (H-heavy, M-medium)
ZCL	silty clay loam (H-heavy, M-medium)
SZL	sandy silt loam (F-fine, M-medium, C-coarse)
LS	loamy sand (F-fine, M-medium, C-coarse)
SL	sandy loam (F-fine, M-medium, C-coarse)
S	sand (F-fine, M-medium, C-coarse)
SCL	sandy clay loam
P	peat (H-humified, SF-semi-fibrous, F-fibrous)
LP	loamy peat; PL - peaty loam

Wetness Class⁵

I (freely drained) to VI (very poorly drained)

⁶stoniness classes as defined in Hodgson (1997)

Limitations:

W	wetness/workability
D	droughtiness
De	depth
F	flooding
St	stoniness
Sl	slope
T	topography/microrelief
C	Climate

Suffixes & prefixes:

o - organic

(vsl, sl, m, v, x)st – (very slightly, slightly, moderately, very, extremely) stony⁶

(vsl, sl, m, v, x)ca (very slightly, slightly, moderately, very, extremely) calcareous⁷

Other abbreviations

fmn	ferri-manganiferous concentrations
dist	disturbed soil layer;
R	bedrock (CH – chalk, SST – sandstone)
LST	limestone, MST – Mudstone)
r	reddish, gn – greenish

Soil pit descriptions

Pit 11 (see Map 1)

0-35 cm	Dark greyish brown (10YR 4/2) heavy clay loam; stoneless; moderately developed medium and coarse sub-angular blocky structure; friable; non-calcareous; smooth clear boundary to:
35-55 cm	Grey (10YR 5/1) heavy clay loam with 15% fine strong brown (7.5YR 5/8) mottles; stoneless; weakly developed very coarse angular blocky structure; very firm; non-calcareous; smooth gradual boundary to:
55-100 cm+	Light grey (10YR 6/1) clay with 25% distinct medium strong brown (7.5YR 5/8) mottles; stoneless; weakly developed very coarse angular blocky structure to structureless (massive); very firm; high packing density.

Pit 16 (see Map 1)

0-32 cm	Dark greyish brown (10YR 4/2) heavy clay loam; 2% medium hard stones (artificial); weakly developed very coarse sub-angular blocky structure; friable; non-calcareous; smooth clear boundary to:
32-54 cm	Greyish brown (10YR 5/2) heavy clay loam with 15% distinct fine strong brown (7.5YR 5/8) mottles; 5% mixed hard stones; weakly developed very coarse sub-angular blocky structure; friable; medium packing density; non-calcareous; smooth gradual boundary to:
54-100 cm+	Blueish grey (5B 5/1) clay with 10% distinct fine yellowish brown (10YR 5/6) mottles; stoneless; weakly developed very coarse angular blocky structure; very firm; high packing density.

Pit 32 (see Map 1)

0-38 cm	Dark greyish brown (10YR 4/2) medium clay loam; stoneless; moderately developed medium sub-angular blocky structure; friable; non-calcareous; smooth clear boundary to:
38-70 cm	Light grey (10YR 7/1) sandy clay loam with 10% prominent fine strong brown (7.5YR 5/8) mottles; stoneless moderately developed medium sub-angular blocky structure; friable; non-calcareous; smooth gradual boundary to:
70-100 cm+	Grey (10YR 6/1) heavy clay loam with 20% distinct medium and coarse strong brown (7.5YR 5/8) mottles; weakly developed very coarse sub-angular blocky structure; firm; medium packing density.

Pit 43 (see Map 1)

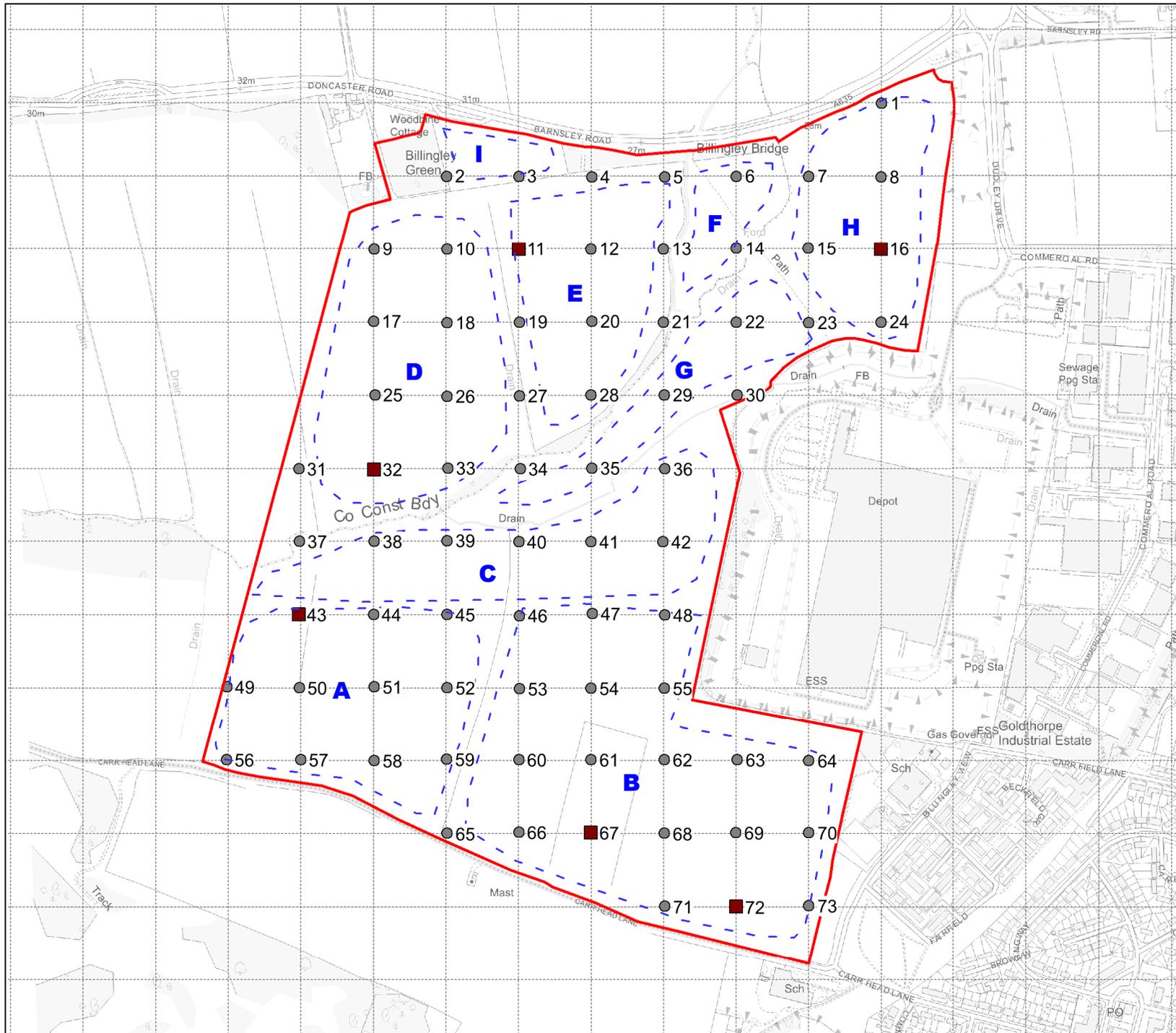
0-28 cm	Dark brown (7.5YR 3/3) medium sandy loam; <1% stones; moderately developed fine sub-angular blocky structure; friable; non-calcareous; smooth gradual boundary to:
28-43 cm	Brown (7.5YR 4/4) medium sandy loam; stoneless to very slightly stony; weakly developed fine sub-angular blocky structure; very friable; non-calcareous; smooth diffuse boundary to:
43-85 cm	Yellowish brown (10YR 5/4) medium sandy loam; 10% very small sandstone fragments; weakly developed fine sub-angular blocky structure; very friable; non-calcareous; uneven clear boundary to:
85 cm+	Hard weathering sandstone.

Pit 67 (see Map 1)

0-28 cm	Dark greyish brown (10YR 4/2) medium sandy loam; 2-3 small soft sandstone fragments; moderately developed medium sub-angular blocky structure; friable; non-calcareous; smooth gradual boundary to:
28-53 cm	Greyish brown (10YR 5/2) medium sandy loam; 20% medium and large soft platy sandstone; moderately developed fine sub-angular blocky structure; very friable; non-calcareous; uneven diffuse boundary to:
53-60 cm+	broken hard platy sandstone.

Pit 72 (see Map 1)

0-30 cm	Dark brown (7.5YR 3/2) medium sandy loam; <1% stones; moderately developed medium to fine sub-angular blocky structure; friable; non-calcareous; smooth clear boundary to:
30-42 cm	Dark yellowish brown (10YR 4/4) medium sandy loam; 10% soft sandstone fragments; moderately developed medium sub-angular blocky structure; friable; non-calcareous; gradual wavy boundary to:
42 cm+	Weathering hard sandstone with interstitial material; penetrable to 15-20 cm.



- KEY**
- Auger observations
 - Pits
 - - - Topsoil sample area
 - Site boundary

Site:
Goldthorpe

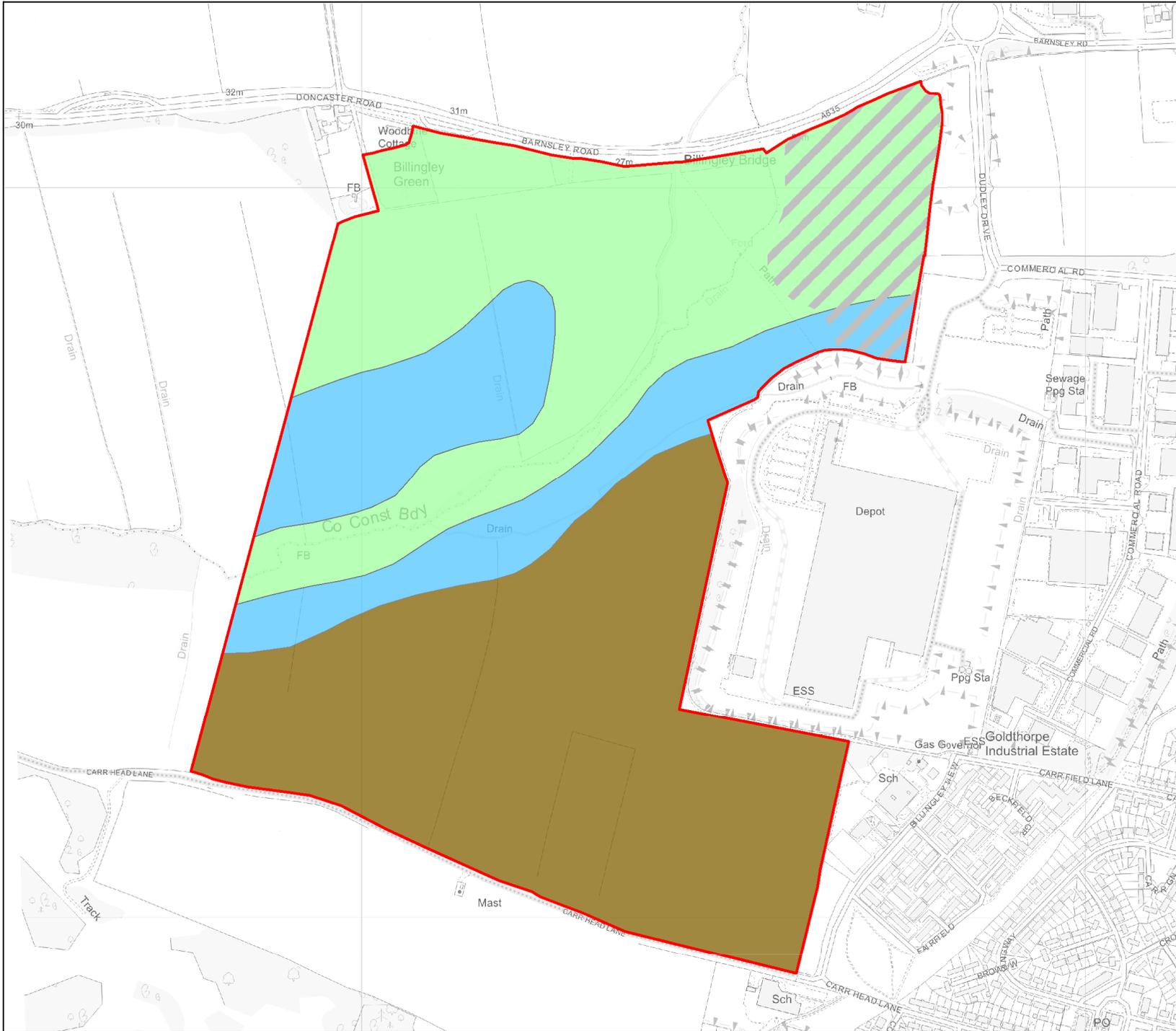
Map title:
**MAP 1
Observations**



Lockington Hall
Lockington
Derby
DE74 2RH
www.lra.co.uk

Date: 19/02/2023

Scale: 1:7,500



- KEY**
- Soil Type A
TS1/SS1
 - Soil Type B
TS1/SS2/(SS3)
 - Soil Type C
TS2/SS3
 - Disturbed soils
 - Site boundary

Site:
Goldthorpe

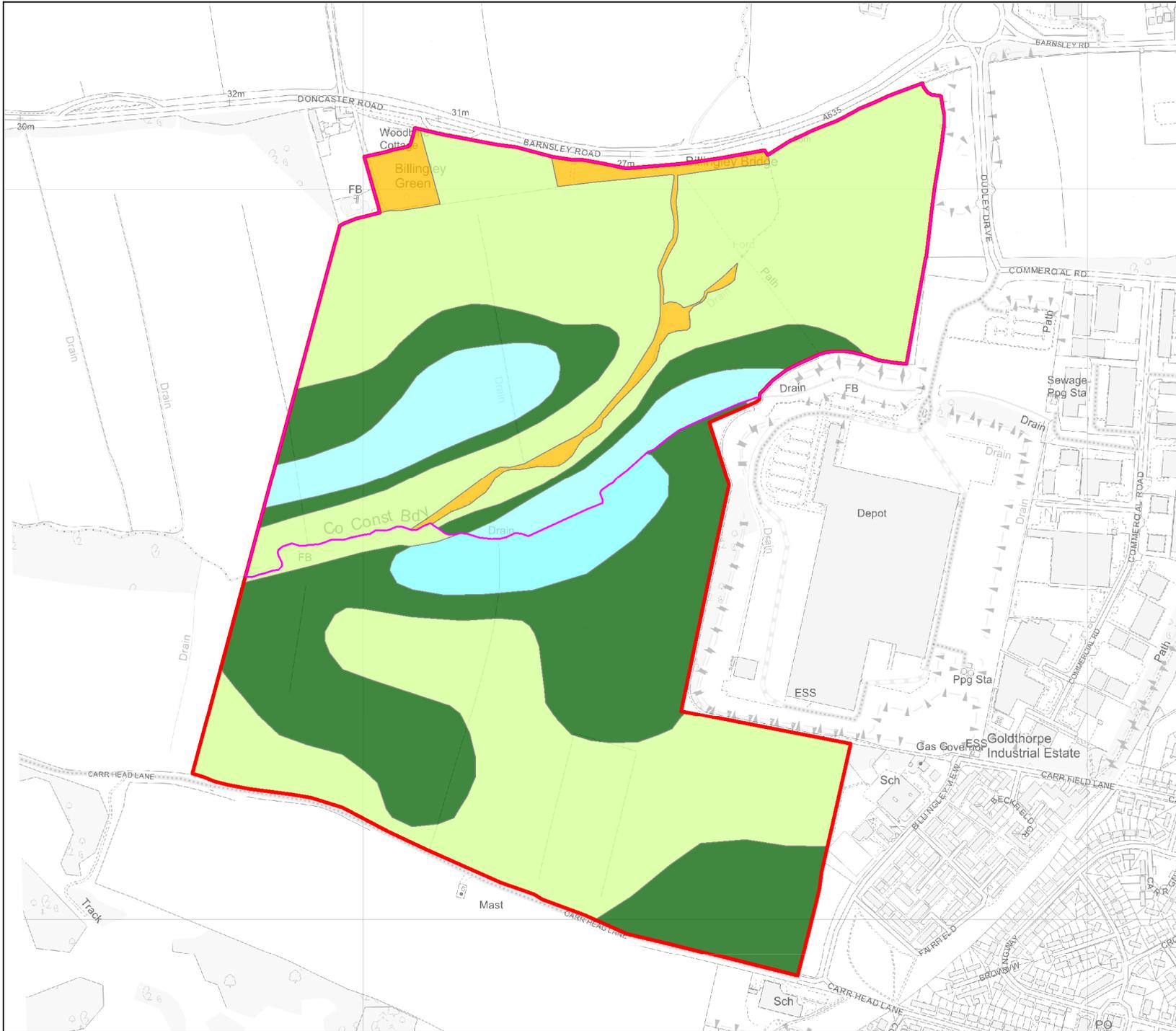
Map title:
**MAP 2
Soil types**



Lockington Hall
Lockington
Derby
DE74 2RH
www.lra.co.uk

Date: 19/02/2023

Scale: 1:7,500



- KEY**
- Grade 2
 - Subgrade 3a
 - Subgrade 3b
 - Other land
 - 2023 ALC boundary
 - Site boundary

Site:
Goldthorpe

Map title:
**MAP 3
Agricultural Land
Classification**



Lockington Hall
Lockington
Derby
DE74 2RH
www.lra.co.uk

Date: 19/02/2023

Scale: 1:7,500

SITE: Goildthorpe
Location: 29

Layer	Lower depth (cm)	Texture symbol (or stop)	Structure (Good, Moderate or Poor)	% stones	Stone type (see table)
Topsoil	29	CL		0	1
Subsoil 1	70	SCL	m	0	1
Subsoil 2	120	SCL	m	0	1
Subsoil 3	120	stop	m	0	1

(Lowest horizon depth must be 120 and topsoil cannot be greater than 70 cm (potatoes) or 50 cm (wheat))

DATA USED FROM MASTER TABLE

	<i>Fine earth</i>	<i>Stones</i>
Topsoil Av	18	1
Subsoil 1 TAv	15	1
Subsoil 1 EAv	10	0.5
Subsoil 2 TAv	15	1
Subsoil 2 EAv	10	0.5
Subsoil 3 TAv	0.1	1
Subsoil 3 EAv	0.1	0.5

(ERR = no data)

Stone codes	
0	No stones
1	Hard rocks or stones
2	Soft, medium or coarse grained sdst
3	Soft weathered ign or metamorph
4	Soft oolitic or dolomitic limestones
5	Soft fine-grained sandstone
6	Soft argillaceous or silty
7	Chalk
8	Gravel with non-porous stones
9	Gravel with porous stones

PROFILE CALCULATIONS

	<i>Ap potatoes</i>	<i>Ap wheat</i>
Topsoil	522.0	522.0
Subsoil 1	615.0	0.0
Subsoil 1	0.0	515.0
Subsoil 2	0.0	0.0
Subsoil 2	0.0	500.0
Subsoil 3	0.0	0.0

TOTAL AP (mm)	114	154
MD (mm)	65	79
AP-MD (mm)	49	75

AGRICULTURAL LAND GRADE

<i>Class</i>	<i>Potatoes</i>	<i>Wheat</i>
1	*	*
2		
3a		
3b		
4		

SITE: Goildthorpe
Location: 32

Layer	Lower depth (cm)	Texture symbol (or stop)	Structure (Good, Moderate or Poor)	% stones	Stone type (see table)
Topsoil	38	CL		0	1
Subsoil 1	70	SCL	g	0	1
Subsoil 2	120	CL	p	0	1
Subsoil 3	120	stop	m	0	1

(Lowest horizon depth must be 120 and topsoil cannot be greater than 70 cm (potatoes) or 50 cm (wheat))

DATA USED FROM MASTER TABLE

	Fine earth	Stones
Topsoil Av	18	1
Subsoil 1 TAv	19	1
Subsoil 1 EAv	14	0.5
Subsoil 2 TAv	12	1
Subsoil 2 EAv	7	0.5
Subsoil 3 TAv	0.1	1
Subsoil 3 EAv	0.1	0.5

(ERR = no data)

Stone codes	
0	No stones
1	Hard rocks or stones
2	Soft, medium or coarse grained sdst
3	Soft weathered ign or metamorph
4	Soft oolitic or dolomitic limestones
5	Soft fine-grained sandstone
6	Soft argillaceous or silty
7	Chalk
8	Gravel with non-porous stones
9	Gravel with porous stones

PROFILE CALCULATIONS

	Ap potatoes	Ap wheat
Topsoil	684.0	684.0
Subsoil 1	608.0	0.0
Subsoil 1	0.0	508.0
Subsoil 2	0.0	0.0
Subsoil 2	0.0	350.0
Subsoil 3	0.0	0.0

TOTAL AP (mm)	129	154
MD (mm)	65	79
AP-MD (mm)	64	75

AGRICULTURAL LAND GRADE

Class	Potatoes	Wheat
1	*	*
2		
3a		
3b		
4		

ANALYSIS REPORT



Contact : MR MIKE PALMER
LAND RESEARCH ASSOCIATES
LOCKINGTON HALL
LOCKINGTON
DERBY
DE74 2RH
Tel. : 01509 670570

H579

Client : GOLDTHORPE TOPSOIL

Please quote the above code for all enquiries

Sample Matrix : Agricultural Soil

Laboratory Reference

Card Number 65740/23

Date Received 23-Feb-23

Date Reported 15-Mar-23

SOIL ANALYSIS REPORT

Laboratory Sample Reference	Field Details			Soil pH	Index			mg/l (Available)		
	No.	Name or O.S. Reference with Cropping Details			P	K	Mg	P	K	Mg
355552/23	1	A <i>No cropping details given</i>		7.0	2	2+	3	17.0	223	147
355553/23	2	B <i>No cropping details given</i>		7.4	3	2+	3	28.6	188	150
355554/23	3	C <i>No cropping details given</i>		7.1	2	2+	3	23.2	238	157
355555/23	4	D <i>No cropping details given</i>		7.3	0	2-	4	8.2	122	250
355556/23	5	E <i>No cropping details given</i>		6.8	0	1	6	6.4	95	388
355557/23	6	F <i>No cropping details given</i>		6.6	0	1	6	7.6	100	408

If general fertiliser and lime recommendations have been requested, these are given on the following sheets.

The analytical methods used are as described in DEFRA Reference Book 427

The index values are determined from the AHDB Fertiliser Recommendations RB209 9th Edition.

Released by Katie Dunn On behalf of NRM Date 15/03/23



ANALYSIS REPORT



Contact : MR MIKE PALMER
LAND RESEARCH ASSOCIATES
LOCKINGTON HALL
LOCKINGTON
DERBY
DE74 2RH
Tel. : 01509 670570

H579

Client : GOLDTHORPE TOPSOIL

Please quote the above code for all enquiries

Sample Matrix : Agricultural Soil

Laboratory Reference
Card Number 65740/23

Date Received 23-Feb-23
Date Reported 15-Mar-23

SOIL ANALYSIS REPORT

Laboratory Sample Reference	Field Details		Soil pH	Index			mg/l (Available)		
	No.	Name or O.S. Reference with Cropping Details		P	K	Mg	P	K	Mg
355558/23	7	G <i>No cropping details given</i>	7.3	2	4	6	16.4	413	425
355559/23	8	H <i>No cropping details given</i>	7.6	1	3	5	15.2	364	319
355560/23	9	I <i>No cropping details given</i>	7.6	0	2-	5	7.2	147	329

If general fertiliser and lime recommendations have been requested, these are given on the following sheets.

The analytical methods used are as described in DEFRA Reference Book 427

The index values are determined from the AHDB Fertiliser Recommendations RB209 9th Edition.

Released by Katie Dunn On behalf of NRM Date 15/03/23



ANALYSIS REPORT



DATE **15th March 2023**
 SAMPLES FROM **GOLDTHORPE TOPSOIL**

MR MIKE PALMER
 LAND RESEARCH ASSOCIATES
 LOCKINGTON HALL
 LOCKINGTON
 DERBY
 DE74 2RH
 Tel: 01509 670570
 Fax: 01509 670676

Report Reference: 65740/23

Lab Ref.	Field Details		Soil Organic Matter [LOI%] Result
	No.	Field Name or Reference	
355552	1	A	4.0
355553	2	B	4.0
355554	3	C	4.2
355555	4	D	6.6
355556	5	E	7.9
355557	6	F	8.1
355558	7	G	7.3
355559	8	H	8.1
355560	9	I	7.4

Your Organic Matter Results Interpretation

Land use	Rainfall	Soil type	Very Low	Low	Target	High
Arable	Low <650mm	Light	<=1.0	1.1-2.1	2.2-3.2	>=3.3
		Medium	<=1.7	1.8-3.3	3.4-5.0	>=5.1
		Heavy	<=2.2	2.3-4.4	4.5-6.5	>=6.6
	Moderate 650-800mm	Light	<=1.0	1.1-3.0	3.1-4.5	>=4.6
		Medium	<=1.9	2.0-4.0	4.1-6.0	>=6.1
		Heavy	<= 2.7	2.8-5.2	5.3-7.6	>=7.7
	High 800-1100mm	Light	<=1.3	1.4-3.7	3.8-6.1	>=6.2
		Medium	<=2.5	2.6-5.0	5.1-7.5	>=7.6
		Heavy	<=3.6	3.7-6.2	6.3-8.8	>=8.9
Grassland (Lowland)	All	Light	<=2.1	2.2-4.9	5.0-7.9	8.0-14.9
		Medium	<=3.4	3.5-6.4	6.5-9.3	9.3-19.9
		Heavy	<=4.6	4.7-7.6	7.7-10.5	10.6-19.9

DATE **15th March 2023**
 SAMPLES FROM **GOLDTHORPE TOPSOIL**

MR MIKE PALMER
 LAND RESEARCH ASSOCIATES
 LOCKINGTON HALL
 LOCKINGTON
 DERBY
 DE74 2RH
 Tel: 01509 670570
 Fax: 01509 670676

Report Reference: 65740/23

Explanatory Note: Cropping

High	Above average and associated with crop residues returns and regular OM inputs, including ley-arable rotations. Organic and conservation agricultural systems would appear in this group.	On target --- Continue
Typical	Typical levels and is associated with crop residue returns and regular OM inputs, such as cover crops, compost or FYM.	Rotational Monitoring
Low	Lower than average associated with intensive cropping & few organic matter inputs. Plan to add OM inputs and retain crop residues in the field. Be aware: changes in SOM as a result of a change in practice can take a long time.	Lower than average --- Review
Very Low	Very low associated with very intensive cropping and very few organic matter returns. Plan to regularly add OM inputs and retain crop residues in the field. Be aware: changes in SOM as a result of a change in practice can take a long time.	Very Low --- Investigate

Explanatory Note: Grassland Fields [Lowland]

High	Above average for the climate and soil type. Well drained, near neutral pH, well managed returns through grazing and inputs. Be aware that high levels could suggest an accumulation of undecomposed SOM near the soil surface due to a deteriorating pH and drainage, for example due to compaction.	On target --- Continue
Typical	Typical for the climate and soil type. Associated with well drained near neutral pH, well managed returns through grazing and inputs.	Rotational Monitoring
Low	Lower than average for the climate and soil type, intensively managed or recently reseeded and/or low OM inputs. If the soil is compacted and regularly poached by livestock, then OM soil incorporation by biological activity will have been reduced.	Lower than average --- Review
Very Low	Very low for climate/soil type. Intensively managed or recently reseeded and/or very low OM inputs. If the soil is compact and regularly poached by livestock, then OM incorporation by biological activity will have been reduced. Add more OM inputs to build SOM levels.	Very Low --- Investigate

Traffic light system: These advisory categories only apply to mineral soils. The benchmarks **are not appropriate for peats/ organic soils, i.e. soils with >20% organic matter to 40cm depth.**

In grassland situations only: SOM results $\geq 15\%$ on light & $\geq 20\%$ on med/heavy soil types suggest accumulation at the soil surface often indicating poor biological activity due to soil acidity or wetness on mineral soils.

Cropping & grassland: There is no defined **critical SOM value to aim for**, feeding the soil with organic inputs is more important than reaching an absolute target value.

Please note: A different set of benchmarks would also be required for upland grass and semi-natural systems.

OM = Organic Matter, SOM = Soil Organic Matter

Reference: ADHB-BBRO Soil Biology & Soil Health Partnership protocol and benchmarking document July 2022. Rainfall categories for the SOM benchmarks in AHDB report:91140002 final report 02.pdf (windows.net) see pages 7-11, based on work originally in Defra project SP0310

ANALYSIS REPORT



Contact : MR MIKE PALMER
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 DE74 2RH
 Tel. : 01509 670570

H579

Client : GOLDTHORPE SUBSOIL

Please quote the above code for all enquiries

Sample Matrix : Agricultural Soil

Laboratory Reference
 Card Number 65741/23

Date Received 23-Feb-23
 Date Reported 15-Mar-23

SOIL ANALYSIS REPORT

Laboratory Sample Reference	Field Details		Soil pH	Index			mg/l (Available)		
	No.	Name or O.S. Reference with Cropping Details		P	K	Mg	P	K	Mg
355561/23	1	32 <i>No cropping details given</i>	7.9	0	0	4	5.4	40	232
355562/23	2	43 <i>No cropping details given</i>	7.1	0	1	3	8.6	115	134
355563/23	3	67 <i>No cropping details given</i>	8.1	0	2-	2	8.0	171	84
355564/23	4	72 <i>No cropping details given</i>	7.7	1	1	2	13.0	118	69

If general fertiliser and lime recommendations have been requested, these are given on the following sheets.

The analytical methods used are as described in DEFRA Reference Book 427

The index values are determined from the AHDB Fertiliser Recommendations RB209 9th Edition.

Released by Katie Dunn On behalf of NRM Date 15/03/23



ANALYSIS REPORT



DATE **15th March 2023**
 SAMPLES FROM **GOLDTHORPE SUBSOIL**

MR MIKE PALMER
 LAND RESEARCH ASSOCIATES
 LOCKINGTON HALL
 LOCKINGTON
 DERBY
 DE74 2RH
 Tel: 01509 670570
 Fax: 01509 670676

Report Reference: 65741/23

Lab Ref.	Field Details		Soil Organic Matter [LOI%] Result
	No.	Field Name or Reference	
355561	1	32	3.8
355562	2	43	2.6
355563	3	67	1.5
355564	4	72	1.5

Your Organic Matter Results Interpretation						
Land use	Rainfall	Soil type	Very Low	Low	Target	High
Arable	Low <650mm	Light	<=1.0	1.1-2.1	2.2-3.2	>=3.3
		Medium	<=1.7	1.8-3.3	3.4-5.0	>=5.1
		Heavy	<=2.2	2.3-4.4	4.5-6.5	>=6.6
	Moderate 650-800mm	Light	<=1.0	1.1-3.0	3.1-4.5	>=4.6
		Medium	<=1.9	2.0-4.0	4.1-6.0	>=6.1
		Heavy	<= 2.7	2.8-5.2	5.3-7.6	>=7.7
	High 800-1100mm	Light	<=1.3	1.4-3.7	3.8-6.1	>=6.2
		Medium	<=2.5	2.6-5.0	5.1-7.5	>=7.6
		Heavy	<=3.6	3.7-6.2	6.3-8.8	>=8.9
Grassland (Lowland)	All	Light	<=2.1	2.2-4.9	5.0-7.9	8.0-14.9
		Medium	<=3.4	3.5-6.4	6.5-9.3	9.3-19.9
		Heavy	<=4.6	4.7-7.6	7.7-10.5	10.6-19.9

DATE **15th March 2023**
 SAMPLES FROM **GOLDTHORPE SUBSOIL**

MR MIKE PALMER
 LAND RESEARCH ASSOCIATES
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 Tel: 01509 670570
 Fax: 01509 670676

Report Reference: 65741/23

Explanatory Note: Cropping

High	Above average and associated with crop residues returns and regular OM inputs, including ley-arable rotations. Organic and conservation agricultural systems would appear in this group.	On target --- Continue
Typical	Typical levels and is associated with crop residue returns and regular OM inputs, such as cover crops, compost or FYM.	Rotational Monitoring
Low	Lower than average associated with intensive cropping & few organic matter inputs. Plan to add OM inputs and retain crop residues in the field. Be aware: changes in SOM as a result of a change in practice can take a long time.	Lower than average --- Review
Very Low	Very low associated with very intensive cropping and very few organic matter returns. Plan to regularly add OM inputs and retain crop residues in the field. Be aware: changes in SOM as a result of a change in practice can take a long time.	Very Low --- Investigate

Explanatory Note: Grassland Fields [Lowland]

High	Above average for the climate and soil type. Well drained, near neutral pH, well managed returns through grazing and inputs. Be aware that high levels could suggest an accumulation of undecomposed SOM near the soil surface due to a deteriorating pH and drainage, for example due to compaction.	On target --- Continue
Typical	Typical for the climate and soil type. Associated with well drained near neutral pH, well managed returns through grazing and inputs.	Rotational Monitoring
Low	Lower than average for the climate and soil type, intensively managed or recently reseeded and/or low OM inputs. If the soil is compacted and regularly poached by livestock, then OM soil incorporation by biological activity will have been reduced.	Lower than average --- Review
Very Low	Very low for climate/soil type. Intensively managed or recently reseeded and/or very low OM inputs. If the soil is compact and regularly poached by livestock, then OM incorporation by biological activity will have been reduced. Add more OM inputs to build SOM levels.	Very Low --- Investigate

Traffic light system: These advisory categories only apply to mineral soils. The benchmarks **are not appropriate for peats/ organic soils, i.e. soils with >20% organic matter to 40cm depth.**

In grassland situations only: SOM results $\geq 15\%$ on light & $\geq 20\%$ on med/heavy soil types suggest accumulation at the soil surface often indicating poor biological activity due to soil acidity or wetness on mineral soils.

Cropping & grassland: There is no defined **critical SOM value to aim for**, feeding the soil with organic inputs is more important than reaching an absolute target value.

Please note: A different set of benchmarks would also be required for upland grass and semi-natural systems.

OM = Organic Matter, SOM = Soil Organic Matter

Reference: ADHB-BBRO Soil Biology & Soil Health Partnership protocol and benchmarking document July 2022. Rainfall categories for the SOM benchmarks in AHDB report:91140002 final report 02.pdf (windows.net) see pages 7-11, based on work originally in Defra project SP0310



AGRICULTURAL LAND CLASSIFICATION
BARNSELY UDP
(AREA OF SEARCH FOR AIRFIELD)
SOUTH YORKSHIRE
JANUARY 1995

ADAS
Leeds Statutory Group

Job No:- 9/95
MAFF Ref:- EL 47/2
Commission No:- 1568

2 FCS 10616

SUMMARY

An Agricultural Land Classification survey of 173 ha of land south of Billingley ("Barnsley UDP, Area of Search for Airfield") was carried out in three stages between August 1993 and January 1995. The final auger boring density was one per hectare over the whole site.

4.0 ha of Grade 2 land was mapped. These soils are well drained and consist of light-textured topsoils over light to medium-textured subsoils. Slight soil droughtiness limits this land to Grade 2.

48.2 ha of Subgrade 3a land occurs on the site. Most of the soils are well drained, with light-textured topsoils over light to very light-textured subsoils. Weathering sandstone occurs at between 60cm and 80cm depth and moderate soil droughtiness restricts these areas to Subgrade 3a. In a few cases the soils are imperfectly drained, with medium-textured topsoils over medium to heavy-textured upper and lower subsoils. The upper subsoils are generally gleyed while the lower subsoils, which begin at between 40cm and 60cm depth, are both gleyed and slowly permeable. Soil wetness limits this land to Subgrade 3a.

The remainder of the agricultural land (117.3 ha) falls in Subgrade 3b. In the south and east the soils are well drained with light-textured topsoils over light or very light-textured subsoils. Weathering sandstone begins at around 40cm depth and severe soil droughtiness limits these areas to Subgrade 3b. In the north and west the soils are poorly drained, with medium to heavy-textured topsoils overlying gleyed and slowly permeable heavy-textured subsoils at around 30cm depth. Soil wetness and topsoil workability restrictions limit this land to Subgrade 3b.

The remainder of this site consists of Urban land (2.7 ha in the north and south-west) and Non Agricultural land (1.1 ha in the south-west).

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2. AGRICULTURAL LAND CLASSIFICATION

MAP

1. AGRICULTURAL LAND CLASSIFICATION

AGRICULTURAL LAND CLASSIFICATION REPORT ON LAND SOUTH OF BILLINGLEY
(BARNSELY UDP, AREA OF SEARCH FOR AIRFIELD)

1. INTRODUCTION AND SITE CHARACTERISTICS

1.1 Location and Survey Methods

The site lies approximately 10km east-south-east of Barnsley town centre, on the south side of the A635 Barnsley-Doncaster road. It covers a total area of 173 ha. Much of the south and east had been surveyed at a semi-detailed level (one auger boring per two hectares) in August 1993 ("Barnsley UDP, Site DE18") and 21 ha in the north had been the subject of a detailed ALC survey in October 1994 ("Woodbine OCCS"). Previously unsurveyed areas were subject to a detailed survey in January 1995 when the soils were examined by hand auger borings at 100m intervals predetermined by the National Grid, and additional borings were carried out in the area previously subject to a semi-detailed survey to bring the boring density up to the same level of one per hectare as on the rest of the site. Four pits were dug to allow full profile descriptions to be made. The land quality was assessed using the methods described in "Agricultural Land Classification of England and Wales. Revised guidelines and criteria for grading the quality of agricultural land" (MAFF, 1988).

This report and its accompanying map supersede the report and map provided in 1993, "Barnsley UDP, Site DE18", where the survey work was only semi-detailed.

1.2 Land Use and Relief

At the time of the most recent survey (January 1995) 98% of the site was in agricultural, principally arable, use. The remainder consists of Urban land (consisting of housing and a spoil heap) and Non-Agricultural land (consisting of scrub).

Site altitude varies between 20m AOD in the south-west and 40m AOD in the south-east and the land is level to gently sloping in the north (1-3° with a southerly aspect) and gently to strongly sloping in the south (2-8°, with a northerly aspect).

1.3 Climate

Grid Reference	: SE 439 036
Altitude (m)	: 30
Accumulated Temperature above 0°C (January - June)	: 1394 day °C
Average Annual Rainfall (mm)	: 622
Climatic Grade	: 1
Field Capacity Days	: 132
Moisture Deficit (mm) Wheat	: 107
Moisture Deficit (mm) Potatoes	: 99

1.4 Geology, Soils and Drainage

The area is underlain by Carboniferous Coal Measures, consisting of interbedded sandstones and shales. Weathering sandstone bedrock is found within one metre of the soil surface over much of the south of the site while weathering shale frequently occurs at similar depths in the north.

With the exception of localised Head deposits and a narrow band of alluvium alongside Carr Dike, in the centre of the site, there are no drift deposits.

Where the soils have formed in weathering sandstone the profiles are generally well drained (Wetness Class I) with medium sandy loam topsoils overlying medium sandy loam or loamy medium sand subsoils. Weathering sandstone occurs at between 30cm and 100cm depth in most cases.

The soils derived from weathering shale are imperfectly or poorly drained, falling in Wetness Classes III and IV and typically consist of medium or heavy clay loam topsoils over heavy clay loam or heavy silty clay loam subsoils. Weathering shale occurs at depths of between 30cm and 100cm in some areas.

The alluvial soils alongside Carr Dike are also poorly drained, falling in Wetness Class IV, with heavy clay loam topsoils over heavy silty clay loam, clay or silty clay subsoils.

Most of the soils on this site correspond to the Bardsey and Rivington Series as mapped by the Soil Survey and Land Research Centre.

2. AGRICULTURAL LAND CLASSIFICATION

The ALC grades occurring on this site are as follows:

<u>Grade/Subgrade</u>	<u>Hectares</u>	<u>Percentage of Total Area</u>
1		
2	4.0	2.3
3a	48.2	27.8
3b	117.3	67.7
4		
5		
(Sub total)	(169.5)	(97.8)
Urban	2.7	1.6
Non Agricultural	1.1	0.6
Woodland - Farm		
- Commercial		
Agricultural Buildings		
Open Water		
Land not surveyed		
(Sub total)	(3.8)	(2.2)
TOTAL	<u>173.3</u>	<u>100</u>

2.1 Grade 2

Approximately 4 ha of Grade 2 land occurs in the south-east of the site. The soils here are well drained, falling in Wetness Class I, and typically consist of medium sandy loam topsoils overlying medium sandy loam, medium silty clay loam or sandy clay loam subsoils. Both topsoils and subsoils are very slightly stony, containing around 4% small and medium subangular sandstones. Slight soil droughtiness is the factor limiting this land to Grade 2.

2.2 Subgrade 3a

Much of the south and east of the site falls in this Subgrade. In most cases the soils are well drained (Wetness Class I) with medium sandy loam topsoils overlying medium sandy loam or loamy medium sand subsoils. Weathering sandstone bedrock occurs at between 60cm and 80cm depth in most places and topsoils are very slightly stony (with around 4% small and medium subangular sandstones) while subsoils are very slightly to slightly stony (with between 4% and 12% subangular sandstones). A more severe soil droughtiness limitation restricts this land to Subgrade 3a.

In a few cases in the north of the site the Subgrade 3a land consists mainly of imperfectly drained soils which fall in Wetness Class III. Medium clay loam topsoils overlie gleyed medium silty clay loam, sandy clay loam or heavy clay loam upper subsoils and gleyed and slowly permeable sandy clay loam or heavy clay loam lower subsoils. The lower subsoils begin at between 40cm and 60cm depth and soil wetness is the factor limiting the ALC grade.

2.3 Subgrade 3b

The remainder of the agricultural land on this site falls in Subgrade 3b. In the south and east the soils are generally well drained (Wetness Class I) and consist of medium sandy loam topsoils over medium sandy loam or loamy medium sand subsoils. Weathering sandstone typically begins at around 40cm depth. Topsoils are very slightly stony, containing around 4% small and medium subangular sandstones, and subsoils are slightly stony, with between 6% and 15% small to large subangular sandstones. Severe soil droughtiness limits this land to Subgrade 3b.

In the north and west the Subgrade 3b land generally consists of poorly drained (Wetness Class IV) soils with medium clay loam or heavy clay loam topsoils overlying gleyed and slowly permeable heavy clay loam, heavy silty clay loam or clay in most cases. These slowly permeable subsoils typically begin at around 30cm depth and soil wetness and topsoil workability restrict this land to Subgrade 3b.

2.4 Urban

This category includes houses in the north and a spoil heap in the south-west.

2.5 Non Agricultural

This category includes an area of scrub in the south-west of the site.

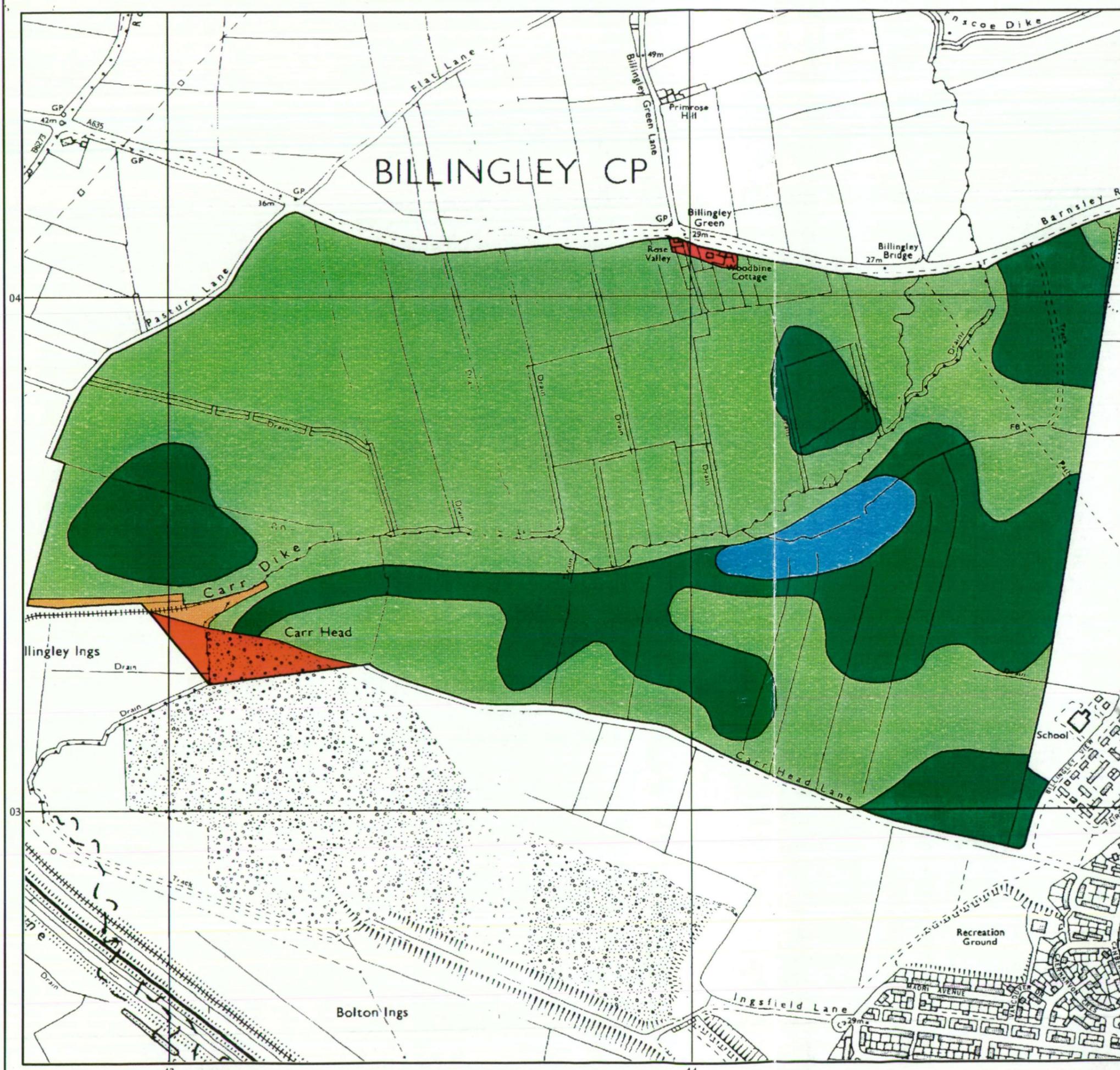
RPT File: 2FCS 10616
Leeds Statutory Centre

MAP

Agricultural Land Classification

BARNESLEY U.D.P.

(Area of search for Airfield)



Agricultural Land

Grade	Quality	Area (ha)
1	Excellent	Nil
2	Very Good	4.0
3a	Good	48.2
3b	Moderate	117.3
4	Poor	Nil
5	Very Poor	Nil

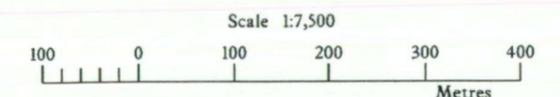
Other Land Categories

Urban	Area (ha)
Non-Agricultural	2.7
Woodland (*W)	1.1
Agricultural Buildings (*)	Nil
Open Water (*)	Nil
Not Surveyed (*)	Nil

Total agricultural land area 169.5

Total survey area 173.3

* Grade/category not present within survey area



Further details contained in MAFF (1988) Agricultural Land Classification of England and Wales - Revised guidelines and criteria for grading the quality of agricultural land. MAFF (Publications), London SE99 7TP.

The information is accurate at the base map scale but any enlargement would be misleading.

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Surveyed and drawn by the Resource Planning Team, ADAS Statutory Unit Leeds

Based on the 1980 Ordnance Survey 1:10,000 map with the permission of the Controller of Her Majesty's Stationery Office.

Source Map(s): SE 40 SW

Reference no. 9/95

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1945 BARNSLEY U.D.P. Land South of Billingley
SE40 SW. 1:5,000 100 m. grid

BILLINGLEY CP

