NOTTINGHAMSHIRE MINERALS LOCAL PLAN CALL FOR SITES

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

LOCATION: **NEWARK**

	Plan Reference/Evidence	Additional Information
Proposed boundary of the site	Red line on Plan 2579-5-2-2 DR0001	Approximately 100 ha south of the A617, southeast of of the village of Kelham, and east of the village of Averham, which predominantly comprises agricultural land with hedgerows along field boundaries.
The extent of excavations	See plan 2579-5-2-2 DR0001	Proposed excavation area from circa 75 Ha. Scheme includes stand offs to the River Trent, the A617 and the railway along the southern boundary of the site. In addition, extraction would stand-off (by circa 50m) from the potential route of the Kelham bypass to the north of the site.
Proposed access to the site	Drawing No's 001, 002, 011.	It proposed to establish dedicated access to the area north of the A617 (refer to the separate call for sites pro-forma in this regard) with conveyor link to be established the area south of the A617 which is the subject of this call for sites pro-forma. A secondary access is proposed to be established south of the A617 for infill traffic and delivery of mobile plant/construction traffic (refer to Plan 011).
Potential location of processing plant	Refer to Plan 2579-5-5-2 DR0002	The indicative plant site location is proposed to the west of Great North Road

Phasing	See plan 2579-5-2-2 DR0001	Two main working phases (Phase 3 and 4) are proposed in the area south of the A617, which would follow workings in the area north of the A617 (refer to the separate call for sites pro-forma in this regard). Phase 3 and 4 will be worked south to north.
An OS Map of the site	OS detail included on Plans.	/
Estimated number of HGV Movements per day/month/year	/	Up to 65 loads per day.

Reserve Data

	Plan Reference/Evidence	**Additional Information**
Quality and quantity of recoverable reserves	/	Estimated workable reserves of 4 million tonnes south of the A617. 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.
When will the site be ready to be worked?	/	From circa 2038 (to provide production continuity in the event of sand and gravel extraction taking place from site area north of A617).

Role of Sites/Market

	Plan Reference/Evidence	Additional Information
Is the site a new Greenfield site or an extension?	/	Extension to proposed Greenfield site.
If a Greenfield site, is it replacing an existing mineral working within or outside the county	/	The site is a long term extension reserve to provide production continuity for the proposed Great North Road Quarry (north of the A617).
What is your planned market area?	/	The site is well located to serve the Nottingham and South Nottinghamshire markets and 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 dedicated access proposed 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 highway or any other transport route?	/	Yes. Tarmac has an option to lease necessary mineral working rights from the owners of the site. The site can be accessed directly to the A617 (for site development traffic and inert fill importation) and to the land to the north of the A617 to link to the proposed quarry development scheme north of the A617 (which has direct access to the Great North Road).

Landowner Consent

	Plan Reference/Evidence	Additional Information
Who is the legal owner of the site?	/	Tarmac has a formal option agreement with the owners of the site.
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 has a formal option agreement with the owners of the site. The owners support the site to be promoted to the Plan.

Agricultural Land Classification

	Plan Reference/Evidence	Additional Information
Agricultural land classifications found within the site	See attached report.	Phase 3 is mainly categorised as Subgrade 3a and Subgrade 3b agricultural land, with some Grade 2 land. Phase 4 is mainly Subgrade 3a with some Subgrade 3b and Grade 2 agricultural 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

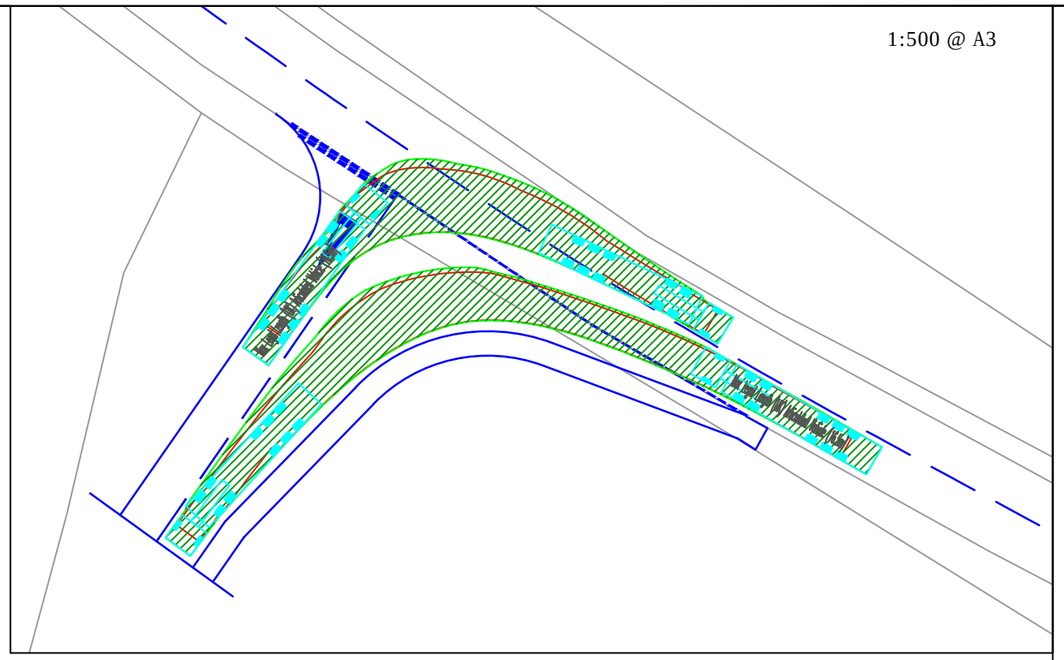
	Plan Reference/Evidence	Additional Information
Is the site located within 250m of any sensitive receptors? (schools, residential dwellings, workplaces, healthcare facilities)	Refer to Plan 2579-5-2-2 DR001	St Michael and All Angels Church is located approximately 110m to the west of the site on the opposite side of the River Trent. Robin Hood Theatre and a small number of residential properties are also located within 250m to the west. The proximity of these receptors have been taken into account in the site design (i.e. through the inclusion of standoffs in excess of 100m between the proposed extraction areas and those properties closest to the site).

Reclamation

	Plan Reference/Evidence	Additional Information	
Proposed reclamation schemes – what opportunities for environmental benefits do you see arising from the scheme?	See plan 2579 -5-2-2 DR003	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 1.138 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. Infill commencing circa 2 years after commencement of mineral extraction (10 years proposed for life of infill operations).

N

1:500 @ A3



2.4M X 160M VISIBILITY SPLAY

EXISTING HEDGES TO BE REMOVED AND SET BACK

THROUGH LANES AS EXISTING CARRIAGEWAY WIDTH APPROXIMATELY 7.3M

8M RADII

EXISTING FOOTWAY 2.4M WIDTH

CUTLINE

2M FOOTWAY

1 IN 6M DIVERGING TAPER, 30M IN LENGTH

15M RADII

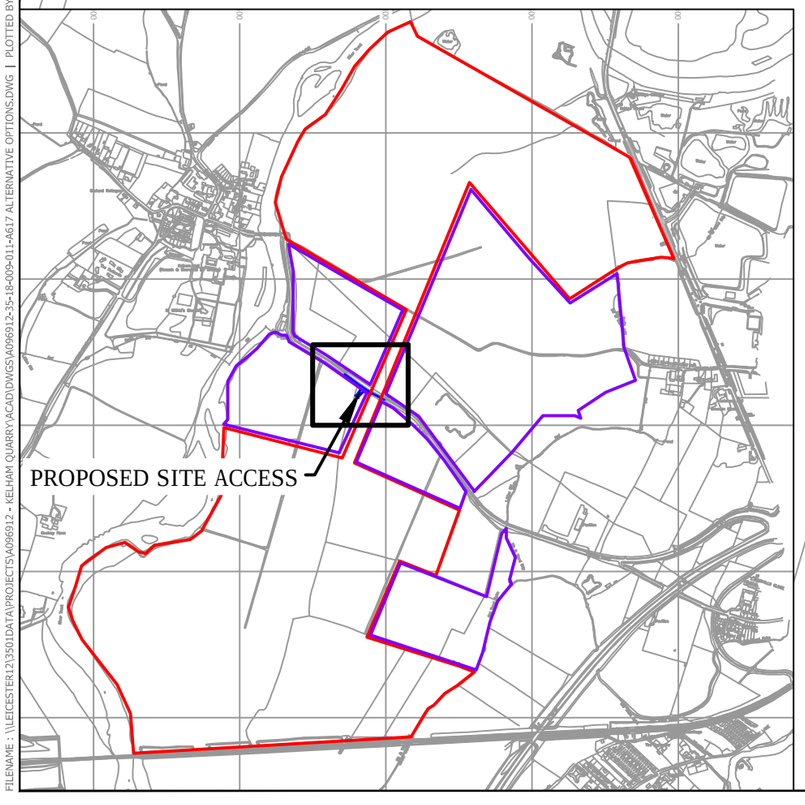
1 IN 6M MERGING TAPER, 30M IN LENGTH

EXISTING HEDGES TO BE REMOVED AND SET BACK

2.4M X 160M VISIBILITY SPLAY

A 617

CR



PROPOSED SITE ACCESS

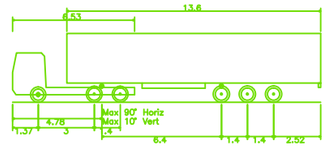
DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

KEY

- PROPOSED HIGHWAY LAYOUT
- VISIBILITY SPLAY
- INDICATIVE SITE BOUNDARY
- INDICATIVE OTHER TARMAC LAND BOUNDARY

DESIGN FOR IN PRINCIPLE AGREEMENT ONLY. PROPOSED HIGHWAY LAYOUT IS SUBJECT TO TOPOGRAPHICAL SURVEY.

VEHICLE 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

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

TARMAC
A CRH COMPANY

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

Project:

KELHAM QUARRY

Drawing Title:

FIGURE 11
A617 ALTERNATIVE ACCESS - OPTION 2

Scale @ A3	Drawn Date	Checked Date	Approved Date
1:1000	PJ 30/05/17	PG 30/05/17	ASG 30/05/17

Project No.	Office	Type	Drawing No.	Revision
A096912	35	18	011	-

Kelham

Trent Lane

River Trent

Ollerton Road

Broadgate Lane

Manor Farm

Trentside Farm

Blacksmith Lane

Kelham Bridge

Grey House

Pond

The Rutlands

Playing Field

Kelham Hall

The Red House Hotel

Pavilion

Tennis Court

St Wilfrid's Church

Muskham Bridge

Civil War Earthwork

Lake

Bridge Cottage

Bridge House

A616 Great North Road

Crankley Lane

Kelham Lane

Valley Farm

Parkvale

Field Conveyor

Plant Site Access

Plant Site

Clean Water Lagoon

Silt Lagoon

Proposed Site Access

A617 Main Road

A617 Kelham Road

Temporary screen bunds for A617 Kelham Road

Temporary topsoil screen bunds (with flood flow attenuation) for Averham

Temporary subsoil store

Phase 3b temporary topsoil screen bund for elevated A46

Phase 4a

Phase 4b

Phase 3a

Phase 3b

Rugby Football Ground

Pavilion

Old Trent Dyke

A46

Newark Cricket Ground

Tolney Lane

The Bungalow

Hose Farm

Mill House Cottage

Castle View Caravan Park

Ropewalk Farm

Civil War Earthwork

Legend

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

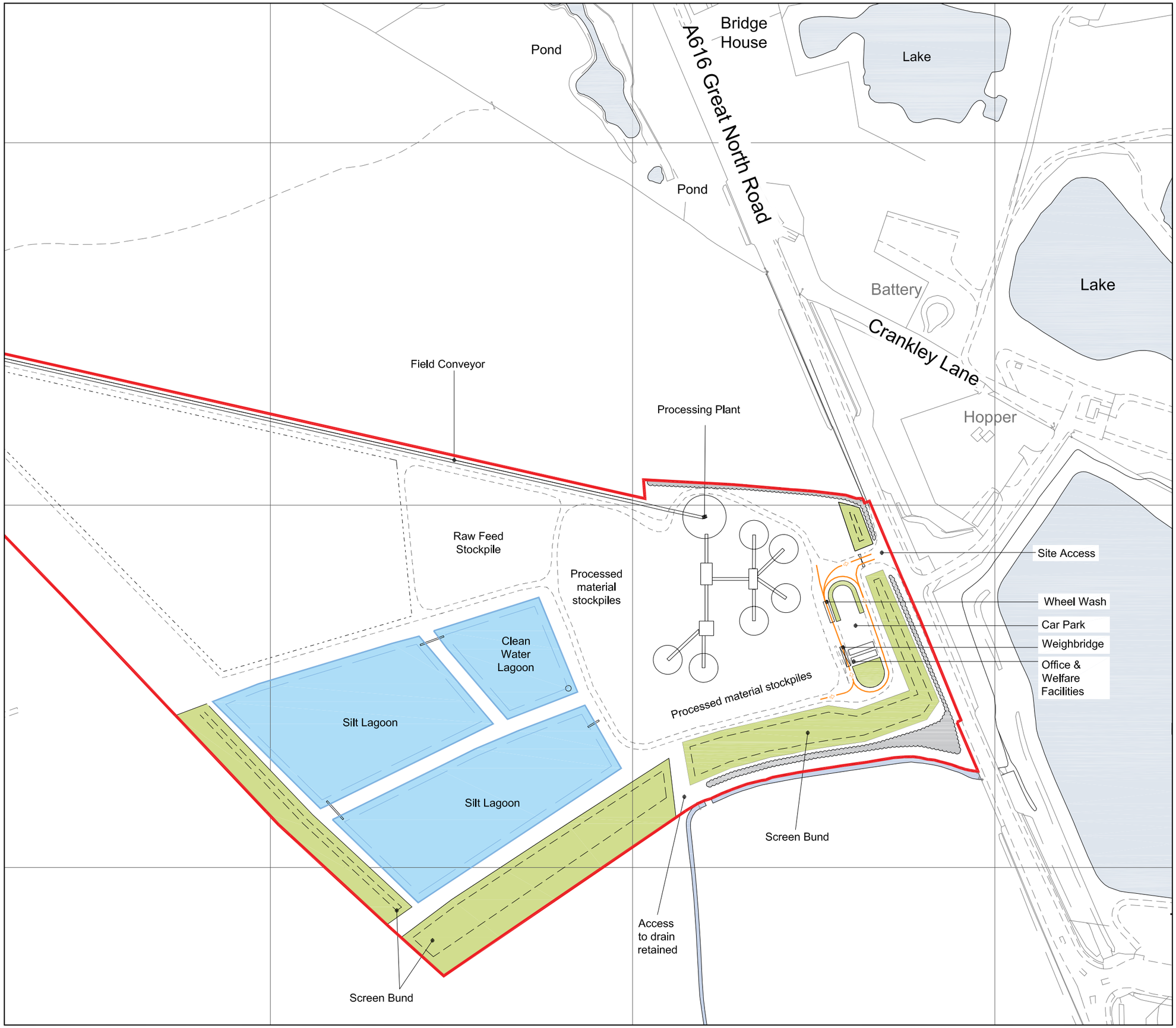
DAVID JARVIS ASSOCIATES

TARMAC
A CRH COMPANY

Site Name: Kelham - South

Drawing Name: Outline Working Plan

Drawn By:	Scale @ A1:
DJA	1:4,000
Date:	**Drawing Number:**
28/11/2017	2579-5-2-2-DR0001



Legend

- Boundary: Site
- Existing Vegetation

DAVID JARVIS ASSOCIATES

TARMAC
A CRH COMPANY

Site Name:

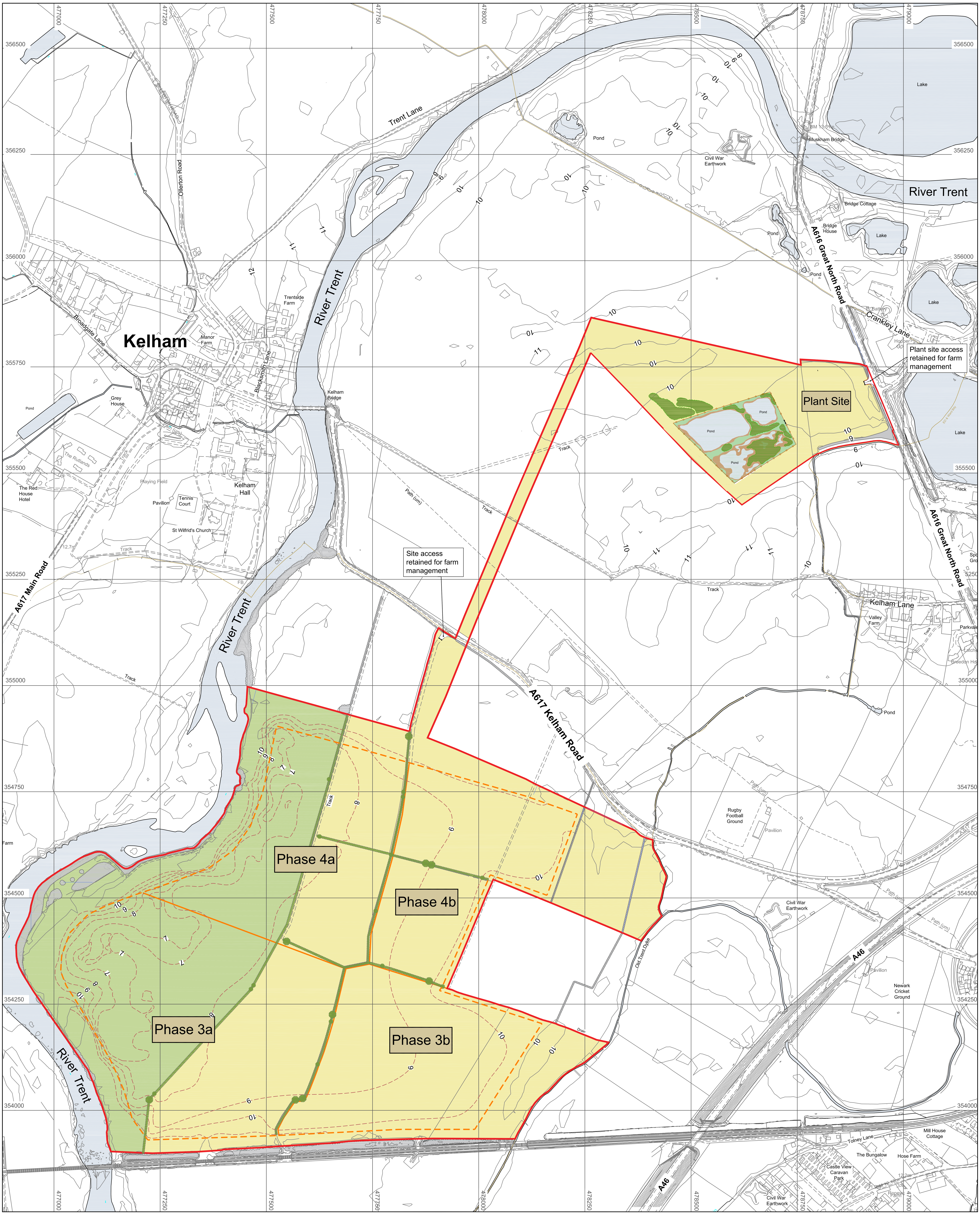
Kelham - South

Drawing Name:

Indicative Plant Site Layout

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

N



Legend

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

DAVID JARVIS ASSOCIATES

TARMAC
A CRH COMPANY

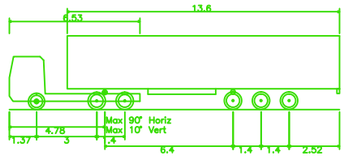
Site Name: Kelham - South

Drawing Name: Outline Restoration Proposals

Drawn By:	Scale @ A1:
DJA	1:4,000
Date:	**Drawing Number:**
08/01/2018	2579-5-2-2-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
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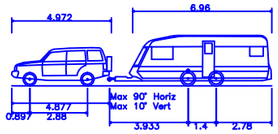
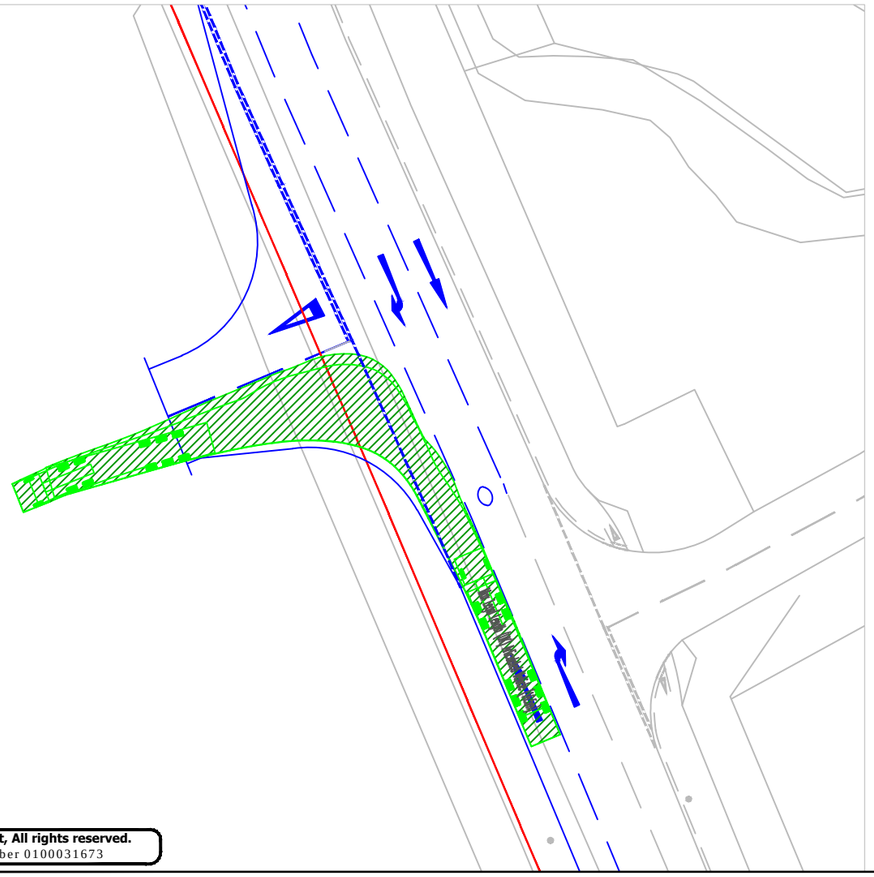
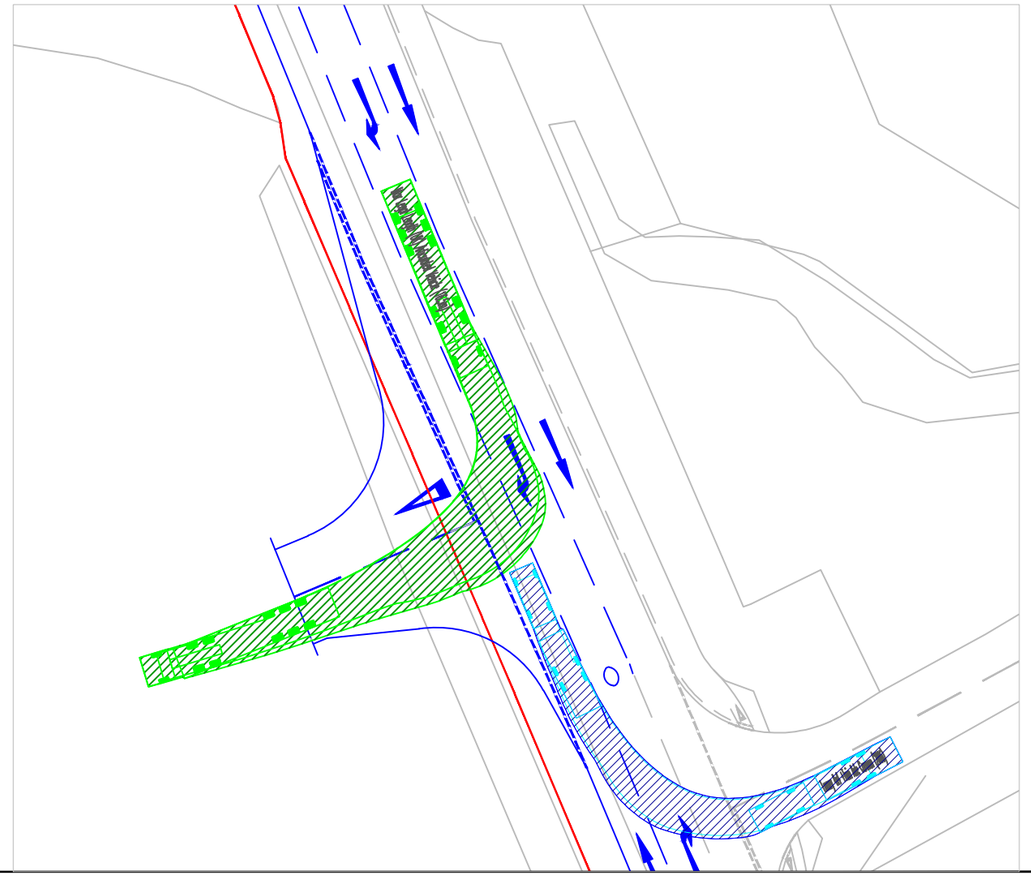
Kerb to Kerb Turning Radius	6.530m



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
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LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
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

TARMAC
A CRH COMPANY

EXECUTIVE PARK
AVALON WAY
ANSTEY
LEICESTER
LE7 7GR
TEL: +44 (0)116 234 8000
FAX: +44 (0)116 234 8001
e-mail: leicester@wyg.com

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

SOIL RESOURCES AND AGRICULTURAL USE & QUALITY OF LAND EAST OF KELHAM NOTTINGHAMSHIRE

Report 414/2

10th August, 2017

Land Research ASSOCIATES
www.lra.co.uk

SOIL RESOURCES AND AGRICULTURAL USE & QUALITY

OF LAND EAST OF KELHAM, NOTTINGHAMSHIRE

F.W. Heaven BSc, MISoilSci
Laura Thomas MSc

Report 414/2

Land Research Associates Ltd
Lockington Hall,
Lockington,
Derby
DE74 2RH
www.lra.co.uk

10th August, 2017

SUMMARY

A soil resources and agricultural land quality survey has been undertaken of 60 ha of agricultural land east of Kelham, Nottinghamshire.

The survey has shown two main soil types at the site: heavy textured soils some with clay subsoils; and lighter loamy soils on higher ground. The land is mainly of subgrade 3a quality, with smaller areas of grade 2 and subgrade 3b agricultural quality.

Five soil resources have been identified: a topsoil and subsoil resource from the heavier land; and a topsoil and two subsoil resources from the lighter land. Adherence to soil stripping and restoration recommendations would enable land to be returned to its current agricultural quality.

1.0 Introduction

1.1 This report provides information on the soil resources and agricultural quality and use of 60 ha of land east of Kelham, Nottinghamshire, which has been proposed for quarrying. The report is based on a survey of the land in May and July 2017.

SITE ENVIRONMENT

1.2 The site is made up of 2 fields. It is bordered to the west by the River Trent and to the south by the Newark to Nottingham railway. The eastern edge is marked by field boundaries, and the northern edge passes across a field.

1.3 The land is level at an average elevation of approximately 11 m AOD.

AGRICULTURAL USE

1.4 At the time of the May survey, the smaller of the two fields was in potatoes, and the larger was in oilseed rape. In July the rape had been harvested.

1.5 The land is not registered to any agri-environment schemes.

PUBLISHED INFORMATION

1.6 1:50,000 BGS geological information shows the basal geology as Mercia Mudstone Group in the northern half of the site and Gunthorpe Member Mudstone in the southern half. Superficial deposits of alluvium (clay, silt, sand and gravel) overlie the majority of the site with an area of Holme Pierrepoint sand and gravel in the south-east.

1.7 The National Soil Map[1] at 1:250,000 scale shows the land as within the Wharfe Association, described as stoneless permeable fine loamy soils occurring on floodplains.

1.8 Provisional Agricultural Land Classification of the site shows most of the land as grade 2 with some grade 3 in the western part. No more detailed survey of the site has been published.

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

2.0 Soils

2.1 A detailed soil resource and agricultural quality survey was carried out partly in in May when the rape crop was found to be very difficult to access. Survey of that land was thus deferred to July 2017 after harvest. The survey 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 1) showing their location is in an appendix to this report.

SOILS

2.2 The survey shows two principal soil types: heavy loam soils, and light loamy over sandy subsoils (see Map 2).

Heavy loam soils

2.3 These are the most widespread soils on the site and are mainly located on slightly lower levels. The topsoil is heavy clay loam around 30 cm thick, and generally stone-free. It overlies brown heavy clay loam upper subsoil passing to mottled heavy clay loam or clay lower subsoil, some slowly permeable. Occasionally the lower subsoils are stony and sandy.

2.4 An example profile from a nearby pit at grid reference SK 77800 54100 is described below:

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

2.5 These soils are moderately freely-draining (Soil Wetness Class II) and have a moderate to good capacity to absorb excess winter rainfall.

2.6 In some small areas the heavy clay loam topsoil lies directly over slowly permeable clay as in the example profile at grid reference SK 78600 55000 described below:

0-32 cm	Dark greyish brown (10YR 4/2) stoneless clay with few strong brown mottles; weak coarse subangular blocky structure with a fine surface crumb.
32-55 cm	Brown (7.5YR 5/2) stoneless clay with many strong brown (7.5YR 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 (7.5YR 5/6) mottles; massive.

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

Loamy over sandy soils

2.8 These soils are generally encountered on raised parts of the site. There is some variation in the upper parts of the soils but they are characterized by sandy or gravelly lower subsoils. Topsoils are often medium sandy loam, but sandy clay loam and loamy sand types also occur. They are rarely stony. The subsoils pass downwards through medium sandy loam and loamy medium sand to sandy and sometimes gravelly lower layers. Below 40 cm depth, some ochreous mottling becomes evident indicating some slight seasonal wetness caused by fluctuating groundwater.

2.9 An example profile of the loamier type from a nearby pit at SK 77700 54100 is described 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 (5YR. 4/4) and brown (7.5YR 5/4) stoneless medium sandy loam, weak medium subangular blocky structure; common roots; many large pores.
48-80 cm	Brown (7.5YR 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.

2.10 An example profile of the sandier type from observation 26 (Map 1) is described below:

0-32 cm	Brown to dark brown (7.5YR 4/3) stoneless medium sandy loam; moderately developed medium subangular blocky structure; friable; a few fine and medium pores; many very fine fibrous roots; clear smooth boundary to:
32-50 cm	Brown to dark brown (7.5YR 4/4) stoneless loamy medium sand; weakly developed medium subangular blocky structure; friable; no visible pores; common very fine fibrous roots; a few ferri-manganiferous concentrations; merging boundary to:
50-100 cm	Brown (7.5 YR 5/3) stoneless medium sand with a few yellowish red (5YR 5/8) mottles; structureless, single grain; common very fine fibrous roots, common ferri-manganiferous concretions.

2.11 Locally the sandy layers are close to the surface, occurring below loamy medium sand topsoil.

2.12 The light loamy soils are freely-draining (Soil Wetness Class I) and have a high capacity to absorb excess winter rainfall.

3.0 Agricultural Quality

3.1 To assist in assessing land quality, the former 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.[2] The relevant site data for an average elevation of 11 m is given below.

• Average annual rainfall:	565 mm
• January-June accumulated temperature >0°C	1431 day°
• Field capacity period (when the soils are fully replete with water)	109 days early Dec – early Apr
• Summer moisture deficits for:	wheat: 119 mm potatoes: 114 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 Food.[3] There are no climatic limitations in this area of Nottinghamshire.

SURVEY RESULTS

3.4 Land of grades 2 and 3 exists on the site. Land quality is determined mainly by either soil wetness or droughtiness. There are some parts of the site which suffer flooding in winter.

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

Grade 2

3.5 There are approximately 4 ha of grade 2 land on the site in areas where deeper loamy soils similar to the profile described in paragraph 2.9 occur. The soils are easy working and have good reserves of available moisture to sustain crop growth, with the only agricultural limitation being slight droughtiness.

Subgrade 3a

3.6 There are approximately 49 ha of sub-grade 3a land on the site of two main types. Where heavy loam soils similar to those described in paragraph 2.4 occur, the agricultural limitation is restricted seasonal workability as the result of slight wetness.

3.7 Where loamy soils have sandy layers closer to the surface, limitations in soil moisture reserves increases the droughtiness limitation.

Subgrade 3b

3.8 There are approximately 7 ha of sub-grade 3b land on the site. Where soils similar to those described in paragraph 2.6 occur the presence of impermeable clay layers close to the surface reduces soil drainage and the land suffers from seasonal wetness.

3.9 Very sandy soils have very limited capacity to retain sufficient moisture to maintain crop yield, and droughtiness is the principal agricultural limitation of the land (paragraph 2.10).

3.10 Local knowledge suggests that lower parts of the field close to the river are inundated for short periods in most years, and this flooding reduces the land grade to sub-grade 3b.

Non agricultural

3.11 There is about half a hectare of land close to the river in the centre of the site which is not farmed. It lies between the river bank and the access track.

Grade areas

3.12 The boundaries between the different grades of land are shown on Map 4 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*
Grade 2	4.1	7
Subgrade 3a	49.0	82
Subgrade 3b	6.7	11
Non agricultural	0.4	-
Total	60.2	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 five reusable soil resource units identified for land restoration: two topsoils and three subsoils, which are described below and shown on Map 2 and 3. A summary of stripping depths and yields is in an appendix to this report.

Topsoil

4.3 Two topsoil resources occur, and their extent and distribution is shown on Map 2.

4.4 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 approximately **300 mm**. In general the resource is stoneless. The estimated potential yield is ***130,000 m^3***

4.5 Topsoil resource **T2** is associated with raised land and soils formed in sandy or coarse loamy deposits. The mean thickness is approximately **300 mm**. It consists of mainly medium sandy loams and includes some areas of light (*c.* 20% clay content) sandy clay loams, and some loamy medium sands. The estimated potential yield is ***57,000 m^3***.

Subsoil

4.6 Four subsoil resources occur of which three are suitable for reuse in restoration. Their extent and distribution is shown on Map 3.

4.7 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** and **S4** under **T2.**

4.8 Subsoil resource **S1** consists of brown upper subsoils from the land over river alluvium. 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. The resource is heavy textured and easily damaged if mishandled.

4.9 There is considerable variation in thickness and in the western part of the site the resource often extends to below 1.2 m depth so that assessment of potential yield is difficult. This area (pale blue on Map 3) should be stripped to a thickness of **350 mm** below the topsoil resource. The area marked **S1** on the map (pink on Map 3) should be stripped to a thickness of **900 mm** below the topsoil resource. This will give an estimated maximum yield of ***324, 235 m^3***

4.10 Subsoil resource **S2** consists of clay subsoils developed in the wetter and more poorly structured river alluvium. Its slower permeability and weak structure means it is unsuitable as a reusable resource for soil profile restoration once stripped.

4.1 Subsoil **S3** is sandy loam or sandy clay loam in texture and lies below the similar textured topsoil **T2.** It has more potential for retaining soil moisture than the underlying sandy layers, and is useful in restoration of the lighter soils to achieve best and most versatile status by limiting droughtiness. There is some variation in depth but the mean thickness is approximately **330 mm** giving an estimated potential yield of ***43,000 m^3***.

4.2 Subsoil **S4** consists of sand and loamy sand lower horizons over gravel or other materials. It is generally below subsoil **S3** but it may lie directly under topsoil resource **T2** in some locations (pale yellow on Map 3). Its most useful function in restoration may be to provide a permeable basal layer in the restored profile. This resource should be stripped to a thickness of **600 mm** where it occurs below resource S3 (bright yellow areas on Map 3) and to a thickness of **900 mm** where it occurs below the topsoil T2 (pale yellow on Map 3). This will provide a total maximum yield of ***114,200 m^3.***

Soil Handling and Restoration

4.3 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

and avoided during or just after heavy rainfall. Soils should be stripped using the excavator and dumper method as described by Sheet 1 in the MAFF Good Practice Guide for Handling Soils[4].

4.4 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.

4.5 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.

4.6 It is recommended that the lighter loam soils should be used to restore area T2 and the heavier soils used to restore areas marked T1 on Map 2.

Lighter soils

4.7 To restore land in area T2 - Map 2, resource **S4** should be laid as a lower subsoil at a thickness of **620 mm**. **S3** should then be laid at a thickness of **250 mm**. Finally, **T2** should be emplaced at **330 mm** thickness. The loamy sand upper subsoil and sandy loam topsoil will retain moisture for roots and enable the land to be restored to subgrade 3a agricultural quality with slight droughtiness limitations.

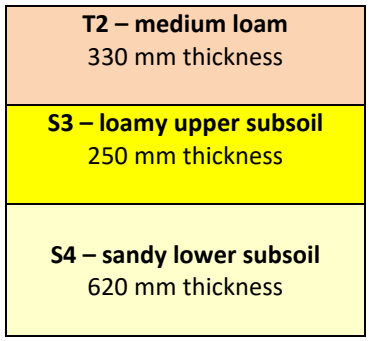


Figure 1: Restored 1.2 m profile of lighter soils to be emplaced in area T2 - Map 2

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

Heavier soils

4.8 The key to restoring these soils is to maintain permeability and drainage. Topsoil **T1** should be laid at **300 mm** thickness and overlie brown subsoil **S1** laid at **750 mm** thickness. This restoration will provide land of grade 2 / subgrade 3a agricultural quality depending on topsoil texture.

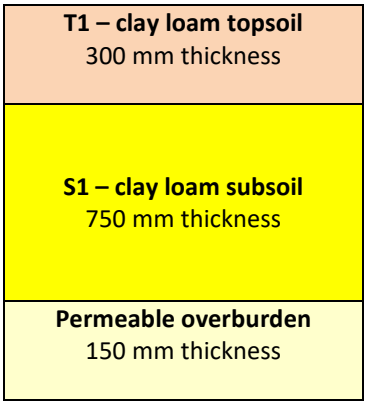


Figure 2: Restored 1.2 m profile of heavier soils to be emplaced in area T1 - Map 2

APPENDIX

MAPS AND DETAILS OF OBSERVATIONS

Land east of Kelham: 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	0-26	HCL	1	26-70	SCL	o	70-120	(st) SCL	x	0	I/II	2/3a	W
2	0-30	HCL	0	30-85	HCL	o	85-120	C	xx	0	I/II	2/3a	W
3	0-29	HZCL	<5	29-45	HZCL	xx	45-100	C	xxx	0	II	3a	W
4	0-30	HCL		30-60	HCL	xxx	60-100	C	xxx	0	II	3a	W
5	0-30	HCL	<1	30-60	HCL	x	60-80 80-120	HCL HCL	xx xxx	0	II	3a	W
6	0-33	HCL	0	33-70	HCL	x(x)	70-120	C	xxx	0	II	3a	W
7	0-30	C	<5	30-72	C	xxx	72-100	SZL	xxx	0	III	3b	W
8	0-29	HCL		29-65	HCL	x	65-100	C	xxx	0	II	3a	W
9	0-29	HCL	<1	29-120	HCL	o				0	I	2	W
10	0-30	HCL-C	0	30-55	HCL	xx	55-110 110-120	C HCL	xxx xxx	0	II/III	2/3a	W
11	0-30	HCL		30-52	HCL	x	52-110+	C	xxx	0	II	3a	W
12	0-31	HCL	<5	31-85	HCL	x	85-110	C	xxx	0	II	3a	W
13	0-30	MCL	0	30-70	MSL	xx	70+	stop on stones		0	II	3b	D
14	0-30	SCL	0	30-60	SCL	o	60-90	SCL	xx	0	II	2	W
							90-110	oC	xx				
15	0-35	HCL	0	35-85	br HCL	o	85-110+	HCL	x	0	I	2	W
16	0-30	HCL-C	0	30-65	C	xxx	65+	Stop on gravel		0	III	3b	W
17	0-28	HCL	<5	28-59	HCL	xx	59-80 80-100	C SCL	xxx xxx	0	II	3a	W
18	0-45	(ca)MCL	0	45+	stop on hard layer					0		4	FI
19	0-25	SCL	0	25-40	LMS	xx	40-120	MSL+C	xxx	0	II	3a	W
20	0-32	HCL	0	32-50	HCL	o	50-120	MCL	o	0	II	2/3a	W
21	0-30	HCL	0	30-55	HCL	o	55-110	C	xx(x)	0	II	3a	W
22	0-35	HCL	0	35-50	HCL	o	50-70 70-120	HCL SCL	xx xx	0	II	3a	W
23	0-30	SCL	0	30-65	MSL	o	65-120	LMS	x	1	I	2	D
24	0-28	HCL	<5	28-66	SCL	xx	66-85 85-110	SCL C	xxx xxx	0	II	3a	W
25	0-30	C	<5	30-100	C	xxx				0	III	3b	W
26	0-32	MSL	0	32-50	LMS	o	50-100 100-120	LMS+S MS	x	0	I	3b	D
27	0-30	HCL	0	30-60	HCL	o	60-90 90-120	SCL SCL	o x	0	I	2	W
28	0-30	HCL	0	30-60	HCL	o	60-100 100-120	HCL-MCL MS	xx	0	II	3a	W
29	0-30	HCL	0	30-65 65-75	SCL MSL	o	75-110 110-120	st MSL MS	o	0	I	3	W
30	0-30	HCL	o	30-45	HCL	o	45-110	HCL	x-xx	0	II	3a	W
31	0-30	MSL	0	30-45	MSL	o	45-110	LMS	x	0	I	3a	W
32	0-29	SCL		29-74	MSL	xx	74+	stop on stones		I	I/II	2	D
33	0-30	C		30-100+	C	xxx				0	III	3b	W
33a	0-27	SCL	<5	27-60	MSL	x	60-80 80-100+	MS; MS	xx xx	0	1	3	D

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
34	0-30	HCL	0	30-40	SCL	o	40-70 70+	MS stop on stones	x	0	II	3a	W
35	0-30	HCL	0	30-70	HCL	o-x	70-110 110-120	oHCL HZCL	xx xx	0	II	3a	W
36	0-30	HCL	0	30-70	HCL	o	70+	stop on stone		0	I/II	2/3a	W
37	0-28	HCL	0	28-70	HCL	o-x	70-120	st C	xxx	0	II	3a	W
38	0-40	SCL	0	40-80	SCL	o-x	80-120	HCL	x	0	I	2	W
39	0-30	MSL-SCL	0	30-40	MSL	o	40-65 65-110	LMS MS	o o-x	0 0	I I	3a 3a	D D
40	0-30	MS	<5	30-79	MSL	x	79-100	LMS+gravel		0	I	2	D
41	0-30	MCL	0	30-60	SCL	o	60-90 90-120	MSL MS	x x	0	II	2	W
42	0-30	HCL	0	30-60	HCL	o	60-110	(st) HCL	xx	0	II	3a	W
43	0-28	HCL	0	28-60	HCL	o	60-100 100+	HCL S+gravel	xxx	0	II	3a	W
44	0-30	SCL	0	30-50	SCL	o	50-60 60+	MSL stop on stones	o	0	I	3a	D
45	0-32	MSL	<5	32-71	MSL	x	71+	stop on stones		0	I	2	D
46	0-31	LMS		31-70	MS	x	70-110	SCL	x	0	I	3b	D
47	0-30	SCL	0	30-50	SCL	xx	50+	stop on stone		0	II	3a	D
48	0-26	HCL	0	26-50	HCL	o	50+	st HCL		0	I/II	2/3a	W
49	0-28	HCL	0	28-50	HCL-SCL	o	50-70 70+	LMS stop on stones	x	0	I	3a	D
50	0-30	HCL	0	30-90	HCL	xx	90+	stop on stones		0	II	3a	W
51	0-32	LMS	<5	32-100+	MS	x				0	I	3b	D
52	0-32	LMS	<5	32-100+	MS	o				0	I	3b	W
53	0-30	MCL	0	30-50	HCL	o	50-80 80-110	HCL oC	xx xxx	0	II	3a	W
54	0-30	HCL	0	30-70	HCL	o	70-80 80+	st SCL stop on stones		0	I	2	W
55	0-26	HCL	0	26-45	HCL	o	45-110	HCL	xx	0	II	3a	W
56	0-33	LMS	<5	33-110+	MS					0	I	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. 50) indicates the top of a slowly permeable layer

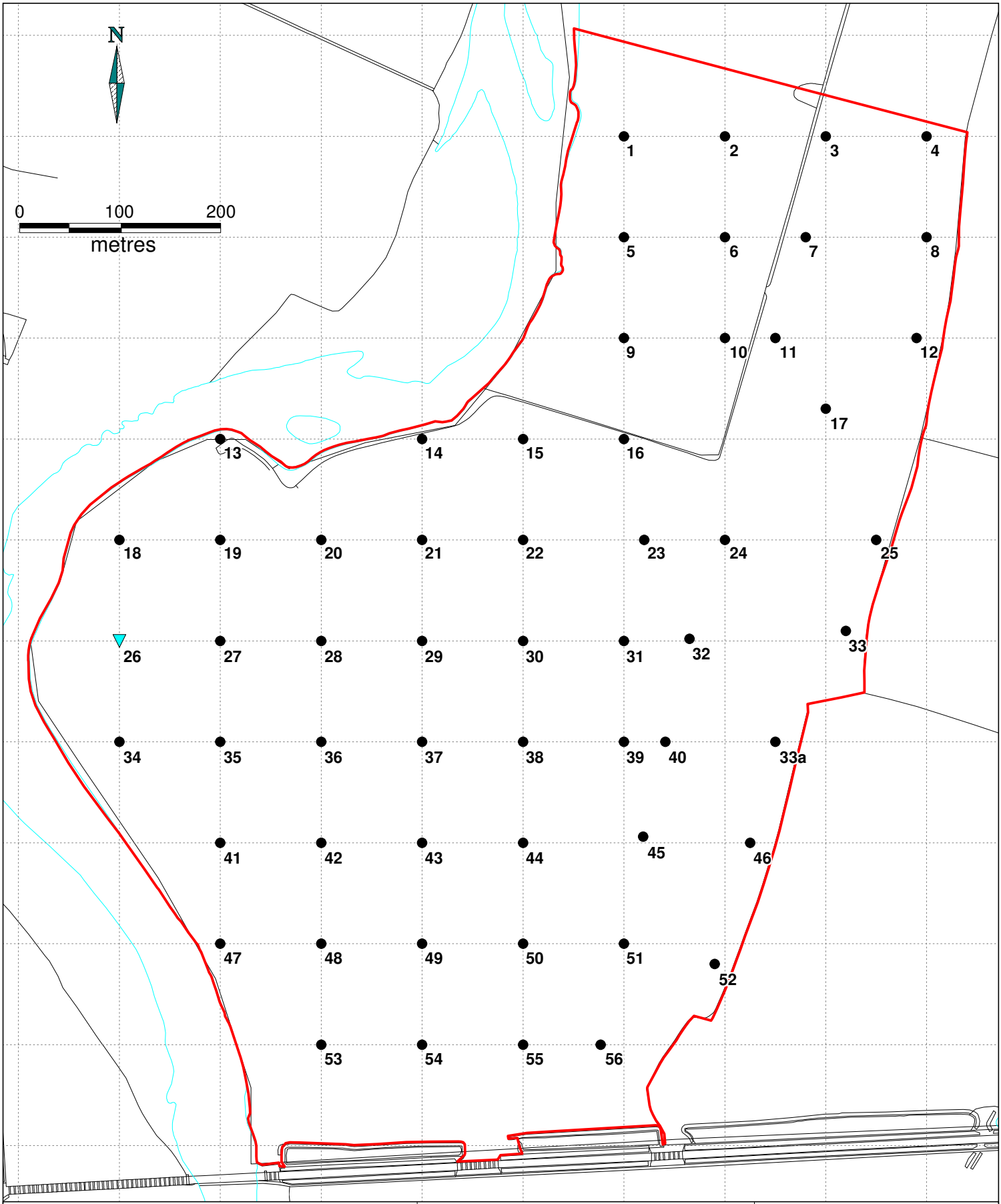
Texture:
- C - clay
- ZC - silty clay
- SC - sandy clay
- CL - clay loam (H-heavy, M-medium)
- ZCL - silty clay loam (H-heavy, M-medium)
- SCL - sandy clay loam
- SZL - sandy silt loam (F-fine, M-medium,C-coarse)
- SL - sandy loam (F-fine, M-medium, C-coarse)
- LS - loamy sand (F-fine, M-medium, C-coarse)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

Limitations:
- W - wetness/workability
- D - droughtiness
- De - depth
- St – stoniness
- Sl – slope
- Fl - Flooding
- T – topography/microrelief
- Cl - Climate

Texture suffixes & prefixes:
- ca – calcareous: x-extremely, v-very, sl-slightly
- (ca) – marginally calcareous
- st – stony, v st – very stony
- o –organic
- gr – greyish, br – brownish, r - reddish

Table of stripping depths and yields

Resource	Stripping thickness	Map area	Yield / m^3
T1	300 mm	Map 2 – orange	130,000
T2	300 mm	Map 2 - yellow	57,000
S1	350 mm below topsoil	Map 3 – pale blue	324,235
S1	900 mm below topsoil	Map 3 – pink	
S2	Non reusable resource		
S3	330 mm below topsoil	Map 3 – bright yellow	43,000
S4	600 mm below S3	Map 3 – bright yellow	114,200
S4	900 mm below topsoil	Map 3 – pale yellow	



Client: TARMAC A CRH COMPANY

Project:

Kelham: Phase 4

Map title:

Map 1
Location of the observations

KEY

- Auger location
- Soil description pit
- Survey area

Scale
1:5,000 at A4

Date
27/7/2017

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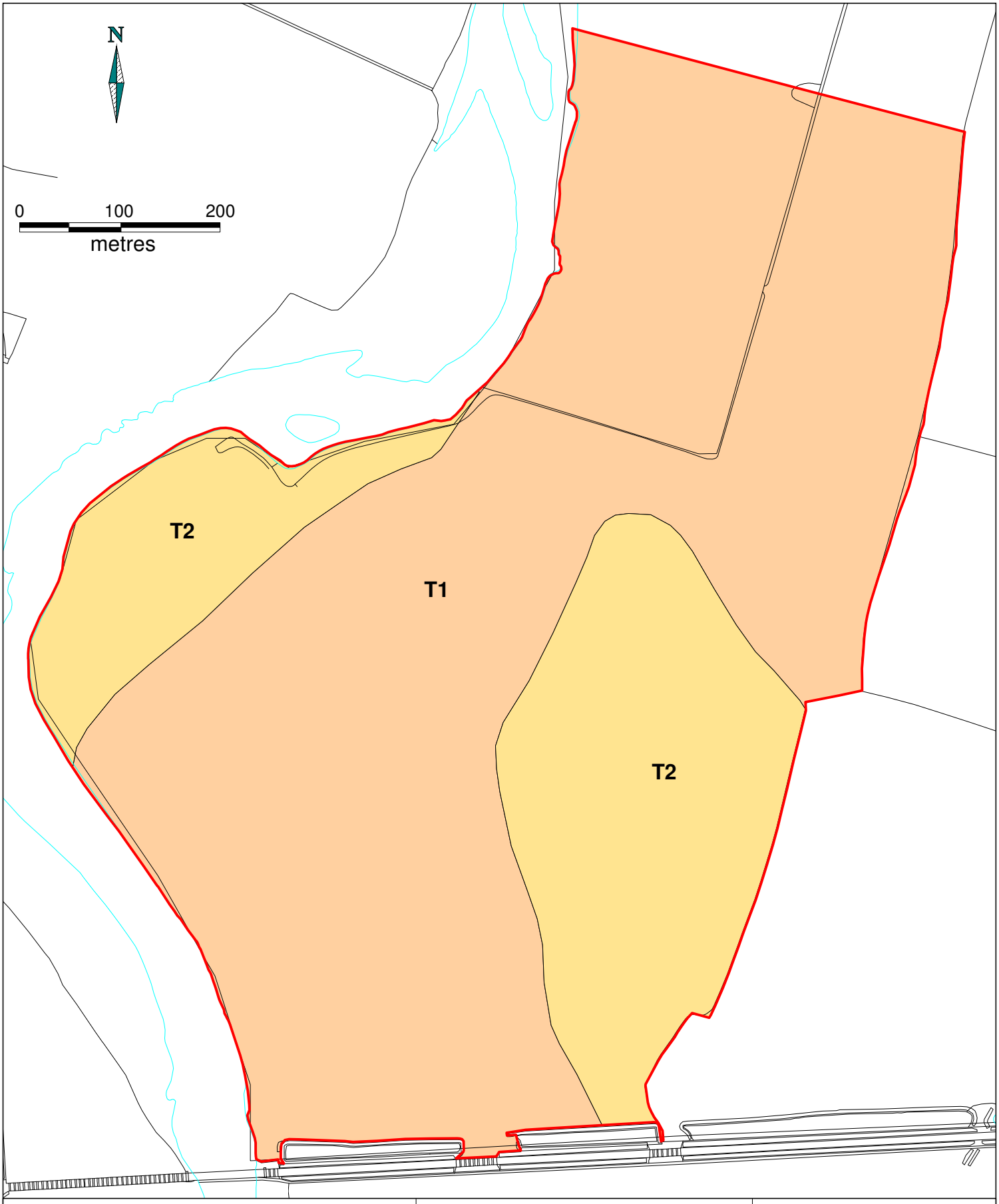

Client:

TARMAC
A CRH COMPANY

Project:

Kelham: Phase 4

Map title:

Map 2
Principal soil types
and topsoil resources

KEY

Soils with light loamy topsoil over light loamy or sandy subsoils

Soils with heavy loam topsoil over heavy loam subsoil

Survey area

Scale
1:5,000 at A4

Date
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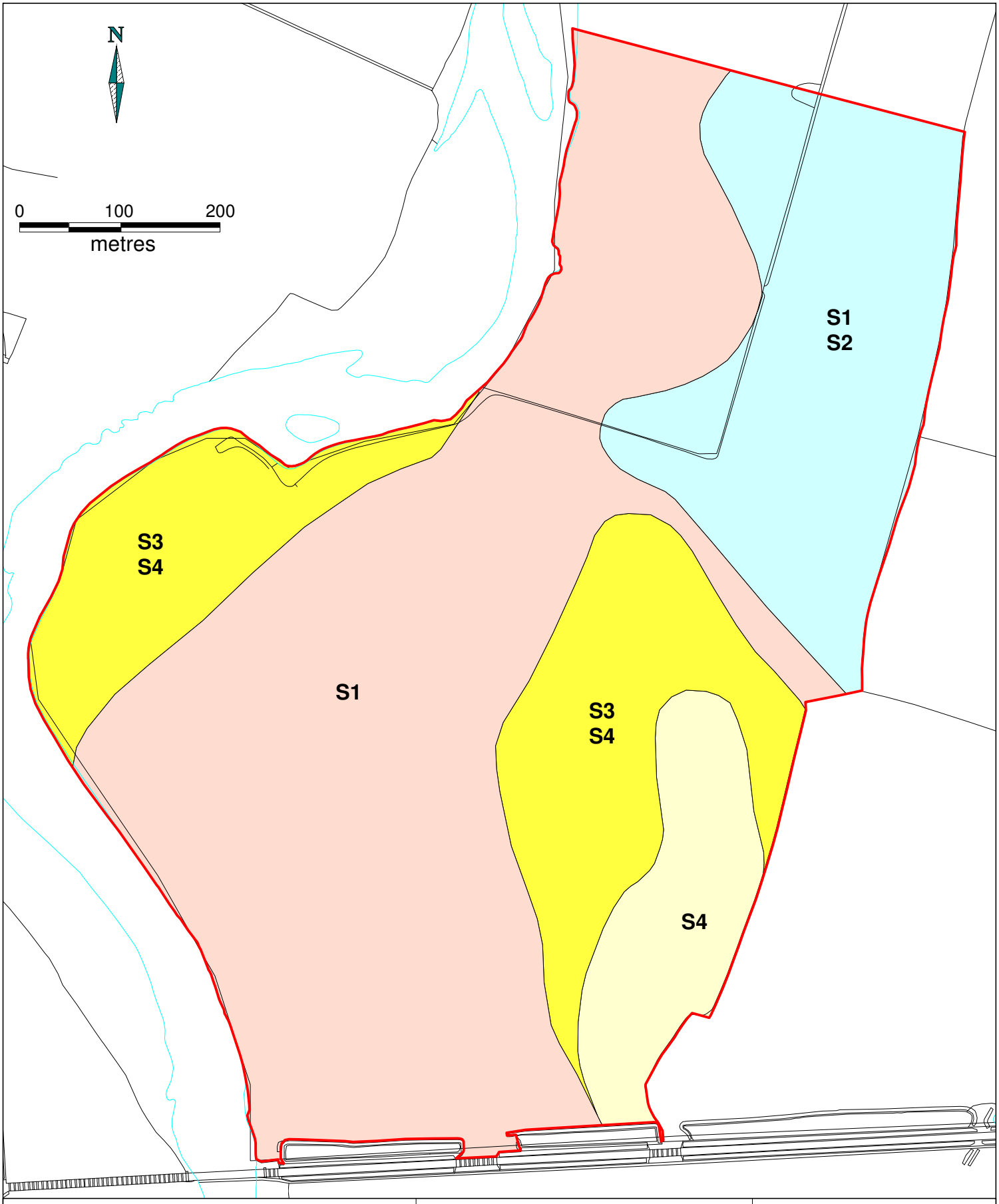

Client: TARMAC A CRH COMPANY

Project: **Kelham: Phase 4**

Map title: **Map 3**
Subsoil resources

KEY

- Subsoil S1
- Subsoil S1 over S2
- Subsoil S4
- Subsoil S3 over S4
- Survey area

Scale
1:5,000 at A4

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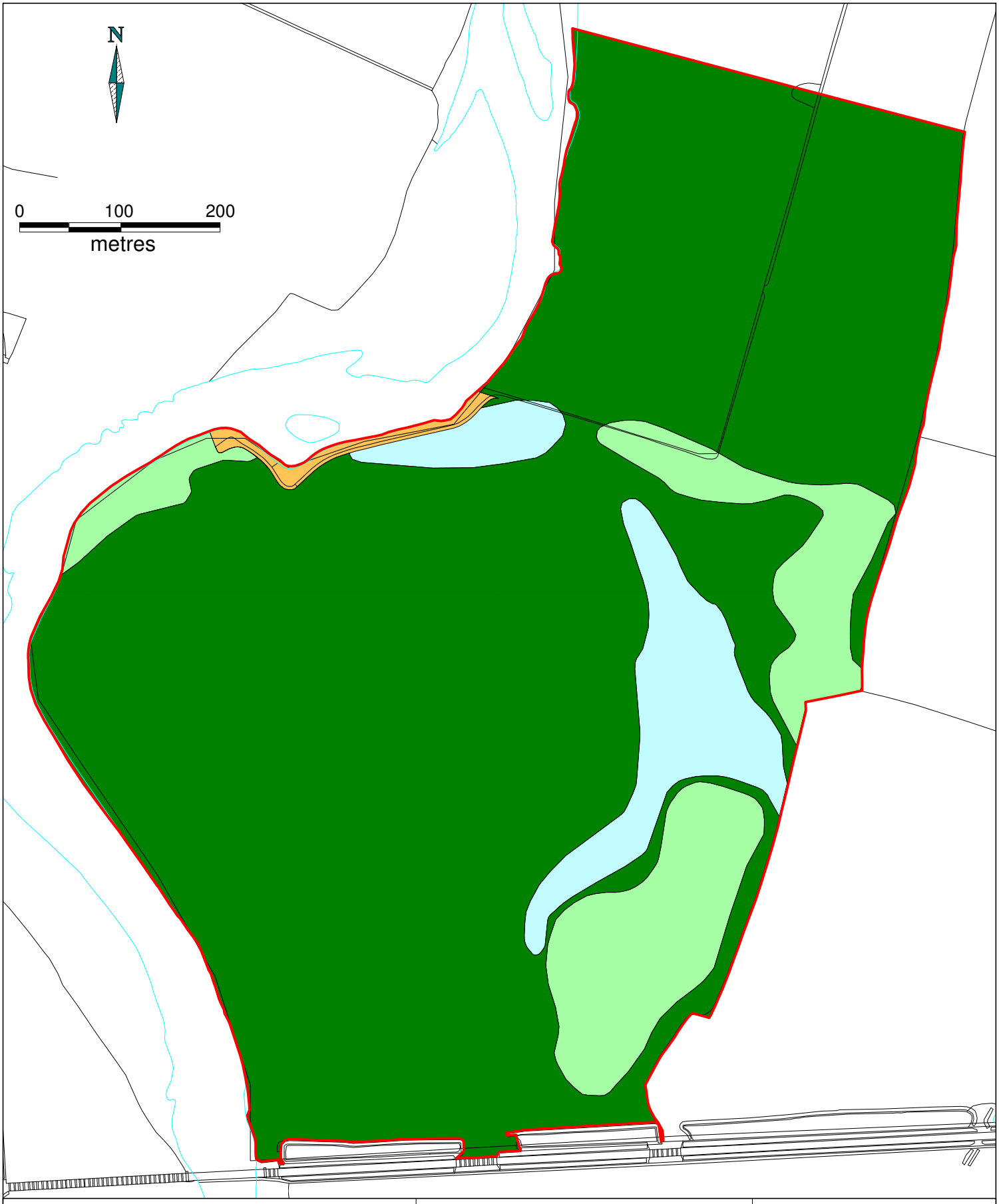

Client:

TARMAC
A CRH COMPANY

Project:

Kelham: Phase 4

Map title:

Map 4
Agricultural land quality

KEY

- Grade 2 (4.1 ha)
- Sub-grade 3a (49.0 ha)
- Subgrade 3b (6.7 ha)
- Other land (0.4 ha)
- Survey area

Scale
1:5,000 at A4

Date
27/7/2017

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