NOTTINGHAMSHIRE MINERALS LOCAL PLAN CALL FOR SITES

SITE NAME: **NORTH ROAD QUARRY - (NORTH of A617)**

LOCATION: **NEWARK**

	Plan Reference/Evidence	Additional Information
Proposed boundary of the site	Red line on Plan 2579-5-2-1 DR0001	Approximately 74 ha north of the A617, east of of the village of Kelham, which predominantly comprises agricultural land with hedgerows along field boundaries.
The extent of excavations	See Plan 2579-5-2-1 DR0001	The proposed excavation area from circa 56 Ha. Scheme provides for stand offs to the River Trent and Old Trent Dyke, the public highway (including the A617 and A616 (Great North Road), as well as an area of potential archaeological interest.
Proposed access to the site	Indicative access design shown on Drawing No. 001. Tracking shown Drawing No.002.	A dedicated access is proposed off the A616 (Great North Road) along the eastern boundary of the site. The proposed access junction includes an 8.3m carriageway width, radii and taper designed based on tracking requirements of an articulated HGV.
Potential location of processing plant	Refer to Plan 2579-5-2-1 DR0002	The indicative plant site location is proposed to the east of Phase 1.
Phasing	See Plan 2579-5-2-1 DR0001	Two main working phases are proposed, with Phase 1 to be worked east to west and Phase 2 to be worked north to south.
An OS Map of the site	OS detail included on Plans	/

Estimated number of HGV Movements per day/month/year	/	Mineral Output - Circa 65 loads per day. Imported Inert Infill - Circa 50 loads per day

Reserve Data

	Plan Reference/Evidence	**Additional Information**
Quality and quantity of recoverable reserves	/	Estimated workable reserves of 4 million tonnes north of the A617 (of which circa 0.3mt under processing plant site). Good quality Trent Valley sand and gravel suitable for production of concreting aggregate
Estimated output per annum	/	Approximately 250,000 tonnes per annum.
Estimated lifespan of the mineral working (years)	/	Approximately 16 years (extraction).
When will the site be ready to be worked?	/	2022.

Role of Sites/Market

	Plan Reference/Evidence	**Additional Information**
Is the site a new Greenfield site or an extension?	/	Greenfield site.
If a Greenfield site, is it replacing an existing mineral working within or outside the	/	The site is a proposed replacement for the exhausted production sites east of Nottingham (Holme Pierrepont Quarry and Hoveringham Quarry, which operated at 250,000-300,000 tonnes per annum and 450,000-500,000 tonnes per annum

county		respectively) and a direct replacement for Brooksby Quarry in Leicestershire (which serves the market east of Nottingham via the A46 trunk road). Brooksby Quarry operates at circa 250ktpa and is expected to be fully exhausted in circa 2026. There is no identifiable replacement for Brooksby Quarry, creating an identified sand and gravel reserve and production capacity shortfall in north east Leicestershire from circa 2026.
What is your planned market area?	/	The site is well located to serve the Nottingham and South Nottinghamshire markets and would directly replace output from Brooksby Quarry (which supplies the Barnstone Cement Works at Langor). The site would complement the company's existing operation at Langford Quarry which predominantly serves markets north and south along the A1 corridor. Other quarries that the company operates in the Trent Valley (i.e. Besthorpe Quarry and Girton Quarry) predominantly serve markets in north Nottinghamshire and South Yorkshire owing to vehicle routing requirements.
Is the location of the site optimum in terms of serving the market?	/	Yes the site is located adjacent to the strategic road network with access onto the A616 (Great North Road), which links in with the A46 to the east. Access to the A616 (Ollerton Road) and to the A1 at the North Muskham interchange is also readily attainable.

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	/	Yes. Tarmac has an option to take a lease of the necessary mineral working rights from the owner of the site.

highway or any other transport route?		

Landowner Consent

	Plan Reference/Evidence	Additional Information
Who is the legal owner of the site?	/	The site is in a single ownership
Is the legal owner of the site also a minerals operator?	/	No
Has the legal owner made a formal agreement with any mineral operator for minerals exploration and/or minerals extraction?	/	Yes Tarmac hold a formal option to take a lease of the surface and the minerals from the owner. The owner fully supports the site being promoted to the Plan.

Agricultural Land Classification

	Plan Reference/Evidence	Additional Information
Agricultural land classifications found within the site	Refer to the attached assessment of Soil Resources and Agricultural Use and Quality.	The site is mainly categorised as Subgrade 3a and Subgrade 3b agricultural land, with some Grade 2 land. However given the site is prone to seasonal flooding the quality of the soils on

		site is diminished and the majority of the site is therefore, not considered best and most versatile agricultural land.

Sensitive Receptors

	Plan Reference/Evidence	Additional Information
Is the site located within 250m of any sensitive receptors? (schools, residential dwellings, workplaces, healthcare facilities)	Refer to Plan 2579-5-2-1 DR0001	There are a number of residential premises within 250m of the site comprising properties on the eastern edge of Kelham to the west of Phase 2 on the opposite side of the River Trent. Smeaton's Lake caravan park is also located approximately 100m to the east of Phase 1. The proximity of these receptors have been taken into account in the site design (i.e. through the inclusion of 100 m standoffs between the proposed extraction areas and those properties closest to the site and location of the processing plant within the site in an area of low sensitivity).

Reclamation

	Plan Reference/Evidence	Additional Information
Proposed reclamation schemes – what opportunities for environmental benefits do you see arising from the scheme?	See plan 2579 -5-2-1 DR0003	Proposed restoration is to agricultural land restored close to original ground levels through the use of on site soils and overburden and the importation of infill material. The land adjoining the River Trent to be restored to grassland, to allow for seasonal flooding events. The restored landform to largely replicate the existing landscape, although significant opportunity to create enhanced grassland

		habitats in corridor adjoining River Trent.	
Does the reclamation of the site depend on importing fill? If so, please indicate type of waste, main sources and timescales	/	Infill required?	Yes for areas to be restored to agriculture. An estimated 1.204 million m3 of imported material to be required to restore the land to the proposed levels. Importation estimated at circa 200,000 tonnes per annum.
		Type of waste	Imported inert demolition and construction material.
		Main source of waste	Excavation arisings from construction projects, mostly derived from ground excavation works within cira 20 mile radius of the site.
		Timescales	Progressive restoration over the course of operations , commencing circa 2 years after mineral extraction commencement, (10 years proposed for life of infill operations).

Legend

- Boundary: Site
- Boundary: Proposed Extraction Area
- Phase 1 — Proposed Phasing
- 15 — Existing Ground Surface Contour at 1m interval
- Temporary Topsoil Store (maximum 3m high)
- Temporary Subsoil Store (maximum 5m high)

Phase 1

Phase 2

Plant Site

Temporary topsoil screen bund (with flood flow attenuation) for A616 at Muskham Bridge

Phase 2 temporary topsoil screen bunds (with flood flow attenuation) for Kelham and Kelham Lane

Temporary 5m high subsoil screen bund to plant site

Site Access

Clean Water Lagoon

Silt Lagoon

Silt Lagoon

Kelham

Trent Lane

River Trent

Pond

Civil War Earthwork

BM 13.51m

Muskham Bridge

Lake

Bridge Cottage

Bridge House

Pond

Pond

A616 Great North Road

Crankley Lane

Hopper

Battery

Lake

Lake

Lake

Trentside Farm

Blacksmith Lane

Kelham Bridge

Kelham Hall

Track

Track

Track

Track

Path (um)

Path (um)

Sports Ground

Kelham Lane

Valley Farm

Parkvale

A617 Kelham Road

356500 356250 356000 355750 355500 355250 FB

477500 477750 478000 478250 478500 478750 479000

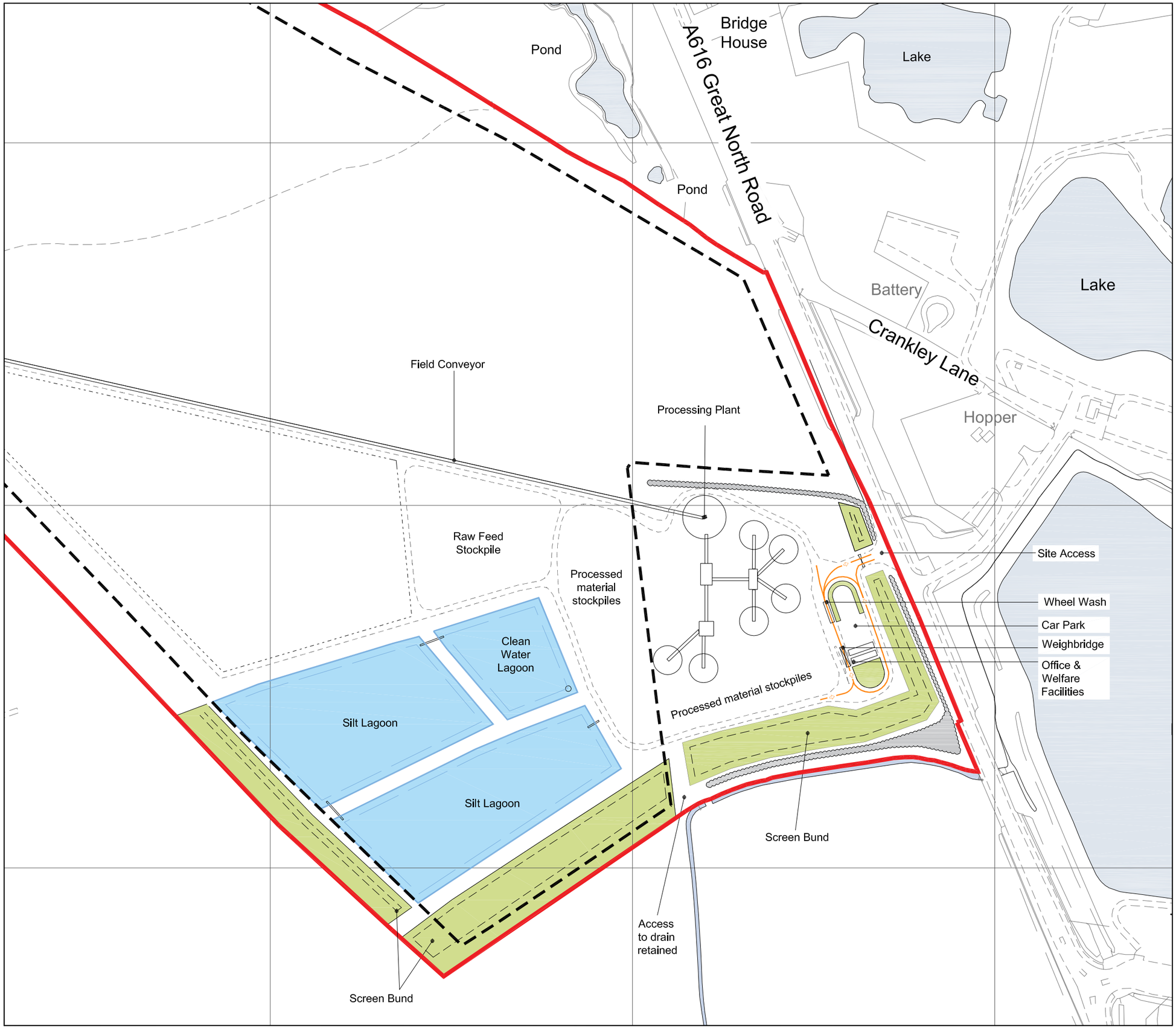
DAVID JARVIS ASSOCIATES

TARMAC
A CRH COMPANY

Site Name: Kelham - North

Drawing Name: Outline Working Plan

Drawn By:	Scale @ A1:
DJA	1:2,500
Date:	**Drawing Number:**
08/01/2018	2579-5-2-1-DR0001



Legend

- Boundary: Site
- Boundary: Proposed Extraction Area
- Existing Vegetation

DAVID JARVIS ASSOCIATES

TARMAC
A CRH COMPANY

Site Name:
Kelham - North

Drawing Name:
Indicative Plant Site Layout

Drawn By:	Scale @ A3:
DJA	1:2,500
Date:	**Drawing Number:**
08/01/2018	2579-5-2-1-DR0002

N

Legend

- Boundary: Site
- Boundary: Proposed Extraction Area
- 15 — Existing Ground Surface Contour at 1m interval
- 12 — Proposed Restoration Ground Surface Contour at 1m interval
- Existing Vegetation
- Existing Vegetation (to be retained)
- Proposed Hedgerow with Standard Trees
- Land restored to Wet Woodland Scrub
- Land restored to Farmland
- Land restored Grass Pasture
- Open Water
- Species Rich Grassland
- Land Restored to Reedbed/ Wetland Margins

Phase 1

Phase 2

Site access retained for farm management

Trent Lane

River Trent

Pond

Civil War Earthwork

BM 13.51m

Muskham Bridge

Lake

River Trent

Bridge Cottage

Bridge House

A616 Great North Road

Pond

Lake

Pond

Lake

Battery

Crankley Lane

Hopper

Path (um)

Trentside Farm

Blacksmith Lane

Kelham Bridge

Pond

Pond

Pond

Lake

Track

Kelham Hall

Path (um)

Track

A616 Great North Road

Sports Ground

Track

A617 Kelham Road

Kelham Lane

Valley Farm

Parkvale

Track

477500 477750 478000 478250 478500 478750 479000

356500 356250 356000 355750 355500 355250

DAVID JARVIS ASSOCIATES

TARMAC
A CRH COMPANY

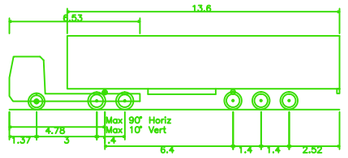
Site Name: Kelham - North

Drawing Name: Outline Restoration Proprosals

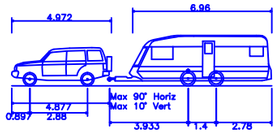
Drawn By:	Scale @ A1:
DJA	1:2,500
Date:	**Drawing Number:**
08/01/2018	2579-5-2-1-DR0003

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

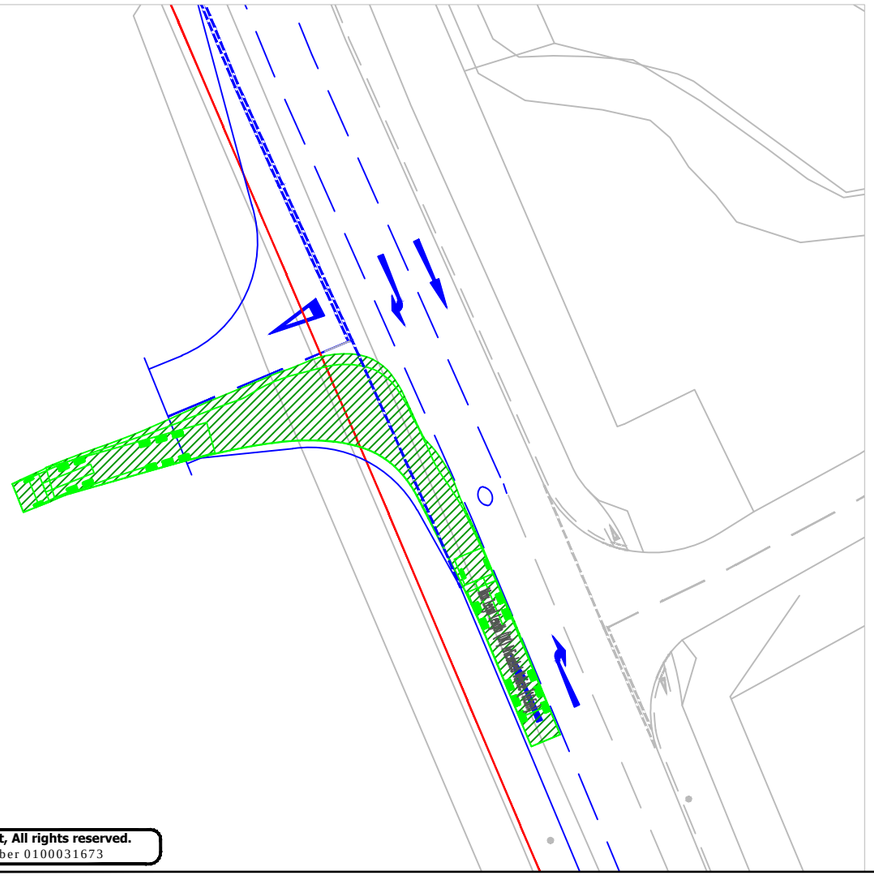
VEHICLES USED FOR TRACKING:

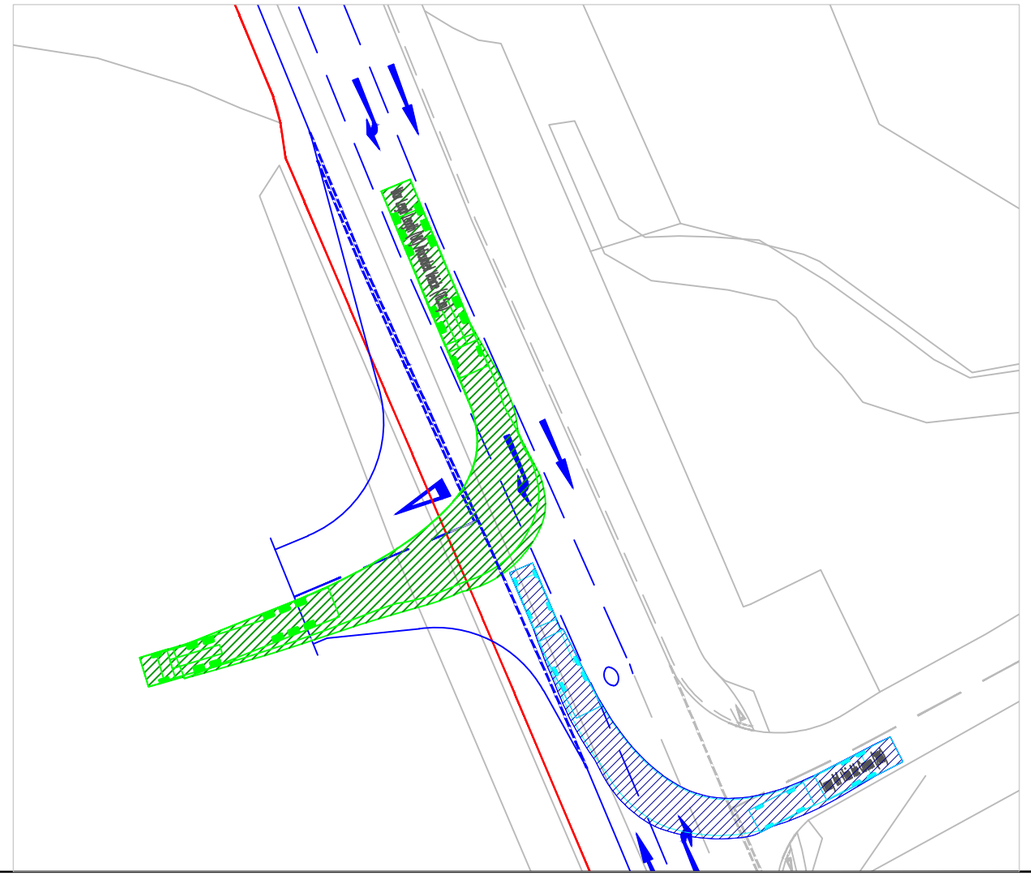


Max Legal Length (UK) Articulated Vehicle (16.5m)	
Overall Length	16.500m
Overall Width	2.550m
Overall Body Height	3.681m
Min Body Ground Clearance	0.411m
Max Track Width	2.500m
Lock to Lock Time	6.00s
Kerb to Kerb Turning Radius	6.530m



Luxury 4x4 +Twin Axle Caravan (2006)	
Overall Length	12.990m
Overall Width	2.286m
Overall Body Height	2.524m
Min Body Ground Clearance	0.251m
Max Track Width	2.130m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	5.800m





REV	DESCRIPTION	BY	CHK	APP	DATE

TARMAC
A CRH COMPANY

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
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e-mail: leicester@wyg.com

Project:

KELHAM QUARRY

Drawing Title:

FIGURE 7
PROPOSED SITE ACCESS ARRANGEMENT
VEHICLE TRACKING

Scale @ A3	Drawn Date	Checked Date	Approved Date
1:500	PJ 15/03/16	PG 15/03/16	ASG 15/03/16

Project No.	Office	Type	Drawing No.	Revision
A096912	35	18	002	-

FILENAME : \\LEICESTER12\350\DATA\PROJECTS\A096912 - KELHAM QUARRY\ACAD\DWGS\A096912-35-18-001-PROPOSED SITE ACCESS ARRANGEMENT.DWG | PLOTTED BY : PETR.JANDIK | PLOTTED DATE : 09 June 2017 11:44:04

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

SITE BOUNDARY

PROPOSED HIGHWAY LAYOUT

VISIBILITY SPLAY

DESIGN FOR IN PRINCIPLE AGREEMENT ONLY

N

CRANKLEY LANE

2.4M X 215M VISIBILITY SPLAY

PROPOSED KERBLINE TO TIE INTO EXISTING KERBLINE

1 IN 30M TAPER, 60M IN LENGTH

25M DIRECT TAPER LENGTH

3M WIDTH THROUGH LANES

3.5M WIDTH RIGHT TURN LANE. 80M DECELERATION LENGTH.

SPEED LIMIT CHANGE LOCATION. (NATIONAL SPEED LIMIT TO THE NORTH, 50MPH TO THE SOUTH).

CUTLINE

PROPOSED SITE ACCESS JUNCTION (8.3M CARRIAGEWAY WIDTH. RADII AND TAPER DESIGNED BASED ON TRACKING REQUIREMENTS OF AN ARTICULATED HGV)

INSTALLATION OF CENTRAL REFUGE BETWEEN OPPOSING RIGHT TURN LANES

EXISTING RIGHT TURN LANE INCREASED TO 3.5M. WITH 3M WIDTH THROUGH LANES

BUS STOPS LOCATIONS TO BE MAINTAINED AS EXISTING

EXISTING TAPER LENGTH MAINTAINED

PROPOSED KERBLINE TO TIE INTO EXISTING KERBLINE

2.4M X 160M VISIBILITY SPLAY

Drain

NOTE: PROPOSED HIGHWAY LAYOUT AND GHOST ISLAND JUNCTION IS SUBJECT TO TOPOGRAPHICAL SURVEY.

REV	DESCRIPTION	BY	CHK	APP	DATE

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Project:

KELHAM QUARRY, NEWARK

Drawing Title:

FIGURE 6
PROPOSED SITE ACCESS ARRANGEMENT

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
1:1000	JL	10/03/16	PG	10/03/16	ASG	10/03/16

Project No.	Office	Type	Drawing No.	Revision
A096912	35	18	001	-

FILENAME : \\LEICESTER12\3501DATA\PROJECTS\A096912 - KELHAM QUARRY\ACAD\DWGS\A096912-35-18-001-PROPOSED SITE ACCESS ARRANGEMENT.DWG | PLOTTED BY : PETR.JANDIK | PLOTTED DATE : 09 June 2017 11:44:46

AGRICULTURAL LAND QUALITY AND SOIL RESOURCES OF LAND NEAR KELHAM, NOTTINGHAMSHIRE

F W Heaven BSc, MISoilSci

Report 414/1
Land Research Associates
Lockington Hall,
Lockington,
Derby DE74 2RH

6 April, 2000

Introduction

This report considers the agricultural land quality and soil resources of land near Kelham in Nottinghamshire (Map 1). The work has included

- A detailed soil survey of most of the land
- A desk study of the remainder

LOCATION, RELIEF AND LAND USE

The land lies to the east of the River Trent, running down to the Newark-Nottingham railway as the southern boundary. The eastern edge is defined partly by the Old Trent Dyke, partly by field boundaries, and partly by the A616 road. The northern edge is a field boundary. The land is on the flood plain of the River Trent. Relief is very subdued, the land being mainly flat with some minor undulations. There is raised ground bordering the river, and residual 'rig and furrow' on old grassland. There are some earthworks in near Kelham Bridge and in a field on the northern side of the A617. Elevation is 10-12m AOD.

Most of the area is in arable use growing cereals and sugar beet, but there are significant areas of permanent and ley grassland, mainly for sheep.

AGRICULTURAL CLIMATE

This locality has a relatively dry climate with an average annual rainfall of **565 mm** and a January-June accumulated temperature above 0°C of **1428 day degrees**. It has a field capacity period (when the soils are fully replete with water) of **109 days,** extending on average from early December to the end of March. During the growing season, moisture deficits build up and those for wheat and potatoes average **119 mm** and **114 mm** respectively.

GEOLOGY

The underlying geology is of sandy and gravelly terrace deposits, much overlain by riverine alluvium.

Agricultural Quality

The site has been classified using the revised guidelines for agricultural land classification issued in 1988 by the Ministry of Agriculture, Fisheries and Food. A survey was carried out in March 2000 based on a 100 x 100 m grid; occasional additional sampling was carried out to check the location of boundaries. 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 5) showing their location is in an appendix to this report.

The area between Kelham and Newark is designated by the Environment Agency as flood plain with a return period of 100 years, but the Agency was unable to provide details of more frequent flooding events. Local sources consulted report that parts of the area flood more frequently than this, with flooding not originating from the Trent directly, but with water backing up main watercourses like the Old Trent Dyke. It was reported that the Kelham to Newark road is closed by flooding every three to five years.

Grades 2, 3 and 4 were identified.

GRADE 2

There are about 22 hectares of grade 2 land of two main types.

The main area occurs on slightly raised land where the soils have sandy loam or sandy clay loam topsoils over sandy loam upper subsoils which become sandier below 60 cm depth. All layers are stoneless or only very slightly stony. The soils are mainly brown throughout, although there is often some mottling below 70 cm indicating slight seasonal wetness from fluctuating groundwater. The soils are similar to that described below in the section on sub-grade 3a land, but with sandy loam layers extending to below 60 cm depth. This reduces drought risk.

Elsewhere, grade 2 land occurs along the edges of the River Trent. Topsoils there are usually medium clay loam or sandy clay loams and stoneless. The subsoils are variable medium clay loams, sandy clay loams or heavy clay loams, but are characteristically brown and free from mottling within 50 cm depth. These layers

may be medium clay loams, sandy clay loams or heavy clay loams. Below 50 cm mottle colours indicate waterlogging, and horizons which are slowly permeable occur locally. The principal limitation to agricultural quality is slight droughtiness.

GRADE 3

Sub-grade 3a

There are 103 hectares of sub-grade 3a land of two distinctive types.

The first occurs on low domed hillocks rising above the alluvial soils. Topsoils are sandy clay loam or sandy loams and are over sandy loam upper subsoils. Within 60 cm depth, subsoil texture becomes loamy sand or sand. The soils are freely drained, but lower subsoils occasionally show rusty mottles indicating some wetness induced by fluctuating ground water. The principal limitation to land quality is doughtiness, however.

A typical soil profile described in a pit near the location of observation 191 is shown below

0-32 cm	Brown to dark brown (7.5YR 4/3) sandy clay loam with about 20% clay content; rare small rounded quartzite stones; weak medium subangular blocky structure; surface slightly slaked with thin cap.
32-48 cm	Reddish brown (5 YR. 4/4) and brown (7.5 YR 5/4) stoneless medium sandy loam, weak medium subangular blocky structure; common roots; many large pores.
48-80 cm	Brown (7.5 YR 5/4) stoneless loamy medium sand weak medium subangular blocky structure; common roots; common large pores.
80-120+ cm	Reddish brown (5YR 4/4) stoneless medium sand; structureless, single grain

Other areas of grade 3a land occur on more extensive areas of level but slightly raised alluvium. Topsoils are usually heavy clay loams which overlie heavy clay loam or clay upper subsoils which are either brown, or show only faint signs of mottling within 40 cm depth. The lower subsoils are usually clay and become slowly permeable at some depth. In many areas, very stony or gravelly layers are encountered within 120 cm depth and these may be helping to locally improve the through drainage of the soils.

A soil profile described in a pit near the location of observation 192 is shown below and represents the most mottled end of the range of these soils.

0-28 cm	Brown to dark brown (7.5YR 4/2) stoneless heavy clay loam; weak coarse subangular blocky structure with a fine surface crumb.
28-44 cm	Brown (7.5 YR. 5/3) stoneless heavy clay loam with a few strong brown (7.5 YR 5/6) mottles and common manganiferous concretions; strong to moderate medium subangular blocky structure; common macropores.
48-55 cm	Brown (7.5 YR 5/2) stoneless clay with common strong brown (7.5 YR 5/6) mottles; moderate medium subangular blocky structure; few macropores; permeable.
55-100+ cm	Brown (7.5 YR 5/2) clay with many grey (10YR 5/1) and strong brown (7.5 YR 5/6) mottles; weak medium prismatic structure becoming massive and slowly permeable below.

Moderate wetness caused by slow permeability and high groundwater table is the principal limitation to agricultural quality.

In addition, land on levees or raised banks bordering the Old Trent Dyke and a subsidiary drain have been downgraded to sub-grade 3a due to the risk of occasional moderate winter flooding.

Sub-grade 3b

There are 70 hectares of sub-grade 3b land again of two distinct types. It is commonest on the lowest lying parts of the site where the topsoils are clay or heavy clay loam over mottled slowly permeable clay subsoils.

A typical soil profile described near the location of observation 141 is shown below.

0-32 cm	Dark greyish brown (10 YR 4/2) stoneless clay with few strong brown mottles; weak coarse subangular blocky structure with a fine surface crumb.
32-55 cm	Brown (7.5 YR 5/2) stoneless clay with many strong brown (7.5 YR 5/6) mottles and common manganiferous concretions; weak coarse prismatic structure; slowly permeable.
55-100+ cm	Grey (10YR 5/1) clay with many strong brown (7.5 YR 5/6) mottles; massive.

The principal agricultural limitation is wetness, but in some areas where stony or gravelly layers are close to the surface (<50 cm), droughtiness is an equal limitation.

Droughtiness is the principal limitation to the other dominant class of 3b land found on the tops of small domed rises The topsoils are loamy medium sand or sandy loam, and the subsoils are loamy medium sand or medium sand. All the

layers are permeable and stoneless.

Grade 4

A small area of land close to the River Trent is subject to frequent short or medium term flooding when the river level rises. Some land close to Kelham Bridge shows considerable undulation due to earthworks precluding its use as arable land with out remodelling, and has been down graded to grade 4.

Other land

Some land is not in agricultural use. A field edge next to the main road near Kelham Bridge has trees planted, and a small area nearby is hard standing for bridge maintenance and access to a pump extracting water from the river. Land near the railway in the far south is made up of water-filled pits and is covered in scrub woodland. A semi-metalled track runs through the land from Kelham Bridge towards the A616, with a truncated branch for access to the northern land.

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

	TOTAL SITE	
	AREA (HA)	***%***
Grade 2	21.75	11.6
Sub-grade3a	102.48	51.7
Sub-grade 3b	70.31	35.5
Grade 4	1.43	0.7
Non agricultural	2.31	1.2
TOTAL	198.28	100

Soil resources

Soil resources were assessed at the same time as the land quality survey by accurately recording the depths of the soil layers. Five soil resource layers were recognised, two topsoils, a medium and heavy subsoil, and a sandier subsoil.

Topsoil resources

Two topsoil resources occur, and their extent and distribution is shown on Map 3.

Topsoil resource **T1** is mainly associated with land that has soils developed in riverine alluvium, and consists of heavy clay loams and clays with an average thickness of **290 mm**. In general the resource is stoneless or very slightly stony, but there are small local patches of stony topsoils included. Near the river are some small areas of medium clay loam, and near some of the sandier hillocks of the area, some heavier sandy clay loam topsoils are included.

Topsoil resource **T2** is associated with raised land and soils formed in sandy or coarse loamy deposits. The mean thickness is **270 mm**. It consists of mainly medium sandy loams and includes some areas of light (*circa* 20% clay content) sandy clay loams, and some loamy medium sands

Subsoil resource

Three subsoil resources occur, and their extent and distribution is shown on Map 4.

The resources are associated with the same kind of division as the topsoil resources, with **S1** and **S2** mainly occurring under topsoil **T1,** and **S3** under **T2**

Subsoil resource **S1** consists of brown upper subsoils mainly from the western side of the site nearer to the River Trent. Textures are mainly heavy, with heavy clay loams dominant, but medium clay loam and clays also occurring. These layers are more porous than some of those underlying, and would be useful in restoring some heavier land to sub-grade 3a quality. Many are associated with areas where gravely or very stony bands lie close to the surface; the locations and depths to gravelly layers is also shown on Map 4. There is considerable variation in thickness but the average depth is about **300 mm** overall.

Subsoil resource **S2** consists of clay and heavy clay loam subsoils developed in the wetter and more poorly structured river alluvium. There is a considerable variation in depth; many extend to below 1200 mm depth, and some to less than 450mm over gravel. They will be a reasonable resource if stripped to 1000 mm depth with material below this considered as overburden. This resource also occurs below the browner **S1** resource in many areas.

Subsoil resource **S3** consists of mainly sandy loams and loamy sands but will include some medium sand. Stripping to 1000 mm would give an average depth of this resource of **730 mm.** Material below 1000 mm is likely to be sand.

The adjacent unsurveyed land

No access was available for detailed survey of some adjacent land. The likely land quality in that area is assessed below from published information and interpolation of survey findings and shown on Map 2.

The landform is similar to the alluvium covered parts of the surveyed land in elevation and topography, although the westernmost section has a small sand hill in its southern extreme close to the railway.

No detailed soil maps of the site have been published and the national soil map is the primary source of information. Three soil associations are delineated in the vicinity of the site:

Fladbury 2	consisting of poorly drained clayey river alluvial soils, some shallow over gravel, and some better drained loamier soils.
Wharfe	Brown,freely drained loamy soils associated with moderately drained and wetter loamy soils
Arrow	Coarse loamy soils with sandier subsoils, more or less mottled

This range of soil types is entirely consistent with those found in our detailed survey of the site. In the usurveyed parts, Wharfe association is dominant in the land to the west and it would therefore be expected that sub-grade 3a will predominate, with smaller areas of sub-grade 3b. There is likely to be a small patch of grade 2 in the southern corner near the railway associated with a sandier hill. Topsoil resource **T1** will predominate on the sub-grade 3a and 3b land, and **T2** on the sandier land in the south. Subsoil resource **S1** may be common in the western field with **S2** below it. In the sub-grade 3b land in the east, the subsoils will be **S2.** There will be **S3** under the land dominated by grade 2. Thickness of all the resource layers is likely to be similar to those found in the detailed survey of the adjacent land.

The smaller field in the eastern side of the area is designated as Fladbury 2 association, and likely to be predominantly sub-grade 3b in quality.

APPENDIX

LOCATION AND DETAILS OF OBSERVATIONS FOR THE AGRICULTURAL LAND CLASSIFICATION SURVEY

Land near Kelham - Details of observations at each sampling point

Obs No	Topsoil			Upper subsoil			Lower subsoil				Wetness Class	ALC grade	Main limitation
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling	Slope (º)			
1	0-30	MCL	0	30-50	SCL	o	50-120	stMSL+LMS	xx	0	II	2	D,W
2	0-32	HCL	0	32-60	HCL	o	60-90	C	x	0	II	3a	W
							90-120	SCL	xxx				
3	0-32	HCL	0	32-40	LS+gr		40-55	MCL	xx	0	II	3b	D
				55-70	LS+gr		stopped	on stones					
4	0-27	HCL	0	27-60	HCL	o	60-100	C	xx	0	II	3a	W
							100-120	C	xxx				
5	0-30	HCL	0	30-60	C	o-x	60-120	C	xxx	0	II	3a	W
6	0-32	HCL	0	32-40	C	xx	40-55	C	xx	0	II/III	3a/3b	W
				55-110	C	xxxx	over	gravel					
7	0-29	HCL	0	29-55	C	x	55-70	C	xx	0	II	3a	W
							stopped	on gravel					
8	0-33	HCL	0	33-60	HCL	o	60-100	C	o	0	II	2/3a	W
							100-120	C	xxx				
9	0-30	HCL	0	30-45	C	o	45-70	C	xxx	O	II	3a	W
							70-120	C	xxxx				
10	0-30	HCL	0	30-50	C	xx	50-120	C	xxx	0	II/III	3a/3b	W
11	0-30	HCL	0	30-45	C	x	45-70	C	xxx	0	III	3a	W
							70-120	C	xxxx				
12	0-32	HCL-C	1	32-40	C	x	40-55	C	xx	0	II	3a/3b	W,D
							stopped	on gravel					
13	0-30	HCL-C	0	30-40	C	xx(x)	40-100	C	xxx	0	II/II	3b	W
							100-120	stSCL	xxx				
14	0-30	C	0	30-40	C	xx(x)	40-90	C	xxx	0	II	3a/3b	W
							90-120	SCL	xxx				
15	0-24	caMCL	2	24-120	MCL+LS								
16	0-28	MCL	0	28-53	SCL	o	53-65	C	xx	1	II	2	W,D
							65-120	C	xxxx				
17	0-29	HCL-C	0	29-40	C	xx	40-120	C	xxx	0	II/III	3a/3b	W
18	0-29	HCL	0	29-45	C	xx(x)	45-120	C	xxxx	0	III	3b	W
19	0-27	HCL	0	27-120	C	xxx				0	III	3b	W
20	0-30	C	0	30-120	C	xxx				0	III	3b	W
21	0-30	HCL	0	30-120	C	xxx				0	III	3b	W
22	0-31	C	0	31-60	C	xxx	60-120	C	xxxx	0	III	3b	W
23	0-31	HCL	0	31-45	C	xx	45-120	C	xxx	0	II	3a	W
24	0-28	C	o	28-50	C	xx(x)	50-120	C	xxx	0	II/III	3a/3b	W
25	0-26	C	0	26-50	C	xxx	50-120	C	xxxx	0	III	3b	W
26	0-28	SCL	1	28-90	vstMSL	x	90-120	SCL	xx	0	I	3b	D
27	0-28	MCL	0	28-50	HCL	x	50-90	HCL	xxx	0	II	2	W
							90-120	C	xxx				
28	0-29	HCL	0	29-60	C	x	60-120	C	xxx	0	II/III	3a/3b	W
29	0-29	HCL	0	29-50	C	xx	50-120	C	xxx	0	II	3a	W
30	0-30	HCL	0	30-45	HCL	x(x)	45-60	HCL	xx	0	II	3a	W
							60-120	C	xxx				
31	0-30	C	0	30-45	C	xx(x)	45-120	C	xxxx	0	III	3b	W
32	0-31	C	0	31-120	C	xxx				1	III	3b	W
33	0-26	HCL	1	26-50	HCL	x	50-70	SCL	xx	0	II	3a	W

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (º)	Wetness Class	ALC grade	Main limitation
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling				
							70-120	stSCL	xxx				
34	0-31	HCL	0	31-50	C	xx	50-80	C	xx	0	II	3a	W
							stopped	on stones					
35	0-32	C	0	32-50	HCL	xx	50-100	stHCL	xxx	0	II	3a	W
							stopped	on stones					
36	0-31	HCL	0	31-70	C	xxx	70-120	SCL	xxx	0	II/II	3a/3b	
37	0-29	SCL	1	29-40	SCL	o	40-70	MSL	o	0	II	2	D
				70-100	LMS	x	100-120	MS	xx				
38	0-26	HCL	0	26-70	SCL	o	stopped	on gravel		1	I	3a	D
39	0-32	HCL	0	32-90	MCL	o	90-120	MCL	x	0	1	2	D
40	0-30	HCL	0	30-45	HCL	x	45-65	HCL	xx	<1	II	3a	W
							65-120	C	xxx				
41	0-30	HCL	0	30-60	HCL	xx	60-120	HCL	xxx	0	II	3a	W
42	0-30	(s)HCL	0	30-60	(s)HCL	xx	60-120	HCL	xxx	0	II	3a	W
43	0-30	MSL	1	30-60	MSL	o	60-120	LMS	o	1	1	2	D
44	0-31	SCL	1	31-45	SCL	o	45-80	LMS	x	0	I/II	3a	D
							80-120	MS	xx				
45	0-31	SCL	0	31-45	SCL	o	45-60	MSL	o	0	I/II	2/3a	D
							60-120	LMS-MS	x				
46	0-31	HCL	0	31-50	C	xxx	50-65	SCL	xx	0	II	3a	W
				65-90	stMSL	xx	90-120	MS	xx				
47	0-30	HCL	0	30-55	HCL	xx	55-90	stHCL	xxx	0	II	3a	W
							stopped	on stone					
48	0-29	C	0	29-50	C	xxx	50-120	C	xxxx	0	III	3b	W
49	0-28	C	0	28-65	C	xxx	65-120	C	xxxx	0	III	3b	W
50	0-30	C	0	30-50	C	xxx	50-110	C	xxxx	0	III	3b	W
							stone	at 110cm					
51	0-27	MCL	3	27-85	MCL	o	85-120	MCL	xxx	0	I	3	D,W
52	0-30	HCL	0	30-80	HCL	o	80-120	HCL	xx	0	II	3a	W
53	0-32	HCL-C	0	32-45	C	xx(x)	45-100	C	xxx	0	II/III	3b/3a	W
							100-120	stHCL					
54	0-33	HCL	0	33-60	HCL	xx	60-70	SCL	xxx	0	II	3a	W
							70-120	MLS	xx				
55	0-28	HCL	0	28-60	HCL	o	60-100	C	xx(x)	0	II	3a	W
				100-110	stSCL		stopped	on gravel					
56	0-31	(s)HCL	0	31-45	SCL	x	45-120	MSL	xxx	0	II	3a	D
57	0-32	SCL	2	32-55	SCL	o	55-70	stMSL	x	0	II	3a	D
							70+	MLS+gravel					
58	0-29	MSL	2	29-65	MSL	o	65-80	MLS+gr	o	0	1	3a	D
							stopped	on gravel					
59	0-29	HCL	1	29-100	C	xxx	100-120	LMS+gr	xx	0	III	3b	W
60	0-25	C	0o	25-50	C	xxx	50-110	C	xxxx	0	III	3b	W
							stopped	on gravel					
61	0-30	SCL	1	30-60	MSL	o	60-120	LMS	x	1	I	2	D
62	0-29	MSL	0	29-120	LMS	o				1	I	3a/3b	D
63	0-31	SCL	1	31-70	MSL	o	70-100	LMS	x	1	I	2	D
							100-120	MS	x				
64	0-20	HZCL	0	20-45	HCL	o	45-60	MSL	xxx	0	II	3a	W
							60-120	SCL+LS					
65	0-30	HCL	0	30-70	HCL-C	o	70-90	stC	xxx	0	II	3a	W
							stopped	on gravel					

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (º)	Wetness Class	ALC grade	Main limitation
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling				
66	0-26	HCL-C	0	26-55	HCL	o	55-70	C	x	0	II	3a	W
				70-110	HCL	xxx	110-120	MSL over gr	xx				
67	0-29	HCL	0	29-60	C	o	60-90	(st)C	xxx	0	II	3a	W,D
							stopped	on gravel					
68	0-33	HCL	0	33-55	C	xx	55-110	C	xxx	0	III	3b	W
							stopped	on gravel					
69	0-33	HCL	0	33-40	HCL	x	40-70	C	xxx	0	III	3b	W
				70-80	vstC	xx	80-120	stSC	xxxx				
70	0-28	HCL-C	2	28-40	C	xx	40-70	C	xxx	0	III	3b	
				70-80	HCL	v.dark	stopped	on gravel					
71	0-26	C	1	26-100	C	xxx	stopped	on gravel		0	III	3b	W
72	0-26	C	0	26-60	C	xxx	60-110	stHCL	xxx	0	III	3b	W
							110-120	SCL+gr					
73	0-28	C	1	28-80	C	xxx	stopped	on stones		0	III	3b	W
74	0-31	MCL	1	31-60	SCL	x	60-110	MSL	xx	<1	II	2	D
							110-120	LMS+gr	xx				
75	0-28	MSL	<1	28-60	MSL	o	60-100	LMS	xx	1	I/II	2	D
							100-120	MS	xx				
76	0-29	MSL	1	29-60	MSL	o	60-100	MSL	xx	1	I/II	2	D
							stopped	on stones					
77	0-15	HZCL	0	15-120	HCL	o	disturb-	ed ground		0	I	2	D
78	0-28	M/HCL	0	28-60	HCL	o	60-80	HCL	xx	0	II	3a	W
							80-120	C	xxx				
79	0-30	HCL	2	30-55	HCL	o	55-70	stC	xx	0	II	3a	W
80	0-30	HCL	0	30-45	HCL	x	45-70	SCL	x	0	I/II	2/3a	W
							70-120	MSL	xx				
81	0-31	HCL	0	31-50	C	xx	50-65	C	xx	0	II	3a	W
							stopped	on stones					
82	0-30	HCL-C	4	30-60	HCL	x	stopped	on stones		0	II	3a	W
83	0-29	C	0	29-60	C	xxx	stopped	on stones		0	III	3b	W
84	0-30	HCL-C	4	30-40	HCL	x	40-70	stHCL	xx	0	II	3a	W,D
							stopped	on gravel					
85	0-31	HCL	2	31-45	HCL	o	stopped	on gravel		0	II	3b	D
86	0-30	HCL	2	30-50	MSL	o	50-70	MSL	xx	0	II	3a	W
							stopped	on gravel					
87	0-27	C	<1	27-55	C	xxx	stopped	on gravel		0	III	3b	W
88	0-30	SCL	1	30-40	HCL	xxx	40-120	C	xxx	1	III	3b	W
89	0-16	MZCL	0	16-60	HCL	o	60-75	SCL	xx	0	II	2	D
							75-120	SCL+LS	xxx				
90	0-30	HCL	0	30-60	HCL	o	60-100	C	xxx	0	II	3a	W
							stopped	on stones					
91	0-30	HCL-C	2	30-90	stC	xxx				0	III	3b	W
92	0-26	HCL	1	26-50	HCL	o	stopped	on gravel		0	II	3b	D
93	0-31	HCL-C	<1	31-40	C	x(x)	40-70	stC	xxx	0	II	3a	W
							stopped	on gravel					
94	0-28	C	0	28-55	C	x	stopped	on gravel		0	II	3b	D
95	0-30	C	2	30-45	C	xxx	stopped	on gravel		0	III	3b	W, D
96	0-30	HCL	5	30-45	HCL	xx	stopped	on gravel		0	II	3b	D
97	0-32	LMS	0	32-120	LMS	o				1	I	3b	D
98	0-32	LMS-SL	1	32-90	LMS	0	90-120	MS	x	0	I	3a/3b	D
99	0-34	LMS	1	34-90	LMS	o	90-120	MS	x	0	I	3b	D

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (º)	Wetness Class	ALC grade	Main limitation
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling				
100	0-33	SCL	2	33-40	SCL	xx	40-60	C	xxx	0	III	3a	W
							60-120	SCL	xxx				
101	0-14	MCL	0	14-75	SCL	o	75-110	SCL	xx	0	II	2	D
							110-120	MSL	xx				
102	0-16	(s)MCL	0	16-75	SCL	o	75-90	SCL	xx	0	II	2	D
							90-120	C	xxx				
103	0-17	HCL	0	17-50	C	xx	50-120	C	xxx	0	II/III	3a/3b	W
104	0-28	HCL	0	28-55	HCL	x	55-70	stC	xxx	0	II	3a	W
							stopped	on gravel					
105	0-28	HCL	0	28-45	HCL	o	45-50	stC	xx	O	II	3a/3b	D
							stopped	on gravel					
106	0-29	MCL	2	29-75	stHCL	x	stopped	on gravel		0	II	3a	D
107	0-31	HCL-C	1	31-55	HCL	xx	stopped	on gravel		0	II	3a	W
108	0-29	SCL	2	29-120	LMS	o				1	I/II	3a	D
109	0-32	MSL	2	32-120	MSL	o				1	I	2	D
110	0-31	MSL	1	31-110	LMS	o	stopped	on gravel		1	I	2	D
111	0-32	LMS-SL	1	32-90	LMS	o	90-120	MS	o	1	I	3b	D
112	0-30	SCL	2	30-60	SCL	x	60-120	MSL	xx	1	I/II	2	D
113	0-30	HCL	0	30-60	HCL	o	60-120	C	xxx	0	II	3a	W
114	0-30	HCL	0	30-40	C	xx	40-120	C	xxxx	0	III	3b	W
115	0-29	HCL	1	29-45	HCL	o	45-60	stHCL	x	0	I/II	3a	D,W
							stopped	on stone					
116	0-27	HCL	8	27-50	vstHCL	o	stopped	on stone		0	II	3b	D
117	0-30	HCL	5	30-45	HCL	x	45-70	stC	xxx	0	II	3a	W,D
							stopped	on stone					
118	0-24	LMS	3	24-60	LMS	o	60-120	MS	xx	0	I	3b	D
119	0-26	SCL	3	26-100	(st)SCL	o	stopped	on stones		1	I	2	D
120	0-32	MSL	1	32-60	LMS	o	60-120	LMS	x	1	I	3a	D
121	0-30	MSL	1	30-60	MSL	o	60-110	LMS	o	1	I	2	D
							110-120	MS	x				
122	0-29	SCL	1	29-60	SCL	o	60-120	MS+gr	xx	0	I	3a	D
123	0-26	HCL	1	26-50	HCL	xx	50-70	HCL	xxx	0	II	3a	W
							70-120	C	xxxx				
124	0-30	HCL	2	30-40	HCL	x	40-120	C	xxx	0	II/III	3b	W
125	0-27	HCL	2	27-45	HCL	xx	45-70	C	xxx	0	II	3a	W
							stopped	on stones					
126	0-18	MZCL	0	18-50	vstC	0	stopped	on stone		0		3b	D
127	0-28	SCL	8	28-50	SCL	0	50-60	vstSCL	o	0		3b	D
							stopped	on stone					
128	0-34	MSL	1	34-60	LMS	o	60-120	MS	x	1	I	3a	D
129	0-27	MSL	2	27-60	LMS	o	60-110	MS	x	0	I	3b	D
							stopped	on gravel					
130	0-31	MSL	1	31-70	MSL	o	70-80	LMS+gr		2	I	3a	D
							stopped	on stones					
131	0-32	HCL	2	32-50	C	xx(x)	50-90	C	xxxx	1	III	3b	W
				90-100	stSCL	xxx	stopped	on stone					
132	0-28	C	1	28-110	C	xxx	110-120	MS	xxx	0	III	3b	W
133	0-27	C	1	27-60	C	xxx	60-100	SCL	xxx	0	III	3b	W
							100-120	C	xxxx				

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (º)	Wetness Class	ALC grade	Main limitation
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling				
134	0-28	HZCL	0	28-65	HCL	xx	65-120	C	xxx	0	II	3a	W
135	0-32	HCL	0	32-60	HCL	xx	60-120	C	xxx	0	II	3a	W
136	0-28	HCL	0	28-60	C	xxx	60-120	C	xxx	0	III	3b	W
137	0-13	HZCL	0	13-30	C	xx(x)	stopped	on gravel		0	II	3b	D
138	0-13	MCL	1	13-100	vstHCL	o				0	II	3a	D,W
139	0-29	SCL	4	29-40	SCL	o	40-70	MLS+gr	0	0	I/II	3b	D
							stopped	on gravel					
140	0-32	SCL	2	32-55	SCL	x	55-110	MLS+gr	x	<1	II	3a	D
							stopped	on gravel					
141	0-32	C	0	32-100	C	xxx	100-120	SCL	xxx	1	III	3b	W
142	0-32	HCL-C	0	32-120	C	xxx				1	III	3b	W
143	0-32	HCL-C	0	32-40	C	xx	40-60	C	xxx	0	III	3b	W
							60-120	HCL(s)	xxx				
144	0-32	HCL	0	32-45	HCL	xx	45-70	C	xxx	0	II	3a	W
							70-120	C	xxxx				
145	0-30	HCL	0	30-45	HCL	xx	45-60	C	xxx	0	II	3a	W
							60-120	C	xxxx	0	II	3a	W
146	0-27	HCL	0	27-70	C	xxx	70-120	C	xxxx	0	III	3b	W
147	0-15	HCL	0	15-30	C	xx	30-60	C	xxx	0	II/III	3a/3b	W
							60-120	C	xxxx				
148	0-32	MCL	8	32-40	stMCL	o	stopped	on gravel		0	I/II	3b	D
149	0-32	SCL	3	32-40	stMSL	o	40-70	LMS+gr	o	0	I	3b	D
							stopped	on gravel					
149a	0-30	C	0	30-70	C	xxx	70-120	HCL	xxx	0	III	3b	W
150	0-31	HCL	0	31-45	C	xx	45-80	C	xxx	0	II	3a	W
							80-120	C	xxxx				
151	0-26	HCL	0	26-45	C	xx	45-100	C	xxx	0	II	3a	W
							100-120	stSCL	xxx				
152	0-26	HCL	0	26-70	C	xxx	70-100	stSCL	xxx	0	III	3b	W
							stopped	on stone					
153	0-31	HCL-C	0	31-40	C	xx(x)	40-70	C	xxx	0	I/III	3a/3b	W
							70-120	C	xxxx				
154	0-34	HCL	0	34-40	HCL	xx	40-50	vstHCL	xx	1	II	3a	W
				50-70	C	xxxx	stopped	on stone					
155	0-27	HCL	0	27-60	SCL	xx	60-120	C	xxxx	0	II	3a	W
156	0-31	HCL-C	0	31-60	C	xxx	60-120	C	xxxx	0	III	3b	W
157	0-32	HCL-C	0	32-50	C	xx(x)	50-110	C	xxxx	0	II/III	3a/3b	W
							over	LMS+gr					
158	0-25	C	0	25-70	C	xxx	70-90	stSCL	xxx	0	III	3b	W
							90-120	MLS+gr					
159	0-28	HCL	0	28-110	C	xxx	110-120	vsrC	xxx	0	III	3b	W
160	0-30	HCL-C	0	30-55	HCL	xx	55-110	C	xxx	0	II	3a	W
							110-120	MSL+gr	xx				
161	0-30	HCL-C	0	30-120	C	xxx				0	III	3b	W
162	0-29	HCL	0	29-80	C	xxx	stopped	on gravel		0	III	3b	W
163	0-32	HCL	0	32-60	C	xxx	60-100	vstHCL	xxx	0	III	3b	W
							stopped	on stone					
164	0-31	C	0	31-75	C	xxx	75-100	C	xxxx	0	III	3b	W
							stopped	on stone					
165	0-22	HZCL	0	22-65	HCL	o	65-110	HCL	xx	0	II	3a	W
							110-120	C	xxx				

Obs No	Topsoil			Upper subsoil			Lower subsoil			Slope (º)	Wetness Class	ALC grade	Main limitation
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling				
166	0-29	HCL	0	29-60	HCL	xx	60-120	stC	xxx	0	II	3a	W
167	0-29	HCL-C	0	29-60	C	xxx	60-110 stopped	C on stone	xxxx	0	III	3b	W
168	0-26	HCL	0	26-65	HCL	xx	65-100 stopped	stSCL on stone	xx	0	II	3a	W
169	0-28	HCL	0	28-50	C	xx	50-90 stopped	C on stone	xxx	0	II/III	3a/3b	W
170	0-20	MCL	0	20-80	HCL	o	80-90 90-120	HCL HCL-C	xx xxx	0	II	3a	F
171	0-28	HCL	2	28-50	HCL	x	stopped	on stone		0	I/II	3b	D
172	0-29	HCL	0	29-80	C	xxx	stopped	on stone		0	III	3b	W
173	0-31	HCL	2	31-40 60-90	HCL StMLS	xx(x) xx	40-60 stopped	HCL+gr on stone	xx	0	II	3a	D,W
174	0-28	HCL	4	28-50	vstHCL	0	stopped	on stone		0I	II	3b	D
175	0-30	HCL-C	0	30-38	HCL	xxx	38-120	C	xxx	0	III	3b	W
176	0-30	HCL	<1	30-50	C	xxx	50-120	C	xxx	0	III	3b	W
177	0-27	HCL	0	27-55	C	xxx	55-120	C	xxx	0	III	3b	W
178	0-30	M-HCL	4	30-55	srSCL	x	stopped	on gravel		0	I/II	3b	D
179	0-27	HCL	2	27-60	HCL	x	stopped	on stone		0	II	3a	W,D
180	0-27	C	0	27-60	C	xxx	stopped	on stone		0	III	3b	W
181	0-28	C	0	28-40	C	xx	40-70 stopped	C on gravel	xx(x)	0	II	3a	W,D
182	0-28	HCL-C	0	28-50	HCL	xx	50-75 75-120	C C	xxx xxxx	0	II	3a	W
183	0-8	MZCL	0	8-120	C	xxx				0	III	3b	W
184	0-31	SCL	2	31-70	SCL	o	70-80 stopped	stSCL on gravel	xx	0	I	2	D
185	0-30	HCL	1	30-100	C	xxx	stopped	on gravel		0	III	3b	W
186	0-33	HCL	0	33-70	C	x	stopped	on gravel		0	II	3a	W,D
187	0-30	HCL	0	30-45	C	xx	45-70 stopped	C on gravel	xxx	0	II	3a	W
188	0-28	HCL	0	28-60	HCL	x(x)	60-100 stopped	C on gravel	xxx	0	II	3a	W
189	0-15	HZCL	0	15-40	HCL	o	40-65 65-120	C C	xx xxx	0	II	3a	W
190	0-19	MCL	0	19-90	SCL	o	90-120	HCL	x	0	I	3a	F
191	0-28	MSL	1	28-80	MSL	o	80-120	LS+HCL	x	1	I	2	D
192	0-32	HCL	0	32-45	C	xx	45-120	C	xxx(x)	0	II	3a	W
193	0-31	HCL	0	31-60	C	Ó	stopped	on gravel		0	II	3a	D,W
194	0-28	HCL	0	28-50	HCL	o	stopped	on gravel		0	I/II	3a	D
195	0-28	MCL	0	28-70	C	xxx	70-120	C	xxxx	0	III	3a(/b)	W
196	0-22	MCL	0	22-65	SCL	o	65-120	HCL	o	0	I	3a	F
197	0-31	MSL	1	31-110	LMS	o	110-120	MS	o	1	I	3a	D
198	0-29	SCL	2	29-60	SCL	o	60-120	stSCL	xx	0	II	2	D
199	0-33	HCL	0	33-55	C	xx	55-120	C	xxx	0	II	3a	W
200	0-33	HCL	0	33-70	HCL	o	stopped	on stone		0	I/II	3a	D
201	0-29	HCL	0	29-50 80-90	HCL stC	xx xxx	50-80 stopped	C on stone	xxx	0	II	3a	W
202	0-15	MCL	0	15-38	MCL	x	38-50 50-120	C C	xxx xxx	1	II/III	3a	W
203	0-35	HCL	2	35-60	SCL	xx	60-80	MSL-LMS	xx	0	II	2/3a	W

Obs No	Topsoil			Upper subsoil			Lower subsoil				Wetness Class	ALC grade	Main limitation
	Depth (cm)	Texture	Stones (%)	Depth (cm)	Texture	Mottling	Depth (cm)	Texture	Mottling	Slope (º)			
							80-120	HCL+SCL					

Key to soil and ALC tables

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)
md	mottled (topsoils only)

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 SP - Sandy Peat
PL - peaty loam Sed P - Sedimentary peat

Limitations:

W - wetness/workability
D - droughtiness
De - depth
St - stoniness
Sl - slope
F - flooding

Texture suffixes & prefixes:

ca - calcareous
gr - gravel
st - stony
cky- chalky
e - extremely
v - very

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

Map 2 Agricultural land quality
1:7,500

Grade 2 (23.4 ha)

Subgrade 3a (103.0 ha)

Subgrade 3b (70.3 ha)

Grade 4 (1.4 ha)

Not in agriculture (2.3 ha)

Not surveyed - assessed land grade shown in brackets

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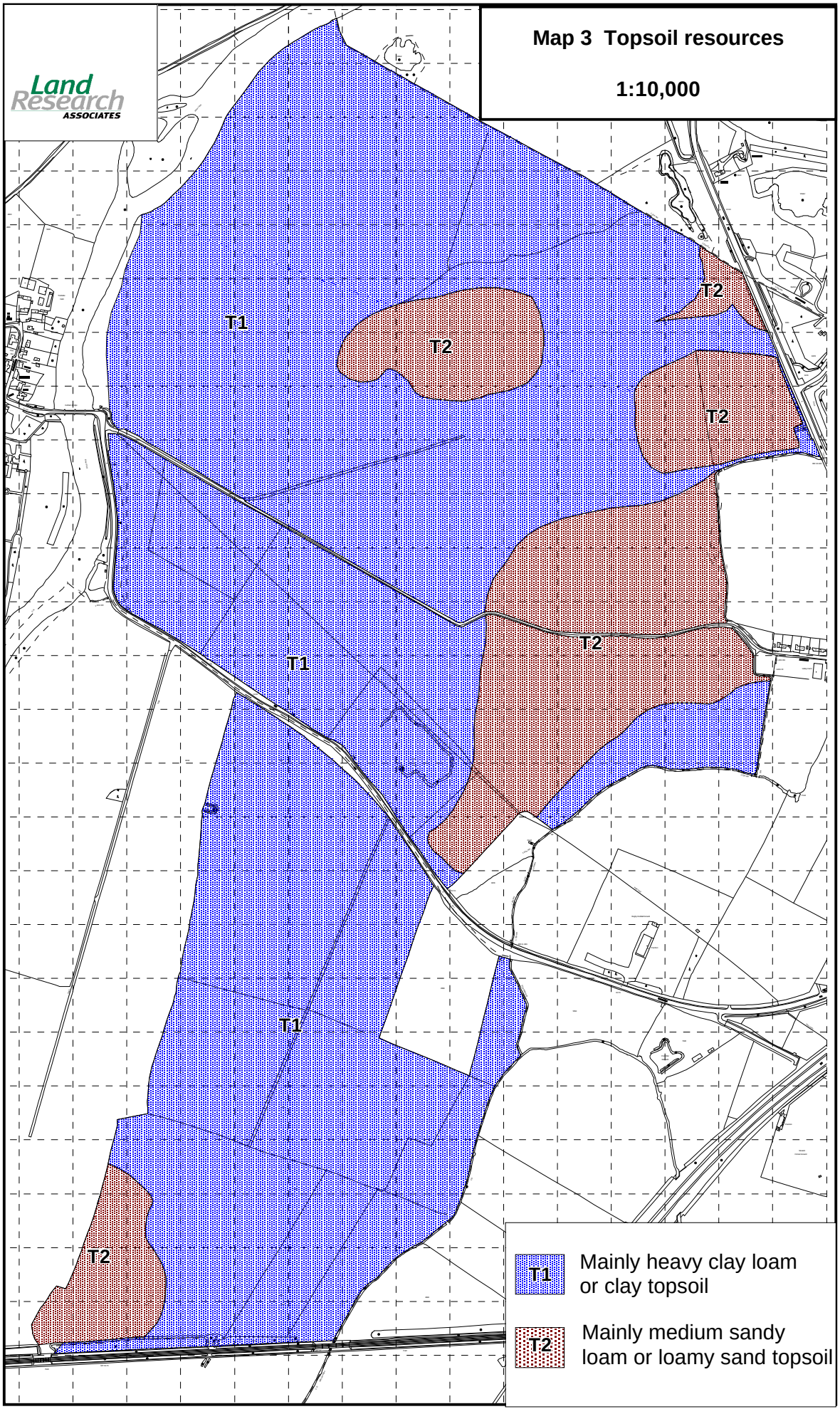
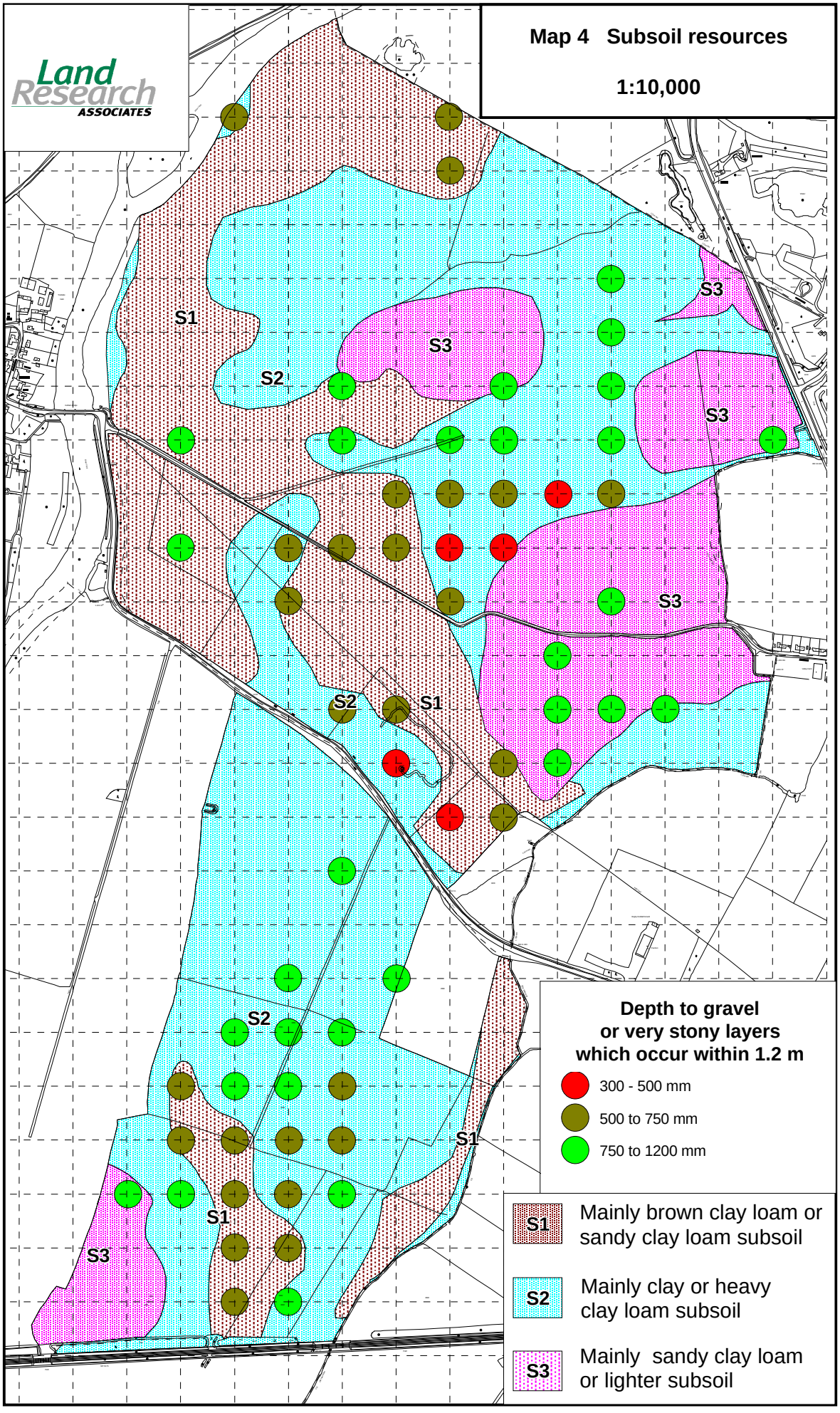
(3a)

(3b)

(2)


Land Research ASSOCIATES
Map 3 Topsoil resources
1:10,000
T1
T2
T2
T2
T1
T2
T1
T2
T1 Mainly heavy clay loam or clay topsoil
T2 Mainly medium sandy loam or loamy sand topsoil


Land Research ASSOCIATES
Map 4 Subsoil resources
1:10,000
S1
S2
S3
Depth to gravel or very stony layers which occur within 1.2 m
300 - 500 mm
500 to 750 mm
750 to 1200 mm
S1 Mainly brown clay loam or sandy clay loam subsoil
S2 Mainly clay or heavy clay loam subsoil
S3 Mainly sandy clay loam or lighter subsoil

Map 5 Location of the observations (1:12,500)