

**SOILS AND
AGRICULTURAL USE & QUALITY
OF LAND OFF HOLT ROAD, ROSSETT**

Report 1067/1

2nd March, 2015

Land
Research
ASSOCIATES

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OF LAND OFF HOLT ROAD, ROSSETT**

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SUMMARY

A survey has been undertaken of 6.2 ha of land off Holt Road, Rossett in Clwyd.

The agricultural land comprises two fields to the north and south of Holt Road, under grass and winter cereal respectively at the time of survey. The soils are variable, with groundwater-affected loams over gravel and deep fine loams with impeded subsoil drainage, giving a mixture of subgrades 3a and 3b due to wetness and droughtiness limitations.

The medium loamy topsoil in the north and west would form a high to quality resource if the site is developed.

1.0 Introduction

- 1.1 This report provides information on the soils and agricultural quality and use of 6.2 ha of land off Holt Road, Rossett in Clwyd. The report is based on a soil and agricultural desk study and a survey of the land in February 2015.

SITE ENVIRONMENT

- 1.2 The site comprises two fields, to the north and south of Holt Road (B5102). The land is bordered to the north by playing fields, to the west by residential development and to the south and east by adjoining agricultural land. The site is situated on level ground at an elevation of approximately 12 m AOD.

AGRICULTURAL USE

- 1.3 At the time of survey the field to the north of Holt Road was under grass (ungrazed at time of survey) while the land to the south was under a winter cereal crop.

PUBLISHED INFORMATION

- 1.4 1:50,000 BGS geological information shows solid geology as interbedded mudstone, siltstone and conglomerate of the Salop Formation, overlain by drift deposits; these mainly consist of river terrace sands and gravels, with a small area of floodplain alluvium in the north.
- 1.5 The soil map of the area, published at 1:25,000 scale¹ shows coarse loamy groundwater-affected Rossett and Quordon series to the south of Holt Road and freely-draining slightly stony soils of the Radyr series to the north. Within the northern field patches of clayey poorly-draining alluvial soils of the Wigmore series are recorded.
- 1.6 Agricultural Land Classification (ALC) mapping carried out in the 1970s shows the land as grade 2. No detailed survey has previously been conducted of the site.

¹ Lea, J.W. and Thompson, T.R.E., 1978. *Soils in Clwyd I (Wrexham North)*. Soil Survey of England and Wales Record No. 48, Harpenden.

2.0 Soils

- 2.1 The National Planning Practice Guidance states that the planning system should protect and enhance valued soils and prevent the adverse effects of unacceptable levels of pollution. This is because soil is an essential finite resource that provides important ecosystem services, for example as a growing medium for food, timber and other crops, as a store for carbon and water, as a reservoir of biodiversity and as a buffer against pollution.
- 2.2 A detailed soil resource and agricultural quality survey was carried out in February 2015. It was based on observations at alternate intersects of a 50 m grid, giving a sampling density of two observations 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.
- 2.3 Soils were found to be highly variable, with significant differences in texture, stoniness and drainage. The distribution of soils types is shown by Map 2 in an appendix to this report and is described below.

Gravelly soils

- 2.4 These soils are found in an area either side of Holt Road. They comprise clay loam or sandy clay loam topsoil and upper subsoil, with coarse gravel below. They show evidence of waterlogging (grey-mottled colours) to shallow depth and were often found to have shallow standing water within the underlying gravel layer at the time of survey.
- 2.5 An example profile is described below from observation 11 (Map 2).
- | | |
|-----------|---|
| 0-32 cm | Very dark greyish brown (10YR 3/2) heavy clay loam; moderately stony (medium very hard cobbles and pebbles of mixed lithology); moderately developed coarse sub-angular blocky structure; firm; clear smooth boundary to: |
| 32-55 cm | Greyish brown (10YR 5/2) coarse loamy sand with common distinct yellowish brown (10YR 5/8) mottles; extremely stony (70-80% pebbles and cobbles); single grain; loose; gradual smooth boundary to: |
| 55-72 cm | Yellowish brown (10YR 5/6) coarse sand; extremely stony (40% pebbles); single grain; loose; abrupt smooth boundary to: |
| 72-120 cm | Greyish brown (10YR 5/2) silty clay with many fine distinct reddish brown (5YR 4/4) mottles; structureless (massive) firm (plastic). |
- 2.6 These soils are freely to imperfectly-draining (Soil Wetness Class I or II) and have a high capacity to absorb excess winter rainfall.

Fine loamy soils with impeded drainage

- 2.7 These soils are found in the south and west of the site. They comprise medium to heavy clay loam or silty clay loam topsoil, with the mottled fine loamy subsoil becoming slowly permeable at depth (Soil Wetness Class II or III). These soils are heavier and more poorly-draining in the south of the site. In a linear low-lying feature in the north of the site, soils were found to be waterlogged, with structureless fine silty peaty subsoil (Soil Wetness Class IV). This appears to be a former channel which has not been artificially drained.
- 2.8 An example profile is described below from observation point 11 (Map 2)
- | | |
|------------|---|
| 0-32 cm | Very dark greyish brown (10YR 3/2) heavy clay loam; stoneless; moderately developed coarse sub-angular blocky structure; firm; clear smooth boundary to: |
| 32-52 cm | Greyish brown (10YR 5/2) heavy clay loam with many distinct medium reddish brown (5YR 5/4) mottles; stoneless; moderately developed coarse sub-angular blocky structure; friable; gradual smooth boundary to: |
| 52-106 cm | Greyish brown (10YR 5/2) heavy clay loam with many distinct reddish brown (5YR 4/4) mottles; stoneless; moderately developed very coarse sub-angular to angular blocky structure; firm; clear smooth boundary to: |
| 106-120 cm | Yellowish brown (10YR 5/6) sandy clay loam; very stony. |
- 2.9 These soils are imperfectly to poorly-draining and have a moderate capacity to absorb excess winter rainfall.

3.0 Agricultural 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 sub-grades (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 Classification². The relevant site data for an elevation of 12 m is given below.

- Average annual rainfall: 726 mm
- January-June accumulated temperature >0°C 1459 day°
- Field capacity period 166 days
(when the soils are fully replete with water) late Oct-mid Apr
- Summer moisture deficits for: wheat: 105 mm
potatoes: 96 mm

3.3 The survey described in the previous section was used in conjunction with the agroclimatic data above to classify the site using the revised guidelines for agricultural land classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food³. Climate does not present a limitation to agriculture in this part of Wales.

SURVEY RESULTS

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

Subgrade 3a

3.5 This subgrade includes the better-draining fine loamy soils in the west of the site. These soils will stand wet at moderately shallow depth for long periods from mid/ late autumn to mid spring and given the moderately high clay

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

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

content of the topsoil, this limits flexibility of operations. High yields of autumn sown cereals are likely, but spring sowings are likely to result in moderate average yields.

- 3.6 Also included are fine loamy soils over gravel immediately to the north and south of Holt Road. The very stony subsoil layer holds very limited moisture reserves and is likely to restrict rooting. A wide range of crops may be grown, but droughtiness is likely to result in moderate average yields.

Subgrade 3b

- 3.7 This sub-grade includes land in the south and north of the site, where poor subsoil drainage results in waterlogging to shallow depth for long periods from mid autumn to mid spring. Combined with the often high clay content of the topsoil, this means spring sowings are rarely possible and the flexibility of autumn sowings is restricted by wet periods.
- 3.8 Also included are soils with gravel at shallow depth in the south and east, which means limited moisture supply and restricted rooting. A wide range of crops may be grown, but average yields are likely to be low.

Grade areas

- 3.9 The boundaries between the different grades of land are shown on Map 3 and the areas occupied by each are shown below.

Table 1. Areas occupied by the different land grades

<i>Grade/sub-grade</i>	<i>Area (ha)</i>	<i>% of the agricultural land</i>
Subgrade 3a	2.4	39
Subgrade 3b	3.8	61
Total	6.2	100

4.0 Soil resources and their use

- 4.1 An objective of the Defra Soil Strategy was to ensure that the construction industry and planning authorities take sufficient account of the need to protect soil resources, and ensure soils are able to fulfil as many as possible of their functions. An Environment Agency strategy *Soil a Precious Resource: Our strategy for protecting, managing and restoring soil* (Environment Agency, 2007) has complementary aims.

Topsoil

- 4.2 The topsoils in the north of the site are mainly medium-textured and are of high quality for use in landscaping should the site be developed. The soils in the south are of higher clay content and b susceptible to compaction when wet, particularly likely during long periods between October and April. These topsoils are of medium quality for use in landscaping.

Subsoil

- 4.3 The upper subsoils of the site are mainly naturally permeable, but are susceptible to smearing and sealing during construction activities which could result in restricted rooting depth, increased droughtiness and risk of localised flooding. If compacted during construction they should be loosened before any topsoil is spread on them.

Soil Handling

- 4.4 Areas not being built over (e.g. environmental buffers and landscape areas) should not be trafficked by construction vehicles as this will render the soils impermeable, preventing percolation of rainfall beyond the base of the topsoil, which will quickly become saturated.
- 4.5 Stripped topsoil should be stored in separate resource bunds no more than 3 m high, and kept grassed and free from construction traffic until required for re-use. 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 Rossett: ALC and soil resources survey – Details of observations at each sampling point

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (°)	Wetness Class	Agricultural quality	
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling			Grade	Main limitation
1	0-23	M/HZCL	0	23-59	HZCL	xxx	59-95+	MZCL	xxx	0	IV	3b	W
2	0-26	MZCL	0	26-52	MZCL	xxx	52-73 <u>73-90+</u>	HZCL ZC	xxx xxx	0	III	3a	W
3	0-19	MZCL(PL)	0	19-63	MSL	xxx	<u>63-100+</u>	SCL	xxx	0	III	2	W
3a	0-28	MSL	0	<u>28-100+</u>	HZCL(LP)	xxx				0	IV	3b	W
4	0-20	MCL	5-10	20-43	vstMCL	xxx	43+	Too stony		1	?	3a	D
5	0-24	MCL	<5	24-42	sistMCL	xx	42-66 66+	vstMCL Too stony	xxx	0	II?	3a	D
6	0-32	HCL	<5	32-110+	HCL	xx				0	II	3a	W
7	0-30	MSZL	<5	30-52	vstMSZL	xx	52+	Too stony		0	I	3a	D
8	0-32	HCL	5	32-65	gravel	xxx	65+	Too stony		0	?	3b	D
9	0-34	HCL/SCL	5-10	34-48	vstSCL	xx	48+	Too stony		0	?	3b/3a	D
10	0-32	HCL	5-10	32-55	xstLCS	xx	55-72 <u>72-120</u>	xstCS ZC	xxx xxx	0	II	3b	W
11	0-32	HCL	0	32-52	HCL	xxx	<u>52-106</u> 106-120	HCL vstSCL	xxx xxx	0	III	3b	W
12	0-33	HCL	5	<u>33-90+</u>	HCL	xx				0	II	3a	W
13	0-29	HCL	<5	<u>29-58</u>	HCL	xxx	58-100+	ZC	xxx	0	III/IV	3b	W
14	0-32	HCL	0	32-51	HCL	xxx	<u>51-100+</u>	mstHCL	xxx	0	III	3b	W

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 (slightly gleyed horizon)
- xxx greyish colours and common to many ochreous mottles (gleyed horizon)
- xxxx dominantly grey, often with some ochreous mottles (gleyed horizon)

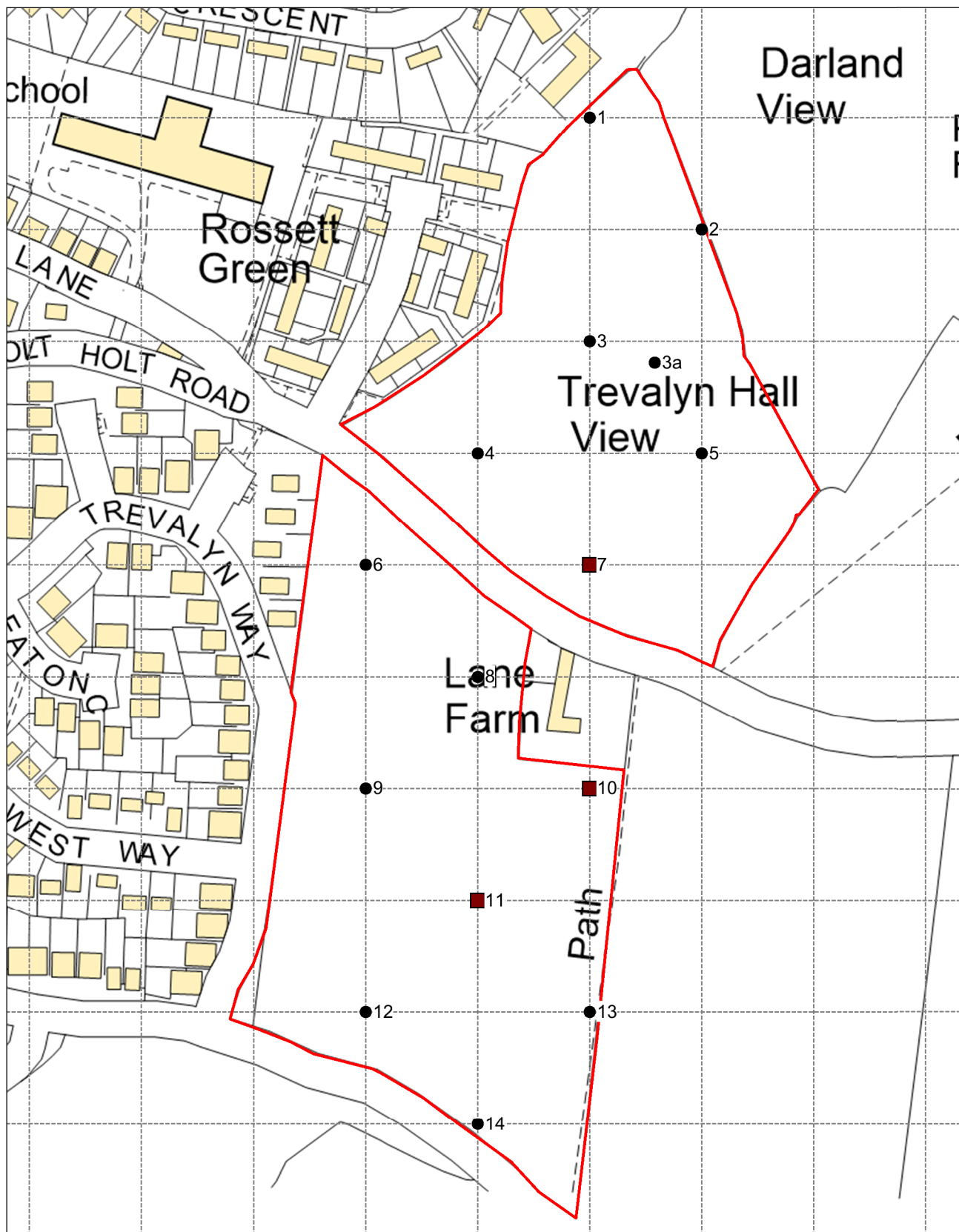
Texture:

- 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

Limitations:

- W - wetness/workability
 - D - droughtiness
 - De - depth
 - St - stoniness
 - Sl - slope
 - F - flooding
 - T - topography/microrelief
- Texture suffixes & prefixes:
- ca - calcareous: x-extremely, v-very, sl-slightly (ca) - marginally calcareous
 - mn - ferrimanganiferous concentrations
 - r - reddish: (v)st - (very) stony
 - dist - disturbed soil layer

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)



Client:



Project: Rossett

Map title:
Map 1
Location of Observations

KEY

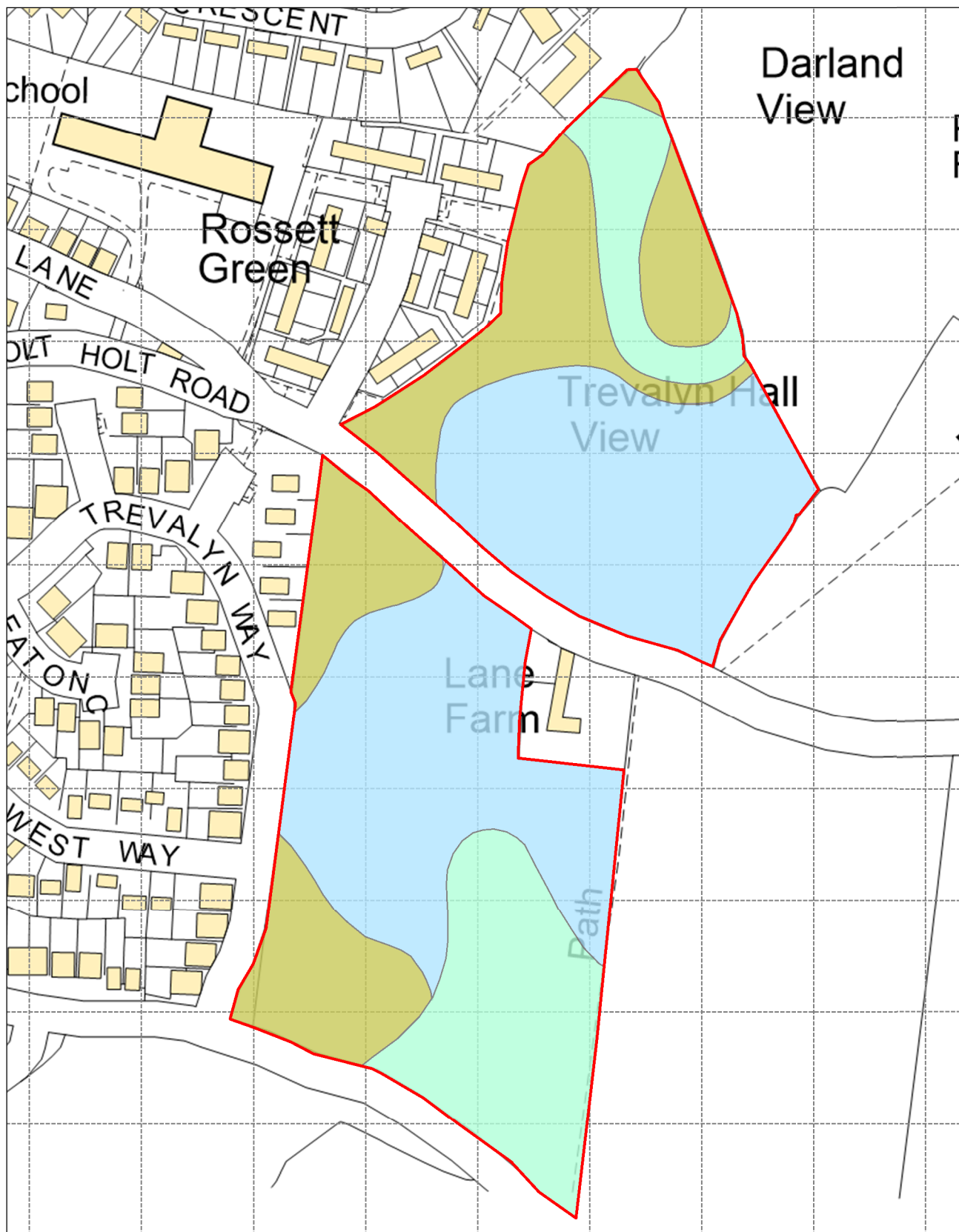
- Survey area
- Auger observation
- Soil description pit

Scale: 1:2,500 at A4

Date: 02/03/2015

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Client:



Project: **Rossett**

Map title: **Map 2
Soil Types**

KEY

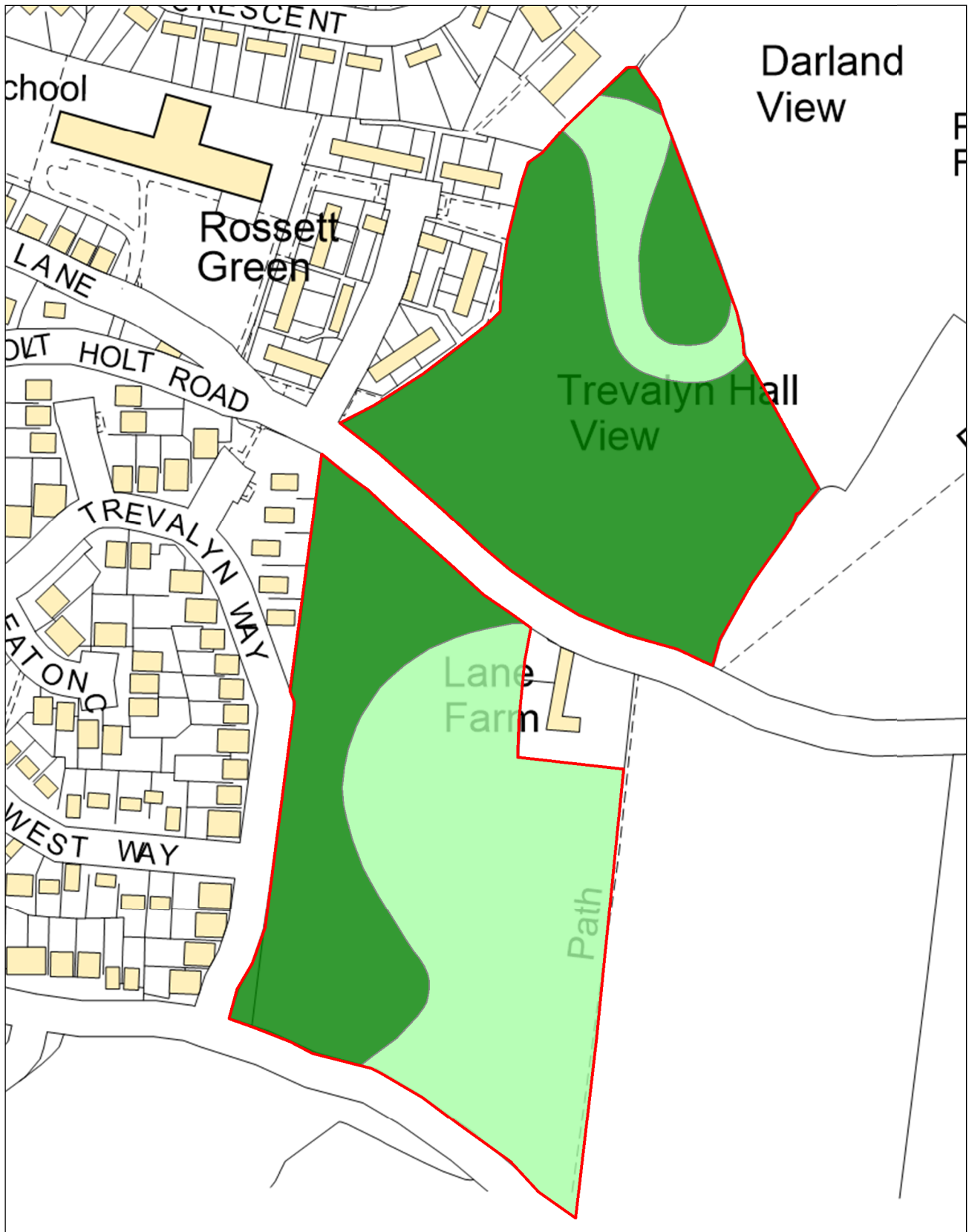
- Gravelly soils
- Medium loamy soils
- Heavy and poorly-draining soils
- Survey area

Scale: 1:2,500 at A4

Date: 02/03/2015

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Client:



Project: **Rossett**

Map title: **Map 3
Land Quality**

KEY

- Subgrade 3a
- Subgrade 3b
- Survey area

Scale: 1:2,500 at A4

Date: 02/03/2015

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