

12th December 2022

21.08.016a

Ingleton Wood LLP
10 12 Alie Street
London
E1 8DE

For the attention of Nicol Perryman

Dear Nicol,

Supplementary Ground Gas Flux Monitoring – Land at Rear of 163 to 173 The Roundway, Tottenham, London, N17 7HE

INTRODUCTION

We refer to the findings of our previously undertaken Ground Investigation report, reference, 21.08.016, issued in November 2021. This report summarised the findings of two ground gas monitoring visits undertaken in October 2021 using traditional monitoring well standpipes. The previous investigation encountered variable thicknesses of Made Ground and elevated Carbon Dioxide levels and flow rates during the ground gas monitoring. Following the issue of the report, it was agreed with the client that additional monitoring be undertaken to further assess the ground gas risk at the site.

SCOPE OF THE INVESTIGATION

The high groundwater table in the area can preclude the use of traditional methods for undertaking ground gas monitoring given that the monitoring zone becomes saturated. A high groundwater table can cause a piston effect inside a monitoring well leading to elevated flows being recorded within monitoring wells.

It was therefore proposed to undertake flux box monitoring over one day on site. The results of this round of flux box testing have been combined with the findings of the two ground gas monitoring visits totalling three monitoring events in total.

PROPOSALS

It is proposed to redevelop the site to accommodate a single storey pre-fabricated/modular residential property to comprise five units with associated access for emergency service vehicles and paving and soft landscaping surrounding the units. A proposed site layout plan is provided in Appendix A.

The report is based upon the above development proposals and the existing ground levels. Should either of these alter significantly following issue of this report, then the contents will require re-evaluation.

FLUX BOX TEST METHODOLOGY

Flux box testing was undertaken following the principals presented in the current editions of Environment Agency Wales's Publication reference LFTGN07 v2 dated 201, BS 8576:2013 "Guidance on investigations for ground gas" and CIRIA C665 Assessing risks posed by hazardous ground gases to buildings dated 2007. Reference has also been made to Landfill methane emissions measured by enclosure and atmospheric tracer methods by Czepiel et al., 1996 and the US Environmental protection Agency Measurement of gaseous emission rated from land surfaces using an emission isolation flux chamber. User's guide". EPA 600/8-86-008 (NTIS PB-223161).

The core objective of a passive flux box survey is to identify the total releases of methane (CH₄) from the surveyed area and is designed to mimic the gas conditions within the sub-floor void of a building. However, fluxes of other gases such as carbon dioxide (CO₂), carbon monoxide (CO), di-hydrogen sulphide (H₂S) and oxygen (O₂) can also be monitored.

The flux box consists of an enclosure of known volume and footprint with two ports to the upper surface allowing the user to equalise the pressure between the flux box and the outer space and to collect gas readings continuously or at regular intervals. The flux box used had dimensions of 600mm x 1,200mm x 300mm and a volume of 0.165m³.

Prior to commencement of testing, and in order to minimize dangers from/to buried services, the proposed locations were scanned using a Cable Avoidance Tool in line with the service plans provided by the client. This was performed both as a safety measure as well as to prevent preferential inflow along service runs.

A total of five flux box tests were performed at five locations, (FLB01 to FLB05) on the 4th November 2022 with one test per location.

Flux box test FLB03 was located to the northwest of the proposed building, FLB04 and FLB05 to the northeast and FLB02 to the south-southwest. FLB01 was located further to the east of the site.

FLB03 was located between CT03 and BH01, with FLB04 adjacent to CT02 and CLB05 adjacent to CT01.

It is understood that some additional monitoring points were put down by a different contractor in November 2022 and are noted on the plan as TH1 to TH4. FLB02 was put down adjacent to TH2 and FLB01 adjacent to TH1.

Details for these boreholes such as their base depth or construction of the well had not been provided to ListersGeo at the time of writing and hence these results should be treated with due circumspection. However, the monitoring wells (TH1 to TH4) were for ground gas content and groundwater levels during the third monitoring visit on the 4th November 2022. This information has been used in this report to assist with the ground gas risk assessment.

Prior to the flux box testing, holes were excavated using hand digging tools at each test location, FLB01 to FLB05, to in order to provide a preferential gaseous-flow pathway from deeper strata during the duration of the tests. Holes of 600mm wide and 1,200mm long were excavated down to a maximum depth of 100mm.

Prior to the fluxes boxes being placed, and following the removal of vegetation and up to 100mm of topsoil, the test area was left exposed for a few minutes to allow dispersion of the small amounts of volatile organic compounds (VOCs) that naturally arise from the removal of vegetation/damage to plants. The flux boxes were sealed on the ground using a mixture of damp sand and bentonite powder around the perimeter. A 25kg weight was placed on top of the flux box in order to help keep it in place and to prevent breaking of the seal by wind action.

The flux box tests were placed as close to the proposed building as possible, with one test roughly on each side of the building, and in consideration of the site levels, the thickness of Made Ground recorded by our previous investigation beneath the site and taking into account the previous gas readings recorded by the two previous ground gas monitoring visits.

On the 4th November, flux box tests FLB01 to FLB05 were monitored straight after installation, with the test running for 45 minutes, in accordance with the LFTGN07 standard. The pressure in the flux box was equalised prior to the testing commencing. A flow rate measurement was taken once the pressure in the box had been equalised. Monitoring was undertaken using a calibrated Geotech GA 5000 gas analyser to monitor Carbon Dioxide, Oxygen and Methane.

The flux box data is used to calculate the flux of gas (the flow/movement of the gas) and the correlation coefficient (r^2) shows an association between the concentration of the gas over time.

GROUND CONDITIONS

The exploratory work from the previous investigation has shown the soils beneath the site to comprise a layer of Made Ground or Topsoil overlying London Clay Formation to depths of between 0.10m and 1.80m, represented in general by a firm, becoming stiff with depth, brown, mottled light grey, slightly gravelly, locally slightly sandy, silty clay, locally with clayey silt laminations. Gravel was of flint at the top of the formation and of mudstone and carbonate concretions at depth. Below depths of around 5.0m the formation was grey brown. It appears that some of the vegetation and Topsoil/Made Ground has been stripped since the original ground investigation undertaken in October 2021.

Stratum	Locations encountered	Top of stratum (m)	Base of stratum (m)	Thickness (m)	Comments
Topsoil	All exploratory holes except HA03	0.0 and 0.65	0.1 to 0.9	0.1 to 0.6	Buried Topsoil from 0.65m to 0.90m in CT03
Made Ground	BH01, CT01, CT03, HA01, HA03	0.0 to 0.60	0.65 to 1.8*	0.25 to 1.6*	*Where the base was encountered
London Clay Formation	All exploratory holes except HA01 and HA03	0.1 to 1.8*	>15.45	13.65	*where encountered

The soils removed from the hand pits beneath FLB01 to FLB05 presented information of the topsoil into which the flux box tests were sealed. Topsoil comprised of brown, slightly organic, slightly sandy, slightly gravelly silt or clay with gravel of flint, brick, and occasional fragments of pottery. Further information about the underlying strata can be found in the trial hole logs (Enclosures).

COMBINED GROUNDWATER MONITORING RESULTS

Boreholes CT01, CT02 and TH1 to TH4 were monitored for groundwater. The results of the groundwater monitoring are summarised below together with ground levels at boreholes of known elevation.

The first phase of field works encountered groundwater as a seepage in CT01 at 0.8m in the Made Ground during the fieldwork with the borehole being dry after 20 minutes; and in CT02 at 5.0m in the London clay formation.

Groundwater monitoring carried out as part of the previous investigations on two occasions (20th October 2021, 27th October 2021) followed by one round of groundwater monitoring (4th November 2022) during the flux box testing as presented below:

Monitoring date and groundwater measurements:		20 th October 2021		27 th October 2021		4 th November 2022	
Monitoring Location	Elevation (mAOD)	m bgl	mAOD	m bgl	mAOD	m bgl	mAOD
CT01	+14.10	0.87	+13.23	0.73	+13.33	0.87	+13.23
CT02	+14.40	1.50	+12.6	0.72	+13.38	*-	*-
TH1	-					0.2	-
TH2	-					1.6	-
TH3	-					1.8	-
TH4	-					0.9	-

Notes: * CT02 could not be monitored on the 4th November as it appeared to have been damage/removed during the vegetation clearance.

COMBINED GROUND GAS MONITORING

Ground gas monitoring was carried out in the monitoring wells installed in CT01 and CT02 as a part of this investigation, on two occasions (20th October 2021, 27th October 2021) followed by one round of ground gas monitoring with the flux box method (4th November 2022), using a calibrated Geotech GA 5000 gas analyser. The response zones of the standpipes are detailed below:

Well	Response Zone (m)	Stratum
CT01	1.0 to 3.0	London Clay Formation
CT02		

The results of the gas monitoring based from monitoring wells CT01 and CT02 is presented below:

Parameter	Range	Comments
Oxygen (%v/v)	10.0 to 20.0	High flow rates may be linked to a saturated response zone and the low oxygen and high carbon dioxide to microbial respiration.
Carbon Dioxide (%v/v)	1.0 to 8.1	
Methane (%v/v)	<0.1	
Flow rate (l/h)	0.0 to 3.3	

The results of the gas monitoring based on the additional monitoring wells, TH1 to TH4, installed by a different contractor with the depth of the response zone and strata being unknown to Listers, is presented below:

Parameter	Range	Comments
Oxygen (%v/v)	17.0 to 19.4	High flow rates may be linked to a saturated response zone and the low oxygen and high carbon dioxide to microbial respiration.
Carbon Dioxide (%v/v)	1.1 to 2.0	
Methane (%v/v)	<0.1	
Flow rate (l/h)	0.0 to 26.0	

The results of the gas monitoring based on the flux box testing in FLB01 to FLB05 is presented below:

Parameter	Range	Comments
Oxygen (%v/v)	20.3 to 21.6	Normal ranges for non-gassing ground.
Carbon Dioxide (%v/v)	0.1 to 0.3	
Methane (%v/v)	<0.1	
Flow rate (l/h)	0.0 to 0.2	

Falling pressure conditions were recorded during the monitoring in October 2021; and rising but low conditions during the supplementary monitoring on the 4th November 2022. During the supplementary visits on the 4th November 2022 barometric pressure was rising from low to high and pressure readings fluctuated from 1009mB to 1013mB while ambient air temperature was around 4°C during the test period.

Elevated flow rates and borehole pressures have been recorded on site in boreholes CT01 and TH1, located in the east of the site. The soils in these positions is considered to be comprise of Topsoil down to around 0.6m, underlain by Made Ground down to around 0.9m with the London Clay Formation at depth.

The permeability testing has also shown the London clay to be impermeable. It is therefore considered that the high flow rates and borehole pressures are linked to the rise in the water levels and may be also linked to initial microbial respiration in the excavation for the standpipe due to a saturated response zone, resulting in low oxygen-high carbon dioxide in the boreholes rather than long term high actual flow rates/ground gas. This has been supported by the results of the flux box testing.

The correlation coefficient (r^2) from the flux box testing was less than 0.8 and the change in concentration of methane flux was less than 5mg/m³ for the first 30 minutes of the flux box test. The highest recorded reading lies within the monitoring instrument's margin of error (0.2%) and a constant rise in the concentration of methane within the chamber was not recorded. It is therefore possible that the methane flux may be less than the lower detection limit for methane and carbon dioxide.

UPDATED GROUND GAS RISK ASSESSMENT

The results of the borehole standpipe gas monitoring have revealed that levels of carbon dioxide gas up to 8.1% and methane gas below the limit of detection <0.1% are being produced in the ground. Flows rate of between 0.0l/hr and up to 26l/hr have been recorded.

The subsequent flux box testing has not identified any significantly elevated levels of Carbon Dioxide or Methane, normal atmospheric levels of Oxygen, and with no significant gas flow or methane flux recorded.

GROUND GAS SCREENING VALUES

The results have been evaluated with reference to Code of practice for the characterization and remediation from ground gas in affected developments, BS 8485:2019.

Using the maximum carbon dioxide reading of 8.1% with the highest recorded absolute flow rate of ± 26 l/hr, the maximum gas screening value is 2.106l/hr.

However, flux box testing was undertaken at the same time as the recording of some of the high flow rates recorded in boreholes. It is therefore considered that whilst elevated flows have been recorded in boreholes, they are not likely to be experienced beneath buildings. Using the maximum flow rates from the flux box testing would give a GSV of 0.0162.

Given the absence of an obvious source and the fact that elevated flow appears to be linked to rising groundwater levels within boreholes, it is considered that the previous classification of the site with respect to ground gas is sufficient and does not need to be increased to a higher level of protection as discussed below.

GROUND GAS PROTECTION MEASURES

Carbon Dioxide and Methane Gas

Based on the two monitoring visits undertaken to date, the results have been provisionally evaluated with reference to Code of practice for the characterization and remediation from ground gas in affected developments, BS8485. It is considered that as a precaution, ground gas protection measures to NHBC Amber 1 or Characteristic Situation (CS) 2 in accordance with BS8485, are adopted, as carbon dioxide levels exceed 5%. The NHBC guidance is specifically derived for an 8m by 8m house and relies upon the building having a 150mm under slab void.

Table 4 of BS8485, provides minimum gas protection scores for measures to be incorporated into the building design. Various gas protection design systems for the floor slabs, ventilation measures and gas resistant membrane are detailed in Tables 5, 6 and 7 of the document in order to achieve the required level of protection.

Where NHBC design measures are required then high level gas protection measures will also be necessary. This includes; installing a high level gas protection membrane to create a permeability contrast to prevent ingress of gas into buildings and installed as prescribed in BRE414; incorporating ventilation of the sub floor void designed to provide a minimum of one complete volume change per 24 hours; ensuring membranes used are fitted by a specialist contractor and are fully certified.

If undertaken, the installation of the membrane should be validated in accord with CIRIA guidance C735.

Where a suspended slab and gas protection are both required, Cordek can provide a combined vented under slab void former, Cellvent, with an integrated membrane to provide varying degrees of gas protection.

Consideration could be given to continuous ground gas monitoring to explore the feasibility of adopting reduced gas preventative measures, if required. Continuous ground gas monitoring can provide more detailed information under changing environmental conditions. This would increase the data set further and may enable less conservative gas protection measures to be designed for the development.

Radon Gas

The BGS advises that no radon gas protection measures are necessary for buildings without underground rooms at this site.

REGULATORY APPROVAL

The above conclusions regarding ground gases should be agreed with the relevant local Regulatory Authority as soon as possible prior to development, to reduce any potential delays to the development should they require further clarification of this report or further monitoring/testing.

We trust this information is satisfactory. In the event of any queries please contact us.

Yours sincerely



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Checked by
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MGeol(Hons), FGS



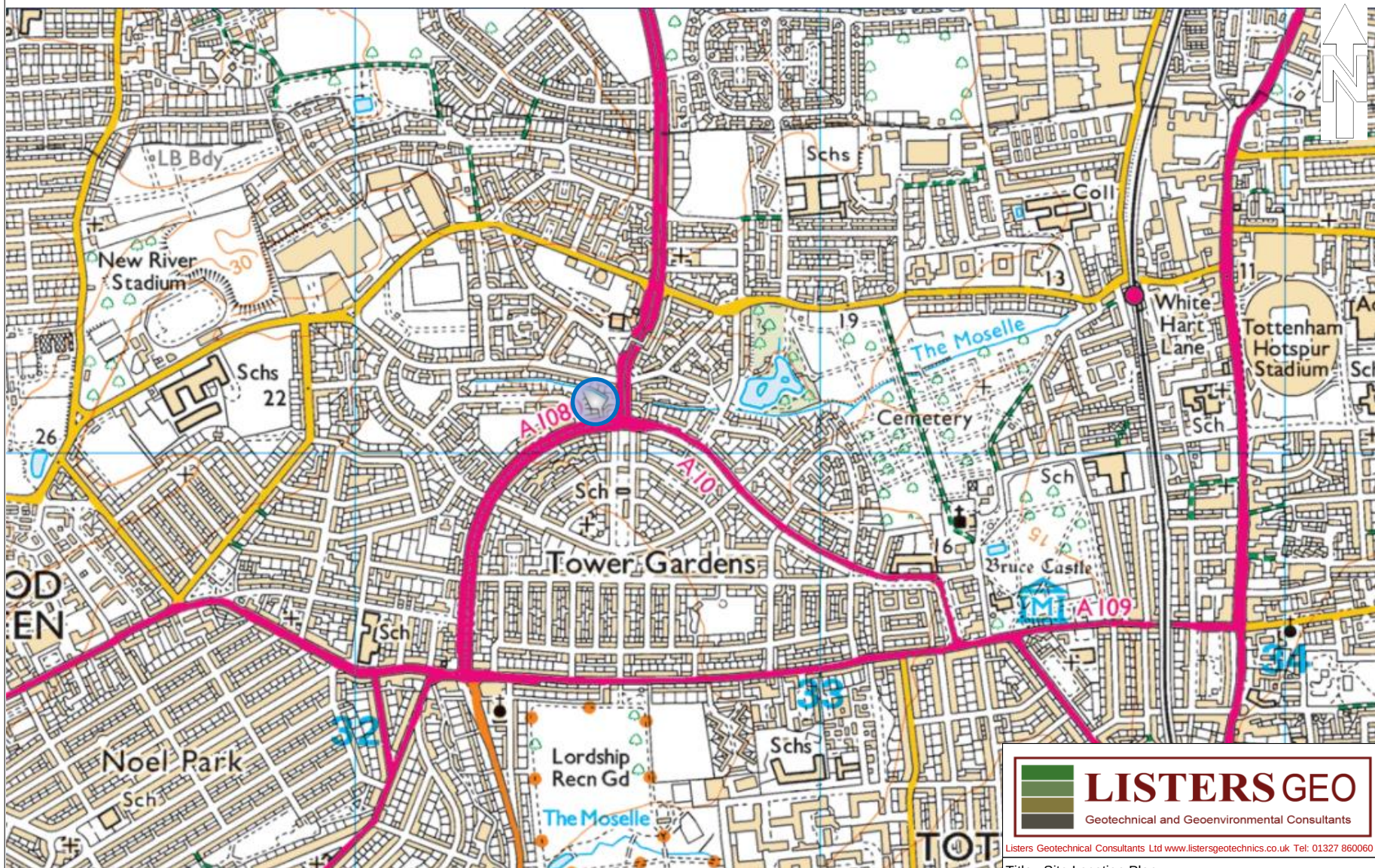
Reviewed by
Ian Evetts
Managing Director
HNC, MSc, FGS, CGeol, RoGEP

Enclosures:

- **Site Location Plan**
- **Exploratory Hole Location Plan: Pre-Development Plan**
- **Exploratory Hole Location Plan: Post-Development Plan**
- **Site Photographs**
- **Ground gas and Flux Box Monitoring Results**
- **Cable-tool Percussive Borehole Log**
- **Continuous Tube Sampler Borehole Logs**

References:

- British Standards BS 8576 (2013) Guidance on investigations for ground gas - Permanent gases and volatile organic compounds (VOCs).
- Environment Agency, (2010). Guidance on the management of landfill gas. Environment Agency, Bristol.
- CIRIA C665, (2007). Assessing risks posed by hazardous ground gases to buildings.
- Czepiel, Mosher & Harriss, "Landfill methane emissions measured by enclosure and atmospheric tracer methods"; Journal of Geophysical Research, 1996, Volume 101, 16, pp711-16,719.
- Environment Agency Wales LFTGN07 v2 (2010). Guidance on monitoring landfill gas surface emissions.
- US Environmental Protection Agency - USEPA (1986). "Measurement of gaseous emission rated from land surfaces using an emission isolation flux chamber. User's guide". EPA 600/8-86-008 (NTIS PB-223161).
- BSI, Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, BS 8485:2015+A1:2019, 2019



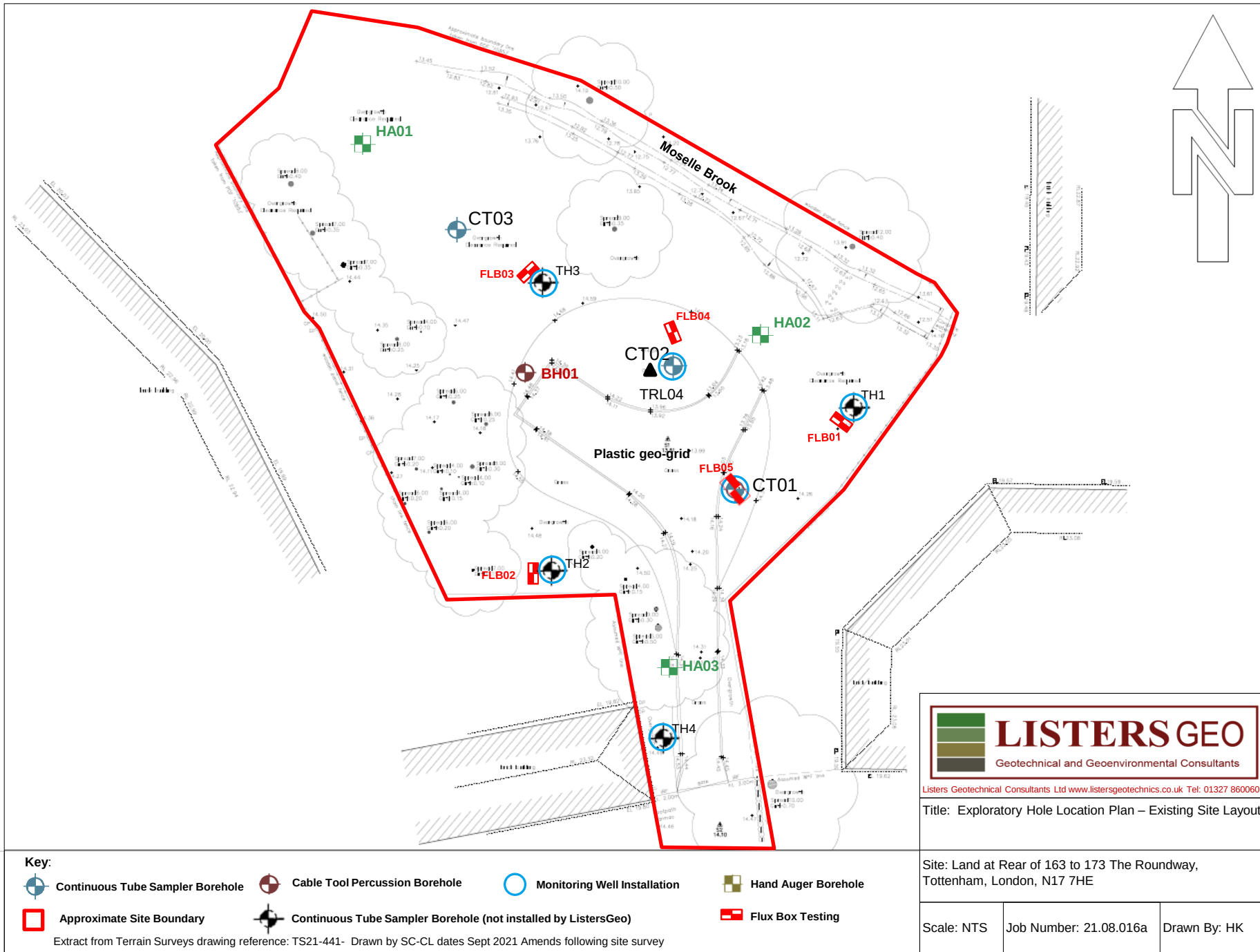
LISTERS GEO

Geotechnical and Geoenvironmental Consultants

Listers Geotechnical Consultants Ltd www.listersgeotechnics.co.uk Tel: 01327 860060

Title: Site Location Plan		
Site: Land at Rear of 163 to 173 The Roundway, Tottenham, London, N17 7HE		
Scale: NTS	Job Number: 21.08.016a	Drawn By: HK

Key:
 Approximate site location





	Continuous Tube Sampler Borehole		Cable Tool Percussion Borehole		Monitoring Well Installation		Hand Auger Borehole
	Approximate Site Boundary		Continuous Tube Sampler Borehole (not installed by ListersGeo)		Flux Box Testing		

Extract from plan provided by Ingleton Wood LLP Drawing No. RNDWAY-IW-XX-00-DR-A-0520 Status S2_29.07.2021



Listers Geotechnical Consultants Ltd www.listersgeotechnics.co.uk Tel: 01327 860060

Title: Exploratory Hole Location Plan – Proposed Site Layout

Site: Land at Rear of 163 to 173 The Roundway, Tottenham, London, N17 7HE

Scale: NTS

Job Number: 21.08.016a

Drawn By: HK



Site overview



Showing site entrance and adjacent plots

Site Photographs
November 2022

Report:
21.08.016a



Showing flux box tested area FLB01 adjacent to Plot 1.



Showing flux box tested area FLB03 adjacent on top of a mound of soil near the previously drilled CT03.



Showing previously drilled monitoring well CT01 (recovered after vegetation clearance).



Showing Moselle Brook on the northeast site boundary

Site Photographs
November 2022

Report:
21.08.016a



Showing culvert on the northeast site boundary



Views of the northeast site boundary

Site Photographs
November 2022

Report:
21.08.016a

Project: , Land Rear of 163-173, , The Roundway, London, N17 7HE

Date: 04/11/2022 **Ambient air temperature (°C):** 4
Time: From 09:26am to 15:33am **Barometric pressure (mB):** 1013
Recorded by: HK **Barometric trend:** Rising but low
Equipment: Geotech GA5000 gas monitor and dip-meter **Weather conditions:** Clear

Groundwater monitoring

Hole ID	Ground level (mAOD)	Water depth (m)	Water level (mAOD)	Depth of pipe base (m)	Depth of flux box test (m) bgl	Tested surface of flux box
CT01	+14.10	0.5	+13.60	3.00		
TH1		0.2		3.00		
TH2		1.6		3.00		
TH3		1.8		3.00		
TH4		0.9		3.00		
FLB01		dry			0.1	Topsoil
FLB02		dry			0.1	Topsoil
FLB03		dry			0.1	Topsoil
FLB04		dry			0.1	Topsoil
FLB05		dry			0.1	Topsoil

Gas monitoring

Hole ID	Methane CH ₄ (%v/v)	Carbon Dioxide CO ₂ (%v/v)	Oxygen O ₂ (%v/v)	Flow Rate (l/h)	Well Pressure (mBar)	PID* (ppm)	Remarks
CT01	<0.1	4.5	16.8	1.7	39.4		
TH1	<0.1	1.3	19.4	26.0	-52.60		
TH2	<0.1	2.0	18.2	0.2	0.00		
TH3	<0.1	1.9	17.0	0.0	0.16		
TH4	<0.1	1.1	18.3	0.3	-0.27		
FLB01	<0.1	0.1	21.6	0.1	-0.09		
FLB02	<0.1	0.1	21.6	0.1	-0.09		
FLB03	<0.1	0.3	21.2	0.0	-0.11		
FLB04	<0.1	0.2	20.3	0.1	-0.19		
FLB05	<0.1	0.2	21.6	0.2	-0.04		

SUMMARY OF GAS & GROUNDWATER MONITORING - 04.Nov.22

Report No.
21.08.016a

Project:	, Land Rear of 163-173, , The Roundway, London, N17 7HE
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Hole ID	Ground level (mAOD)	Water depth (m)	Water level (mAOD)	Depth of pipe base (m)	Remarks
CT01	+14.10	0.87	+13.23	3.00	
CT02	+14.40	1.50	+12.90	2.95	

[illegible]

SUMMARY OF GAS & GROUNDWATER MONITORING - 20.Oct.21	Report No. 21.08.016a
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Project:	, Land Rear of 163-173, , The Roundway, London, N17 7HE
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Weather conditions: Overcast

[illegible]

Hole ID	Methane CH ₄ (%v/v)	Carbon Dioxide CO ₂ (%v/v)	Oxygen O ₂ (%v/v)	Flow Rate (l/h)	Well Pressure (mBar)	PID* (ppm)	Remarks
CT01	<0.1	6.0	13.7	0.4	13.09		
CT02	<0.1	1.0	20.0	0.0	0.10		

Report No.
21.08.016a

Cable Percussive Borehole Log

Borehole No.

BH 01
Project Location: Land at Rear of 163, 173 Roundway, Tottenham, London N17 7HE

Co-ords: 532518E - 191114N

Project Number:
21.08.016

Level: 14.45 m AOD

Logged By:
Dates: 06/10/2021

 Adam Jones
to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Result					
		0.20			0.20	14.25		TOPSOIL	1
		0.50	D					Weeds over brown slightly organic slightly sandy slightly gravelly SILT. Gravel is sub-angular to sub-rounded of flint and brick gravel	
		0.50 - 1.00	B					MADE GROUND	2
		1.20	D					Firm grey brown slightly sandy slightly gravelly clayey SILT with occasional roots. Gravel is fine to medium sub-angular to sub-rounded of flint, quartzite and occasional brick	
		1.20	SPT(S)	N=10 (3/2,2,3,3)					3
		1.70	D		1.80	12.65			
		2.00	D					LONDON CLAY FORMATION	4
		2.00	SPT(S)	N=13 (4/3,3,4,3)				Stiff brown mottled grey slightly sandy CLAY with occasional gravel-size carbonate concretions	
		2.50	D						5
		3.00	D						
		3.00	SPT(S)	N=12 (5/3,3,3,3)					6
		3.50	D						
		4.00	D						7
		4.00	SPT(S)	N=11 (4/2,3,3,3)					
		4.50	D						8
		5.00	D						
		5.00	SPT(S)	N=13 (5/3,3,3,4)					9
		5.50	D		5.50	8.95			
		6.00	D					LONDON CLAY FORMATION	10
		6.00 - 6.50	B					Stiff grey brown slightly gravelly CLAY. Gravel is sub-angular of carbonate concretions	
		6.00	SPT(S)	N=14 (5/3,3,4,4)					1
		6.50	D						
		7.00	D						2
		7.00	SPT(S)	N=14 (6/3,3,4,4)					
		7.50	D						3
		8.00	D						
		8.00	SPT(S)	N=16 (6/3,4,4,5)					4
		8.50	D						
		9.00	D						5
		9.00	SPT(S)	N=18 (6/4,4,5,5)					
		9.50	D						6
		10.00	D						

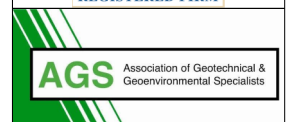
Borehole Diameter: 150mm

Casing Depth: 1.50m

Chiselling: None

Instrumentation: Backfilled with arisings

Groundwater: Not encountered

Remarks:


Cable Percussive Borehole Log

Borehole No.

BH 01
Project Location: Land at Rear of 163, 173 Roundway, Tottenham, London N17 7HE

Co-ords: 532518E - 191114N

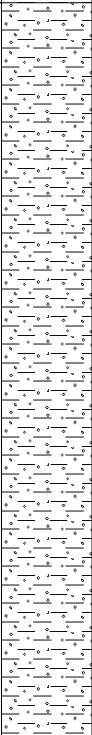
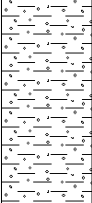
Project Number:
21.08.016

Level: 14.45 mAOD

Dates: 06/10/2021

Logged By:

 Adam Jones
to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Result					
		10.00	SPT(S)	N=17 (7/4,4,4,5)				LONDON CLAY FORMATION Stiff grey brown slightly gravelly CLAY. Gravel is sub-angular of carbonate concretions	
		11.00	D						11
		11.50	D						
		11.50	SPT(S)	N=18 (7/4,4,5,5)					
		12.00	D						12
		13.00	D						
		13.00	SPT(S)	N=22 (7/5,5,6,6)					13
		14.00	D					<u>- very stiff below 13.0m</u>	14
		15.00	D						
		15.00	SPT(S)	N=24 (7/5,6,6,7)					15
					15.45	-1.00		End of Borehole at 15.45m	16
									17
									18
									19
									20

Borehole Diameter: 150mm

Casing Depth: 1.50m

Chiselling: None

Instrumentation: Backfilled with arisings

Groundwater: Not encountered

Remarks:


Continuous Tube Sampler Log

Borehole No.

CT 01
Project Location: Land at Rear of 163, 173 Roundway, Tottenham, London N17 7HE

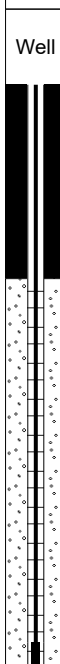
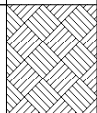
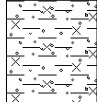
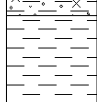
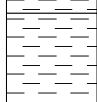
Co-ords: 532533E - 191104N

Project Number:
21.08.016

Level: 14.10 m AOD

Logged By:
Dates: 06/10/2021

 Adam Jones
to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Result					
		0.10 - 0.60	D					TOPSOIL Weeds over brown, slightly organic, slightly sandy slightly gravelly SILT. Gravel is sub-angular to sub-rounded of flint	
		0.60 - 0.90	D		0.60	13.50		MADE GROUND Soft orange brown CLAY with pockets of dark brown topsoil	
		0.90 - 1.50	D		0.90	13.20		LONDON CLAY FORMATION Firm grey brown slightly gravelly silty CLAY with clayey silt laminations. Gravel is sub-angular of flint and mudstone	1
		1.00	PP	1.5kg/cm ²					
		1.00	SPT(S)	N=6 (2/2,1,1,2)					
		1.25	PP	1.5kg/cm ²					
		1.50 - 2.00	D		1.50	12.60		LONDON CLAY FORMATION Firm grey brown slightly gravelly silty CLAY with clayey silt laminations. Gravel is sub-angular of mudstone	
		1.50	PP	1.8kg/cm ²					
		1.75	PP	2.2kg/cm ²					
		2.00 - 2.50	D						2
		2.00	PP	2.2kg/cm ²					
		2.00	SPT(S)	N=9 (3/2,2,2,3)					
		2.25	PP	2.5kg/cm ²					
		2.50 - 3.00	D						
		2.50	PP	2.5kg/cm ²					
		2.75	PP	2.8kg/cm ²					
		3.00 - 3.50	D						3
		3.00	PP	3.0kg/cm ²					
		3.00	SPT(S)	N=10 (3/2,2,3,3)					
		3.25	PP	3.0kg/cm ²					
		3.50 - 4.00	D						
		3.50	PP	4.0kg/cm ²					
		3.75	PP	3.5kg/cm ²					
		4.00 - 4.50	D						4
		4.00	PP	4.0kg/cm ²					
		4.00	SPT(S)	N=12 (4/3,3,3,3)					
		4.25	PP	3.0kg/cm ²					
		4.50 - 5.00	D		4.50	9.60		LONDON CLAY FORMATION Stiff dark grey brown CLAY	
		4.50	PP	3.0kg/cm ²					
		4.75	PP	3.5kg/cm ²					
		5.00 - 5.50	D						5
		5.00	PP	3.5kg/cm ²					
		5.00	SPT(S)	N=14 (4/3,3,4,4)					
		5.25	PP	3.2kg/cm ²					
		5.50 - 6.00	D						
		5.50	PP	3.2kg/cm ²					
		5.75	PP	3.2kg/cm ²					
		6.00	PP	3.5kg/cm ²	6.00	8.10		End of Borehole at 6.00m	6
									7

Borehole Diameter: 87mm to 57mm

Groundwater: Slight groundwater seepage at 0.80m bgl, dry on completion

Instrumentation: Gas/groundwater pipe installed to 3.00m bgl

Remarks:


Continuous Tube Sampler Log

Borehole No.

CT 02
Project Location: Land at Rear of 163, 173 Roundway, Tottenham, London N17 7HE

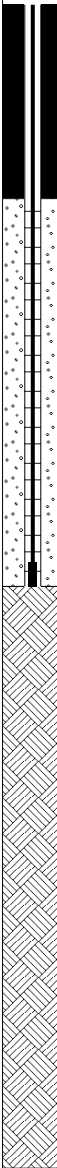
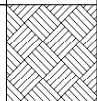
Co-ords: 532528E - 191114N

Project Number:
21.08.016

Level: 14.40 mAOD

Logged By:
Dates: 06/10/2021

 Adam Jones
to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Result					
		0.10 - 0.50	D					TOPSOIL Weeds over brown, slightly organic, slightly sandy slightly gravelly SILT. Gravel is sub-angular to sub-rounded of flint and brick	
		0.50 - 0.80	D		0.50	13.90		LONDON CLAY FORMATION Firm orange brown slightly gravelly CLAY. Gravel is fine to medium angular of flint	
		0.80 - 1.05	D		0.80	13.60		LONDON CLAY FORMATION Firm brown clay bound medium angular GRAVEL. Gravel is sub-angular of flint	1
		1.00	SPT(S)	N=10 (2/3,2,2,3)	1.05	13.35		LONDON CLAY FORMATION Firm brown mottled light grey slightly gravelly silty CLAY. Gravel is sub-angular of carbonate concretions and occasional mudstone	
		1.05 - 1.50	D						
		1.25	PP	2.0kg/cm ²					
		1.50 - 2.00	D						
		1.50	PP	2.5kg/cm ²					
		1.75	PP	3.2kg/cm ²					
		2.00 - 2.50	D						2
		2.00	PP	3.0kg/cm ²					
		2.25	SPT(S)	N=11 (4/2,3,3,3)					
		2.50 - 3.00	D						
		2.50	PP	2.0kg/cm ²					
		2.75	PP	3.2kg/cm ²					
		3.00 - 3.50	D						3
		3.00	PP	3.2kg/cm ²					
		3.25	SPT(S)	N=13 (3/3,3,3,4)					
		3.50 - 4.00	D						
		3.50	PP	3.5kg/cm ²					
		3.75	PP	3.5kg/cm ²					
		4.00 - 4.50	D						4
		4.00	PP	3.5kg/cm ²					
		4.25	SPT(S)	N=15 (4/4,3,4,4)					
		4.50 - 5.00	D						
		4.50	PP	3.5kg/cm ²					
		4.75	PP	3.2kg/cm ²					
		5.00 - 5.50	D		5.00	9.40			5
		5.00	PP	3.5kg/cm ²					
		5.25	SPT(S)	N=17 (6/4,4,4,5)					
		5.50 - 6.00	D						
		5.50	PP	3.0kg/cm ²					
		5.75	PP	3.5kg/cm ²					
		6.00	PP	3.5kg/cm ²	6.00	8.40			6
								End of Borehole at 6.00m	7

Borehole Diameter: 87mm to 57mm

Groundwater: Slight groundwater seepage at 5.00m bgl, dry upon completion

Instrumentation: Gas/groundwater pipe installed to 3.00m bgl

Remarks:


Continuous Tube Sampler Log

Borehole No.

CT 03
Project Location: Land at Rear of 163, 173 Roundway, Tottenham, London N17 7HE

Co-ords: 532516E - 191132N

Project Number:
21.08.016

Level: 14.60 mAOD

Logged By:
Dates: 06/10/2021

 Adam Jones
to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Result					
		0.10 - 0.40	D					TOPSOIL	
		0.40 - 0.65	D		0.40	14.20		Weeds over brown, slightly organic, slightly sandy slightly gravelly SILT. Gravel is sub-angular to sub-rounded of flint and brick	
		0.65 - 0.90	D		0.65	13.95		MADE GROUND	
		0.90 - 1.50	D		0.90	13.70		Firm brown slightly gravelly silty CLAY. Gravel is sub-angular of flint	
		1.00	PP	1.8kg/cm ²				TOPSOIL	1
		1.00	SPT(S)	N=8 (2/2,1,2,3)				Dark brown slightly organic slightly sandy slightly gravelly CLAY. Gravel is sub-angular to angular flint	
		1.25	PP	2.0kg/cm ²					
		1.50 - 2.00	D		1.50	13.10		LONDON CLAY FORMATION	
		1.50	PP	2.0kg/cm ²				Firm orange brown mottled brown silty slightly gravelly CLAY. Gravel is fine to medium angular to sub-rounded of flint	
		1.75	PP	2.5kg/cm ²					
		2.00 - 2.50	D					LONDON CLAY FORMATION	2
		2.00	PP	2.5kg/cm ²				Firm brown mottled light grey slightly gravelly silty CLAY with clayey silt laminations. Gravel is fine to medium sub-angular of mudstone and carbonate concretions	
		2.00	SPT(S)	N=11 (3/2,3,3,3)					
		2.25	PP	3.5kg/cm ²					
		2.50 - 3.00	D						
		2.50	PP	3.2kg/cm ²					
		2.75	PP	3.5kg/cm ²					
		3.00 - 3.50	D						3
		3.00	PP	3.8kg/cm ²				- stiff and with selenite crystals below 3.00m	
		3.00	SPT(S)	N=17 (4/4,4,4,5)					
		3.25	PP	4.0kg/cm ²					
		3.50 - 4.00	D						
		3.50	PP	3.8kg/cm ²					
		3.75	PP	4.0kg/cm ²					
		4.00 - 4.50	D						4
		4.00	PP	4.0kg/cm ²					
		4.00	SPT(S)	N=17 (5/4,4,4,5)					
		4.25	PP	4.0kg/cm ²					
		4.50 - 5.00	D						
		4.50	PP	4.0kg/cm ²					
		4.75	PP	3.8kg/cm ²					
		5.00 - 5.50	D		5.00	9.60		LONDON CLAY FORMATION	5
		5.00	PP	3.5kg/cm ²				Stiff dark grey brown CLAY	
		5.00	SPT(S)	N=18 (5/4,4,5,5)					
		5.25	PP	3.5kg/cm ²					
		5.50 - 6.00	D						
		5.50	PP	3.5kg/cm ²					
		5.75	PP	3.2kg/cm ²					
		6.00	PP	3.5kg/cm ²	6.00	8.60		End of Borehole at 6.00m	6
									7

Borehole Diameter: 87mm to 57mm

Groundwater: Not encountered

Instrumentation: Backfilled with arisings

Remarks:


Hand Auger Log

Borehole No.

HA 01
Project Location: Land at Rear of 163, 173 Roundway, Tottenham, London N17 7HE

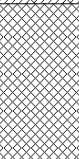
Co-ords: 532509E - 191132N

Project Number:
21.08.016

Level: 14.60 mAOD

Logged By:
Dates: 06/10/2021

 Adam Jones
to BS 5930:2015

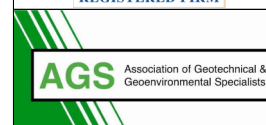
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	0.15	D		0.30	14.30		TOPSOIL Weeds over dark brown slightly sandy slightly gravelly CLAY with frequent roots. Gravel is sub-rounded to sub-angular of bricks, flint and pottery	
	0.45	D		0.55	14.05		MADE GROUND Firm brown mottled orange slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is fine to medium sub-rounded to sub-angular flint, brick, slate and small carbonate nodules	
							End of Borehole at 0.55m	

Method of excavation: Hand dug

Stability: Sides Stable

Groundwater: Not encountered

Hand Auger Dimensions: 0.20m W x 0.55m D

Remarks:


Hand Auger Log

Borehole No.

HA 03
Project Location: Land at Rear of 163, 173 Roundway, Tottenham, London N17 7HE

Co-ords: 532529E - 191087N

Project Number:
21.08.016

Level: 14.30 mAOD

Logged By:
Dates: 06/10/2021

 Adam Jones
to BS 5930:2015

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	0.30	D					MADE GROUND Weeds over brown black slightly sandy slightly gravelly CLAY with frequent roots and rootlets. Gravel is sub-rounded to sub-angular of brick, mortar, clinker and flint	
	0.85	D		0.70	13.60		MADE GROUND Firm brown mottled orange slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is fine to medium sub-rounded to sub-angular flint, brick, slate and small carbonate nodules	
				1.00	13.30		End of Borehole at 1.00m	1
								2

Method of excavation: Hand dug

Stability: Sides Stable

Groundwater: Not encountered

Hand Auger Dimensions: 0.20m W x 1.00m D

Remarks:
