



CLEVE HILL SOLAR PARK

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SOILS AND AGRICULTURAL USE AND QUALITY REPORT

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**SOILS AND
AGRICULTURAL USE & QUALITY
OF LAND AT CLEVE HILL FARM
FAVERSHAM, KENT**

Report 1294/1

22nd March, 2017

**Land
Research
ASSOCIATES**

**SOILS AND AGRICULTURAL USE & QUALITY
OF LAND AT CLEVE HILL FARM, FAVERSHAM, KENT**

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Report 1294/1
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SUMMARY

This report provides information on the soils and agricultural land quality of 381.8 ha of land at Cleve Hill Farm near Faversham, Kent. The land comprises a number of very large fields separated by drainage ditches and under arable cropping at the time of survey.

The survey found the site to be dominated by heavy clay soils with impeded subsoil drainage, with soil wetness limiting agricultural quality to subgrade 3b.

1.0 Introduction

- 1.1 This report provides information on the soils and agricultural quality of land at Cleve Hill Farm near Faversham, Kent. The land has been proposed as the site of a solar farm. The report is based on a survey of the land in March 2017.

SITE ENVIRONMENT

- 1.2 The land investigated spans 381.8 ha of reclaimed marshland to the south of The Swale. The land is bordered to the north by a sea wall, to the west by Faversham Creek, to the south by horticultural land (poly-tunnels and orchards) and to the east by adjoining marshland. The land is mostly level at an approximate elevation of 3 m AOD. Land at Cleve Hill in the south-east rises moderately steeply to approximately 10 m AOD.

AGRICULTURAL USE

- 1.3 At the time of survey the land was under spring and winter cereal/oilseed rotations. The land is not registered under any agri-environment schemes.

PUBLISHED INFORMATION

- 1.4 1:50,000 scale BGS information records the solid geology of the site as London Clay Formation. This is mainly recorded to be overlain by clayey alluvium, with the exception of the higher ground at Cleve Hill (where drift cover is not recorded).
- 1.5 The National Soil Map (published at 1:250,000 scale) shows the land as Wallasea Association, comprising mainly clayey soils with slowly permeable subsoil, formed in coastal alluvium.
- 1.6 Provisional Agricultural Land Classification of the site shows the land as grade 3. No more detailed survey of the site has been published, although land adjoining to the west is recorded as grade 4, and land to the south-west as subgrade 3b, by surveys conducted by MAFF in the 1990s.

2.0 Soils

2.1 A detailed soil resource and agricultural quality survey was carried out in March 2017. It was based on observations at alternate intersects of a 100 m grid, giving a sampling density of one observation per two hectares. In areas of significant variability, additional observations were made at a density of one observation per hectare. During the survey, soils were examined by a combination of pits and augerings to a maximum depth of 1.2 m. A log of the sampling points and a map (Map 1) showing their location is in an appendix to this report.

SOILS

2.2 Soils at the site vary in texture, drainage and calcium carbonate content.

Slowly permeable clay soils

2.3 These soils dominate at the site. They typically comprise clay topsoils directly over dense slowly permeable clay subsoil, which shows evidence of seasonal waterlogging to shallow depth (grey mottled colours). In the north-west of the site, the soils are calcareous in both topsoil and subsoil (see Map 2). Elsewhere they are dominantly non-calcareous with occasional calcareous patches.

2.4 A typical profile is described below from observation 136 (Map 1).

0-18 cm	Dark greyish brown (10YR 4/2) clay; stoneless; weakly developed fine granular structure; very friable; non calcareous; smooth clear boundary to:
18-31 cm	Dark greyish brown (10YR 4/2) clay; stoneless; weak very coarse subangular blocky structure; very firm; non calcareous; smooth gradual boundary to:
31-49cm	Dark greyish brown (10YR 4/2) clay with dark grey (2.5Y 4/1) ped faces; stoneless; moderately developed very coarse prismatic structure; very firm; non calcareous; smooth gradual boundary to:
49-120+ cm	Bluish grey (Gley 2 5/1) clay with many prominent red (2.5YR 5/8) mottles; stoneless; weakly developed very coarse prismatic structure; very firm; non calcareous.

2.5 These soils are imperfectly draining (Soil Wetness Class III) with a low to moderate capacity to absorb excess winter rainfall.

Freely-draining soils

2.6 These soils are found in two small patches in the north and south-west of the site. They have coarser-textured, more permeable subsoil than the rest of the land. Topsoils vary in texture from clays to coarse loams.

2.7 An example profile with coarse loamy topsoil is described below from observation 186 (Map 1).

0-34 cm	Dark brown (7.5YR 3/2) medium sandy loam; stoneless; moderately developed medium and fine sub-angular blocky structure; friable; non-calcareous; smooth clear boundary to:
34-74 cm	Greyish brown (10YR 5/2) medium sandy loam with common distinct fine strong brown (7.5YR 5/8) mottles; stoneless; weakly developed medium sub-angular blocky structure; friable; non-calcareous; smooth gradual boundary to:
74-100+ cm	Pale brown (10YR 6/3) loamy medium sand with many distinct yellowish red (5YR 5/8) mottles; stoneless; single grain; loose; non-calcareous.

2.8 An example with clay topsoil is described below from a pit at observation 16 (Map 1).

0-34 cm	Dark greyish brown (10YR 4/2) clay; stoneless; weakly developed very coarse sub-angular blocky structure; very firm; calcareous; smooth clear boundary to:
74-120 cm	Dark greyish brown (10YR 4/2) medium sandy silt loam with many distinct strong brown (7.5YR 5/8) mottles; stoneless; weakly developed coarse to very coarse sub-angular blocky structure, becoming laminar (structureless) at depth; friable; very calcareous.

2.9 These soils are freely-draining (Soil Wetness Class I or II) if an effective drainage system is maintained, with a moderate to high capacity to absorb excess rainfall.

3.0 Agricultural land quality

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 Agricultural Land Classification (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 Classification¹. The relevant site data for an average elevation of 3 m is given below.

- Average annual rainfall: 593 mm
- January-June accumulated temperature >0°C 1493 day°
- Field capacity period 116 days
(when the soils are fully replete with water) early Dec-late Mar
- Summer moisture deficits for: wheat: 128 mm
potatoes: 127 mm

3.3 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 Agricultural Land Classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food². There are no climatic limitations at this locality.

SURVEY RESULTS

3.4 The agricultural quality of the land is determined primarily by wetness. Land of grade 2 and 3 quality has been identified.

Grade 2

3.5 This land occurs in a small area in the south-west (see Map 3) where coarse loamy over sandy soils occur (see paragraph 2.7). These soils are easy to work and freely-draining, but are slightly droughty for root crops under the local climate, which is likely to reduce yields in drier years.

¹Meteorological Office, (1989). *Climatological Data for Agricultural Land Classification*.

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

Subgrade 3a

3.6 This land occurs in two patches in the north and south-west, where freely-draining soils with heavy topsoils occur (see paragraph 2.8). The high clay content of the topsoil makes the soils difficult to work when wet and is likely to restrict land access in winter and early spring.

Subgrade 3b

3.7 This is the dominant land grade, found where slowly permeable clay soils occur (see paragraphs 2.3 to 2.5). The topsoils are difficult to work when wet, and the imperfect drainage of the subsoil means such wetness is likely to occur in winter and spring under the local climate. This mainly restricts arable cropping to autumn-sown crops.

3.8 The topsoils in the north-west were found to be calcareous, a property which is reported to improve soil structure and workability, particularly in spring. However, the very high clay content (see analysis in appendix) means the topsoils at this site remain difficult to work under wet conditions.

3.9 In small areas in the south-east around Cleve Hill, the land slopes at between 7 and 11 degrees. Such gradients restrict some field operations and lead to increased erosion risk. Gradient is therefore an equally limiting factor on this land.

Non Agricultural

3.10 This land includes tracks and drainage ditches.

Grade areas

3.11 The boundaries between the different grades of land are shown on Map 3 and the areas occupied by each are shown on the next page.

Table 1. Areas occupied by the different land grades

Grade/subgrade	Area (ha)	% of the agricultural land	% of the total land
Grade 2	1.9	0.5	0.5
Subgrade 3a	8.8	2.4	2.3
Subgrade 3b	359.9	97.1	94.2
Non Agricultural	11.2	-	3.0
Total	381.8	100	100

4.0 Soil resources and their use

4.1. As part of the Government's 'Safeguarding our Soils' Strategy, Defra published a code of practice on the sustainable use of soils on construction sites, which can be helpful in design of developments and setting planning conditions. An Environment Agency strategy Soil a Precious Resource: Our strategy for protecting, managing and restoring soil (Environment Agency, 2007) has complementary aims.

4.1 The proposed development will involve the installation of rows of interconnected photo-voltaic (PV) panels mounted on a steel supporting structure that is driven directly into the ground to a depth of 1 m, with no need for foundations. A typical installation also includes inverter cabinets, adjacent transformers and a switchgear cabinet to connect the solar park to the distribution network.

4.2 Apart from small areas occupied by these and access roadways, the only impacts on soils will be the insertion of support legs for the solar panels and possible surface compaction of soils during equipment installation.

Topsoil

4.3 Topsoil stripped from the route of access tracks or where transformers or substations are to be built should be spread thinly on adjacent land.

Subsoil

4.4 Subsoils are easily damaged by the trafficking of vehicles used for installation. If compacted during construction work they should be loosened in order to retain their ability to absorb direct rainfall and run-off from the panels.

Soil Handling

4.5 The Construction Code of Practice for Sustainable Use of Soils on Construction Sites (Defra 2009) provides guidance on good practice in soil handling.

APPENDIX MAPS AND DETAILS OF OBSERVATIONS

Land at Cleve Hill Farm: ALC and soil resources survey – Details of observations at each sampling point

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
1	0-45	HCL sl ca	<5	45-110+	LMS -> MSL ca	xx(x)				<1	I	3a	D
2	0-27	ZC	<5	27-40	ZC	xx	40-110+	ZC	xxxx	<1	II/III	3a/b	W
3	0-32	ZC	<5	32-110+	ZC	xxxx				<1	III	3b	W
4	0-26	ZC	<5	26-36	ZC	xx(x)	36-70 70-110+	ZC v sl ca ZC ca	xxxx xxxx	<1	III	3b	W
5	0-32	C ca	0	32-50+	C	xxx				0	III	3ba/b	W
6	0-31	ZC v sl ca	<5	31-110+	ZC	xxx->xxxx				<1	III	3b	W
7	0-37	HZCL v sl/sl ca	<5	37-72	HZCL sl ca	xxxx	72-110+	MSZL ca	xxxx	<1	III	3a/3b	W
8	0-35	HCL sl ca	5	35-110+	LMS v ca	xx(x)				<1	I/II	3a	D
8a	0-29	HCL/C ca	5-10	29-65	HCL/C ca slst	xxx	65-110+	ZC sl ca	xxxx	<1	II/III	2/3a	W
9	0-33	ZC sl ca	<5	33-110+	ZC sl ca					<1	III	3a	W
9a	0-30	ZC	<5	30-110+	ZC	xxxx				<1	III	3b	W
10	0-32	ZC	<5	32-80	ZC	xxxx	80-110+	ZC ca	xxxx	<1	III	3b	W
11	0-34	C ca	0	34-50+	C	xxx				0	III	3b	W
12	0-33	C	0	33-50	C	xxx				0	III	3b	W
13	0-31	ZC v sl ca	<5	31-38	ZC	xx	38-110+	ZC	xxxx	<1	III	3b	W
14	0-32	ZC	<5	32-110+	ZC sl ca -> ca	xxx->xxxx				<1	III	3b	W
15	0-28	HZCL/ZC v sl ca	<5	28-45	ZC	xx	45-75 75-110+	ZC ca MSZL ca	xxxx xxxx	<1	II	3a	W
16	0-33	H(Z)CL sl ca	<5	33-110+	MSZL	xx->xxx				<1	I	2	W
17	0-32	ZC	<5	32-110+	ZC	xxxx				<1	III	3b	W
18	0-28	ZC ca	<5	28-35	ZC ca	xx(x)	35-110+	ZC sl ca	xxxx	<1	III	3a	W
19	0-27	ZC	<5	27-40	ZC	xx(x)	40-70 70-110+	ZC ZC	xxxx xxxx	<1	II/III	3a/3b	W
20	0-34	C	0	34-50+	C	xxx				0	III	3b	W
21	0-27	ZC v sl ca	<5	27-35	ZC v sl ca	xx	35-110+	ZC sl ca -> ca	xxxx	<1	III	3b	W
22	0-30	ZC	<5	30-110+	ZC non -> ca	xxx->xxxx				<1	III	3b	W
23	0-25	C ca	0	25-70+	C	xxx				0	III	3b	W
24	0-30	ZC	<5	30-70	C sl ca	xxxx	70-110+	SCL ca	xxx	<1	III	3b	W
24a	0-29	HZCL/ZC sl ca	<5	29-42	ZC sl ca	xx	42-110+	ZC ca	xxxx	<1	II	3a	W
25	0-30	ZC	<5	30-48	HCL sl ca	xxx	48-110+	MSZL ca	x	<1	III	3b	W
26	0-32	HCL ca	<5	32-110+	MSZL ca	xxx				<1	II	2	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
27													
28	0-32	ZC	<5	32 -75	ZC	xxxx	75 -110+	ZC ca	xxxx	<1	III	3b	W
29	0-35	ZC v sl ca	<5	35 -80	ZC	xxx->xxxx	80 -110+	ZC v ca	xxxx	<1	III	3b	W
30	0-29	C	0	29 -80+	C	xxx				0	III	3b	W
31	0-30	ZC	<5	30 -110+	ZC					<1	III	3b	W
32	0-22	HZCL v sl ca	<5	22 -40	ZC	xx	40 -110+	ZC	xxx->xxxx	<1	II/III	3a/3b	W
33	0-28	ZC v sl ca	<5	28 -41	ZC v sl ca	xxx	41 -80 80 -110+	ZC ZC v ca (sand lenses)	xxxx xxxx	<1	III	3b	W
34	0-36	C ca	<5	36 -100	C ca	xxx				0	III	3b	W
35	0-40	C ca	0	40 -80+	C	xxx				0	III	3b	W
36	0-38	C ca	0	38 -90+	C	xxx				0	III	3b	W
37	0-45	C ca	0	45 -80+	C	xxx				0	III	3b	W
38	0-31	C ca	0	31 -70+	C	xxx				0	III	3b	W
39	0-30	C ca	0	30 -70+	C	xxx				0	III	3b	W
40	0-35	HZCL	<5	35 -110+	ZC	xxxx				<1	III	3b	W
41	0-30	HZCL v sl ca	<5	30-40	HCL v sl ca	xx	40 -110+	HCL->SCL	xxxx	<1	II/III	3a/3b	W
42	0-29	ZC	<5	29 -110+	ZC	xxx				<1	III	3b	W
43	0-30	ZC	<5	30 -38	ZC	xx(x)	38 -80 80 -110+	ZC ZC ca	xxxx xxxx	<1	III	3b	W
44	0-30	ZC	<5	30 -110+	ZC	xxxx				<1	III	3b	W
45	0-27	ZC	<5	27-36	ZC	xx	36 -110+	ZC (sand lenses)	xxxx	<1	III	3b	W
46	0-32	C	<5	32 80+	C	xxx				0	III	3b	W
47	0-33	ZC	<5	33 -110+	ZC	xxxx				<1	III	3b	W
48	0-28	ZC v sl ca	<5	28 -80	ZC	xxx->xxxx	80 -110+	ZC ca	xxxx	<1	III	3b	W
49	0-32	C ca	<5	32 -80+	C ca	xxx				0	III	3b	W
50	0-32	C sl ca	<5	32 -80+	C ca	xxx				0	III	3b	W
51	0-34	C ca		34 -100	C ca	xxx				0	III	3a	W
52	0-33	C ca	0	33 -80+	C	xxx				0	III	3b	W
53	0-35	C ca	0	35 -80+	C	xxx				0	III	3b	W
54	0-45	C ca	0	45 -80+	C	xxx				0	III	3b	W
55	0-34	C ca	0	34 -90+	C	xxx				0	III	3b	W
56	0-35	C v sl ca	0	35 -80+	C	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	Main limitation
57	0-30	ZC	<5	30-40	ZC	xx	40-50 50-110+	ZC ZC ca	xxxx xxxx	<1	II/III	3a/3b	W
58	0-30	ZC	<5	30-110+	ZC non -> ca	xxxx				<1	III	3b	W
59	0-26	C	<5	26-80+	C	xxx				0	III	3b	W
60	0-29	ZC	<5	29-70	ZC	xxxx	70-110+	ZC ca	xxx	<1	III	3b	W
61	0-31	ZC	<5	31-45	ZC	xx(x)	45-110+	ZC	xxxx	<1	II/III	3a/3b	W
62	0-30	C	<5	30-60+	C	xxx				0	III	3b	W
63	0-28	ZC	<5	28-37	ZC	xx	37-110+	ZC	xxxx	<1	III	3b	W
64	0-27	HZCL/ZC v sl ca	<5	27-40	ZC v sl ca	xx	40-80 80-110+	ZC v sl ca ZC sl ca	xxx->xxxx xxxx	<1	II/III	3a/3b	W
65	0-34	C ca	<5	34-79	C ca	xxx	79-100	SZL ca	xxx	0	III	3b	W
66	0-33	C ca	<5	33-80+	C ca	xxx				0	III	3b	W
67													
68	0-33	C ca	0	33-80+	C	xxx				0	III	3b	W
69	0-38	C ca	0	38-80+	C	xxx				0	III	3b	W
70	0-31	C ca	<5	31-80+	C	xxx				0	III	3b	W
71	0-30	C ca	0	30-80+	C	xxx				0	III	3b	W
72	0-38	ZC	<5	38-110+	ZC	xxxx				<1	III	3b	W
73	0-30	C	<5	30-110+	ZC	xxxx				<1	III	3b	W
74	0-28	C	<5	28-80+	C	xxx				0	III	3b	W
75	0-31	ZC	<5	31-110+	ZC	xxxx				<1	III	3b	W
76	0-28	ZC	<5	28-110+	ZC	xxx				<1	III	3b	W
77	0-27	HZCL/ZC	<5	27-110+	ZC v sl ca	xxx->xxxxx				<1	III	3b	W
78	0-25	C	<5	25-60+	C	xxx				0	III	3b	W
79	0-32	ZC	<5	32-55	ZC	xx	55-110+	ZC v sl ca	xxx->xxxx	1	II	3a	W
80	0-30	C ca	<5	30-86	C ca	xxx	86-100	SZL ca	xxx	0	III	3b	W
81	0-31	C sl ca	<5	31-80+	C ca	xxx				0	III	3b	W
82	0-27	C ca	<5	27-80+	C ca	xxx				0	III	3b	W
83	0-29	C sl ca	<5	29-80+	C ca	xxx				0	III	3b	W
84	0-26	C ca	0	26-80+	C	xxx				0	III	3b	W
85	0-30	C ca	0	30-80+	C	xxx				0	III	3b	W
86	0-29	C ca	0	29-90+	C	xxx				0	III	3b	W
87	0-32	C sl ca	0	32-60+	C	xxx				0	III	3b	W
88	0-30	ZC	<5	30-40	ZC v sl ca	xx(x)	40-110+	ZC sl ca	xxxx	<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
89	0-27	ZC	<5	27-50	ZC	xxxx	50-110+	ZC v ca	xxxx	<1	III	3b	W
90	0-33	C	<5	33-100	C	xxx				0	III	3b	W
91	0-29	C	<5	29-100	C	xxx				0	III	3b	W
92	0-27	HZCL/ZC	<5	27-60	HZCL/ZC	xxx	60-110+	ZC	xxxx	<1	III	3b	W
93	0-35	ZC	<5	35-110+	ZC	xxxx				<1	III	3b	W
94	0-29	C	<5	29-50+	C	xxx				0	III	3b	W
95	0-33	C ca	<5	33-100	C ca	xxx				0	III	3b	W
96	0-26	C sl ca	<5	26-80+	C	xxx				0	III	3b	W
97	0-28	C ca	<5	28-86	C ca	xxx	86-100+	SZL ca	xxx	0	III	3b	W
98	0-32	C ca	<5	32-80+	C ca	xxx				0	III	3b	W
99	0-27	C x ca	<5	27-100+	C x ca	xxx				0	III	3b	W
100	0-37	C ca	0	37-70+	C	xxx				0	III	3b	W
101	0-33	C ca	0	33-80+	C	xxx				0	III	3b	W
102	0-34	C v sl ca	0	34-55+	(S)C	xxx				0	III	3b	W
103	0-33	C	0	33-70+	C	xxx				0	III	3b	W
104	0-32	ZC v sl ca	<5	32-110+	ZC sl ca -> ca	xxxx				<1	III	3b	W
105	0-29	ZC	<5	29-110+	ZC sl ca	xxxx				<1	III	3b	W
106	0-30	C	<5	30-100	C	xxx				0	III	3b	W
107	0-31	C	<5	31-100+	C	xxx				0	III	3b	W
108	0-30	ZC	<5	30-110+	ZC	xxx->xxxx				<1	III	3b	W
109	0-32	C	5	32-80+	C	xxx				0	III	3b	W
110	0-28	C	5-10	28-100	C	xxx				0	III	3b	W
111	0-24	C	<5	24-80+	C ca	xxx				0	III	3b	W
112	0-34	C	<5	34-100	C	xxx				0	III	3b	W
113	0-36	C	0	36-80+	C	xxx				0	III	3b	W
114	0-34	C	0	34-60+	C	xxx				0	III	3b	W
115	0-35	C ca	0	35-90+	C	xxx				0	III	3b	W
116	0-29	C	<5	29-100+	C	xxx				0	III	3b	W
117	0-33	ZC v sl/sl ca	<5	33-60	ZC ca	xxxx	60-110+	ZC v sl ca	xxxx	<1	III	3a/3b	W
118	0-29	ZC	<5	29-38	ZC	xx	38-110+	ZC sl ca	xxxx	<1	III	3b	W
119	0-31	C	<5	31-100	C	xxx				0	III	3b	W
120	0-35	C	<5	35-100+	C	xxx				0	III	3b	W
121	0-27	C	0	27-70+	C	xxx				<1	III	3b	W
122	0-26	C ca	5	26-80+	C ca	xxx				0	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
157													
158	0-29	ZC v sl ca	<5	<u>29</u> -110+	ZC	xxxx				<1	III	3b	W
159	0-28	ZC	<5	<u>28</u> -110+	ZC	xxxx				<1	III	3b	W
160	0-29	C ca	0	<u>29</u> -90+	C	xxx				0	III	3b	W
161	0-28	C	<5	<u>28</u> -100+	C	xxx				0	III	3b	W
162	0-30	C	<5	<u>30</u> -80+	C	xxx				0	III	3b	W
163	0-35	C	0	<u>35</u> -80+	C	xxx				0	III	3b	W
164	0-28	HCL/C	<5	<u>28</u> -70+	C	xxx				6	III	3b	W
165	0-29	C	0	<u>29</u> -90+	C	xxx				0	III	3b	W
166	0-32	ZC sl ca	0	<u>32</u> -53	SCL	xxx	<u>53</u> -90	C	xxx	0	III	3a/b	W
167	0-34	C	0	<u>34</u> -70+	C	xxx				0	III	3b	W
168	0-32	ZC	<5	<u>32</u> -110+	ZC	xxxx				<1	III	3b	W
169	0-32	HCL	<5	<u>32</u> -72	SCL	xx	<u>72</u> -110+	SCL/HCL	xxx	<1	II	3a	W
170	0-30	C	<5	<u>30</u> -100+	C	xxx				0	III	3b	W
171	0-31	C	<5	<u>31</u> -100	C	xxx				0	III	3b	W
172	0-28	HCL	<5	<u>28</u> -48	HCL	xxx	<u>48</u> -80+		xxx	0	III	3b	W
173	0-32	C	<5	<u>32</u> -70+	C	xxx				5	III	3b	W
174	0-37	HCL v sl ca	0	<u>37</u> -80+	HCL	xxx				0	III	3b	W
175	0-30	HZCL/ZC	<5	<u>30</u> -110+	HZCL/ZC	xxx->xxxx				<1	III	3b	W
176	0-26	C	<5	<u>26</u> -80+	C	xxx				0	III	3b	W
177	0-27	C	<5	<u>27</u> -80+	C	xxx				0	III	3b	W
178													
179	0-28	HZCL	0	<u>28</u> -44	HZCL	xxx	<u>44</u> -80+	HZCL	xxx	0	III/II	3b/3a	W
180	0-35	C	0	<u>35</u> -70+	C	xxx				4	III	3b	W
181	0-33	MSZL	0	<u>33</u> -100	MSZL	xxx				0	II	1	
182	0-32	HCL	0	<u>32</u> -60+	C	xxx				0	III	3b	W
183	0-33	SCL	<5	<u>33</u> -62	MSL	xxx	<u>62</u> -90+	SC	xxx	0	II	2	W
184	0-28	C	<5	<u>28</u> -80+	C	xxx				0	III	3b	W
185	0-30	C	<5	<u>30</u> -80+	C	xxx				0	III	3b	W
186	0-34	MSL	0	<u>34</u> -74	MSL	xxx	74-100+	LMS	xxx	0	II	1	

Key to table

Mottle intensity:

- o unmottled
- x few to common rusty root mottles (topsoils)
or a few ochreous mottles (subsoils)
- xx common to many ochreous mottles and/or dull structure faces
- xxx common to many greyish or pale mottles (gleyed horizon)
- xxxx dominantly grey, often with some ochreous mottles (gleyed horizon)

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

Texture:

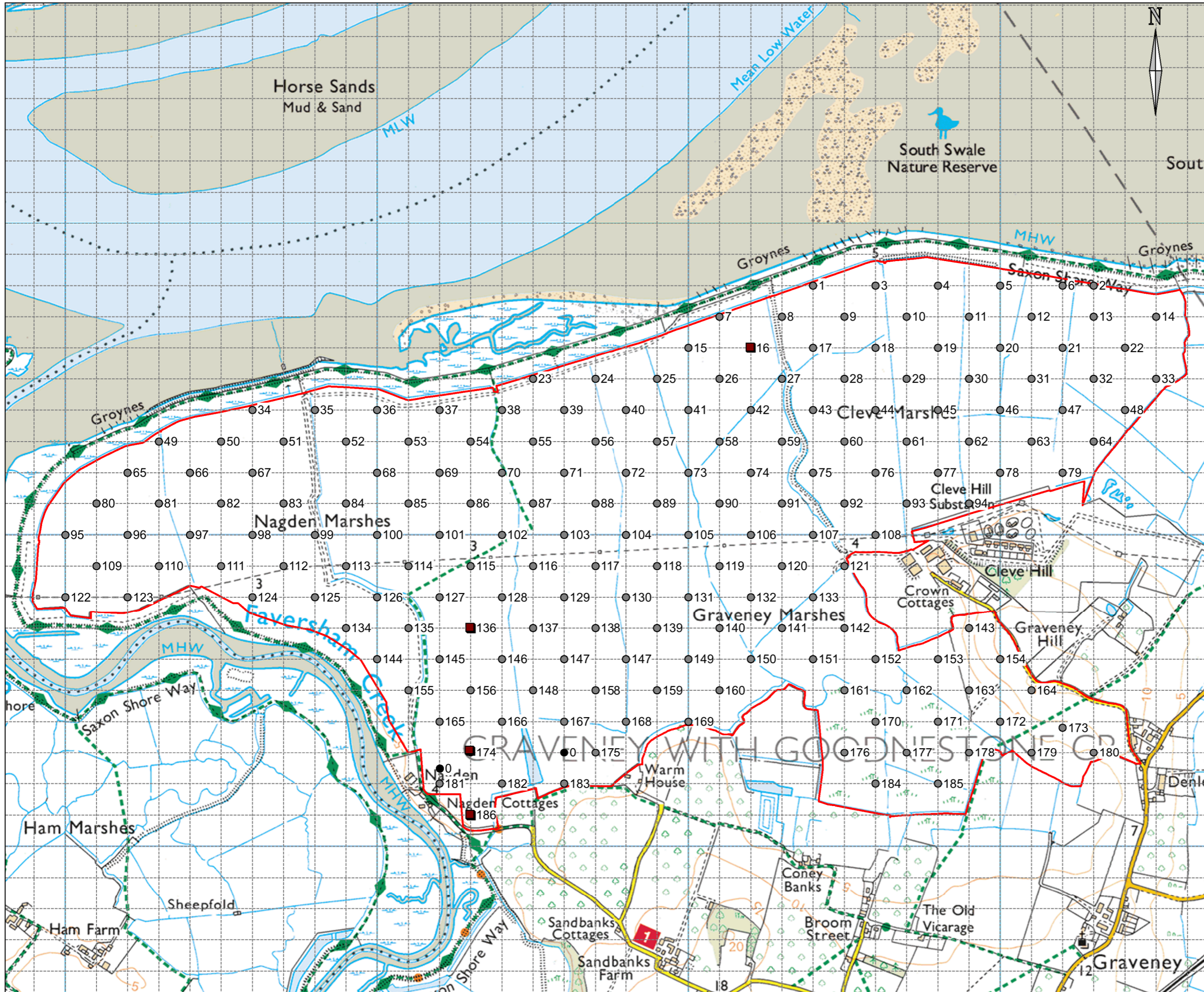
- C - clay
- ZC - silty clay
- SC - sandy clay
- CL - clay loam (H-heavy, M-medium)
- ZCL - silty clay loam (H-heavy, M-medium)
- SCL - sandy clay loam
- SZL - sandy silt loam (F-fine, M-medium, C-coarse)
- SL - sandy loam (F-fine, M-medium, C-coarse)
- LS - loamy sand (F-fine, M-medium, C-coarse)
-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

Limitations:

- W - wetness/workability
- D - droughtiness
- De - depth
- St - stoniness
- SI - slope
- F - flooding
- T - topography/microrelief

Texture suffixes & prefixes:

- ca - calcareous: x-extremely, v-very, sl-slightly
- (ca) marginally calcareous
- mn - ferrimanganiferous concentrations
- gn - greenish, yb - yellowish brown, rb - reddish brown
- r - reddish; (v)st - (very) stony; sdst - sandstone; lst - limestone
- dist - disturbed soil layer; mdst - mudstone



KEY

- Auger observation
- Soil/land grade description pit
- Survey area

Client:

ARCUS

Site:

Land at Cleve Hill Farm, Faversham

Map title:

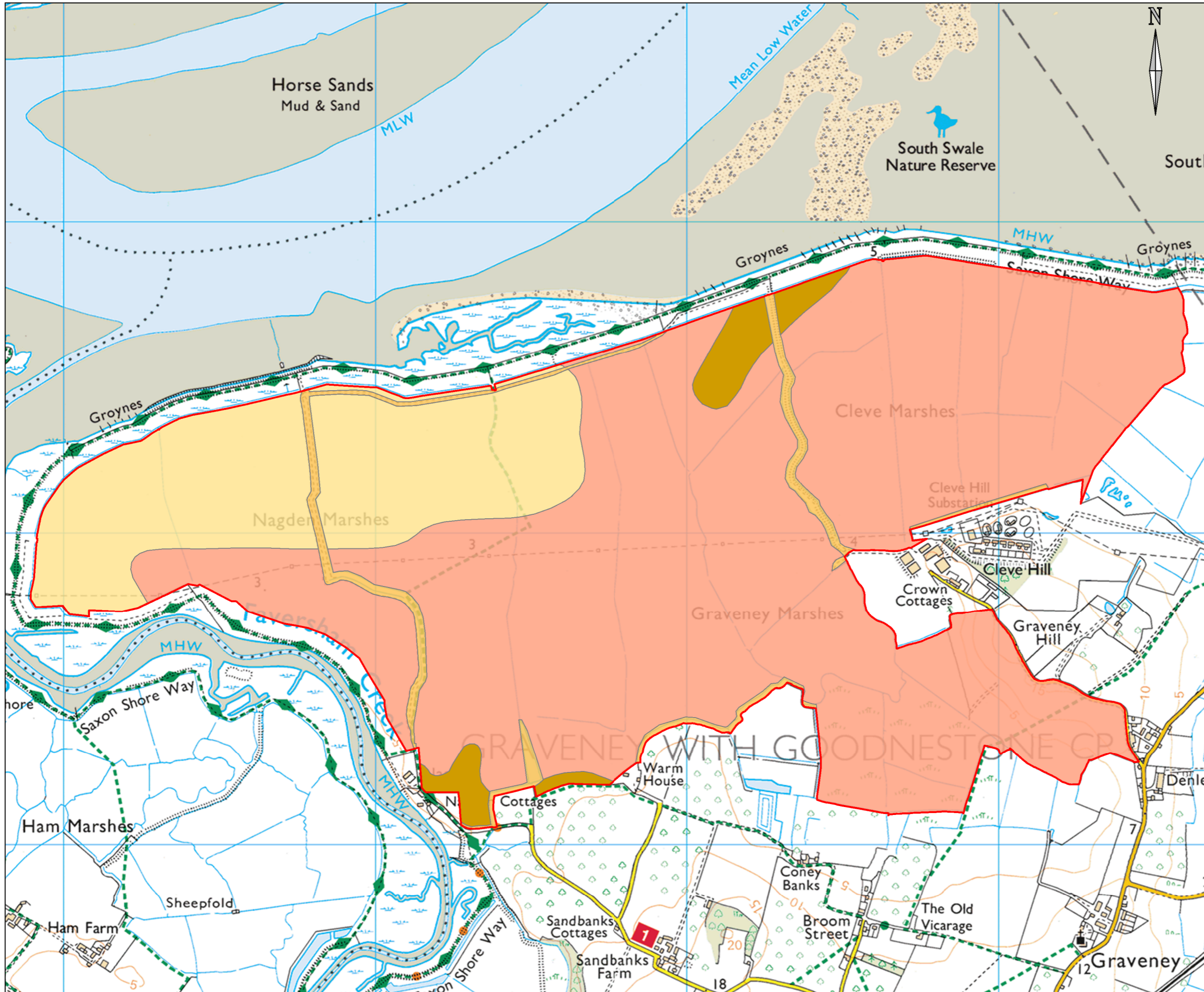
**Map 1
Survey observations**

Land Research ASSOCIATES

Land Research Associates
Lockington Hall
Lockington
Derby DE74 2RH
01509 670570

Scale: 1:12,000
(on A3)


Date: 22/03/2017



KEY

- Calcareous slowly permeable clay soils
- Non calcareous slowly permeable clay soils
- Freely draining soils
- Non agricultural
- Survey area

Client:




Site:

**Land at Cleve Hill Farm,
Faversham**

Map title:

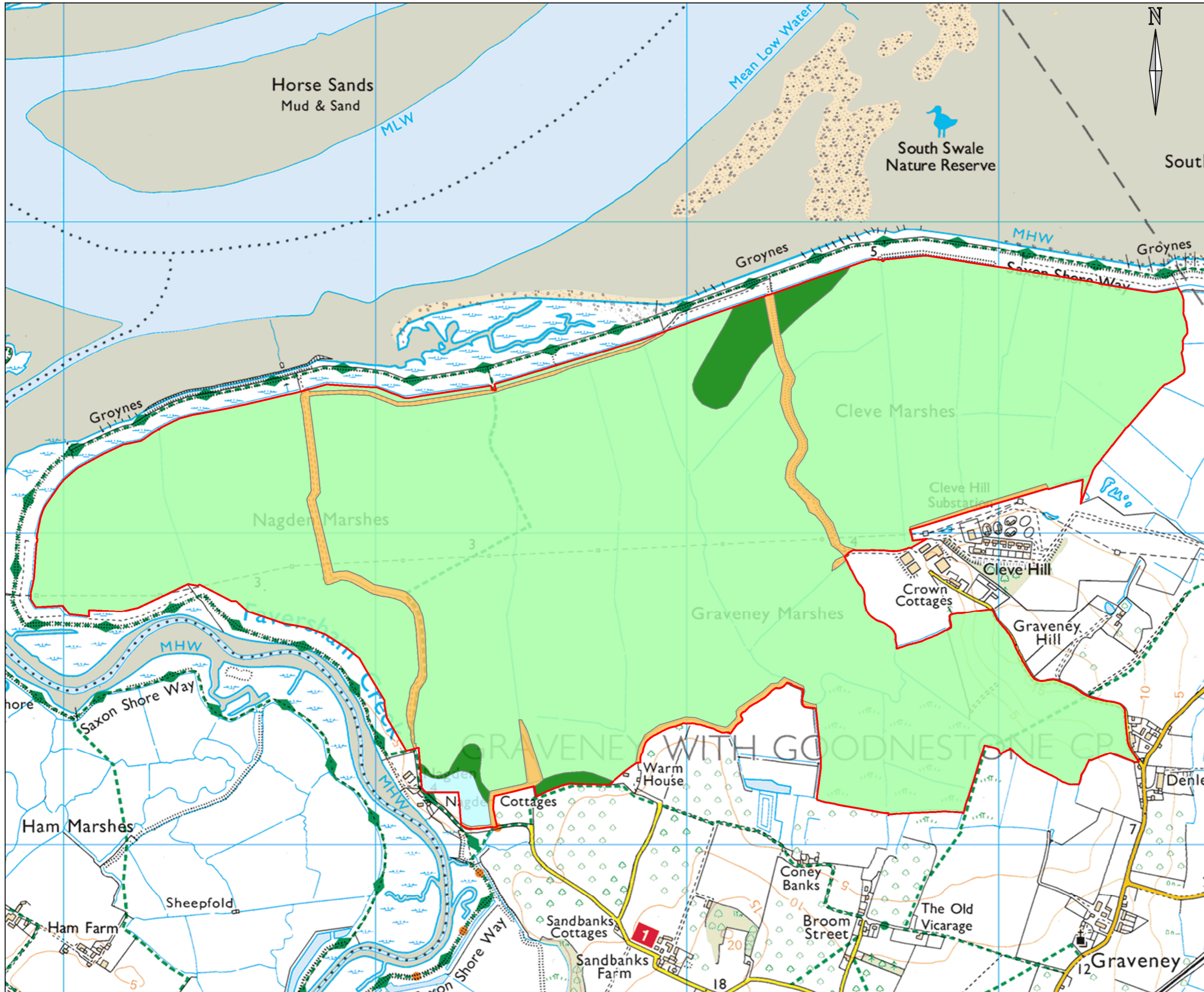
**Map 2
Soil types**



Land Research Associates
Lockington Hall
Lockington
Derby DE74 2RH
01509 670570

Scale: 1:12,000
(on A3)

Date: 22/03/2017



KEY

- Grade 2
- Subgrade 3a
- Subgrade 3b
- Non agricultural
- Survey area

Client:



Site:

**Land at Cleve Hill Farm,
Faversham**

Map title:

**Map 3
Agricultural Land Classification**



Land Research Associates
Lockington Hall
Lockington
Derby DE74 2RH
01509 670570

Scale: 1:12,000
(on A3)

Date: 22/03/2017



ANALYTICAL REPORT

Report Number	52047-17	H579	MR MALCOLM REEVE
Date Received	13-MAR-2017		LAND RESEARCH ASSOCIATES
Date Reported	17-MAR-2017		LOCKINGTON HALL
Project	SOIL		LOCKINGTON
Reference	CLEVE HILL FARM		DERBY
Order Number			DE74 2RH

Laboratory Reference		SOIL335634	SOIL335635	SOIL335636						
Sample Reference		11	16	54						
Determinand	Unit	SOIL	SOIL	SOIL						
Sand 2.00-0.063mm	% w/w	9	16	7						
Silt 0.063-0.002mm	% w/w	40	38	39						
Clay <0.002mm	% w/w	51	46	54						
Neutralising Value as CaCO3 eq.	% w/w	4.5	4.4	5.3						
Neutralising Value as CaO eq.	% w/w	2.5	2.5	3.0						
Textural Class **		C	C	C						

Notes

Analysis Notes The sample submitted was of adequate size to complete all analysis requested.
 The results as reported relate only to the item(s) submitted for testing.
 The results are presented on a dry matter basis unless otherwise stipulated.

Document Control **This test report shall not be reproduced, except in full, without the written approval of the laboratory.**

** Please see the attached document for the definition of textural classes.

Reported by ***Darren Whitbread***
 Natural Resource Management, a trading division of Cawood Scientific Ltd.
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 Fax: 01344 890972
 email: enquiries@nrm.uk.com

Textural Class Abbreviations

The texture classes are denoted by the following abbreviations:

Class	Code
Sand	S
Loamy sand	LS
Sandy loam	SL
Sandy Silt loam	SZL
Silt loam	ZL
Sandy clay loam	SCL
Clay loam	CL
Silt clay loam	ZCL
Clay	C
Silty clay	ZC
Sandy clay	SC

For the *sand*, *loamy sand*, *sandy loam* and *sandy silt loam* classes the predominant size of sand fraction may be indicated by the use of prefixes, thus:

vf	Very Fine (more than 2/3's of sand less than 0.106 mm)
f	Fine (more than 2/3's of sand less than 0.212 mm)
c	Coarse (more than 1/3 of sand greater than 0.6 mm)
m	Medium (less than 2/3's fine sand and less than 1/3 coarse sand).

The subdivisions of *clay loam* and *silty clay loam* classes according to clay content are indicated as follows:

M	medium (less than 27% clay)
H	heavy (27-35% clay)

Organic soils i.e. those with an organic matter greater than 10% will be preceded with a letter O.

Peaty soils i.e. those with an organic matter greater than 20% will be preceded with a letter P.