SOIL RESOURCES AND AGRICULTURAL USE & QUALITY OF LAND OFF NORTH ROAD, GLOSSOP

Report 807/1a

7th November, 2013

Land Research ASSOCIATES

SOIL RESOURCES AND AGRICULTURAL USE & QUALITY OF LAND OFF NORTH ROAD, GLOSSOP

F.W Heaven BSc, MISoilSci

Report 807/1a

Land Research Associates Ltd
Lockington Hall,
Lockington,
Derby
DE74 2RH

7th November, 2013

SUMMARY

A study and survey of 5.9 ha of agricultural land east of North Road, Glossop in Derbyshire shows that the soils have heavy subsoil, some clay textured, covered by medium clay loam topsoil, or less often, heavy clay loam topsoil. Land grade is moderate or poor in sub-grade 3b or grade 4. There is an overall climate limitation on land grade.

The medium loam topsoils would provide a moderate quality resource for gardens and landscaping if the site is developed.

1.0 Introduction

1.1 This report provides information on the soil resources and agricultural quality and use of an area of 5.9 ha of land lying to the east of North Road, Glossop in Derbyshire. The report is based on a soil and agricultural desk study, and a survey of the land in November 2012.

SITE ENVIRONMENT

1.2 The land investigated is disposed as three grass fields running east from North Road to a footpath at the eastern margin. The northern edge is marked by field boundaries which pass round a reservoir. The southern edge runs along the gardens of residential development. The land slopes gently from the south at 209 m aOD up to a plateau in the north at 225 m aOD.

AGRICULTURAL USE

1.3 The land is primarily in grass and was due to have cattle turned out on it by a tenant grazier. There are no Environmental Stewardship agreements in force.

PUBLISHED INFORMATION

1.4 The 1:50,000 BGS geological information shows that the area is underlain by the Carboniferous sandstone with a cover of Devensian till.

1.5 The National Soil Map[1] shows the land in the east as Brickfield 3 association, comprising slowly permeable seasonally waterlogged heavy soils in glacial drift. In the west an area of Rivington 2 association is shown, indicating well drained coarse loamy soils over sandstone rock.

1.6 Reconnaissance agricultural land classification (ALC) mapping carried out in the 1970s shows the agricultural land of the study area as grade 4. There are no more recent detailed published surveys of the site.

[1] Thomasson, A J (*et al)* 1984. *Soils and their Use in Midland and Western England* Soil Survey of England and Wales Bulletin No. 12

2.0 Soils

2.1 The Defra Soil Strategy[2] points out that soils deliver a range of vital functions for human activities including food and fibre production support for ecosystems and habitats, and environmental services that play a vital role in the global carbon cycle, stabilising and degrading contaminants and providing clean water. One of the strategy's objectives is to ensure that soil functions (soil ecosystem services) are fully valued in the planning process.

2.2 A detailed soil resource and agricultural quality survey was carried out in November 2012. 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 3) showing their location is in an appendix to this report.

2.3 The survey identified mainly heavy soils developed in heavy clay loam or clayey till. The topsoil is most commonly medium clay loam, slightly stony, and 20-30 cm thick, although heavy clay loam is found locally. The underlying subsoil is more variable, ranging from heavy clay loam to clay, all prominently mottled grey or reddish grey indicating seasonal wetness. Some are stony. Soils with clay subsoil directly below the topsoil are more common on the less sloping land in the north of the area.

2.4 An example profile from SK 03185 95293 (Map 3) is described below.

0-24 cm	Dark greyish brown (10YR 4/2) medium clay loam with a few small and medium flaggy sandstone stones; moderately developed medium subangular blocky structure; friable; 1% medium macropores; abundant very fine fibrous roots and common fine fleshy roots; clear smooth boundary to:
24-62 cm	Grey (10YR 6/1) heavy clay loam with many large prominent yellowish brown (10YR 5/8) and prominent fine dark reddish brown (5YR 3/4) mottles; 2% small rounded hard stones; weakly developed very coarse angular blocky structure; firm; 0.1% fine macropores; many very fine fibrous roots; merging to:
62-100+cm	Grey (5YR 5/1 and 10YR 6/1)) and brown (7.5YR 5/4) heavy clay loam to clay, 2% small rounded hard stones; structureless, massive; firm, deformable; no visible pores; a few very fine fibrous roots, reducing with depth.

2.5 Most of the soils are slowly permeable, with water ponding over the heavy subsoils (wetness class IV and V) and the soils are wet for long periods in autumn winter and spring. They support a limited range of food and fibre

[2] Safeguarding our Soils: a Strategy for England (Defra, 2009)

production, being effectively limited to grass, and have a limited capacity to absorb excess winter rainfall. They provide moist, neutral habitats for plant communities.

2.6 The distribution of the soil types is shown on Map 1.

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 Classification[3]. The relevant site data for an average elevation of 216 m is given below.

• Average annual rainfall:	1163 mm
• January-June accumulated temperature >0°C	1795 day°
• Field capacity period (when the soils are fully replete with water)	258 days early Aug –mid May
• Summer moisture deficits for:	wheat: 49 mm potatoes: 28 mm

3.3 This cool wet climate limits the agricultural land quality to no better than sub-grade 3b.

3.4 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 Food[4].

SURVEY RESULTS

3.5 The agricultural quality of most of the survey area is determined mainly by the degree of soil wetness over slowly permeable subsoils. Land of grades 3, 4 and 5 agricultural quality exists on the site.

[3] *Climatological Data for Agricultural Land Classification*. Meteorological Office, 1989
[4] *Agricultural Land Classification for England and Wales: Guidelines and Criteria for Grading the Quality of Agricultural Land*. MAFF, 1988.

Grade 3b

3.6 There are almost 4 hectares of grade 3b land, mainly on soils similar to those described in paragraph 2.4, where there is medium loamy topsoil over heavy clay loam subsoil. The principal constraint to production is seasonal wetness caused by water ponding over slowly permeable subsoils (wetness class IV).

Grade 4

3.7 There are 2 ha of grade4 land where the heavy loam topsoil is directly over clay or heavy clay loam subsoil. The principal agricultural limitation is long term seasonal wetness caused by water ponding over slowly permeable subsoils (wetness class V).

Grade 5

3.8 This grade is mapped in the south of the site where there is a small area that is permanently waterlogged and covered in rushes and brambles.

Other land

3.9 A very small area in the south of the site has a cover of trees.

Grade areas

3.10 The boundaries between the different grades of land are shown on Map 2 and the areas occupied by each are shown below.

Table 1. Areas within the survey area occupied by the different land grades

Grade/sub-grade	*Area (ha)*	*% of the site*	*% of agricultural land*
Sub-grade 3b	3.8	64.8	65.1
Grade 4	2.0	34.4	34.5
Grade 5	0.02	0.3	0.3
Other land	0.03	0.5	
Total	5.85	100	100

4.0 Soil resources and their use

4.1 An objective of the Defra Soil Strategy is 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. The soil across the site has been described in section 2 and shown on Map 1.

Topsoil

4.2 The medium clay loam topsoil most common on the site has developed moderately good structure because of long periods under grass, and is a good resource to be retained for use in gardens and landscaping. It is easily damaged by being stripped when moist, and soil working should be confined to the summer months when possible.

Subsoil

4.3 All of the subsoils are heavy textured and easily damaged by excess traffic. They should be loosened when dry to improve permeability before the topsoil is replaced.

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.

5.0 Conclusions

5.1 The survey shows that the soils have heavy subsoil, some clay-textured, covered by medium clay loam topsoil, or less often, heavy clay loam topsoil. Land grade is moderate or poor in sub-grade 3b or grade 4.

5.2 The medium loam topsoils would provide a moderate quality resource for gardens and landscaping if the site is developed.

APPENDIX

LOCATION AND DETAILS OF OBSERVATIONS

This page has been left intentionally blank

North Road, Glossop: ALC and soil resources survey November 2012 - Details of observations at each sampling point

Obs	Topsoil			Upper subsoil			Lower subsoil			Slope	Wetness	Agricultural quality	
No	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling	(°)	Class	Grade	Main limitation
14	0-23	MCL	0	23-40	HCL	xxx	40-110	r br C	xxxx	2	IV	3b	W
2	0-23	MCL	0	23-80	r br HCL	xxxx	80+	stopped on stone		4	V	4	W
3	0-23	HCL	1	23-100+	r br C	xxx				2	V	4	W
4	0-20	MCL	1	20-70	gy HCL	xxxx	70-110	HCL-C	xxx	4-5	IV	3b	W
5	0-32	MCL	0	32-70	HCL	xxxx	70-110	C-HCL	xxx	3	IV	3b	W
6	0-24	MCL	0	24-110	C+HCL	xxxx				2	V	4	W
7	0-20	MCL	0	20-100+	HCL	xxx				5	IV	3b	W
8	0-30	M-HCL	1	30-45	HCL	xxx	45-110	C-HCL	xxxx	2	IV	3b/4	W
9	0-28	M-HCL	1	28-35	HCL	xxx	35-110	C	xxxx	2	IV	3b/4	W
10	0-40	dk HCL	0	40-60	HCL	xxx				2	V	4	W
11	0-25	MCL	1	25-48	HCL	xxx	48-70 70+	st HCL stopped on stone	xxx	4-5	IV	3b	W
12	0-28	MCL	1	28-45	MCL	xxx	45-110	HCL	xxxx	3	IV	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 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)

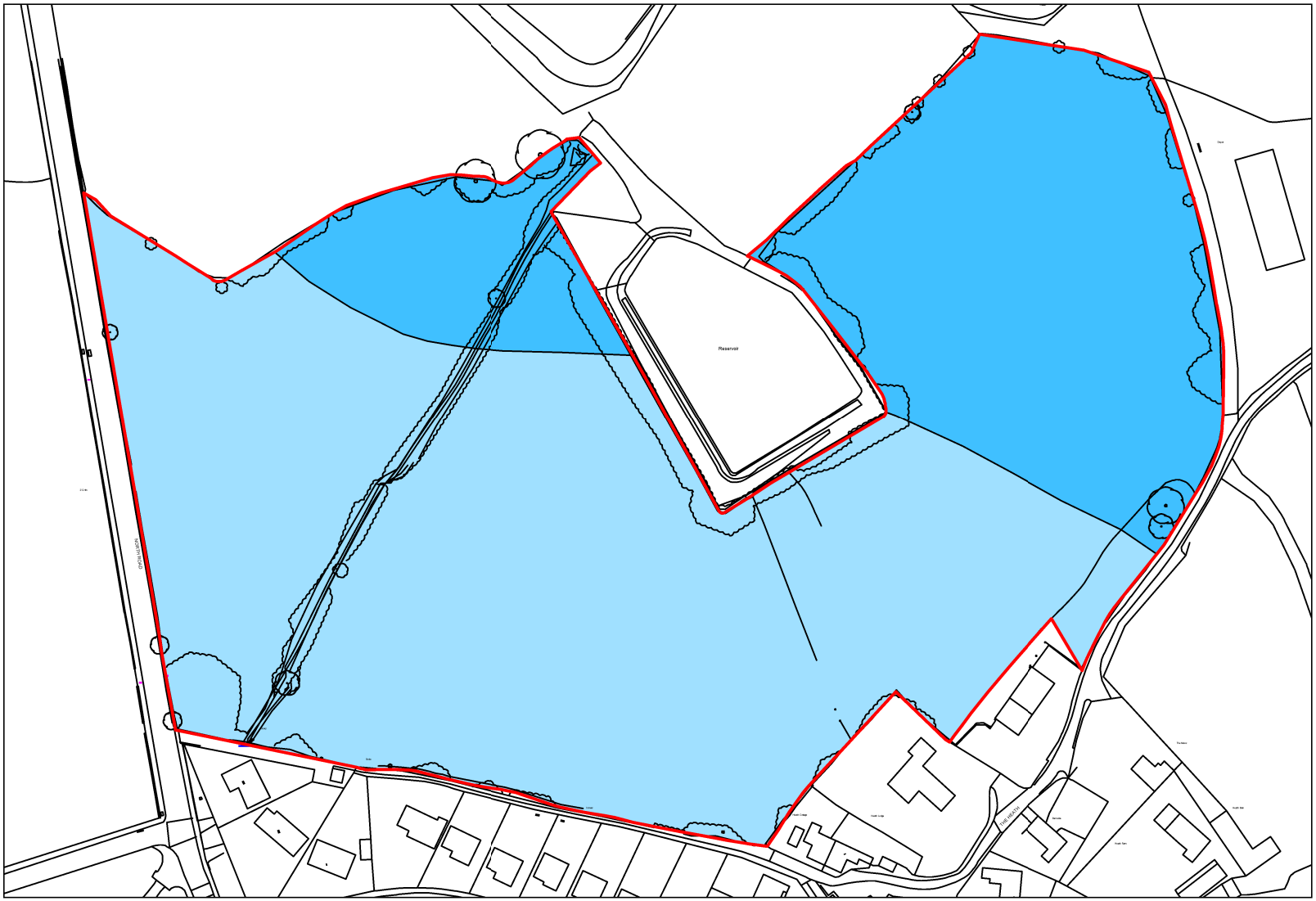
a depth underlined (e.g. 50) indicates the top of a slowly permeable layer

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
- st – stony;, v st – very stony
- gr – greyish, br – brownish, r - reddish

This page has been left intentionally blank



KEY

Survey area

Medium clay loam topsoil over heavy clay loam subsoil

Medium or heavy clay loam topsoil over clay subsoil

Client:

GLADMAN

Project:

North Road
Glossop

Map title:

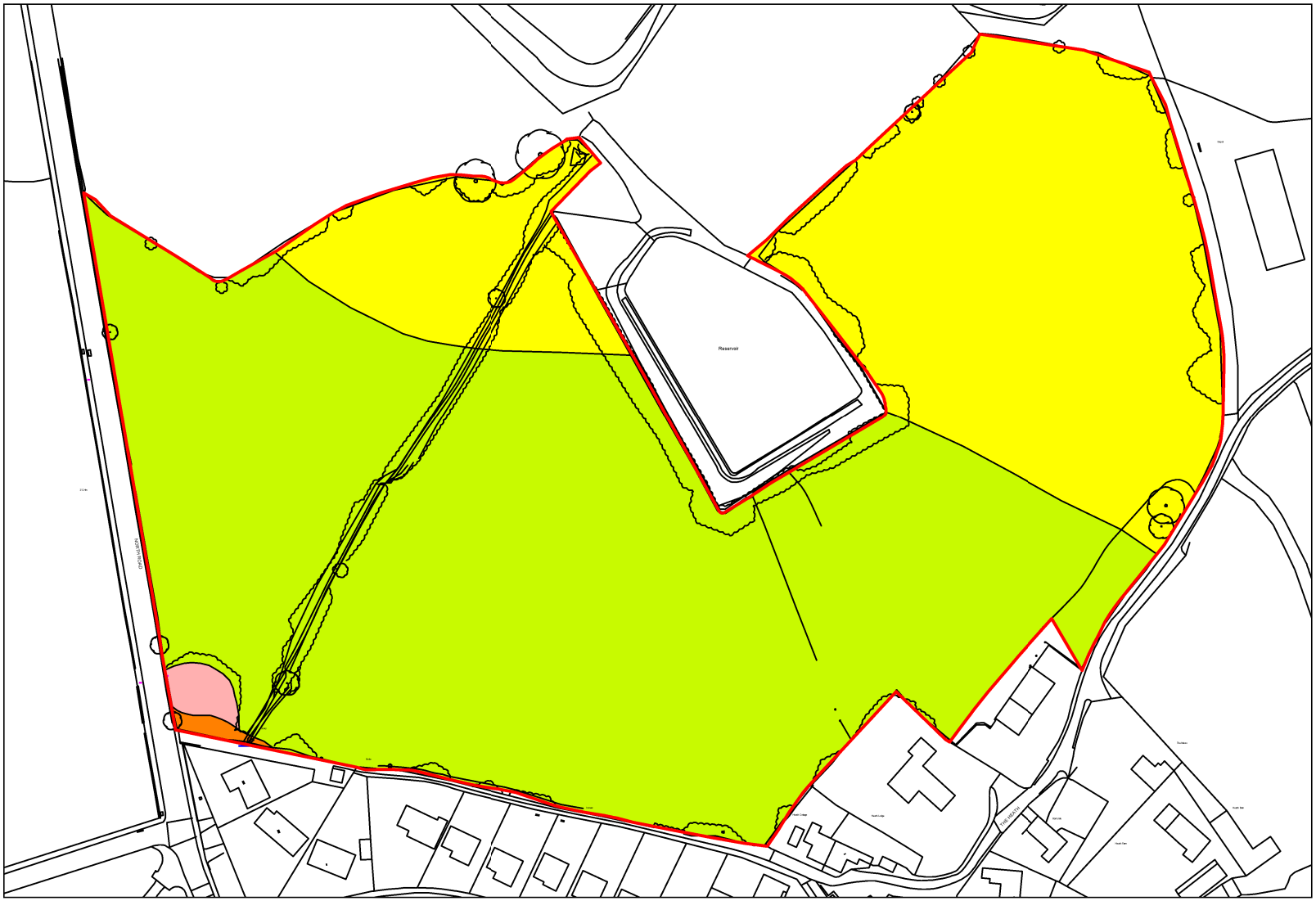
Map 1
Soil resources

Land Research Associates
Lockington Hall
Lockington, Derby DE74 2RH
Tel: 01509 670570

Scale:
1:2,000 at A4

Date:
30/11/2012

This page has been left intentionally blank



KEY

- Survey area
- Sub-grade 3b
- Grade 4
- Grade 5
- Other land

Client:

GLADMAN

Project:

North Road
Glossop

Map title:

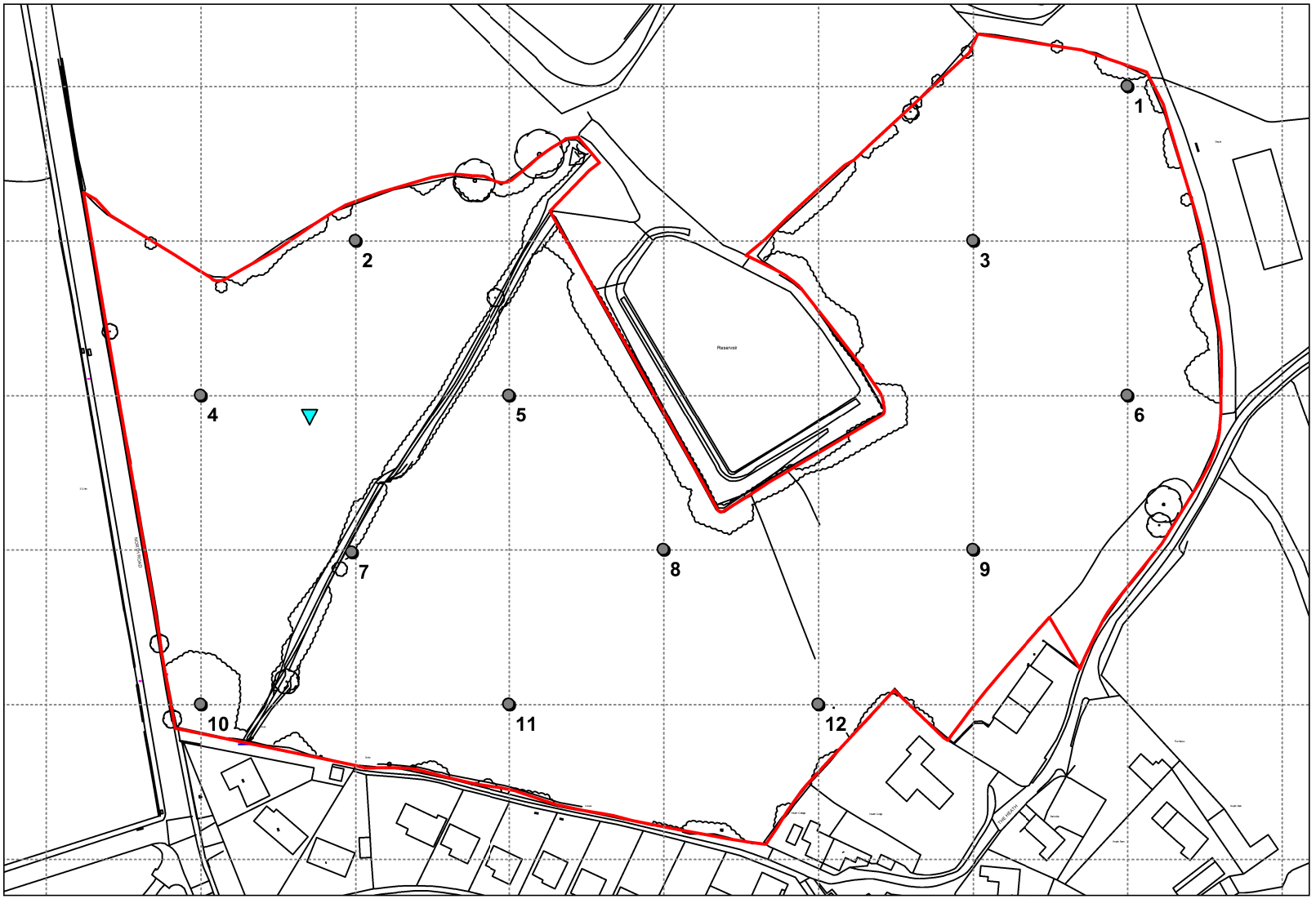
Map 2
Agricultural
Land Quality

Land Research Associates
Lockington Hall
Lockington, Derby DE74 2RH
Tel: 01509 670570

Scale:
1:2,000 at A4

Date:
30/11/2012

This page has been left intentionally blank



KEY

Survey area

Location of survey observations

Soil and land grade description pits

Client:

GLADMAN

Project:

North Road
Glossop

Map title:

Map 3
Survey Observations

Land Research ASSOCIATES
Lockington Hall
Lockington, Derby DE74 2RH
Tel: 01509 670570

Scale:
1:2,000 at A4

Date:
30/11/2012