



Whitby Wood Limited

**Plot B, Ferry Island,
Tottenham Vale
Masterplan
Redevelopment**

**Borehole
Decommissioning Method
Statement**

December, 2022



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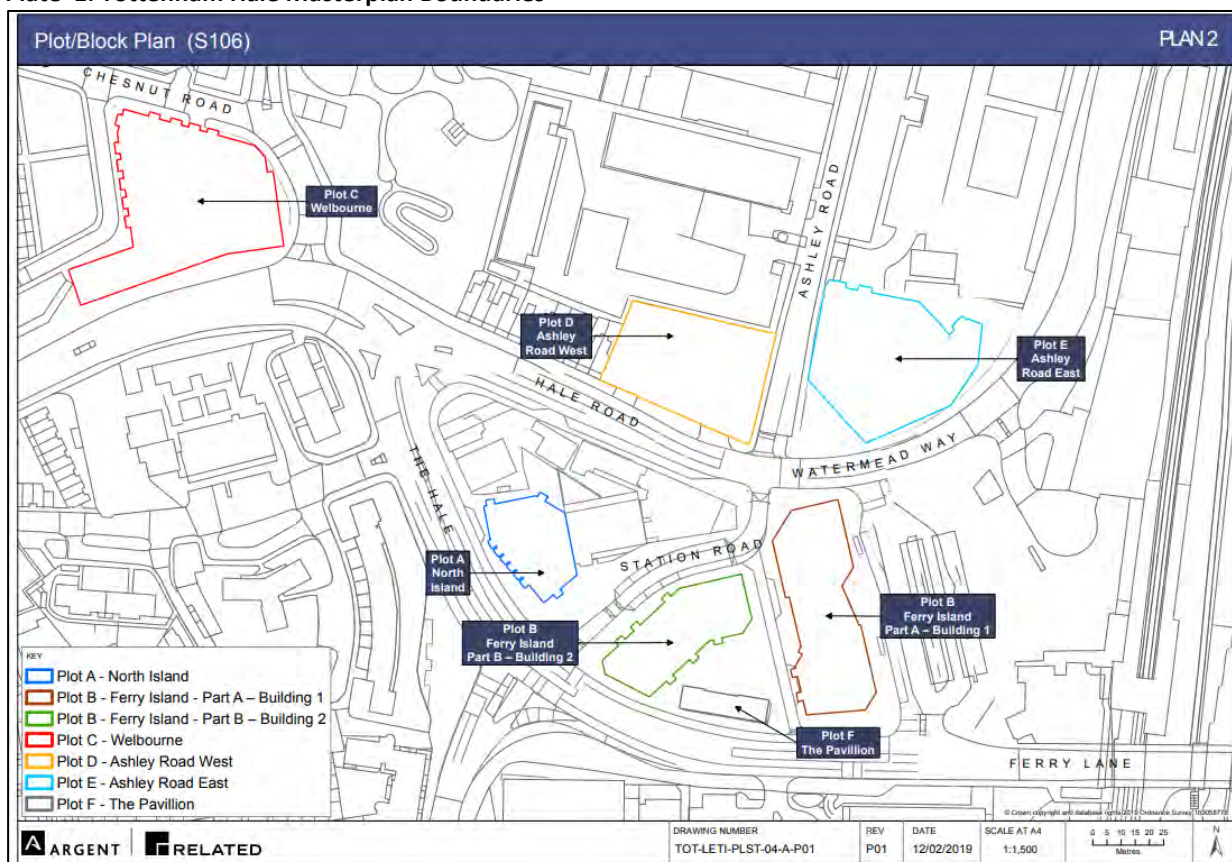
1. INTRODUCTION

1.1 General

Card Geotechnics Limited (CGL) has been instructed by Whitby Wood Limited to prepare a method statement for the decommissioning of active and historical boreholes for the site known as Plot B, Ferry Island (herein referred to as 'the site'). The site forms part of the wider Tottenham Hale Centre (THC) development in Haringey Council area. The THC development proposals originally extended across five plots of land (known as Welbourne; North Island, Ferry Island, Ashley Road East and Ashley Road West) in Tottenham Hale, totalling approximately 1.55 hectares ('ha').

A THC plot / block plan is presented as Plate 1. below. For the avoidance of doubt and to remove any ambiguity, this report relates to Ferry Island (Plot B) only and not the Pavilion (Plot F). Plot F (the Pavilion) previously formed part of the Ferry Island Site (and was subject to ground investigation and assessment as part of the original Ferry Island Site boundary) but is now subject to separate planning conditions.

Plate 1: Tottenham Hale Masterplan Boundaries



1.2 Background

Several phases of ground investigation and assessment work have been completed at the site, and across the wider THC development, by others. Only the salient details from these previous reports have been included here and for full background information, this Statement should be read alongside those previously issued.

Ground investigations were carried out in 2022¹, 2020² and 2018³ and these included sampling and analysis of soils and groundwater samples from across the site. Information from these investigations were used to inform the Remediation Strategy⁴ (RS) for Plot B, Ferry Island, of the wider Tottenham Vale Masterplan Redevelopment project, recently revised⁵ and reissued. The RS along with a site constraints plan⁶ was submitted to Haringey Council and the Environment Agency (EA) as a statutory consultee for review on 29 September 2022, to which the EA issued comments⁷ on 25 October 2022.

CGL was also provided with a Method Statement for CFA Piling⁸ which included an assessment of “Contamination of Aquifers through Piling Method”. The RS was revised and updated following the receipt of these additional reports, and a Technical Note⁹ and Response Note¹⁰ to the EA were prepared and issued by CGL.

1.3 Scope

The purpose of this document is to provide an appropriate method for the decommissioning of boreholes in accordance with current guidance and standards.

It is noted that the existing boreholes should be decommissioned once they are no longer required for groundwater monitoring. All borehole decommissioning works will be undertaken by an experienced contractor.

¹ Concept (September 2022). Ground Investigation Report – Factual. Ferry Island. Concept: 22/3722-GIR-F01.

² Langan International Ltd (2021). *Geo-Environmental Site Assessment Report for Ferry Island*, Tottenham Hale, London, United Kingdom. Reference 841011101.

³ Whitby Wood Ltd (2018). *Tottenham Hale Development. Geotechnical Interpretative Report*. Reference P450040-REP-004.

⁴ CGL (September 2022). Plot B, Ferry Island, Tottenham Vale Masterplan Redevelopment, Remediation Strategy.

⁵ CGL (November 2022). Plot B, Ferry Island, Tottenham Vale Masterplan Redevelopment, Remediation Strategy. Revision 01.

⁶ Whitby Wood (07/09/22). Mark-up of Drawing TH-IS-XX-XX-S-010

⁷ Environment Agency (October 2022), NE/2022/134314/03, dated 25 October 2022.

⁸ JRL Civil Engineering Ltd (2022). Ferry Island Method Statement – CFA Piling. Doc Ref No: T22001-SSOW#001. Revision 01.

⁹ CGL (November 2022). Concept Site Investigations (September 2022). Ground Investigation Report – Factual. Ferry Island. Concept: 22/3722-GIR-F01 – Technical Note of Findings of Additional Ground Investigation.

¹⁰ CGL (November 2022). Plot B Ferry Island – Response to Environment Agency Letter, NE/2022/134314/03.

2. BACKGROUND

2.1 Site Location and Description

The Tottenham Hale Centre (THC) site is located to the northwest of Tottenham Hale Railway Station, London. The Ferry Island site within the wider masterplan development is located between Hale Road/ Watermead Way to the north and The Hale/ Ferry Lane to the south. An approximate National Grid Reference for the site is 534369E, 189535N.

A site location plan is presented as Plate 2 and the site layout plan is included as Figure 1.

Plate 2: Site Location Plan



Scale: 1: 25,000

2.2 Ground Conditions

The ground conditions encountered during the Langan investigation² comprised a variable thickness of Made Ground (between 0.80m and 3.7m in thickness), overlying the Enfield Silt Member and Kempton Park Gravel Formation. The superficial deposits are underlain by the London Clay Formation, Harwich Formation and Lambeth Group in succession. The bedrock deposits were not encountered during the Langan investigation.

The 2022 investigation¹ reported the same sequence of geology with Made Ground thicknesses reported between 0.55m and 0.7m. The 2022 site investigation did not identify the Enfield Silt

Member but did note Alluvium underlying the Made Ground. It is considered probable that these two descriptions relate to the same geology strata beneath the site.

The borehole logs for the wells installed at the site are included as Appendix A. The borehole locations are indicated on Figure 1.

2.3 Hydrogeology and Hydrology

With reference to the BuroHappold desk study¹¹, aquifer designations for the stratum expected to be encountered at the site are outlined in Table 1.

Table 1: Summary of Aquifer Designations

Stratum	Environment Agency Classification
Made Ground	Unproductive Stratum
Enfield Silt	Unproductive Stratum
Kempton Park Gravel Formation	Secondary (undifferentiated) Aquifer
London Clay Formation	Unproductive Stratum
Lambeth Group	Secondary (undifferentiated) Aquifer
Thanet Formation	Principal
White Chalk	Principal

The site is within Zone 2 – Outer Protection Zone of a groundwater Source Protection Zone (SPZ). The closest potable water abstraction is located 1km east of the site.

The closest surface water feature is Pymmes Brook located which is some 300m east, with the River Lea Navigation Channel and River Lea (also referred to as the River Lee and New River) and a series of reservoirs beyond. The anticipated groundwater flow direction of the region is towards the River Thames to the south/southeast.

Results of groundwater monitoring undertaken previously and reported by Langan investigation² indicate that the main groundwater body is located within the Kempton Park Gravel, although where deeper deposits of Enfield Silt were encountered groundwater was also encountered within these deposits. Interpretation of the groundwater monitoring results by Langan did not indicate a clear groundwater flow direction. The results indicate that there is some flow towards the west / southwest across the wider Ferry Island site, with some mounding to the south and some flow to the north and west. Groundwater data from the 2022 investigation¹ was used to infer flow within the shallow aquifer to be predominately towards a sump in the southeast corner of the site, with flow influenced by the upper surface of the London Clay.

¹¹ BuroHappold Engineering Ltd (2016). *Tottenham Hale Masterplan, Phase I Geoenvironmental Desk Study*. Reference 035543 Revision 00.

3. BOREHOLE DECOMMISSIONING

3.1 Boreholes to be Decommissioned

A plan showing the borehole locations is provided in Figure 1 and a summary of the borehole information is provided below in Table 2. It is noted that several of the boreholes were identified as ‘destroyed’ during the most recent monitoring event, and their status is currently unclear. Operational wells should be decommissioned once they are no longer required for groundwater monitoring and following agreement with the regulators as appropriate. There are at least 14 wells at the site for decommissioning, however, should other wells be identified, these should also be included.

Borehole installations generally comprise 50mm internal diameter standpipes. The annulus of the boreholes outside of the standpipes was recorded to have been backfilled with bentonite above the response zone, with the response zone filter pack formed of sand and gravel.

Three of the wells (BHV101 to BHV103) were installed as vibration monitoring wells and as such were constructed with solid pipe from the surface to base. These larger diameter wells are less likely to act as a preferential pathway for possible contaminant migration but for conservatism, it is recommended that these too be appropriately decommissioned.

Two of the locations (BH01A and BH02) were installed with dual installations and both the shallow and deep wells should be decommissioned.

Table 2: Boreholes to be Decommissioned

Borehole ID	Easting	Northing	Elevation (mOD)	Screened Geology	Screen Depth (mOD)	Well Diameter (mm)	Notes
BH01A	534383.08	189547.28	8.33	RTD	2.7 – 4.5	50	Two installs – one shallow and one deep.
				LB/TS	39 – 42.5	19	
BH02	534330.37	189508.81	6.98	MG/ RTD	1.0 – 2.7	50	Two installs – one shallow and one deep.
				LB	29.8 – 33.75	19	Noted as destroyed on 15/09/2022.
BH03	534392.67	189501.79	8.59	MG/ AL/ RTD	2.3 – 5.4	50	Presumed still an active well.
BHV101	534320.81	189514.96	8.24	n/a	0.0 – 15.7	225	Installed as a vibration monitoring borehole – no screened section.
BHV102	534384.82	189528.74	8.82	n/a	0.0 – 16.3	225	Installed as a vibration monitoring borehole – no screened section.
BHV103	534378.69	189492.91	8.59	n/a	0.0 – 18.8	225	Installed as a vibration monitoring borehole – no screened section.
EBH101	534348.35	189520.69	8.12	MG/ RTD/ LC	1.2 – 5.4	50	Noted as destroyed on 15/09/2022
EBH102	534315.51	189504.14	8.07	ES/ RTD/ LC	1.5 – 4.5	50	Noted as destroyed on 08/09/2022

Borehole ID	Easting	Northing	Elevation (mOD)	Screened Geology	Screen Depth (mOD)	Well Diameter (mm)	Notes
EBH103	534377.00	189490.96	8.56	RTD/ LC	3.0 – 5.7	50	Noted as destroyed on 08/09/2022
EBH104	534384.49	189530.34	8.72	ES/ RTD/ LC	1.8 – 5.5	50	Noted as destroyed on 08/09/2022
EBH105B	534360.08	189487.39	8.34	MG	1.0 – 3.0	50	Noted as destroyed on 08/09/2022
EBH106	534382.23	189507.93	8.75	ES/ RTD/ LC	2.0 – 6.0	50	Noted as destroyed on 15/09/2022

Wells BH101_S, BH102_D and BH103 were installed in 2022. The EBH and BHV series were installed in 2020.

MG = Made Ground; RTD = River Terrace Deposits; KPG = Kempton Park Gravel; ES = Enfield Silt; AL = Alluvium; LB = Lambeth Group; TS = Thanet Sands; n/a = not applicable

3.2 Decommissioning Objectives

The objectives for the borehole decommissioning are as follows, in accordance with the EA guidance¹²:

-  Remove the hazard of an open hole;
-  Prevent borehole from acting as a preferential pathway for contamination of groundwater;
-  Prevent the mixing of contaminated and uncontaminated groundwater from different aquifers; and
-  Prevent the flow of groundwater from one geological stratum to another.

3.3 Decommissioning Guidelines

General guidelines and approach to decommissioning are provided in the Environment Agency guidance, as outlined below:

-  Borehole and/or well inspection to confirm there are no obstructions which will interfere with the sealing of the hole;
-  The ground should be restored as closely as possible to its pre-drilling conditions. The borehole should be backfilled with clean, uncontaminated materials, ensuring that permeability is similar to the properties of the geological strata against which they are placed; and
-  The backfill should mimic the surrounding natural strata and groundwater flow and quality will be protected.

¹² Environment Agency (2012) Good Practice for Decommissioning Redundant Wells and Boreholes.

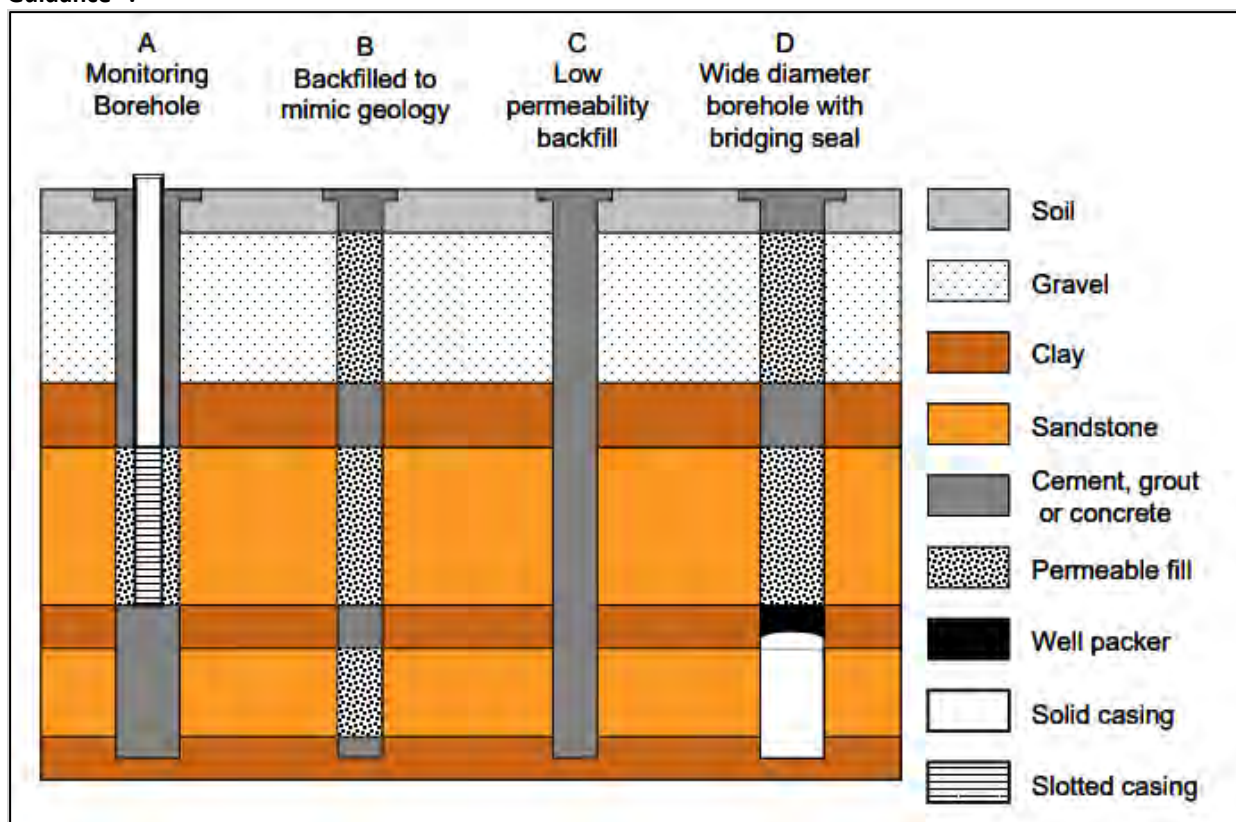
3.4 Decommissioning Methodology

Prior to the decommissioning works, it is recommended that a site walkover be completed to locate and determine the status of the wells installed at the site and to determine the works involved with the decommissioning of the boreholes. As noted above, several of the wells have been identified as 'destroyed', although it is not clear if this means the wells are still in-situ or if they have been removed from the ground. The installation coordinates for each location are detailed in Table 2 and these should be used as a guide to locate any missing wells.

If a well cannot be located at the surface, it is recommended that an excavation be completed at the reported coordinate location to try and locate the well. A hydraulic excavator should be used to scrape the surface of the Made Ground in thin (~50mm) layers to reveal the borehole headworks (if remaining) and/or residual pipework. The condition of the installation (headworks and pipework) will be recorded ahead of commencing decommissioning. If found, the well can be decommissioned as described below, following the standard guidance. If after completing an excavation at the coordinate location, the monitoring well still cannot be located, photographs should be taken of the excavation and a layer of concrete placed over the base of the excavation, before backfilling.

Once found, all boreholes are to be decommissioned in accordance with Option C of the Environment Agency guidance, as depicted in Plate 3 below.

Plate 3: The Schematic Options for Decommissioning Boreholes in Line with the Environment Agency Guidance¹².



Prior to commencement of decommissioning, where possible, all pipes will be dipped with a dip meter to confirm the installation depth and existing water level.

Given the recorded depths of the installations, the boreholes will be decommissioned by removing the headworks and upper pipework, sealing the remaining installation pipework with gravity-fed bentonite grout, and sealing the surface of the decommissioned borehole with cement grout.

Bentonite-based grout will be used, and there is potential for the installation pipes to become blocked or 'bridged' with the grout. To mitigate this, a suitably fluid grout will be mixed to reduce the risk of bridging and the grout will be tremmied into the borehole from the base of the borehole and filled upwards. Where possible the grout will also be applied under pressure to reduce the risk of bridging.

The objective is to seal through and beyond the response zones. By ensuring that the boreholes are tremmied from the base, and the grout is delivered under pressure where possible, the grout will seal through the slotted pipe into the granular fill which surrounds the response zone.

The method for decommissioning is outlined below:

-  Prior to decommissioning, the dimensions of each well will be measured, confirmed and recorded by the contractor.
-  Volume of the standpipe for each well to be calculated so that the correct volume of grout to be injected can be calculated.
-  Borehole headworks are to be removed by hand excavation prior to commencing decommissioning works.
-  Mix bentonite-based grout with a grout mixer to achieve a suitable slurry consistency for pumping / injecting into the wells.
-  For 50mm diameter standpipes, place delivery pipe (tremie) down to base of borehole and inject bentonite grout through the tremie. Assess volume of grout pumped into pipe against pre-calculated well volume and record details.
-  Fill borehole with bentonite grout to approximately 2m below the surface.
-  Allow to settle then top up with bentonite grout mix to approximately 2m below surface, where required.
-  Place cement-based grout within final 2m to form cement 'cap'.
-  Record details for each standpipe decommissioned.
-  Take photographs of the boreholes before and after decommissioning.

3.5 Reporting

All pre-commencement field details (water levels, installation type etc, as outlined above) will be recorded and logged by the field engineer. During the works, the field engineer will record information for each standpipe decommissioned, including the method used, grout volume, completion details and any issues encountered. Photos of the boreholes before and after decommissioning will also be taken.

On completion, a short factual report will be produced, outlining the above and details of works completed. The report should be submitted to the regulators and/ or planning authority as required.

FIGURES



Client	Project	Job No
Whitby Wood Limited	Plot B, Ferry Island, Tottenham Hale Masterplan Redevelopment	CG/39277B
	Title	Figure 1
	Exploratory Hole Location Plan	

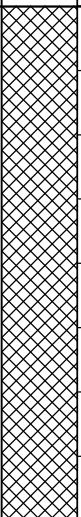
APPENDIX A

Borehole Logs

Project

Ferry Island

Job No 22/3722	Date Started 18/07/22 Date Completed 18/07/22	Ground Level (mOD) 8.33	Co-Ordinates E 534387.56 N 189547.49	Final Depth 0.80m
Client Midgard			Plant Used Hand Excavated	Sheet 1 of 1

STRATA					SAMPLES & TESTS			Field Records
Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth	Type No	Test Result	
				Brown very gravelly fine SAND with medium flint cobble content and occasional to frequent plastic fragments (<70mm). Gravel comprises angular to rounded fine to coarse flint, brick, concrete and cement fragments. (MADE GROUND)	0.10	D1		VOC 0.2ppm
					0.20-0.40	B2		
					0.30 0.30-0.40	ES3		
			(0.80)					
				0.60 ... with a black geotextile membrane	0.60 0.60-0.70	D4 B5		
	7.53		0.80		0.80			
				End of Trial Pit				... Location aborted at 0.80m depth

GENERAL REMARKS

1. An inspection pit was hand excavated to 0.80m depth prior to boring commencing.
2. Pit aborted at 0.80m depth due to presence of concrete obstruction with a strong CAT signal. Borehole location moved to position BH01A.
3. Pit backfilled with soil arisings and made good upon completion.

Issue: FINAL	Driller: CR	Logger: AB	CHD: AN	APRV: OS	Log Print Date & Time: 30/09/2022 15:09	
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Log Scale: 2 m per page



BH01A

Ferry Island

Final Depth	42.50m
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Midgard

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Barrel Type	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	1.20	IP	18/07/2022	18/07/2022	CR	AB			Hand Excavated	BHDS03
1.20	42.50	CP	18/07/2022	25/07/2022	CR	AB			Dando 3000	

WELL LOG DATA					WELL IDENTIFICATION		WELL LOG SUMMARY			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks
13.80 20.50	13.80 19.50	20 20	5.40 5.40		2.70	4.50				

HOLE		CORE		LOG			
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Duration (hr)	Recovery (%)
0.00	250	0.00	250				
2.50	250	2.50	250				
24.00	200	24.00	200				
42.50	150	42.50	150				

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation
GMP SPIE	50	4.50	2.70	4.50	25/07/2022
	19	42.00	39.00	42.50	25/07/2022

Top (m)	Bottom (m)	Material	Backfill Date	Remarks
0.00	0.30	Concrete	25/07/2022	Flush Cover
0.30	2.70	Bentonite Pellets		
2.70	4.50	Pea Shingle		
4.50	39.00	Bentonite Pellets		
39.00	42.50	Pea Shingle		

Log Print Date & Time: 30/09/2022 15:07





8 Warple Mews, Warple Way
W3 0RF
Telephone: 020 8811 2880_Fax: 020 8811 2881
E-mail: si@conceptconsultants.co.uk



Borehole No

BH01A

Project

Ferry Island

Job No

22/3722

Date Started

18/07/22

Date Completed

25/07/22

Ground Level (mOD)

8.33

Co-Ordinates

E 534383.08 N 189547.28

Final Depth

42.50m

Client

Midgard

PROGRESS					SPT DETAILS					
Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
18/07/22	0.00		Dry		C	1.70	N3	1, 0 / 1, 0, 1, 1		Dry
18/07/22	1.20		Dry		C	2.70	N34	3, 4 / 5, 6, 11, 12	2.70	Dry
18/07/22	2.50	2.00	Dry		C	3.70	N45	6, 7 / 10, 10, 12, 13	3.60	3.20
19/07/22	2.50	2.00	Dry		S	4.70	N13	1, 1 / 2, 3, 4, 4	4.60	4.20
19/07/22	2.70	2.70	Wet	... Water Added	S	6.70	N20	3, 3 / 4, 4, 6, 6	5.40	Wet
19/07/22	3.70	3.60	3.20		S	8.70	N20	2, 3 / 4, 5, 6, 5	5.40	Dry
19/07/22	4.70	4.60	4.20		S	11.00	N25	3, 4 / 5, 5, 7, 8	5.40	Dry
19/07/22	5.70	5.00	5.20		S	14.00	N23	2, 3 / 4, 5, 7, 7	5.40	Wet
19/07/22	6.70	5.40	Wet		S	17.00	N27	3, 4 / 6, 6, 7, 8	5.40	Wet
19/07/22	7.70	5.40	Dry		S	20.00	N50/5	25 / 50	5.40	Wet
19/07/22	10.25	5.40	Dry		S	22.50	N40	4, 6 / 8, 8, 12, 12	5.40	20.00
20/07/22	10.25	5.40	9.80	... see Remark 2	S	24.50	N43	4, 6 / 9, 9, 12, 13	24.00	24.50
20/07/22	11.00	5.40	Dry		S	27.00	N50/95	12, 13 / 30, 20	26.50	26.90
20/07/22	13.80	5.40	13.80	... Water Strike	S	28.50	N50/95	12, 13 / 35, 15	28.40	16.50
20/07/22	15.50	5.40	Wet		S	30.00	N50/90	15, 10 / 40, 10	29.90	18.00
20/07/22	18.50	5.40	Wet		S	31.50	N50/250	5, 7 / 10, 12, 18, 10	31.40	20.00
20/07/22	20.50	5.40	20.50	... Water Strike	S	34.50	N50/85	7, 13 / 35, 15	34.20	28.00
20/07/22	21.50	5.40	19.00		S	36.00	N50/200	6, 10 / 15, 20, 15	35.90	28.50
20/07/22	22.50	5.40	20.00		C	39.00	N50/180	3, 10 / 12, 24, 14	38.90	30.00
20/07/22	23.50	5.40	19.00		S	40.50	N50/50	10, 15 / 50	40.40	18.00
20/07/22	24.50	24.00	22.00		S	41.50	N50/125	5, 17 / 25, 25	41.40	22.00
20/07/22	25.50	24.00	22.00		S	42.50	N50/120	10, 15 / 30, 20	42.50	22.00
20/07/22	27.00	26.90	26.90							
21/07/22	27.00	26.90	14.00							
21/07/22	28.50	28.40	16.50							
21/07/22	30.00	29.90	18.00							
21/07/22	31.50	31.40	20.00							
21/07/22	34.50	34.20	28.00							
21/07/22	36.00	35.90	28.50							
21/07/22	37.50	37.30	28.00							
21/07/22	39.00	38.90	30.00							
25/07/22	39.00	38.90	15.00							
25/07/22	40.50	40.40	18.00							
25/07/22	41.50	41.40	22.00							
25/07/22	42.50	42.50	22.00							

GENERAL REMARKS

1. UXO testing carried out in the borehole.
2. Borehole sealed with bentonite pellets between 1.50m and 2.50m depth. Casing reduced from Ø250mm and borehole re-drilled to 2.50m depth.
3. Water entering the borehole between 19/07/2022 and 20/07/2022.
4. Water seepage encountered at 13.80m depth with no rise.
5. Water seepage encountered at 20.50m depth, rising to 20.00m (5mins), 19.70m (10mins), 19.60m (15mins), 19.50m (20mins).

KEY

SAMPLES

- ES - Environmental Sample (Tub, Vial, Jar)
- U - 100mm Diameter Undisturbed Sample
- UT - 100mm Diameter Thin Wall Undisturbed Sample
- U38 - 38mm Diameter Undisturbed Sample
- D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
- C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

- GMP - Gas monitoring point
- GWMP - Groundwater monitoring point
- SPIE - Standpipe piezometer
- EPIE - Electronic Piezometer
- SP - Standpipe

HOLE TYPES

- IP - Inspection Pit, TP-Trial Pit TT - Trial Trench
- CP - Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
- DS - Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
- DC - Diamond Coring, C/P-R-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds

Note: All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

Issue: FINAL

CHD: AN

APRV: OS

Log Print Date & Time:

30/09/2022 15:11



Project

Ferry Island

Job No
22/3722

Date Started 18/07/22
Date Completed 25/07/22

Ground Level (mOD)
8.33

Co-Ordinates
E 534383.08 N 189547.28

Final Depth
42.50m

Client
Midgard

Method
Cable Percussion

Sheet
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PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
18/07/22		Dry	7.93		0.40	Grey very gravelly fine to coarse SAND with rare glass fragments. Gravel comprises angular to rounded fine to coarse flint, granite, brick and concrete fragments. (MADE GROUND)	0.10 0.10-0.30 0.50 0.50-0.60 0.50 0.60-0.90 1.00 1.00-1.10	D1 B2 ES3 D4 B5 ES6		VOC 0.7ppm VOC 0.2ppm	
18/07/22		Dry	6.53		(1.40)	Brown slightly sandy gravelly CLAY with rare plastic and ceramic fragments. Gravel comprises angular to rounded fine to coarse flint, brick and concrete fragments. Sand is fine to coarse. (MADE GROUND)	1.70 1.70 1.80-2.20	D7 B8	N3	1, 0 / 1, 0, 1, 1	
18/07/22	2.00	Dry			(0.90)	Soft, orangish brown slightly sandy gravelly CLAY. Gravel is subrounded to rounded fine to coarse flint. Sand is fine to coarse. (ALLUVIUM)	2.30 2.30-2.40	ES9		VOC 0.1ppm	
19/07/22	2.00	Dry	5.63		2.70		2.70 2.70 2.70-3.10	D10 B11	N34	3, 4 / 5, 6, 11, 12	
19/07/22	2.70	Wet			(1.80)	Dense, light brown slightly clayey sandy subangular to rounded fine to coarse flint GRAVEL with medium flint cobble content. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	3.20 3.20-3.30	ES12		VOC 0.3ppm	
19/07/22	3.60	3.20					3.70 3.70 3.70-4.10	D13 B14	N45	6, 7 / 10, 10, 12, 13	
19/07/22	4.60	4.20	3.83		4.50	Firm, dark grey slightly micaceous slightly silty CLAY. (THAMES GROUP: LONDON CLAY FORMATION - A3i)	4.50 4.70 4.70-5.15 5.00 5.00-5.10 5.20-5.60	D15 D16 ES17 B18	N13	1, 1 / 2, 3, 4, 4 VOC 0.1ppm	
19/07/22	5.00	5.20				5.70 - 6.15 ... becoming very closely fissured and silty with rare shell fragments (<10mm)	5.70-6.15 6.15-6.25	UT19 D20	30 blows	100% Recovery	
19/07/22	5.40	Wet			(5.65)		6.70 6.70-7.15	D21	N20	3, 3 / 4, 4, 6, 6	
19/07/22	5.40	Dry				7.70 - 8.15 ... becoming very closely fissured slightly sandy and silty with occasional pockets of sand (<20mm) 7.77 ... with a pocket (<45mm) of pyritised lignite fragments	7.70-8.15 8.15-8.25	UT22 D23	50 blows	80% Recovery	
19/07/22	5.40					8.70 ... with occasional pockets of sand and rare fine shell fragments	8.70 8.70-9.15	D24	N20	2, 3 / 4, 5, 6, 5	
19/07/22	5.40					9.70 - 10.15 ... becoming very closely fissured slightly sandy and silty with occasional partings of sand (<1mm)	9.70-10.15 10.15-10.25	UT25 D26	80 blows	100% Recovery	
20/07/22	5.40	Dry	-1.82		10.15	Stiff, dark grey slightly sandy slightly micaceous silty CLAY. (THAMES GROUP: LONDON CLAY FORMATION - A2)					
20/07/22	5.40	9.80					11.00		N25	3, 4 / 5, 5, 7, 8	

Issue: FINAL

Logger: AB

CHD: AN

APRV: OS

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Project

Ferry Island

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22/3722

Date Started 18/07/22
Date Completed 25/07/22

Ground Level (mOD)
8.33

Co-Ordinates
E 534383.08 N 189547.28

Final Depth
42.50m

Client
Midgard

Method
Cable Percussion

Sheet
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PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
20/07/22	5.40	13.80					11.00-11.45	D27			
							12.00	D28			
						12.50 - 12.95 ... becoming extremely closely fissured with occasional partings of sand (<1mm) and rare shell fragments (<1mm)	12.50-12.95	UT29	80 blows	100% Recovery	
							12.95-13.05	D30			
							14.00		N23	2, 3 / 4, 5, 7, 7	
							14.00-14.45	D31			
							15.00	D32			
20/07/22	5.40	Wet			(9.85)	15.50 - 15.95 ... becoming extremely closely fissured with occasional partings of sand (<1mm)	15.50-15.95	UT33	60 blows	100% Recovery	
							15.95-16.05	D34			
							17.00		N27	3, 4 / 6, 6, 7, 8	
							17.00-17.45	D35			
							18.00	D36			
20/07/22	5.40	Wet				18.50 - 18.95 ... becoming very closely fissured with occasional shell fragments (<1mm)	18.50-18.95	UT37	70 blows	100% Recovery	
							18.95-19.05	D38			
							19.50	D39			
							20.00		N50/5mm	25 / 50	
							20.00	D40			
20/07/22	5.40	20.50			(0.60)	Very stiff, dark grey slightly micaceous silty CLAY with frequent partings of light brown fine sand and 1No rare shell fragment (<80mm). (THAMES GROUP: HARWICH FORMATION - Swanscombe Member)	20.00-20.50	B41			
							20.60	D42			
							20.60-21.00	B43			
						Very stiff, brown mottled bluish grey CLAY. (LAMBETH GROUP: READING FORMATION: Upper Mottled Beds)	21.50-21.95	UT44	100 blows	89% Recovery	
20/07/22	5.40	19.00				21.50 - 21.95 ... becoming reddish brown mottled bluish grey and silty	21.50-21.95				
							21.95-22.05	D45			

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Ground Level (mOD)
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Co-Ordinates
E 534383.08 N 189547.28

Final Depth
42.50m

Client
Midgard

Method
Cable Percussion

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PROGRESS

STRATA

SAMPLES & TESTS

Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
20/07/22	5.40	20.00			(4.40)	22.50 ...becoming bluish grey mottled red, yellowish brown, light grey and brown	22.50 22.50-22.95	D46	N40	4, 6 / 8, 8, 12, 12	
20/07/22	5.40	19.00				23.50 - 23.95 ... becoming bluish grey mottled reddish brown and silty	23.50-23.95 23.80-23.90 24.00 24.00-24.10	UT47 D48 ES49	100 blows	89% Recovery VOC 0ppm	
20/07/22	24.00	22.00					24.50 24.50-24.95	D50	N43	4, 6 / 9, 9, 12, 13	
20/07/22	24.00	22.00	-16.67		25.00	Very stiff, light grey mottled yellowish brown and brown gravelly silty CLAY. Gravel is subangular siltstone fragments. (LAMBETH GROUP: READING FORMATION: Upper Mottled Beds)	25.50-25.75 25.75-25.85	UT51 D52	100 blows	78% Recovery	
20/07/22	26.90	26.90	-18.67		27.00	Very stiff, grey mottled yellowish brown sandy CLAY. (LAMBETH GROUP: READING FORMATION: Lower Mottled Beds)	27.00 27.00	D53	N50/95mm	12, 13 / 30, 20	
21/07/22	26.90	14.00			(1.50)		28.00	D54			
21/07/22	28.40	16.50	-20.17		28.50	Very dense, light grey slightly clayey fine to medium SAND with dark grey flecks. (LAMBETH GROUP: UPNOR FORMATION)	28.50 28.50-28.95 28.50-29.00	D55 B56	N50/95mm	12, 13 / 35, 15	
21/07/22	29.90	18.00			(3.70)	29.00 ... with no clay	29.50	D57			
21/07/22	31.40	20.00				30.00 ... becoming brownish grey	30.00 30.00 30.00-30.10 30.00-30.35	ES58 D59	N50/90mm	15, 10 / 40, 10 VOC 0ppm	
21/07/22	31.40	20.00				31.50 ... becoming dark grey	31.00	D60			
21/07/22	31.40	20.00					31.50 31.50-31.95 31.50-32.00	D61 B62	N50/250mm	5, 7 / 10, 12, 18, 10	
21/07/22	31.40	20.00	-23.87		32.20	Very stiff, dark grey sandy CLAY. (LAMBETH GROUP: UPNOR FORMATION)	32.50	D63			
21/07/22	31.40	20.00					33.00-33.45	UT64	100 blows	89% Recovery	

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Ground Level (mOD)
8.33

Co-Ordinates
E 534383.08 N 189547.28

Final Depth
42.50m

Client
Midgard

Method
Cable Percussion

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PROGRESS

STRATA

SAMPLES & TESTS

Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
21/07/22	34.20	28.00			(5.30)	33.00 - 33.45 ... becoming very sandy slightly micaceous and silty with frequent pockets of light grey sand (<30mm)	33.45-33.55	D65			
21/07/22	35.90	28.50				36.00 ... with occasional partings of dark grey silt	34.50 34.50-34.95 35.50 36.00 36.00 36.00-36.10 36.00-36.45	D66 D67 ES68 D69	N50/85mm N50/200mm	7, 13 / 35, 15 6, 10 / 15, 20, 15 VOC 0ppm	
21/07/22	37.30	28.00	-29.17		37.50	37.00 ... becoming slightly gravelly. Gravel is angular to rounded fine to medium flint	37.00 37.50-37.95	D70 UT71		100% Recovery	
21/07/22	38.90	30.00			(2.30)	Very dense, dark grey clayey gravelly fine to medium SAND with frequent shell fragments (<20mm). Gravel is rounded medium to coarse black flint. (LAMBETH GROUP: UPNOR FORMATION)	37.95-38.05	D72			
25/07/22	38.90	15.00					39.00 39.00 39.00-39.50	D73 B74	N50/180mm	3, 10 / 12, 24, 14	
			-31.47		39.80						
25/07/22	40.40	18.00			(2.70)	Very dense, dark grey slightly clayey fine SAND. (THANET FORMATION: Thanet Sands)	40.50 40.50 40.50-41.00 41.00 41.00-41.10	D75 B76 ES77	N50/50mm	10, 15 / 50 VOC 0ppm	
25/07/22	41.40	22.00				40.50 ... becoming slightly silty and clayey	41.50 41.50-41.95	D78	N50/125mm	5, 17 / 25, 25	
25/07/22	42.50	22.00	-34.17		42.50		42.50 42.50	D79	N50/120mm	10, 15 / 30, 20	
						End of Borehole					

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Project

Ferry Island

Job No
22/3722

Date Started 08/08/22
Date Completed 11/08/22

Ground Level (mOD)
6.98

Co-Ordinates
E 534330.37 N 189508.81

Final Depth
33.75m

Client

Midgard

BOREHOLE SUMMARY

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Barrel Type	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00 1.20	1.20 33.75	IP CP	08/08/2022 08/08/2022	08/08/2022 10/08/2022	CH CH	OE OE			Hand Excavated Dando 1750	AR3698

WATER STRIKES

WATER ADDED

CHISELLING / SLOW DRILLING

Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks
17.00 27.50	0.50 23.65	20 20	4.00 26.90		2.20	4.00	12.50 30.00		05:30 04:00	Slow Drilling Slow Drilling

HOLE

CASING

Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)
0.00 4.00 33.75	200 200 150	0.00 4.00 31.70	200 200 150

DYNAMIC SAMPLING /ROTARY RECOVERY

From (m)	To (m)	Duration (hr)	Recovery (%)

ROTARY FLUSH DETAIL

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour

INSTALLATION DETAILS

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation
GMP GWMP	50 19	2.70 32.80	1.00 29.80	2.70 33.75	11/08/2022 11/08/2022

BACKFILL DETAILS

Top (m)	Bottom (m)	Material	Backfill Date	Remarks
0.00 0.30 1.00 2.70 29.80	0.30 1.00 2.70 29.80 33.75	Concrete Bentonite Pellets Pea Shingle Bentonite Pellets Pea Shingle	11/08/2022	Flush Cover

Project**Ferry Island****Job No**
22/3722**Date Started** 08/08/22
Date Completed 11/08/22**Ground Level (mOD)**
6.98**Co-Ordinates**
E 534330.37 N 189508.81**Final Depth**
33.75m**Client****Midgard****PROGRESS**

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks
08/08/22	0.00		Dry	
08/08/22	1.20		Dry	
08/08/22	2.20	2.00	0.50	... Water Added
08/08/22	4.20	4.00	Dry	
08/08/22	11.45	4.00	Dry	
09/08/22	11.45	4.00	2.00	... see Remark 1
09/08/22	14.00	4.00	Dry	
09/08/22	17.00	4.00	17.00	... Water Strike
09/08/22	20.00	4.00	0.50	
09/08/22	23.00	4.00	0.50	
09/08/22	26.00	4.00	1.50	
09/08/22	27.00	26.90	Wet	
10/08/22	27.00	26.90	24.80	
10/08/22	27.50	26.90	27.50	... Water Strike
10/08/22	29.00	28.80	3.00	
10/08/22	32.00	31.70	3.50	
10/08/22	33.75	31.70	3.80	

SPT DETAILS

Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
C	1.20	N16	5, 5 / 3, 3, 4, 6		Dry
C	2.20	N7	2, 2 / 1, 1, 2, 3	2.00	0.50
S	3.20	N8	1, 1 / 1, 2, 2, 3	3.00	0.50
S	4.20	N11	1, 1 / 2, 3, 3, 3	4.00	Dry
S	5.20	N13	2, 2 / 3, 3, 3, 4	4.00	Dry
S	8.00	N13	2, 2 / 3, 3, 3, 4	4.00	Dry
S	11.00	N16	2, 3 / 3, 4, 4, 5	4.00	Dry
S	14.00	N20	2, 3 / 4, 5, 5, 6	4.00	Dry
S	17.00	N21	3, 3 / 4, 5, 6, 6	4.00	0.50
S	20.00	N50	5, 7 / 12, 14, 14, 10	4.00	0.50
S	23.00	N36	5, 6 / 8, 8, 10, 10	4.00	0.50
S	26.00	N38	6, 6 / 9, 9, 9, 11	4.00	1.50
S	27.50	N50/285	3, 6 / 11, 26, 13, 0	27.00	2.00
S	29.00	N27	3, 3 / 6, 6, 6, 9	28.80	3.00
S	30.50	N48/245	5, 7 / 11, 17, 20, 0	30.40	3.50
S	32.00	N50/245	10, 12 / 14, 16, 20, 0	31.70	3.50
S	33.30	N50/170	9, 12 / 19, 23, 8	31.70	3.80

GENERAL REMARKS

- UXO testing carried out in the borehole.
- Water entering the borehole between 08/08/2022 and 09/08/2022.
- Rapid water seepage encountered at 17.00m depth.
- Water seepage encountered at 27.50m depth, rising to 25.60m (5mins), 24.86m (10mins), 24.00m (15mins), 23.65m (20mins).

KEY**SAMPLES**

ES - Environmental Sample (Tub, Vial, Jar) AZCL: Assumed Zone of Core Loss
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

GMP - Gas monitoring point
GWMP - Groundwater monitoring point
SPIE - Standpipe piezometer
EPIE - Electronic Piezometer
SP - Standpipe

HOLE TYPES

IP - Inspection Pit, TP-Trial Pit TT - Trial Trench
CP - Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS - Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC - Diamond Coring, CPR-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds**Note:** All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key**Issue:** FINAL**CHD:** AN**APRV:** OS**Log Print Date & Time:**

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Project

Ferry Island

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Ground Level (mOD)
6.98

Co-Ordinates
E 534330.37 N 189508.81

Final Depth
33.75m

Client
Midgard

Method
Cable Percussion

Sheet
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PROGRESS			STRATA				SAMPLES & TESTS			Field Records	Instrument/Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
08/08/22		Dry	6.98		0.30	Dark grey gravelly fine to coarse SAND with low concrete cobble content and occasional wood fragments (<65mm). Gravel comprises subangular to rounded fine to coarse flint, brick, concrete and chalk fragments. (MADE GROUND)	0.00-0.20 0.20 0.20 0.30-0.50 0.50 0.50	B1 ES2 B3 ES4 B5		VOC 3.18ppm VOC 1.5ppm	
08/08/22		Dry	5.98		1.00	Soft, dark brown slightly sandy gravelly CLAY. Gravel comprises subrounded to rounded fine to coarse flint and clinker fragments. Sand is fine to coarse. (MADE GROUND)	1.00-1.20 1.20 1.20 1.20		N16	5, 5 / 3, 3, 4, 6 VOC 1.1ppm	
08/08/22	2.00	0.50	4.98		2.00	Medium dense, brownish grey slightly clayey very sandy GRAVEL. Gravel comprises subrounded to rounded fine to coarse flint and sandstone fragments. Sand is fine to coarse. (RIVER TERRACE DEPOSITS)	2.00-2.20 2.20 2.20 2.20	B7 ES8	N7	2, 2 / 1, 1, 2, 3 VOC 1.1ppm	
			4.28		2.70	Loose, orangish brown sandy GRAVEL with low sandstone cobble content and with rare pockets of clay. Gravel comprises subrounded to rounded fine to coarse flint and sandstone fragments. Sand is fine to medium. (RIVER TERRACE DEPOSITS)	2.70-2.90 2.90 2.90 3.20	B9 ES10 D11	N8	VOC 1.4ppm 1, 1 / 1, 2, 2, 3	
08/08/22	4.00	Dry	2.98		4.00	Soft to firm, grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse flint. (THAMES GROUP: WEATHERED LONDON CLAY FORMATION)	4.00-4.20 4.20 4.20 4.20-4.65	B12 ES13 D14	N11	1, 1 / 2, 3, 3, 3 VOC 1.5ppm	
					(2.50)	Firm, greyish brown slightly micaceous CLAY with rare pockets of dark grey silt (<30mm). (THAMES GROUP: LONDON CLAY FORMATION - A3i)	5.20 5.20-5.65	D15	N13	2, 2 / 3, 3, 3, 4	
			0.48		6.50	5.20 ... becoming slightly sandy with occasional pockets of light brown fine sand (<30mm), occasional claystone fragments and rare fine shell fragments	6.50-6.95	UT16	75 blows	100% Recovery	
						Firm, dark very closely fissured brownish grey slightly sandy slightly micaceous silty CLAY with frequent pockets of light brown fine sand (<30mm) and white flecks. (THAMES GROUP: LONDON CLAY FORMATION - A2)	6.95-7.05	D17			
						8.00 ... becoming slightly micaceous with frequent pockets of dark grey silt (<25mm)	8.00 8.00-8.45	D18	N13	2, 2 / 3, 3, 3, 4	
							9.50-9.95	UT19	85 blows	100% Recovery	
						9.95 ... with rare bioturbation	9.95-10.05	D20			
							11.00		N16	2, 3 / 3, 4, 4, 5	

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33.75m

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PROGRESS			STRATA			SAMPLES & TESTS				Field Records	Instrument/Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
09/08/22	4.00	0.50				21.95 ... with occasional white shell fragments (<5mm)	23.00		N36	5, 6 / 8, 8, 10, 10	
						23.00 ... becoming bluish grey with rare pockets of light brown fine sand (<15mm) and occasional white flecks	23.00-23.45	D35			
					(4.70)						
							24.50-24.95	UT36	100 blows	100% Recovery	
						24.95 ... with frequent pockets of orangish brown fine sand (<30mm)	24.95-25.05	D37			
09/08/22	4.00	1.50	-19.02		26.00		26.00		N38	6, 6 / 9, 9, 9, 11	
						Very stiff, dark grey mottled orangish brown CLAY with occasional pockets of light brown fine sand (<20mm). (LAMBETH GROUP: READING FORMATION: Lower Mottled Beds)	26.00-26.45	D38			
09/08/22	26.90	Wet			(1.50)						
10/08/22	26.90	24.80									
10/08/22	26.90	27.50	-20.52		27.50		27.50		N50/285mm	3, 6 / 11, 26, 13, 0	
						Very dense, light bluish grey very clayey very silty fine to medium SAND. (LAMBETH GROUP: READING FORMATION: Lower Mottled Beds-Sand Channel)	27.50-27.95	D39			
			-21.02		(0.50)		28.00-28.20	B40		VOC 1.3ppm	
					28.00		28.20				
10/08/22	28.80	3.00				Very dense, dark grey slightly gravelly clayey silty fine to medium SAND. Gravel is fine to medium flint. (LAMBETH GROUP: UPNOR FORMATION)	29.00		N27	3, 3 / 6, 6, 6, 9	
						29.00 ... becoming medium dense and bluish grey	29.00-29.45	D41			
					(3.80)						
							30.20			VOC 1.4ppm	
						30.50 ... becoming dense	30.50-30.95	D42	N48/245mm	5, 7 / 11, 17, 20, 0	
10/08/22	31.70	3.50	-24.82		31.80		31.80-32.00	B43			
						Very stiff, bluish grey sandy CLAY. (LAMBETH GROUP: UPNOR FORMATION)	32.00		N50/245mm	10, 12 / 14, 16, 20, 0	
					(1.00)		32.00-32.45	D44		VOC 1.3ppm	
			-25.82		32.80						
						Very dense, dark bluish grey clayey silty fine	32.90-33.10	B45			

Issue: FINAL

Logger: OE

CHD: AN

APRV: OS

Log Print Date & Time: 30/09/2022 15:08

Project	
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Ferry Island

Job No 22/3722	Date Started 08/08/22 Date Completed 11/08/22	Ground Level (mOD) 6.98	Co-Ordinates E 534330.37 N 189508.81	Final Depth 33.75m
Client Midgard			Method Cable Percussion	Sheet 4 of 4

PROGRESS			STRATA							SAMPLES & TESTS		Field Records	Instrument Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result				
10/08/22	31.70	3.80	-26.77		(0.95) 33.75	to medium SAND. (LAMBETH GROUP: UPNOR FORMATION) 33.30 ... with frequent pockets of dark grey silt (<25mm)	33.10 33.30 33.30-33.75	D46	N50/170mm	VOC 1.1ppm 9, 12 / 19, 23, 8			
						End of Borehole							



BH03

Ferry Island

Final Depth	40.00m
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Midgard

Top (m)	Base (m)	Type	Date Started	Date Ended	Crew	Logged By	Barrel Type	Core Bit	Plant Used/ Method	SPT Hammer Reference
0.00	1.20	IP	11/07/2022	11/07/2022	CR	AB			Hand Excavated	
1.20	40.00	CP	12/07/2022	15/07/2022	CR	AB			Dando 3000	BHDS03

WELL LOG DATA					WELL IDENTIFICATION		WELL LOG SUMMARY			
Strike at (m)	Rise to (m)	Time to Rise (min)	Casing Depth (m)	Sealed (m)	From (m)	To (m)	From (m)	To (m)	Duration (hr)	Remarks
15.00	15.00	20	15.00		2.30	5.00				
20.80	20.40	20	6.30							
29.00	21.80	20	29.00							

HOLE		CORE		LOG			
Depth (m)	Diameter (mm)	Depth (m)	Diameter (mm)	From (m)	To (m)	Duration (hr)	Recovery (%)
0.00	250	0.00	250				
2.30	250	2.30	250				
26.00	200	6.30	200				
40.00	150	29.00	150				

From (m)	To (m)	Flush Type	Flush Return (%)	Flush Colour

Type	Diameter (mm)	Depth of Installation (m)	Top of Response Zone (m)	Bottom of Response Zone (m)	Date of Installation
GMP	50	5.40	2.30	5.40	15/07/2022

Top (m)	Bottom (m)	Material	Backfill Date	Remarks
0.00	0.30	Concrete	15/07/2022	Flush Cover
0.30	2.30	Bentonite Pellets		
2.30	5.40	Pea Shingle		
5.40	40.00	Bentonite Pellets		

Log Print Date & Time: 30/09/2022 15:07



Project**Ferry Island****Job No****22/3722****Date Started**

11/07/22

Date Completed

15/07/22

Ground Level (mOD)

8.59

Co-Ordinates

E 534392.67 N 189501.79

Final Depth

40.00m

Client**Midgard****PROGRESS****SPT DETAILS**

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	Remarks	Type	Depth (m)	N Value	Blow Count / 75mm	Casing Depth (m)	Water Depth (m)
11/07/22	0.00		Dry		S	1.70	N12	1, 0 / 0, 2, 4, 6	1.00	Dry
11/07/22	1.20		Dry		C	2.70	N30	4, 7 / 7, 7, 7, 9	2.60	2.00
11/07/22	1.70	1.00	Dry		C	3.70	N29	5, 5 / 6, 7, 9, 7	3.60	3.20
11/07/22	2.00	1.00	Dry		C	4.70	N26	3, 5 / 5, 6, 8, 7	4.60	4.00
12/07/22	2.00	1.70	Dry		S	5.30	N14	1, 2 / 2, 3, 4, 5	5.50	5.00
12/07/22	2.30	1.70	Wet	... Water Added	S	7.50	N21	2, 3 / 4, 5, 6, 6	6.30	Dry
12/07/22	2.70	2.60	2.00		S	9.50	N23	3, 4 / 5, 5, 6, 7	6.30	Dry
12/07/22	3.70	3.60	3.20		S	12.00	N25	3, 4 / 6, 6, 6, 7	6.30	Dry
12/07/22	4.70	4.60	4.00		S	15.00	N24	3, 4 / 4, 6, 6, 8	6.30	Wet
12/07/22	5.50	5.50	5.00		S	19.00	N30	3, 4 / 5, 7, 9, 9	6.30	Wet
12/07/22	6.50	5.70	6.40		S	21.00	N39	4, 7 / 8, 9, 11, 11	6.30	Wet
12/07/22	7.50	6.30	Dry		S	23.00	N38	5, 5 / 8, 8, 10, 12	6.30	22.80
12/07/22	13.00	6.30	Dry		S	25.00	N50	5, 7 / 9, 11, 15, 15	6.30	24.80
12/07/22	13.50	6.30	Dry		S	28.00	N50/135	8, 10 / 20, 30	26.80	26.90
12/07/22	15.00	6.30	15.00	... Water Strike	S	29.50	N50/95	5, 20 / 39, 11	29.00	21.50
12/07/22	16.50	6.30	Wet		S	31.00	N50/115	4, 16 / 30, 20	30.90	20.00
12/07/22	19.50	6.30	Wet		S	32.50	N50/233	6, 9 / 16, 16, 16, 2	32.40	20.50
12/07/22	20.80	6.30	20.80	... Water Strike	S	35.50	N50/130	8, 16 / 18, 32	35.40	21.00
12/07/22	21.00	6.30	20.40		S	37.00	N50/230	9, 11 / 15, 15, 17, 3	36.90	19.00
12/07/22	22.55	6.30	21.30		S	38.50	N50/190	6, 10 / 15, 18, 17	38.40	19.00
13/07/22	22.55	6.30	15.80		C	40.00	N50/160	10, 15 / 20, 25, 5	39.90	19.00
13/07/22	23.00	6.30	22.80							
13/07/22	24.00	6.30	23.50							
13/07/22	25.00	6.30	24.80							
13/07/22	26.00	6.30	25.50							
13/07/22	26.50	26.40	25.00							
13/07/22	28.00	26.80	26.90							
13/07/22	29.00	29.00	29.00	... Water Strike						
13/07/22	29.50	29.00	21.00							
15/07/22	29.50	29.00	18.00							
15/07/22	31.00	30.90	20.00							
15/07/22	32.50	32.40	2.50							
15/07/22	34.00	33.90	22.00							
15/07/22	35.50	35.40	21.00							
15/07/22	37.00	36.90	19.00							
15/07/22	40.00	39.90	19.00							

GENERAL REMARKS

- UXO testing carried out in the borehole.
- Bentonite seal inserted between 1.30m and 2.30m depth. Casing reduced from Ø250mm to Ø200mm and borehole re-drilled to 2.30m depth.
- Water seepage encountered at 15.00m depth with no rise.
- Water seepage encountered at 20.80m depth, rising to 20.60m (5mins), 20.50m (10mins), 20.45m (15mins), 20.40m (20mins).
- Water seepage encountered at 29.00m depth, rising to 22.80m (5mins), 22.00m (10mins), 21.90m (15mins), 21.80m (20mins).

KEY**SAMPLES**

- ES - Environmental Sample (Tub, Vial, Jar) AZCL: Assumed Zone of Core Loss
U - 100mm Diameter Undisturbed Sample
UT - 100mm Diameter Thin Wall Undisturbed Sample
U38 - 38mm Diameter Undisturbed Sample
D - Disturbed Sample, B-Bulk Sample, LB- Large Bulk Sample, BLK-Block Sample
C - Core Sample, W-Water Sample, R-Root Sample

INSTALLATION DETAILS

- GMP - Gas monitoring point
GWMP - Groundwater monitoring point
SPIE - Standpipe piezometer
EPIE - Electronic Piezometer
SP - Standpipe
- HOLE TYPES
IP - Inspection Pit, TP-Trial Pit TT - Trial Trench
CP - Cable Percussion, RC-Rotary Coring, R/S-Rotary/Sonic
DS - Dynamic Sampling, DS/R-Dynamic Sampling /Rotary
DC - Diamond Coring, CPR-Cable Percussion Rotary follow on

TESTS S/C-SPT / CPT, V-Shear Vane, PP-Pocket Penetrometer, MP-Mackintosh Probe, VOC-Volatile Organic Compounds**Note:** All depths are in metres, all diameters in millimetres, water strike rise time in minutes. For details of abbreviations see Key

Issue: FINAL

CHD: AN

APRV: OS

Log Print Date & Time:

30/09/2022 15:11

Project

Ferry Island

Job No
22/3722

Date Started 11/07/22
Date Completed 15/07/22

Ground Level (mOD)
8.59

Co-Ordinates
E 534392.67 N 189501.79

Final Depth
40.00m

Client
Midgard

Method
Cable Percussion

Sheet
1 of 4

PROGRESS			STRATA			SAMPLES & TESTS				Field Records	Instrument/Backfill
Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result		
11/07/22		Dry	8.04		(0.55)	Grey and brownish grey gravelly fine to coarse SAND with occasional wood fragments. Gravel comprises angular to rounded fine to coarse flint, brick, concrete and granite fragments.	0.20-0.40	B1		VOC 3.4ppm	
			7.84		0.55		0.30-0.40	ES2		VOC 3ppm	
					0.75		0.50-0.60	ES3			
						(MADE GROUND)	0.55	D4			
						0.55 ... with a geotextite membrane	0.60-0.75	B5			
11/07/22		Dry			(0.95)	Brown and dark brown gravelly slightly clayey fine to coarse SAND with medium brick cobble content and occasional glass fragments. Gravel comprises angular fine to coarse flint, brick, concrete and limestone fragments.	0.75	D6		VOC 1.4ppm	
							0.95	D7			
11/07/22	1.00	Dry	6.89		1.70		1.00-1.10	ES8			
11/07/22	1.00	Dry			(0.60)		1.00-1.20	B9	N12	1, 0 / 0, 2, 4, 6	
12/07/22	1.70	Dry				(MADE GROUND)	1.70-2.15	D10		VOC 1ppm	
12/07/22	1.70	Wet	6.29		2.30	Soft, dark grey slightly gravelly slightly sandy CLAY. Gravel comprises subangular to rounded fine to coarse flint, brick and charcoal fragments. Sand is fine to coarse.	1.80-1.90	ES11			
						(MADE GROUND)	2.00-2.30	B12			
12/07/22	2.60	2.00					2.30	D13			
						Firm, brown and grey slightly sandy CLAY with rare shell fragments. Sand is fine to medium.	2.70-3.00	B14	N30	4, 7 / 7, 7, 7, 9	
						(ALLUVIUM)	2.80	ES15		VOC 0.9ppm	
12/07/22	3.60	3.20			(3.10)	2.00 ... becoming brown and slightly gravelly. Gravel is subangular to rounded fine to coarse flint. Sand is fine to coarse	2.80-2.90	D16			
							3.70		N29	5, 5 / 6, 7, 9, 7	
						Medium dense, brown very gravelly slightly clayey fine to coarse SAND. Gravel is subangular to rounded fine to coarse flint. (RIVER TERRACE DEPOSITS)	3.70-4.00	B17			
							4.30	D18			
12/07/22	4.60	4.00				4.70 ... with medium flint cobble content	4.70		N26	3, 5 / 5, 6, 8, 7	
							4.70-5.00	B19			
12/07/22	5.50	5.00	3.19		5.40		5.30		N14	1, 2 / 2, 3, 4, 5	
					(0.50)		5.30	D20			
			2.69		5.90	Firm, brownish grey gravelly CLAY. Gravel is rounded fine to medium flint. (THAMES GROUP: WEATHERED LONDON CLAY FORMATION)	5.40	D21			
							5.50-5.80	B22		VOC 0ppm	
							5.90				
12/07/22	5.70	6.40				Firm, very closely fissured dark grey slightly micaceous silty CLAY. (THAMES GROUP: LONDON CLAY FORMATION - A3i)	5.90-6.00	ES23			
							6.50-6.95	UT24	40 blows	100% Recovery	
							6.95-7.05	D25			
12/07/22	6.30	Dry			(4.60)	7.50 ... becoming stiff	7.50		N21	2, 3 / 4, 5, 6, 6	
							7.50-7.95	D26			
							8.50-8.95	UT27	70 blows	100% Recovery	
						8.50 - 8.95 ... with occasional pockets of silty sand (<10mm)	8.95-9.05	D28			
							9.50		N23	3, 4 / 5, 5, 6, 7	
							9.50-9.95	D29			
			-1.91		10.50		10.50-10.95	UT30	75 blows	89% Recovery	
						Stiff, very closely fissured dark grey slightly sandy slightly micaceous silty CLAY with occasional partings of light grey silty fine	10.95-11.05	D31			

Issue: FINAL

Logger: AB

CHD: AN

APRV: OS

Log Print Date & Time: 30/09/2022 15:08

Project

Ferry Island

Job No
22/3722

Date Started 11/07/22
Date Completed 15/07/22

Ground Level (mOD)
8.59

Co-Ordinates
E 534392.67 N 189501.79

Final Depth
40.00m

Client
Midgard

Method
Cable Percussion

Sheet
2 of 4

PROGRESS

STRATA

SAMPLES & TESTS

Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
12/07/22	6.30	Dry				sand (<2mm), rare selenite crystals and rare bioturbation (THAMES GROUP: LONDON CLAY FORMATION - A2)	12.00 12.00-12.45	D32	N25	3, 4 / 6, 6, 6, 7	
12/07/22	6.30	Dry				12.00 ... with occasional bioturbation and dark grey flecks	13.00	D33			
12/07/22	6.30	Dry				13.00 ... with frequent lignite fragments	13.50-13.95	UT34	70 blows	100% Recovery	
						13.50 - 13.95 ... with frequent pockets of sand (<30mm) and frequent shell fragments (<1mm)	13.95-14.05	D35			
12/07/22	6.30	15.00				15.00 ... with rare partings of light grey silt	15.00 15.00-15.45	D36	N24	3, 4 / 4, 6, 6, 8	
					(9.70)		16.00	D37			
12/07/22	6.30	Wet				16.50 - 16.95 ... becoming extremely closely fissured with rare pyrite nodules (<25mm) and rare pockets of sand (<10mm)	16.50-16.95	UT38	80 blows	100% Recovery	
						16.95 ... becoming brownish grey with occasional lenses of light grey sand and frequent foraminifera	16.95-17.05	D39			
						17.00 ... becoming dark greenish grey with occasional lenses of fine sand	18.00-18.45	D40			
						18.00 ... with rare bioturbation	19.00 19.00	D41	N30	3, 4 / 5, 7, 9, 9	
12/07/22	6.30	Wet				19.00 ... becoming very stiff with frequent bioturbation	19.50-19.95	UT42	100 blows	100% Recovery	
						19.50 - 19.95 ... becoming extremely closely fissured with frequent pockets of silty sand (<20mm) and occasional shell fragments (<1mm)	19.95-20.05	D43			
							20.20	D44			
12/07/22	6.30	20.80	-11.61		20.20	Very stiff, dark brown sandy CLAY with occasional shell fragments (<20mm). Sand is fine to medium.	20.30-20.60	B45			
					(0.70)		20.90	D46			
12/07/22	6.30	20.40	-12.31		20.90	(THAMES GROUP: HARWICH FORMATION: Swanscombe Member)	21.00	D47	N39	4, 7 / 8, 9, 11, 11	
						20.30 ... with frequent shell fragments (<80mm)	21.00-21.45				
						Very stiff, yellowish brown mottled bluish grey slightly silty CLAY.	21.50	ES48		VOC 0ppm	
						(LAMBETH GROUP: READING FORMATION: Upper Mottled Beds)	21.50-21.60	B49			
						21.40 ... becoming bluish grey mottled red and	21.50-22.00				
							22.00-22.45	UT50	100 blows	78% Recovery	

Issue: FINAL

Logger: AB

CHD: AN

APRV: OS

Log Print Date & Time: 30/09/2022 15:08

Project

Ferry Island

Job No
22/3722

Date Started 11/07/22
Date Completed 15/07/22

Ground Level (mOD)
8.59

Co-Ordinates
E 534392.67 N 189501.79

Final Depth
40.00m

Client
Midgard

Method
Cable Percussion

Sheet
3 of 4

PROGRESS

STRATA

SAMPLES & TESTS

Date	Casing	Water	Level (mOD)	Legend	Depth (Thickness)	Strata Description	Depth (m)	Type No	Test Result	Field Records	Instrument/ Backfill
12/07/22	6.30	21.30				yellowish brown	22.45-22.55	D51			
13/07/22	6.30	15.80				22.00 - 22.45 ... becoming very closely fissured and bluish grey mottled brown					
13/07/22	6.30	22.80				23.00 ... becoming multicolored	23.00 23.00-23.45	D52	N38	5, 5 / 8, 8, 10, 12	
13/07/22	6.30	23.50			(5.90)	24.00 - 24.45 ... becoming bluish grey with brown staining	24.00-24.45 24.45-24.55	UT53 D54	100 blows	100% Recovery	
13/07/22	6.30	24.80				25.00 ... becoming light blue mottled red and yellow	25.00 25.00-25.45	D55	N50	5, 7 / 9, 11, 15, 15	
13/07/22	6.30	25.50				26.00-26.45	26.00-26.45 26.00-26.50	UT56 B57	100 blows	22% Recovery	
13/07/22	26.40	25.00				26.50 - 26.95 ... becoming bluish grey mottled brown and very sandy	26.50-26.95 26.80-26.90	UT58 D59	150 blows	78% Recovery	
13/07/22	26.80	26.90	-18.21		26.80	Very dense, light brown mottled light grey, red and light blue very clayey fine to medium SAND. (LAMBETH GROUP: READING FORMATION: Upper Mottled Beds-Sand Channel)	28.00				
13/07/22	26.80	26.90	-19.41		(1.20)	28.00-28.45	28.00-28.45	D60	N50/135mm	8, 10 / 20, 30	
13/07/22	29.00	29.00			(1.50)	Very stiff, multicolored sandy CLAY. Sand is fine to medium. (LAMBETH GROUP: READING FORMATION: Lower Mottled Beds)	28.80 29.00-29.50	D61 B62			
13/07/22	29.00	21.00	-20.91		29.50	29.50	29.50-29.95	D63	N50/95mm	5, 20 / 39, 11	
15/07/22	29.00	18.00				Very dense, light grey clayey silty fine to medium SAND. (LAMBETH GROUP: UPNOR FORMATION)	29.50-29.95 29.50-30.00	B64			
15/07/22	30.90	20.00			(3.00)	30.50	30.50	D65			
15/07/22	30.90	20.00				31.00-31.45	31.00-31.45	D66	N50/115mm	4, 16 / 30, 20	
15/07/22	30.90	20.00				31.50	31.50	D67			
15/07/22	30.90	20.00				31.80 ... becoming grey	31.80	D68			
15/07/22	32.40	2.50	-23.91		32.50	32.50	32.50-32.95	D69	N50/233mm	6, 9 / 16, 16, 16, 2	
15/07/22	32.40	2.50				Very stiff, dark grey very sandy CLAY. Sand is fine to medium. (LAMBETH GROUP: UPNOR	32.50-32.95				

Issue: FINAL

Logger: AB

CHD: AN

APRV: OS

Log Print Date & Time: 30/09/2022 15:08