NOTTINGHAMSHIRE MINERALS LOCAL PLAN CALL FOR SITES

SITE NAME: LANGFORD QUARRY

LOCATION : SOUTH & WEST EXTENSION

	Plan Reference/Evidence	Additional Information
Proposed boundary of the site	See Plan L020SG415	As covered by planning application ref 3/16/01689/CMA submitted to Notts CC in September 2016. Planning application still subject to ongoing consultation ,with target determination date March 2018.
The extent of excavations	See Plan L020SG415	Phases B-G as shown on submitted working plan.
Proposed access to the site	See Plan L020SG415	Existing dedicated quarry access road off A1133 Gainsborough Road.
Potential location of processing plant	See Plan L020SG415	Existing processing plant and stock yard.
Phasing	See Plan L020SG415	As shown on plan submitted with planning application.
An OS Map of the site	See Plan L020SG415	As shown on plans submitted with planning application.
Estimated number of HGV Movements per day/month/year		Up to 110 loads per day.

Reserve Data

	Plan Reference/Evidence	Additional Information
Quality and quantity of recoverable reserves		Estimated workable reserves of 3.6mt of sand and gravel. Good quality Trent Valley sand and gravel suitable for production of concreting aggregate.
Estimated output per annum		As historical output, circa 450,000t per annum.
Estimated lifespan of the mineral working (years)		Circa 8 years production.
When will the site be ready to be worked?		Subject to planning permission, Tarmac are seeking for operations to commence in mid 2018, to be operated in tandem with remaining 0.7 mt permitted reserves under planning permission ref 3/14/00040/CMA issued in March 2015.

Role of Sites/Market

	Plan Reference/Evidence	Additional Information
Is the site a new Greenfield site or an extension?		Extension.
If a Greenfield site, is it replacing an existing mineral working within or outside the county		
What is your planned market area?		As existing quarry, which has been operating since 1989. Market area is predominantly : Newark, Grantham, Lincoln ,Mansfield, Worksop, Retford (served by A1 , A46, A52, A57 Trunk road infrastructure

Is the location of the site optimum in terms of serving the market?		Yes

Availability of Mineral

	Plan Reference/Evidence	Additional Information
Do you have the legal rights to work all of the mineral including access to a public highway or any other transport route?		Tarmac own the freehold of the access road, processing plant and stock ground. Tarmac have a long term lease of the minerals and working rights in the current permission area and have Option rights to take further leases of the minerals and working rights over the majority of the extension area. Tarmac are securing the necessary Option rights from two separate owners of a small part of the extension area.

Landowner Consent

	Plan Reference/Evidence	Additional Information
Who is the legal owner of the site?		Tarmac has leases and contractual option agreements to lease the minerals and working rights from the owners of the surface and the minerals over the majority of the extension area.
Is the legal owner of the site also a minerals operator?		The owners of the land and the minerals in the extension area are not a mineral operator.
Has the legal owner made a formal agreement with any		Tarmac have been granted leases and Option to take leases of the mineral and mineral working rights over the majority of the extension area.

mineral operator for minerals exploration and/or minerals extraction?		All land and mineral owners covering the extension area have given their full support for Tarmac to submit planning application ref 3/16/01689/CMA and for the site to be promoted for allocation as a future sand and gravel extraction area.

Agricultural Land Classification

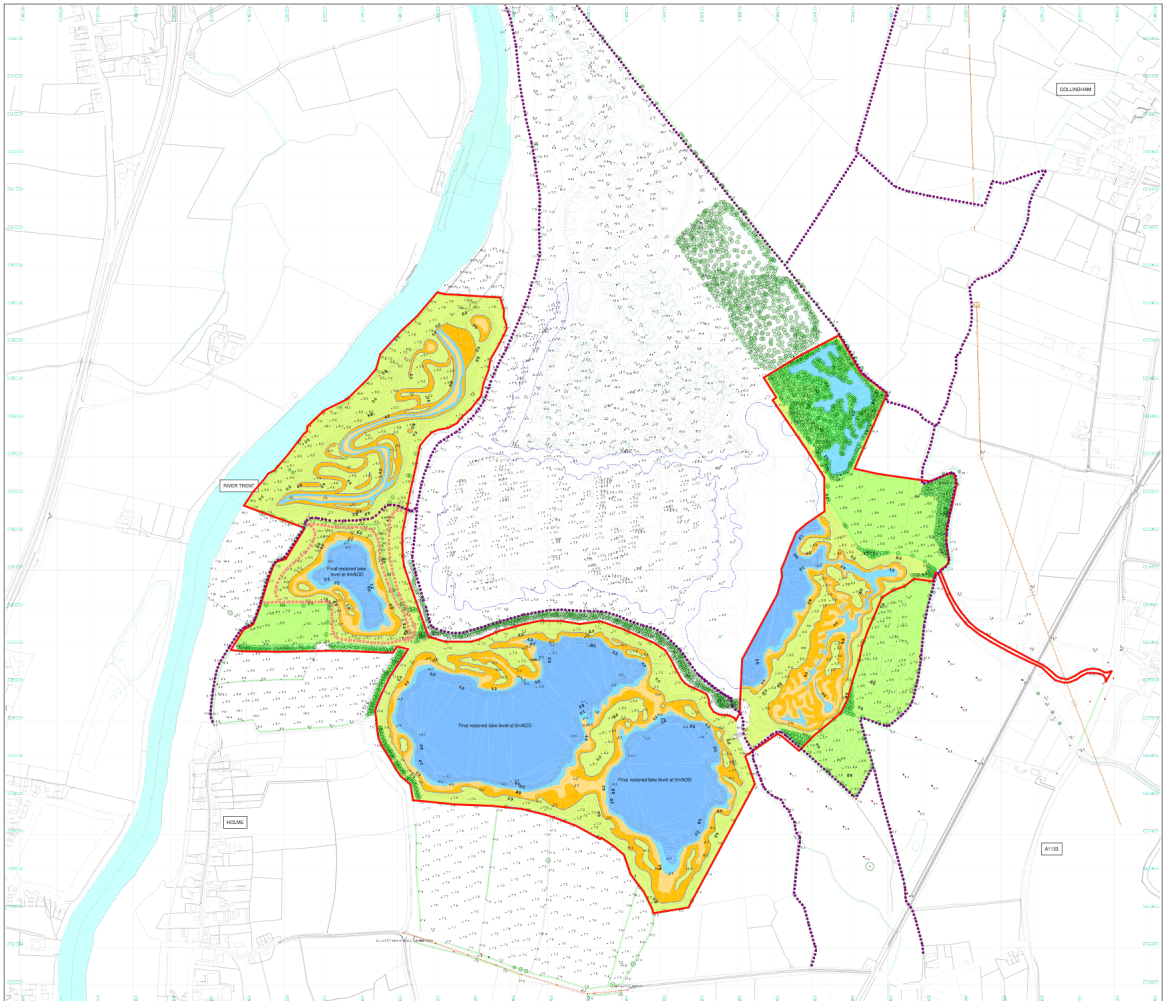
	Plan Reference/Evidence	**Additional Information**
Agricultural land classifications found within the site	See reports for Southern and Western extension areas	Predominantly grade 3b soils with some limited 3a on higher ground above flood inundation levels.

Sensitive Receptors

	Plan Reference/Evidence	**Additional Information**
Is the site located within 250m of any sensitive receptors? (schools, residential dwellings, workplaces, healthcare facilities)	See plan L020SG415	Proposed working scheme has taken account of residential properties on the northern edge of Holme village and appropriate stand off has been maintained to the north and west of Holme village.

Reclamation

	Plan Reference/Evidence	Additional Information	
Proposed reclamation schemes – what opportunities for environmental benefits do you see arising from the scheme?	See plan L20RE417	Restoration to predominantly water based nature conservation in line with the published RSPB "Bigger Better" vision for the restoration and after use of sand and gravel workings in the Trent Valley north of Newark. The restoration scheme enhances the existing RSPB reed bed based nature reserve complex on the main quarry and creates a variety of open water and shallow water bodies within surrounding riverside pasture on other areas. Permissive public access routes are proposed around one of the restored water bodies to link to existing public footpaths.	
Does the reclamation of the site depend on importing fill? If so, please indicate type of waste, main sources and timescales		Infill required?	No
		Type of waste	
		Main source of waste	
		Timescales	



LEGEND

- Lake margin restoration
- Shallows in lake margins with less than 0.8m of water depth at optimum lake levels.
- Shallows in lake margins with between 0.8m and 1.2m of water depth at optimum lake levels.
- Shallows in lake margins with between 1.2m and 2m of water depth at optimum lake levels.
- Deeper water areas with greater than 2m of water depth at optimum lake levels.
- Areas of restoration to agriculture or managed wetland meadows
- Areas of wet woodland restoration
- Areas of restoration woodland planting
- Existing public rights of way and access routes
- Proposed permissive footpaths to be created when land restored
- Planning application boundary

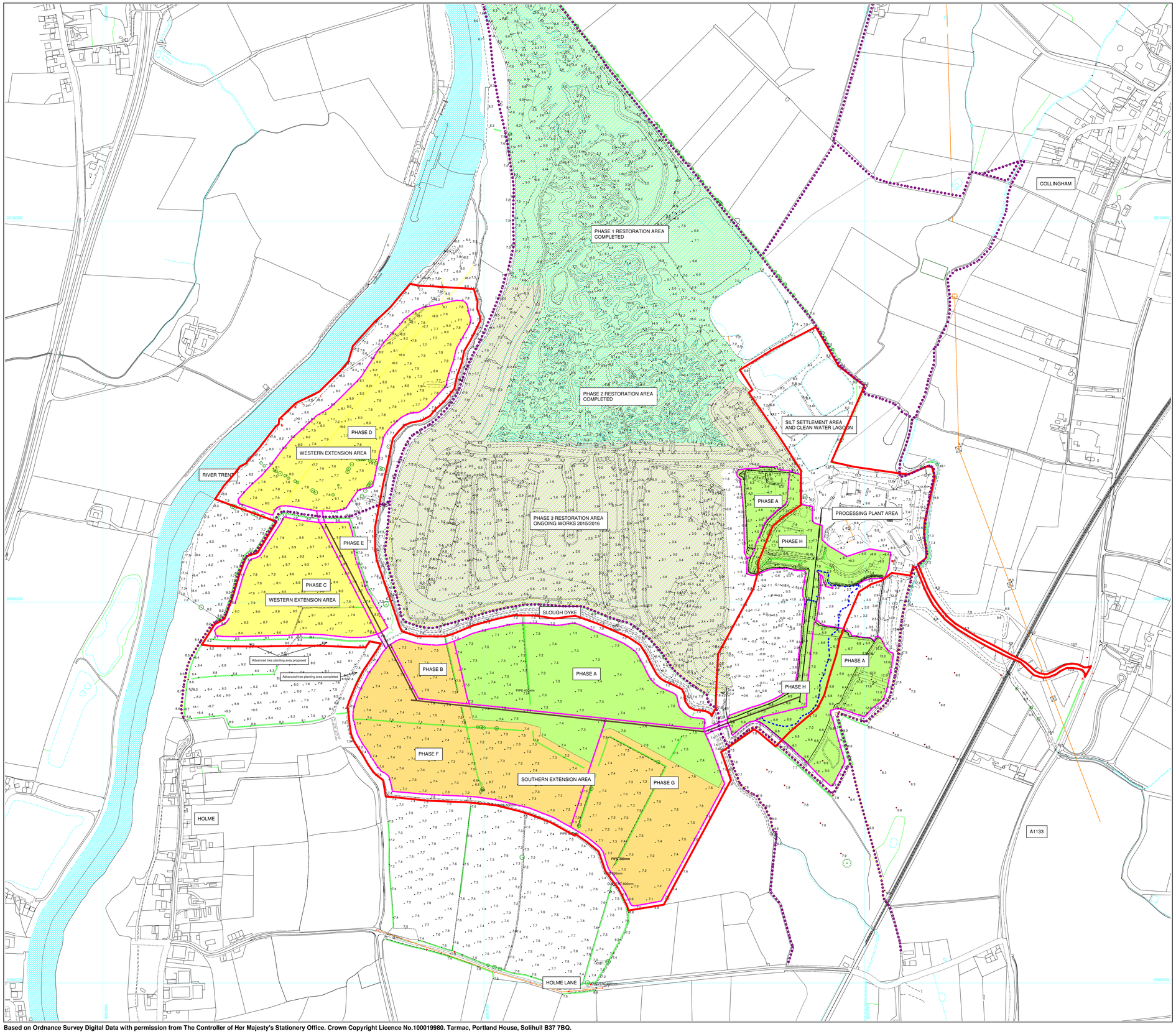
TARMAC
A CRH COMPANY

Site Name:
Langford Quarry

Drawing Name:
South and West Extension
Proposed restoration

Drawn By:	Scale:
N.G.Jones	1 : 5000
Date:	Drawing No:
18/05/2017	L20RE417.PDF

N



LEGEND

- Currently permitted area of sand and gravel extraction.
- Proposed Southern Extension Area
- Proposed Western Extension Areas
- Areas of completed restoration
- Areas undergoing restoration works 2015/2016
- Existing public rights of way and access routes
- Planning application boundary
- Operational access points between excavation areas

TARMAC
A CRH COMPANY

Site Name:
Langford Quarry

Drawing Name:
South and Western Extension Working Plan

Drawn By:	Scale:
N.G.Jones	1 : 5000
Date:	**Drawing No:**
23/10/2015	L020SG415.PDF

N

SOIL RESOURCES AND AGRICULTURAL USE & QUALITY OF PROPOSED SOUTHERN EXTENSION TO LANGFORD QUARRY, NEWARK

Report 1109/1

1st June 2015

Land Research ASSOCIATES

SOIL RESOURCES AND AGRICULTURAL USE & QUALITY OF PROPOSED SOUTHERN EXTENSION TO LANGFORD QUARRY, NEWARK

F.W Heaven BSc, MISoilSci

Report 1109/1

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

1st June 2015

SUMMARY

A survey of 27.1 ha of agricultural land to the south of Langford Quarry in Nottinghamshire has identified heavy soils, many with clay topsoils, over slowly permeable subsoils affected by fluctuating groundwater. Seasonal wetness is the principal limitation to agricultural use and the land is of moderate quality, belonging to sub-grade 3b.

Three soil resources have been identified; these include a heavy topsoil, a single clay or heavy clay loam subsoil and in some localities a sandy lower subsoil.

1.0 Introduction

1.1 This report provides information on the soil resources and agricultural quality and use of an area of 27.1 ha of land south of Langford Quarry, near Newark in Nottinghamshire. The land is proposed for a quarry extension. The report is based on a soil and agricultural desk study and a survey of the land in May 2015.

SITE ENVIRONMENT

1.2 The land lies to the south of the current quarry working and an area of land previously surveyed by Land Research Associates1 and designated as an "area of change to restoration". A drain runs around the western margin of the land and other site limits are marked mainly by field boundaries.

1.3 The land is generally nearly flat at around 7-8 m AOD. It is designated by the Environment Agency as having a significant risk of flooding (Flood Zone 3).

AGRICULTURAL USE

1.4 The land is currently in arable use and was cropped with winter cereals at the time of the survey.

1.5 Most of the land is subject to an Entry Level plus Higher level Environmental Stewardship agreement, part of a 296 ha contract.

PUBLISHED INFORMATION

1.6 The 1:50,000 BGS geological information shows the basal geology as Mercia Mudstone, though this is overlain by Flandrian alluvium comprising clay, silt, sand and gravel.

1.7 A detailed soil map2 at 1:25,000 scale shows that the land has stoneless clayey soils of the Fladbury series that are affected by groundwater.

1.8 Reconnaissance agricultural land classification (ALC) mapping carried out in the 1970s shows the study area as grade 3. There are no known published modern (post 1988) maps.

[1] Heaven, F W (2013) *Soil Resources and Agricultural Use and Quality of Land South of Langford Quarry, Newark* Land Research Associates Report 878/1

[2] Johnson P A. (1975) *Soils in Nottinghamshire II: Sheet SK 85(Newark on Trent)* Soil Survey Record No 26

2.0 Soils

2.1 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 May 2015. It was based on observations at intersects of a 100 m grid, giving a sampling 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 3) showing their location is in an appendix to this report.

2.3 The survey shows heavy textured soils developed in riverine alluvium across the entire area. The topsoils are most often clay textured, less often heavy clay loam, and stoneless. Similarly, the subsoil is predominantly clay, greyish brown in colour, with ochreous mottling indicating seasonal wetness. Lower subsoils of sandy texture occur in some localities.

2.4 An example profile from SK 81400 59700 (Map 3) is described below:

0-29 cm	Dark brown (10YR 3/3) stoneless clay, moderately developed coarse angular blocky structure; firm; 1% fine macropores; many fine fibrous roots; clear smooth boundary to:
29-55 cm	Greyish brown (10YR 5/2) stoneless clay with common strong brown (7.5YR 5/8) mottles; weakly developed coarse prismatic structure; firm; 1% very fine macropores; common fibrous roots; merging to:
50-100+ cm	Grey (10YR 5/1) clay, passing to heavy clay loam below, with many yellowish red (5YR 5/8) mottles; structureless, massive; firm; no visible pores; a few fine fibrous roots near the top of the layer; common ferri-manganiferous concentrations particularly at depth.

2.5 These soils are mainly slowly permeable, and are likely to be affected by fluctuating groundwater levels in this floodplain position (Soil Wetness Class III). Some browner soil types on slightly higher land may be less affected by wetness (Soil Wetness Class II). These soils have a poor capacity to absorb excess winter rainfall and they are limited in the range of food and fibre production they can support, with autumn sown crops and grasses being typical. They provide moist, neutral habitats for plant communities.

2.6 The soil resources of the site are 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 Classification3. The relevant site data for an average elevation of 8 m is given below, and shows a relatively dry agricultural climate with a build up of large summer moisture deficits.

• Average annual rainfall:	569 mm
• January-June accumulated temperature >0°C	1430 day°
• Field capacity period (when the soils are fully replete with water)	112 days early Dec – March
• Summer moisture deficits for:	wheat: 117 mm potatoes: 112 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 Food4.

SURVEY RESULTS

3.4 The agricultural quality over most of the study area is determined by surface wetness caused by slow drainage over slowly permeable subsoils, and fluctuating groundwater. The land is of grade 3 agricultural quality.

[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.

Sub-grade 3b

3.5 This sub-grade accounts for all of the land of the site, with soils similar to those described in paragraphs 2.3-2.4 (clay topsoils over clay subsoils). Seasonal wetness is the agricultural limitation. Although there are small patches of better-draining browner soils on slightly higher land these cannot be treated separately, so in practical agricultural terms the whole of the site behaves as sub-grade 3b land.

Grade areas

3.6 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 agricultural land*
Sub-grade 3b	27.1	100
Total	27.1	100

4.0 Soil resources and their use

4.1 Government policy as outlined in the Defra Soil Strategy for England and Department of Communities and Local Government's National Planning Policy Framework (paragraphs 109 and 143) is to protect valuable soil resources from loss or damage during land disturbance and ensure that stripped soils are used to either for land reinstatement after quarrying or other beneficial use off-site.

4.2 There are three soil resource units, one topsoil and two subsoils, which are described below and shown on Map 1.

Topsoil T1

4.3 All of the topsoil on the site is heavy textured and can be considered as one resource. It needs careful handling to retain its structure and should be stripped when as dry as possible. Most of the topsoils are around 300 mm thick, giving an estimated potential yield of 81,300 m3.

Subsoil S1

4.4 Although there is some variation in texture across the site, the upper subsoils are heavy textured and can be considered as a single resource. Such soil is easily damaged by mishandling and should be stripped when as dry as possible. The mean thickness of the resource could not be accurately estimated in this auger survey, because it continued below 1200 mm depth so beyond auger reach.

Subsoil S2

4.5 In some localities sandy lower subsoil occurs but this is patchy in distribution and not a contiguous resource. It will probably be taken as mineral during working. This subsoil usually occurs below 500 mm depth.

Soil Handling and Restoration

4.6 All soil resources are easily damaged by being stripped or moved when wet. Consequently, stripping should only take place in the driest parts of the year, using the excavator and dumper method as described by Sheet 1 in the MAFF

Good Practice Guide for Handling Soils[5].

4.7 If direct placement of stripped soils onto areas being restored is not possible, the resources should be stripped and stored separately in low bunds (no more than 3 m high for topsoil). Topsoil should be stripped from areas designated for storing subsoil. The bunds should be constructed either by excavator or bulldozer (Sheets 2 and 14 in the MAFF Good Practice Guide) avoiding over-compaction. They should be sown with grass to help maintain biological activity and prevent water erosion.

4.8 The soils should be removed from storage (Sheet 3 in the MAFF Good Practice Guide) and replaced by excavator during the summer using the loose tipping technique (Sheet 4 in MAFF Good Practice Guide), which avoids traffic on the restored surfaces.

[5] MAFF Good Practice Guide for Handling Soils, (www.defra.gov.uk/farm/environment/land-use/soilguid/)

5.0 Conclusions

5.1 A survey of 27.1 ha of agricultural land to the south of Langford Quarry in Nottinghamshire has shown that

- The land has heavy soils, many with clay topsoils, over slowly permeable subsoils affected by fluctuating groundwater.
- Seasonal wetness is the principal limitation to agricultural land quality and the majority of the land is of moderate quality in sub-grade 3b.
- Three soil resources have been identified; these include a heavy topsoil, a single clay or heavy clay loam subsoil and in some localities a sandy lower subsoil.

APPENDIX

MAPS AND DETAILS OF OBSERVATIONS

Langford Quarry Southern Extension: ALC and soil resources survey May 2015 - 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
1	0-30	C	0	30-110	C	xxx				0	III	3b	W
2	0-35	C	0	35-100+	C	xxx				0	III	3b	W
3	0-30	C	0	30-45	C	xx(x)	45-110	C	xxx	0	II/III	3a/3b	W
4	0-30	C	0	30-45	C	xx(x)	45-110 110-120	C HCL	xxx xxx	0	II/III	3a/3b	W
5	0-30	C	0	30-75	C	xxx	75-110	MS	xx	0	III	3b	W
6	0-26	C	0	26-110	C	xxx				0	III	3b	W
7	0-30	C	0	30-110	C	xxx				0	III	3b	W
8	0-30	C	0	30-90	C	xxx	90-120	MS	xx	0	III	3b	W
9	0-26	C	0	26-120	C	xxx				0	III	3b	W
10	0-28	HCL	0	28-78	C	xxx	78-110	MS	xxx	0	III	3b	W
11	0-30	C	0	30-45	C	xx	45-60 60-110	HCL SCL	xxx xxx	0	II	3b	W
12	0-28	C	0	28-80	C	xxx	80-120	SCL	xxx	0	III	3b	W
13	0-28	C	0	28-50	C	xxx	50-120	C	xxxx	0	III	3b	W
14	0-23	C	0	23-50	C	xxx	50-70 70-120	SCL MS	xxx xxx	0	III	3b	W
15	0-30	C	0	30-60	C	xxx	60-110	C	xxxx	0	III	3b	W
16	0-30	HCL	0	30-40	C	xx(x)	40-110	C	xxx	0	II/III	3b	W
17	0-30	C	0	30-110		xxxx	110-120	hSCL	xxx	0	III	3b	W
18	0-27	C	0	27-110	C	xxx				0	III	3b	W
19	0-28	C	0	28-70	C	xxx	70-120	MS	xxx	0	III	3b	W
20	0-30	C	0	30-45	HCL	xxx	45-120	C	xxxx	0	III	3b	W
21	0-25	C	0	25-120	C	xxx				0	III	3b	W
22	0-28	C	0	28-110	C	xxx	110-120	SCL	xxx	0	III	3b	W
23	0-30	C	0	30-120	C-HCL	xxx				0	III	3b	W
24	0-29	C	0	29-120	C	xxx				0	III	3b	W
25	0-28	C	0	28-55	C	xxx	55-65 65-110	SCL MS	xxx xx	0 0	III III	3b 3b	W W
26	0-30	C	0	30-89	C	xxx	89-120	MS	xxx	0	III	3b	W
27	0-28	C	0	28-120	C	xxxx				0	III	3b	W
28	0-30	HCL	0	30-110	C	xxx	110-120	HCL	xxx	0	III	3b	W
29	0-30	C	0	30-110	C	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 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:

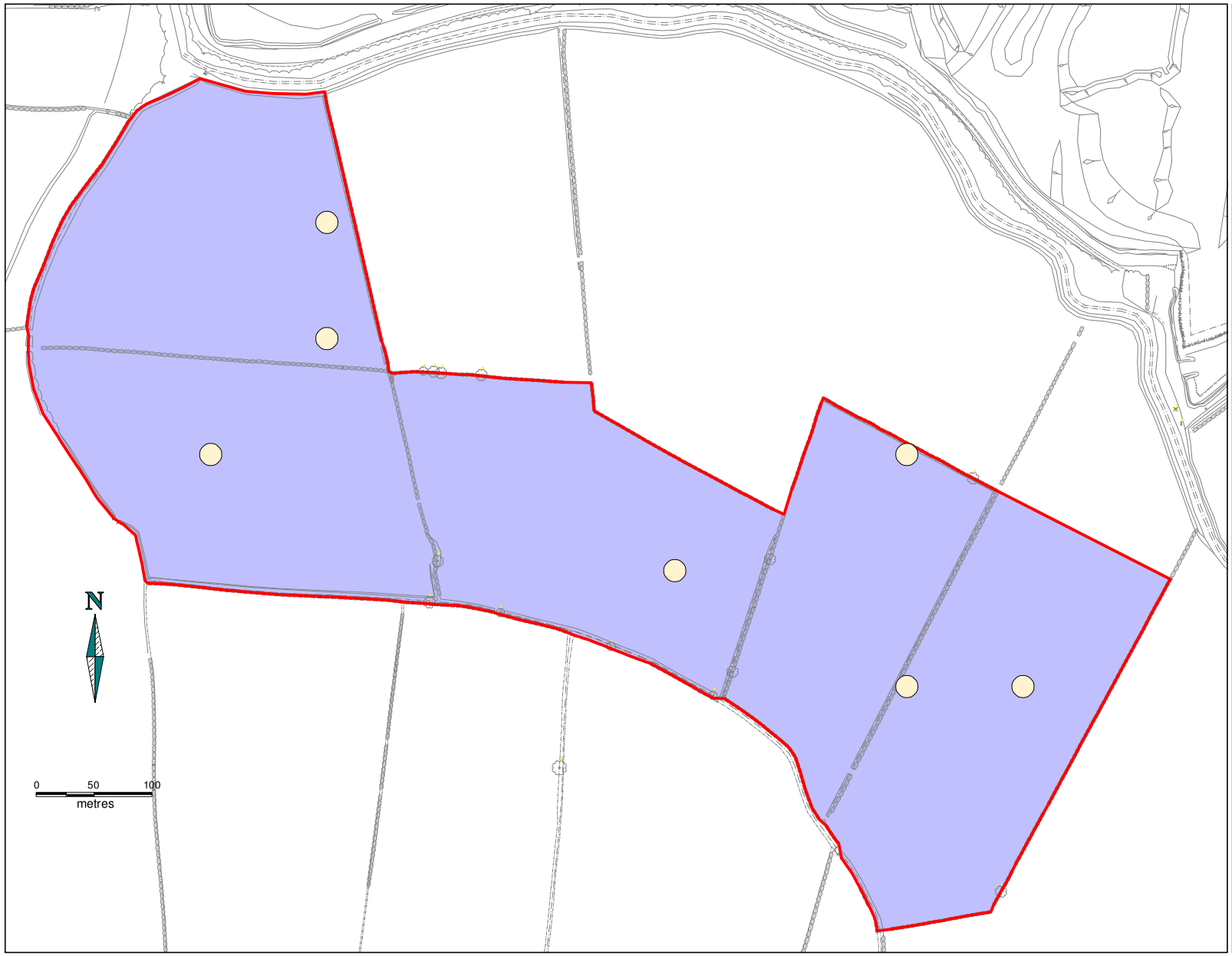
C - clay
ZC - silty clay
SC - sandy clay
CL - clay loam (H-heavy, M-medium)
ZCL - silty clay loam (H-heavy, M-medium)
SCL - sandy clay loam
SZL - sandy silt loam (F-fine, M-medium,C-coarse)
SL - sandy loam (F-fine, M-medium, C-coarse)
LS - loamy sand (F-fine, M-medium, C-coarse)
S - sand (F-fine, M-medium, 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
h –organic ;
gr – greyish, br – brownish, r - reddish



KEY

Heavy topsoil (T1) over clay subsoil (S1)

Sandy lower subsoiil (S2) observed within 1000 mm depth

Survey area

Client

LAFARGE TARMAC

Project

Langford Quarry
Southern Extension

Map

Map 1
Soil Resources

Land Research ASSOCIATES

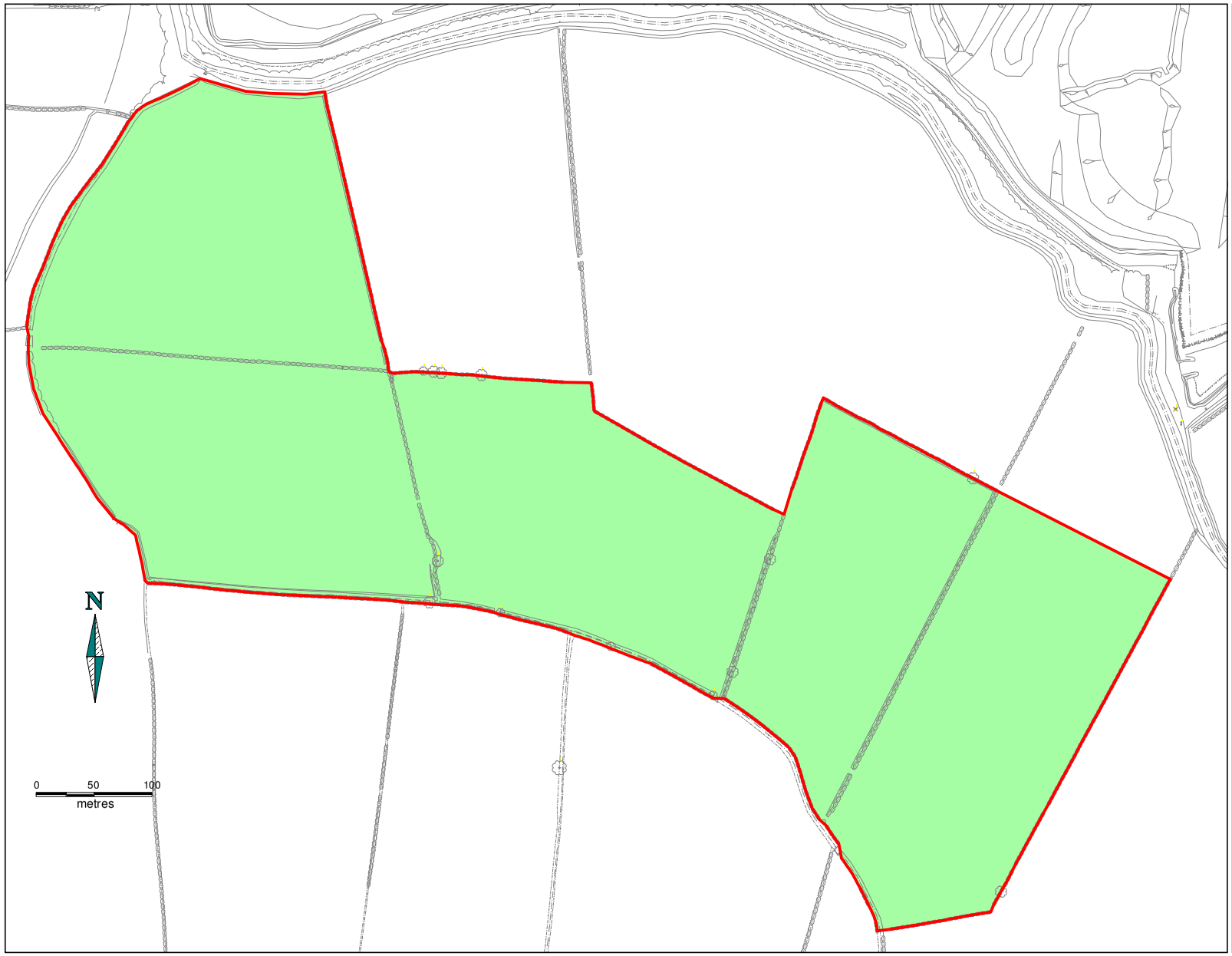
Lockington Hall
Lockington
Derby DE74 2RH
Tel: 01509 670470

Scale

1:5,000 at A4

Date

1/6/2015



KEY

Sub-grade 3b

Survey area

Client

LAFARGE TARMAC

Project

Langford Quarry
Southern Extension

Map

Map 2
Agrricultural Land Quality

Land Research ASSOCIATES

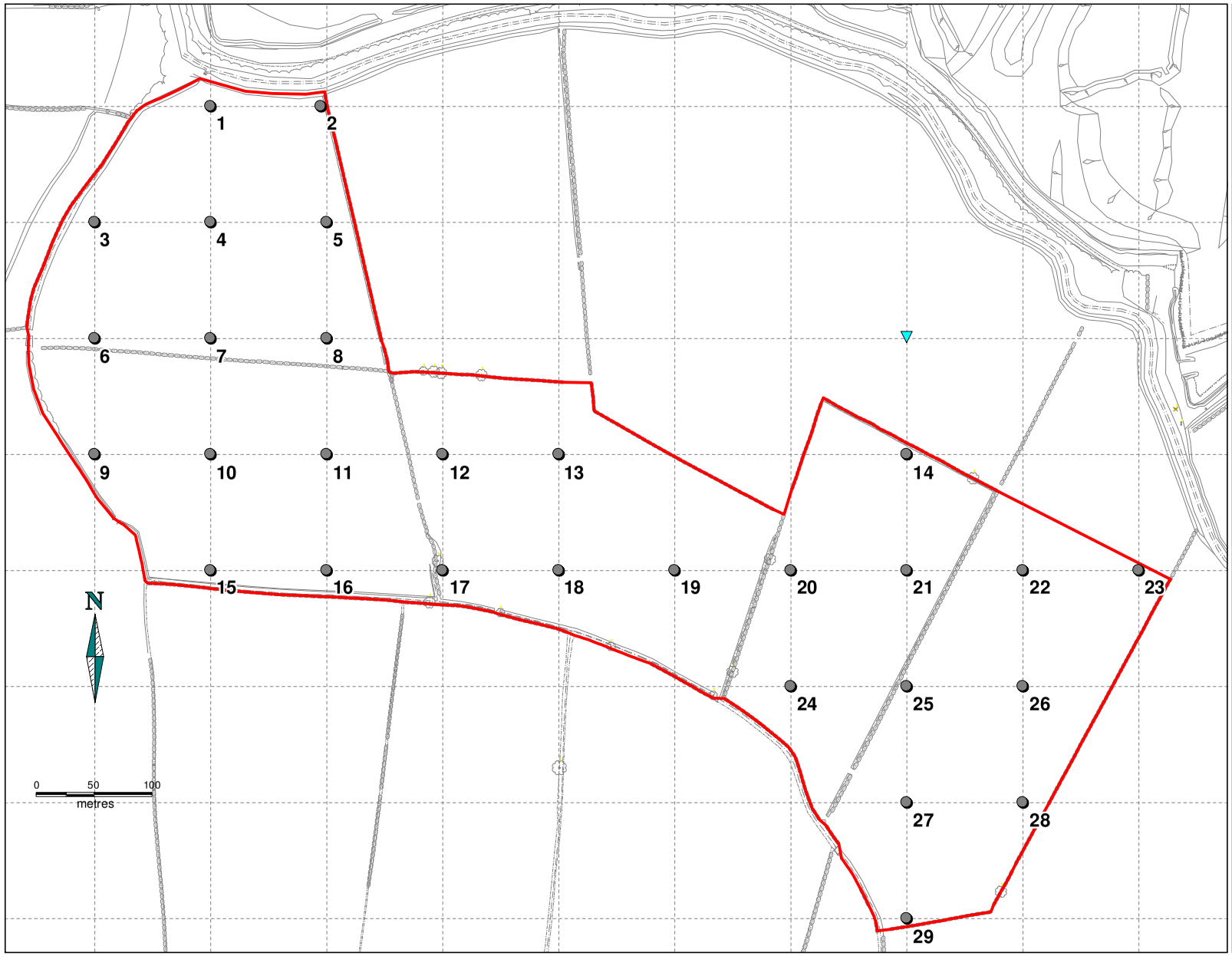
Lockington Hall
Lockington
Derby DE74 2RH
Tel: 01509 670470

Scale

1:5,000 at A4

Date

1/6/2015



KEY

- Auger location
- Soil description pit
- Survey area

Client

LAFARGE TARMAC

Project

Langford Quarry Southern Extension

Map

Map 3 Location of the observations

Land Research ASSOCIATES

Lockington Hall
Lockington
Derby DE74 2RH
Tel: 01509 670470

Scale

1:5,000 at A4

Date

1/6/2015

SOIL RESOURCES AND AGRICULTURAL USE & QUALITY OF PROPOSED WESTERN EXTENSION TO LANGFORD QUARRY, NEWARK

Report 1109/2a

11th August 2015

Land Research ASSOCIATES

SOIL RESOURCES AND AGRICULTURAL USE & QUALITY

OF PROPOSED WESTERN EXTENSION

TO LANGFORD QUARRY, NEWARK

F.W Heaven BSc, MISoilSci

Report 1109/2a

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

11th August 2015

SUMMARY

A survey of 32 ha of agricultural land to the west of Langford Quarry in Nottinghamshire has shown that the lower lying land has heavy loamy soils with brown relatively permeable subsoils, some affected by fluctuating groundwater. The higher land in arable use has deep sandy soils. Risk of flooding is the principal limitation to agricultural quality in the lower lying land and this is classed as sub-grade 3b quality. The higher land is limited by droughtiness to sub-grade 3b. There is some land of sub-grade 3a on higher land above the frequent flooding level.

Four soil resources have been identified. These include one sandy topsoil and one sandy subsoil from the higher ground, and one heavy loam topsoil and one heavy loam subsoil from the lower ground.

1.0 Introduction

1.1 This report provides information on the soil resources and agricultural quality and use of an area of 32 ha of land west of Langford Quarry, near Newark in Nottinghamshire, proposed for a quarry extension. The report is based on a soil and agricultural desk study, and a survey of the land in early June 2015.

SITE ENVIRONMENT

1.2 The current quarry workings are bounded in the west by the Slough Dyke which forms the eastern margin of the proposed extension. The River Trent runs along the western edge and the southern edge is marked by field boundaries.

1.3 The land is close to the river is generally nearly flat at around 8 m AOD. A ridge of higher ground with elevation up to 10 m AOD runs from the southern margin about one third of the way up the site. The land is designated by the Environment Agency as having a significant risk of flooding. The lower lying land is at high risk, whilst that on the higher ground is of low or medium risk.

1.4 Parts of the floodplain grassland has a complex microrelief with drainage creeks passing through it. In the northern part is a lower lying terrace close to the river.

AGRICULTURAL USE

1.5 The higher land is in arable use and was cropped with potatoes supported by irrigation at the time of the survey. The land to the north is grassland with grazing cattle. It is designated as a coastal and floodplain grazing marsh.

1.6 Most of the land is subject to Entry Level plus Higher level Environmental Stewardship agreements, one part of a 296 ha contract, and one field part of a 127 ha contract.

PUBLISHED INFORMATION

1.7 The 1:50,000 BGS geological information shows the basal geology as Mercia Mudstone, but this is overlain by Flandrian alluvium comprising clay silt sand and gravel, and with Pierrepont sands and gravels on hills in the south.

1.8 A detailed soil map[1] at 1:25,000 scale shows that the land immediately to the south has deep stoneless permeable fine loamy soils of the Wharfe series on lower lying land close to the river, and deep well drained sandy soils of the Newport series on the higher ground in the south. The National Soil Map[2] T 1:250,000 scale shows the lower lying land as Wharfe association comprising deep stoneless permeable fine loamy soils and some similar soils affected by groundwater. The higher ground is shown in Newport association comprising deep well drained sandy and coarse loamy soils, some affected by groundwater.

1.9 Reconnaissance agricultural land classification (ALC) mapping carried out in the 1970s shows the study area as grade 3. There are no known published modern (post 1988) maps.

[1] Johnson P A. (1975) *Soils in Nottinghamshire II: Sheet SK 85(Newark on Trent)* Soil Survey Record No 26
[2] Ragg, J.M. *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 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 buffer against pollution.

2.2 A detailed soil resource and agricultural quality survey was carried out in May 2015. It was based on observations at intersects of a 100 m grid, giving a sampling 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 3) showing their location is in an appendix to this report.

2.3 The survey shows three principal soil types. On the higher ground the soils are sandy with a few stones, and on most of the lower ground the soils are loamy and dominantly brown in colour. Close to the river in the north is an area of lighter soils, probably still actively accruing river sediment.

Sandy soils

2.4 These soils are on the higher ground in the south of the survey site. The topsoil is loamy sand or sand and has a few small rounded quartzite stones. It overlies loamy sand or sand slightly stony subsoil which is brown in colour and rarely shows signs of seasonal wetness.

2.5 An example profile from observation 28 (Map 3) is described below:

0-29 cm	Dark brown (10YR 3/3) loamy medium sand; 1% small rounded quartzite stones; weakly developed fine subangular blocky structure; friable; no visible macropores; many fine fibrous roots; clear smooth boundary to:
29-110 cm	Dark yellowish brown (10YR 4/5) medium sand; 1% small rounded quartzite stones; structureless, single grain; friable to loose; no visible macropores; common fibrous roots reducing in number with depth.

2.6 These soils are very permeable and drain freely (wetness class I). They are easy to cultivate in spring and can support a wide range of food and fibre production although their limited reserves of soil moisture will reduce yields unless irrigation is used. They have a good capacity to absorb excess winter rainfall, but have a small capacity to attenuate potential contaminants falling on the surface. They provide dry, neutral habitats for plant communities.

Deep loamy soils.

2.7 These are common on the upper terrace of the Trent floodplain. The topsoil is stoneless heavy clay loam or clay and dark coloured. The upper subsoils are heavy clay loam or clay and mainly brown in colour. Over some of the site the subsoil remains brown to depth, but in other areas there is a lower subsoil showing slight mottling indicating wetness due to rising groundwater.

2.8 An example profile from observation 13 (Map 3) is described below:

0-31 cm	Very dark greyish brown (10YR 3/2) (dark brown (10YR 3/3) rubbed colour) stoneless heavy clay loam;; 1% small rounded quartzite stones; weakly developed fine subangular blocky structure; friable; no visible macropores; many very fine fibrous roots; clear smooth boundary to:
31-65 cm	Brown to dark brown (10YR 4/3) stoneless clay with a few yellowish red (5YR 5/8) mottles; moderately developed medium angular blocky structure; firm; common medium and fine macropores; common very fine fibrous roots; merging to:
65-100+ cm	Greyish brown (10YR 5/2) stoneless clay with common strong brown (7.5YR 5/6) mottles; weakly developed coarse prismatic structure; firm; 1% fine macropores; a few fine fibrous roots.

2.9 Although there is some variation, the soils are relatively permeable, and wetness is likely to be the result of rising groundwater (wetness class I or II). The soils are developed in a floodplain and are likely to be inundated occasionally during wet periods, although they have a good capacity to absorb excess winter rainfall, and attenuate any potential pollutants falling on the surface.

Light soils close to the river

2.10 These occur on the lowest level on the site next to the river. They have sandy silt loam topsoils, some calcareous. The subsoils are similarly textured and a mixture of subsoil material and layers with organic content similar to the topsoils. Their position near river level is likely to be flooded regularly.

2.11 The soil resources are 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 8 m is given below, and shows a relatively dry agricultural climate with a build up of large summer moisture deficits.

• Average annual rainfall:	569 mm
• January-June accumulated temperature >0°C	1430 day°
• Field capacity period (when the soils are fully replete with water)	112 days early Dec – March
• Summer moisture deficits for:	wheat: 117 mm potatoes: 112 mm

3.3 A hydrological study based on river flow[4] between October 1968 and September 2014 indicates that the river floods the lower lying land in winter approximately once every two years, and that the average duration of flooding is 2.7 days. This is frequent medium duration flooding as defined in *The Guidelines and Criteria for Grading the Quality of Agricultural Land*[5] .

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

[3] *Climatological Data for Agricultural Land Classification*. Meteorological Office, 1989
[4] *Pers.comn* Richard Laker BSc MSc FGS, Hydrologist

agricultural land classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food[5].

SURVEY RESULTS

3.5 The agricultural quality in the survey area is determined partly by wetness caused by rising groundwater, partly by droughtiness, and partly by flooding risk. Land of grade 3 agricultural quality exists on the site.

Subgrade 3a

3.6 This accounts for 6 ha of the site partly where there are soils similar to those described in paragraphs 2.7-2.8 and rising groundwater causes slight seasonal wetness. These occur on slopes and in areas protected from frequent flooding risk.

Sub-grade 3b

3.7 This sub-grade accounts for 26 ha. On land with sandy soils similar to those described in paragraphs 2.4 -2.5, droughtiness in crops because of lack of moisture holding capacity in the soils is the principal agricultural limitation.

3.8 Land close to the river is classed as sub-grade 3b because of the risk of frequent flooding.

Grade areas

3.9 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 agricultural land*
Sub-grade 3a	6.3	20
Sub-grade 3b	25.7	80
Total	32.0	100

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

4.0 Soil resources and their use

4.1 Government policy as outlined in the Defra Soil Strategy for England and Department of Communities and Local Government's National Planning Policy Framework (paragraphs 109 and 143) is to protect valuable soil resources from loss or damage during land disturbance and ensure that stripped soils are used to either for land reinstatement after quarrying or other beneficial use off-site.

4.2 There are four soil resource units, two topsoils and two subsoils, which are described below and shown on Map 1.

Topsoil T1

4.3 The topsoils from the higher ground of the site are sandy with a few small stones. Such soils can be handled at most times of the year but is prone to wind erosion from bare ground in spring. Most of the topsoils are around 300 mm thick, giving an estimated potential yield of 19,800 m^3.

Topsoil T2

4.4 The topsoils from the lower lying areas of the site are well structured heavy clay loam or clay and can be considered as a single resource. They need careful handling to maintain their structure and should be stripped when dry. The thickness is variable and is greatest in the arable land. The average thickness is 260 mm giving a potential yield of 62,400 m^3.

Subsoil S1

4.5 Beneath the sandy topsoil T1 is a sandy subsoil S1 to be handled in a similar way to the topsoil. The thickness of the resource could not be determined by the auger survey as it passed below 1200 mm depth.

Subsoil S2

4.6 Although there is some variation in texture across the site, the subsoils of the loamy are heavy textured and can be considered as a single resource. It is easily damaged by mishandling and should be stripped when as dry as possible. The mean thickness of the resource could not be accurately estimated in this auger survey, because it continued below 1200 mm depth so beyond auger reach.

4.7 The light loamy soils close to the river are of mixed texture and unlikely to be

stripped.

Soil Handling and Restoration

4.8 All soil resources are easily damaged by being stripped or moved when wet. Consequently, stripping should only take place in the driest parts of the year, using the excavator and dumper method as described by Sheet 1 in the MAFF Good Practice Guide for Handling Soils[6].

4.9 If direct placement of stripped soils onto areas being restored is not possible, the resources should be stripped and stored separately in low bunds (no more than 3 m high for topsoil). Topsoil should be stripped from areas designated for storing subsoil. The bunds should be constructed either by excavator or bulldozer (Sheets 2 and 14 in the MAFF Good Practice Guide) avoiding over-compaction. They should be sown with grass to help maintain biological activity and prevent water erosion.

4.10 The soils should be removed from storage (Sheet 3 in the MAFF Good Practice Guide) and replaced by excavator during the summer using the loose tipping technique (Sheet 4 in MAFF Good Practice Guide), which avoids traffic on the restored surfaces.

[6] MAFF Good Practice Guide for Handling Soils, (www.defra.gov.uk/farm/environment/land-use/soilguid/)

5.0 Conclusions

5.1 A study and survey of 32 ha of agricultural land to the west of Langford Quarry in Nottinghamshire has shown that

- The lower lying land has heavy loamy soils, with brown relatively permeable subsoils, some affected by fluctuating groundwater. The higher land in arable use has deep sandy soils.
- Risk of flooding is the principal limitation to agricultural quality in the lower lying land and this is classed as sub-grade 3b quality. The higher land is limited by droughtiness to sub-grade 3b. There is some land of sub-grade 3a on higher land above the frequent flooding level.
- Four soil resources have been identified. These include one sandy topsoil and one sandy subsoil from the higher ground, and one heavy loam topsoil and one heavy loam subsoil from the lower ground.

APPENDIX

MAPS AND DETAILS OF OBSERVATIONS

Langford Quarry Western Extension: ALC and soil resources survey June 2015 - 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
1	0-20	HCL	0	20-110	FSZL+MCL	o				0	1	3b	FI
2	0-20	HCL	0	20-60	HZCL	o	60-75 75-110	HCL C	x xxx	0	II	3b	FI
3	0-30	FSZL	0	30-110	FSZL+MCL	o				0	I	3b	FI
4	0-30	HCL	0	30-45	HCL	xx	45-110	C	xxx	0	II	3b	FI
5	0-20	HCL-C		20-110	C	o				0	I	3b	FI
6	0-20	HCL	0	20-60	HCL	o	60-90 90-120	C HCL	o o	0	I	3b	FI
7	0-20	HCL	0	20-90	SCL-MSZL	o	90-110	MSL	o	0	I	3b	T, FI
8	0-30	HCL	0	30-120	HCL	o				0	I	3b	FI
9	0-15	ca MSZL	0	15-100	MSZL mixed	o				0	I	3b	FI
10	0-20	C	0	20-110	br HCL	o				0	I	3b	FI
11	0-20	C	0	20-110	br HCL-C	o				0	I	3b	FI
12	0-20	HCL	0	20-80	brHCL	o	80-120	HZCL	o	0	I	3b	FI
13	0-31	C	0	31-65	C	x	65-100	C	xxx	0	II	3b	FI
14	0-25	C	0	25-50	C	o	50-110	br C	xx	0	II	3b	FI
15	0-25	C	0	25-45	C	0-x	45-110	C	xx(x)		II	3b	FI
16	0-32	HCL-C	0	32-50	C	x	50-110	C	xx(x)	0	II	3b	FI
17	0-30	C	0	30-45	C	xx	45-110	C	xxx	0	II/III	3b	FI,W
18	0-30	HCL	0	30-110	HCL-C	o				0	I	2	W
19	0-28	HCL	0	28-70	SCL	o	70-110	C	xx	0	II	3b	FI
20	0-32	MSL	1	32-110	SCL-HCL	x	110-120	SCL	xx	0	II	1	
21	0-28	LMS	1	28-50	LMS	o	50-120	MS	o	0	II	3b	D
22	0-20	M-HCL	0	20-55	SCL-HCL	xx	55-110	C	xxx	0	II	3a	W
23	0-32	SCL-HCL	2	32-65	SCL	x	65-75	st MSL	xx	0	II	2/3a	W
24	0-28	LMS	1	28-70	LMS-MS	o	70-120	MS	o-x	0	I	3b	D
25	0-35	LMS	1	35-110	LMS	o	10-120	MSL	o	0	I	3b	D
26	0-20	HCL	0	20-30	HCL	o	30-110	C	xxx	0	III	3b	W
27	0-32	HCL	2	32-120	HCL	xx				0	II	3a	W
28	0-32	LMS	1	32-120	MS	o				0	I	3b	D
29	0-30	LMS	1	30-50	LMS	o	50-120	MS	o	0	I	3b	D
30	0-28	SCL-HCL	1	28-40	HCL-SCL	xx	40-110	C	xxx	0	II	2/3a	W
31	0-28	LMS	1	28-60	MS	o	60-120	MS	xx	0	I/II	3b	D

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. <u>50</u>) indicates the top of a slowly permeable layer
gr – greyish, br – brownish, r - reddish

Texture:

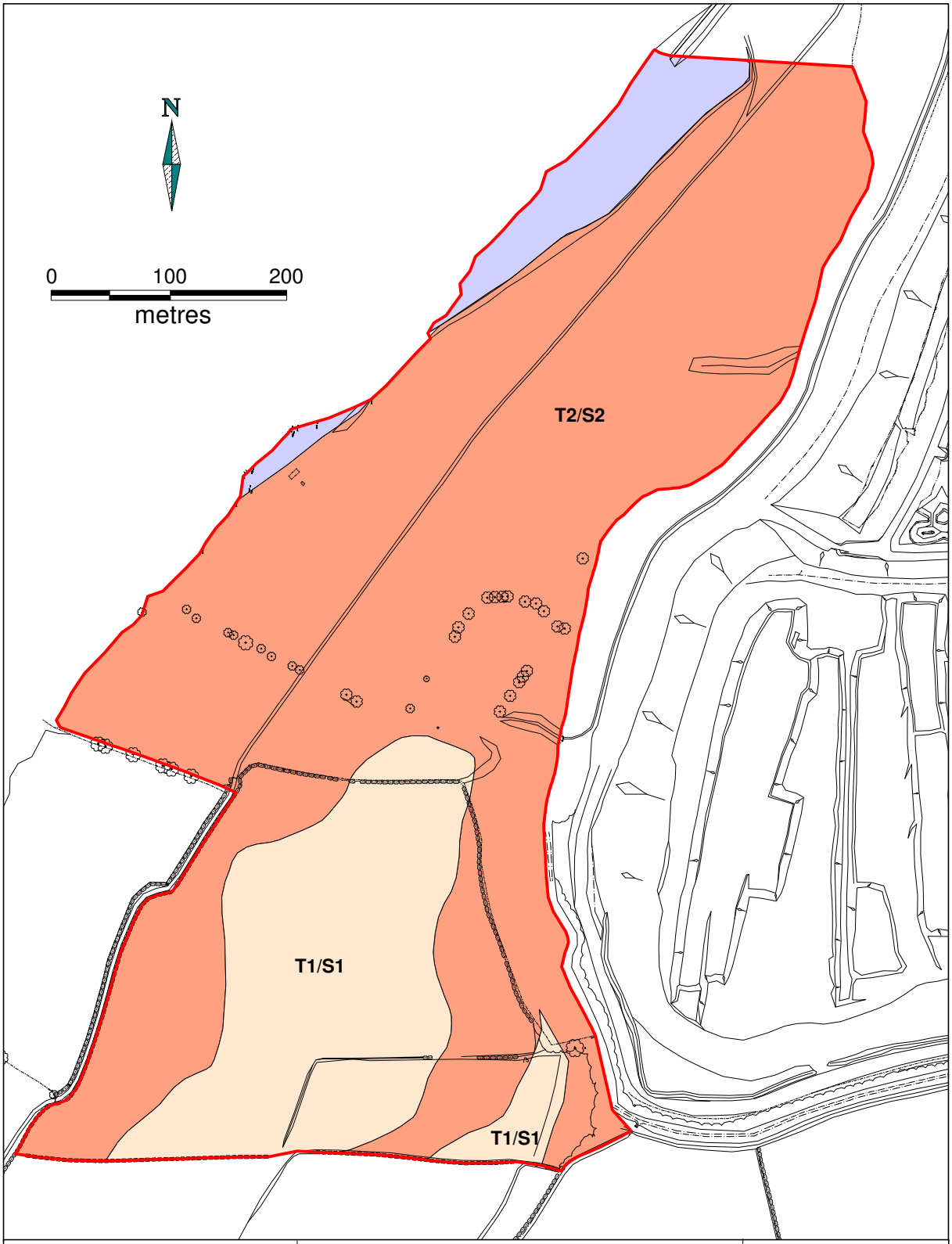
C - clay
ZC - silty clay
SC - sandy clay
CL - clay loam (H-heavy, M-medium)
ZCL - silty clay loam (H-heavy, M-medium)
SCL - sandy clay loam
SZL - sandy silt loam (F-fine, M-medium,C-coarse)
SL - sandy loam (F-fine, M-medium, C-coarse)
LS - loamy sand (F-fine, M-medium, C-coarse)
S - sand (F-fine, M-medium, 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
Fl - Flooding
T – topography/microrelief

Texture suffixes & prefixes:

ca – calcareous: x-extremely, v-very, sl-slightly
(ca) – marginally calcareous
st – stony;, v st – very stony
h –organic ;



Client

LAFARGE TARMAC

Project

Langford Quarry
Western Extension

Map

Map 1
Soil Resources

KEY

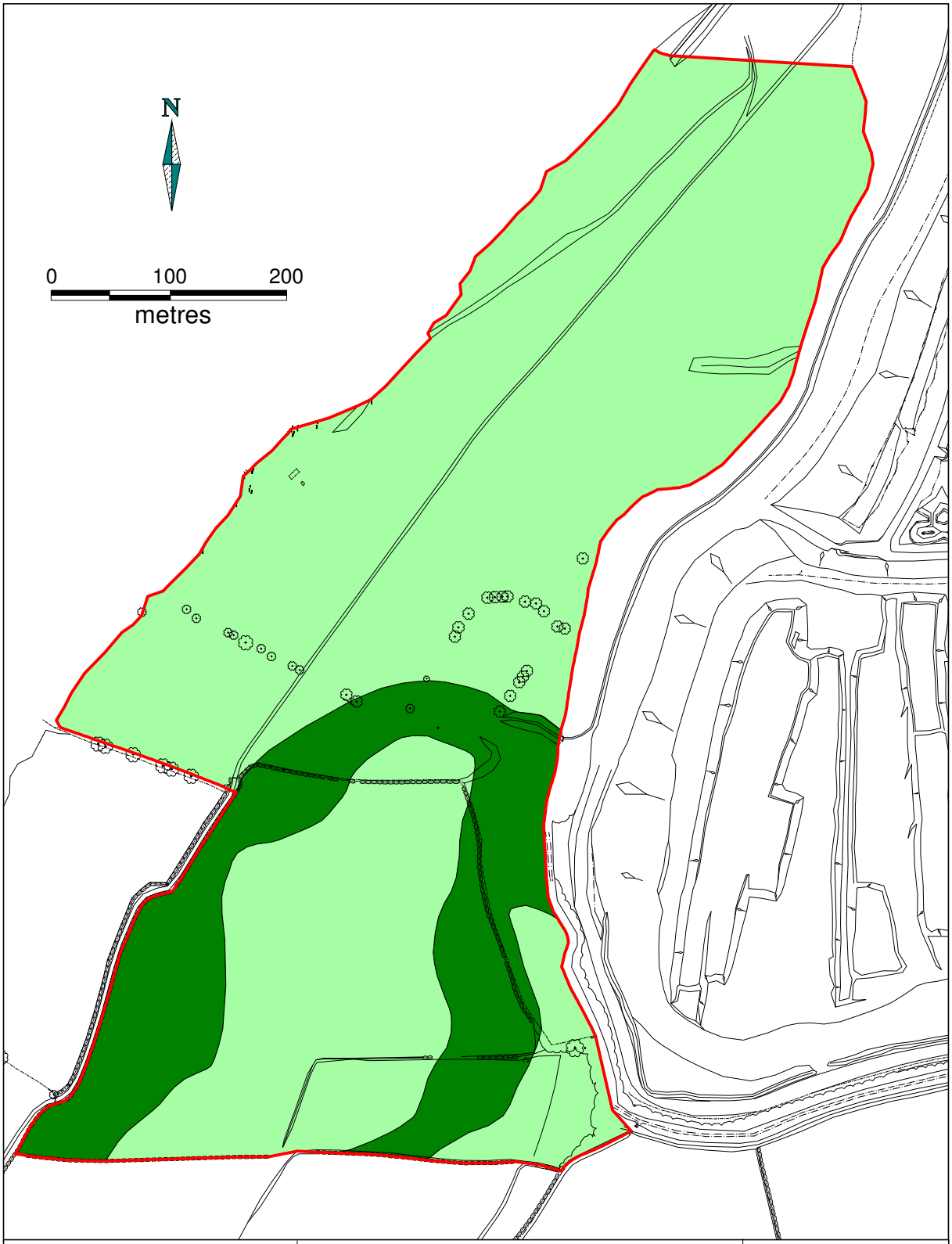
- Sandy soils
- Principally deep heavy loam or clayey soils
- Light soils close to the river
- Survey area

Scale
1:5,000 at A4

Date
05/6/2015

Land Research ASSOCIATES

Lockington Hall
Lockington
Derby DE74 2RH
Tel: 01509 670470



Client

LAFARGE TARMAC

Project

Langford Quarry
Western Extension

Map

Map 2
Agricultural Land Quality

KEY

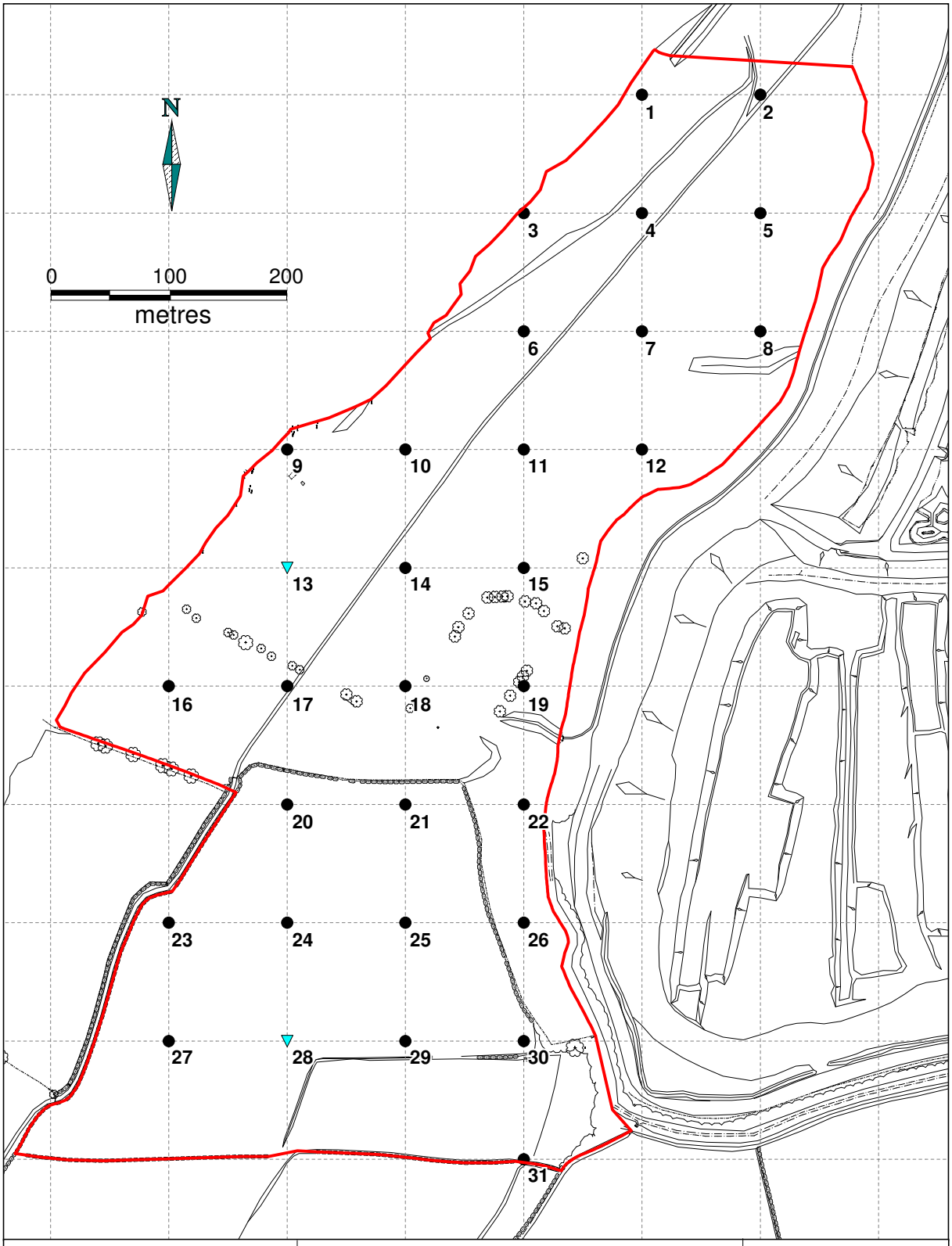
- Sub-grade 3a land (22.9 ha)
- Sub-grade 3b (9.1 ha)
- Survey area

Scale
1:5,000 at A4

Date
5/8/2015

Land Research ASSOCIATES

Lockington Hall
Lockington
Derby DE74 2RH
Tel: 01509 670470



Client

LAFARGE TARMAC

Project

Langford Quarry
Western Extension

Map

Map 3
Location of the observations

KEY

- Auger observation
- Soil description pit
- Survey area

Scale

1:5,000 at A4

Date

05/6/2015

Land Research ASSOCIATES

Lockington Hall
Lockington
Derby DE74 2RH
Tel: 01509 670470