GEOTECHNICAL ENGINEERS
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Geo-environmental Assessment

Richborough Estates

Brascote Lane, Newbold Verdon.

11th May 2022
Ref: PJSG21-47-RT-02

Executive Summary

Environmental Risk Assessment Summary	
Human Health Risk Assessment	Based on the contamination testing carried out, the risk assessment has indicated that the site poses a negligible risk to Human receptors. The natural topsoil and subsoils tested are therefore considered suitable for retention / reuse on site where geotechnically suitable, subject to compliance with a Materials Management Plan (MMP).
Controlled Waters Risk Assessment	During the investigation, no evidence of contamination was identified below the site and no evidence of Made Ground was found; as such, no tangible risk has been identified. The contamination testing undertaken has identified marginally elevated levels of leachable copper in excess of the EQS value in samples of natural undisturbed sub-soil on site and are therefore not considered to present a significant risk. Taking the above into consideration, the risk to groundwater / surface water associated with the site is considered very low to negligible and no further risk assessment is considered necessary in that regard.
Ground Gas	Based on the gas monitoring undertaken to date, gas protection measures are not required.
Vapour Risk	No vapours have been identified on site; no mitigation measures are therefore required.
Ecological Risk	Potential Impacts from contamination sources is considered negligible. However, the impact to ecological receptors from proposed construction activities should always be considered.
Geotechnical Assessment Summary	
Ground Conditions Summary	• Topsoil - encountered across the site proven to depths of between 0.2m and 0.4m. • Subsoils - encountered in 5 No. exploratory hole locations recovered as firm sandy gravelly clays proven to depths of 1.0m to 1.5m. • Alluvium - Encountered in 13 No. exploratory hole locations mostly in the northern site area recovered as occasionally soft to firm orangish brown mottled grey gravelly clay proven to depths of between 1.0m and 1.7m. • Glaciofluvial Deposits (Granular) - Encountered in the majority of the locations across the site recovered as occasionally loose but predominantly medium dense orange-brown sandy gravel and gravelly sands proven up to 4.0m deep. The deposits were occasionally encountered overlying cohesive glaciofluvial deposits with a second layer of granular deposits encountered below the clay at some locations. • Glaciofluvial Deposits (cohesive) - Encountered in 14 No. locations across the site recovered as firm reddish brown / brown very gravelly very sandy clays proven to maximum depths of between 1.0m and 4.0m. • Oadby Member Deposits - Encountered in 16 No. locations from minimum depths of between 1.0m and 4.0m proven to a maximum depth of 4.1m. The deposits were recovered as firm to stiff and stiff to very stiff dark grey / mottled brown very gravelly clay with gravel of mudstone, chalk and quartz. • Gunthorpe Member Bedrock – Not encountered.
Foundations	Traditional strip / trenchfill foundations are generally considered appropriate for most of the development proposals for the site, bearing within either the medium dense granular Glaciofluvial Deposits or firm to stiff cohesive Oadby Member and Glaciofluvial Deposits found to underly the majority of the site, subject to consideration of the loads imposed.

	The granular deposits in the vicinity of WS09, WS10, WS12, WS15 and WS16 are noted to be loose (SPT N value <10) at depths between 1m and 4m. Additionally, low SPT N Values (<8 blows) were recorded in the cohesive deposits in WS14, WS16 and WS18 indicative of very soft to soft low strength deposits. Instability / running sands has also been noted in a number of trial pits advanced within the granular Glaciofluvial Deposits. An allowance for deepening foundations / alternative foundations in these areas of the site should be made at this stage. Piled foundations are recommended for any residential plots where foundations depths would exceed 2.5m due to tree influence and in areas where ground levels are raised significantly. Piled foundations may also have to be considered where loose granular deposits / soft cohesive deposits and instability has been encountered at potential founding depth. Ground improvement techniques (such as vibro stone column ground improvement) with reinforced concrete strip foundations may provide a suitable alternative foundation solution to piles for plots where poor bearing strata (areas where low SPT N values have been encountered) and / or where significant trench collapse has been encountered.
Floor Slabs	At this stage it is anticipated that both ground bearing and suspended floor slabs may be suitable for the site, subject to developer preference and further assessment of proposed ground levels / tree influence.
Drainage	Infiltration testing undertaken within both the cohesive and granular geology encountered across the site, alongside the high groundwater table noted, would suggest that soakaway drainage is not considered feasible; an alternative drainage solution is therefore likely to be required.
Concrete	Design Sulphate Class DS-1 and Aggressive Chemical Environment for Concrete Class AC-1 should be used for design purposes.
Roads & Hardstanding	In-situ testing has determined that a preliminary CBR design value of >4% should be achieved for road construction design purposes where natural soils are present beneath the site. Further in-situ testing is however recommended at formation level once development proposals have been established

Recommendations

It is recommended that further localised investigation is carried out to delineate the extent of very loose / loose granular deposits and soft cohesive deposits encountered on site. An allowance for deepening foundations / alternative foundations in these areas of the site should be made at this stage. The drilling of deeper boreholes may be required to aid the design of piled foundations.

Once the site development layout has been established it is recommended that further targeted plasticity index testing is undertaken within samples recovered from the various cohesive deposits encountered below the site to confirm preliminary dig depths and foundation requirements for coinciding plots.

No assessment of the localised areas of fly tipped materials in the northwest of the site has been undertaken within this investigation. Therefore, visual vigilance in this area of the site is recommended during development for the presence of ACMs and / or other sources of potential contamination. Further chemical testing / removal off-site is likely to be required during the construction phase of the development.

Re-use of materials on-site should be controlled by a CL:AIRE approved Materials Management Plan (MMP).

Document Issue Record

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Status	Revision	Date of Issue	Author	Checked	Approved
Draft	-	29/03/2022	Nicholas Brown MSc AMIEnvSc	Vinny Hallifield BSc (Hons)	Martin Parker BSc (Hons) ICIOB
					
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Drawings

PJSG21-47-DR-001-Rev A–Site Location Plan
PJSG21-47-DR-003 – Exploratory Hole Location Plan
Illustrative layout plan (n1741_006A Rev A) dated 16.02.22

1. Introduction

1.1 Instruction

In January 2022, PJS Geotechnical Engineers Limited (PJSG) were instructed by Richborough Estates (the Client) to undertake a Geo-environmental Assessment at land off Brascote Lane, Newbold Verdon, Leicestershire (the site).

A site location plan (PJSG21-47-DR-001 Rev A) is included within the Drawings Section of this report.

1.2 Proposed Development

Redevelopment proposals for the site are understood to comprise a residential development with gardens and areas of soft landscaping used as Public Open Space (POS).

An illustrative layout plan (n1741_006A Rev A) has been provided by the Client and is presented within the Drawings Section of this report.

1.3 Objectives

The objectives of this assessment are detailed below:

Table 1-1 Objectives

Objectives
Confirm the suitability of the site for the proposed residential development, taking into account the ground conditions and contaminative status of the site.
Undertake a generic quantitative risk assessment to confirm the findings of the Initial Conceptual Site Model (ICSM).
Determine the ground gas regime beneath the site.
Revision of the ICSM.
Identify suitable foundation depths and sub-structure design solutions.
Confirm preliminary CBR values for near surface soils.
Confirm the suitability of the site for infiltration characteristics for drainage design.
Identify any potential geo-environmental issues that may cause abnormal development costs.
Make recommendations for any further investigation / remediation deemed necessary.

1.4 Previous Reports

The table below provides details of the relevant information sources which have been made available to PJSG for review in preparation of this report:

Table 1-2 Information Sources

Report Reference	Produced By	Report Name	Date	Comments
PJSG21-47-RT-01	PJSG	Desk Study Report	29th October 2021	The report recommended that intrusive investigation of the site should be undertaken. The main objective of the investigation would be to confirm the absence and / or presence of significant contamination and to determine geotechnical characteristics of the ground for foundation design and drainage.

2. The Site

This section provides a brief overview of the site in its present condition, including the site's existing layout, general location and near surrounding land use.

A brief summary of the site's description is presented below in Table 2-1. The full details of the site are presented in the Phase 1 Desk Study Report referenced in Table 1-2. A site location plan is presented in the drawings section of this report.

Table 2-1 Summary of Site Information

Specifics	Details
Location	Land adjacent of Brascote Lane, Newbold Verdon, Leicestershire, LE9 9LE.
National Grid Reference	444690E, 303055N
Approximate Site Area	14.34 hectares (ha).
Topography	The highest point of the site was observed on the east and west of the site dipping slightly to the lowest area in the centre. Localised undulations were noted on site coinciding with areas of pooling rainwater.
Current Land Use	The site is used as agricultural farm land. Evidence of a recent crop was observed due to the presence of crop stubble.
Existing Buildings / Retaining Structures	No buildings or structures were observed on site.
Services / Utilities	No services were observed on site. Overhead telecommunications lines were observed on Brascote Lane running parallel to the boundary.
Identified Potential Contamination Sources from Reconnaissance	• ACMs / other potential contaminants in fly-tipped materials located on site. • Potential leaks and spills of fuels / oils from plant / vehicles using adjacent road located west and south of the site. • Potential leaks and spills of fuels / oils from plant / vehicles using the site.
Vegetation / Invasive Plants	No assessment has been made for the presence of pernicious plant species e.g. Japanese Knotweed, Giant Hogweed, within the remit of this investigation. It is recommended a specialist arboriculture survey be undertaken prior to design works commencing.
Site Boundaries	Boundaries across the site consisted of mature hedgerows and trees. The southern boundary is located partially adjacent to a residential property and the boundary is formed of a wooden post and rail fence.
Surrounding Land Use	Surrounding land uses predominantly comprise an agricultural land use, with residential development located to the north. Allotments are located adjacent northwest and southwest. A public house is located adjacent west of the site.
Surface Water Features (Site & Vicinity)	A small stream was observed flowing west to east along the northern boundary. The channel is shallow and runs behind mature hedgerows and trees.

3. Site Setting

3.1 Summary of Desk Study Information

The desk study report (referenced in Table 1-2) has been reviewed to provide a summary of the site's setting as detailed in Table 3-1 below.

Table 3-1 Summary of Site Information

Historical Summary	
Site	The site has remained undeveloped agricultural land since the start of historical records and has remained as such up to the present day. A pond was historically located in the central-northern area but was shown to have been infilled in the early 1970s. No further potential contaminative land uses or features have been noted on site thereafter.
Surrounding area	A number of potential contaminative land uses have been identified in the vicinity which have comprised: • Several farms historically / currently located within 500m of the site, the closest located adjacent south and east. • Allotment gardens located adjacent northwest and southwest of the site. • Localised areas of Made Ground associated with a public house and former windmill located adjacent west. • A large pond is present to the south and south west. • Sewage treatment works ~250m west of site.
Geological Summary	
Made Ground	None recorded.
Superficial Geology	• Glaciofluvial Deposits (sand and gravel) – Mapped under the west and south-east portions of the site. • Alluvium (clays, silts, sands and gravel) – Mapped under the central-northern boundary in the approximate area of the stream. • Oadby Member (Diamicton) – Mapped in the central and north-eastern portions of the site and localised within the very southern extremities of the site.
Bedrock Geology	Gunthorpe Member - Mudstone.
Faults	None recorded.
Hydrogeology	
Aquifers	• Secondary A (Glaciofluvial Deposits and Alluvium) • Secondary Undifferentiated (Oadby Member) • Secondary B (Gunthorpe Member)
Source Protection Zones (SPZ)	No records within 500m.
Potable Abstractions	One abstraction located ~1.15km south-west for use at a Tarmac Trading Limited.
Groundwater Flow	Likely to be locally towards the north in the direction of the surface water stream located along the northern boundary.

Hydrology	
Surface Water Features	On-site: The closest record to site relates to an inland river (stream) located along the northern boundary of the site. Off-site: Numerous ponds located to the south of the site and an unspecified surface water feature (narrower then 5m) located ~15m SE.
Surface water flow	Based on site reconnaissance observations, surface water within the stream adjacent north flows west to east.
Mining & Ground Constraints	
Mining	Based on the available information, it is considered that the site is at negligible risk from coal mining activities.
Potential for Natural Ground Subsidence	• Compressible deposits – Moderate risk relates to Alluvium mapped on the northern boundary. • Low to negligible remaining ground stability hazards have been identified for the remainder of the site.
Radon	No radon protection measures are required.
UXO	Low risk - no further assessment is considered necessary.
Environmental Records	
Regulatory Records	*On-Site:* • No records. *Off-Site* • Former windmill located adjacent west. • Unspecified tanks (~235mW) • Gravel workings (305mW) • Closest to site: ~220m W listed as a sewage farm. • 2 No. records for electricity sub stations (ESS) located ~228m NE. • 3 No. pollution incidents occurring within the last 20 years within 250m of site.
Landfills / waste sites	No landfill records / waste sites have been identified within 1km of the site boundary.

4. Preliminary Contamination Risk Assessment

In accordance with CLR11, a preliminary risk assessment (PRA) was completed for the site as detailed in the Phase 1 Desk Study report referenced in Table 1-2. The PRA is the first tier of risk assessment that develops the initial conceptual site model (ICSM) to establish whether there are any potentially unacceptable risks associated with the site.

The ICSM was developed based on the commonly adopted source-pathway-receptor (S-P-R) model as detailed within ICRM 2020. This was carried out in the context of the proposed development and potential contaminant linkages which may represent a risk to identified receptors.

The ICSM contained within the Phase 1 Report has been reproduced and refined where necessary for the purpose of this assessment and is summarised in Table 4-3. A summary of the potential contamination sources identified is given in the table below.

4.1 Potential Sources of Contamination

Sources (S); These are potential or known sources of contamination that may relate to a former land use or present site feature or process (e.g. fuel storage tanks). Sources relevant to the site identified within the ICSM are listed below:

The Phase 1 Desk Study report identified the following potential on-site sources (S) of contamination as detailed in Table 4-1 below.

Table 4-1 Potential On-Site Sources of Contamination

Source Number (S)	Potential Sources	Inorganic Contaminants	Organic Contaminants
S1	Potential for localised Made Ground located in in-filled pond	Heavy Metals comprising Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, Sulphate, sulphide, sulphur, Free Cyanide and elevated pH	Poly-Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH), BTEX and Volatile Organic Compounds (VOCs) in groundwater.
S2	Potential for localised spills of fuels / oils from farm machinery using the land.	-	As above.
S3	Agricultural land - existing agricultural Topsoil.	Naturally occurring metals and pH and asbestos.	Pesticides
S4	Localised areas of fly tipped materials in NW of the site.	Potential for asbestos containing materials (ACMs) and fibres. Potential for other common contaminants to be present.	Potential for TPH should oils and fuels be identified.

Source Number (S)	Potential Sources	Inorganic Contaminants	Organic Contaminants
S5	Natural subsoils	Potential for elevated sulphates and pyrites.	-

The Phase 1 Desk Study report identified the following potential off-site sources (S) of contamination as detailed in Table 4-2 below.

Table 4-2 Potential Off-Site Sources of Contamination

Source Number (S)	Potential Sources	Inorganic Contaminants	Organic Contaminants
S6	Potential for localised boundary impact associated with leaks and spills of fuels / oils / chemicals from plant / vehicles using adjacent Brascote Lane located west and south of the site.	Heavy Metals comprising Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, Sulphate, sulphide, sulphur, Free Cyanide and elevated pH	Poly-Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH), BTEX and Volatile Organic Compounds (VOCs) in groundwater.
S7	Spills and leaks of fuels / oils / chemicals occurring from adjacent / nearby farms.	Dissolved metals in groundwater comprising Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, Sulphate, sulphide, sulphur, Free Cyanide and elevated pH	TPH & BTEX, VOCs in groundwater.
S8	Localised Made Ground adjacent to west boundary associated with former windmill.	As S6	As above
S9	Spills and leaks of fuels / oils occurring from 2 No. historical Pollution incidents - NW boundary.	n/a	As S6.
S10	Sewage works with associated tanks ~250m west	As S6	As S6
S11	Allotment gardens located adjacent NW & SW.	Potential for asbestos containing materials (ACMs) and fibres.	Soils may contain pesticides & naturally occurring metals. Potential for localised TPH contamination to occur to site boundaries.

The potential exists for dissolved metals and organic contaminants to be present within soils localised to site boundaries adjacent to Brascote Lane located to the west and south of the site. Potential for contaminants within any groundwater below the site (albeit unlikely) associated with the current / historical industrial land uses / pollution incidents located near to the site. However, it is expected that any associated contaminants would be fairly localised to the boundary and would be unlikely to impact the majority of the site.

4.2 Potential Sources of Ground Gas & Vapours

It is considered that the following potential sources of ground gas / vapours may be present on site and in the surrounding area as detailed in Table 4-3.

Table 4-3 Potential Sources of Ground Gas / Vapours

Source Number (S)	Location	Details	Source Generation Potential (CIRIA C665)
S1 & S8.	**On-site** Made Ground associated with infilled pond on site. **Off-site** Localised Made Ground associated with demolition of adjacent windmill.	Made Ground has the potential to generate elevated ground gas at the site particularly if any putrescible material is present.	Generally, very low but would be dependent on nature of any materials identified. Source is likely to be localised.
S2, S4, S6 to S11	**On-site & Off-site:** Spills / leaks of fuels / oils from the various sources identified in Tables 4-21 and 4-2.	The potential exists for localised VOCs to be present within any soils and / or groundwater below the site associated with leaks or spills of fuels / oils from the various sources identified.	Generally low and localised.

4.3 Potential Contaminant Linkages

Based on the information above, the following potential contaminant linkages are considered applicable to the site. The risk classification has been qualitatively derived in accordance with Land Contamination Risk Management (LCRM) and the updated online guidance published in October 2020.

There is the potential for localised contamination at the site resulting from past / present on-site & off-site land uses which may have potentially impacted the site. Plausible contaminant linkages have been identified and therefore a risk assessment is required. Site investigation was recommended to establish the current levels of contamination and risk.

The risk classification has been qualitatively derived in accordance with CIRIA C552 (2001). The methodology is presented in Appendix A. Based on the information above, the ICSM and following potential contaminant linkages considered applicable to the site are detailed in Table 4-5 overleaf.

Table 4-4 ICSM & Potential Contaminant Linkages

Contaminant Linkage	Source (S)	Pathway (P)	Receptor (R)	Probability	Consequence	Current Risk
Human Health						
1	**S1:** Potential for localised Made Ground. **S2:** Spills and leaks of fuels / oils occurring on site from farm vehicles / plant utilising the site. **S3:** Agricultural land - existing agricultural Topsoil. **S4:** Localised areas of fly tipped materials in NW of the site. **S6 to S11:** Various identified off-site sources with potential to impact the site.	**P1**: Ingestion of contaminated particulates. **P2:** Dermal contact. **P3:** Inhalation of contaminated dust / particles.	**R1**: Site end users.	Unlikely	Medium	Low
2			**R2**: Construction workers / maintenance workers.	Low	Medium	Low / Moderate
3	**S1 to S4:** as above.	**P3:** Inhalation of contaminated dust / particles.	**R3:** Members of the public and residential properties adjacent to the site during construction	Low	Mild	Low
4	**S1 & S8:** Ground gas arising from potential areas of localised Made Ground. **S1, S2, S4, S6 to S11** -Vapours arising from contaminated soils and / or groundwater below the site associated with leaks / spills of fuels from surrounding land uses.	**P3:** Inhalation of vapours in outdoor air. **P8:** Migration of asphyxiant and explosive/ harmful gasses into confined spaces.	**R1**: Site end users.	Unlikely	Severe	Low / moderate
			R2: Construction workers / maintenance workers in trenches.	Unlikely	Severe	Low / moderate

Contaminant Linkage	Source (S)	Pathway (P)	Receptor (R)	Probability	Consequence	Current Risk
Controlled Waters						
5	**S1** to **S4** detailed above**.** **S6 to S11:** Spills and leaks of fuels / oils occurring adjacent to site boundary impacting the site.	**P4:** Leaching of contamination into groundwater.	**R4**: Secondary (A) & B Aquifers & Secondary undifferentiated Aquifer.	Unlikely	Medium	Low
6		**P5:** Surface water run-off and / or migration of contaminated groundwater.	**R5:** Inland rivers located on site and in the vicinity.	Unlikely	Medium	Low
Property and Infrastructure						
7	**S1** to **S3** detailed above**.** **S5:** Natural subsoils.	**P4:** Leaching of sulphates, corrosive contaminants and / or acidic or alkaline leachate. **P6:** Direct contact with aggressive ground.	**R6:** Buried concrete & structures on and off-site. **R7:** Buried services / water pipes.	Low	Mild	Low
Ecology						
8	**S1 to S3** detailed above**.**	**P7**: Uptake of available phytotoxic contaminants via direct contact with contaminants.	**R8:** Ecological receptors Flora & Fauna on and off-site.	Low	Mild	Low

5. Site Investigation

5.1 Summary of Site Works

The intrusive ground investigation works were undertaken on 21st to 23rd February 2022 by PJSG to establish the ground conditions underlying the site.

The locations of the exploratory holes were positioned taking into consideration the proposed development. However, this involved working within the constraints of the site, which included access restrictions due to numerous archaeological trenches that were open across the site at the time of the PJSG investigation. Several intrusive points were therefore repositioned.

The ground investigation works were designed in general accordance with BS10175:2011+A2:2017 'Investigation of Potentially Contaminated Sites'. Further details of the ground investigation work undertaken, including the rational for the location of the exploratory holes are detailed below in Table 5-1.

An Exploratory Hole Location Plan (PJSG21-47-DR-002) is provided within the Drawings Section of this report.

Table 5-1 Summary of Site Investigation Works

Method / Activity	No.	Hole Reference	Depth Range (m)	Testing	Gas & Groundwater Ancillaries	Rationale
Investigation Method						
Window Sample Borehole (WS)	18	WS01 to WS18	3.00m – 4.00m	*SPT's	WS01, WS02, WS06, WS08, WS11, WS12, WS13, WS18	To determine ground conditions.
Machine Excavated Trial Pits (TP)	24	TP01 to TP05, TP07 to TP23	1.20m – 3.20m	Hand Shear Vanes (HSVs) in selected TPs.	-	To determine ground conditions.
Soakaway Trial Pits (SA)	4	SA01 to SA04	1.00m-1.20m	Infiltration testing in accordance with BRE365	-	To establish an infiltration rate.
Dynamic Cone Penetration (DCP)	15	DCP01 to DCP15	Various	-	-	To determine CBR %.
Gas & Groundwater Monitoring						
Gas data meter, flow meter and groundwater dip meter	6 visits	WS01, WS02, WS06, WS08, WS11, WS12, WS13, WS18.	Various.	-	See above	To determine the ground gas regime in accordance with CIRIA C665.

*SPTs undertaken in accordance with the guidance set out within BS EN 22476-3 2005 +A1:2011;

It should be noted that TP06 could not be excavated due to the location being in the middle of an archaeological pit and moving the location was not possible due to other archaeological pits in the near vicinity.

No assessment of the localised areas of fly tipped materials in northwest of the site has been undertaken within this investigation.

The exploratory logs are presented within Appendix B and the results of the SPT / HSVs tests are shown on the individual exploratory hole logs. The SPT hammer calibration certificate for the WS drilling rigs are also included in Appendix C.

5.2 Laboratory Testing and Sampling

Representative soil samples of the various strata types present were collected during the site investigation works by a suitably qualified engineer. Samples were recovered using a stainless-steel trowel and disposable gloves.

Samples were stored in cool boxes prior to being transported to an MCERTS accredited laboratory. A selection of these samples was tested for the presence of contaminants and for classification purposes. Chemical testing was undertaken by i2 Analytical Ltd and geotechnical testing was undertaken by Exploration & Testing Associates Ltd.

A summary of the laboratory testing carried out is presented below.

Table 5-2 Summary of Laboratory Testing

Quantity	Analysis
Chemical Testing - Soils	
10	PJS Contamination Suite for Soils comprising: Moisture content, pH, Organic matter, Speciated USEPA 16 PAHs, Metals: As, Cd, Cr III & VI, Cu, Pb, Hg, Ni, Se, Zn, Water soluble sulphate (SO4).
7	Asbestos Identification (ID).
6	BRE Suite B
3	PJS Contamination Suite for Leachates comprising: Metals: As, Cd, Cr III & VI, Cu, Pb, Hg, Ni, Se, Zn.
2	Pesticides Screen
Geotechnical Testing	
7	Moisture Content
7	Liquid and Plastic Limits
5	Particle Size Distribution

Geotechnical laboratory testing was generally carried out in accordance with the relevant part of BS1377: 1990, *Methods of Test for Soils for Civil Engineering Purposes*, or, where superseded, by the relevant part of BS EN ISO 17892:2014+ *Geotechnical investigation and testing – Laboratory Testing of Soil*.

The chemical laboratory results are included within Appendix D and the geotechnical testing results are included as Appendix E of this report.

6. Ground Conditions

6.1 Summary of Ground Conditions

The geology encountered during the intrusive investigation was generally consistent with that anticipated from the desk study. A summary of the general strata encountered across the site is provided in the Table 6-1 below, with more detailed description given in the following sections and on the exploratory hole logs presented within Appendix B.

Table 6-1 Summary of Ground Conditions

Stratum Description	Depth to base of Strata (mbgl)	Strata Thickness (Range, m)
Topsoil	0.2 – 0.4	0.2 – 0.4
Subsoil	1.0 – 1.5	0.7 – 1.3
Alluvium	*1.0 – 1.7	0.6 – 1.4
Oadby Member	Not proven	Not proven
Glaciofluvial Deposits	1.2 – 4.0 (Where proven)	0.2 – 3.7 (Full thickness not proven at every location)
Gunthorpe Member	Not encountered.	-

*Not proven at every location.

6.2 Summary of Geological Descriptions

The geology encountered below the site is described below.

Table 6-2 Geological Descriptions

Topsoil	Topsoil	Crop stubble over brown clayey gravelly Topsoil encountered in all of the exploratory hole locations across the site and proven to depths ranging between 0.2m and 0.4m.
Superficial Deposits	Subsoils	Encountered in 5 No. exploratory hole locations at WS06, WS08, WS11, TP18 and TP20 recovered as firm orange brown occasionally mottled grey sandy gravelly clay, brown slightly sandy gravelly clay, light brown gravelly clays and generally with pockets of sand. These deposits are likely highly weathered near surface alluvial deposits, Oadby Member Deposits or cohesive Glaciofluvial Deposits as described below, proven to depths of 1.0m to 1.5m.
	Alluvium	Encountered in 13 No. exploratory hole locations at WS01, WS02, WS04, WS05, WS12, WS16, WS18, TP02, TP04, TP15, SA02 and SA04 mostly in the northern site area. Alluvium was recovered as occasionally soft to firm orangish brown mottled grey gravelly clay proven to depths of between 1.0m and 1.7m. It should be noted that where there is any uncertainty, the alluvial deposits have been categorised as probable / possible alluvium because they fit within the typical description of alluvial deposits and the general area of the site where alluvium is mapped.
	Glaciofluvial Deposits (Granular)	Encountered in the majority of the locations across the site below the topsoil, subsoils or alluvium recovered as occasionally loose but predominantly medium dense orange-brown sandy gravels, gravelly sands, silty sands to a maximum depth of 4.0m. At exploratory hole locations WS13, WS16, WS17, TP01, TP03, TP11, TP12 and TP17, the granular deposits were encountered overlying cohesive glaciofluvial deposits (discussed below), 0.5m to 2.3m deep (0.2m to 2.1m thick). At exploratory

		hole locations WS13, WS16 and TP01 a second layer of granular deposits were encountered below the clay from depths of between 2.0m (TP01) and 3.5m (WS13).
	Glaciofluvial Deposits (Cohesive)	Encountered in 14 No. locations across the site directly below the topsoil, alluvium or granular recovered as firm reddish brown / brown very gravelly very sandy clays proven to maximum depths of between 1.0m and 4.0m. At exploratory hole locations WS13, WS16, WS17, TP01, TP03, TP11, TP12 and TP17, the cohesive deposits were encountered underlying granular glaciofluvial deposits (discussed above).
	Oadby Member	Encountered in 16 No. locations below the topsoil, subsoils, alluvium or glaciofluvial deposits from minimum depths of between 1.0m and 4.0m, proven to a maximum depth of 4.1m. The deposits were recovered as firm to stiff and stiff to very stiff dark grey / mottled brown very gravelly clay with gravel of mudstone, chalk and quartz.
Bedrock Geology	Gunthorpe Member	Not encountered.

6.3 Summary of SPT Testing within Boreholes.

A summary of the uncorrected SPT N Values recorded in the boreholes advanced across the site in relation to the geology encountered is summarised below in Table 6-3.

Table 6-3 SPT Summary in relation to Ground Conditions

Borehole Ref:	SPT 'N' Value with Depth (m).			
	1m	2m	3m	4m
WS01	10 (CGFD)	26 (GGFD)	50 (GGFD)	-
WS02	*11 (OM)	18 (OM)	23 (OM)	27 (OM)
WS03	*21 (GGFD)	14 (GGFD)	8 (GGFD)	15 (GGFD)
WS04	*9 (ALL)	21 (OM)	23 (OM)	22 (OM)
WS05	*14 (OM)	25 (OM)	28 (OM)	20 (OM)
WS06	*14 (OM)	26 (OM)	50 (OM)	-
WS07	*8 (GGFD)	14 (GGFD)	20 (GGFD)	14 (GGFD)
WS08	**18	14 (GGFD)	8 (OM)	21 (OM)
WS09	22 (GGFD)	5 (GGFD)	10 (GGFD)	13 (OM)
WS10	18 (GGFD)	20 (GGFD)	18 (GGFD)	8 (GGFD)
WS11	14 (CGFD)	28 (OM)	14 (OM)	26 (OM)
WS12	7 (GGFD)	9 (GGFD)	4 (GGFD)	15 (GGFD)
WS13	10 (CGFD)	11 (CGFD)	14 (CGFD)	11 (GGFD)
WS14	**6	**7	**8	**11
WS15	9 (GGFD)	7 (GGFD)	6 (GGFD)	13 (GGFD)
WS16	6 (ALL)	10 (CGFD)	9 (GGFD)	8 (GGFD)
WS17	9 (GGFD)	21 (CGFD)	8 (CGFD)	11 (CGFD)
WS18	9 (CGFD)	10 (CGFD)	2 (CGFD)	6 (CGFD)
CGFD – Cohesive Glaciofluvial Deposits - GGFD – Granular Glaciofluvial Deposits				
ALL – Alluvium - OM – Oadby Member Deposits (Cohesive)				
Loose Granular Deposits **Soft cohesive deposits.**				

*SPT undertaken at 1.2m. **Subsoils / unknown geology.

As noted above, some of the granular Glaciofluvial deposits encountered in exploratory hole locations WS07, WS09 in the central northern site area and at WS12, WS15 and WS17 located in the central-eastern area of the site, were noted to be loose (SPT N value <10) at potential founding depths (1.2m deep). The remainder of the granular deposits encountered elsewhere comprised medium dense deposits.

Additionally, some marginally low SPT N Values (<8 blows) were recorded in the cohesive alluvial deposits at WS16 at 1.0m and within cohesive deposits (unconfirmed geology) encountered in WS14 between 1.0m and 3.0m, which would generally be indicative of soft low strength deposits (approximate shear strength of 5 x N value).

The cohesive Oadby Member deposits and cohesive Glacifluvial Deposits predominantly comprised firm to stiff cohesive material. However, some soft Glacifluvial clays were encountered in WS18 from a depth of 3.0mbg. The alluvium encountered in WS16 at 1.0m was also noted to be soft (N<8).

The implication of the low SPT N Values encountered is discussed further in Section 7.0. The recorded SPT N values are detailed on the exploratory hole logs presented within Appendix B.

6.4 Summary of Field Observations

The following field observations were made during the intrusive investigation works.

Table 6-4 Field Observations

	Location Encountered	Geological Description	Observation	Depth Range (m)
Groundwater	TP03, TP10, TP20	Glaciofluvial Deposits	Slow groundwater ingress	1.2 - 2.3
	TP14, TP15, TP16, TP17, TP22	Glaciofluvial Deposits	Groundwater ingress	1.0 – 3.0
	TP18	Oadby Member	Groundwater ingress when excavation left open	1.7
	WS03, WS07, WS09, WS10, WS11, WS16	Glaciofluvial Deposits	Groundwater encountered	1.0 -3.0
	WS04, WS05	Alluvium	No groundwater encountered during drilling. Groundwater rose to 0.30m bgl after completion	0.3 -0.5
	WS12	Alluvium	Groundwater encountered / rise noted.	0.5-1.0
	WS14	Oadby Member / subsoils	Groundwater encountered / rise noted.	2.1 - 0.6
Instability / Trench Collapse	TP14	Glaciofluvial Deposits	Excavation unstable below 1.0m in granular Glaciofluvial Deposits.	1.0-1.2
	TP15	Glaciofluvial Deposits	Side wall collapse	2.0
	TP18	Oadby Member	Unstable	1.5
	TP19, TP21, WS11	Glaciofluvial Deposits	Unstable	1.2-2.0
Running Sands	TP10, TP16, TP20	Glaciofluvial Deposits	Running sands noted	1.3 -2.0
Contamination	-	-	None observed	-

6.5 Dynamic Cone Penetration Testing

In-situ Dynamic Cone Penetrometer (DCP) testing was undertaken at 15 locations (DCP01 to DCP15) across the site, as shown on the Exploratory Hole Location Plan.

The Transport Research Laboratory (TRL) DCP uses an 8kg hammer dropping through a height of 575mm and a 60° cone having a maximum diameter of 20mm. The penetration and number of blows are recorded up to a maximum depth of 1.00m BGL. The penetration rate is recorded as the cone is driven into the subgrade and is used to calculate the strength of the material (CBR value) through which the cone is passing. A change in penetration rate indicates a change in strength between materials, thus allowing layers to be identified and the thickness and strength of each to be determined.

Exceptionally high or low CBR results which deviate from the expected best fit line are most likely due to the driving of coarse gravel or cobble sized particles or encountering localised very loose or soft unconsolidated strata. It should be noted that TRL DCP testing is not a test defined by British Standards. It is however, widely used and accepted in the industry for determination of equivalent CBR values.

The below table illustrates CBR value ranges obtained at depths considered typical of sub-formation levels (0.40 to 0.60m bgl), and generally correspond with natural granular soils underlying the site area. A full copy of the DCP test results is presented within Appendix F.

Table 6-5 CBR Values for Depths at Anticipated Formation Level

Ref.	CBR (%) Range (~0.4m to 0.6m bgl)		CBR (%) Mean
	Lowest CBR (%)	Highest CBR (%)	
DCP01	4.5	8.0	5.5
DCP03	4.1	9.6	5.8
DCP04	7.0	33.5	14.0
DCP05	7.7	26.5	14.7
DCP06	4.8	6.5	5.7
DCP07	13.4	29.6	19.2
DCP08	6.8	21.8	11.6
DCP09	4.5	5.5	5.1
DCP10	4.6	38.6	21.9
DCP11	5.7	21.8	13.6
DCP12	5.0	18.6	10.2
DCP13	4.5	7.5	6.0
DCP14	3.9	5.5	4.5
DCP15	6.5	16.1	10.7

6.6 Infiltration Testing.

Infiltration testing was carried out on 22nd February 2022 by PJS to give an indication of preliminary infiltration rates of the underlying soils. The testing was carried out under the general guidance of BRE Digest 365 'Soakaway Design' to enable surface water soakaway design.

A total of 4 No. soakage trial pits (SA01 to SA04) was excavated on the site so as to perform an infiltration test. The locations of these tests are shown on the PJS Exploratory Hole Location Plan. A copy of the infiltration calculations is included within Appendix G.

Excavations were advanced using a backhoe excavator ensuring vertical sides which were trimmed square as much as reasonably possible. Using a water bowser, all soakage trial pit locations were rapidly filled with water, ensuring the flow did not cause the collapse of the side walls. The water level and the time taken for the pits to drain were recorded.

The locations and depths of the infiltration tests were predetermined following consultation with the appointed Drainage Engineer at PJS Consulting Engineers. The locations of the infiltration test pits are shown on the PJS Exploratory Hole Location Plan located in the drawings section.

The tests were generally carried out in accordance with the methodology set out in BRE 365; however, due to time constraints, it was not possible to achieve 3 No. fills of water at each location in accordance with the relevant guidance.

In order to calculate accurate infiltration rates in accordance with BRE 365, the time taken for the soakaway pit to drain between 25% and 75% of the effective water depth is required.

The results are summarised below in Table 6-6.

Table 6-6 Infiltration Testing Results Summary

Test Location	Strata at Base	Soil Infiltration rate (m/s)	Water discharged from Full to Half Volume within 24 Hours
SA01	Very gravelly sand.	2.03×10^{-6}	No
SA02	Sandy gravelly clay.	$*2.32 \times 10^{-6}$	No
SA03	Slightly clayey very gravelly sand.	Not determined	No
SA04	Slightly gravelly clay.	Not determined	No

Data extrapolated.

As noted above, it was not possible to calculate an infiltration rate at all of the test locations, as the water did not discharge at any discernible rate. At SA01 the time taken for the soakaway pit to drain between 25% and 75% of the effective water depth was achieved on the first test and an infiltration rate was therefore calculated.

At SA02, the water discharged below 25% of the effective depth. However, due to slow infiltration the water did not drain beyond 75% of the effective depth and therefore an accurate infiltration rate could not be calculated. As the test had nearly discharged to 75% of the effective depth, the data was extrapolated so that a preliminary infiltration rate could be calculated as detailed above. At SA03 and SA04, the water did no discharge below 25% of the effective depth in any of the test locations and therefore an infiltration rate was not calculated.

At SA01 and SA02 (extrapolated), infiltration rates of $2.03x10^{-6}$ and $*2.32x10^{-6}$ were calculated for the underlying gravelly sand and sandy gravelly clay deposits respectively. This preliminary infiltration rate would suggest that the deposits in the vicinity of SA01 and SA02 generally displayed potentially good drainage characteristics of medium permeability. However, the tests taken at SA03 and SA04 within similar strata identified much slower infiltration rates which indicates that variable infiltration rates are likely to be achieved elsewhere across the site.

Groundwater monitoring (Appendix H) has also indicated that average groundwater levels across the site are ~1.5mbgl (based on 4 groundwater monitoring visits to date). Groundwater levels are also likely to fluctuate during the early autumn / winter months and after prolonged periods of rainfall and therefore have the potential to rise further. The Code of Practice for Surface Water Management (BS8582:2013) requires that the base of the soakaway should be at least 1.0m above the existing groundwater level and therefore, it is considered unlikely that soakaways will be feasible due to the high groundwater table.

The data would also suggest that the soakage pits would not have discharged from full to half-volume within 24h in readiness for subsequent storm inflow in accordance with BRE365 guidance.

Based on the infiltration testing undertaken, the high groundwater table and the variable nature of the ground conditions encountered across the site (variable cohesive and granular deposits) soakaways are not considered to be feasible drainage solution. The advice of a drainage Engineer should however be sought to confirm this preliminary assessment prior to construction.

6.7 Gas & Groundwater Monitoring

Gas Monitoring Summary

To characterise the ground gas regime for the site, gas and groundwater monitoring has been carried out on 6 No. monitoring visits to date between 2nd March and 10th May 2022 at atmospheric pressures of between 996mb to 1016mb.

The concentration (initial and steady state) of methane (CH_4), carbon dioxide (CO_2), oxygen (O_2) by percentage volume and gas flow rates within each borehole were recorded. Weather conditions and atmospheric pressures before, during and after monitoring were also recorded. As some of the boreholes had flooded response zones (as detailed in Table 6-8), groundwater was bailed from these boreholes, then the borehole was left to stabilise prior to gas readings being taken.

A summary of the ground gas monitoring results obtained to date are displayed in the table below.

Table 6-7 Ground Gas Monitoring Summary

Ground Gas Monitoring Summary	Minimum	Maximum	Unit
Methane (CH4)	< 0.1	<0.1	% v/v
Carbon dioxide (CO2)	< 0.1	3.3	% v/v
Oxygen (O)	11.3	20.9	% v/v
Carbon monoxide (CO)	< 1	10	ppm
Hydrogen sulphide (H2S)	< 1	< 1	ppm
Atmospheric Pressure (mb)	996	1016	mb
Flow Rates (m/s)	< 0.1	1.8	l/hr

Groundwater Monitoring Summary

A summary of the groundwater monitoring results obtained to date are displayed in the table below.

Table 6-8 Groundwater Monitoring Summary

Borehole Ref.	Minimum Depth bgl. (m)	Maximum Depth bgl. (m)	Average Depth bgl. (m)	Response Zone Flooded (Y/N)	Number of Occasions Flooded
WS01	1.79	2.14	2.02	N	-
WS02	0.37	1.11	0.78	Y	4 of 6
WS06	0.44	1.28	0.78	Y	4 of 6
WS08	DRY	DRY	DRY	N	-
WS11	- 0.22	0.92	0.38	Y	6 of 6
WS12	0.97	1.62	1.28	N	-
WS13	1.01	1.97	1.33	N	-
WS18	1.07	1.87	1.36	N	-

The gas and groundwater monitoring results are contained within Appendix H.

7. Geotechnical Assessment

7.1 Introduction

Redevelopment proposals for the site are understood to comprise the construction of residential buildings with areas of hardstand and soft landscaping.

At this stage, a preliminary concept development layout plan has been provided and is presented in the Drawings section of this report.

7.2 Material Properties

To assist with foundation design, in-situ testing and geotechnical classification testing has been undertaken on a selection of the soil samples recovered from site. The geotechnical properties of the soil types encountered across the site as summarised in the sections below.

Geotechnical analysis of the samples was carried out by Exploration & Testing Associates Ltd. Results are contained within the Appendix E.

7.3 Particle Size Distribution (PSD) Analysis

5 No. PSD analyses were undertaken on samples recovered from site to aid in the classification of soils. Classification was undertaken in in accordance with BS1377: 1990 Part 2: Clause 9.2 and the results of the tests are summarised below:

Table 7-1 Summary of PSD Analysis

Sample Location	Depth (m)	Field Soil Description	Percentage Passing (%)			
			Very Coarse Soils (>63mm)	Gravel (63mm – 2mm)	Sand (2mm - 0.063mm)	Fines (<0.063mm)
TP01	2.20	Gravelly clayey SAND	0	53	27	20
TP07	1.00	Very gravelly SAND with pockets of sandy gravelly clay. (GFD)	0	14	43	43
TP08	0.80	Very gravelly SAND with pockets of clayey sand (GFD)	0	30	48	21
TP16	2.50	Very silty SAND (GFD)	0	1	81	19
TP18	2.70	Gravelly SAND with occasional clayey pockets. (GFD)	0	32	41	26

GFD – Glaciofluvial Deposits.

The results of the PSD tests generally indicate that the deposits predominantly comprise granular material mostly consisting of gravels and sands with a significant portion of fines within the sample, which generally confirms the field description.

7.4 Plasticity Index & Volume Change Potential

A total of 7 No. Plasticity Index (PI) tests were undertaken on soil samples in accordance with BS1377-2: 1990 Clause 3.2, to determine the Modified Volume Change Potential (VCP) in accordance with NHBC Standards (Chapter 4.2).

Results of the PI tests and the related VCP of the samples is summarised below.

Table 7-2 Summary of Plasticity Testing

Sample Location	Depth (m)	Strata	Plasticity Index (%)	Percentage Passing 425µm Sieve (%)	Modified Plasticity Index (%)	VCP
TP08	0.80	Very gravelly SAND with pockets of clayey sand (GFD)	9	97	8.73	Non-Plastic
TP13	0.90	Sandy CLAY with pockets of reddish-brown sand (GFD)	30	98	29.40	Medium
WS13	0.90	Very gravelly very sandy CLAY (GFD)	17	85	14.45	Low
TP04	1.00	Slightly sandy gravelly CLAY with pockets of brown sand (ALL)	24	93	22.32	Medium
WS14	1.20	**Brown mottled orange and grey gravelly CLAY	22	91	20.02	Medium
TP01	2.20	Gravelly clayey SAND (GFD)	16	87	13.92	Low
TP23	2.2	Dark grey gravelly CLAY (Oadby Member)	16	95	15.2	Low

GFD – Glaciofluvial Deposits. – ALL – Alluvium **Undetermined geology.

Geotechnical testing has determined the cohesive Glaciofluvial Deposits to range from low to medium VCP as indicated in the above table.

One sample of the Oadby Member Deposits (2.2m depth) was determined to comprise low VCP materials as indicated in the above table.

Based on the results, and limited tested undertaken in the Oadby Member Deposits, at this stage it is considered that medium VCP should be assumed for foundation design purposes for foundations positioned within both the cohesive Glaciofluvial Deposits and Oadby Member Deposits.

Where founding in medium VCP deposits detailed foundation design will be required to determine the required founding level in accordance with NHBC Guidelines Chapter 4.2 – Building Near Trees. Heave precautions will also be required on the inside face of foundation trenches.

In accordance with NHBC standards, where founding in the cohesive Glaciofluvial Deposits, foundation depths should be a minimum of 0.90m below existing or reduced levels (where foundations are located outside the zone of influence of trees).

Granular materials have however, been encountered on-site at potential founding depth and therefore it is considered likely that a number of plots may be founded within granular strata. If founding within granular strata the requirement for deepening due to nearby tree influence may not be required and there may be a potential to reduce minimum foundation depths to 0.60m bgl . This should be assessed at detailed foundation design stage following receipt of a final site layout and confirmation of proposed slab and external levels.

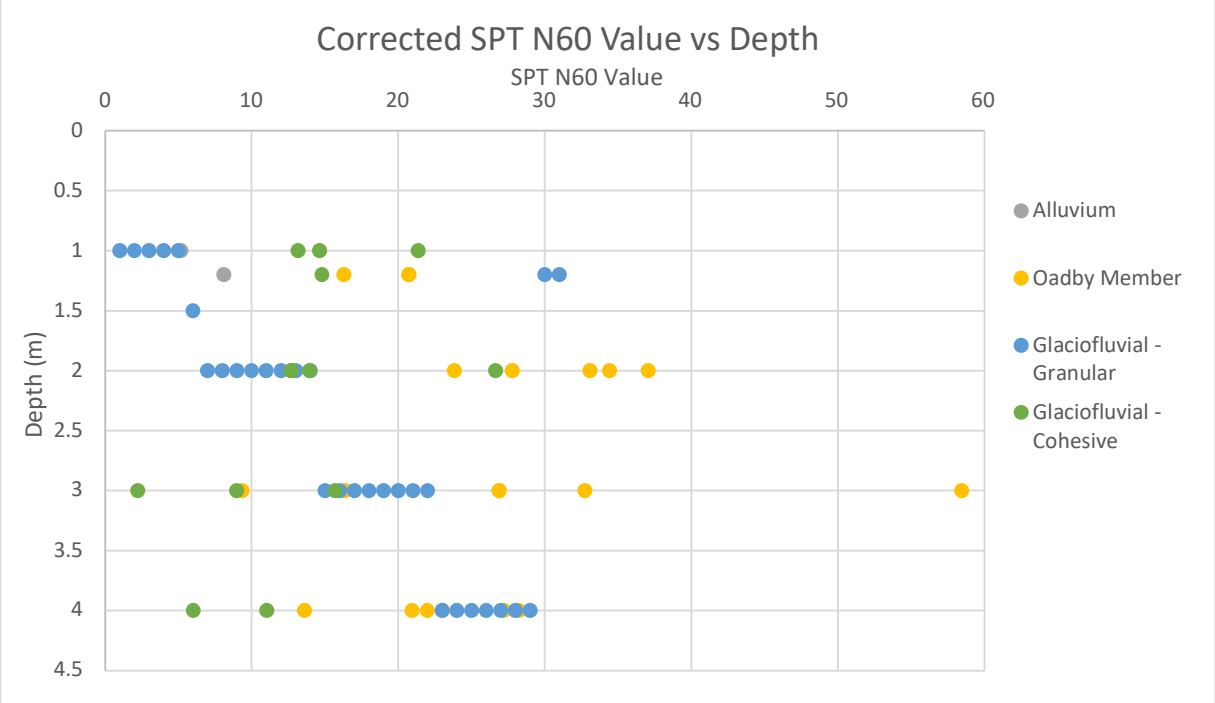
7.5 In-situ Standard Penetration Testing

Standard Penetration Tests were undertaken at regular intervals during drilling of the window sample boreholes and rotary borehole in accordance with the methodology outlined in British Standard BS EN 22476-3 2005.

The resulting N values have been converted into an N60 value in accordance with the British Standard, taking account of the energy ratio value of the SPT equipment and a plot of SPT N values with depth is presented in Figure 1 below.

A copy of the SPT calibration certificates for the window sample drilling rig is presented within Appendix C.

Figure 1 – SPT N Value with depth



Results of the SPT testing would indicate that the cohesive Oadby Member deposits generally comprise firm to stiff and very stiff strata (mean N60 = 26) noted to be increasing in strength with depth.

Results of the SPT testing would indicate that the cohesive Glaciofluvial deposits generally comprise firm and occasionally stiff strata (mean N60 = 13) noted to be increasing in strength with depth. However, at exploratory hole location WS18 in the east of the site, very soft to soft cohesive deposits were encountered at 3.0m to 4.0m depth.

The granular Glaciofluvial deposits were noted to comprise medium dense to dense deposits (mean N60 = 17 calculated) generally increasing in strength with depth. However, localised areas of loose deposits (N60 <10) were identified at WS9, WS10, WS12, WS15 and WS16 between 2m and 4.0m depth.

Results of the SPT testing would indicate that the cohesive Alluvium encountered at WS16 at 1.0m generally comprise soft clays (N60 = 5) with soft / firm alluvium encountered in WS04at 1.2m (N60 = 8).

7.6 Undrained Shear Strength

The undrained shear strength of the materials has been estimated from the SPT N Values by empirical correlation as described in CIRIA Report C143 (after Stroud and Butler, 1975):

$$c_u = \tilde{N} f_1 \ (kN/m^2) \qquad [1]$$

Where c_u is the undrained shear strength, N is the SPT N value and f_1 is an empirical correlation factor based on the soil plasticity index. The soil plasticity data obtained from soil samples recovered below the site during the investigation has been used. Any materials categorised as non-plastic has not been included within the dataset for the purpose of the below calculation. Based on the plasticity index testing carried out, the values in Table 7-3 have been assumed for the purpose of calculation.

Table 7-3 Calculated F1 Values

Strata	Average I'p	F_1 Value
Cohesive Glaciofluvial Deposits	20	5.4
*Oadby Member	19	5.5

*Based on 1 sample tested.

The estimated undrained shear strength of the cohesive Glaciofluvial Deposits is between ~50 kN/m^2 and ~145 kN/m^2 (average ~75kPa) calculated using corrected N60 value range of 9 – 27 which corresponds to medium strength materials noted to generally increase in shear strength with depth. This has been estimated discounting the low / very low strength deposits encountered at WS18. It should however be noted that the very low strength deposits were localised to WS18 advanced in the east of the site and recorded between a depth of ~3m and 4m.

The average estimated undrained shear strength of the Oadby Member cohesive strata is ~120kPa which corresponds to high strength materials. The estimated shear strength of the deposits was however recorded between 50kPa to 320kPa, which corresponds to medium to very high materials noted to increase in strength with depth.

In-situ Hand Shear Vane (HSV) tests were also carried out in the near cohesive Glaciofluvial deposits between depths of 0.9mm and 2.40mbgl which ranged between 50 kPa and 71 kPa (site average of ~59kPa) which indicates the cohesive deposits to be medium strength as approximately estimated above. HSV testes were also carried out in the cohesive Oadby Member deposits between depths of 1.4m and 2.00mbgl which ranged between 55 kPa and 82 kPa (site average of ~67kPa) which indicates the cohesive deposits to be medium strength as generally indicated above.

Figure 2 and 3 overleaf presents plot of undrained shear strength with depth beneath the site from the results of the tests described above within both the cohesive Glaciofluvial Deposits and Oadby Member Deposits. The graphs show a clear trend of increasing shear strength with depth with the exception of the Glaciofluvial Deposits encountered in WS18 in the east of the site, whereby very soft to soft cohesive deposits were encountered at 3.0m to 4.0m depth.

Figure 2 – Estimated Shear Strength with depth – Glaciofluvial Deposits

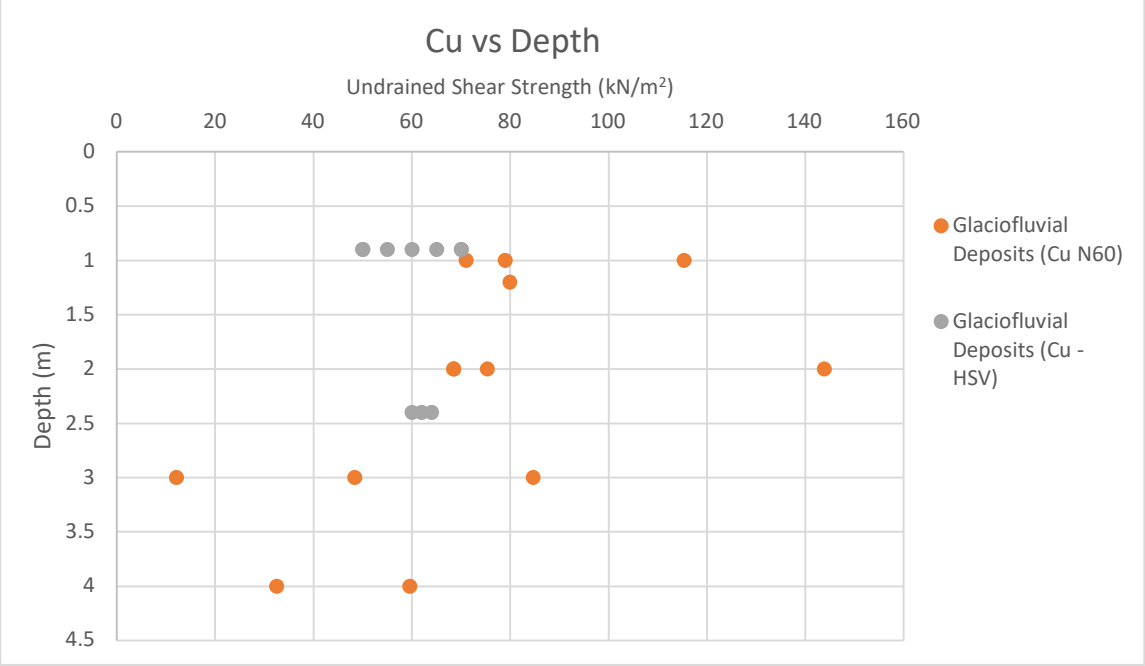
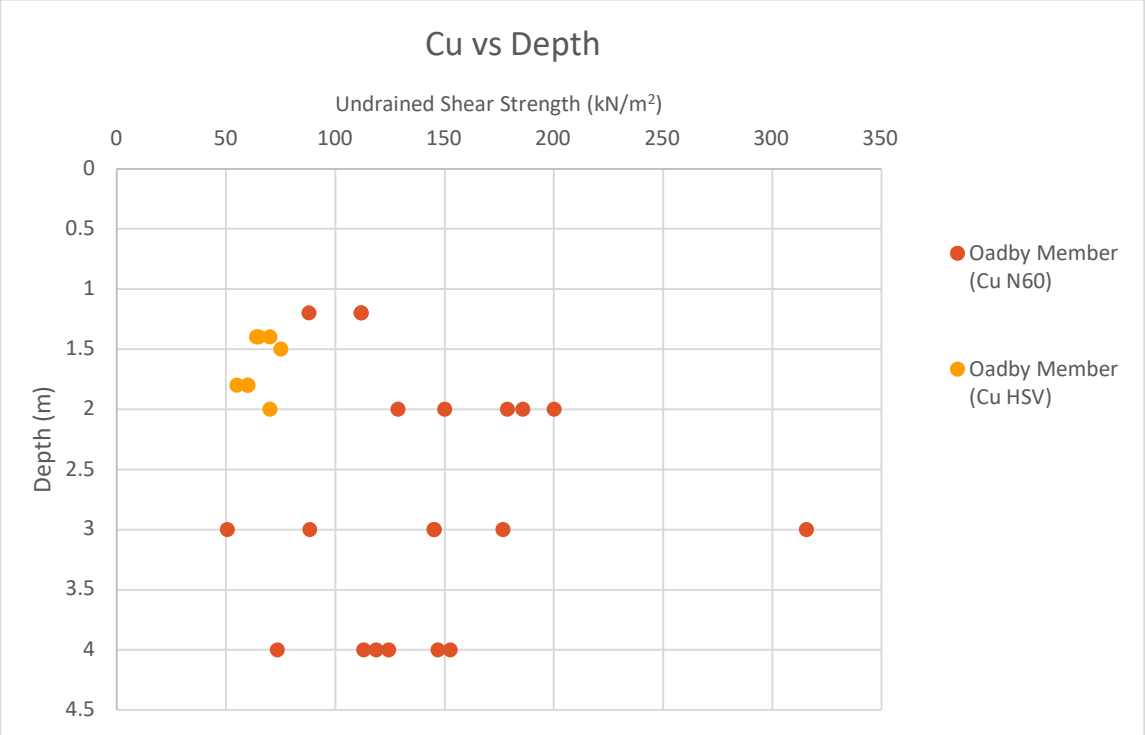


Figure 3 – Estimated Shear Strength with depth – Oadby Member Deposits



7.7 Material Properties Summary

A summary of the material properties / strength characteristics is presented below in Table 7-4.

Table 7-4 Material Properties Summary

Strata	Approx. Depth (m)	N60 Value	VCP	Average Undrained Shear Strength (kPa)	Strength	Recommended Allowable Bearing Pressure (kPa)
Oadby Member Deposits	1	16-21	*Low	105	Stiff	125 kPa
	2	24-37	*Low	130	Firm to stiff and very stiff	125 kPa
Cohesive Glaciofluvial Deposits	1	13-21	Low to medium	68	Firm to stiff	125 kPa
	2	13-27	Low to medium	90	Firm to stiff	125 kPa
Granular Glaciofluvial Deposits	1	10-34	-	-	Medium dense to dense	**100 kPa (>medium dense)
	2	7-34	-	-	Loose to medium dense	**100 kPa (>medium dense)
Alluvium	1	5-8	-	55	Soft to Firm	Not recommended for traditional foundations.

*Only 1 sample tested.

** Foundations should extend beyond any loose deposits.

7.8 Foundation Assessment.

The following section presents recommendations for foundations for the proposed development taking into consideration the ground conditions encountered and the material properties.

Traditional Foundations

Traditional strip / trenchfill foundations are generally considered appropriate for the majority of the proposed development, bearing within the firm to stiff cohesive Glaciofluvial Deposits and firm to very stiff Oadby Member deposits encountered, subject to consideration of the loads imposed.

An allowable design bearing pressure of 125kN/m^2 is recommended for trenchfill foundations (up to 1m wide), bearing uniformly within the firm to stiff cohesive Oadby Member deposits and cohesive Glaciofluvial deposits placed at a minimum depth of 0.9m, based on medium VCP clays. This value includes a factor of safety of 3.0 against general shear failure and should result in total settlements of not more than 25mm for foundations up to 1m wide, keeping differential settlements within acceptable limits.

It is recommended that a conservative allowable bearing capacity of 100kN/m^2 is adopted for foundation design within the natural medium dense granular Glaciofluvial deposits (predominantly encountered in the northeast and northwest of the site), placed at a minimum depth of 0.60m. A maximum permissible settlement of ~25mm should be achieved.

Foundations should be advanced beyond any localised alluvial deposits (deemed soft and compressible) encountered predominantly along the northern boundary / localised within the northern site area or beyond shallow granular deposits encountered (less than 1.2m deep / limited thickness) in the vicinity of WS11, WS13, TP01, TP11, TP12 and TP14 (or any other shallow granular deposits potentially present) and be placed uniformly within the underlying firm to stiff cohesive Glaciofluvial Deposits / Oadby Member deposits at a minimum depth of 1.0m.

The requirement for deepening of foundation trenches to a depth of 0.9m (or greater) and requirements for heave protection should be assessed at detailed foundation design stage. Where significant granular material is present then an assessment in accordance with NHBC guidelines should be undertaken. Foundations may be constructed in non-shrinkable soils at shallow depths in accordance with the NHBC '¾ x' rule, whereby 'x' represents the required depth due to trees and ¾ of that should be present in non-shrinkable granular soils below ground level. Further geo-technical testing of the granular materials across the site will be required in order to gain a larger data set and confirm that the granular material is non-plastic and will not heave.

Some of the granular deposits in the vicinity of WS09, WS10, WS12, WS15 and WS16 are noted to be loose (SPT N value <10) at depths between 1m and 4m. Additionally, low SPT N Values (<8 blows) were recorded in the cohesive deposits in WS14, WS16 and WS18 which is indicative of very soft to soft low strength deposits. As such, once a final site layout has been established, it is recommended that further investigation is carried out in these areas of the site to delineate the extent of loose / soft deposits and to confirm appropriate foundation types. An allowance for deepening foundations / alternative foundations in these areas of the site should be made at this stage.

Where any contrasting ground / localised soft spots are encountered at founding level, steel mesh reinforcement (B785 or similar) may be required in the base of foundations to span the different strata types. Should steel be required, RC35 concrete should be utilised.

Where plots are underlain by cohesive strata and within the influence of existing trees / hedges, foundations will require deepening in accordance with the NHBC guidelines. Foundations trenches may also need to be stepped in the base; any steps should be constructed in accordance with the NHBC guidelines.

Where strip/ trenchfill foundations are adopted and plots are impacted by tree influence and within cohesive deposits, heave precautions to include for the provision of a 250mm void beneath beam and block floor slabs will be required. Further heave precautions include a requirement for a 25mm void on the inside face of all external foundations where foundation depths exceed 1.5m due to tree influence.

Care should be taken to avoid softening of the base of the foundation excavation during construction. Where necessary, a 100mm blinding of concrete should be constructed to protect the foundation level during adverse weather. The excavation should not be left open for any extended period.

Foundation widths should be designed as part of detailed design by a structural Engineer, appropriate to the loads being imposed, however 0.6m wide foundations are likely to be appropriate for external walls and 0.75m wide for party walls and gable ends.

It is recommended that foundation trenches should be inspected by an Engineer prior to pouring concrete to confirm that all trenches are placed uniformly within firm to stiff cohesive deposits or medium dense granular deposits where appropriate. It is recommended that confirmation of the shear strength of the in-situ soils in the base of foundation excavations (using a HSV or similar) is also carried out to ensure that the allowable bearing pressure is achieved.

It is recommended that detailed foundation design is undertaken prior to construction to confirm compliance with appropriate guidance and derive the most cost-effective foundation solution. A tree survey shall be required in order to facilitate detailed foundation design.

Alternative Foundation Options

Unstable and low strength strata have been encountered within the north eastern (WS02) and central eastern area of the site (TP03, TP06, TP07, TP08, TP11 and WS07) which may preclude the use of traditional foundations. This area is indicated on drawing PJSG21-08-004 presented in the drawings section of this report. In addition, should site levels be raised significantly then alternative foundations (such as piled or ground improvement) may also be necessary.

The choice of any alternative foundation solution/s will be based on a number of factors including the developer's preference along with economic, social and environmental factors. At this stage the following options are considered to be most appropriate:

Piled Foundations

Piled foundations may be required for any plots that coincide with loose granular deposits (vicinity of WS09, WS10, WS12, WS15 and WS16) and very soft to soft cohesive deposits (vicinity of WS14, WS16 and WS18) with column loads being transferred to more competent strata at depth.

Piled foundations may be required in areas of the site should ground levels be raised significantly or should foundations depths exceed 2.5m due to tree influence. Where piled plots are within the influence of existing or removed trees, heave precautions shall be required comprising compressible material on the inside face of external wall ground beams (25mm) and the underside of all ground-beams (100mm). The piling contractor should consider the risk of heave on the actual pile shaft or column.

Any piled plots will require reinforced ground beams, which can be either pre-cast or cast in-situ depending on developer preference, and should be designed by a specialist contractor or Structural Engineer.

An allowance should be made for the design of a working platform to support a piling rig.

Steel piles may be required if driving resistance is high or a reduction in ground vibration is required. Bored piles may be required if ground conditions are not conducive to driven piles or if detailed design demonstrates bored piles could be founded at shallower depths. A specialist piling contractor should be consulted for site specific pile type and design.

Further site investigation (deeper boreholes) may be required to determine pile depths should this foundation option be desired.

It is recommended that advice is obtained from specialist piling contractors to ascertain the most economical solution for the ground conditions encountered.

Ground Improvement

Ground improvement techniques (such as vibro stone column ground improvement) with reinforced concrete strip foundations may provide a suitable foundation solution for plots where poor bearing strata (areas where low SPT N values have been encountered) and / or where significant trench collapse has been encountered. Typically, allowable bearing capacities in the region of 125kN/m^2 can be achieved following ground improvement works. The ground logs should be forwarded to a specialist contractor to confirm that ground improvement techniques will be viable.

Foundation depths should be a minimum of 0.9m below existing or reduced levels in accordance with NHBC Guidelines Chapter 4.2 – Building Near Trees. Should foundations coincide with cohesive deposits and are within the influence of trees there is likely to be a requirement for further deepening of foundation trenches. The requirement for deepening of foundation trenches and heave protection should be assessed at detailed foundation design stage.

The potential use of a ground improvement solution shall require careful design, control and validation of the proposed filling operation. Such works will need to be controlled by an Earthworks Strategy & Validation Report.

Ground improvement foundations shall require design by a specialist Contractor, and in particular should involve early engagement with them regarding any proposed filling operations.

It is considered likely that a bottom feed vibro solution will be considered the most suitable due to the instability noted within the granular superficial deposits found at the depth in which groundwater was encountered. The bottom feed method should allow the columns to be formed beneath the ground before any potential collapse occurs.

Ground improvement foundations may not be suitable where ground conditions are inconsistent beneath the footprint of the plot, as differential settlement may be a potential issue. Further plot specific investigation may be required to confirm uniform ground conditions beneath plot footprints.

An allowance should be made for a working platform to support a specialist rig.

7.9 Floor Slab Construction

Suspended floor slabs and beam and block floor construction is likely to be the most viable floor slab construction types.

At this stage however it is anticipated that both ground bearing and suspended floor slabs may be suitable for the site, subject to developer preference and further assessment of proposed ground levels / tree influence. For plots where depths of fill exceed 600mm below the floor slab or where founded within cohesive deposits and within the influence of trees, ground bearing slabs will not be suitable and a suspended floor slab should be adopted.

The final specification of ground floor slabs will be subject to detailed design, taking into account existing and proposed ground levels and the impact of trees/vegetation.

7.10 Excavations

Excavations using backhoe excavators are expected to be suitable in the natural strata across the site. Mechanical breaking equipment is unlikely be required given the type of material encountered below the site and observations made during the investigation works.

Instability was noted in numerous excavations and some evidence of localised running sands was encountered predominantly within the granular Glaciofluvial Deposits. As such, it may not be feasible to utilise trenchfill foundations in these areas of the site. Affected plots where instability is noted may have to utilise piled / ground improvement foundations.

An allowance for shoring may be required for excavations in these aforementioned areas of the site. Elsewhere, no evidence of ground instability was noted. The requirement for shoring is therefore considered unlikely for the majority of excavations in the short term.

Excavations that remain open for long periods, particularly during inclement weather are expected to be prone to instability. Where personnel entry is required for inspection, excavations should be sufficiently enlarged and an assessment of safe temporary angles should be carried out; alternatively, temporary shoring should be provided.

No excavations should be entered until a full risk assessment is completed to assess the stability requirements and safety issues.

7.11 Obstructions

No significant obstructions are anticipated based on observations undertaken during the ground investigation works.

7.12 Drainage

Infiltration testing undertaken within both the cohesive and granular geology encountered across the site, alongside the high groundwater table noted, would suggest that soakaway drainage is not considered feasible and an alternative drainage solution is therefore likely to be necessary. The advice of a Drainage Engineer should however be sought to confirm this preliminary assessment prior to construction.

7.13 Roads & Hardstanding

In-situ Dynamic Cone Penetrometer (DCP) testing was undertaken at 15 locations (DCP01 to DCP15) across the site. Based on mean values, a preliminary CBR design value of >4% should be achieved for road construction design purposes for the near surface superficial deposits underlying the site.

Any soft or otherwise unsuitable material should be removed and replaced by engineered stone to an appropriate specification prior to construction. Formation levels should be thoroughly proof-rolled.

Further in-situ testing is however, recommended at formation level once development proposals have been established.

7.14 Concrete Classification

The laboratory results have been assessed against the BRE Special Digest 1 2005: 3rd Edition Aggressive Chemical Environment for Concrete (ACEC) Site classification. The Site has been designated as Greenfield ground with mobile groundwater.

Water soluble sulphate concentrations in the natural soils varied from 6.3 mg/l to 29 mg/l with soil pH values ranging from 7.3 to 7.6. Total sulphur concentration ranged from <0.005 % to 0.054 %. Pyrite is not indicated to be present in the soils.

The results of the laboratory testing indicate that Design Sulphate Class DS1 (AC1) conditions are present within the natural soil deposits at the site.

8. Generic Quantitative Risk Assessment

In accordance with Land Contamination Risk Management (LCRM EA, 2020), a Generic Quantitative Risk Assessment (GQRA) has been undertaken to determine the significance of the measured concentrations of contaminants identified during the ground investigation.

This involves undertaking an assessment of each potential contaminant linkage identified within the ICSM by comparing the contaminant concentrations against appropriate Generic Assessment Criteria (GAC).

GACs are screening criteria which are derived using a standard set of generic assumptions. They are designed to be broadly applicable to a wide range of site conditions and exposure scenarios. They must be appropriate and suitable for your site. The GACs used in this assessment a represent "trigger values" that, if exceeded, could indicate a possibility of significant harm. However, these criteria do not represent the threshold at which there is a significant possibility of significant harm; this determination will normally require further investigation and / or Detailed Quantitative Risk Assessment (DQRA) is required and evaluation of risk to human health and controlled waters

8.1 Human Health Risk Assessment

8.1.1 Assessment Criteria

Contaminant data has been compared to the Land Quality Management (LQM) / Chartered Institute of Environmental Health (CIEH) values published within 'The LQM/CIEH Suitable for Use Levels (S4ULs) for Human Health Risk Assessment' 2015. In brief, the document provides assessment criteria which have been derived in accordance with UK legislation, national as well as EA policy and using a modified version of the CLEA software and available guidance.

The S4ULs are considered appropriate for use in this assessment for organic contaminants and the Soil Organic Matter (SOM) content has been taken into consideration where appropriate.

Criteria for a limited number of contaminants have been derived by the Department for Environment, Food and Rural Affairs (DEFRA; UK government) in their document entitled SP1010: Development of Category 4 Screening Levels (C4SL) for Assessment of Land Affected by Contamination, April 2014. The National Planning Policy Framework states that 'after development, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990'. Therefore, by inference, the C4SLs are appropriate for use in the planning context. It is generally accepted that assessment criteria for metals are not sensitive to changes in soil organic content (SOM). The C4SLs have therefore been adopted as assessment criteria in this report for the listed metals within the SP1010.

8.1.2 Soil Chemical Data in Comparison to GACs

The soil samples recovered from the site have been compared to appropriate GACs for a residential end use with plant uptake. When in comparison, none of the samples of topsoil or natural subsoils identified any exceedances of the GAC and will therefore not be considered further.

8.1.3 Asbestos

A total of 7 No. samples recovered from the topsoil on site were screened for the presence of asbestos. Although CCs are not available for asbestos, the results indicate that no trace of asbestos was identified in any samples tested and will therefore not be considered further.

8.1.4 Pesticides

A total of 2 No. samples recovered from the topsoil on site were screened for the presence of pesticides. The results indicate that no trace of pesticides was identified in samples tested and will therefore not be considered further.

8.2 Controlled Waters Risk Assessment

The controlled waters risk assessment considers the potential impact of on-site contamination to the relevant controlled water receptors identified within the ICSM. These are summarised as follows:

- Secondary A (Glaciofluvial Deposits and Alluvium)
- Secondary Undifferentiated (Oadby Member)
- Secondary B (Gunthorpe Member).
- The closest surface water record to site relates to an inland river (stream) located along the northern boundary of the site.

8.2.1 Assessment Criteria

The approach adopted to assessing risks to Controlled Waters is based principally on considering the concentrations of contaminants identified within the groundwater / leachate samples obtained in comparison to relevant GAC.

Several Water Quality Standards (WQS) have been applied as Generic Assessment Criteria (GAC), these include Water Framework Directive standards and thresholds (WFD), the Freshwater Environmental Quality Standards (EQS), the UK Drinking Water Quality Standards (DWQS) and WHO Guidelines for Drinking Water Quality values which have been used as initial conservative GAC to assess whether further assessment or discussion in terms of the risks to controlled waters is required.

Contaminant concentrations that exceed the applied GAC are then considered in the context of the site's environmental setting as to whether further qualitative or quantitative assessment is required.

8.2.2 Soil Leachability Testing

To assess the potential risk to controlled waters from the recorded concentrations in soils, the use of leachability is generally used to determine contaminant mobility within the ground with the results of these tests compared to the determinants respective environmental quality standards (EQS) or other applicable standards such as UK drinking water standards (DWS).

In the absence of a sensitive potable groundwater supply in the vicinity, it was considered appropriate to adopt EQS for freshwater when assessing the risk to groundwater and surface water associated with soil leachate concentrations. Where EQS are not available, WHO and UK DWS have been adopted as the relevant screening criteria.

Following a direct comparison of leachate laboratory results to water quality standards, the following exceedances were identified:

Table 8-1 Summary of Soil Leachate Results Exceeding GAC

Contaminant	GAC	GAC Source	No. samples exceeding GAC	Range of Concentrations (µg/))	Location
Copper	1 (bioavailable)	EQS	2 from 3	6.0 – 6.9	TP12 @ 0.4m TP11 @ 0.4m.

As noted above, levels of leachable copper were recorded marginally in in excess of the EQS value in 2 out of 3 samples of natural sub-soils collected from the site.

Some marginally elevated concentrations of leachable lead and nickel were also recorded in samples of the natural subsoils in excess of the annual average concentrations; however, none of the concentrations exceeded the Maximum Allowable Concentration (MAC) when in comparison and will therefore not be considered further.

8.2.3 Groundwater Testing

The site is considered to be located in an area of low sensitivity in regard to the risk to groundwater as the site is not located within a groundwater SPZ and the nearest potable abstraction is >1km distance from site.

Based on the above, no specific groundwater analysis or risk assessment other than soil leachate testing has been included as part of this assessment.

8.2.4 Evaluation of Risk to Controlled Waters

The contamination testing undertaken has identified:

- Marginally elevated levels of leachable copper in excess of the EQS value in samples of natural sub-soil on site and are therefore not considered to present a significant risk.
- During the investigation, no evidence of contamination was identified below the site and no evidence of Made Ground was identified; as such, no risk tangible has been identified.

Taking the above into consideration, the risk to surface water / groundwater associated with the site is considered very low to negligible and no further risk assessment is considered necessary in that regard.

As a measure of good practice, any materials excavated and stockpiled on site should be positioned to take into consideration the potential for surface water / leachate run-off to impact surface water receptors. Control measures should comprise keeping the sides of stockpiles at a low gradient to minimise surface water run-off and appropriate measures to prevent the ingress of suspended solids into surface waters.

8.3 Property and Infrastructure Risk Assessment

8.3.1 Building Materials

Design Sulphate Class DS1 (AC1) conditions are present within the natural soil deposits at the site.

8.3.2 Potable Water Supply Pipes

Contamination testing has not identified any elevated chemical contaminant concentrations within soils on the site in terms of a residential end use.

The investigation requirements for the selection of potable water pipe material are set out in UKWIR Report 10/WM/03/21 "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (UKWIR, 2010)".

This report has specific investigation requirements and as such detailed investigation of proposed utility routes was not within the scope of this investigation. However, based on current information conventional plastic water supply pipes are likely to be suitable.

It is however recommended that the contamination test results are made available to the relevant water company to allow design of any required potable water supply pipe work to be undertaken and to confirm requirements for any further assessment.

8.4 Ecological Risk Assessment

Soil results were compared to phytotoxic guideline values as outlined in Table 1 within BS3882:2007. No elevated contaminants were identified and therefore the probability of phytotoxic contaminants affecting vegetation is considered unlikely.

The risk to ecological receptors is anticipated to be negligible given the concentrations found within the soils. However, the impact to ecological receptors from proposed construction activities should always be considered

9. Ground Gas & Vapour Risk Assessment

9.1 Ground Gas Monitoring

Gas and groundwater monitoring has been carried out on 6 No. monitoring visits to date between 2nd March and 10th May 2022 at atmospheric pressures of between 996mb to 1016mb.

The monitoring data is presented in Appendix H.

The ground gas risk assessment and recommendations are presented below.

9.2 Ground Gas Risk Assessment Methodology

The risk to end users from ground gas has been assessed in accordance with the methodology presented in the following referenced documents:

- British Standard BS8576:2013 – Guidance on investigations for ground gas – permanent gases and Volatile Organic Compounds (VOCs).
- British Standards BS8485:+A1:2019 – Code of practise for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
- CIRIA C665: Assessing risks posed by hazardous ground gas to buildings, 2007.

9.3 Derivation Gas Screening Value (GSV)

Both the CIRIA Report and the British Standard require the calculation of a Gas Screening Value (GSV). This is calculated as the maximum recorded percentage gas concentrations multiplied by the maximum gas flow rate. Where concentrations or flow rates less than the limit of detection on the analyser have been recorded, the limit of detection has been used (0.1% for gas concentration, 0.1 l/hr for gas flow rates).

The main method of characterising a site is using the method proposed by Wilson and Card (1999) and can be used for all types of development except for conventional low-rise housing with a ventilated underfloor void. The method uses both gas concentrations and borehole flow rates to define a characteristic situation for a site based on the limiting borehole gas volume flow for methane and carbon dioxide.

The GSVs and corresponding characteristic situation is summarised below in Table 9-1 which has been reproduced from Table 8.5 presented within CIRIA C665 and Table 2 within BS8485.

Table 9-1 Gas Screening Value Thresholds – Modified Wilson & Card Classification

CIRIA – No Sub-floor Void		Risk Classification	Additional Factors
Characteristic Situation	**GSV (CH_4 &CO_2)**		
CS1	<0.07	Very low risk	Typically, methane <1 % and / or carbon dioxide <5 %. Otherwise consider increase to CS2.
CS2	<0.7	Low risk	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to CS3.
CS3	<3.5	Moderate risk	
CS4	<15	Moderate to high risk	Quantitative risk assessment required to evaluate scope of protective measures.
CS5	<70	High risk	
CS6	>70	Very high risk	

The NHBC have also developed a characterisation system that is similar to the Wilson and Card system, but is specific to low-rise housing with a clear ventilated underfloor void. This is a risk-based approach that is designed to allow an identification of gas protection for a low-rise housing development by comparing the measured gas emission rates to generic "traffic lights" scenarios.

The traffic light system also includes "typical maximum concentrations" and are provided for initial screening purposes and risk-based gas screening values (GSVs) for consideration in situations where the typical maximum concentrations are exceeded. The "typical maximum concentrations" can be exceeded in certain circumstances should the conceptual site model indicate it is safe to do so. This is where professional judgement will be required, based on a thorough understanding of the gas-regime identified at the site where monitoring in the worst temporal conditions has occurred.

The CIRIA 665 report author (Steve Wilson) since provided further clarification regarding which guidance should be adopted for residential houses that have suspended cast in-situ concrete floor slab; for the avoidance of doubt, it was confirmed that the NHBC GSVs within the CIRIA 665 guidance should be adopted.

The NHBC GSVs and typical maximum concentrations are summarised below in Table 9-2 reproduced from Table 8.7 presented within CIRIA C665.

Table 9-2 Gas Screening Value Thresholds – NHBC Traffic Light System

NHBC – Sub-floor Void			Methane Typical Maximum Concentrations (% v/v)	Carbon Dioxide Typical Maximum Concentrations (% v/v)
Classification	**GSV (CH_4)**	**GSV (CO_2)**		
Green	<0.16	<0.78	1	5
Amber 1	<0.63	<1.56	5	10
Amber 2	<1.56	<3.13	20	30
Red	>1.56	>3.13	-	-

However, it should also be recognised that the GSV thresholds in the above tables, are guideline values only and in some cases the guideline GSV can be exceeded should the CSM indicate it is safe to do so. It should be noted however that the GSV should not be exceeded without completion of a detailed gas risk assessment taking into account site-specific conditions.

9.4 Calculated Gas Screening Values (GSV)

Gas screening values have been calculated using maximum values from the entire gas monitoring data set collected. The GSV represents the gas hazard present for the whole site and is based on similar ground conditions having been identified across the site. The calculated GSVs are presented in the table below

Table 9-3 Calculated GSV.

Chg Methane (% v/v)	Chg Carbon Dioxide (% v/v)	Gas Flow Rate (l/hr)	Hazardous Gas Flow Rate, Qhg CH4 (l/hr)	Hazardous Gas Flow Rate, Qhg CO2 (l/hr)	NHBC Traffic Light System	Wilson & Card Classification
< 0.1	3.3	1.8	0.0018	0.0594	Green	CS1

9.5 Ground Gas Protection Recommendations

Based on the gas monitoring undertaken to date, the calculated gas screening value for the site would indicate a 'Green' classification under the NHBC Traffic Light System and CS-1 classification in accordance with BS8485:2015+A1:2019. Therefore, at this stage, it is considered that gas protection measures will not be necessary for the site.

Based on the gas monitoring results obtained, the concentrations of ground gases are not considered to be at a level which would pose a significant risk to the health of construction workers working in an external environment at surface level. Working within confined spaces should however be avoided wherever possible, however if this work is unavoidable then the works should be carried out in strict accordance with the confined spaces regulations to include gas monitoring during the works.

9.6 Radon Protection Measures

Radon protection measures are not considered necessary in the construction of new properties.

9.7 Vapour Risk and Membranes

No evidence of vapours has been noted during the intrusive investigation, as such the risk associated with vapours arising from the site is considered negligible. No further assessment is considered necessary in that regard.

10. Revised Environmental Risk Assessment

In accordance with the requirements of LCRM 2020, the S-P-R potential contaminant linkages identified by the intrusive investigation are discussed below. All remaining contaminant linkages identified within the ICSM have been discounted as no plausible contaminant linkage has been identified.

A summary of the findings is presented below.

10.1 Identified Sources

Based on the GQRA that has been carried out within Section 7.0, potential sources of contamination that could impact on the identified receptors are summarised below.

- Marginal exceedances of the EQS for copper have been recorded in surface water samples recovered from the site.
- Low concentrations of sulphates in sub-soils.

10.2 Identified Pathways

- Direct contact of buried concrete with aggressive ground.
- Migration of leachates and overland flow into surface water receptors (run-off).

10.3 Identified Receptors

- Buried concrete.
- Inland river (stream) located along the northern boundary of the site.

10.4 Revised CSM and Potential Contaminant Linkages

Based on the above, the revised CSM is presented in Table 10-1 below.

Appropriate remedial / mitigation measures to break the potential contaminant linkages are discussed where required.

Table 10-1 Revised CSM.

Contaminant Linkage	Source (S)	Pathway (P)	Receptor (R	Probability	Consequence	Current Risk	Investigation / Mitigation Measures
Controlled Waters							
1	**On Site** **S1:** Slightly elevated levels of leachable copper in excess of the EQS value have been identified in samples of natural sub-soils on site.	**P5:** Surface water on & off site via overland flow into surface water (run-off).	**R5:** Inland River (stream) located along the northern boundary of the site / in vicinity.	Unlikely	Mild	Very Low	Materials excavated and stockpiled on site should be positioned to take into consideration the potential for surface water / leachate run-off to impact surface water receptors.
Property and Infrastructure							
2	**On Site** **S2:** Natural subsoils – Low concentrations of sulphate identified.	**P6:** Direct contact with aggressive ground.	**R6:** Buried concrete & structures	Unlikely	Mild	Very Low	Design Sulphate Class DS-1 and Aggressive Chemical Environment for Concrete Class AC-1 should be used for design purposes.

11. Conclusions & Recommendations

This Geo-Environmental Assessment is based upon the findings of an intrusive site investigation undertaken in February 2022.

It is understood that the site is proposed to be developed for a residential land use.

The Geo-environmental assessment has produced the following key conclusions and recommendations which should be implemented as part of the future redevelopment of the site to ensure suitability for the proposed end-use and to meet the requirements of planning.

Environmental Risk Assessment Summary	
Human Health Risk Assessment	Based on the contamination testing that has been carried out, the risk assessment has indicated that the site poses a negligible risk to Human receptors. The natural topsoil and subsoils tested are therefore considered suitable for retention / reuse on site where geotechnically suitable, subject to compliance with a Materials Management Plan (MMP).
Controlled Waters Risk Assessment	During the investigation, no evidence of contamination was identified below the site and no evidence of Made Ground was found; as such, no tangible risk has been identified. The contamination testing undertaken has identified marginally elevated levels of leachable copper in excess of the EQS value in samples of natural sub-soil on site and are therefore not considered to present a significant risk. Taking the above into consideration, the risk to groundwater / surface water associated with the site is considered very low to negligible and no further risk assessment is considered necessary in that regard.
Ground Gas	Based on the gas monitoring undertaken to date, gas protection measures are not required for the site.
Vapour Risk	No vapours have been identified on site; no mitigation measures are therefore required.
Ecological Risk	Potential Impacts from contamination sources is considered negligible. However, the impact to ecological receptors from proposed construction activities should always be considered
Geotechnical Assessment Summary	
Foundations	Traditional strip / trenchfill foundations are generally considered appropriate for most of the development proposals for the site, bearing within the medium dense granular Glaciofluvial Deposits or firm to stiff cohesive Oadby Member and Glaciofluvial deposits found to underly the majority of the site, subject to consideration of the loads imposed. The granular deposits in the vicinity of WS09, WS10, WS12, WS15 and WS16 are noted to be loose (SPT N value <10) at depths between 1m and 4m. Additionally, low SPT N Values (<8 blows) were recorded in the cohesive deposits in WS14, WS16 and WS18 indicative of very soft to soft low strength deposits. Instability / running sands has also been noted in a number of trial pits advanced within the granular Glaciofluvial Deposits. An allowance for deepening foundations / alternative foundations in these areas of the site should be made at this stage.

	Piled foundations are recommended for any residential plots where foundations depths would exceed 2.5m due to tree influence. Piled foundations may also be required in areas where ground levels are raised significantly. Piled foundations may have to be considered where loose granular deposits / soft cohesive deposits and instability has been encountered at potential founding depth with column loads being transferred to more competent strata at depth. Ground improvement techniques (such as vibro stone column ground improvement) with reinforced concrete strip foundations may provide a suitable alternative foundation solution to piles for plots where either poor bearing strata (areas where low SPT N values have been encountered) and / or significant trench collapse has been encountered.
Floor Slabs	At this stage it is anticipated that both ground bearing and suspended floor slabs may be suitable for the site, subject to developer preference and further assessment of proposed ground levels / tree influence.
Drainage	Infiltration testing undertaken within both the cohesive and granular geology encountered across the site, alongside the high groundwater table noted, would suggest that soakaway drainage is not considered feasible; an alternative drainage solution is therefore likely to be required. The advice of a Drainage Engineer should however be sought to confirm this preliminary assessment prior to construction.
Concrete	Design Sulphate Class DS-1 and Aggressive Chemical Environment for Concrete Class AC-1 should be used for design purposes.
Roads & Hardstanding	In-situ testing has determined that a preliminary CBR design value of >4% should be achieved for road construction design purposes where natural soils are present beneath the site. Further in-situ testing is however recommended at formation level once development proposals have been established

Recommendations

It is recommended that further localised investigation is carried out to delineate the extent of very loose / loose granular deposits and soft cohesive deposits encountered on site. An allowance for deepening foundations / alternative foundations in these areas of the site should however be made at this stage. The drilling of deeper boreholes may also be required to aid the design of piled foundations.

Once the site development layout has been established, it is recommended that further targeted plasticity index testing is undertaken within samples recovered from the various cohesive deposits encountered below the site to confirm preliminary dig depths and foundation requirements for coinciding plots.

No assessment of the localised areas of fly tipped materials in the northwest of the site has been undertaken within this investigation. Therefore, visual vigilance in this area of the site is recommended during development for the presence of ACMs and / or other sources of potential contamination. Further chemical testing / removal off-site is likely to be required during the construction phase of the development.

Re-use of materials on-site should be controlled by a CL:AIRE approved Materials Management Plan (MMP).

12. References

The following documents are referenced in the report;

1. Desk Study Report, (PJSG) dated October 2021.
2. Land Contamination Risk Management (LCRM) 2020 https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm
3. British Standards Institution (BSI) BS 10175:2015 Investigation of Potentially Contaminative Sites Code of Practice 2015.
4. BS 5930 'Code of Practice for Site Investigations' 2015+A1:2020.
5. BS EN ISO 22476-3:2005+A1:2011; Geotechnical investigation and testing. Field testing. Standard penetration test.
6. BS1377: 1990, Methods of Test for Soils for Civil Engineering Purposes.
7. BS EN ISO 17892:2014+ Geotechnical investigation and testing – Laboratory Testing of Soil.
8. BRE Digest 365 'Soakaway Design' 2016.
9. BS 8582:2013: Code of practice for surface water management for development sites.
10. CIRIA-R143-the-Standard-Penetration-Test-SPT-Methods-and-Use-1995.
11. BRE Special Digest 1 'Concrete in Aggressive Ground 2005'
12. BS3882:2015 Specification for Topsoil.
13. CL:AIRE SP1010 Development of Category 4 Screening Levels for Land Affected by Contamination (Rev 2) dated 24th September 2014.
14. The LQM/CIEH Suitable 4 Use Levels published 2015.
15. UKWIR Report 10/WM/03/21 "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (UKWIR, 2010)".
16. BS8576:2013 – Guidance on investigations for ground gas – permanent gases and Volatile Organic Compounds (VOCs).
17. BS8485:+A1:2019 – Code of practise for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
18. Construction Industry Research and Information Association (CIRIA). 2008. Assessing the risk posed by hazardous gases to buildings. C665.

Drawings

PJSG21-47-DR-001-Rev A–Site Location Plan
PJSG21-47-DR-003 – Exploratory Hole Location Plan
Illustrative layout plan (n1741_006A Rev A) dated 16.02.22

SYCAMORE CL
GILBERT'S DRIVE
MALLORY CLOSE
RUSH CLOSE
ALANS WAY
BARBARA AVENUE
WILLOW CLOSE
ARNOLD'S CRESCENT
BRASCOTE LANE
Path (um)
Sports Pavilion
Recreation Ground
The Pastures
El Sub Sta
ESS
123.3m
Allotment Gardens
Track
Arrival Green
Proposed allotment car parking & composting area
Pump Stn
Swale/Rain Garden
LANE
PRIMARY STREET
128.8m
SECONDARY STREET
Windmill Green
Children's Play (LEAP)
Eastern Green
Children's Play (LAP)
Windmill Inn (PH)
Proposed allotment car parking
EDGE LANE
Swale
Allotment Gardens
127.4m
Proposed Country Park
Play-on-the-way Event (LAP)
Reinstated historic hedgerow
Adequate route of access to potential future burial ground
Pond
Ecology pond
Brascote Fields Farm
Land Reserved for Potential Future Burial Ground Provision (subject to further consultation)
Far Away
Goats Gate
128.3m
Pond
Track
128.9m Brascote
BRASCOTE LANE
129.8m
129.8m
130.1m
Issues

Key

- Application site boundary
- Other land under control of applicant
- Existing (retained) trees & hedgerow
- Proposed tree/hedge removal
- Indicative proposed planting
- Potential for fruit-tree planting
- Areas of new publicly-accessible open space
- Potential for equipped area of children's play (with min 20m development offset shown)
- Potential for children's play ar and/or event along a trim-trai (with min 5m development offset shown)
- Indicative marginal wildflower and grassland planting
- Indicative surface water attenuation basin
- Existing Public Right of Way
- Proposed pedestrian/cycle routes
- Proposed vehicular access from Brascote Lane
- Visual link with the spire of The Church of St. James
- Potential for improvements at Windmill pub
- Indicative dwellings (and associated garages)

0 10 50 m

Richborough Estates

nineteen47
CHARTERED TOWN PLANNERS & URBAN DESIGNERS

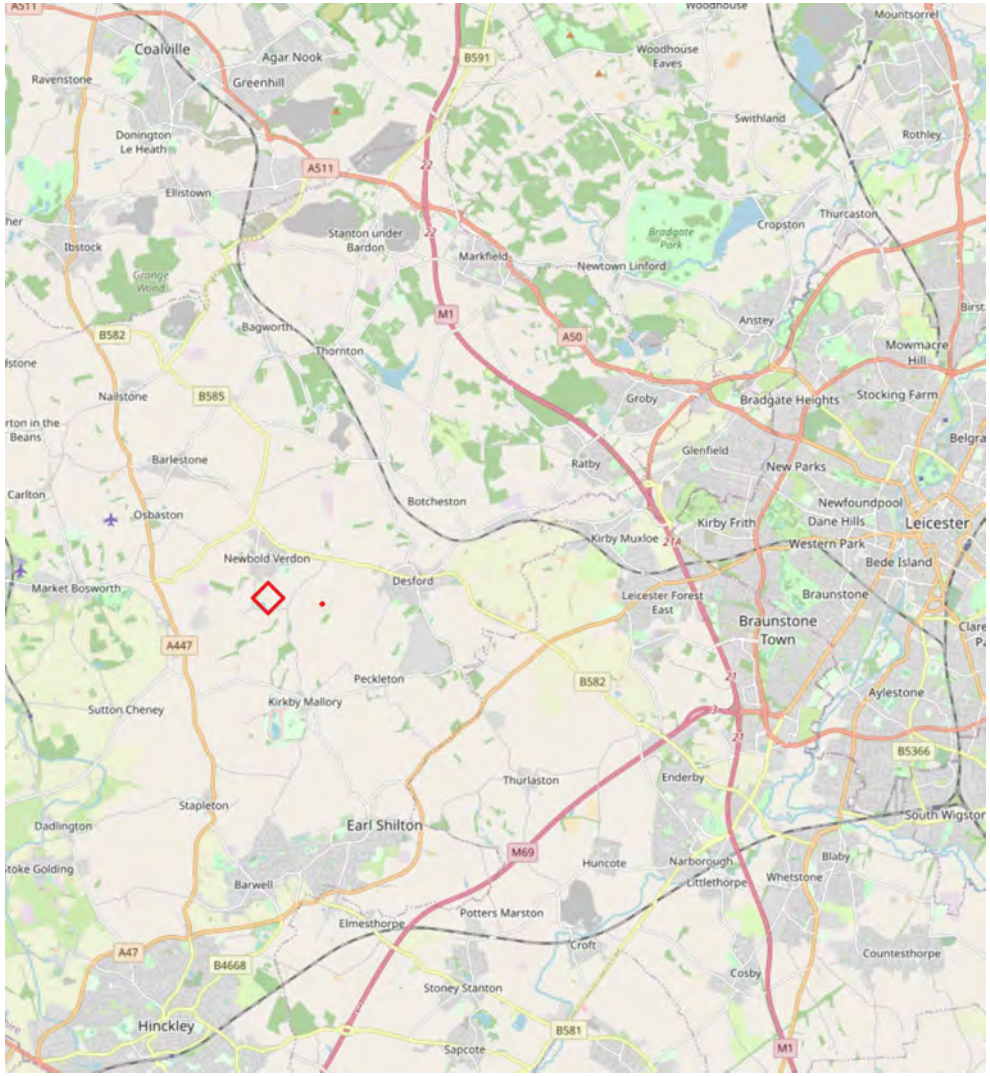
Project
Brascote Lane, Newbold Verdon

Drawing Title
Illustrative Layout

Project Code	Drawing Nr	Rev
n1741	006	A

Date	Drawing Scale
16.02.2022	1:1,250 @ A1

A4



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Kingston on Soar, Nottingham, NG11 0DP.
Registered Number: 11882468 Tel: 0115 704 3950 Email: Enquiries@pjs-geo.co.uk

Client: Richborough Estates

Project: Brascote Lane, Newbold Verdon

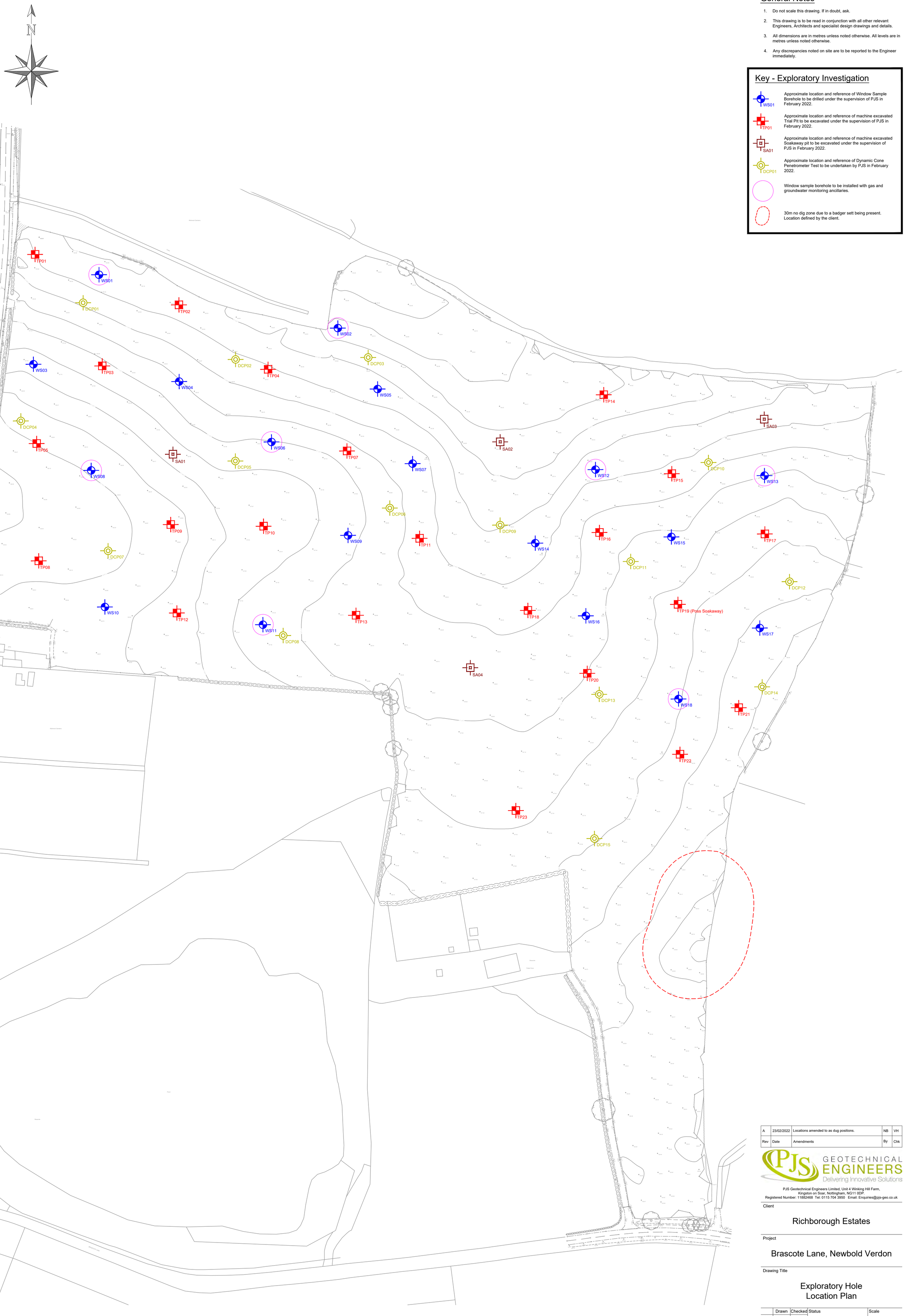
Drawing Title: Site Location Plan

	Drawn	Checked	Status	Scale
Initial	NB	AM	INFORMATION	NTS
Date	01.10.21	01.10.21		

Project	Drawing Number	Revision
PJSG21-47	DR-001	A

Rev	Date	Amendments	By	Chk
A	24/02/2022	Amended to reflect changes to red line boundary.	NB	VH

A1



General Notes

1. Do not scale this drawing. If in doubt, ask.
2. This drawing is to be read in conjunction with all other relevant Engineers, Architects and specialist design drawings and details.
3. All dimensions are in metres unless noted otherwise. All levels are in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the Engineer immediately.

Key - Exploratory Investigation

- WS01 — Approximate location and reference of Window Sample Borehole to be drilled under the supervision of PJS in February 2022.
- TP01 — Approximate location and reference of machine excavated Trial Pit to be excavated under the supervision of PJS in February 2022.
- SA01 — Approximate location and reference of machine excavated Soakaway pit to be excavated under the supervision of PJS in February 2022.
- DCP01 — Approximate location and reference of Dynamic Cone Penetrometer Test to be undertaken by PJS in February 2022.
- Window sample borehole to be installed with gas and groundwater monitoring ancillaries.
- 30m no dig zone due to a badger sett being present. Location defined by the client.

Rev	Date	Amendments	By	Chk
A	23/02/2022	Locations amended to as dug positions.	NB	VH

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Client

Richborough Estates

Project

Brascote Lane, Newbold Verdon

Drawing Title

Exploratory Hole
Location Plan

	Drawn	Checked	Status	Scale
Initial	VH	MP	INFORMATION	1:1000
Date	01/02/22	01/02/22		

Project Number	Drawing Number	Revision
PJSG21-47	DR-003	A

Appendix A: Contamination Risk Assessment Procedure

By considering the sources, pathways and receptors (contaminant linkages), an assessment of the human health/ environmental risks is made regarding the significance and degree of the risk. This assessment is based on consideration of whether the source of contamination can reach a receptor and hence whether it is of major or minor significance.

The risks associated with construction materials are considered outside of this procedure. The risk from ground gas has not been assessed in this report.

The risk assessment has been undertaken regarding BS10175:2001 and CIRIA Document C552: Contaminated Land Risk assessment 'A Guide to Good Practice'.

The risk assessment has been carried out by assessing the severity of the potential consequence, considering both the potential severity of the hazard and the sensitivity of the target, based on the categories given in Table 1.

Table 1: Potential Hazard Severity Definition

Category	Definition
Severe	Acute risks to human health, catastrophic damage to buildings/property, major pollution of controlled waters;
Medium	Chronic risk to human health, pollution of sensitive controlled waters, significant effects on sensitive ecosystems or species, significant damage to buildings or structures;
Mild	Pollution of non-sensitive waters, minor damage to buildings or structures;
Minor	Requirement for protective equipment during site works to mitigate health effects, damage to non-sensitive ecosystems or species.

The likelihood of an event (probability) considers both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given in Table 2.

Table 2: Potential of Risk Definition

Category	Definition
High Likelihood	Contaminant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor;
Likely	Contaminant linkage may be present, and it is probable that the risk will occur over the long term;
Low Likelihood	Contaminant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so;
Unlikely	Contaminant linkage may be present, but the circumstances under which harm would occur are considered improbable.

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the following matrix to give a level of risk for each potential hazard as listed in Table 3.

Table 3: Level of Risk

Probability of Risk	Potential severity			
	Severe	**Medium**	**Mild**	**Minor**
High Likelihood	Very High	High	Moderate	Low/Moderate
Likely	High	Moderate	Low/Moderate	Low
Low Likelihood	Moderate	Low/Moderate	Low	Very Low
Unlikely	Low/Moderate	Low	Very Low	Very Low

The assessment is discussed in terms of plausible contaminant linkages.

A description of the risk classifications and likely action required are given in CIRIA 552. These risk classifications are listed in Table 4.

Table 4: Risk Classification

Risk Classification	
Very High Risk	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 happening. This risk, if realised, is likely to result in substantial liability. Urgent investigation and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard. This risk, if realised, is likely to result in substantial liability. Urgent investigation is required, and remedial works may be necessary in the short term and are likely over the long term.
Moderate Risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm 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 risks and to determine potential liability. Some remedial works may be required in the long term.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very Low Risk	It is a low possibility that harm could arise to a designated receptor. In the event of such harm being realised it is not likely to be severe.

Appendix B: Exploratory Hole Logs

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	SA01

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	VH	AM	444523, 303136	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(0.60) 1.00		Orangeish brown very gravelly SAND. Gravel is rounded, medium to coarse of quartz. [GLACIOFLUVIAL DEPOSITS]		
						Trial Pit Terminated @ 1.00m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 1.00m for infiltration testing.
5) Excavation backfilled with arisings on completion.

Dimensions:
0.90 x 2.20 x 1.00

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	SA02

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	VH	AM	444719, 303143	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.20) 0.20		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(0.80) 1.00		Orangeish brown mottled grey slightly sandy gravelly CLAY. Gravel is rounded, fine to coarse of quartz. [PROBABLE ALLUVIUM]		
						Trial Pit Terminated @ 1.00m		

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 1.00m for infiltration testing.
5) Excavation backfilled with arisings on completion.

Dimensions:	Plant Used:
0.90 x 2.30 x 1.00	Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	SA03

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	VH	AM	444877, 303157	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.20) 0.20		Crop stubble over dark brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(0.90) 1.10		Orangeish brown slightly clayey very gravelly SAND. Gravel is rounded, medium to coarse of chert. [GLACIOFLUVIAL DEPOSITS] Becoming mottled grey from 0.80m.		
						Trial Pit Terminated @ 1.10m		

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 1.10m for infiltration testing.
5) Excavation backfilled with arisings on completion.

Dimensions:
0.90 x 2.50 x 1.10

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	SA04

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	VH	AM	444701, 303008	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over dark brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(0.70) 1.10		Firm orangeish brown slightly sandy CLAY. [PROBABLE ALLUVIUM]		
				(0.10) / 1.20		Firm grey slightly gravelly CLAY. Gravel is rounded, fine chalk. [OADBY MEMBER] Trial Pit Terminated @ 1.20m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 1.20m for infiltration testing.
5) Excavation backfilled with arisings on completion.

Dimensions:
0.90 x 2.20 x 1.20

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP01

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444440, 303256	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(0.70) 1.10		1.0 Brown gravelly slightly clayey SAND. [GLACIOFLUVIAL DEPOSITS]		
1.50	HSV	55,60,55		(0.90) 2.00		2.0 Firm brown sandy gravelly CLAY. Gravel is sub-angular to sub-rounded, fine to coarse of quartz, chert and chalk. [GLACIOFLUVIAL DEPOSITS]		
2.20	B1			(0.90) 2.90		Brown gravelly clayey SAND. Gravel is sub-angular to rounded, fine to coarse of quartz, chert and sandstone with pockets of very sandy very gravelly clay. [GLACIOFLUVIAL DEPOSITS]		
						3.0 Trial Pit Terminated @ 2.90m		
						4.0		

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.90m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP02

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444526, 303226	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
0.90	HSV	68,56,62		(0.60) 1.00		Firm brown sandy gravelly CLAY. Gravel is rounded, fine to coarse of quartz with pockets of reddish brown clayey sand. [PROBABLE ALLUVIUM]		
				(1.70) 2.70		Firm grey gravelly CLAY. Gravel is angular to rounded, fine to coarse of chalk, quartz, chert and lignite. Becoming very gravelly and damp with depth. [OADBY MEMBER]		
						Trial Pit Terminated @ 2.70m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.70m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP03

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444480, 303189	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(1.90) 2.30		Brown gravelly clayey SAND with pockets of gravelly sandy clay. Gravel is sub-angular to rounded, fine to coarse of quartz, chert and sandstone. [GLACIOFLUVIAL DEPOSITS]		
2.40	HSV	62,60,64		(0.50) 2.80		Firm brown mottled grey gravelly CLAY with pockets of reddish brown sand. Gravel is sub-angular to sub-rounded, fine to coarse of quartz, chert and chalk. [GLACIOFLUVIAL DEPOSITS]	▼	
						Trial Pit Terminated @ 2.80m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) Groundwater encountered - slow ingress at 2.40m.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.80m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP04

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444580, 303187	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
0.90 1.00	HSV D1	70,65,70		(0.90) 1.30		Firm brown slightly sandy gravelly CLAY with pockets of orangeish brown sand. Gravel is rounded, fine to coarse of quartz. [PROBABLE ALLUVIUM]		
1.40	HSV	55,65,60		(1.20) 2.50		Firm grey and brown gravelly CLAY with pockets of reddish brown sand. Gravel is angular to rounded, fine to coarse of chalk, quartz, chert and lignite. [OADBY MEMBER] Becoming very gravelly from 2.00m. Boulder encountered at 2.30m.		
						Trial Pit Terminated @ 2.50m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.50m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP05

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444441, 303143	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
0.20	ES1			(0.40) 0.40		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(2.20) 2.60		Brown gravelly SAND with pockets of damp and clayey sand. Gravel is rounded to sub-rounded, fine to coarse of quartz and chert. [GLACIOFLUVIAL DEPOSITS]		
						Trial Pit Terminated @ 2.60m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.60m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP07

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444627, 303138	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
1.00	B1			(1.80) 2.20		1.0 Brown to reddish brown very gravelly SAND with pockets of sandy gravelly clay. Gravel is rounded to sub-rounded, fine to coarse of quartz and chert. [GLACIOFLUVIAL DEPOSITS] 2.0		
						Trial Pit Terminated @ 2.20m 3.0 4.0		

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.20m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP08

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444442, 303092	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
0.80	B1			(2.20) 2.60		Brown very gravelly SAND with pockets of clayey sand. Gravel is rounded to sub-rounded, fine to coarse of quartz and chert. [GLACIOFLUVIAL DEPOSITS]		
						Trial Pit Terminated @ 2.60m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.60m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP09

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444521, 303094	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
0.80	D1			(2.20) 2.60		Brown very gravelly SAND with pockets of orange very gravelly sandy clay. Gravel is rounded to sub-angular, fine to coarse of quartz, chert, chalk lignite, sandstone and mudstone. [GLACIOFLUVIAL DEPOSITS]		
						Trial Pit Terminated @ 2.60m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.60m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP10

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444577, 303093	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(2.00) 2.40		Brown very gravelly SAND with pockets of clayey gravelly sand and sandy gravelly clay. Gravel is rounded to sub-angular, fine to coarse of quartz, chert, chalk lignite, sandstone and mudstone. [GLACIOFLUVIAL DEPOSITS] 1.0 Becoming damp from 1.00m. Slow groundwater and running sands noted at 1.30m. 2.0	▼	
						Trial Pit Terminated @ 2.40m 3.0 4.0		

General Remarks:
1) Excavation stable.
2) Groundwater encountered at 1.30m.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.40m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP11

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444670, 303086	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
0.40	ES1			(0.30) 0.60		Brown very gravelly SAND. Gravel is rounded to sub-rounded, fine to coarse of quartz and chert. Pockets of damp and clayey sand. [GLACIOFLUVIAL DEPOSITS]		
0.90	HSV	50,50,60		(0.90) 1.50		Firm orangeish brown mottled grey gravelly CLAY with pockets of reddish brown sand. Gravel is rounded, fine to medium of quartz. [GLACIOFLUVIAL DEPOSITS]		
				(1.10) 2.60		Firm grey gravelly CLAY with pockets of orange brown sand. Gravel is angular to rounded, fine to coarse of chalk, quartz, chert and lignite. [OADBY MEMBER]		
						Trial Pit Terminated @ 2.60m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.60m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP12

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444525, 303041	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
0.40	ES1			(0.20) 0.50		Brown clayey gravelly SAND. Gravel is rounded to sub-angular, fine to coarse of quartz, chert, lignite, sandstone. [GLACIOFLUVIAL DEPOSITS]		
0.90	HSV	55,60,60		(1.10) 1.60		Firm orangeish brown mottled grey sandy CLAY with pockets of reddish brown sand. Occasional gravel of rounded, fine to medium of quartz. [GLACIOFLUVIAL DEPOSITS]		
1.80	HSV	70,75,70		(1.00) 2.60		Firm grey mottled orangeish brown gravelly CLAY. Gravel is angular, fine to medium of chalk and mudstone. [OADBY MEMBER]		
						Trial Pit Terminated @ 2.60m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.60m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP13

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	23/02/2022	NB	AM	444632, 303040	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
0.90	D1			(0.90)		Firm orangeish brown mottled grey sandy CLAY with pockets of reddish brown sand. Occasional gravel of rounded, fine to medium of quartz. [GLACIOFLUVIAL DEPOSITS]		
0.90	HSV	70,70,75		1.30		1.0		
1.50	HSV	60,60,60				Firm grey mottled orangeish brown gravelly CLAY with pockets of reddish brown sand. Gravel is angular to rounded, fine to coarse of chalk, quartz, chert and lignite. Singular cobble noted at 1.40m. [OADBY MEMBER]		
2.00	HSV	80,80,85		(1.30)		2.0 Becoming stiff and dark grey at 1.90m.		
				2.60		Trial Pit Terminated @ 2.60m		
						3.0		
						4.0		

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.60m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP14

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	BH	AM	444781, 303172	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
0.10	ES1			(0.30) 0.30		Crop stubble over light brown slight sandy clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(0.70) 1.00		Greyish brown clayey gravelly SAND with pockets of gravelly clay. Gravel is sub-rounded to rounded, fine to coarse of quartz. Rounded, cobbles of quartz. [GLACIOFLUVIAL DEPOSITS]		
				(0.20) 1.20		Orangeish brown wet clayey sandy GRAVEL of rounded, fine to coarse quartz. Groundwater ingress at 1.00m causing side walls of excavation to collapse. [GLACIOFLUVIAL DEPOSITS]		
						Trial Pit Terminated @ 1.20m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation unstable below 1.00m.
2) Groundwater encountered at 1.00m.
3) No evidence of contamination identified.
4) Trial pit terminated at 1.20m due to instability.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP15

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	BH	AM	444822, 303125	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
0.20	ES1			(0.40) 0.40		Crop stubble over dark brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
1.00	D1			(1.00) 1.40		Firm orangeish brown sandy slightly gravelly CLAY. Gravel is sub-angular to sub-rounded, fine to medium of quartz. [PROBABLE ALLUVIUM]		
				(0.20) 1.60		Light grey slightly clayey SAND. [GLACIOFLUVIAL DEPOSITS]		
				(0.60) 2.20		Reddish brown wet clayey sandy GRAVEL of sub-rounded to rounded, fine to coarse of quartz. Occasional rounded, cobbles of quartz. [GLACIOFLUVIAL DEPOSITS] Groundwater ingress at 2.00m causing instability and side walls of excavation to collapse.		
						Trial Pit Terminated @ 2.20m		

General Remarks:
1) Excavation unstable below 2.00m.
2) Groundwater encountered at 2.00m.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.20m due to instability.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP17

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	BH	AM	444877, 303088	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
0.10	ES1			(0.20) 0.20		Crop stubble over dark brown sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(2.10) 2.30		Orangeish brown gravelly SAND. Gravel is rounded, fine to medium of chert and sandstone. Becoming mottled reddish brown with depth. Occasional rounded, cobble of chert. [GLACIOFLUVIAL DEPOSITS] 1.0 Becoming very gravelly from 1.20m. Becoming wet from 1.30m. 2.0		
				(0.70) 3.00		Firm reddish brown slightly sandy slightly silty CLAY. Occasional rounded, cobble of chert. [GLACIOFLUVIAL DEPOSITS] 3.0		
						Trial Pit Terminated @ 3.00m 4.0		

General Remarks:
1) Excavation stable.
2) Groundwater encountered at 1.30m.
3) No evidence of contamination identified.
4) Trial pit terminated at 3.00m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP16

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	BH	AM	444778, 303089	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over dark brown sandy gravelly TOPSOIL. Gravel is sub-rounded to rounded, fine to coarse of quartz.		
				(0.80) 1.10		Orangeish brown mottled grey gravelly clayey SAND with lenes of reddish brown sand. Gravel is rounded, fine to medium of quartz. Occasional rounded, cobbles of quartz. [PROBABLE ALLUVIUM] Becoming clayey from 0.60m.		
				(1.20) 2.30		Reddish brown clayey GRAVEL of rounded, fine to coarse quartz and chert. Pockets of gravelly clay. [GLACIOFLUVIAL DEPOSITS] Becoming sandy from 1.60m. Running sands and groundwater ingress at 2.00m.		
2.40 2.50	D1 B1			(0.70) 3.00		Pale grey mottled orangeish brown very silty SAND. [GLACIOFLUVIAL DEPOSITS]		
						Trial Pit Terminated @ 3.00m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation unstable between 2.00m - 2.20m.
2) Groundwater encountered at 2.00m.
3) No evidence of contamination identified.
4) Trial pit terminated at 3.00m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP18

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	BH	AM	444735, 303043	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.20) 0.20		Crop stubble over brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(1.30) 1.50		Firm grey mottled brown gravelly CLAY with pockets of reddish brown sand. Gravel is sub-rounded to rounded, fine to coarse of quartz and chert.		
				(1.00) 2.50		Firm grey mottled brown slightly gravelly very sandy CLAY. Gravel is sub-angular, fine to medium of chalk. [OADBY MEMBER] Groundwater ingress at 1.70m when left open.		
2.70	B1			(0.40) 2.90		Grey and brown mottled orangeish brown very clayey sandy GRAVEL sub-angular, fine to medium of chalk. [OADBY MEMBER]		
						Trial Pit Terminated @ 2.90m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation unstable below 1.50m.
2) Groundwater encountered at 1.70m.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.90m due to instability.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP19

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	BH	AM	444825, 303046	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40)		Dark brown gravelly SAND. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				0.40				
						Orangeish brown mottled reddish brown gravelly SAND with occasional clayey pockets. Gravel is sub-rounded to sub-angular, fine to coarse of chert. [GLACIOFLUVIAL DEPOSITS]		
1.00	D1					1.0		
						Instability from 1.20m.		
				(2.50)				
						Becoming reddish brown and wet from 1.80m.		
						2.0		
						Becoming very gravelly from 2.50m.		
				2.90				
						3.0 Trial Pit Terminated @ 2.90m		
						4.0		

General Remarks:
1) Excavation unstable below 1.20m.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.90m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP20

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	BH	AM	444771, 303005	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over dark brown clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
0.50	ES1			(1.10) 1.40		Firm to stiff orangeish brown CLAY with pockets of reddish brown sand.		
				(0.60) 2.00		Firm light grey gravelly CLAY with pockets of reddish brown sand. Gravel is rounded, fine to medium of chalk. (PROBABLE OADBY MEMBER - POSSIBLE GLACIOFLUVIAL DEPOSIT) Running sand and slight groundwater ingress at 1.60m.		
				(0.60) 2.60		Stiff dark grey gravelly CLAY. Gravel is rounded, fine to medium of chalk. [OADBY MEMBER]		
						Trial Pit Terminated @ 2.60m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.60m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP21

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	BH	AM	444862, 302984	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over dark brown sandy gravelly TOPSOIL. Gravel is rounded, fine to coarse of chert.		
				(1.50) 1.80		Orangeish brown gravelly SAND. Gravel is rounded, fine to coarse of chert. [GLACIOFLUVIAL DEPOSITS]		
				(0.40) 2.20		Orangeish brown mottled grey sandy GRAVEL of rounded, medium to coarse of chert. Unstable below 1.80m. [GLACIOFLUVIAL DEPOSITS] Becoming damp and slightly silty from 2.00m.		
2.30	D1			(0.30) 2.50		Brown slightly gravelly slightly silty SAND. [GLACIOFLUVIAL DEPOSITS]		
						Trial Pit Terminated @ 2.50m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation unstable below 1.80m.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.50m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP22

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	BH	AM	444824, 302956	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Dark brown slightly gravelly SAND.		
				(2.10) 2.40		Firm orange mottled grey and red slightly sandy gravelly CLAY. Pockets of reddish brown clayey sand. [GLACIOFLUVIAL DEPOSITS]		
				(0.60) 3.00		Orangeish brown silty SAND. Becoming unstable below 2.50m. [GLACIOFLUVIAL DEPOSITS]		
				(0.20) 3.20		Orangeish brown sandy GRAVEL. Strata is wet.[GLACIOFLUVIAL DEPOSITS]		
						Trial Pit Terminated @ 3.20m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) Groundwater encountered at 3.00m.
3) No evidence of contamination identified.
4) Trial pit terminated at 3.20m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	TP23

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	22/02/2022	BH	AM	444728, 302922	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over dark brown gravelly TOPSOIL. Gravel is rounded, fine to coarse of chert.		
0.20	ES1			(0.70) 1.00		Firm orangeish brown slightly sandy slightly gravelly CLAY with pockets of reddish brown clayey sand. Gravel is rounded, fine to medium of chert. [GLACIOFLUVIAL DEPOSITS]		
				(0.40) 1.40		Reddish brown and orange SAND. [GLACIOFLUVIAL DEPOSITS]		
				(0.70) 2.10		Firm to stiff grey mottled orange gravelly CLAY. Gravel is rounded, fine to medium of chalk. [OADBY MEMBER]		
2.20	D1			(0.40) 2.50		Stiff dark grey gravelly CLAY. Gravel is rounded, fine to coarse of chalk. [OADBY MEMBER]		
						Trial Pit Terminated @ 2.50m		

1.0
2.0
3.0
4.0

General Remarks:
1) Excavation stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Trial pit terminated at 2.50m.
5) Excavation backfilled with arisings on completion.

Dimensions:

Plant Used:
Kubota KX080 (Maddock Geotechnical Support Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS01

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	NB	AM	444478, 303244	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
0.20	ES1			(0.40) 0.40		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
1.20	SPT	N = 10 (1,1/2,3,2,3)		(0.80) 1.20		Firm orangeish brown mottled grey gravelly CLAY. Gravel is rounded to sub-rounded, fine to medium of quartz and chalk. [ALLUVIUM]		
2.00	SPT	N = 26 (6,6/6,6,6,8)		(0.70) 1.90		Firm reddish brown sandy gravelly CLAY. Gravel is angular to rounded, fine to coarse of quartz, chalk, lignite, chert and sandstone. [GLACIOFLUVIAL DEPOSITS]		
3.00	SPT	N = 50 (9,10/15,10,18,7/20mm)		(1.10) 3.00		Medium dense orangeish red clayey very gravelly SAND. Gravel is angular to rounded, fine to coarse of sandstone, quartz, lignite, chert, chalk and mudstone with occasional cobbles. Strata is wet. [GLACIOFLUVIAL DEPOSITS]		
						Borehole Terminated @ 3.00m		

1.0
2.0
3.0
4.0
5.0

General Remarks:
1) Borehole stable.
2) No groundwater encountered during drilling. Groundwater noted at base after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 3.00m due to SPT refusal.
5) Borehole installed with gas and groundwater monitoring ancillaries.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS02

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	NB	AM	444621, 303212	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
0.20	ES1			(0.30) 0.30		Stubble over reworked agricultural clayey gravelly TOPSOIL. Gravel is rounded, fine to coarse quartz and fragments of rare brick.		
				(0.70) 1.00		Firm brown sandy gravelly CLAY. Gravel is angular to rounded, fine to coarse of quartz and chalk. [PROBABLE ALLUVIUM] Becoming grey mottled brown at 0.80m. 1.0 Black organic staining at 0.90m.		
1.20	SPT	N = 11 (1,1/2,3,3,3)		(1.10) 2.10		Firm grey mottled brown very gravelly CLAY. Gravel is angular, fine to medium of quartz, chalk and sandstone. [GLACIOFLUVIAL DEPOSITS] Becoming sandy at 1.40m. 2.0		
2.00	SPT	N = 18 (3,3/4,4,5,5)						
3.00	SPT	N = 23 (3,3/5,5,6,7)		(1.90) 4.00		Stiff dark grey very gravelly CLAY. Gravel is angular to sub-angular, fine to medium of mudstone, chalk and quartz. [OADBY MEMBER] 3.0 Becoming silty at 3.60m. 4.0		
4.00	SPT	N = 27 (5,5/6,6,6,9)				Borehole Terminated @ 4.00m 5.0		

General Remarks:
1) Borehole stable.
2) No groundwater encountered during drilling. Groundwater noted at base of borehole after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole installed with gas and groundwater monitoring ancillaries.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS03

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	BH	AM	444439, 303190	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over dark brown sandy gravelly TOPSOIL. Gravel is rounded, fine to coarse of quartz.		
				(0.70) 1.10		Brown slightly gravelly SAND. [GLACIOFLUVIAL DEPOSITS]		
1.20	SPT	N = 21 (3,4/4,5,6,6)				Medium dense reddish brown gravelly SAND. Gravel is rounded, fine to medium of chert and chalk. Pockets of reddish brown clayey sand. Very gravelly between 1.10m - 1.90m. [GLACIOFLUVIAL DEPOSITS]		
2.00	SPT	N = 14 (4,4/5,3,3,3)						
				(2.90)		Becoming wet from 2.50m.	▼	
3.00	SPT	N = 8 (2,2/2,2,2,2)				Becoming loose at 3.00m.	▼	
4.00	SPT	N = 15 (2,2/4,4,3,4)		4.00		Becoming medium dense at 4.00m.		
						Borehole Terminated @ 4.00m		

General Remarks:
1) Borehole stable.
2) Groundwater encountered at 2.50m, receded to 3.00m below ground level after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole backfilled with arisings upon completion.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS04

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	NB	AM	444526, 303180	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
1.20	SPT	N = 9 (2,2/3,2,2,2)		(1.20) 1.50		Firm orangeish brown slightly sandy gravelly CLAY with pockets of clayey gravelly sand. Gravel is rounded to sub-rounded, fine to coarse of quartz. [ALLUVIUM] 1.0 Becoming sandy at 1.00m.		
				(0.20) 1.70		Soft grey mottled brown sandy CLAY. [ALLUVIUM]		
2.00	SPT	N = 21 (3,3/4,5,6,6)		(3.50) 3.80		Stiff grey mottled brown gravelly CLAY. Gravel is angular to sub-angular, fine to coarse of chalk, quartz and sandstone. [GLACIOFLUVIAL DEPOSITS] 2.0 Becoming dark grey at 2.40m. 3.0		
3.00	SPT	N = 23 (4,4/4,6,6,7)						
				(0.20) 4.00		Grey medium to coarse gravelly SAND. Gravel is angular, fine of chalk. [GLACIOFLUVIAL DEPOSITS] 4.0		
4.00	SPT	N = 22 (5,4/5,5,6,6)				Borehole Terminated @ 4.00m 5.0		

General Remarks:
1) Borehole stable.
2) No groundwater encountered during drilling. Groundwater rose to 0.30m below ground level after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole backfilled with arisings upon completion.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS05

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	NB	AM	444645, 303175	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(0.60) 1.00		Firm brown mottled grey and orange gravelly sandy CLAY. Gravel is angular to sub-rounded, fine to coarse of sandstone, quartz, chert and lignite. [PROBABLE ALLUVIUM]		
1.20	SPT	N = 14 (2,3/3,3,4,4)		(0.60) 1.60		Firm grey mottled brown gravelly CLAY. Gravel is angular, fine to medium of lignite, chalk, chert and quartz. [OADBY MEMBER]		
2.00	SPT	N = 25 (2,3/6,6,6,7)		(2.40) 4.00		Stiff grey gravelly CLAY. Gravel is angular, fine to medium of lignite and chalk. [OADBY MEMBER]		
3.00	SPT	N = 28 (4,4/4,7,8,9)						
4.00	SPT	N = 20 (5,5/5,5,5,5)						
						Borehole Terminated @ 4.00m		

1.0 2.0 3.0 4.0 5.0

General Remarks:
1) Borehole stable.
2) No groundwater encountered during drilling. Groundwater rose to 0.30m below ground level after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole backfilled with arisings upon completion.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS06

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	VH	AM	444582, 303144	-	1:25

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
0.20	ES1			(0.30) 0.30		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
1.20	SPT	N = 14 (1,2/4,4,3,3)		(0.90) 1.20		Firm orangeish brown occasionally mottled grey sandy gravelly CLAY. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
2.00	SPT	N = 26 (3,3/4,6,8,8)		(0.80) 2.00		Firm brown mottled grey gravelly CLAY. Gravel is sub-angular to sub-rounded, fine to coarse of quartz and chalk. Pocket of orangeish brown fine to coarse SAND between 1.30m - 1.40m. [OADBY MEMBER]		
3.00	SPT	N = 50 (6,9/12,12,15,11/75mm)		(1.00) 3.00		Stiff brown mottled grey very gravelly CLAY. Gravel is sub-angular to sub rounded, fine to medium of chalk, quartz, sandstone and rare lignite. [OADBY MEMBER] Becoming dark grey with fine gravel from 2.40m.		
						Borehole Terminated @ 3.00m		

1.0 2.0 3.0 4.0 5.0

General Remarks:
1) Borehole stable.
2) No groundwater encountered during drilling. Groundwater noted at base of borehole after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 3.00m due to SPT refusal.
5) Borehole installed with gas and groundwater monitoring ancillaries.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS07

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	NB	AM	444668, 303130	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is rounded, fine to coarse of quartz.		
1.20	SPT	N = 8 (2,2/2,2,2,2)		(3.70)		Reddish brown slightly clayey slightly gravelly SAND. Gravel is rounded, fine to medium of chert. [GLACIOFLUVIAL DEPOSITS]		
2.00	SPT	N = 14 (2,2/3,3,4,4)				Becoming wet at 2.00m. Low recovery between 2.00m - 3.00m.		
3.00	SPT	N = 20 (2,2/3,5,5,7)				Becoming very gravelly from 3.00m.		
4.00	SPT	N = 14 (4,3/3,3,4,4)		4.00				
						Borehole Terminated @ 4.00m		

1.0 2.0 3.0 4.0 5.0

General Remarks:
1) Borehole stable.
2) Groundwater encountered at 2.00m during drilling rising to 1.00m below ground level after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole backfilled with arisings upon completion.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS08

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	BH	AM	444479, 303093	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over dark brown slightly clayey gravelly TOPSOIL. Gravel is rounded to angular, fine to coarse of chert.		
1.00	SPT	N = 18 (3,3/3,5,5,5)		(0.80) 1.20		Stiff brown slightly sandy gravelly CLAY. Gravel is sub-rounded, fine to coarse of chert and quartz. [PROBABLE ALLUVIUM]		
2.00	SPT	N = 14 (2,3/3,3,3,5)		(1.70) 2.90		Medium dense brown gravelly SAND. Gravel is rounded, fine to medium of quartz with pockets of sandy clay. [GLACIOFLUVIAL DEPOSITS]		
3.00	SPT	N = 8 (3,2/2,1,2,3)		(0.90) 3.80		Firm brown sandy silty CLAY.		
4.00	SPT	N = 21 (5,5/5,5,5,6)		(0.20) 4.00		Stiff orangeish brown slightly gravelly CLAY. Gravel is rounded, fine to medium of chalk and chert.		
						Borehole Terminated @ 4.00m		

1.0
2.0
3.0
4.0
5.0

General Remarks:
1) Borehole stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole installed with gas and groundwater monitoring ancillaries.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS09

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	BH	AM	444627, 303088	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over dark brown slightly sandy gravelly clayey TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
						Medium dense orangish brown slightly gravelly SAND. Gravel is rounded, fine to medium of chert. [GLACIOFLUVIAL DEPOSITS]		
1.00	SPT	N = 22 (4,4/5,5,6,6)				1.0		
						Becoming damp from 1.10m.		
						Pocket of orangeish brown clayey gravelly SAND between 1.60m - 1.90m.		
2.00	SPT	N = 5 (2,1/2,1,1,1)				2.0		
				(3.70)		Becoming loose and wet from 2.00m.		
3.00	SPT	N = 10 (2,2/3,2,2,3)				3.0		
						Becoming medium dense.		
4.00	SPT	N = 13 (2,3/3,3,3,4)		4.00		4.0		
				(0.10) / 4.10		Firm grey CLAY. [OADBY MEMBER]		
						Borehole Terminated @ 4.10m		
						5.0		

General Remarks:
1) Borehole stable.
2) Groundwater encountered at 2.00m.
3) No evidence of contamination identified.
4) Borehole terminated at 4.10m after reaching target depth.
5) Borehole backfilled with arisings upon completion.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS10

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	BH	AM	444484, 303045	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is rounded, fine to coarse of quartz.		
				(0.60) 0.90		Brown gravelly slightly clayey SAND. Gravel is rounded, fine to medium of chert. [GLACIOFLUVIAL DEPOSITS]		
1.00	SPT	N = 18 (4,4/5,4,4,5)		(1.60) 2.50		1.0 Mediumd dense orangeish brown slightly gravelly SAND. Gravel is rounded, fine to medium of chert. [GLACIOFLUVIAL DEPOSITS] Becoming wet from 1.50m. 2.0		
2.00	SPT	N = 20 (4,4/4,4,6,6)						
				(0.40) 2.90		Orangeish brown sandy very gravelly CLAY. Gravel is rounded, fine to medium of chert. [GLACIOFLUVIAL DEPOSITS]		
3.00	SPT	N = 18 (3,4/4,4,4,6)		(1.10) 4.00		3.0 Medium dense reddish brown slightly clayey SAND. [GLACIOFLUVIAL DEPOSITS] 4.0 Becoming loose at 4.00m.		
4.00	SPT	N = 8 (1,2/2,2,2,2)						
						5.0 Borehole Terminated @ 4.00m		

General Remarks:
1) Borehole stable.
2) Groundwater encountered at 1.50m.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole backfilled with arisings upon completion.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Registered Number: 11882468 Tel: 0115 704 3950 Email: Enquiries@pjs-geo.co.uk

Site Name:				Client:		Trial Pit ID:
Brascote Lane, Newbold Verdon				Richborough Estates		WS11
Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	BH	AM	444576, 303034	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is rounded, fine to coarse of quartz.		
				(0.60) 0.90		Firm light brown gravelly CLAY. Gravel is rounded to sub-angular, fine to coarse of chert and chalk.		
1.00	SPT	N = 14 (1,2/3,3,4,4)		(0.30) 1.20		1.0 Reddish brown clayey SAND. [GLACIOFLUVIAL DEPOSITS]		
				(0.90) 2.10		2.0 Stiff grey gravelly CLAY. Gravel is rounded to sub-angular, fine to coarse of chert and chalk. [GLACIOFLUVIAL DEPOSITS]		
2.00	SPT	N = 28 (3,4/6,6,7,9)		(0.20) 2.30		Reddish brown slightly clayey SAND. Strata is wet. [GLACIOFLUVIAL DEPOSITS]		
3.00	SPT	N = 14 (2,2/3,2,4,5)		(1.70) 4.00		3.0 Very stiff grey gravelly CLAY. Gravel is rounded, fine to medium of chert and chalk. [OADBY MEMBER]		
4.00	SPT	N = 26 (4,4/5,6,7,8)				4.0 Borehole Terminated @ 4.00m		
						5.0		

General Remarks:
1) Borehole cased between to 2.00m due to unstable sand stratas.
2) Groundwater encountered at 2.10m during drilling rising to 1.00m below ground level after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole installed with gas and groundwater monitoring ancillaries.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS12

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	NB	AM	444776, 303127	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over dark brown clayey gravelly TOPSOIL. Gravel is rounded, fine to coarse of quartz.		
				(0.70)		Firm light brown mottled orange and grey slightly sandy gravelly CLAY. Gravel is rounded, fine to medium of quartz. Occasionally very sandy. (PROBABLY ALLUVIUM)		
0.90	D1							
1.00	SPT	N = 7 (1,2/2,1,2,2)		1.10		Becoming wet from 1.00m.		
				(2.90)		Loose reddish brown slightly gravelly SAND. [GLACIOFLUVIAL DEPOSITS] Pockets of sandy clay at 1.20m. Pockets of sandy clay at 1.80m. Low recovery between 2.00m - 4.00m.		
2.00	SPT	N = 9 (1,1/3,2,2,2)						
3.00	SPT	N = 4 (1,0/1,1,1,1)						
4.00	SPT	N = 15 (1,1/2,4,4,3)		4.00				
						Borehole Terminated @ 4.00m		

1.0
2.0
3.0
4.0
5.0

General Remarks:
1) Borehole stable.
2) Groundwater encountered during drilling at 1.00m, rising to 0.50m below ground level after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole installed with gas and groundwater monitoring ancillaries.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Kingston on Soar, Nottingham, NG11 0DP.
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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS13

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	BH	AM	444877, 303123	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown slightly clayey sandy gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
				(0.40) 0.80		Orangeish brown very gravelly clayey SAND. Gravel is angular to sub-rounded, fine to coarse of sandstone, quartz, chert and lignite. [GLACIOFLUVIAL DEPOSITS]		
0.90	D1					Firm reddish brown very gravelly very sandy CLAY. Gravel is angular to sub-rounded, fine to coarse of sandstone, quartz, chert and lignite with pockets of clayey sand. [GLACIOFLUVIAL DEPOSITS]		
1.00	SPT	N = 10 (1,1/2,2,3,3)				1.0		
						Becoming mottled orange and grey.		
2.00	SPT	N = 11 (1,3/3,2,3,3)		(2.70)		2.0		
						Becoming wet from 2.50m.		
						Low recovery between 2.60m - 3.50m.		
3.00	SPT	N = 14 (5,4/4,3,3,4)				3.0		
				3.50				
				(0.50) 4.00		Medium dense reddish brown very gravelly clayey SAND. Gravel is angular to sub-rounded, fine to coarse of sandstone, quartz, chert and lignite. [GLACIOFLUVIAL DEPOSITS]		
4.00	SPT	N = 11 (1,0/1,3,4,4)				4.0		
						Borehole Terminated @ 4.00m		
						5.0		

General Remarks:
1) Borehole stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole installed with gas and groundwater monitoring ancillaries.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS14

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	NB	AM	444740, 303083	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.20) 0.20		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
1.00	SPT	N = 6 (1,1/1,1,2,2)		(1.60) 1.80		Firm brown mottled orange and grey gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse of sandstone, quartz, chert and lignite.		
1.20	D1					Becoming soft at 1.00m.		
2.00	SPT	N = 7 (1,1/2,1,2,2)		(2.20) 4.00		Soft to firm grey gravelly occasionally sandy CLAY. Gravel is angular, fine of lignite and chalk. Low recovery between 2.00m - 4.00m. Strata becomes wet at 2.10m. [OADBY MEMBER]		
3.00	SPT	N = 8 (2,2/2,1,2,3)						
4.00	SPT	N = 11 (2,2/3,3,2,3)				Borehole Terminated @ 4.00m		

1.0 2.0 3.0 4.0 5.0

General Remarks:
1) Borehole stable.
2) Groundwater encountered during drilling at 2.10m rising to 0.60m below ground level after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole backfilled with arisings upon completion.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS15

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	NB	AM	444819, 303087	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.40) 0.40		Crop stubble over brown clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
1.00	SPT	N = 9 (2,3/3,2,2,2)		(3.60)		Loose orangeish brown gravelly very clayey SAND. Gravel is angular to sub-rounded, fine to coarse of sandstone, quartz, chert and lignite. [GLACIOFLUVIAL DEPOSITS] 1.0 Pockets of sandy CLAY between 1.10m - 2.10m.		
2.00	SPT	N = 7 (0,1/1,2,2,2)				2.0 Becoming slightly silty from 2.10m. Becoming wet at 2.20m.		
3.00	SPT	N = 6 (1,1/1,1,2,2)				3.0 Low recovery from 3.00m.		
4.00	SPT	N = 13 (1,2/3,3,3,4)		4.00		4.0 Becoming medium dense at 4.00m.		
						Borehole Terminated @ 4.00m 5.0		

General Remarks:
1) Borehole stable.
2) No groundwater encountered during drilling. Groundwater rose to 0.50m below ground level after completion.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole backfilled with arisings upon completion.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS16

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	NB	AM	444770, 303039	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.30) 0.30		Crop stubble over dark brown clayey gravelly TOPSOIL. Gravel is rounded, fine to coarse of quartz.		
				(0.70) 1.00		Firm brown mottled grey and orange gravelly sandy CLAY. Gravel is rounded, fine to coarse of chert, sandstone and lignite.		
1.00	SPT	N = 6 (1,1/1,1,2,2)		(0.30) 1.30		Soft to firm grey gravelly CLAY. Gravel is angular, fine to medium of chalk, mudstone and lignite. (PROBABLE ALLUVIUM)		
				(0.20) 1.50		Reddish brown gravelly SAND. [GLACIOFLUVIAL DEPOSITS]		
2.00	SPT	N = 10 (1,1/2,2,3,3)		(1.40) 2.90		Firm to stiff grey gravelly CLAY. Gravel is angular, fine to medium of chalk, mudstone and lignite. [GLACIOFLUVIAL DEPOSITS]		
3.00	SPT	N = 9 (2,2/2,3,2,2)		(1.10) 4.00		Loose reddish brown gravelly clayey SAND. Strata is wet. [GLACIOFLUVIAL DEPOSITS] Low recovery between 3.00m - 4.00m.		
4.00	SPT	N = 8 (2,2/2,1,1,4)				Borehole Terminated @ 4.00m		

General Remarks:
1) Borehole stable.
2) Groundwater encountered at 2.90m.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole backfilled with arisings upon completion.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS17

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	BH	AM	444874, 303032	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.20) 0.20		Crop stubble over dark brown sandy clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
1.00	SPT	N = 9 (2,2/3,2,2,2)		(1.30) 1.50		Loose orangeish brown slightly clayey gravelly SAND. Gravel is angular to sub-rounded, fine to coarse of sandstone, quartz, chert and lignite. [GLACIOFLUVIAL DEPOSITS]		
2.00	SPT	N = 21 (4,4/6,7,4,4)		(1.50) 3.00		Firm brown very sandy gravelly CLAY. Gravel is angular to sub-rounded, fine to coarse of sandstone, quartz, chert and lignite. [GLACIOFLUVIAL DEPOSITS]		
3.00	SPT	N = 8 (1,1/1,2,2,3)		(0.50) 3.50		Soft brown silty CLAY. Strata is wet. [GLACIOFLUVIAL DEPOSITS]		
				(0.50) 4.00		Firm brown silty gravelly CLAY. Gravel is angular, fine of lignite. [GLACIOFLUVIAL DEPOSITS]		
4.00	SPT	N = 11 (1,3/3,2,3,3)				Borehole Terminated @ 4.00m		

General Remarks:
1) Borehole stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m after reaching target depth.
5) Borehole backfilled with arisings upon completion.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)

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Site Name:	Client:	Trial Pit ID:
Brascote Lane, Newbold Verdon	Richborough Estates	WS18

Job Number:	Date Logged:	Logged By:	Checked By:	Coordinates:	Ground Level:	Scale:
PJSG21-47	21/02/2022	BH	AM	444826, 302989	-	1:25

Sheet 1 of 1

Samples & In-Situ Testing			Strata Details					
Depths	Type	Test Results	Reduced Level	Depth (Thickness)	Legend	Strata Description	Water	Backfill
				(0.20) 0.20		Crop stubble over dark brown sandy clayey gravelly TOPSOIL. Gravel is sub-rounded to sub-angular, fine to coarse of quartz.		
1.00	SPT	N = 9 (1,2/2,1,3,3)		(0.90) 1.10		Firm orangeish brown slightly gravelly CLAY. Gravel is rounded, fine to medium of chert. [PROBABLE ALLUVIUM]		
2.00	SPT	N =10 (2,3/2,2,3,3)		(2.90)		Firm reddish brown slightly sandy slightly gravelly CLAY. Gravel is sub-rounded to sub-angular, fine to coarse of chert, lignite, sandstone, mudstone and quartz. [GLACIOFLUVIAL DEPOSITS] Becoming sandy at 1.50m. Becoming gravelly at 2.50m.		
3.00	SPT	N = 2 (1,0/1,0,0,1)				Becoming very soft at 3.00m with low recovery between 3.00m - 4.00m.		
4.00	SPT	N = 6 (1,1/1,2,2,1)		4.00		Borehole Terminated @ 4.00m		

General Remarks:
1) Borehole stable.
2) No groundwater encountered.
3) No evidence of contamination identified.
4) Borehole terminated at 4.00m due to reaching target depth.
5) Borehole installed with gas and groundwater monitoring ancillaries.

Dimensions:

Plant Used:
Premier Compact 110 (Dynamic Sampling Ltd)