

**AGRICULTURAL QUALITY  
OF LAND EAST OF KETTERING**

Report 2161/1

9<sup>th</sup> November 2023

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## **SUMMARY**

A soil resources and agricultural land quality survey has been undertaken of 205.9 ha of land east of Kettering in October 2023.

Most of the land has wet clay soils and is of Subgrade 3b quality, with a minor area of Subgrade 3a subject to lesser wetness/workability limitations. An area of land to the north of the main site (proposed for biodiversity offset) has been restored and the land is limited to a maximum of Subgrade 3b by a combination of wetness, droughtiness and steep slope gradients.

## 1.0 Introduction

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- 1.1 This report provides information on the soils and agricultural quality of 205.9 ha of land east of Burton Latimer, Kettering Northamptonshire. The report is based on a survey of the land in October 2023.

### **SITE ENVIRONMENT**

- 1.2 The survey area comprises a 190.2 ha main block of eleven large fields, under winter cereal rotation (wheat, barley and beans) at the time of survey. The site is bordered to the east by Thrapstone Road and on other sides by adjoining agricultural land. The land is level to very gently sloping, at an average elevation of approximately 85 m AOD.
- 1.3 A smaller (15.7 ha) block of three fields to the south of the village of Cranford (north of the main site) was also investigated as a potential biodiversity offset area. This land comprised improved pasture and is bordered to the north by woodland adjoining the A14, to the north-west and north-east by adjoining grassland and on other sides by restored quarry workings. This land slopes gently to moderately from north to south, with an average elevation of approximately 85 m AOD.

### **PUBLISHED INFORMATION**

- 1.4 British Geology Survey 1:50,000 scale information records the main block of land as Bozeat and Oadby Member glacial till, over Blisworth Limestone. The northern land is recorded as Northampton Sand Formation with no drift cover.
- 1.5 The National Soil Map (published at 1:250,000 scale)<sup>1</sup> records the land within the main block as Hanslope Association: mainly slowly permeable calcareous clays formed in chalky glacial till. The northern land is recorded as Banbury Association: mainly well drained loamy soils over shattered ironstone.

<sup>1</sup> Ragg, J.M., *et al.*, (1984). *Soils and their Use in Midland and Western England*, Soil Survey of England and Wales Bulletin No. 12, Harpenden.

## 2.0 Soils

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- 2.1 A soils and agricultural quality survey was carried out in October 2023 in accordance with MAFF (1988) Agricultural Land Classification guidelines<sup>2</sup>. It was based on observations at intersects of a 100 m grid, giving a density of one observation per hectare. During the survey, soils were examined by hand augerings and pits to a maximum depth of 1.2 m. A log of the sampling points, full description of soil profiles and a map (Map 1) showing their location is in an appendix to this report and they are described below.
- 2.2 Representative topsoil samples (0-150 mm) were collected on a field-by-field basis from the northern block of land for laboratory nutrient analysis (see Map 1a for sample area key).
- 2.3 The soils of the land were found to vary between the main block and the northern land and are described below.

### **SLOWLY PERMEABLE CLAY SOILS**

- 2.4 These soils dominate across the main site. They are highly uniform, consisting of clay topsoil over slowly permeable clay subsoil. The topsoil is almost invariably decalcified (non-calcareous), usually over a decalcified upper subsoil, grading to chalky clay at depth. With few exceptions the soils showed evidence of seasonal waterlogging (greyish or pale colours with ochreous mottles) above 40 cm depth. These soils are judged imperfectly-draining under the local climate (Soil Wetness Class III).
- 2.5 Minor variation observed includes heavy clay loam rather than clay topsoils, occasional calcareous topsoils and some soils with waterlogging evidence only evident at greater depth (Soil wetness Class II). However, these profiles are very limited in extent, generally limited to single observation points.
- 2.6 Example profiles are described from pits at observation points 25, 75 and 109 (see Map 1) in an appendix to this report.

### **MAN-MADE SOILS**

- 2.7 These soils occur in the northern block, which has been restored following ironstone extraction, and apparently later landfilling. The soils are variable, comprising varying thickness of heavy clay loam, medium clay loam or clay topsoil, mainly non-calcareous in

<sup>2</sup>MAFF, (1988). *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*.

the north but strongly calcareous in the south. The lower profile is comprised of compacted overburden (apparently glacial till) and in places mixed topsoil and subsoil, typically stony and strongly calcareous with high stone content. Due to the stony compacted nature this material was impenetrable with hand tools at shallow depth.

- 2.8 An example profile is described from a pit at observation point 193 (see Map 1) in an appendix to this report.

### 3.0 Agricultural land quality

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3.1 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.

3.2 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 Classification<sup>3</sup>.

3.3 The relevant site data for the main site area at an average elevation of 85 m at central grid reference SP 927,747 is given below.

- Average annual rainfall: 599 mm
- January-June accumulated temperature >0°C 1357 day°
- Field capacity period (when the soils are fully replete with water) 121 days
- Summer moisture deficits for: wheat: 111 mm  
potatoes: 103 mm

3.4 The relevant site data for the northern area at an average elevation of 85 m at central grid reference SP 925,765 is given below.

- Average annual rainfall: 602 mm
- January-June accumulated temperature >0°C 1376 day°
- Field capacity period (when the soils are fully replete with water) 122 days
- Summer moisture deficits for: wheat: 110 mm  
potatoes: 103 mm

3.5 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 MAFF<sup>4</sup>. There are no climatic limitations at this locality.

<sup>3</sup>Meteorological Office, (1989). *Climatological Data for Agricultural Land Classification*.

<sup>4</sup>MAFF, (1988). *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*.

## **SURVEY RESULTS**

- 3.6 The agricultural quality of the land is primarily determined by wetness/workability, with soil depth, droughtiness and slope gradient factors for the northern land. Other factors have been assessed but do not affect the land grade. Land of grade 3 has been identified.

### **Subgrade 3a**

- 3.7 This land is only mapped in a small area across the centre of the main site and comprises heavy topsoil with slight drainage impedance (Soil Wetness Class II). This combination under the local climate means that land access will be restricted in winter and early spring most years. However, late spring (and autumn) cropping is possible usually possible.

### **Subgrade 3b**

- 3.8 This subgrade comprises the vast majority of the land within the main site. The combination of high topsoil clay content and impeded drainage (Soil Wetness Class III) means that land will be too wet to cultivate in winter and spring. Arable cropping of the land is restricted to autumn-sown combinable crops most years.
- 3.9 Occasional individual observations with lesser limitation are also included due to the wetness of the surrounding land, as they could not be mapped or managed separately.
- 3.10 The man-made soils of the northern land are variable, but overall the highly compacted nature of the underlying overburden means plant rooting depth is likely to be very limited, which, given the dry local climate is likely to lead to low yields. Wetness is also likely to be a limitation given the compacted clays would not respond well to artificial drainage (even were it to be feasible given the existence of underlying landfill). Thirdly, some areas in the south slope at between 7 and 11 degrees, which makes the use of some cultivation machinery difficult, and is an equally limiting factor. Given the land does not appear to have ever been used for arable cropping since restoration, it may be that it is effectively limited to use as permanent pasture or meadow (i.e. Grade 4).

### **Other land (non-agricultural)**

- 3.11 This comprises ponds, tracks and hedges.

### **Grade areas**

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



**Table 1: Areas occupied by the different land grades**

<i>Grade/subgrade</i>	<i>Area (ha)</i>	<i>% of the land</i>	<i>Cranford biodiversity offset area</i>
<b>Subgrade 3a</b>	2.9	2	-
<b>Subgrade 3b</b>	176.5	93	15.8
<b>Non agricultural</b>	10.8	6	-
<b>Total</b>	205.9	100	15.8

## 4.0 Soils and habitat creation

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- 4.1 The topsoils within the site are mainly of neutral pH with moderately high organic matter content and low nutrient concentrations.
- 4.2 The sample areas are shown on Map 1a and full laboratory certificates are appended to this report.

**Table 4.1: Topsoil nutrient status**

Field ID*	pH	Loss on ignition %	P	K	Mg
			MAFF indices		
A	7.5	9.8	1	2-	2
B	7.0	9.3	1	2-	2
C	7.4	9.8	1	2-	2
D	7.3	10.7	0	2-	2

\*See Map 1a

- 4.3 The current sward comprises mainly grass/clover with a limited diversity of wildflowers, consistent with moderately intensively grazed pasture. However, the soil nutrient status of the site is low and the potential for creation of species-rich neutral meadow habitat is relatively high in the short term (provided fertiliser or heavy grazing with supplementary feeding is not initiated).
- 4.4 Introduction of a meadow management regime with hay cutting in late summer and low intensity post-cut stock summer grazing is likely to result in effective biodiversity gains. Overseeding with an appropriate seed mix and/or introduction of green hay would help increase plant species biodiversity in the short term.

**APPENDIX**  
**DETAILS OF OBSERVATIONS**  
**MAPS**  
**SELECTED DROUGHTINESS CALCULATIONS**  
**LABORATORY ANALYSIS**

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Land east of Kettering: Soils and ALC survey – Details of observations at each sampling point

Obs	Topsoil			Upper subsoil			Lower subsoil			Slope	Wetness	Agricultural quality	
No	Depth (cm)	Texture	Stones >20 mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling	(°)	Class	Grade	Main limitation
1	0-31	C	<5	31-50	C	xxx	50+	Wet (stopped)		0	III	3b	W
2	0-30	C	<5	30-49	C	xxx	49-90+	Cchky	xxx	1	III	3b	W
3	0-31	C	<5	31-50	C	xxx	50+	Stopped on stones		0	III	3b	W
4	0-31	C	<5	31-65	Cchky	xxx	65+	Stopped on stones		0	III	3b	W
5	0-35	C	<5	35-100+	C	xxx				0	III	3b	W
6	0-30	C	<5	30-90+	C	xxx				0	III	3b	W
7	0-31	C	<5	31-70+	C	xxx				1	III	3b	W
8	0-30	C	<5	30-50	C	xxx	50+	Stopped		0	III	3b	W
9	0-30	C	<5	30-61	C	xxx	61+	Stopped on stones		1	III	3b	W
10	0-30	C	<5	30-49	C	xxx	49-100+	Cchky	xxx	0	III	3b	W
11	0-32	C	<5	32-78	C	xxx	78-100+	C(gr)	xxx	2	III	3b	W
12	0-32	C	<5	32-100+	C	xxx				1	III	3b	W
13	0-30	C	<5	30-53	C	xxx	53-100+	Cchky	xxx	0	III	3b	W
14	0-30	Cvslica	<5	30-65+	C	xxx				1	III	3b	W
15	Not recorded												
16	Hedgerow (non-agricultural)												
17	0-30	C	<5	30-90+	C	xxx				0	III	3b	W
18	0-33	C	<5	33-50	C	xxx	50+	Stopped		0	III	3b	W
19	0-30	C	<5	30-50	C	xxx	50+	Stopped		0	III	3b	W
20	0-31	HCL	<5	31-72	HCL/C	xxx	72-90+	Cchky	xxx	2	III	3b	W
21	0-32	HCL	<5	32-57	HCL	x	57-90+	Cchky	xxx	2	II	3a	W
22	0-31	C	<5	31-65+	C	xxx				0	III	3b	W
23	0-34	C	<5	34-58	C	xxx	58-90+	Cchky	xxx	1	III	3b	W
24	0-33	C	<5	33-66	C	xxx	66-100+	Cchky	xxx	1	III	3b	W
25	0-32	C	<5	32-54	C	xxx	54-100+	Cchky	xxx	1	III	3b	W
26	Concrete pad (non-agricultural)												
27	0-28	C	<5	33-44	C	xxx	44-50 50+	Cchky Stopped	xxx	0	III	3b	W
28	0-31	C	<5	31-50	C	xxx	50+	Stopped		0	III	3b	W
29	0-31	C	<5	31-65	C	xxx	65+	Stopped on stones		0	III	3b	W
30	0-33	C	<5	28-50+	C	xxx	50+	Stopped		0	III	3b	W
31	0-32	C	<5	32-68	C	xxx	68-90+	Cchky	xxx	3	III	3b	W
32	0-32	C	<5	32-43	C	o	43-90+	C(fm)	xxx	2	II	3a	W

Obs	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	Agricultural quality	
	No	Depth (cm)	Texture	Stones >20 mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture			Mottling	Grade
33	0-30	C	<5	<u>30-70+</u>	Cca	xxx				2	III	3b	W
34	0-34	C	<5	34-39	C	o	<u>39-90+</u>	Cchky	xxx	2	III	3b	W
35	0-31	C	<5	<u>31-90+</u>	Cchky	xxx				3	III	3b	W
36	0-32	C	<5	32-57	C	xxx	<u>57-90+</u>	Cchky	xxx	2	III	3b	W
37	0-32	C	<5	32-45	C	xxx	<u>47-80+</u>	Cchky	xxx	1	III	3b	W
38	0-34	C	<5	<u>34-42</u>	C	xxx	<u>42-90+</u>	Cchky	xxx	1	III	3b	W
39	0-27	C	<5	<u>27-62</u>	C	xxx	<u>62-90+</u>	Cchky	xxx	1	III	3b	W
40	Garden (non-agricultural)												
41	0-28	C	<5	<u>28-80+</u>	Cchky	xxx				1	III	3b	W
42	0-30	C	<5	<u>30-44</u>	C	xxx	<u>44-66</u> <u>66+</u>	Cchky Stopped on stones	xxx	2	III	3b	W
43	0-28	C	<5	<u>28-42</u>	C	xxx	<u>42-90+</u>	Cchky	xxx	1	III	3b	W
44	0-29	C	<5	<u>29-43</u>	C	xxx	<u>43-90+</u>	Cchky	xxx	3	III	3b	W
45	0-31	C	<5	<u>31-51</u>	C	xxx	<u>51-90+</u>	Cchky	xxx	2	III	3b	W
46	0-35	C	<5	<u>35-62</u>	C	xxx	<u>62-90+</u>	Cchky	xxx	2	III	3b	W
47	0-35	C	<5	<u>35-49</u>	C	xxx	<u>49-80+</u>	Cchky	xxx	2	III	3b	W
48	0-31	C	<5	<u>31-90+</u>	Cchky	xxx				1	III	3b	W
49	0-32	C	<5	<u>32-57</u>	C	xxx	<u>57-90+</u>	Cchky	xxx	1	III	3b	W
50	0-35	HCL	<5	<u>35-55</u>	C	xxx	<u>55-90+</u>	Cchky	xxx	1	III	3b	W
51	0-31	C	<5	31-47	C	o	<u>47-90+</u>	Cchky	xxx	1	II	3a	W
52	0-23	C	<5	<u>23-64</u>	C	xxx	<u>64-90+</u>	Cchky	xxx	1	III	3b	W
53	0-21	C	<5	21-56	C	x	<u>56-90+</u>	C	xxx	1	II	3a	W
54	0-32	C	<5	<u>32-73</u>	C	xxx	<u>73-90+</u>	Cchky	xxx	1	III	3b	W
55	0-25	HCL/C	<5	<u>25-36</u>	C	xxx	<u>36-90+</u>	Cchky	xxx	1	III	3b	W
56	0-26	C	<5	<u>26-52</u>	C	xxx	<u>52-90+</u>	Cchky	xxx	0	III	3b	W
57	0-33	C	<5	33-40	C	x	<u>40-53</u> <u>53-90+</u>	C Cchky	xxx xxx	1	II/III	3a/3b	W
58	0-33	C	<5	<u>33-45</u>	C	xxx	<u>45-90+</u>	Cca	xxx	0	III	3b	W
59	0-33	Cca	<5	33-55	C(dist)	-	<u>55-64</u> <u>64-90+</u>	C Cchky	xxx xxx	2	II?	-	-
60	0-40	C	<5	<u>40-90+</u>	C	xxx				1	III	3b	W
61	0-26	C	<5	<u>26-38</u>	C	xxx	<u>38-90+</u>	Cchky	xxx	1	III	3b	W
62	0-28	C	<5	28-45	C	o	<u>45-90+</u>	Cchky	xxx	1	II	3a	W
63	0-37	C	<5	<u>37-55</u>	C	xxx	<u>55-90+</u>	Cchky	xxx	1	III	3b	W
64	Non agricultural - road												
65	0-31	C	<5	<u>31-40</u>	C	xxx	40+	Stopped on stones		1	III	3b	W

Obs	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	Agricultural quality	
	No	Depth (cm)	Texture	Stones >20 mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture			Mottling	Grade
66	0-34	C	<5	<u>34</u> -40	C	xxx	<u>40</u> -100+	Cchky	xxx	1	III	3b	W
67	0-33	HCL	<5	<u>33</u> -41	HCL	xx(x)	<u>41</u> -100+	Cchky	xxx	2	III	3b	W
68	0-33	Cslca	<5	<u>33</u> -100+	Cvslca	xxx				0	III	3b/(3a)	W
69	0-33	HCL/C	<5	<u>33</u> -90+	C	xxx				0	III	3b	W
70	0-32	C	<5	<u>32</u> -38	C	xx	<u>38</u> -100+	C	xxx	1	III	3b	W
71	0-31	HCL	<5	<u>31</u> -80+	C	xxx				2	III	3b	W
72	0-32	HCLslca	<5	<u>32</u> -100+	C	xxx				2	III	3b	W
73	0-32	C	<5	<u>32</u> -100+	C	xxx				2	III	3b	W
74	0-34	C	<5	<u>34</u> -70+	C	xxx				2	III	3b	W
75	0-33	C	<5	<u>33</u> -120	C	xxx				2	III	3b	W
76	0-30	C	<5	<u>30</u> -80+	C	xxx				2	III	3b	W
77	0-31	HCL	<5	<u>31</u> -80+	C	xxx				3	III	3b	W
78	0-30	Cvslca	<5	<u>30</u> -90+	Cca	xxx				3	III	3b	W
79	0-33	HCL	<5	<u>33</u> -39	HCL	xx(x)	<u>39</u> -100+	C	xxx	2	III	3b	W
80	0-30	C	<5	<u>30</u> -68	C	xxx	68+	Stopped on stones		2	III	3b	W
81	0-31	C	<5	<u>31</u> -100+	C	xxx				2	III	3b	W
82	0-33	C	<5	<u>33</u> -90+	C	xxx				2	III	3b	W
83	0-30	C	<5	<u>30</u> -48	C	xxx	<u>48</u> -100+	Cchky	xxx	3	III	3b	W
84	0-31	C	<5	<u>31</u> -90+	C	xxx				2	III	3b	W
85	0-31	C	<5	<u>31</u> -100+	Cca	xxx				2	III	3b	W
86	0-30	C	<5	<u>30</u> -90+	Cchky	xxx				2	III	3b	W
87	0-32	C	<5	<u>32</u> -40	C	xxx	40+	Stopped on stones		1	III	3b	W
88	0-32	C	<5	<u>32</u> -50	C	xxx	<u>50</u> -100+	Cchky	xxx	1	III	3b	W
89	0-32	HCLca	<5	<u>32</u> -90+	C	xx(x)				1	II/III	3a/3b	W
90	0-31	C	<5	<u>31</u> -54	C	xxx	<u>54</u> -100+	Cchky	xxx	0	III	3b	W
91	Track (non-agricultural)												
92	Track (non-agricultural)												
93	0-30	C	<5	<u>30</u> -46	C	xxx	<u>46</u> -90+	Cchky	xxx	0	III	3b	W
94	0-32	C	<5	<u>32</u> -56	C	xxx	<u>56</u> -100+	Cchky	xxx	0	III	3b	W
95	0-30	C	<5	30-40	C	x	<u>40</u> -100+	Cchky	xxx	0	II/III	3a/3b	W
96	0-31	C	<5	<u>31</u> -65	Cchky	xxx				0	III	3b	W
97	0-33	C	<5	<u>33</u> -59	C	xxx	<u>59</u> -100+	Cchky	xxx	0	III	3b	W
98	0-34	C	<5	<u>34</u> -60	C	xxx	<u>60</u> -100+	Cchky	xxx	0	III	3b	W
99	0-33	C	<5	<u>33</u> -54	C	xxx	<u>54</u> -90+	Cchky	xxx	0	III	3b	W
100	0-29	C	<5	<u>29</u> -45	C	xxx	<u>45</u> -90+	Cchky	xxx	0	III	3b	W

Obs	Topsoil			Upper subsoil			Lower subsoil			Slope	Wetness	Agricultural quality	
	No	Depth (cm)	Texture	Stones >20 mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling	(°)	Class	Grade
101	0-30	C	<5	<u>30</u> -50	C	xxx	<u>50</u> -90+	Cchky	xxx	0	III	3b	W
102	0-31	C	<5	<u>31</u> -75+	Cchky	xxx				0	III	3b	W
103	0-33	Cslca	<5	<u>33</u> -90+	Cchky	xxx				1	III	(3a)	W
104	0-34	C	<5	<u>34</u> -52	C	xxx	<u>52</u> -70+	Cchky	xxx	0	III	3b	W
105	0-33	C	<5	<u>33</u> -46	C	xxx				0	III	3b	W
106	0-33	C	<5	<u>33</u> -90+	C	xxx				0	III	3b	W
107	0-35	C	<5	<u>35</u> -100+	Cchky	xxx				0	III	3b	W
108	Wind turbine (non-agricultural)												
109	0-27	C	<5	27-35	C	o	<u>35</u> -50 <u>50</u> -100+	C Cchky	xxx	0	III	3b	W
110	0-22	C	<5	22-43	C	xxx	<u>43</u> -72 72+	Cchky Stopped on stones	xxx	1	III	3b	W
111	0-32	C	<5	<u>32</u> -63	C	xxx	<u>63</u> -90+	Cchky	xxx	0	III	3b	W
112	0-27	C	<5	<u>27</u> -50	C	xxx	<u>50</u> -90+	Cchky	xxx	0	III	3b	W
113	0-34	C	<5	34-42	C(dist)	xxx	<u>42</u> -52 <u>52</u> -90+	C Cchky	xxx xxx	0	III	3b	W
114	Solar panels (non agricultural)												
115	0-32	C	<5	<u>32</u> -90+	Cchky	xxx				1	III	3b	W
116	0-27	C/HCL	<5	<u>27</u> -61	xxxC	xxx	<u>61</u> -90+	Cchky	xxx	1	III	3b	W
117	0-30	C	<5	<u>30</u> -44	C	xxx	<u>44</u> -90+	Cchky	xxx	1	III	3b	W
118	0-30	C	<5	<u>30</u> -47	C(fmn)	xxx	<u>47</u> -90+	Cchky	xxx	1	III	3b	W
119	0-31	C	<5	31-58	C(dist?)	o	<u>58</u> -90+	Cchky	xxx	1	II?	3a	W
120	0-33	C	<5	33-55	C	xxx	<u>55</u> -90+	Cchky	xxx	2	III	3b	W
121	0-25	C	<5	25-35	C	xxx	<u>35</u> -90+	Cchky	xxx	2	III	3b	W
122	0-30	C	<5	<u>30</u> -50	C	xxx	<u>50</u> -70 70+	Cchky Stopped on stones	xxx	2	III	3b	W
123	0-33	C	<5	<u>33</u> -65	C	xxx	<u>65</u> -90+	Cchky	xxx	1	III	3b	W
124	0-34	C	<5	<u>34</u> -90+	C	xxx				1	III	3b	W
125	0-35	HCL	<5	35-64	HCL	xxx	<u>64</u> -90+	Cca	xxx	2	III	3b	W
126	0-32	C	<5	32+	Stopped on stones					1	-	-	-
127	0-31	C	<5	<u>31</u> -56	C	xxx	<u>56</u> -90+	Cchky	xxx	2	III	3b	W
128	0-32	C	<5	32-44	C	xx(x)	<u>44</u> -90+	Cchky	xxx	1	III/II	3b/3a	W
129	0-28	C	<5	28-45	C	o	<u>45</u> -62 <u>62</u> -90+	C Cchky	xxx xxx	0	II	3a	W
130	0-35	C	<5	35-50	C	o	<u>50</u> -62 <u>62</u> -90+	C Cchky	xxx xxx	0	II	3a	W
131	0-36	C	<5	<u>36</u> -60	C	xxx	<u>60</u> -90+	Cchky	xxx	1	III	3b	W

Obs	Topsoil			Upper subsoil			Lower subsoil			Slope	Wetness	Agricultural quality	
No	Depth (cm)	Texture	Stones >20 mm (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling	(°)	Class	Grade	Main limitation
132	0-25	C	<5	<u>25</u> -52	C	xxx	<u>52</u> -90+	Cchky	xxx	1	III	3b	W
133	0-32	C	<5	<u>32</u> -62	C	xxx	<u>62</u> -90+	Cchky	xxx	0	III	3b	W
134	0-33	C	<5	<u>33</u> -74	C	xxx	74+	Stopped on stones		0	III	3b	W
135	0-28	C	<5	<u>28</u> -90+	C	xxx				0	III	3b	W
136	0-31	HCL/C	<5	31-42	C/HCL	xxx	<u>42</u> -90+	Cchky	xxx	3	III	3b	W
137	0-36	C	<5	36-55	C	xxx	<u>55</u> -90+	C	xxx	2	III	3b	W
138	0-33	C	<5	33-58	C	o	<u>58</u> -90+	C	xxx	3	II	3a	W
139	0-35	C	<5	<u>35</u> -90+	C	xxx				3	III	3b	W
140	0-37	C	<5	<u>37</u> -53	C	xx(x)	<u>53</u> -90+	Cchky	xxx	2	II/III	3a/3b	W
141	0-33	C	<5	<u>33</u> -67	C	xxx	<u>67</u> -90+	Cchky	xxx	1	III	3b	W
142	0-34	C	<5	<u>34</u> -51	C	xxx	<u>51</u> -90+	Cchky	xxx	1	III	3b	W
143	0-28	C	<5	<u>28</u> -82	C	xxx	<u>82</u> -90+	Cchky	xxx	2	III	3b	W
144	0-28	C	<5	<u>28</u> -58	C	xx(x)	<u>58</u> -90+	SCL	xxx	1	II	3a	W
145	0-25	C	<5	35-45	C	x	<u>45</u> -90+	C	xxx	1	III	3b	W
146	0-40	HCL	<5	<u>40</u> -60+	mstC	xxx	60+	Stopped on stones		2	III	3b	W
147	0-35	C	<5	35-45	C	x	<u>45</u> -90+	C	xxx	1	II	3a	W
148	0-28	C	<5	<u>28</u> -75	C	xxx	<u>75</u> -90+	Cchky	xxx	1	III	3b	W
149	0-28	C	<5	<u>28</u> -52	C	xxx	<u>52</u> -90+	Cchky	xxx	3	III	3b	W
150	0-33	C	<5	<u>33</u> -90+	Cchky	xxx				3	III	3b	W
151	0-23	C	<5	23-53	C	o	<u>53</u> -90+	Cchky	xxx	2	II	3a	W
152	0-42	C	<5	<u>42</u> -90+	Cchky	xxx				1	III	3b	W
153	0-31	C	<5	<u>31</u> -41	C	xxx	<u>41</u> -90+	Cchky	xxx	0	III	3b	W
154	0-27	C	<5	27-45	C	x	<u>45</u> -80+	Cchky	xxx	1	II	3a	W
155	0-30	C	<5	30-56	C	xxx	<u>56</u> -90+	Cchky	xxx	3	III	3b	W
156	0-29	HCL/C	<5	29-40	HCL/C	xxx	<u>40</u> -67 <u>67</u> -90+	C Cchky	xxx xxx	2	III	3b	W
157	0-50+	C(dist)	<5							0	-	-	-
158	0-25	HCL	<5	<u>25</u> -47	C	xxx	<u>47</u> -90+	Cchky	xxx	1	III	3b	W
159	0-28	HCL/C	<5	<u>28</u> -48	C	xxx	<u>48</u> -90+	Cchky	xxx	1	III	3b	W
160	0-23	C	<5	<u>23</u> -55	C	xxx	<u>55</u> -90+	Cchky	xxx	3	III	3b	W
161	0-25	C/HCL	<5	<u>25</u> -40	C	xxx	<u>40</u> -58 58+	Cchky Stopped on stones	xxx	2	III	3b	W
162	0-28	C	<5	<u>28</u> -52	C	xxx	<u>52</u> -90+	Cchky	xxx	1	III	3b	W
163	0-25	C	<5	25-55	C	o	<u>55</u> -90+	Cchky	xxx	1	II	3a	W
164	0-28	C	<5	<u>28</u> -90+	Cca	xxx				2	III	3b	W





## Soil log key

### **Gley indicators<sup>1</sup>**

o	unmottled
x	1-2% ochreous mottles and brownish matrix (or a few to common root mottles (topsoils)) <sup>3</sup>
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 reddish mottles (gleyed horizon)

### **Slowly permeable layers<sup>4</sup>**

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

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

<sup>2</sup>Texture in accordance with particle size classes in Hodgson (1997)

<sup>3</sup> Occasionally recorded in the texture box

<sup>4</sup>Permeability 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)

<sup>5</sup>Soil Wetness Classes are defined in Hodgson (1997)

<sup>7</sup>calcareous classes as defined in Hodgson (1997)

Grades shown as intergrade e.g. **3a**/3b are close to the grade boundary. The estimate of which side of the boundary the grading falls is the shown first (in bold here)  
grades in brackets eg. (3a) raised by one grade due to calcareous topsoil

### **Texture<sup>2</sup>**

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 Class<sup>5</sup>**

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

### **Limitations:**

W - wetness/workability
D - droughtiness
De - depth
F - flooding
St – stoniness
G - gradient
T – topography/microrelief
C - Climate

### **Suffixes & prefixes:**

o - organic

(vsl, sl, m, v, x)**st** – (very slightly, slightly,  
moderately, very, extremely) **stony**<sup>6</sup>

(vsl, sl, m, v, x)**ca**  
(very slightly, slightly,  
moderately, very, extremely) **calcareous**<sup>7</sup>

### **Other abbreviations**

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

## Soil pit descriptions

### Pit 25 (see Map 1)

0-32 cm	Dark greyish brown (10YR 4/2) clay; slightly stony (mixed small sub-angular and sub-rounded hard stones); moderately developed coarse sub-angular blocky structure; friable; non-calcareous; clear smooth boundary to:
32-54 cm	Light brownish grey (10YR 6/2) clay with 20% distinct brownish yellow (10YR 6/8) mottles; 5% soft chalk stones and 5% hard flints; weakly developed very coarse prismatic blocky structure; very firm; <0.5% macropores; calcareous; wavy diffuse boundary to:
54-100 cm+	Grey (Gley 1 6/1) clay with 20% distinct brownish yellow (10YR 6/8) mottles; abundant soft chalk stones; weakly developed very coarse prismatic blocky structure; very firm; <0.5% macropores; calcareous.

### Pit 75 (see Map 1)

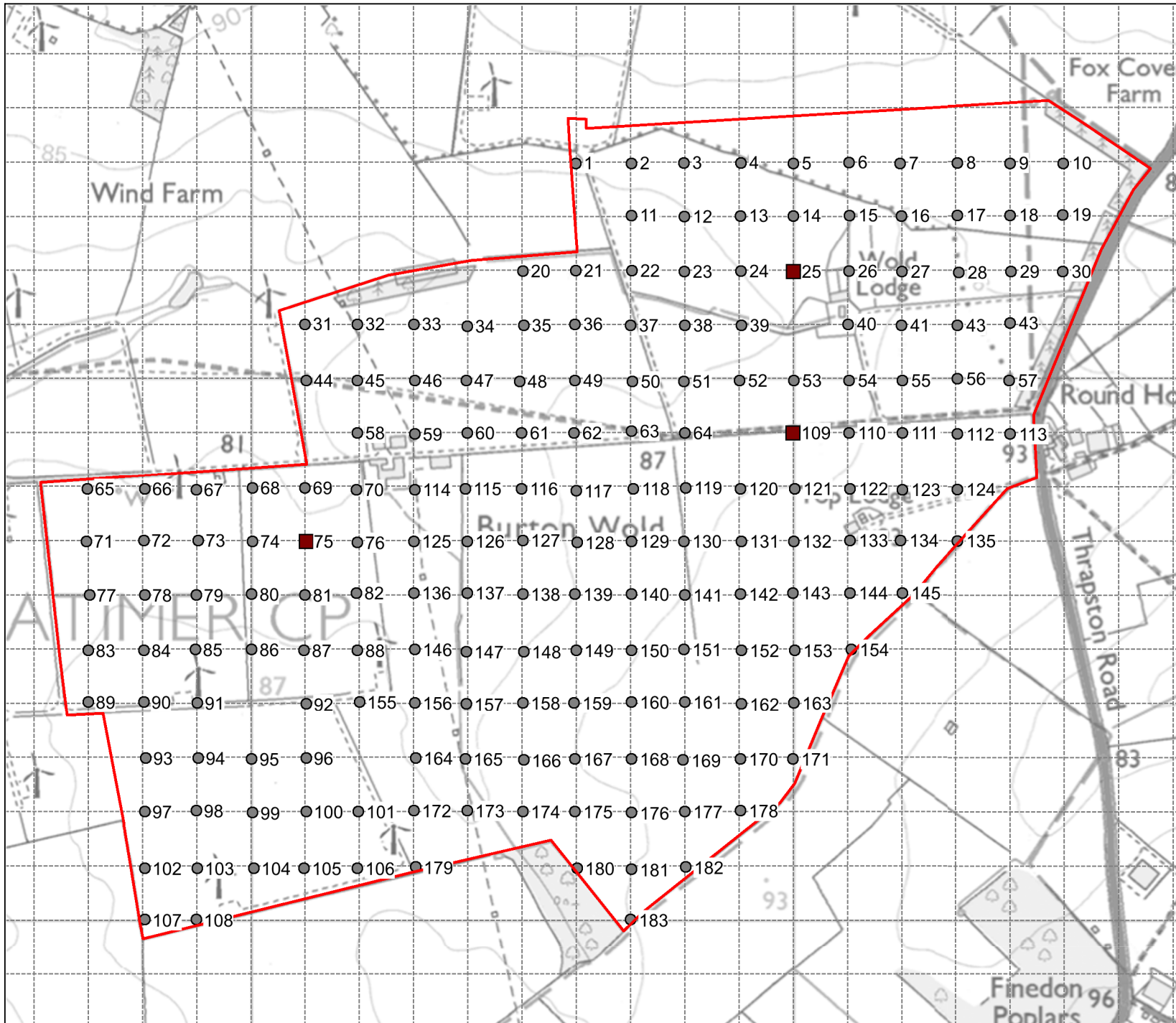
0-33 cm	Dark greyish brown (10YR 5/2) clay; 5% mixed sub-angular flints; moderately developed medium and coarse sub-angular blocky structure; friable; non-calcareous; clear smooth boundary to:
33-61 cm	Brown (10YR 5/3) clay with 2% distinct reddish yellow (7.5YR 6/8) mottles and few fine black ferri-manganiferous concentrations; very slightly stony (small hard flints); weakly developed coarse angular blocky structure; firm; <0.5% macropores; non-calcareous; smooth diffuse boundary to:
61-120 cm	Grey (Gley 1 6/1) clay with large distinct brownish yellow (10YR 6/8) mottles; weakly developed very coarse angular blocky structure to structureless (massive); very firm; <0.5% macropores; non-calcareous.

### Pit 109 (see Map 1)

0-27 cm	Dark greyish brown (10YR 4/2) clay; 1-2% mixed small hard pebbles and flints; weakly developed coarse sub-angular blocky structure; firm; non-calcareous; plough pan at 20 cm (waterlogged above); gradual smooth boundary to:
27-35 cm	Light yellowish brown (10YR 6/4) clay; very slightly stony; weakly developed very coarse sub-angular blocky structure; firm; <0.5% macropores; non-calcareous; gradual wavy boundary to:
35-50 cm	Greyish brown (10YR 5/2) clay with 15% distinct fine yellowish brown (10YR 5/8) mottles; very slightly stony; weakly developed very coarse angular blocky structure; very firm; <0.5% macropores; non-calcareous; smooth gradual boundary to:
50-100 cm+	Greyish brown (10YR 5/2) clay with 15% distinct fine yellowish brown (10YR 5/8) and 10% grey (10YR 5/1) mottles; 10% small soft chalk fragments; weakly developed very coarse prismatic structure to structureless (massive); very firm; <0.5% macropores; calcareous.

### Pit 193 (see Map 1)

0-25 cm	Brown (10YR 4/2) heavy clay loam; 5% mixed small stones; moderately developed coarse sub-angular blocky structure; friable; non-calcareous; common fine fibrous roots; gradual smooth boundary to:
25-54 cm	Grey (7.5YR 4/1) compacted clay overburden; 10% weathering sandstone, flints and mixed pebbles; structureless (massive); very firm; no roots or pores;
54 cm+	Impenetrable with hand tools.



KEY

- Auger observations
- Pits
- Site boundary

Site:

Kettering East

Map title:

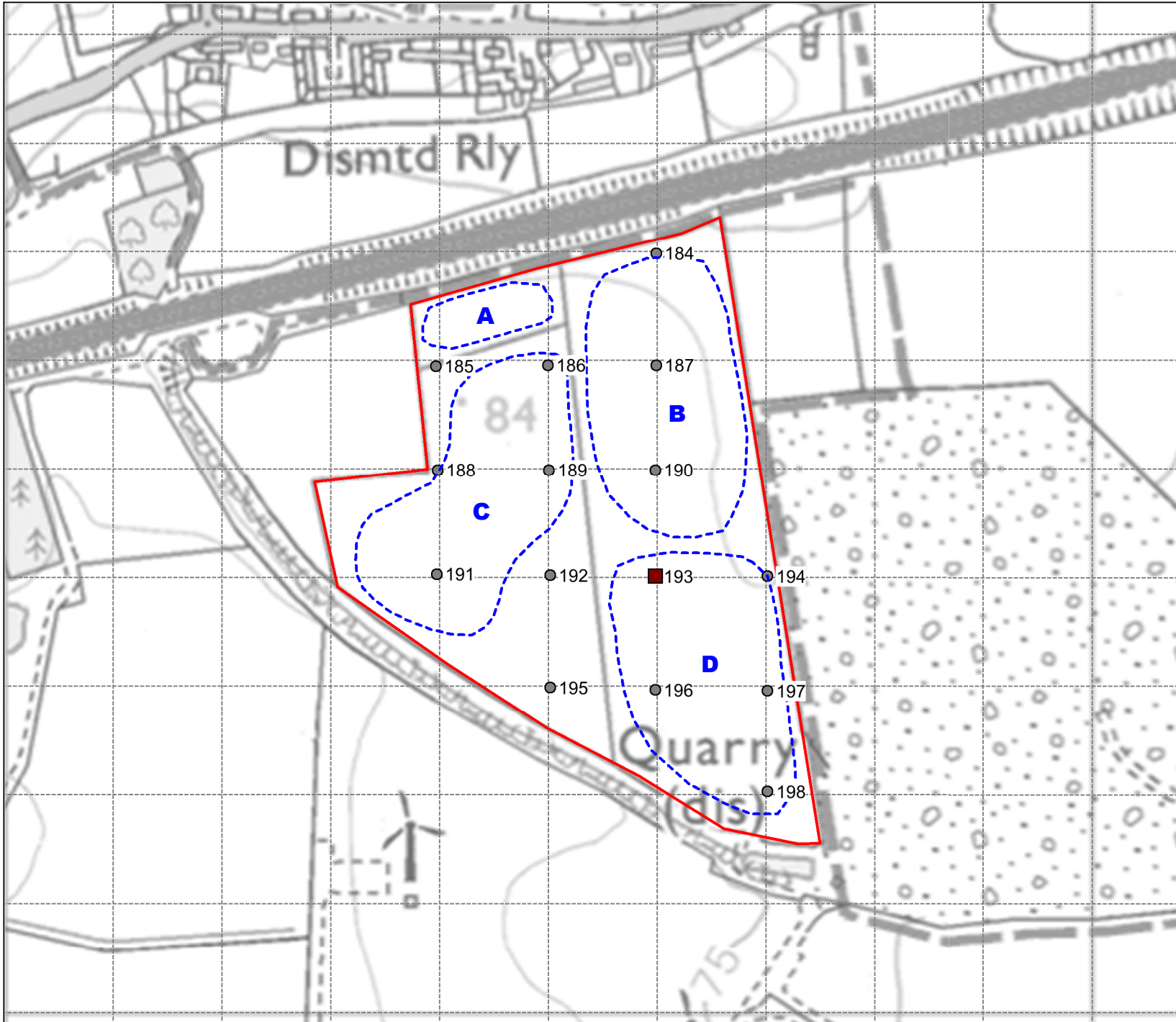
MAP 1  
Observations

**Land  
Research**  
ASSOCIATES

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

Date: 05/11/2023

Scale: 1:10,000



KEY

- Auger observations
- Pits
- Topsoil lab samples
- Site boundary

Site:

Kettering East

Map title:

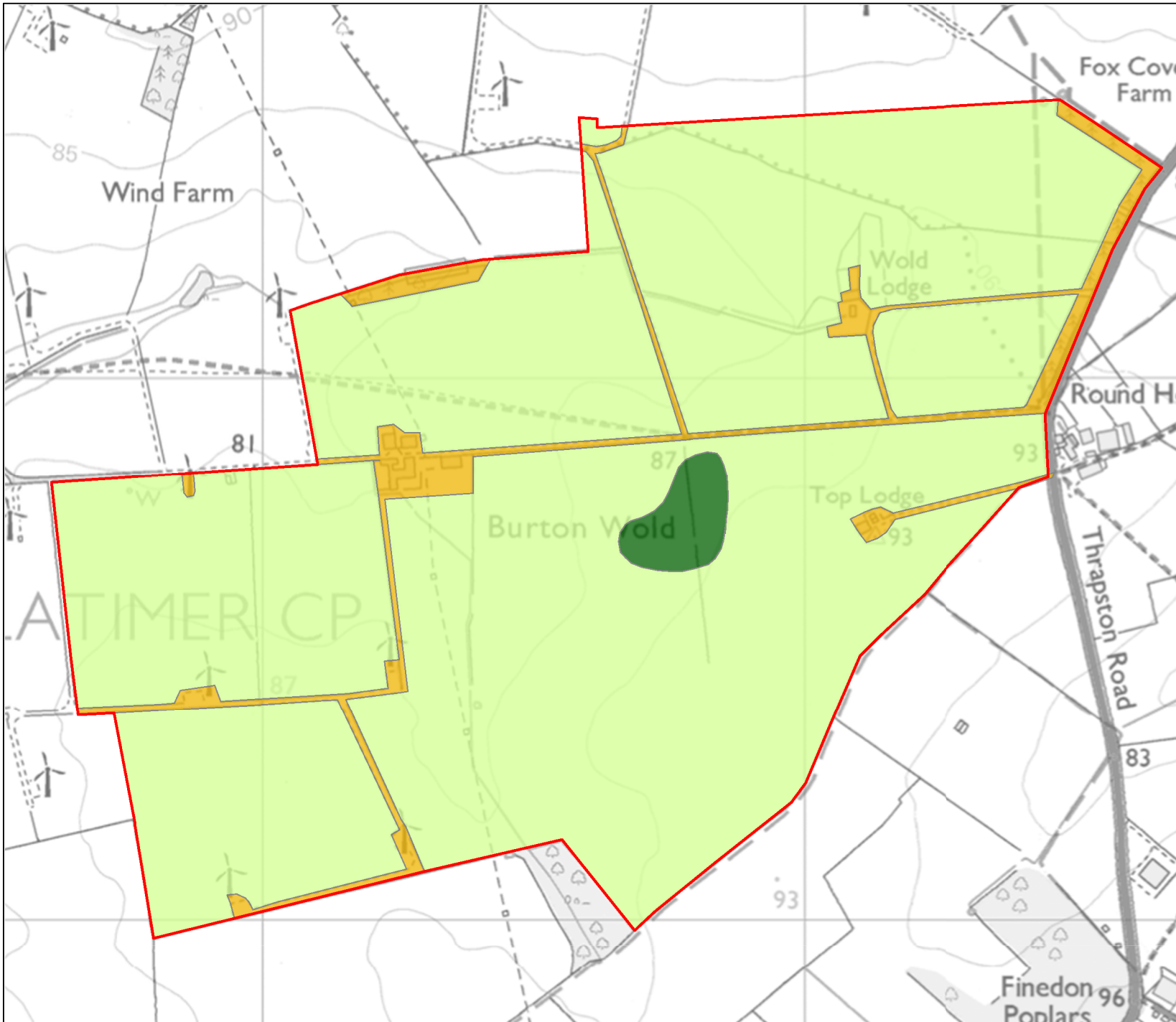
MAP 1A  
Observations

**Land**  
**Research**  
**ASSOCIATES**

Tapton Innovation Centre  
Brimington Road  
Lockington  
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www.lra.co.uk

Date:05/11/2023

Scale: 1:5,000



KEY

- Subgrade 3a
- Subgrade 3b
- Other land
- Site boundary

Site:

Kettering East

Map title:

MAP 2  
Agricultural Land  
Classification

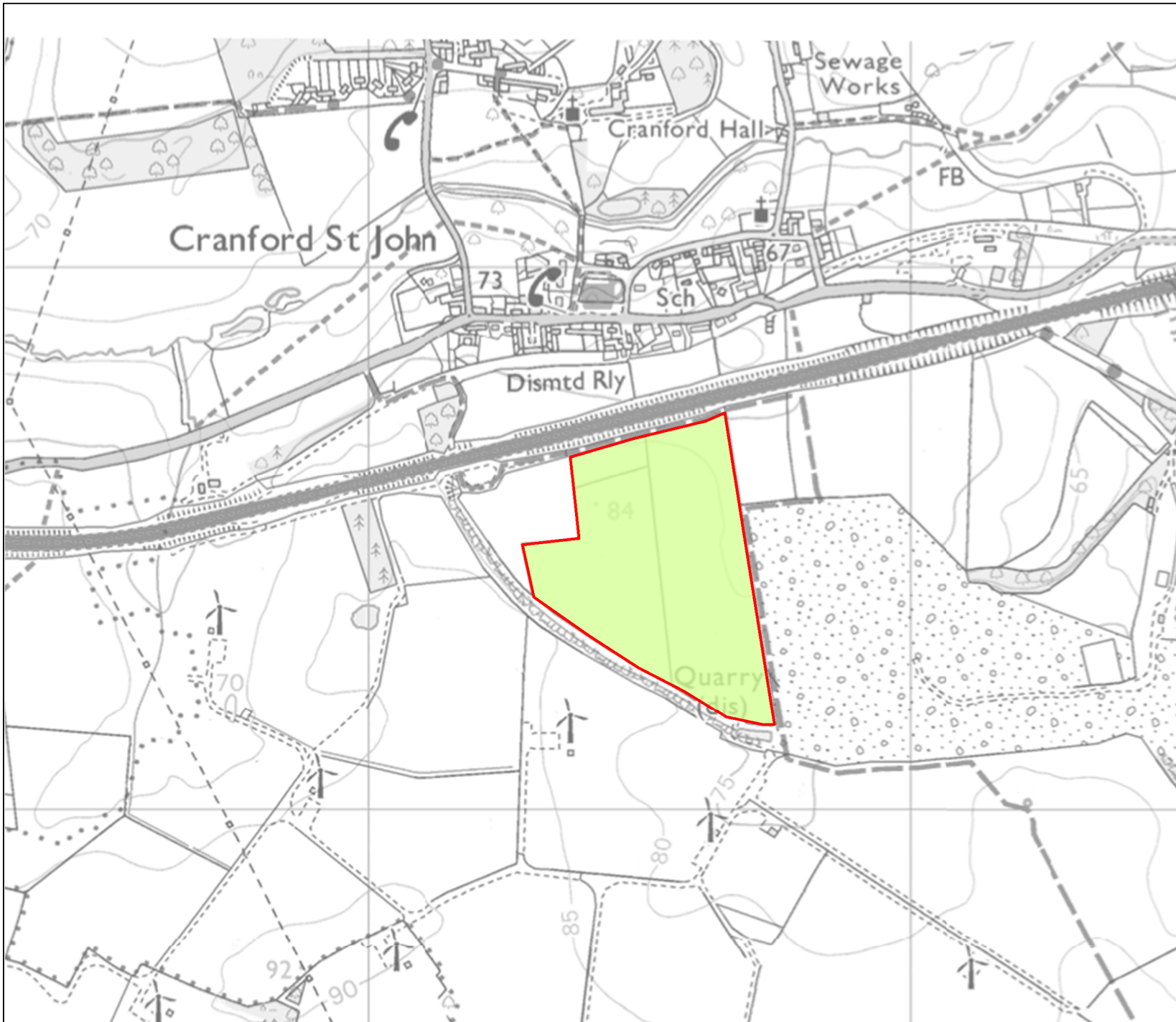
**Land**  
*Research*  
ASSOCIATES

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

Date: 05/11/2023

Scale: 1:10,000





KEY

- Subgrade 3a
- Subgrade 3b
- Other land
- Site boundary

Site:

Kettering East

Map title:

MAP 2a  
Agricultural Land  
Classification

**Land**  
**Research**  
ASSOCIATES

Lockington Hall  
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Date: 05/11/2023

Scale: 1:5,000

**SITE:** Kettering East  
**Location:** 193

Layer	Lower depth (cm)	Texture symbol (or stop)	Structure (Good, Moderate or Poor)	% stones	Stone type (see table)
Topsoil	25	CL		5	1
Subsoil 1	54	C	p	5	1
Subsoil 2	120	STOP	m	0	1
Subsoil 3	120	STOP	p	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	13	1
Subsoil 1 EAv	7	0.5
Subsoil 2 TAv	0.1	1
Subsoil 2 EAv	0.1	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	428.8	428.8
Subsoil 1	0.0	0.0
Subsoil 1	359.6	336.7
Subsoil 2	1.6	0.0
Subsoil 2	0.0	6.6
Subsoil 3	0.0	0.0

<b>TOTAL AP (mm)</b>	79	77
<b>MD (mm)</b>	103	111
<b>AP-MD (mm)</b>	-24	-34

**AGRICULTURAL LAND GRADE**

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



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**H579**

Please quote the above code for all enquiries

Client : CRANFORD

Sample Matrix : Agricultural Soil

Laboratory Reference

Card Number 74370/23

Date Received 24-Oct-23

Date Reported 30-Oct-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
391238/23	1	<b>A</b> <i>No cropping details given</i>		7.5	1	2-	2	13.2	148	60
391239/23	2	<b>B</b> <i>No cropping details given</i>		7.0	1	2-	2	11.0	128	86
391240/23	3	<b>C</b> <i>No cropping details given</i>		7.4	1	2-	2	11.0	141	68
391241/23	4	<b>D</b> <i>No cropping details given</i>		7.3	0	2-	2	5.0	129	56

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 Sandy Cameron

On behalf of NRM

Date 30/10/23

DATE **30th October 2023**

SAMPLES FROM **CRANFORD**

Report Reference: **74370/23**

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Lab Ref.	Field Details		Soil Organic Matter [LOI%] Result
	No.	Field Name or Reference	
391238	1	A	9.8
391239	2	B	9.3
391240	3	C	9.8
391241	4	D	10.7

## 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