



Phase 1 & 2 site investigation report

Land off Seagate Road, Long Sutton

Produced for D. Brown Building Contractors Ltd

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Humberside Materials Laboratory Ltd
Atherton Way, Brigg
North Lincolnshire DN20 8AR
Tel 01652 652753

www.humbersidematerialslab.co.uk

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Ground investigation report

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EXECUTIVE SUMMARY

<i>Proposed works</i>	Large scale residential development (low rise dwellings with estate roads and other associated infrastructure)
<i>Site history</i>	Some former small possible farm buildings in limited areas of the site were removed during the 20th century There is a historic former sea bank crossing the east part of the site There is a former pond along the south boundary and a former drainage ditch in the southwest area A former gas works and Gas Holder were located about 20m north of the site, but these had been removed by the early 1980s.
<i>Published geology</i>	<i>Drift:</i> Tidal Flat Deposits (locally previously known as Terrington Beds - sandy silt, loose sand and soft clay) <i>Solid:</i> Oxford Clay Formation
<i>Topography</i>	Relatively flat and low-lying; c. 3m or 4m above Ordnance Datum A slight slope means east portion of the site is marginally higher
<i>Hydrology</i>	Drainage ditches along the north and south site boundaries The River Nene is 4km east and The Wash is about 7km northeast The site is in a Flood Zone 3 area
<i>Site works</i>	19 windowless-sampler boreholes (WS1-WS19) with SPTs to depths of 3.45 to 5.25m depth. DCP probing to 7.0m adjacent to WS10 2 shell and auger boreholes (BH1 and BH2) to depths of c.20m 24 trial pits (TP13 to TP37) to depths of 1.0m to 1.7m depth
<i>Revealed ground conditions</i>	- Topsoil: (across the site) loamy soil with rootlets (to a maximum depth of 0.50m) - Tidal Flat Deposits (TFD): Locally, shallow firm clay present to a depth of about 1m bgl Common very loose to loose granular silts and fine sands - but sometimes locally clayey - to depths of about 4m bgl A band of (very) soft (slightly organic) clays and silts is present in much of the east area of the site (at depths of up to 4m bgl) Loose to medium dense sands present (below 4m bgl) TFD sands become increasingly gravelly (e.g. >11m bgl) The base of the TFD soils is 14.8m (BH2) to 16.8m (BH1) bgl - Glacial till: Stiff boulder clay (shown to extend deeper than 21.5m bgl) Local BGS records indicate the glacial till is comprised of boulder clay and reaches depths of at least 45m bgl
<i>Groundwater</i>	Recorded standing groundwater levels: 0.61m to 2.95m bgl

<i>Gas protection</i>	Assessed NHBC classification of Green and CIRIA classification of CS1 No gas protection measures should be required
<i>Contamination conceptual site model</i>	The conceptual site model identified four main potential sources of contamination: 1. Possible made ground associated with previous buildings (metals, PAHs, asbestos) 2. Past land use – agricultural buildings (metals, PAHs, pesticides) 3. Highly organic subsoils (ground gases) 4. Nearby former gas holder and gas works (metals, PAHs, cyanides, thiocyanate, ammonia)
<i>Contamination risk assessment</i>	No unacceptable risks were identified. No visual or olfactory evidence of potential contamination was found in the 45 exploratory holes at the site Any unforeseen contamination (for example, hydrocarbon odours or staining) encountered during the development of the site must be monitored and reported to the local authority

1 Introduction

Humberside Materials Laboratory Limited (HML) has undertaken a geo-environmental ground investigation for a proposed development on land between Seagate Road and Wisbech Road, Long Sutton, Lincolnshire, as requested by the client, D. Brown Building Contractors Ltd. The land will be hereinafter referred to as *the site*. This report focuses only on the environmental aspects of the investigation.

1.1 Aims

The aim is to investigate and assess the geo-environmental ground conditions to facilitate contamination assessment of the proposed development.

1.2 Scope

The scope of the investigation includes:

- Review of desk study information (including previous site investigation reports)
- Intrusive investigation works
- Geochemical laboratory testing
- Development of a conceptual site model of potential contamination linkages
- Assessment of contamination risk using a source-pathway-receptor approach
- Recommendations for further works, where appropriate

1.3 Conditions and Limitations

This report is produced solely for the client and should only be copied in full. When transmitted electronically, the definitive copy of the report is held by Humberside Materials Laboratory Ltd.

This report is prepared on the assumption that all facts have been disclosed.

The comments given in this report and the opinions expressed assume that conditions do not vary beyond the range revealed by this study and the information provided in the production of this report is complete and reliable.

2 Desk study information

2.1 Sources of site information

A variety of sources of desk study information have been used to gather information about the site, as listed below (in Table 1).

Table 1: Sources of site information			
Source description		Details	Date
Site specific	Site visit and walkover	Photos (in Appendix A) and notes of HML visit	Dec 2020 to Jan 2021
	Envirocheck report	Landmark™ Envirocheck report (Appendix E) with historical maps (Appendix D). Landmark order number: 273783579_1_1	22 Feb 2021
	Proposed site layout	Templeman Design drawing number 3359-TD-XX-XX-DRG-AR-0002-P0	Nov 2017
	Property sales brochure	Brown & Co estate agents four page sales brochure. Undated, date shown is date received by HML	Nov 2020
Local information	Local maps	www.google.co.uk , www.openstreetmap.org , www.promap.co.uk & www.streetmap.co.uk	Feb 2021
	Online British Geological Survey (BGS) data	www.bgs.ac.uk ; geological maps & borehole records	Feb 2021
	Local BGS geology maps	1:50000 Series, King's Lynn and The Wash, Sheet 145 with part of 129, Solid & Drift Edition	1978
	Historical maps	www.oldmapsonline.org ; www.old-maps.co.uk	Feb 2021
	Topographical data	http://en-gb.topographic-map.com	Feb 2021
	Radon gas data	Interactive map at www.ukradon.org	Feb 2021
	Environmental data	https://magic.defra.gov.uk/MagicMap.aspx	Feb 2021
	Historic landfill data	https://environment.data.gov.uk/	Feb 2021
	Coal authority data	http://mapapps2.bgs.ac.uk/coalauthority/home.html	Feb 2021

2.2 The site

2.2.1 Location and size

The site consists of an area of farmland which is situated between Seagate Road and Wisbech Road, Long Sutton. The site is centred around grid reference 543690, 322310.

The site occupies a roughly rectangular piece of land, which measures about 500m in length and about 200m in width. The total area is about 10 hectares.

Current pedestrian and vehicle access is via Seagate Road or Wisbech Road.

A site location plan is included in Appendix A.

2.2.2 Site features

Photographic views of the site are shown later (in Appendix A).

At the time of the site walkovers in December 2020 and January 2021, the following site features were noted.

The site currently consists of arable farm fields, as shown below (in Table 2). The ground surface is mostly ploughed bare earth with occasional short crop stalks and vegetables. There is also a grassed area in the northeast corner of the site.

Table 2: Ground surface covering at the site		
Surface covering:	Ploughed bare earth	Grassed field
Approximate estimated area (m ²):	940000	50000
Approximate percentage of total:	94	6
All values shown are approximate only		

There is an isolated pair of existing residential dwellings located within the centre of the site which does *not* form part of the site. The two dwellings are accessed via a gravelled track which spurs off Wisbech Road which also does *not* form part of the site.

There are no significant above ground structures within the site. Nevertheless, there are a few telegraph poles and overhead cables.

There are some trees along or close to some parts of the site boundaries. There is a cluster of trees along the west boundary. There is a line of trees close to the northern boundary (on the far side of a drainage ditch). There are also some trees within the isolated existing residential dwelling in the centre of the site.

Some localised ponding was evident on the ground surface in parts of the site. Water did not appear to quickly drain into the topsoil.

2.2.3 Visible evidence of potential contamination

No evidence (visual or olfactory) was identified of potentially significant contamination during the site walkover. No sign of vegetation distress, unusual staining, discolouration or strange odours was noted and inspected vegetation appeared healthy. No evidence of any storage (past or current) of hazardous liquids was noticed (including heating oil tanks). No above or below ground tanks were evident.

A close inspection of the ground surface around the site did not reveal any evidence of made ground or anthropogenic material. This included areas where previous small buildings were formerly located as shown in historical maps (discussed later). It seems

likely that any previous waste materials was probably removed off site (or possibly used to build up the existing access track that cuts through the east part of the site).

2.2.4 Adjacent land use

The site is located within a rural area with several adjacent residential areas, as shown below (in Table 3).

Table 3: Adjacent land use and boundaries				
Direction:	North	East	South	West
Boundary type:	Drainage ditch and fencing	Undefined	Drainage ditch	Undefined
Adjacent land use:	Residential gardens	Wisbech Road	Arable Farmland	Seagate Road
Nearby land use:	Residential	Farmland	Farmland	Residential

2.2.5 Site topography

The site is relatively flat and level but with some localised minor variations in ground level. There is a very gentle short slope which cuts across the east area of the site from north to south. Ground levels fall by about 0.5m to 1.0m (moving from east to west).

The ground level of the existing access road (in or adjacent to the east part of the site) is about 0.5m above adjacent ground levels within the site.

Ground levels at the site are estimated to be about 3m or 4m above Ordnance datum (AOD).

2.2.6 Local topography

Locally, ground levels in the area of the site are very flat and low-lying. The site and the village of Long Sutton are in the Lincolnshire Fens close to The Wash.

Nevertheless, the ground levels rise up next to the northeast corner of the site. There is an adjacent road embankment (about 4m in maximum height) for the approach road (part of Wisbech Road) to a railway bridge (railway now disused).

2.2.7 Proposed development

Development proposals comprise the construction of a new residential development which includes about 215 dwellings. The proposed dwellings are expected to be low rise houses (i.e. one to three storeys in height) with front and rear gardens.

New access roads will be required for the proposed development. A main estate road is expected to join Seagate Road (in the west) to the B1358 Wisbech Road (in the east). Other spur roads and crescents will provide access to the remaining parts of the site.

Some public open spaces are expected to be included in the development. This could include a pond (possibly an attenuation pond) in the northwest corner of the site. A green corridor could run around the edge of much of the site.

2.3 Site History

2.3.1 Historical timeline

Historical documents (maps and photos) have been reviewed. Features considered to be potentially relevant are detailed below (in Table 4).

Table 4: Historical timeline		
Map details	Within the site boundary	Outside of the site boundary
Year: 1887 Scale: 1:10560	The site is part of farm fields. There is an existing building (possible farmhouse and outbuilding) in the centre of the site There is another small building (possible farm dwelling) (in the southeast area) A "ROMAN BANK (Site of)" (possible former embankment) runs across the site (southeast part at the location of an existing slope) A railway line runs along the north boundary of the site	Brunswick Mill, corn mill (adjacent southeast) Some marshy ground (5m north) Gas Works including two possible tanks/pits, c. 9m diameter (40m north) Note: "ROMAN BANK" extends to the north and south of the site. It is evident as an embankment in some places (e.g. 1km south)
Year: 1888 Scale: 1:2500	<i>(No significant change identified)</i>	<i>(No significant change identified)</i>
Year: 1905 Scale: 1:2500	<i>(No significant change identified)</i>	<i>(No significant change identified)</i>
Year: 1931 Scale: 1:2500	Former (possible farm) building <i>removed</i> (near centre of the site) Former possible farm dwelling <i>removed</i> (southeast area) A line of small buildings (possible mill outbuildings) built (in the southeast corner) A pair of small buildings (possible dwellings or farm outbuildings) built (inside the west boundary) Trees (in the southwest corner)	No Gas Works shown but two small round tanks/pits are still evident (40m north)
Year: 1938 Scale: 1:10560	<i>No significant change identified)</i>	<i>No significant change identified)</i>
Year: 1953 Scale: 1:10560	Possible small pond (inside the south boundary)	Existing two dwellings built in the centre of the site (adjacent)

Table 4: Historical timeline		
Map details	Within the site boundary	Outside of the site boundary
	Line of possible mill outbuildings removed (southeast corner)	
Year: 1959 Scale: 1:10000	<i>No significant change identified</i>	<i>No significant change identified</i>
Year: 1972 Scale: 1:1250	Additional small buildings (possible stables or farm outbuildings) built inside the west boundary Possible small pond (inside south boundary) is no longer shown Railway (north boundary) dismantled Trees removed (southwest corner)	Gas Holder – about 19m diameter (20m north)
Year: 1974 Scale: 1:2500	Drainage ditch infilled (southwest corner)	Gas Holder no longer labelled (20m north)
Year: 1980 Scale: 1:2500	Some buildings removed (inside west boundary)	Builders Yard (adjacent, southeast)
Year: 1986 Scale: 1:2500	<i>No significant change identified</i>	Gas Holder building removed (20m north)
Year: 1989 Scale: 1:2500	<i>No significant change identified</i>	Gas Holder building removed (20m north)
Year: 1991 Scale: 1:2500	An existing possible farmhouse removed (centre area) Possible small farm outbuilding removed (inside west boundary)	<i>No significant change identified</i>
Year: 1994 Scale: 1:2500	<i>No significant change identified</i>	<i>No significant change identified</i>
Year: 1999 Aerial photo	<i>(No significant change identified)</i>	<i>(No significant change identified)</i>
Year 2020 Scale 1:10000	<i>(No significant change identified)</i>	<i>(No significant change identified)</i>

2.3.2 Historical summary

2.3.2.1 On-site features

Historical features at or near the site are shown in a historical features plan, presented later (in Appendix A).

There is some evidence of previous small buildings in limited areas of the site that were removed during the 20th century. These are mainly possible dwellings or outbuildings located in small clusters or isolated positions around the site.

The existing small slope evident within the east half of the site appears to be the location of a former sea bank. Historical maps suggest that there is a former sea defence embankment which could date back to Roman times.

There are a couple of small (possibly infilled) former water features within the site. This includes a former pond along the south boundary and a former drainage ditch in the southwest area. There is also some evidence of ponds and marshy land in the nearby surrounding area.

2.3.2.2 Off-site features

A former gas works was located very close to the north boundary of the site. Originally (in maps dated 1888 to 1905), this included a couple of small tanks or pits (about 9m in diameter) about 40m north of the site. Later, a 19m-diameter 'Gas Holder' is shown (only about 20m north), but this is only labelled in the map of 1972, so was probably only used for a few years. The Gas Holder is shown to have been removed in a map of 1986.

2.4 Geology,

2.4.1 Drift deposits

2.4.1.1 Tidal Flat Deposits (TFD)

The British Geological Survey (BGS) online map shows the site is underlain by "Tidal Flat Deposits – Clay And Silt." These are described as: *"mud flat and sand flat deposits, [which] are deposited on extensive nearly horizontal marshy land in the intertidal zone that is alternately covered and uncovered by the rise and fall of the tide. They consist of unconsolidated sediment, mainly mud and/or sand. They may form the top surface of a deltaic deposit. Normally a consolidated soft silty clay, with layers of sand, gravel and peat. Characteristically low relief."*

Historically, the Tidal Flat Deposits have been called Marine Alluvium or Fen Beds. Locally, these are referred to as the Terrington Beds. These are described as: *"younger marine alluvium; salt marsh, tidal creek and river deposits (sandy silt, sand and clay)."*

BGS historical records show six boreholes (1 to 6) were sunk between 20m and 100m west of the site in December 2002. The log from the nearest borehole (BGS ref: TF42SW142), which comprised soil sampling to 4.0m depth and then probing to 5.65m depth, indicates the following sub-strata (in descending order):

- Hardcore. MADE GROUND (to 0.20m)
- Soft brown slightly gravelly fine sandy CLAY... MADE GROUND (to 0.50m)
- Soft brown fine sandy CLAY. MARINE ALLUVIUM. (to 0.80m)
- Soft orange brown slightly gravelly SILT. MARINE ALLUVIUM. (to 1.00m)
- Soft orange brown fine sandy SILT. MARINE ALLUVIUM. (to 2.00m)
- Soft brown fine sandy SILT. MARINE ALLUVIUM. (to at least 4.00m)

- (Probing indicated possible harder strata at about 5.05m depth)

The other five nearby boreholes also indicated broadly similar ground conditions, but with some locally firm and very soft clays. Some fine sand and granular silt soils were also logged. Generally, the logs indicate soft ground which is close to the borderline between either (a) a granular silt/fine sand or (b) a cohesive sandy silt or clay.

2.4.1.2 Historical sea bank

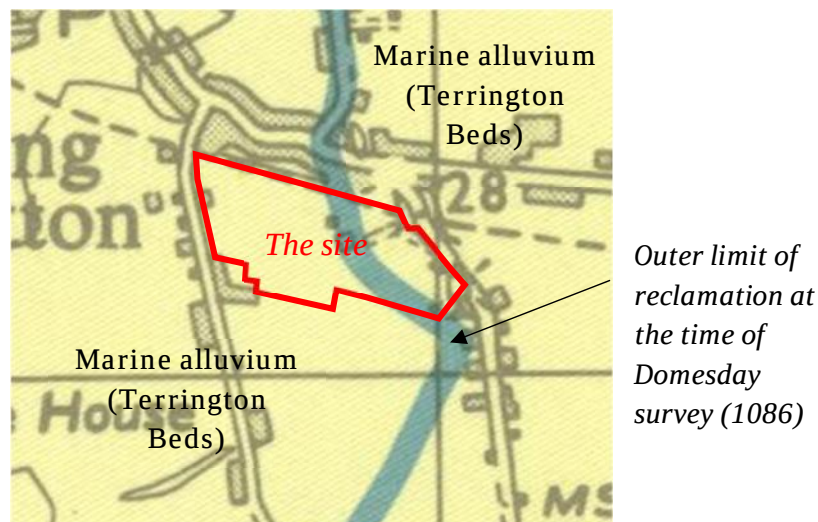
The local BGS geology map shows a historical coastline crosses the site, as reproduced below (in Figure 1). Evidently, this is the same 'Roman Bank' or 'Sea Bank' shown in local historical maps (see Appendix D). The location probably coincides with the slight slope still visible within the site.

The historical sea bank is probably a former coastal sea defence embankment. To the west would have been drier land, while to the east were probably marshy sea flats.

2.4.1.3 Glacial Till

Glacial till (about 40m in thickness) is anticipated below the Tidal Flat Deposits at a depth of about 17m, based on nearby BGS historical records of deep boreholes, copies of which are shown below (in Table 6). The glacial till is expected to mainly comprise boulder clay – stiff gravelly clay.

Figure 1: Extract of local geology map



BGS 1:50000 Series, King's Lynn and The Wash, Sheet 145 with part of 129, Solid & Drift Edition ©NERC

Table 6: BGS borehole records

<i>Distance (m):</i>		950	<i>Distance (m):</i>		1600
<i>Direction:</i>		Northwest	<i>Direction:</i>		Southwest
<i>Elevation (m AOD):</i>		c.4	<i>Elevation (m AOD):</i>		c.3
<i>BGS ref:</i>		TF42SW4	<i>BGS ref:</i>		TF42SW7
<i>Date:</i>		c.1885	<i>Date:</i>		Pre 1921
<i>Water (mbgl):</i>		-	<i>Water (mbgl):</i>		-
<i>Stratum</i>		<i>Depth to base (m bgl)</i>	<i>Stratum</i>		<i>Depth to base (m bgl)</i>
Fen Beds	Silt and fine sand	14.3	Yellow sand		16.8
	Gravel and sea shingle	17.4			
Boulder Clay (Glacial Till)	Blue clay with small pieces of chalk and occasionally flints ...	47.9	Grey boulder clay with flint and chalk pebbles		59.4
Amphill Clay Formation	Blue clay without chalk-stones ...	83.2+	Bluish grey clay		91.7+

2.4.2 Solid geology

BGS online mapping shows the site is underlain by the Amphill Clay Formation (ACF) - Mudstone. This is described as: “Mudstone, mainly smooth or slightly silty, pale to medium grey with argillaceous limestone.”

The mudstone rockhead is not expected until a depth of about 50m to 60m below ground level. The mudstone is expected to reach a depth of at least 90m below ground level (bgl).

2.4.3 Mining and quarrying

According to the Coal Authority, the site is in an area that might not be affected by coal mining. With respect to non-coal mining activity, a designation of *No Hazard* is given in the Envirocheck report.

There are no BGS recorded mineral sites in the area of the site. There are none within at least 1km.

2.4.4 Summary of anticipated geology

Based on the reviewed desk top information, the anticipated ground conditions are as shown below (in Table 7).

Table 7: Anticipated geology (subject to confirmation with site works)			
Strata		Description	Anticipated approx. depth to base (m bgl)
Topsoil		Loamy silts, clays and sands with occasional rootlets	<1
Superficial soils (Drift)	Tidal Flat Deposits (TFD)	Sandy silt, sand and clay (possibly soft or loose)	16 – 19
	Glacial till	Stiff boulder clay with occasional bands of (water-bearing) sands and gravels	48 – 60
Bedrock	Amphill Clay Formation	Mudstone, mainly smooth or slightly silty, pale to medium grey with argillaceous limestone.”	+90

2.4.5 BGS geological hazards

Geological hazards are risk rated as *No hazard* to *Moderate* as reported by the British Geological Survey (BGS) and shown below (in Table 8). The moderate risk ratings relate to compressible ground stability and running sand.

Table 8: Geological hazards	
Hazard	Hazard potential
Collapsible ground stability	No hazard
Compressible ground stability	Moderate
Ground dissolution stability	No hazard
Landslide ground stability	Very Low
Running sand ground stability	Moderate
Shrinking & swelling clay	Low

The moderate risk of compressible ground stability probably reflects the potential for soft highly compressible clays to be present in the shallow Tidal Flat Deposits (TFD).

The moderate risk of running sand probably is probably due to fine sands (and possibly a high water table) being expected in the shallow TFD.

2.5 Hydrogeology (i.e. groundwater)

2.5.1 Groundwater table

The location of the groundwater table is unknown, but it is likely to be very shallow given the site's low-lying topography. Moreover, inspection of BGS records of nearby boreholes (from December 2002) suggests that groundwater levels could typically be somewhere between 0.90m to 1.73m below ground level (bgl).

The underlying groundwater table is likely to be relatively flat – reflecting the generally flat topography. Thus, it is difficult to predict the direction of any groundwater flow beneath the site, and any such flow is likely to be slow.

2.5.2 Permeability, aquifers and groundwater vulnerability

Overall, the site is classified as being of combined *unproductive groundwater vulnerability*. The anticipated superficial soils (i.e. the tidal flat deposits and glacial till) and the mudstone bedrock are all likely to be of (very) low permeability. The anticipated superficial geology is classified as Unproductive Strata. The anticipated bedrock geology is also classed as Unproductive Strata.

The nearest reported groundwater abstraction is located about 803m north of the site and concerns a catchpit, catchment tank or collecting tank. 850m east of the site. This is for spray irrigation. The only other reported groundwater abstraction is located about 1283m east of the site and used to provide water for industrial processing, but the status is now revoked.

2.6 Hydrology (i.e. surface water)

The nearest surface water features are the existing drainage ditches that are present along some parts of the north and south site boundaries. During the site works, the drain along much of the northern boundary and the drain along parts of the southern boundary were noted to be about 2m in depth and contain substantial water. The drain along parts of the west boundary was noted to be shallower and no water was recorded.

There are many small water courses (mainly land drains) in the wider area around the site. However, the most notable large water course is the River Nene which is about 4km east of the site. The River Nene flows north towards The Wash, which is about 7km northeast of the site.

There are no nearby reported *surface water abstractions*. There are none within at least 2km.

2.6.1 Flooding

The site is reported to be at risk from flooding (and extreme flooding) from rivers or sea without defences. This is based on data from fluvial / tidal models.

There are no reported flood defences or flood storage areas near the site. The site is not reported to be in an *Area Benefitting from Flood Defences*.

The site is shown by www.gov.uk (flood maps for planning) to be in a Flood Zone 3 area. *“Land and property in flood zone 3 have a high probability of flooding.”*

2.7 Environmental Data

2.7.1 Pollution and pollution control

There are no recorded *contaminated land entries and notices* within at least 1km of the site.

There is a reported historical discharge consent for one of the existing domestic properties (number 2 Wisbech Road) which is enclosed by the site. This was issued in July 1990 but was revoked in October 1996. Possibly, this could have been for a soakaway or septic tank.

There is an active discharge consent for sewage discharge into a soakaway, but this is located about 460m northwest of the site.

There are no known significant discharge consents to the surface water features at or near to the site.

There are no *prosecutions relating to controlled waters* within 1km of the site. Similarly, there are no *enforcement and prohibition notices*.

In relation to (Local Authority / Integrated) Pollution Controls (and Preventions and Enforcements), there are several recorded in the area and the closest is about 44m northwest of the site. This pertains to the blending, packing, loading and use of bulk cement at C Warrick & Son Ltd off Seagate Road. The next nearest is 78m northwest of the site and concerns a petrol filling station (authorisation revoked). There are no other such pollution controls, preventions, etc. within 300m of the site.

The nearest reported pollution incident to controlled waters occurred only 24m east of the site, evidently on the opposite side of Wisbech Road. The Minor Incident took place in 1995 and concerned some oils – diesel into surface water drains.

There are no reported *prosecutions relating to authorised processes* within 0.6km of the site.

There are no reported *registered radioactive substances* within 1km of the site.

There are no reported entries on the *substantiated pollution incident register* located within 1km of the site.

There are no reported *water industry act referrals* within 1km of the site.

With respect to hazardous substances, there are no *COMAH, NIHHS* or *Explosive* sites within 1km of the site.

2.7.2 Waste

2.7.2.1 Nearby landfills

There are no reported Historical, Local Authority Recorded or BGS Recorded landfills near the site. The nearest is a historical landfill located about 683m southeast of the site at Mill Hill. However, inspection of historical maps has not yielded any evidence to suggest this was a refuse tip and possibly the record pertains to some small, infilled sand pits.

2.7.2.2 Infilled land

The nearest Landmark-identified potentially infilled land is about 157m southwest of the site and concerns infilled water features (e.g. pond or river). This relates to mapping dated 1889.

On the other hand, there is a historical pond inside the southern boundary of the site, as shown in historical maps. This could have been infilled, or it could have simply silted up.

Also, there was a historical gas holder – about 19m in diameter – only about 20m north of the site. This was shown in historical maps dated 1972. There were also two possible small gas works pits about 40m north of the site, e.g. as shown in maps dated 1888. These could have been infilled.

2.7.2.3 Other waste sites

There is no *Integrated Pollution Control Registered Waste Site* in the area (within 1km).

The nearest registered waste treatment or disposal site is located about 807m northwest of the site. This concerns a scrapyards. There is another scrapyards located about 849m west of the site.

2.7.3 Soil chemistry

Estimated soil chemistry data from the BGS indicates element concentrations for rural soil around the site, as shown below (in Table 9). None of these are considered high enough to be of concern.

Table 9: BGS Estimated Soil Chemistry (rural soil)	
Contaminant	Concentration (mm/kg)
Arsenic	15 – 25
Cadmium	<1.8
Chromium	60 – 90
Lead	<100
Nickel	15 – 30

2.7.4 Radon

With respect to *radon potential*, the site is in a *Lower probability radon area* in which less than 1% of homes are estimated to be at or above the *Action Level*. BGS and National Geoscience Information Services report that: “No radon protection measures are necessary in the construction of new dwellings or extensions”.

2.7.5 Industrial land use

A review of historical maps and photos has identified some limited industrial activity near to the site. This includes the former gas works about 40m north of the site and the former gas holder about 20m north of the site, both on the far side of the drainage ditch and former railway line. There was also a works building located about 20m west of the site on the opposite side of Seagate Road.

The site itself has been used to house farm buildings during its history. There have been several small buildings within the site that are probably former farm buildings. However, these were removed many decades ago and no discernible trace of former buildings has been found from a close inspection of the existing ground surface.

The nearest reported *Contemporary Trade Directory Entry* is 44m northwest of the site and probably pertains to the former works building on the opposite side of Seagate Road. The location was involved in the production of concrete products but is classed as inactive.

The nearest reported *Point of Interest (POI) – Commercial Services* is located 137m east of the site and concerns vehicle repairs, testing and servicing.

The nearest reported *Point of Interest (POI) – Manufacturing and Production* is positioned 45m northwest of the site. It pertains to industrial features (unspecified works or factories).

The nearest reported *Point of Interest (POI)* relating to Public Infrastructure is positioned 258m northwest of the site. It is an existing sewage pumping station.

There are no reported fuel stations currently nearby the site. On the other hand, there was a historical filling station about 78m northwest of the site on London Road.

2.7.6 Sensitive land use

There are no identified sensitive land uses at or near to the site.

3 Initial Contaminated Land Assessment

3.1 Assessment principles

Current legislation and best practice, such as Part IIA of the Environmental Protection Act and the Land Contamination Risk Assessment (LCRM) published by the EA on 8th October 2020, recommend that potentially contaminated land is managed using a risk-based approach. Model procedures to assess the risks from contaminated land involve the development of a conceptual site model (CSM) and the identification and assessment of relevant contamination linkages.

A contamination linkage comprises a *source* (i.e. a contaminant capable of causing pollution or harm), a *receptor* and a viable *pathway* by which one can be transmitted to the other. If one of these three elements are missing, there is no significant risk.

The risk from a potential contamination can be assessed as a product of the severity of the consequences that might arise from the contamination hazard and the probability of the hazard occurring, as outlined in CIRIA C552 (Rudland et al., 2001). The definitions used to perform the risk assessment for the subject site are shown below (in Tables 10 to 13).

Table 10: Severity of contamination hazard being realised				
Classification	Category/Definition			
	Human	Controlled waters	Property	Eco system
Severe	Short term acute risk	Short term risk	Catastrophic damage	Short term risk
Medium	Chronic damage	Pollution to sensitive water resources		Significant change
Mild		Pollution to non-sensitive water resources	Significant damage	Significant damage
Minor	Non-permanent health effects		Repairable damage	

Table 11: Probability of hazard being realised	
Classification	Definition
Highly likely	There is a pollution linkage and an event that appears very likely in the short term and or almost inevitable over a long term, or evidence at the receptor of harm or pollution
Likely	There is a pollution linkage and all elements are present which means that it is probable that an event will occur.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event will occur. However, it is not certain that even over a long period such an event would occur and is less likely in the short term.
Unlikely	There is a pollution linkage, but circumstances are such that it is improbable that an event would occur even in the long term.

A matrix can be used to determine a suitable risk classification, as shown below (in Table 12). The largest risks are where the severity of the contaminant is great and the probability of the contaminant linkage occurring is highly likely. The definitions of the different classifications used in this assessment, based on CIRIA C552 (Rudland *et al.*, 2001), are also shown below (in Table 13).

Table 12: Risk classification matrix					
		Consequence			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very low	Very low

Table 13: Risk classification definition	
Classification	Definition
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard or there is evidence that severe harm to a designated receptor is currently occurring. This risk if realised is likely to result in a substantial liability. Investigation and or remediation is required.
High	Harm is likely to a designated receptor from an identified hazard or there is evidence that severe harm to a designated receptor is currently occurring. This risk if realised is likely to result in a substantial liability. Investigation and or remediation may be necessary in the short term and likely over the long term.
Moderate	It is possible that harm could arise to a designated receptor from the identified hazard. However, it is relatively unlikely that such a hazard would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation is normally required to clarify and determine the potential risk. Some remedial works may be required in the long term.
Low	It is possible that harm could arise to a designated receptor from the hazard identified but is likely that this hazard if realised would at worst normally be mild.
Very low	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe

3.2 Initial conceptual site model (CSM)

The following conceptual site model considers all plausible sources, pathways and receptors of potential contamination. This is based on the proposed development which is a residential development (with gardens and the potential for consumption of home grown produce).

3.2.1 Sources of contamination

Based on the assembled desk study information, the identified potential sources of soil contamination are shown below (in Table 14). The plausibility of the pollution sources or the feasibility of pathways to receptors is not considered at this stage.

Table 14: Potential sources of contamination

Location	Source	Potential contaminants					
		Metals & metalloids	Polycyclic aromatic hydrocarbons (PAHs)	Asbestos	Pesticides	Cyanides & thiocyanate & ammonia	Harmful ground gases
On-site	1. Possible made ground associated with previous (probably farm) buildings	P	P	P			
	2. Past land use – agricultural buildings	P	P		P		
	3. Highly organic soils						P
Off-site	4. Nearby former gas holder and gas works	P	P			P	P

The identified on-site contamination sources mainly concern previous development and activity on the site. Previous possible farm outbuildings have been identified which could have given rise to made ground when they were removed, which could contain pollutants such as PAHs, metals and asbestos. Some hazardous materials (e.g. pesticides) may have been stored on the site and could have potentially leaked or spilt into the ground.

There is also some potential for highly organic soils below the site. The underlying tidal flat deposits (TFD) can contain organic peaty layers which can give rise to methane and carbon dioxide gases.

There is a former small gas works close to the northern site boundary. There is some limited potential for migration of contaminants (e.g. within groundwater) from the gas works to the site. Contaminants of concern could include PAHs, cyanides, thiocyanate and ammonia. If infilled, there is also some limited potential for the generation of harmful gases.

3.2.2 Pathways

There are many potential pathways to receptors considered. For the proposed site, these may include:

- Inhalation (i.e. indoor or outdoor dust or vapour).
- Ingestion (i.e. swallowing soil, dust).

- Absorption (i.e. direct contact with soil).
- Migration (i.e. vertical/lateral movement through soil, rock, groundwater, building materials, voids and along services).

In outdoor areas, the pathways for contaminants are likely to occur in garden areas where humans or other entities have more direct access to any contaminated soils. Ingestion, absorption and dust inhalation can affect people and ecology.

Within any indoor areas, the main pathway from pollutant to people is typically through inhalation of vapours and gases. Therefore, low volatility pollutants – such as heavy metals – tend to be non-hazardous in indoor areas.

Migration can occur to facilitate other pathways, e.g. inhalation of vapours in groundwater after migration through permeable soil strata or even the build-up and combustion of some ground gases, e.g. methane.

3.2.3 Receptors

Receptors comprise those material items or living beings that may be impacted by contaminants. For the site, these may include:

- human site users (i.e. shop workers, funeral service workers, customers, trespassers)
- controlled waters (i.e. bodies of groundwater and surface water)
- building materials and services (e.g. clean water pipework and buried concrete)
- ecological systems (e.g. local wildlife)
- adjacent site users (e.g. humans, ecological systems)

3.3 Preliminary risk assessment (PRA)

A preliminary risk assessment of potential contamination linkages which also presents the findings of the initial conceptual site model is presented below (in Table 15).

Risk ratings of *very low* or *low* are not considered significant while ratings of *medium* / *low* (or above) are deemed unacceptable and the associated source-pathway-receptor is taken to be a relevant contamination linkage (RCL) and in need of further consideration. Accordingly, the preliminary risk assessment (below) has only identified one unacceptable contamination risk associated with the proposed development, associated with hazardous ground gas from highly organic subsoils.

There are no identified RCLs associated with soil contamination. The plausibility of these contaminants is low considering the main potential pollution source is from a few small buildings as shown in historical maps. The age of the site and its use for arable farming means that the near surface soils are repeatedly mixed and aerated which should

attenuate and degrade any potential pollutants. Moreover, no made ground or anthropogenic material has been identified from a close inspection of the bare earth ground surface.

Table 15: Initial conceptual site model and preliminary risk assessment

<i>Initial conceptual site model</i>			<i>Preliminary risk assessment</i>			
<i>Potential source</i>	<i>Potential pathway</i>	<i>Potential receptor</i>	<i>Probability</i>	<i>Severity</i>	<i>Risk rating</i>	<i>Comments</i>
1. Possible made ground associated with previous buildings metals, PAHs, asbestos,	Inhalation, ingestion, absorption	Site users	Unlikely	Mild	Low	Previous buildings were removed many years ago. Subsequent inspection of the bare earth ground surface has not identified any significant anthropogenic made ground material (e.g. ashy soils or construction waste)
	Inhalation, ingestion, absorption	Site workers	Unlikely	Mild	Low	
	Migration	Bedrock aquifer	Unlikely	Minor	Very low	
	Migration	Surface waters	Unlikely	Minor	Very low	
	ingestion, absorption	Local flora and fauna	Unlikely	Minor	Very low	
	Aggressive attack	Building materials	Unlikely	Mild	Low	
2. Past land use – agricultural buildings metals, PAHs, pesticides	Inhalation, ingestion, absorption	Site users	Unlikely	Mild	Low	Previous buildings were removed many years ago. The land has been used for arable farming so the topsoil has been repeatedly ploughed which will have encouraged the attenuation and degradation of any contaminants.
	Inhalation, ingestion, absorption	Site workers	Unlikely	Mild	Low	
	Migration	Bedrock aquifer	Unlikely	Minor	Very low	
	Migration	Surface waters	Unlikely	Minor	Very low	
	ingestion, absorption	Local flora and fauna	Unlikely	Minor	Very low	
	Aggressive attack	Building materials	Unlikely	Mild	Low	
3. Highly organic soils Ground gases	Inhalation, migration	Site users	Unlikely	Severe	Low/ Moderate	No peaty materials noted in BGS historical logs of nearby deep boreholes (see Section 2).
	Inhalation, migration	Site workers	Unlikely	Medium	Low	
4. Nearby former gas holder and gas works metals, PAHs, cyanides, thiocyanate, ammonia	Migration, Inhalation, ingestion, absorption	Site users	Unlikely	Medium	Low	The anticipated ground conditions are low permeability which should restrict migration. The gas works are very old and were removed long ago and replaced with residential dwellings
	Migration, inhalation, ingestion, absorption	Site workers	Unlikely	Medium	Low	

The only identified relevant contamination linkage (RCL) concerns the generation of harmful ground gases by organic material in the underlying soils. The TFD can contain organic peat layers that can degrade to produce carbon dioxide or methane. While the

likelihood is very low, the effect would be severe, so this risk needs further consideration.

Some other minor contamination risks do not require consideration as they will be mitigated as a matter of course through standard construction practices. For example, the risk of sulphate attack on buried concrete should be nullified by design to BRE Special Digest 1.

3.4 Further investigation

As discussed, the risk from hazardous ground gas (created by highly organic soils) requires further consideration. Ground gas monitoring is one way to investigate the presence of harmful ground gases at a site. Alternatively, current best practice is to provide some limited gas protection measures (e.g. CIRIA CS2 or NHBC Amber 1), where no gas monitoring has been carried out and the only gas source is highly organic natural soils.

It is noted that little or no highly organic peaty soils have been recorded in BGS records of nearby historical boreholes. Therefore, it may be possible to investigate the presence of any significant highly organic at the site with deep boreholes. This could provide further information about the risk of hazardous ground gas.

It should be noted that any unforeseen contamination (e.g., petroleum hydrocarbons odour or staining) encountered during the development of the site should be monitored and reported to the local authority. Work should be halted in any area of the revealed potential contamination and the contamination investigated and assessed to the satisfaction of the local authority.

4 Site Investigation Works

The procedures adopted for this site investigation are based on BS 5930 (2015) – Code of Practice for Site Investigations and BS 10175 (2011 + A2, 2017). The soils and rocks encountered have been described based on BS5930 (2015), BS EN ISO 14688-1 (2018), BS EN ISO 14688-2 (2018) and BS EN ISO 14689-1 (2018).

4.1 Fieldwork

Fieldwork took place between the 9th December 2020 and the 1st February 2021.

Approximate locations of the site works are shown in the exploratory hole location plan which is presented later (in Appendix A).

The positions of the exploratory holes were established relative to existing site features and using GPS locating equipment. The depths to sub-strata and groundwater were measured from existing ground level.

Logs for the exploratory holes are presented later (in Appendix B).

4.1.1 *Shell and auger boreholes (BH1 & BH2)*

Two shell and auger boreholes (BH1 & BH2) were drilled between 27th January 2021 and 2nd February 2021 by SIS Drill (UK) Ltd of Willoughton, Lincolnshire. The rig extracted disturbed samples as well as some split spoon samples. The borehole was about 150mm in diameter and reached depths of between 18.5m (BH2) and 21.5m (BH1) below ground level (bgl). Standard penetration tests (SPTs) were carried out at frequent intervals within the deeper ground material.

4.1.2 *Windowless sampler boreholes*

19 windowless-sampler boreholes (WS1 to WS19) were drilled by HML between 9th December 2020 and 21st January 2021 with a Dando Terrier rig to a maximum depth of sampling of typically 3.45m below ground level (bgl). The rig extracted consecutive 1m-long tubes of soil material for logging and sampling. The diameter of the borehole decreased from about 100mm to about 75mm. Standard penetration tests (SPTs) were carried out at frequent intervals. Shear vane testing was carried out on suitable cohesive material within the windowless-sampler sampling tubes using a calibrated Impact shear vane.

4.1.3 DCP testing

Super heavy (SH) dynamic cone penetrometer (DCP) testing was carried out adjacent to WS10 using the Dando Terrier rig. The DCP testing reached a depth of 7.0m bgl.

4.2 Laboratory testing

Geochemical testing was undertaken by Chemtech Environmental, a UKAS and MCERTS accredited laboratory. The scope of geochemical testing comprised the following.

- 4 number tests for pH and sulphates

A schedule of testing is shown below (in Table 16). Results for all the laboratory testing undertaken are included later in this report (in Appendix C).

Sample hole	Sample location	HML Sample ref. (S/_)	Chemtech sample ref.	Depth (m bgl)	pH and sulphates
WS2	WS2-2	58217	92468-1	0.6-0.9	P
WS3	WS3-2	58220		0.6-1.4	
WS5	WS5-3	58221		0.9-1.5	
WS7	WS7-2	58222		0.8-1.5	
WS8	WS8-3	58223		1.4-2.0	
	WS8-5	58224		3.0-3.5	
WS9	WS9-2	58225		0.7-0.9	
	WS9-4	58218	92468-1	2.1-2.6	P
WS10	WS10-2	58219	92468-1	0.5-1.0	P
WS11	WS11-3	58226		1.0-1.8	
	WS11-5	58227		3.0-3.5	
BH1	BH1-1	58466		4.0-10.0	
	BH1-6	58467		16.0-16.5	
	BH1-8	58468		17.0-18.0	
BH2	BH2-2	58469		11.0-11.5	
	BH2-6	58470		14.0-14.5	P
	BH2-10	58471		18.0-18.45	
TP13-1 to TP37-1		59192 - 58216		0.5-1.0*	
TP15	TP15-1	58194		0.5-1.0	
TP28	TP28-1	58207		0.5-1.0	

5 Ground Conditions & Soil Properties

5.1 Sequence of sub-strata

The sub-strata as revealed during the site works (in BHs 1 to 2 and WSs 101 to 110) are summarised below (in Table 17 and 18). Copies of the borehole logs are presented later (in Appendix B). Cross sections of the revealed sub-strata are also presented later (in Appendix A).

Table 17: Ground conditions in boreholes (WSs 1 to 19 and BHs 1 to 2)									
Strata:	Topsoil	Tidal Flat Deposits							Glacial till
		(SOFT/ FIRM) cohesive clayey SILT	(VERY LOOSE TO LOOSE) granular (SILT / fine SAND	(VERY) SOFT cohesive clayey SILT	(VERY) SOFT cohesive (SILT/ CLAY)	(VERY) LOOSE becoming LOOSE to MEDIUM DENSE granular (SILT / fine SAND)	Cohesive (SILT/ CLAY	Medium dense granular SAND/ GRAVEL	(Stiff) boulder CLAY
Hole	Depth to base of stratum (m bgl)								
WS1	0.40					3.45+			
WS2	0.40		1.10	1.50		3.50+			
WS3	0.42					3.45+			
WS4	0.38	0.73				3.45+			
WS5	0.45		0.60	0.90		3.45+			
WS6	0.45		1.30	1.80		3.45+			
WS7	0.40		0.80	1.70		3.45			
WS8	0.34		2.10		3.50	4.45+			
WS9	0.50	1.00	1.71	2.00	2.70	4.45+			
WS10	0.32					5.25+			
WS11	0.35		1.85	2.25	3.20	4.45+			
WS12	0.47		1.24	1.68		3.45+			
WS13	0.36			1.02	1.49	3.45+			
WS14	0.42		0.72	2.28	2.79	3.45+			
WS15	0.42					3.45+			
WS16	0.45					3.45+			
WS17	0.43		1.05	2.60	2.60	3.45+			
WS18	0.41		0.61	1.75		3.45+			
WS19	0.35	0.72				3.45+			
BH1	0.40			2.50		16.00		16.80	21.50+
BH2	0.30	0.60				10.80		14.80	18.50+

The windowless sampler boreholes generally show that the shallow Tidal Flat Deposits (TFD) soils consist mainly of both granular silts (and sand) with some cohesive silts (and clays). This is normal for the expected local tidal flats geology as these deposits were laid progressively over time by a tidal action which could (at different times) have deposited either coarse silts and fine sands or clays and finer silts. The results are similar to those

reported in BGS boreholes slightly to the west of the site, as discussed earlier (in Section 2).

The trial pit logs show there was much granular sands and silts at shallow depth, but there was equally as much shallow sandy silt that was either clayey or locally clayey.

Table 18: Ground conditions in trial pits (TP13 to TP37)								
Strata:	Topsoil	Tidal Flat Deposits						
		Granular SILT/ SAND	(FIRM) cohesive sandy SILT/ CLAY	Granular SILT/ SAND	Locally clayey sandy SILT	Cohesive sandy clayey SILT	Granular SILT/ SAND	Cohesive SILT/CLAY
Hole	Depth to base of stratum (m bgl)							
TP13	0.31	0.41	0.51			1.00+		
TP14	0.31					1.00+		
TP15	0.17				1.00+			
TP16	0.25				0.80		1.00+	
TP17	0.31	0.58	0.95				1.00+	
TP18	0.18	0.55		1.05		1.70+		
TP19	0.31				0.90	1.00+		
TP20	0.35	0.50				1.00+		
TP21	0.30	0.65				1.00+		
TP22	0.22	0.50	0.65		1.50+			
TP23	0.40	0.55				1.00+		
TP24	0.30				1.00+			
TP25	0.28	0.62				1.00	1.10+	
TP26	0.31	0.65			1.10+			
TP27	0.32	0.52		0.66	1.00+			
TP28	0.33			1.30			1.50+	
TP29	0.34	0.90					1.00+	
TP30	0.28	0.85					1.00+	
TP31	0.30			1.00+				
TP32	0.36				0.90		1.00+	
TP33	0.31			1.35			1.65+	
TP34	0.30				1.00+			
TP35	0.33					0.70	1.00+	
TP36	0.35				0.77		1.40	1.65+
TP37	0.35	1.00+						

5.2 Topsoil

Topsoil was found across the site in all exploratory holes. It was logged to depths of between 0.17m (TP15) and 0.50m (WS9).

The topsoil was logged as a dark brown sandy, silty and clayey soil with occasional rootlets. Locally, some stone gravel was logged.

Only in WS6 (in the south part of the site) were any fine gravel or brick fragments logged within the topsoil. Otherwise, no anthropogenic material was recorded.

5.3 Tidal Flat Deposits (TFD)

Thick tidal flat deposits (TFD) were revealed across the site. They were logged in all exploratory holes at shallow depth and were found to reach depths of between 14.8m (in BH2) and 16.8m (in BH2) bgl.

The shallower TFD soils were found to be an assortment of granular (silt or sand) and cohesive (silt or clay) soils. Generally, the granular soils were found to be more common but cohesive soils were often present in distinct bands or found locally (e.g. as thin bands, lenses or partings) within granular strata.

5.3.1 *Shallow TFD granular silts/sands*

The revealed shallow TFD soils were mostly comprised of granular silts and fine sands (although much of the material was on borderline between granular and cohesive soil and many bands of cohesive silts and clays were revealed). Granular silts and fine sands were the main soil constituent in all the exploratory holes at shallow depth.

Notably, many of the granular silts and sands were found to be locally clayey. This was very evident in trial pit records.

5.3.2 *Shallow cohesive TFD soils*

5.3.2.1 *Nature and extent of shallow cohesive TFD soils*

Cohesive TFD soils include the clayey silt, silt/clay and silty clay logged around the site. These soils were not found to be as common as granular silts and sands but were recorded in nearly all exploratory holes at shallow depths (i.e. less than 4m bgl). No cohesive TFD soils were revealed at greater depths (>4m bgl).

5.4 Glacial Till (boulder clay)

Glacial Till was revealed at depth below the site in both shell and auger boreholes (BHs 1 to 2). It was found below depths ranging between 14.8m (BH2) and 16.8m (BH1) bgl and was logged to the full depth of exploration (of 18.5m to 21.5m bgl).

The Glacial Till below the site was encountered in the form of boulder clay. It was typically recorded as: "Stiff to very stiff greenish brown or grey silty CLAY with occasional chalk gravel."

The glacial till was known to be present as boulder clay and was expected to come in below depths of 16.8m and 17.4m, based on previous nearby historical borehole records (See Section 2). The boulder clay has been shown to extend to significant depths locally (of at least 45m bgl).

5.5 Groundwater observations

Groundwater was encountered during site works within all 21 boreholes (WSs 1 to 19 and BHs 1 and 2) but only in one trial pit (TP18), as shown below (in Table 26). The recorded resting groundwater levels ranged between 0.61m and about 2.95m.

The recorded groundwater levels in boreholes that were mainly drilled in free-draining granular soils are likely to more closely represent the groundwater level. Therefore, the groundwater level at the site could be about 0.6m to 2.0m bgl.

Of course, groundwater levels can fluctuate with climatic and seasonal variations. The recorded groundwater levels were measured in winter after a relatively wet autumn. It is possible, the groundwater table could be lower in late summer months.

Table 26: Summary of groundwater observations

<i>Location</i>	<i>Date</i>	<i>Prevailing shallow ground conditions</i>	<i>Water level after drilling (m bgl)</i>	<i>Comments</i>
BH1	27 th Jan 2021	Sandy clay	2.5	Resting groundwater level
BH2	27 th Jan 2021	Sandy silt	2.0	Resting groundwater level
TPs 13 to 17	10 th Dec 2020	-	-	No groundwater observed
TP18	11 th Dec 2020	Clayey silt	1.4	Very slight seepage
TPs 19 to 36	11 th Dec 2020	-	-	No groundwater observed
WS1	9 th Dec 2020	Silty sand	1.77	Resting groundwater level
WS2	9 th Dec 2020	Silty sand	1.65	Resting groundwater level
WS3	9 th Dec 2020	Silty sand	1.63	Resting groundwater level
WS4	9 th Dec 2020	Sandy silt	1.60	Resting groundwater level
WS5	9 th Dec 2020	Sandy silt	1.88	Resting groundwater level
WS6	9 th Dec 2020	Silty sand	2.06	Resting groundwater level
WS7	9 th Dec 2020	Clayey silt	1.66	Resting groundwater level
WS8	9 th Dec 2020	Sandy clay	2.95	Resting groundwater level
WS9	9 th Dec 2020	Sandy silt	1.45	Resting groundwater level
WS10	11 th Dec 2020	Sandy silt	1.85	Resting groundwater level
WS11	11 th Dec 2020	Silty clay	2.60	Resting groundwater level
WS12	11 th Dec 2020	Sandy silt	2.45	Resting groundwater level
WS13	11 th Dec 2020	Sandy silt	1.60	Resting groundwater level
WS14	11 th Dec 2020	Clayey silt	1.62	Resting groundwater level
WS15	21 st Jan 2021	Sandy silt	0.88	Resting groundwater level
WS16	21 st Jan 2021	Sandy silt	1.01	Resting groundwater level
WS17	21 st Jan 2021	Sandy silt	0.61	Resting groundwater level
WS18	21 st Jan 2021	Clayey silt	1.05	Resting groundwater level

6 Revised Contamination Assessment

Based on the preliminary risk assessment and findings of the site works, a revised combined CSM and risk assessment has been developed, as shown below (in Table 32), based on a *source-pathway-receptor* consideration of potential pollution linkages.

A risk rating of *very low* or *low* is not considered significant while a rating of *moderate* / *low* (or greater) could be potentially hazardous and the associated source-pathway-receptor taken to be a plausible contamination linkage and in need of further consideration. However, the revised risk assessment below has not identified any unacceptable risks associated with potential contamination.

There is not considered to be a significant risk from permeation of contaminants into water pipes. Nevertheless, the installed pipework should comply with the local water authority's requirements, for instance, based on the findings of this report.

No evidence has been found of contamination on site. Accordingly, it should be possible to re-use clean, natural, site-won soils around the site.

Any unforeseen contamination (for example, hydrocarbon odours or staining) encountered during the development of the site must be monitored and reported to the local authority. Work must be halted in any area of the revealed potential contamination and the contamination investigated and assessed to the satisfaction of the local planning authority.

6.1 Ground gas risk assessment

The site is not in a radon gas affected area. There are no nearby landfills or mineworkings. There is no made ground present. The only identified potentially significant source would be organic material within the underlying tidal flat deposits, which can contain peaty soils.

However, no significant amount of peaty soil has been found at the site and nearby BGS borehole records show tidal flat deposits in the area are not of significant organic content. The only slightly organic soils found on site was a thin band of slightly organic silty clay in the east part of the site. But this was typically less than 1m in thickness. Therefore, there is locally insufficient organic material for the underlying tidal flat deposits to be a plausible source of hazardous ground gas.

Accordingly, a CIRIA CS-1 classification (or NHBC green traffic light classification) should be suitable for the site. No ground gas protection measures should be required.

Table 32: Revised conceptual site model and risk assessment

Revised conceptual site model			Revised risk assessment			
Potential source	Potential pathway	Potential receptor	Probability	Severity	Risk rating	Comments
1. Possible made ground associated with previous buildings metals, PAHs, asbestos,	Inhalation, ingestion, absorption	Site users	Unlikely	Mild	Low	Previous buildings were removed many years ago. Subsequent inspection of the bare earth ground surface has not identified any significant anthropogenic made ground material (e.g. ashy soils or construction waste). Extensive site works have not revealed any made ground.
	Inhalation, ingestion, absorption	Site workers	Unlikely	Mild	Low	
	Migration	Bedrock aquifer	Unlikely	Minor	Very low	
	Migration	Surface waters	Unlikely	Minor	Very low	
	ingestion, absorption	Local flora and fauna	Unlikely	Minor	Very low	
	Aggressive attack	Building materials	Unlikely	Mild	Low	
2. Past land use – agricultural buildings metals, PAHs, pesticides	Inhalation, ingestion, absorption	Site users	Unlikely	Mild	Low	Previous buildings were removed many years ago. The land has been used for arable farming so the topsoil has been repeatedly ploughed which will have encouraged the attenuation and degradation of any contaminants.
	Inhalation, ingestion, absorption	Site workers	Unlikely	Mild	Low	
	Migration	Bedrock aquifer	Unlikely	Minor	Very low	
	Migration	Surface waters	Unlikely	Minor	Very low	
	ingestion, absorption	Local flora and fauna	Unlikely	Minor	Very low	
	Aggressive attack	Building materials	Unlikely	Mild	Low	
3. Highly organic soils Ground gases	Inhalation, migration	Site users	Unlikely	Medium	Low	No significant peaty materials noted in borehole logs (apart from a thin band of slightly organic clay). Also, no peat noted in BGS historical logs of nearby deep boreholes (see Section 2).
	Inhalation, migration	Site workers	Unlikely	Medium	Low	
4. Nearby former gas holder and gas works metals, PAHs, cyanides, thiocyanate, ammonia	Migration, Inhalation, ingestion, absorption	Site users	Unlikely	Medium	Low	The anticipated ground conditions are low permeability which should restrict migration. The gas works are very old and were removed long ago and replaced with residential dwellings
	Migration, inhalation, ingestion, absorption	Site workers	Unlikely	Medium	Low	

6.2 Buried concrete

The results of sulphate (SO_4) and pH tests (full copies of which are included in Appendix C) provide information about the required sulphate resistance of buried concrete within the ground conditions at the site. The buried concrete should be designed in accordance with BRE Special Digest 1 (BRE, 2005) using these results.

The (shallow) ground conditions have been found to be largely of cohesive silt/clays and granular silts/sands and some groundwater has been observed. Therefore, it would be prudent to assume a *mobile* groundwater regime for the specification of buried concrete.

A maximum concentration of 213mg/kg of water-soluble sulphate was detected in the *shallow silts* (in WS2 and WS10), as shown below (in Table 31). The soil samples were not acidic (pH was 8.6 to 8.8). However, a significant quantity of oxidisable sulphides was present (>0.3%). Therefore, a DS-2 Design Sulfate and an AC-2 ACEC classification should be suitable in the shallow silts (BRE Special Digest 1, 2005)

Stratum	Sample location	HML sample ref. (S/_)	Chem-tech sample ref.	Depth (m bgl)	Water-soluble sulfate (mg/l)	pH	Total sulfur, [TS] (%)	Total (acid-soluble) sulfate, [AS] (%)	Total potential sulfate, [3TS] (%)	Oxidisable sulfides (%) [3TS-AS]
Sandy silt	WS2	58217	92468-1	0.6-0.9	16	8.4	0.011	0.026	0.032	0.01
Silty clay	WS9	58218	92468-2	2.10-2.60	538	7.9	0.91	0.15	2.7	2.3
Sandy silt	WS10	58219	92468-3	0.50-1.00	213	8.3	0.19	0.072	0.58	0.51
Gravelly sand	BH2	58470	93484-1	14.0-14.5	86	8.6	0.0917	0.0596	0.28	0.22

A maximum concentration of 538mg/kg of water-soluble sulphate was detected in the deeper soils (in WS9), as shown above (in Table 31). The soil samples were not acidic (pH was 7.9 to 8.6). Significant quantities of oxidizable sulphides were present (>0.3%), but the significant depth of these soil strata means there is not expected to be any opportunity for these to oxidise into sulphates. Therefore, a DS-2 Design Sulfate and an AC-2 ACEC classification should be suitable for concrete (e.g. in piles) within the deeper soil strata, based on the BRE Special Digest 1 (2005).

7 SUMMARY & CONCLUSIONS

7.1 Ground conditions

The findings of the investigation indicate the following sub-strata at the site.

- Topsoil: (across the site) loamy soil with rootlets (to a maximum depth of 0.50m)
- Tidal Flat Deposits (TFD):
 - Locally, some shallow firm clay present to a depth of about 1m bgl
 - Common very loose to loose granular silts and fine sands - but sometimes locally clayey – to depths of about 4m bgl
 - A band of (very) soft (slightly organic) clays and silts is present in much of the east area of the site (at depths of up to 4m bgl)
 - Loose to medium dense sands present (at depths greater than about 4m bgl)
 - TFD sands become increasingly gravelly at significant depth (>11m)
 - The base of the TFD soils was revealed at 14.8m (BH2) to 16.8m (BH1) bgl
- Glacial till:
 - Stiff boulder clay (revealed to reach greater than 21.5m bgl)
 - Local BGS records indicate the glacial till is comprised of boulder clay and reaches depths of at least 45m bgl

7.3 Contamination Assessment

7.3.1 Initial conceptual site model

The conceptual site model presented herein identified four main potential sources of contamination:

- | | |
|----------|---|
| Source 1 | Possible made ground associated with previous buildings (metals, PAHs, asbestos) |
| Source 2 | Past land use – agricultural buildings (metals, PAHs, pesticides) |
| Source 3 | Highly organic subsoils (ground gases) |
| Source 4 | Nearby former gas holder and gas works (metals, PAHs, cyanides, thiocyanate, ammonia) |

7.4.2 Preliminary risk assessment

Unacceptable risk was only found for one potential contamination linkage. This linkage concerned ground gas from highly organic subsoils (source) and the effect on future site users (receptor) through migration and inhalation or combustion (pathway).

The possible made ground was not considered to pose a significant risk as no made ground could be found on site. A close inspection of the site revealed only natural soils within the exposed bare earth. Moreover, the site has been used as farm fields for many years so any contaminants are likely to have been attenuated and degraded.

Similarly, past land use was not considered a viable source. Previous buildings evident from historical maps are too small, isolated and aged to have any significant impact on the site.

The nearby former gas holder is unlikely to have affected the site. The underlying subsoils are of (very) low permeability. There is a drainage ditch and trees between the site and the gas holder.

7.4.3 Revised risk assessment

Following the results of site works, no unacceptable contamination risks are considered to be present for the proposed site development. No potentially significant contamination linkages have been identified.

The extensive boreholes drilled on site have not revealed any significant organic material that could offer a plausible source of hazardous ground gas. No peat has been found and the predominant soils are granular silts and sands. A thin band of slightly organic clay was revealed in the east of the site, but this has a negligible gas generating potential. Accordingly, the underlying subsoils are no longer considered as a viable source of hazardous ground gas.

No evidence has been found of contamination on site. No made ground or substantial anthropogenic material has been recorded. Therefore, it should be possible to re-use clean, natural, site-won soils around the site.

Nevertheless, any unforeseen contamination (for example, hydrocarbon odours or staining) encountered during the development of the site must be monitored and reported to the local authority. Work must be halted in any area of the revealed potential contamination and the contamination investigated and assessed to the satisfaction of the local planning authority.

7.4.4 Ground gas risk assessment

No viable source of hazardous ground gas has been found at the site. Accordingly, a CIRIA CS-1 classification (or NHBC green traffic light classification) should be suitable for the site. No ground gas protection measures should be required.

7.4.5 *Buried concrete*

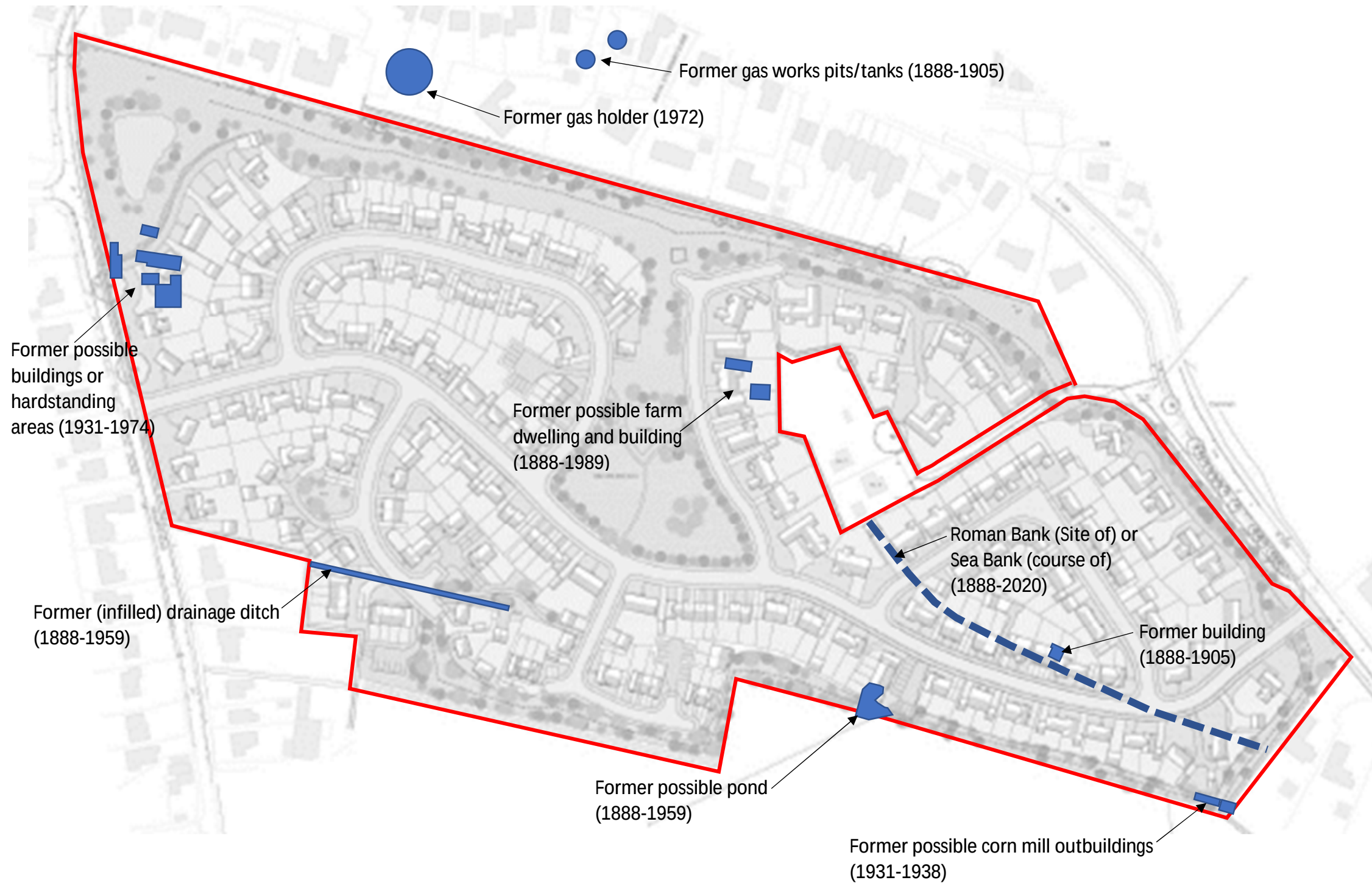
The results of sulphate (SO_4) and pH tests indicate a a DS-2 Design Sulfate and an AC-2 ACEC classification should be suitable in the shallow silts (BRE Special Digest 1, 2005). Also, a DS-2 Design Sulfate and an AC-2 ACEC classification should be suitable for concrete (e.g. in piles) within the deeper soil strata, based on the BRE Special Digest 1 (2005).

- End of Report -

8 References

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Appendix A
Plans & Photographs



LEGEND

 Historical feature

(1888-1959) Range of map years that show the historical feature(s)

Notes:

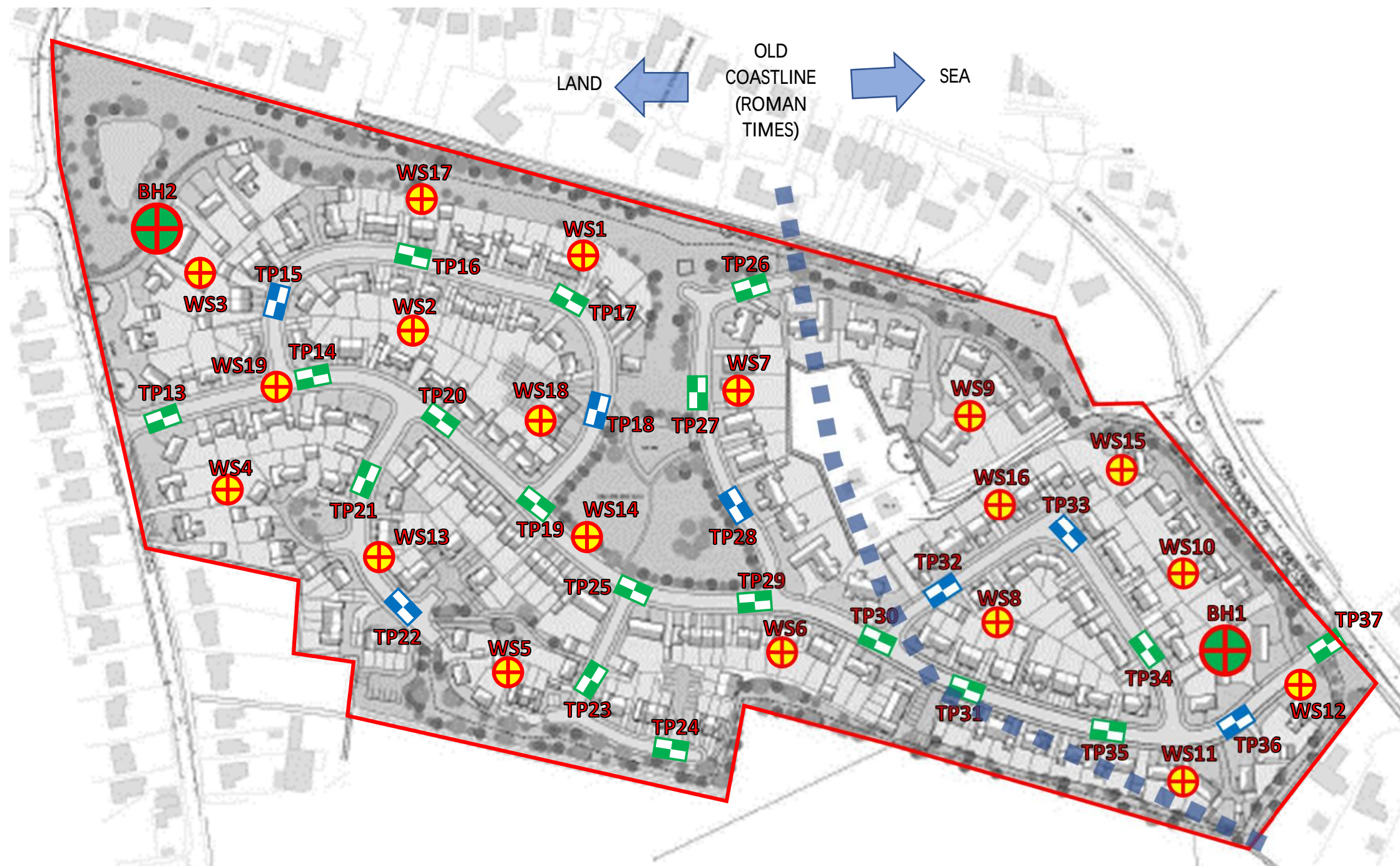
1. Do not scale
2. Locations of all features are approximate only
3. Background image taken from Templeman Design drawing number 3359-TD-XX-DRG-AR-0002-PO, dated November 2017 – shows proposed development

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Drawing Title: Historical features plan
Drawing No.: 1197-5350-SI-02 Revision: 0
Site: Land off Seagate Rd, Long Sutton
Client: D Brown Building Contractors Ltd
Project No.: 1197/5350/P
Date: 18/02/2021



Notes:

1. Do not scale
2. Locations of all features are approximate only
3. Background image taken from Templeman Design drawing number 3359-TD-XX-DRG-AR-0002-PO, dated November 2017

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Drawing Title: Exploratory hole location plan
Drawing No.: 1197-5350-SI-01 **Revision:** 0
Site: Land off Seagate Rd, Long Sutton
Client: D Brown Building Contractors Ltd
Project No.: 1197/5350/P
Date: 18/02/2020



Site location plan

Date copied: 22 Feb 2021

Source: openstreetmap.org



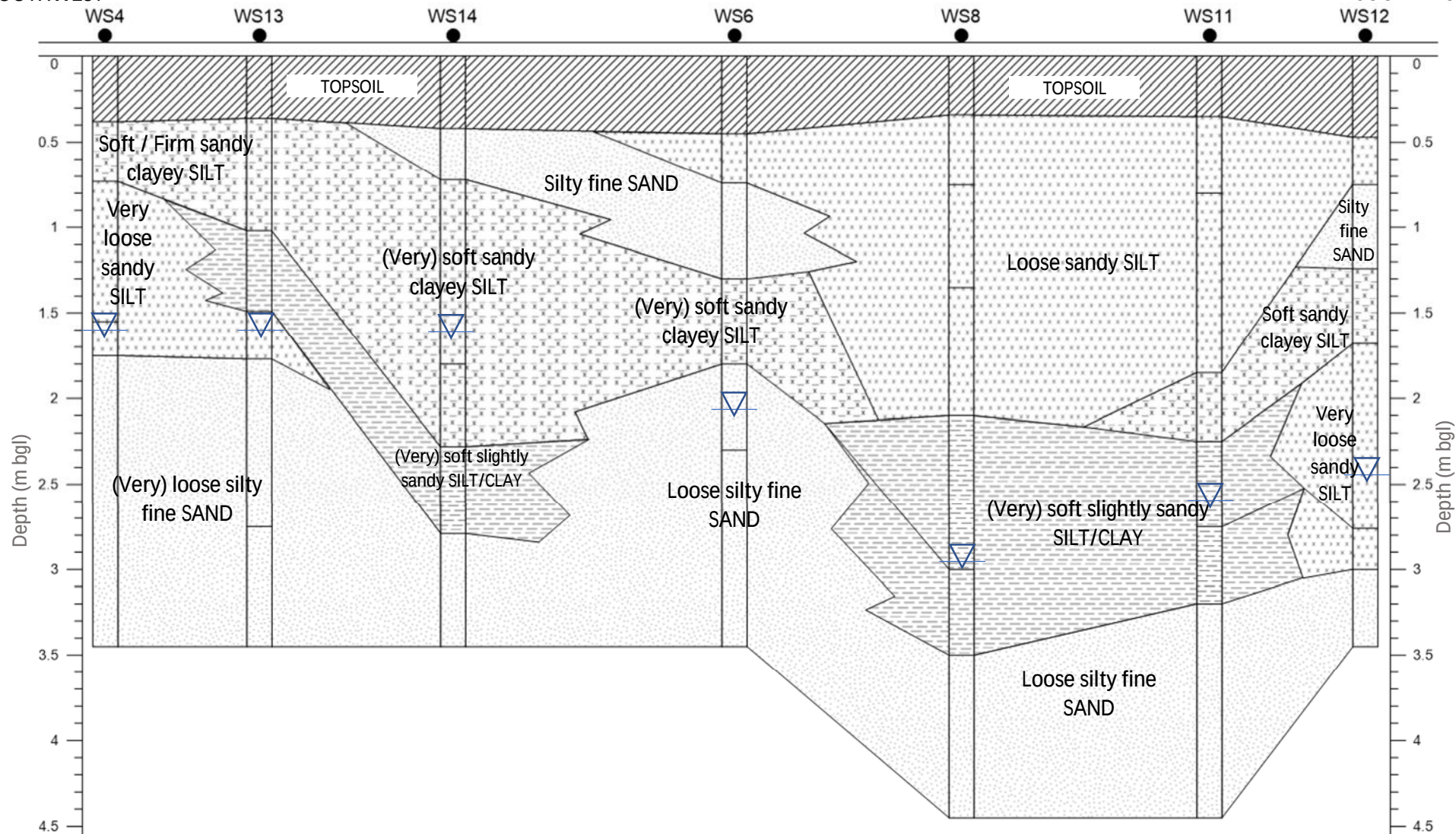
Aerial photograph: 1

Date copied: 22 Feb 2021

Source: Google Maps

SOUTHWEST

SOUTHEAST

**Notes:**

1. Do not scale
2. Strata boundaries and locations are inferred and approximate only
3. Strata descriptions are generic and unlikely to represent whole strata

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Drawing Title: Cross-section of sub-strata 1

Drawing No.: 1197-5350-SI-02 Revision: 0

Site: Land off Seagate Rd, Long Sutton

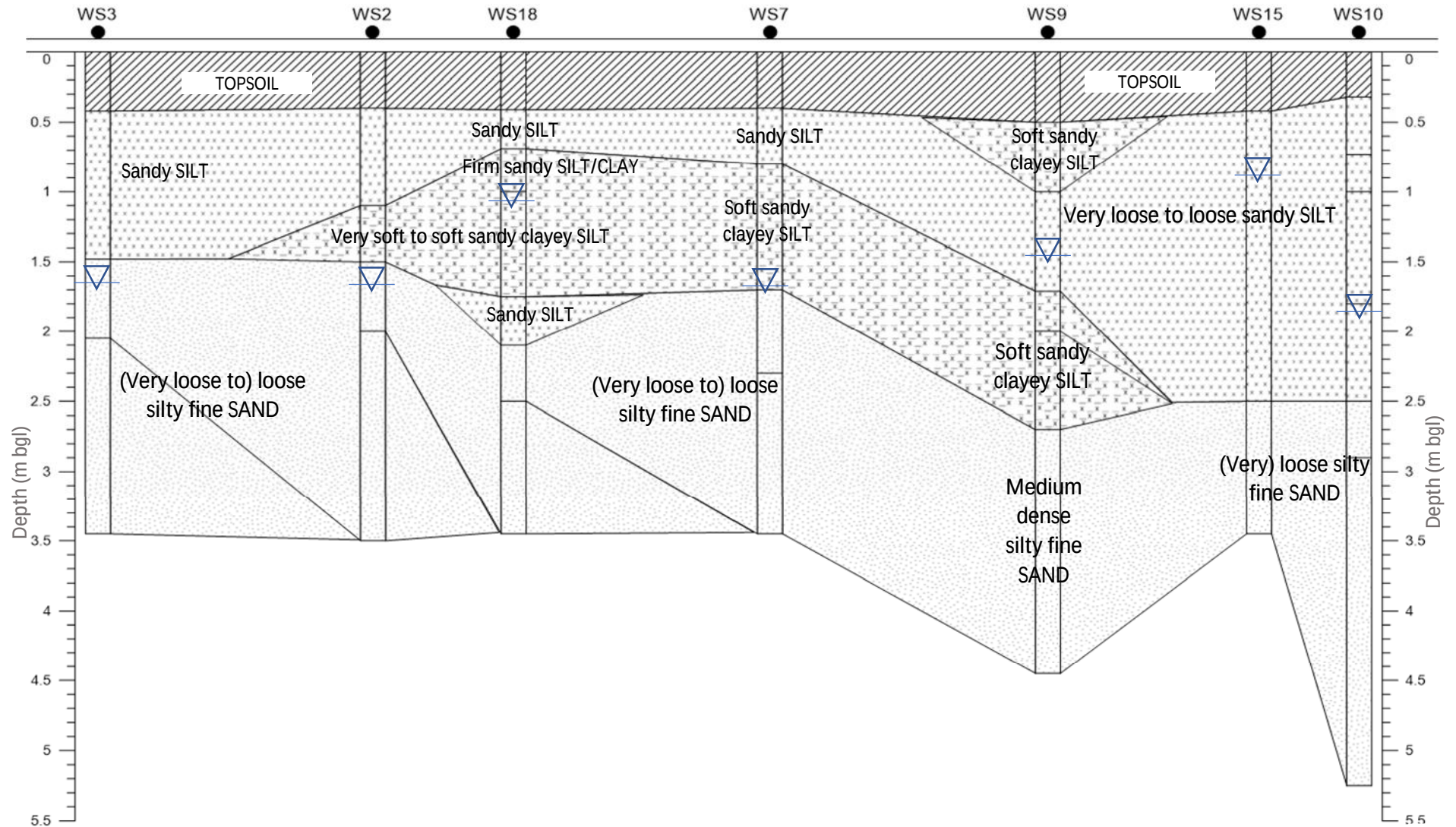
Client: D Brown Building Contractors Ltd

Project No.: 1197/5350/P

Date: 10/03/2020

NORTHWEST

NORTHEAST

Notes:

1. Do not scale
2. Strata boundaries and locations are inferred and approximate only
3. Strata descriptions are generic and unlikely to represent whole strata

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Drawing Title: Cross-section of sub-strata 2

Drawing No.: 1197-5350-SI-03 Revision: 0

Site: Land off Seagate Rd, Long Sutton

Client: D Brown Building Contractors Ltd

Project No.: 1197/5350/P

Date: 10/03/2020



Photo: 1 *Date: 10 Dec 2021*
Photo direction: -
Description: Inside of TP15

Camera
position:

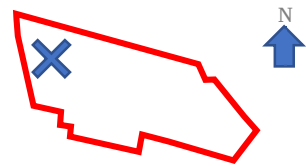
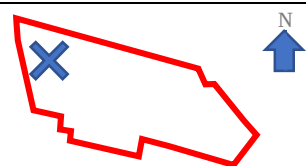
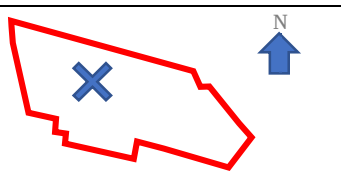
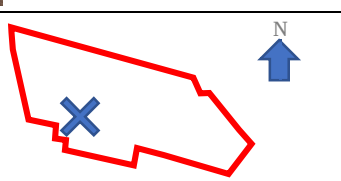


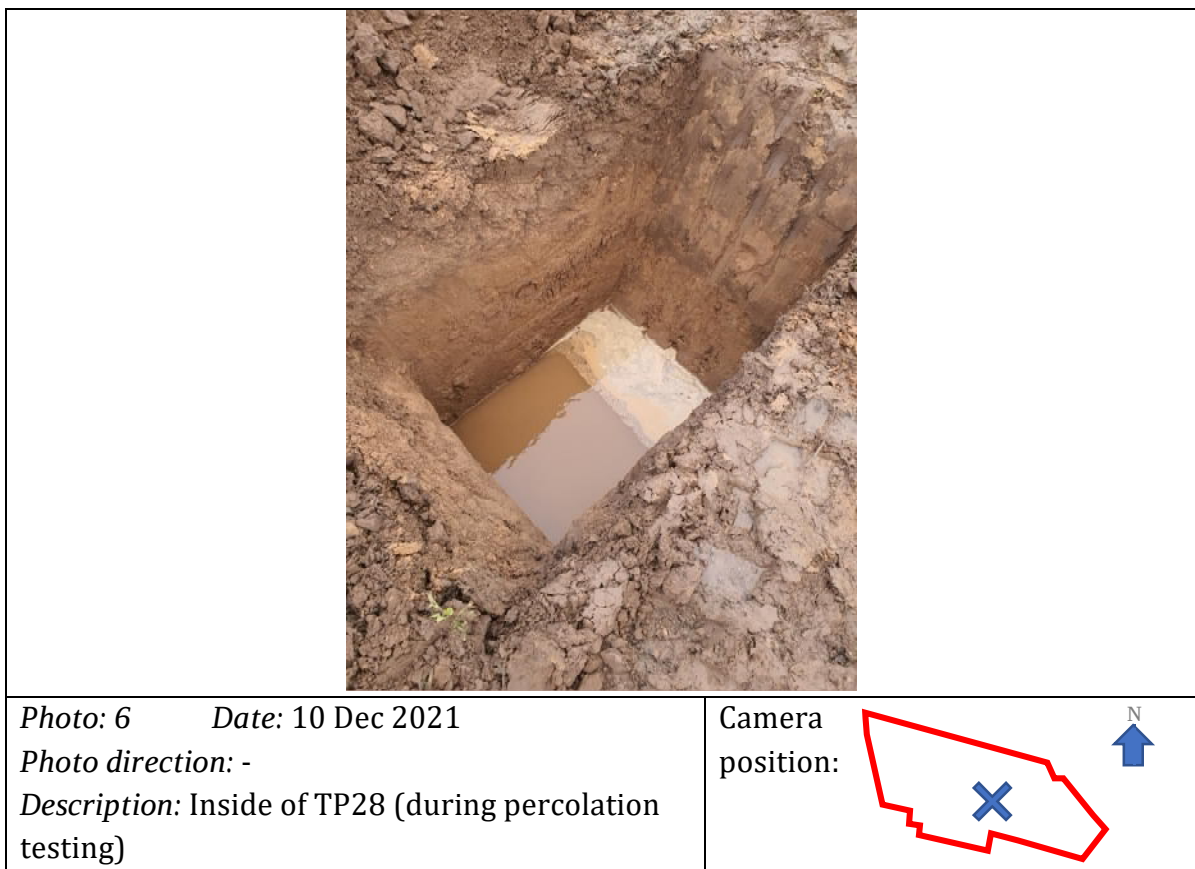
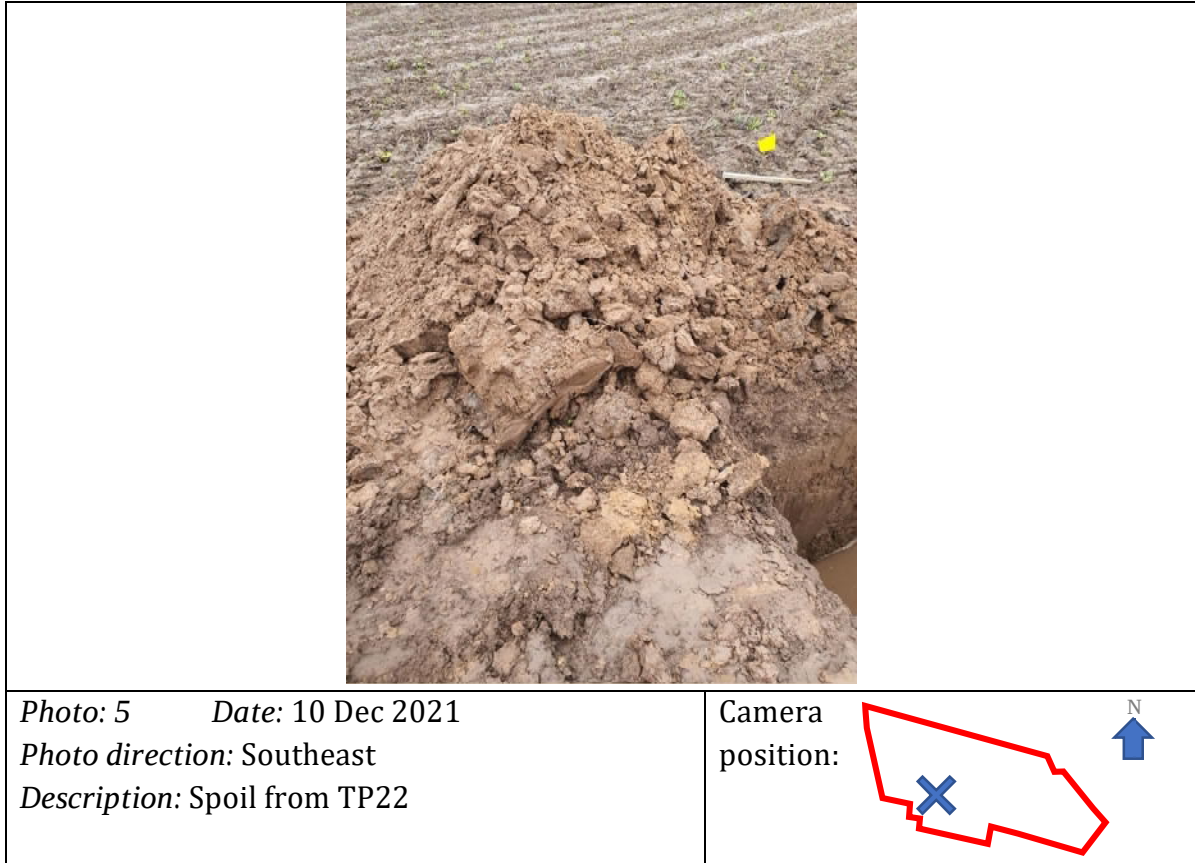
Photo: 2 *Date: 10 Dec 2021*
Photo direction: Southeast
Description: Spoil from TP15

Camera
position:



		
<i>Photo: 3</i> <i>Date: 10 Dec 2021</i> <i>Photo direction: -</i> <i>Description: Inside of TP18</i>		Camera position: 

		
<i>Photo: 4</i> <i>Date: 10 Dec 2021</i> <i>Photo direction: Southeast</i> <i>Description: Inside of TP22 (during percolation testing)</i>		Camera position: 



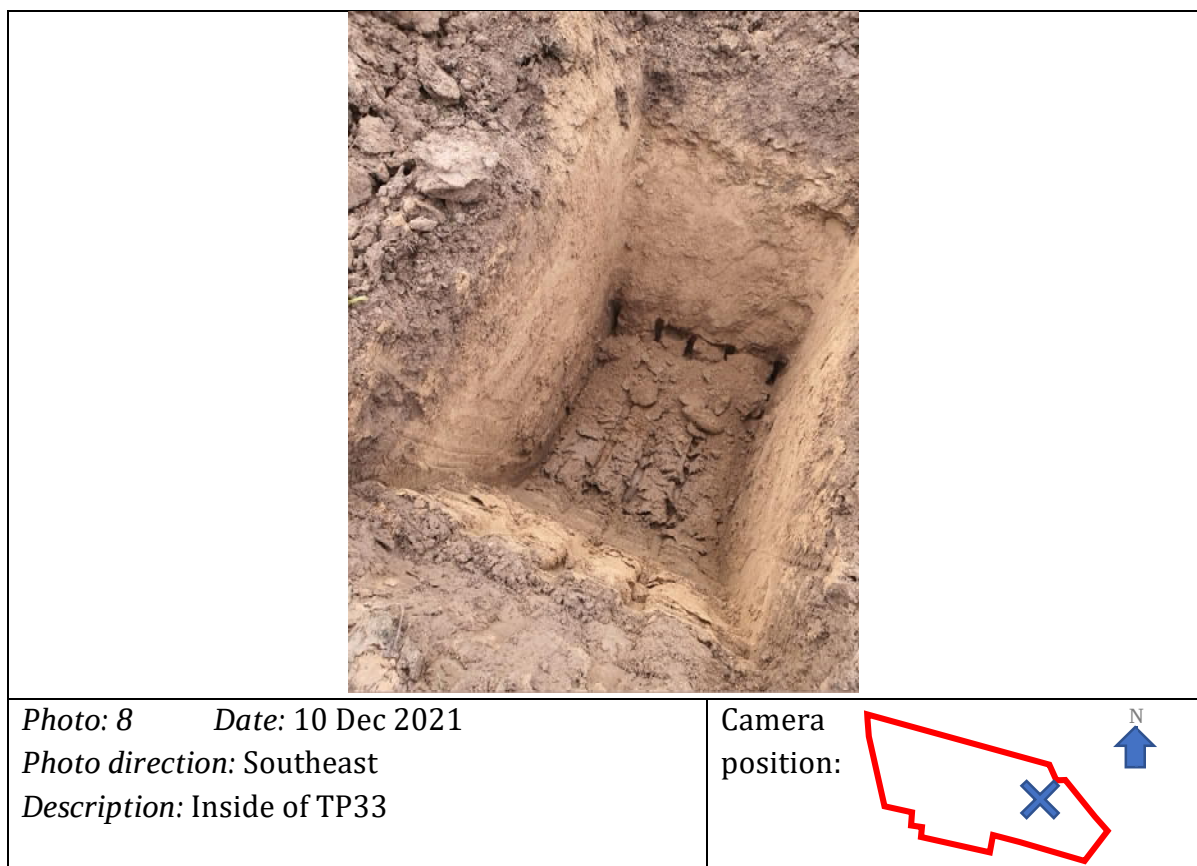
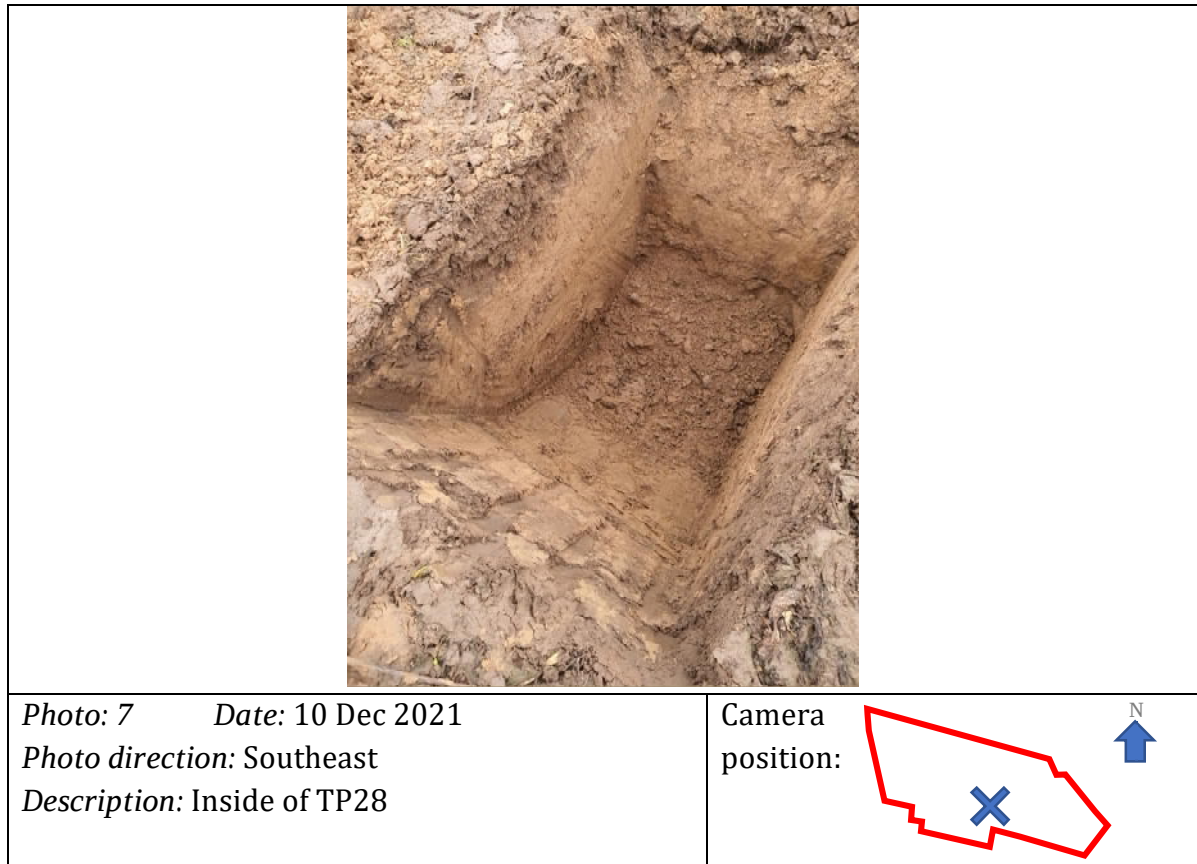




Photo: 9 *Date: 10 Dec 2021*
Photo direction: Southeast
Description: Inside of TP33

Camera
position:

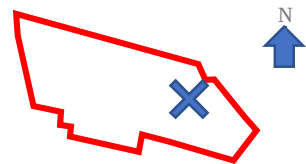
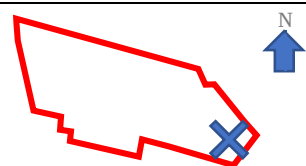
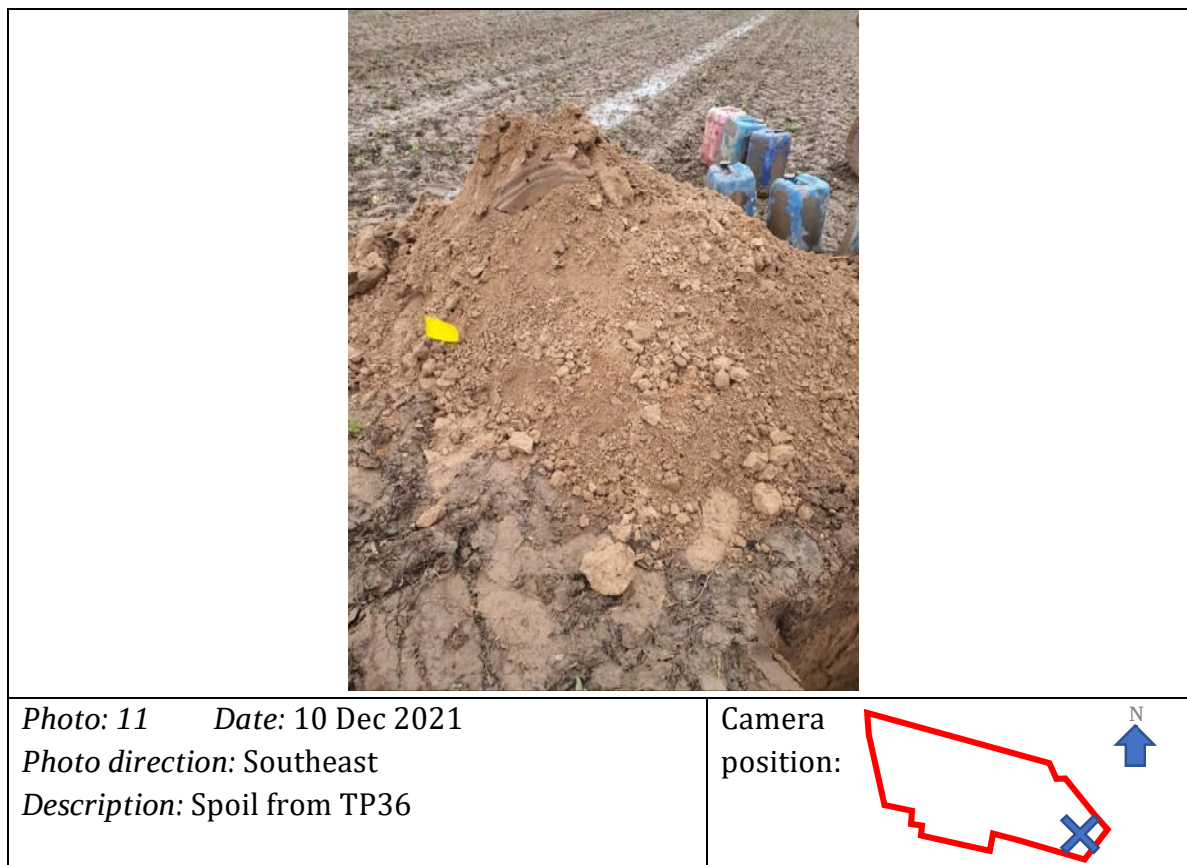


Photo: 10 *Date: 10 Dec 2021*
Photo direction: Southeast
Description: Inside of TP36

Camera
position:





Appendix B
Exploratory hole logs



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BOREHOLE LOG

Borehole
No
BH2

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 01-Feb-21

Coordinates E: N:

Elevation :-

Excavated by :- Shell & Auger

Drilled by :- SIS

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Dark brown sandy SILT/CLAY with occasional rootlets. Sand is fine. (TOPSOIL)	0.3	0.30					
0.6	Soft brown sandy clayey SILT. Sand is fine.	0.6	0.30					
2	Brown sandy SILT. Sand is fine.	2	1.40		2.0m: first water strike			
4	Grey very silty fine SAND.	4						
6		6						
8		8	6.80					
10		10						
10.8	Medium dense greyish brown slightly silty fine to coarse SAND with occasional fine gravel of shell fragments and some rounded fine to coarse stone gravel.	10.8		1,SS 2,B		18		SPT at 11.0m: 2,2,4,4,5,5
12		12	2.40	3,SS 4,B		23		SPT at 12.5m: 3,7,6,7,5,5
13.2	Medium dense greyish brown silty gravelly (becoming very gravelly) fine to coarse SAND. Gravel is mainly of subrounded to rounded fine to coarse stone gravel but also with fine gravel of shell fragments.	13.2		5,SS 6,B		29		SPT at 14.0m: 2,1,4,4,5,6
14		14	1.60	7,B		24		SPT at 15.0m: 1,2,4,4,5,6
14.8	Firm greenish brown slightly sandy silty CLAY with occasional fine to medium chalk gravel.	14.8	0.40	8,SS		24		SPT at 16.5m: 1,3,5,5,,6,8
15.2	Light greenish grey silty SAND with occasional flint gravel.	15.2	0.20	9,SS		24		SPT at 18.0m: 2,5,7,7,9,10
15.4	Stiff greenish grey mottled grey slightly sandy silty CLAY with occasional fine to coarse subangular to rounded chalk and flint gravel.	15.4		10,SS		33		
16		16	3.10					
18		18						
20		20						
22		22						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U Undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 18.5

Casing depth :- 16

File Ref :- 1197/ 5350
Logged by :- R Lester



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BOREHOLE LOG

Borehole
No
BH1

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 27-Jan-21

Coordinates E: N:

Elevation :-

Excavated by :- Shell & Auger

Drilled by :- SIS

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Dark brown sandy SILT/CLAY with occasional rootlets. Sand is fine. (TOPSOIL)	0.4	0.40					
2	Soft brown slightly sandy silty CLAY with occasional thin beds of greyish brown sandy SILT.	2.5	2.10					
	Very soft grey slightly sandy silty CLAY. Sand is fine.		1.50					
4	Grey silty fine to medium SAND	4						
6		6						
8		8						
10	Loose to medium dense grey silty to very silty fine SAND	10						
12		12						
14		14						
16	Greyish brown very gravelly medium to coarse SAND. Gravel is fine to medium of subrounded stone and angular sea shell fragments.	16.8	0.80	6 B				
18	Stiff greenish brown slightly sandy silty CLAY with occasional subrounded to subangular fine to medium chalk gravel.			7,SS 8,B				
20		20		9 SS				
22		22		10 SS				
				11 SS				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 21.5

Casing depth :- 18

File Ref :- 1197/ 5350
Logged by :- R Lester



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BOREHOLE LOG

Borehole
No
WS1

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 09-Dec-20

Coordinates E: 543712 N: 322398

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium brown to dark brown very silty fine SAND with rare rootlets and stone gravel. (TOPSOIL)	0	0.40	1 D				
0.4	Brown very silty fine SAND	0.4	0.70	2 D				
0.8		0.8						
1.2	Loose brown sandy SILT. Sand is fine. Damp.	1.2	0.37	3 D				SPT at 1.0m: 1,1,1,2,2,2
1.6	Brown slightly silty to silty fine SAND.	1.6	0.43	4 D				
2	Medium dense brown silty fine to medium SAND with rare fine gravel sized shell fragments	2			1.77m: after drilling			SPT at 2.0m: 2,4,4,3,4,4
2.4		2.4						
2.8		2.8	2.55					SPT at 3.0m: 3,3,4,4,4,4
3.2		3.2						
3.6		3.6	3.45					
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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BOREHOLE LOG

Borehole
No
WS2

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 09-Dec-20

Coordinates E: 543634 N: 322377

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium brown to dark brown very silty fine SAND with rare rootlets and stone gravel. (TOPSOIL)	0	0.40	1 D				
0.4	Brown sandy SILT. Sand is fine	0.4	0.70	2 D				
0.8		0.8						
1.2	Very soft to soft brown sandy clayey SILT. Sand is fine. Damp.	1.2	0.40	3 D				
1.6	Brown silty fine SAND.	1.6	0.50	4 D	1.65m: after drilling			
2	Loose to medium dense (becoming loose) brown silty fine to medium SAND with rare fine gravel sized shell fragments	2	1.50					
2.4		2.4						
2.8		2.8						
3.2		3.2						
3.6		3.6						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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BOREHOLE LOG

Borehole
No
WS3

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 09-Dec-20

Coordinates E: 543540 N: 322408

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium brown to dark brown very silty fine SAND with rare rootlets and stone gravel. (TOPSOIL)	0	0.42	1 D				
0.4	Loose brown sandy SILT. Sand is fine. Damp below 1.2m.	0.4	1.06	2 D		6		SPT at 1.0m: 2,1,2,1,1,2
0.8		0.8						
1.2		1.2						
1.6	Brown very silty fine SAND.	1.6	0.47	3 D	1.63m: after drilling	4		SPT at 2.0m: 2,1,1,1,1,1
2	(Very loose to) loose greyish brown very silty fine to medium SAND.	2		4 D				
2.4		2.4						
2.8		2.8	0.40			5		SPT at 3.0m: 1,1,1,1,2,1
3.2		3.2						
3.6		3.6						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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Atherton Way, Brigg
North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
WS4

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 09-Dec-20

Coordinates E: 543550 N: 322298

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium brown to dark brown very silty fine SAND with rare rootlets. (TOPSOIL)	0	0.38	1 D				
0.4	Soft to firm brown mottled grey sandy clayey SILT with rare rootlets. Sand is fine.	0.4	0.35	2 D				
0.8	Very loose brown sandy SILT. Sand is fine. Damp below 1.1m.	0.8	0.82	3 D		2		SPT at 1.0m: 1,1,0,0,0,2
1.2		1.2						
1.6	Brown sandy SILT. Sand is fine.	1.6	0.20		1.60m: after drilling			
1.75	Very loose becoming loose greyish brown very silty fine to medium SAND.	1.75		4 D		1		SPT at 2.0m: 0,0,0,1,0,0
2		2						
2.4		2.4	1.70					
2.8		2.8				7		SPT at 3.0m: 1,2,2,1,2,2
3.2		3.2						
3.45		3.45						
3.6		3.6						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
WS5

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 09-Dec-20

Coordinates E: 543644 N: 322227

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium brown to dark brown very silty fine SAND with rare rootlets. (TOPSOIL)	0	0.45	1 D				
0.4	Brown sandy SILT with rare rootlets. Sand is fine.	0.4	0.15					
0.6	Soft to firm friable brown mottled grey sandy clayey SILT with rare rootlets. Sand is fine.	0.6	0.30	2 D				
0.8	Loose brown sandy SILT. Sand is fine.	0.8	0.60	3 D				
1.2		1.2	0.40	4 D				
1.6	Greyish brown sandy SILT. Sand is fine.	1.6	1.55	5 D				
1.9	Loose (becoming very loose to loose) greyish brown very silty fine to medium SAND.	1.9						
2		2						
2.4		2.4						
2.8		2.8						
3.2		3.2						
3.45		3.45						
3.6		3.6						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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Atherton Way, Brigg
North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
WS6

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 09-Dec-20

Coordinates E: 543780 N: 322227

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Dark greyish brown very silty fine SAND with rare rootlets and rare brick fragments. (TOPSOIL)	0	0.45	1 D				
0.4	Light brown sandy SILT. Sand is fine.	0.45	0.29					
0.8	(Possibly very loose to loose) brown mottled grey friable very clayey fine SAND. Becoming damp at 1.1m.	0.74	0.56	2 D		2		SPT at 1.0m: 1,0,1,0,1,0
1.2	Very soft to soft brown mottled grey clayey SILT. Sand is fine.	1.3	0.50	3 D				
1.6	(Probably loose) brown very silty fine SAND.	1.8	0.50	4 D	2.06m: after drilling	7		SPT at 2.0m: 1,2,2,1,2,2
2	Loose greyish brown silty fine to medium SAND.	2.3	1.15	5 D				
2.4		2.4						
2.8		2.8				6		SPT at 3.0m: 1,1,2,2,1,1
3.2		3.2						
3.6		3.6						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
WS7

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 09-Dec-20

Coordinates E: 543757 N: 322334

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium brown to dark brown sandy SILT with rare rootlets. Sand is fine. (TOPSOIL)	0	0.40	1 D				
0.4	Light brown sandy SILT. Sand is fine.	0.4	0.40					
0.8	Soft brown mottled grey sandy clayey SILT. Sand is fine. Becoming damp at 1.1m.	0.8	0.90	2 D		4		SPT at 1.0m: 1,0,0,1,1,2
1.2		1.2						
1.6	(Probably very loose to loose) brown very silty fine SAND.	1.6	0.60	3 D	1.66m: after drilling	4		SPT at 2.0m: 0,1,1,0,1,2
2		2						
2.4	Very loose to loose greyish brown silty fine to medium SAND.	2.4	1.15	4 D		5		SPT at 3.0m: 0,1,1,1,1,2
2.8		2.8						
3.2		3.2						
3.6		3.6						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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Tel & Fax 01652 652753

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BOREHOLE LOG

Borehole
No
WS8

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 09-Dec-20

Coordinates E: 543871 N: 322240

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium to dark greyish brown very silty fine SAND with occasional rootlets and rare fine gravel. (TOPSOIL)	0	0.34	1 D				
0.4	Brown sandy SILT with rare dark blackish grey fine gravel of possible lignite	0.4	0.41					
0.8	Loose light brown sandy SILT. Sand is fine.	0.8	0.60	2 D		9		SPT at 1.0m: 2,3,2,2,2,3
1.2		1.2						
1.6	Brown slightly sandy to sandy SILT. Sand is fine. Becoming damp at 1.9m.	1.6	0.75	3 D				
2		2				0		SPT at 2.0m: 0,0,0,0,0,0
2.4	Very soft to soft brown sandy SILT/CLAY. Sand is fine.	2.4	0.90	4 D				
2.8		2.8						
3.2	Very soft slightly organic dark bluish grey slightly sandy SILT/CLAY. Organic matter is amorphous peat.	3.2	0.50	5 D		0		SPT at 3.0m: 0,0,0,0,0,0
3.6		3.6						
4	Loose to medium dense brown very silty fine SAND.	4	0.95	6 D		10		SPT at 4.0m: 1,1,2,2,3,3
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key

B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 4.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
WS9

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 09-Dec-20

Coordinates E: 543857 N: 322332

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Brown very silty fine SAND with occasional rootlets. (TOPSOIL)	0						
0.4		0.4	0.50	1 D				
0.8	Soft brown slightly sandy clayey SILT with rare rootlets. Sand is fine.	0.8	0.50	2 D				
1.2	Very loose to loose brown sandy SILT. Sand is fine. Damp.	1.2	0.71	3 D		4		SPT at 1.0m: 2,1,0,1,1,2
1.6		1.6			1.45m: after drilling			
2.0	Very soft to soft dark bluish grey sandy clayey SILT. Sand is fine.	2.0	0.29			0		SPT at 2.0m: 0,0,0,0,0,0
2.4	Very soft slightly organic dark bluish grey sandy SILT/CLAY. Organic material is amorphous peat.	2.4	0.70	4 D				
2.8		2.8						
3.2	Medium dense grey silty fine to medium SAND	3.2				14		SPT at 3.0m: 2,3,3,3,4,4
3.6		3.6	1.75	5 D				
4.0		4.0				26		SPT at 4.0m: 6,7,6,7,6,7
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 4.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
WS10

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 11-Dec-20

Coordinates E: 543955 N: 322285

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium to dark brown sandy (locally clayey) SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0	0.32	1 D			0	SH DCP testing began adjacent to WS10 at ground level
0.4	Brown sandy to very sandy SILT with rare rootlets. Sand is fine.	0.4	0.41				2	
0.8	Light brown sandy SILT. Sand is fine.	0.8	0.27	2 D			1	
1.2	Loose brown sandy to very sandy SILT. Sand is fine. Damp.	1.2	0.80	3 D		5	2	SPT at 1.0m: 1,1,1,1,2,1
1.6		1.6					1	
2.0	Very loose to loose brown sandy SILT.	2.0	0.70	4 D	1.85m: after drilling	4	0	SPT at 2.0m: 0,0,1,1,1,1
2.4		2.4					1	
2.8	Brown silty to very silty fine SAND.	2.8	0.40				2	
3.2	Very loose becoming loose grey silty to very silty fine SAND.	3.2		5 D		2	1	SPT at 3.0m: 0,0,0,1,0,1
3.6		3.6					1	
4.0		4.0	2.35			6	2	SPT at 4.0m: 0,1,2,1,1,2
4.4		4.4					3	
4.8		4.8				5	1	SPT at 4.8m: 0,1,1,1,1,2
5.2		5.2					2	
5.6		5.6					3	

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 5.25

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
WS11

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 11-Dec-20

Coordinates E: 543950 N: 322178

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium brown to dark brown very silty fine SAND with occasional rootlets. (TOPSOIL)	0	0.35	1 D				
0.4	Light brown sandy SILT with rare rootlets. Sand is fine	0.4	0.45	2 D				
0.8	Loose brown sandy SILT. Sand is fine	0.8	1.05	3 D		8		SPT at 1.0m: 1,2,2,2,2,2
1.2		1.2						
1.6		1.6						
1.85	Soft brown sandy clayey SILT. Sand is fine.	1.85	0.40			0		SPT at 2.0m: 0,0,0,0,0,0
2		2						
2.25	Very soft to soft slightly sandy SILT/CLAY. Sand is fine.	2.25	0.50	4 D				
2.4		2.4						
2.75	Very soft to soft probably slightly organic dark bluish grey slightly sandy SILT/CLAY. Sand is fine. Organic matter is amorphous peat. Faint organic odour.	2.75	0.45	5 D		6		SPT at 3.0m: 0,0,1,2,1,2
2.8		2.8						
3.2	Grey silty fine to medium SAND.	3.2	1.25	6 D		8		SPT at 3.85m: 0,1,1,2,2,3
3.6		3.6						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key

B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 4.3
Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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Tel & Fax 01652 652753

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BOREHOLE LOG

Borehole
No
WS12

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 11-Dec-20

Coordinates E: 543998 N: 322219

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium brown to dark brown very silty fine SAND with occasional rootlets. (TOPSOIL)	0	0.47	1 D				
0.4	Brown sandy SILT with rare rootlets. Sand is fine.	0.47	0.28	2 D				
0.8	Light brown silty fine to medium SAND.	0.75	0.49					
1.2	Soft brown slightly sandy to sandy clayey SILT. Sand is fine.	1.24	0.44	3 D				
1.6	Very loose brown occasionally with veins of reddish brown sandy to very sandy SILT. Sand is fine. Damp.	1.68	1.08	4 D				
2		2						
2.4		2.4						
2.8	Possibly slightly organic bluish grey sandy to very sandy SILT. Sand is fine.	2.76	0.24	5 D				
3.2	Very loose grey silty fine SAND.	3	0.45					
3.6		3.45						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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BOREHOLE LOG

Borehole
No
WS13

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 11-Dec-20

Coordinates E: 543608 N: 322275

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium to dark brown silty fine SAND with occasional rootlets. (TOPSOIL)	0	-0.36	1 D				
0.4	Soft brown mottled light grey slightly sandy clayey SILT. Sand is fine.	0.4	-0.66	2 D				
0.8		0.8						
1.2	Soft brown mottled light grey slightly sandy SILT/CLAY. Sand is fine.	1.2	-0.47	3 D				SPT at 1.0m: 0,0,0,0,1,1
1.6	Brown sandy SILT. Sand is fine.	1.6	-0.28		1.60m: after drilling	2		
2.0	Very loose brown slightly silty to silty fine to medium SAND. Damp.	2.0	-0.98	4 D		2		SPT at 2.0m: 0,0,1,0,1,0
2.4		2.4						
2.8	Very loose to loose brownish grey slightly silty to silty fine to medium SAND. Damp.	2.8	-0.70			4		SPT at 3.0m: 0,1,1,1,1,1
3.2		3.2						
3.6		3.6						
4.0		4.0						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
WS14

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 11-Dec-20

Coordinates E: 543685 N: 322290

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium to dark greyish brown very silty fine SAND with occasional rootlets. (TOPSOIL)	0	0.42					
0.4	Light brown very silty fine SAND.	0.42	0.30					
0.8	(Possibly very soft to soft) brown mottled light grey with occasional reddish brown veins sandy clayey SILT. Damp.	0.72	1.08	1	D	0		SPT at 1.0m: 0,0,0,0,0,0
1.2		1.2						
1.6		1.6						
2	Very soft brown slightly sandy to sandy clayey SILT. Sand is fine.	1.8	0.48	2	D	0		SPT at 2.0m: 0,0,0,0,0,0
2.4	Very soft grey slightly sandy SILT/CLAY. Sand is fine.	2.28	0.51	3	D			
2.8	Very loose grey very silty fine SAND.	2.79	0.66	4	D	1		SPT at 3.0m: 0,0,0,1,0,0
3.2		3.45						
3.6								
4								
4.4								
4.8								
5.2								
5.6								

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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Atherton Way, Brigg
North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

**Borehole
No
WS15**

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 21-Jan-21

Coordinates E: 543930 N: 322311

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium to dark brown sandy SILT with rare rootlets. Sand is fine. (TOPSOIL)	0	0.42					
0.4	Very loose to loose (becoming very loose) light brown slightly sandy to sandy SILT. Sand is fine.	0.4						
0.8		0.8						
1.2		1.2						
1.6		1.6	2.08					
2		2						
2.4		2.4						
2.8	Very loose to loose grey very silty fine SAND	2.8						
3.2		3.2	0.95					
3.6		3.6						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

BOREHOLE LOG

Borehole
No
WS16

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 21-Jan-21

Coordinates E: 543876 N: 322287

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium to dark brown sandy SILT with occasional rootlets. (TOPSOIL)	0	0.45					
0.4	Brown slightly sandy to sandy SILT. Sand is fine.	0.45	0.60					
0.8		0.8						
1.2	Very loose to loose (becoming very loose) brown sandy SILT. Sand is fine.	1.05			1.01m: after drilling	4		SPT at 1.0m: 0,1,1,1,1,1
1.6		1.6	1.50					
2		2				2		SPT at 2.0m: 0,0,0,0,1,1
2.4		2.4						
2.8	Very loose to loose brownish grey very silty fine SAND	2.55	0.90					
3.2		3.2				6		SPT at 3.0m: 2,1,1,1,2,2
3.6		3.45						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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BOREHOLE LOG

Borehole
No
WS17

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 21-Jan-21

Coordinates E: 543607 N: 322434

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium to dark brown and grey very silty fine SAND with rare rootlets. (TOPSOIL)	0	0.43					
0.4	Brown sandy SILT. Sand is fine.	0.43	0.62		0.61m after drilling	1		SPT at 1.0m: 1,0,0,1,0,0
0.8		0.8						
1.2	Very soft to soft brown slightly sandy to sandy clayey SILT. Sand is fine.	1.05	1.55			0		SPT at 2.0m: 0,0,0,0,0,0
1.6		1.6						
2		2						
2.4		2.4						
2.8	Very soft possibly slightly organic grey sandy clayey SILT. Sand is fine.	2.6	0.40					
3.2	Medium dense grey very silty fine SAND.	3	0.45			13		SPT at 3.0m: 3,3,3,3,4,3
3.6		3.45						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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BOREHOLE LOG

Borehole
No
WS18

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 21-Jan-21

Coordinates E: 543665 N: 322337

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium to dark greyish brown sandy SILT with rare rootlets. Sand is fine. (TOPSOIL)	0	0.41					
0.4	Brown sandy SILT. Sand is fine.	0.4	0.28					
0.69	Firm brown mottled grey slightly sandy silty CLAY. Sand is fine.	0.8	0.31					
1	Very soft to soft brown slightly sandy to sandy clayey SILT.	1.2	0.75		1.05m: after drilling	0		HV at 0.8m: 68kPa SPT at 1.0m: 0,0,0,0,0,0
1.6	Brown sandy SILT. Sand is fine.	1.75	0.35			6		SPT at 2.0m: 1,1,2,2,1,1
2	Loose light brown very silty fine SAND.	2.1	0.40					
2.4	Very loose to loose greyish brown silty fine SAND.	2.5	0.95			4		SPT at 3.0m: 1,1,2,2,2,2
3.45		3.6						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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BOREHOLE LOG

Borehole
No
WS19

Client :- D Brown Builders Ltd

Site :- Seagate Road, Long Sutton

Project No :- 5350

Location :- see site plan

Date :- 21-Jan-21

Coordinates E: 543568 N: 322346

Elevation :-

Excavated by :- Dando Terrier

Drilled by :- RL & MBP

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT	SH DCP	Notes
0	Medium to dark grey sandy SILT with rare (degraded) rootlets. (TOPSOIL)	0	0.35					
0.4	Soft to firm brown slightly sandy clayey SILT. Sand is fine.	0.4	0.37					
0.8	Very loose to loose brown sandy SILT. Sand is fine.	0.8						
1.2		1.2	1.03					
1.6		1.6						
2	Very loose to loose brown silty to very silty fine SAND.	2	0.65					
2.4	Loose grey silty fine SAND.	2.4						
2.8		2.8	1.05					
3.2		3.2						
3.6		3.6						
4		4						
4.4		4.4						
4.8		4.8						
5.2		5.2						
5.6		5.6						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :- 3.45

Casing depth :- 0

File Ref :- 1197/ 5350
Logged by :- R Lester



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TRIAL PIT LOG

**Trial pit
No
TP13**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.31)				
0.31	Brown silty fine SAND.	0.31				
0.41		(0.1)				
0.4	Firm to stiff brown mottled grey slightly sandy SILT/CLAY. Sand is fine.	0.41				
0.51	Soft greyish brown mottled orangish brown sandy clayey SILT.	(0.1)				
0.6						
0.8		(0.49)	1	B		
1		1				
1.2		1.2				
1.4		1.4				
1.6		1.6				
1.8		1.8				
2		2				
2.2		2.2				
2.4		2.4				
2.6		2.6				
2.8		2.8				
3		3				
3.2		3.2				
3.4		3.4				
3.6		3.6				
3.8		3.8				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

Trial pit
No
TP14

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy SILT/CLAY with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.31)				
0.4	Soft light brown mottled orangish brown sandy clayey SILT. Sand is fine.	0.31				
0.6		(0.69)				
0.8			1	B		
1		1				
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

**Trial pit
No
TP15**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
0	Dark brown sandy SILT/CLAY with occasional rootlets. Sand is fine. (TOPSOIL)	0			0	
0.17		(0.17)			5	
0.2	Brown mottled grey sandy SILT locally soft and clayey. Sand is fine.				10	
0.4					15	
0.6					20	
0.8			1	B		
1		(1.48)				
1.2						
1.4						
1.6		1.65				
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

**Trial pit
No
TP16**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		0.2				
0.4	Light brown to brown sandy SILT locally soft and clayey. Sand is fine.	0.4				
0.6		0.6				
0.8		0.8	1	B		
1	Light brown mottled orangish brown very silty fine SAND.	1				
1.2		1.2				
1.4		1.4				
1.6		1.6				
1.8		1.8				
2		2				
2.2		2.2				
2.4		2.4				
2.6		2.6				
2.8		2.8				
3		3				
3.2		3.2				
3.4		3.4				
3.6		3.6				
3.8		3.8				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

**Trial pit
No
TP17**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.31)				
0.31	Brown sandy SILT. Sand is fine.	0.31				
0.4		(0.27)				
0.58	Friable brown mottled grey sandy SILT/CLAY. Sand is fine.	0.58				
0.6		(0.37)				
0.8			1	B		
0.95	Brown mottled grey very silty fine SAND.	0.95				
1		(0.05)				
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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Tel & Fax 01652 652753

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TRIAL PIT LOG

Trial pit
No
TP18

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
0	Dark brown sandy SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0			0	
0.2	Friable brown mottled grey very clayey fine SAND.	0.18			5	
0.4		(0.37)			10	
0.6	Light brown mottled light grey and brown sandy SILT locally soft and clayey. Sand is fine.	0.55			15	
0.8		(0.5)	1	B	20	
1	Soft brown mottled grey sandy clayey SILT. Sand is fine.	1.05				
1.2		(0.65)				
1.4						
1.6		1.7				
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350
Logged by :- D Driver



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TRIAL PIT LOG

Trial pit
No
TP19

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown very clayey fine SAND with occasional rootlets. (TOPSOIL)	0				
0.2		(0.31)				
0.4	Light brown sandy SILT locally soft and clayey. Sand is fine.	0.31				
0.6		(0.59)				
0.8			1	B		
1	Soft brown mottled grey sandy clayey SILT. Sand is fine.	0.9				
		(0.1)				
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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Tel & Fax 01652 652753

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TRIAL PIT LOG

Trial pit
No
TP20

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown very clayey fine SAND with occasional rootlets. (TOPSOIL)	0				
0.2		(0.35)				
0.35						
0.4	Brown very silty fine SAND.	(0.15)				
0.5						
0.6	Firm brown mottled grey sandy clayey SILT. Sand is fine.	(0.5)	1	B		HV at 0.55m: 159kPa, 174kPa & 159kPa
0.8						
1		1				HV at 1.00m: 159kPa, 125kPa & 133kPa
1.2		1.2				
1.4		1.4				
1.6		1.6				
1.8		1.8				
2		2				
2.2		2.2				
2.4		2.4				
2.6		2.6				
2.8		2.8				
3		3				
3.2		3.2				
3.4		3.4				
3.6		3.6				
3.8		3.8				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

**Trial pit
No
TP21**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
0	Dark brown very clayey fine SAND with occasional rootlets. (TOPSOIL)	0			0	
0.2		(0.3)			5	
0.3	Brown sandy SILT. Sand is fine.	0.3			10	
0.4		(0.35)			15	
0.6		0.65			20	
0.8	Firm brown mottled grey sandy clayey SILT. Sand is fine.	(0.35)	1	B		
1		1				
1.2		1.2				
1.4		1.4				
1.6		1.6				
1.8		1.8				
2		2				
2.2		2.2				
2.4		2.4				
2.6		2.6				
2.8		2.8				
3		3				
3.2		3.2				
3.4		3.4				
3.6		3.6				
3.8		3.8				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

Trial pit
No
TP22

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2	Brown sandy SILT. Sand is fine.	0.22				
0.4		0.28				
0.5	Firm to stiff grey mottled brown sandy clayey SILT. Sand is fine.	0.5				
0.6	Light greyish brown sandy SILT locally soft and clayey. Sand is fine.	0.65				
0.8		0.85	1	B		
1		1				
1.2		1.2				
1.4		1.4				
1.5		1.5				
1.6		1.6				
1.8		1.8				
2		2				
2.2		2.2				
2.4		2.4				
2.6		2.6				
2.8		2.8				
3		3				
3.2		3.2				
3.4		3.4				
3.6		3.6				
3.8		3.8				

HV at 0.55m: 143kPa,
117kPa & 140kPa

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350
Logged by :- D Driver



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TRIAL PIT LOG

Trial pit
No
TP23

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
0		0			0 5 10 15 20	
0.2	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	(0.4)				
0.4	Light brown silty fine SAND.	(0.15)				
0.6	Soft brown mottled orangish brown clayey SILT. Sand is fine.	(0.45)	1	B		
0.8						
1						
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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Tel & Fax 01652 652753

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TRIAL PIT LOG

**Trial pit
No
TP24**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		0.2				
0.3		0.3				
0.4	Brown mottled orangish brown sandy SILT locally soft and clayey.	0.4				
0.6		0.6				
0.7		0.7				
0.8		0.8	1	B		
1		1				
1.2		1.2				
1.4		1.4				
1.6		1.6				
1.8		1.8				
2		2				
2.2		2.2				
2.4		2.4				
2.6		2.6				
2.8		2.8				
3		3				
3.2		3.2				
3.4		3.4				
3.6		3.6				
3.8		3.8				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



HUMBERSIDE MATERIALS LABATORY Ltd.

Atherton Way, Brigg
North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

TRIAL PIT LOG

**Trial pit
No
TP25**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.28)				
0.28	Light brown very silty fine SAND.	(0.34)				
0.4						
0.62	Firm friable brown mottled grey sandy clayey SILT.	(0.38)	1	B		
0.8						
1	Brown mottled grey very silty fine SAND	(0.1)				
1.1						
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

**Trial pit
No
TP26**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.31)				
0.4	Brown silty fine SAND.	0.31				
0.6		(0.34)				
0.8	Brown mottled grey sandy SILT locally soft and clayey. Sand is fine.	0.65				
1		(0.45)	1	B		
1.1		1.1				
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver

Page :- 1 of 1



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TRIAL PIT LOG

**Trial pit
No
TP27**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.32)				
0.32	Brown silty fine SAND.	(0.2)				
0.4						
0.52	Brown mottled grey sandy SILT.	(0.14)				
0.66						
0.8	Light brown mottled grey sandy SILT locally soft and clayey. Sand is fine.	(0.34)	1	B		
1						
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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Atherton Way, Brigg
North Lincs DN20 8AR
Tel & Fax 01652 652753

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TRIAL PIT LOG

Trial pit
No
TP28

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0			0	
0.2		(0.33)			5	
0.33					10	
0.4	Brown sandy SILT. Sand is fine.	(0.37)			15	
0.6					20	
0.7						
0.8	Brown mottled grey sandy SILT. Sand is fine.	(0.6)	1	B		
1						
1.2						
1.3		(0.2)				
1.4	Light greyish brown very clayey fine SAND.					
1.5						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

**Trial pit
No
TP29**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.34)				
0.4	Light brown to medium brown sandy SILT locally very soft to soft and clayey. Sand is fine.	0.34				
0.6		(0.56)				
0.8			1	B		
1	Greyish brown mottled orangish brown very silty fine SAND.	0.9				
		(0.1)				
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

**Trial pit
No
TP30**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		0.2				
0.4	Light brown to medium brown sandy SILT locally very soft to soft and clayey. Sand is fine.	0.4				
0.6		0.6				
0.8		0.8	1	B		
1	Greyish brown mottled orangish brown very silty fine SAND.	1				
1.2		1.2				
1.4		1.4				
1.6		1.6				
1.8		1.8				
2		2				
2.2		2.2				
2.4		2.4				
2.6		2.6				
2.8		2.8				
3		3				
3.2		3.2				
3.4		3.4				
3.6		3.6				
3.8		3.8				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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Tel & Fax 01652 652753

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TRIAL PIT LOG

Trial pit
No
TP31

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		0.2				
0.3		0.3				
0.4	Light brown to medium brown sandy SILT. Sand is fine.	0.4				
0.6		0.6				
0.7		0.7				
0.8		0.8	1	B		
1		1				
1.2		1.2				
1.4		1.4				
1.6		1.6				
1.8		1.8				
2		2				
2.2		2.2				
2.4		2.4				
2.6		2.6				
2.8		2.8				
3		3				
3.2		3.2				
3.4		3.4				
3.6		3.6				
3.8		3.8				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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Atherton Way, Brigg
North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

TRIAL PIT LOG

**Trial pit
No
TP32**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.36)				
0.4	Light brown to medium brown sandy SILT locally soft and clayey. Sand is fine.	0.36				
0.6		(0.54)				
0.8		0.9	1	B		
1	Greyish brown mottled orangish brown silty fine SAND.	(0.1)				
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

**Trial pit
No
TP33**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.31)				
0.4	Light brown to medium brown slightly sandy to sandy SILT. Sand is fine.	0.31				
0.6						
0.8		(1.04)	1	B		
1						
1.2						
1.4	Brown mottled grey very silty fine SAND.	1.35				
1.6		(0.3)				
1.8		1.65				
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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TRIAL PIT LOG

**Trial pit
No
TP34**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.3)				
0.3	Brown sandy locally clayey SILT. Sand is fine.	0.3				
0.4						
0.6		(0.7)				
0.8			1	B		
1		1				
1.2		1.2				
1.4		1.4				
1.6		1.6				
1.8		1.8				
2		2				
2.2		2.2				
2.4		2.4				
2.6		2.6				
2.8		2.8				
3		3				
3.2		3.2				
3.4		3.4				
3.6		3.6				
3.8		3.8				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

TRIAL PIT LOG

**Trial pit
No
TP35**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.33)				
0.4	Very soft to soft brown sandy clayey SILT. Sand is fine.	(0.37)				
0.6						
0.8	Light brown very silty fine SAND.	(0.3)	1	B		
1						
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350
Logged by :- D Driver



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Tel & Fax 01652 652753

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TRIAL PIT LOG

Trial pit
No
TP36

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0			0	
0.2		(0.35)			5	
0.4	Light brown sandy locally clayey SILT. Sand is fine.	0.35			10	
0.6		(0.42)			15	
0.8	Brown sandy SILT. Sand is fine.	0.77	1	B	20	
1.0	Light brown with orange laminations silty fine SAND.	0.83				
1.2	Light brown silty fine SAND.	0.9				
1.4		(0.06)				
1.6	Firm brown mottled grey slightly sandy silty CLAY. Sand is fine.	0.9				
1.8		(0.07)				
2.0		(0.5)				
2.2		(0.25)				
2.4						
2.6						
2.8						
3.0						
3.2						
3.4						
3.6						
3.8						

HV at 1.6m: 78kPa, 83kPa

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver



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North Lincs DN20 8AR
Tel & Fax 01652 652753

email info@humbersidematerialslab.co.uk

TRIAL PIT LOG

**Trial pit
No
TP37**

Client :- D Brown Builders Ltd
Site :- Seagate Road, Long Sutton
Project No :- 5350

Location :- see site plan
Date :- 10-Dec-20

Coordinates E: N:
Elevation :-
Excavated by :- Tracked excavator

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe	Notes
					0 5 10 15 20	
0	Dark brown sandy clayey SILT with occasional rootlets. Sand is fine. (TOPSOIL)	0				
0.2		(0.35)				
0.4	Light brown sandy SILT. Sand is fine.	0.35				
0.6		(0.65)				
0.8			1	B		
1		1				
1.2						
1.4						
1.6						
1.8						
2						
2.2						
2.4						
2.6						
2.8						
3						
3.2						
3.4						
3.6						
3.8						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 1197 / 5350

Logged by :- D Driver

Appendix C
Test results



ANALYTICAL TEST REPORT

Contract no: 93484

Contract name: Seahate Road, Long Sutton

Client reference: 1197/5350/P

Clients name: Humberside Materials Laboratory

Clients address: Atherton Way
Brigg
North Lincolnshire
DN20 8AR

Samples received: 16 February 2021

Analysis started: 16 February 2021

Analysis completed: 23 February 2021

Report issued: 23 February 2021

Notes: Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key: U UKAS accredited test
M MCERTS & UKAS accredited test
\$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by:

Rachael Burton
Customer Support Squad Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
93484-1	B/58470	14.00-14.50	Sand with Gravel	-	-	14.4

Chemtech Environmental Limited

SOILS

Lab number			93484-1
Sample id			B/58470
Location			BH2-6
Depth (m)			14.00-14.50
Date sampled			02/02/2021
Test	Method	Units	
pH	CE004 ^M	units	8.6
Magnesium (2:1 water soluble)	CE061	mg/l Mg	9.3
Chloride (2:1 water soluble)	CE049 ^U	mg/l Cl	22
Nitrate (2:1 water soluble)	CE049 ^U	mg/l NO ₃	<1
Nitrite (2:1 water soluble)	CE049	mg/l NO ₂	<1
Sulphate (2:1 water soluble)	CE061	mg/l SO ₄	86
Sulphate (total)	CE062	mg/kg SO ₄	596
Sulphur (total)	CE119	mg/kg S	917

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO ₃
CE049	Nitrite (2:1 water soluble)	Aqueous extraction, IC-COND	Dry		1	mg/l NO ₂
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		10	mg/l SO ₄
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry		100	mg/kg SO ₄
CE119	Sulphur (total)	Acid extraction, ICP-OES	Dry		100	mg/kg S

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
93484-1	B/58470	14.00-14.50	N	



ANALYTICAL TEST REPORT

Contract no: 92468

Contract name: Land between Seagate Road & B1359, Long Sutton

Client reference: 1197/5350/P

Clients name: Humberside Materials Laboratory

Clients address: Atherton Way
Brigg
North Lincolnshire
DN20 8AR

Samples received: 14 January 2021

Analysis started: 14 January 2021

Analysis completed: 19 January 2021

Report issued: 20 January 2021

Notes: Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key: U UKAS accredited test
M MCERTS & UKAS accredited test
\$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by:

Sam Rogerson
Customer Support Hero

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
92468-1	S/58217	0.60-0.90	Clayey Sand with Gravel	-	-	18.7
92468-2	S/58218	2.10-2.60	Clay with Gravel	-	-	19.6
92468-3	S/58219	0.50-1.00	Clay with Gravel	-	-	19.6

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SOILS

Lab number			92468-1	92468-2	92468-3
Sample id			S/58217	S/58218	S/58219
Sample location			WS2-2	WS9-4	WS10-2
Depth (m)			0.60-0.90	2.10-2.60	0.50-1.00
Date sampled			09/12/2020	09/12/2020	09/12/2020
Test	Method	Units			
pH	CE004 ^M	units	8.4	7.9	8.3
Magnesium (2:1 water soluble)	CE061	mg/l Mg	5.6	55	17
Chloride (2:1 water soluble)	CE049 ^U	mg/l Cl	9.0	6.8	11
Nitrate (2:1 water soluble)	CE049 ^U	mg/l NO ₃	2.3	<1	1.6
Nitrite (2:1 water soluble)	CE049	mg/l NO ₂	<1	<1	<1
Sulphate (2:1 water soluble)	CE061 ^M	mg/l SO ₄	16	538	213
Sulphate (total)	CE062 ^M	mg/kg SO ₄	260	1517	719
Sulphur (total)	CE119	mg/kg S	105	9123	1929

92468

Land between Seagate Road & B1359, Long Sutton
1197/5350/P

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO ₃
CE049	Nitrite (2:1 water soluble)	Aqueous extraction, IC-COND	Dry		1	mg/l NO ₂
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	M	10	mg/l SO ₄
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	M	100	mg/kg SO ₄
CE119	Sulphur (total)	Acid extraction, ICP-OES	Dry		100	mg/kg S

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DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
92468-1	S/58217	0.60-0.90	Y	pH (EHT), Chloride (EHT), Nitrate (EHT), Nitrite (EHT), Sulphate (EHT), Sulphur (EHT)
92468-2	S/58218	2.10-2.60	Y	pH (EHT), Chloride (EHT), Nitrate (EHT), Nitrite (EHT), Sulphate (EHT), Sulphur (EHT)
92468-3	S/58219	0.50-1.00	Y	pH (EHT), Chloride (EHT), Nitrate (EHT), Nitrite (EHT), Sulphate (EHT), Sulphur (EHT)

Appendix D
Historical maps

Appendix E
Envirocheck™ Report