Pinner Road, Northwood	SUBADRA Environmental - Geotechnical - Laboratory - Foundations 13 Triangle Business Park, Stoke Mandeville, HP22 5BL Tel: 01296 739400 Email: consultants@subadra.com

GEO-ENVIRONMENTAL INVESTIGATION REPORT

Report Prepared By:	Report Reviewed By:
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Client: Polaris Property Developments Limited	Subadra Consulting Ltd. Registered in England No. 4586038 Registered Office 13 Triangle Business Park, Stoke Mandeville, HP22 5BL	Report	IN22732 CL 002
		Date	July 2022
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Attachment One: Notice to Interested Parties
Attachment Two: Site Plans and Borehole Logs
Attachment Three: Analysis Certificates

1 Introduction

1.1 The Purpose of This Assessment

The site is located on the corner of Pinner Road and Chestnut Avenue in Northwood and comprises a second hand car dealership with offices. We understand that Polaris Property Developments Limited (Polaris) proposes to redevelop the site with a mixed commercial and residential scheme.

Prior to the commencement of the redevelopment works we have been commissioned by Polaris Property Developments Limited to carry out a combined environmental and geotechnical investigation at the site. The purpose of the assessment is twofold:

- An environmental assessment of soil and/or groundwater underlying the site to determine whether any contaminants present might pose an unacceptable (long-term) risk to future site residents and/or any nearby environmental receptors. Our environmental assessment was undertaken in accordance with the guidelines presented in the Environment Agency (2020) 'Land contamination risk management (LCRM)' documents and Environment Agency (2010) Guiding principles for land contamination (GPLC).
- To provide geotechnical information that is intended to provide information to assist in the design of foundations for the proposed building and any temporary works that may be required;

Your attention is drawn to the Notice to Interested Parties included as Attachment One.

1.2 The Scope of This Assessment

Our assessment of the site was carried out in the following parts:

- A review and refinement of our previous desk study comprising a review of information that is readily available in the public domain, including geology, hydrogeology and potential geo-hazards;
- A review of previous ground investigation report(s);
- Completion of a underground utilities survey of the site using passive and active radio detection techniques to identify the location of below ground services at the site and collection of public utility drawings for the sites locality to assist with locating public utilities that may be present;
- A walkover survey to identify visual signs of pollution or potentially polluting activities and any factors that might impact on the proposed development scheme;
- An intrusive site investigation comprising four boreholes drilled using our Comacchio Geo205 drilling rig, using a combination of percussive sampling and rotary (water-flush) rock coring;
- In situ and ex situ geotechnical field testing including SPT and pocket penetrometer testing;
- Logging of soil cores and the collection of soil samples;
- Carry out monitoring for hazardous ground gases on a single occasion.
- Analysis of representative soil samples for both chemical parameters (for waste classification purposes) and geotechnical parameters (for foundation design purposes);
- Chemical analysis of representative soil samples to assist in the completion of our environmental risk assessment;
- Compilation of a conceptual site model and, if applicable, completion of a Generic Quantitative Risk Assessment, in order to assess whether the site is considered suitable for use;

- Presentation of the geotechnical data obtained during our investigation;
- Provision of this report, which details the results of our environmental assessment and conclusions, and recommendations relating to temporary and permanent foundations and the presence of potential contaminants identified during our investigation.

All the activities comprising this assessment were carried out in accordance with the procedures set out in our Quality Manual.

1.3 Previous Reports Relating to the Site

As part of our environmental assessment we have reviewed the reports listed in the following table.

Our Ref.	Report Title	Prepared By	Prepared on Behalf of	Date of Issue	Report Reference
Ref.1	Soil Gas Survey Report	Delft Geotechnics UK Ltd	Shell UK Ltd	March 1994	C146/ CT137
Ref.2	Soil testing during tank and flowline removal report	DG environmental Ltd		February 1995	C230.68
Ref.3	Phase One Environmental Desk Study Report	Subadra Consulting Ltd	Polaris Property Developments Limited	April 2022	IN22732 CL 001

Our detailed review of these documents is provided in Table Two below and we have used information from these documents, where relevant, in other sections of this report.

Table One: Previous Environmental Reports Relating to the Site

Our Ref.	Summary of Results and Conclusions of Previous Works
Ref.1	This report presents the findings of a desk top review of the site and results of a soil gas survey (for hydrocarbon vapours) carried out in 1994, when the site was an operation petrol station. The report identified the site as being is underlain by London Clay followed by Reading Beds (clays and sand) and then the Upper chalk. There are three licensed water abstractions within a 2km radius. The report includes a review of the site's history as a petrol station, sourced from the Petroleum Officer. In 1987, product was identified in a stream close to the site. Integrity testing of the fuel tanks and lines at the petrol station identified no detectable leaks and no details on the volume of fuel lost were made available. Intrusive investigation works, carried out in response to the fuel in the stream, identified hydrocarbon product and a fuel recovery pump was installed and operated for three years, at which point fuel was no longer accumulating in remedial wells. The vapour survey comprised 45 soil gas probes (drilled at ~20mm diameter probe to ~900mm depth) and then screened using a Photo-ionisation Detection (PID) at 600mm and 900mm depths. VOC readings above 20ppm were recorded at ten locations, and exceeded 100ppm in a location between the the tanks and pump island. Six soil samples were also collected and analysed for TPH. All six of the soil samples returned concentrations of TPH between 50 and 100mg/kg. The factual report does not provide any recommendations for further work.

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Ref.2	This report presents the findings of soil testing carried out following tank and fuel line removal at the site in 1995. The report confirms six underground storage tanks were removed. These comprised 3No. 3,000 gallon and 3No. 8,000 gallon tanks (all split into compartments of 5,000 and 3,000 gallons. Eighteen soil samples were collected during the excavation works and tested using semi-quantitative methods. Analysis results showed seven samples recorded TPH concentrations <25mg/kg, six of the samples contained concentrations above 400mg/kg. The maximum concentration recorded was 1,000mg/kg. The report records that ~120m^3 of hydrocarbon impacted soil was removed from beneath the central forecourt (fuel lines) and the area between the central forecourt and sales building.
Ref.3	This report presents the findings of a Phase I desk-top assessment we carried out in support of the planning application for the site redevelopment. [This information is reproduced below].

Table Two: Review of Previous Environmental Works at the Site

1.4 Proposed Development Plans

We understand that Polaris proposes to redevelop the site with a mixed commercial and residential building. The commercial units and parking will form ground level with the upper two levels populated with nine flats. There will be a communal landscaped area within the development. A site plan showing the proposed development plan is provided below.

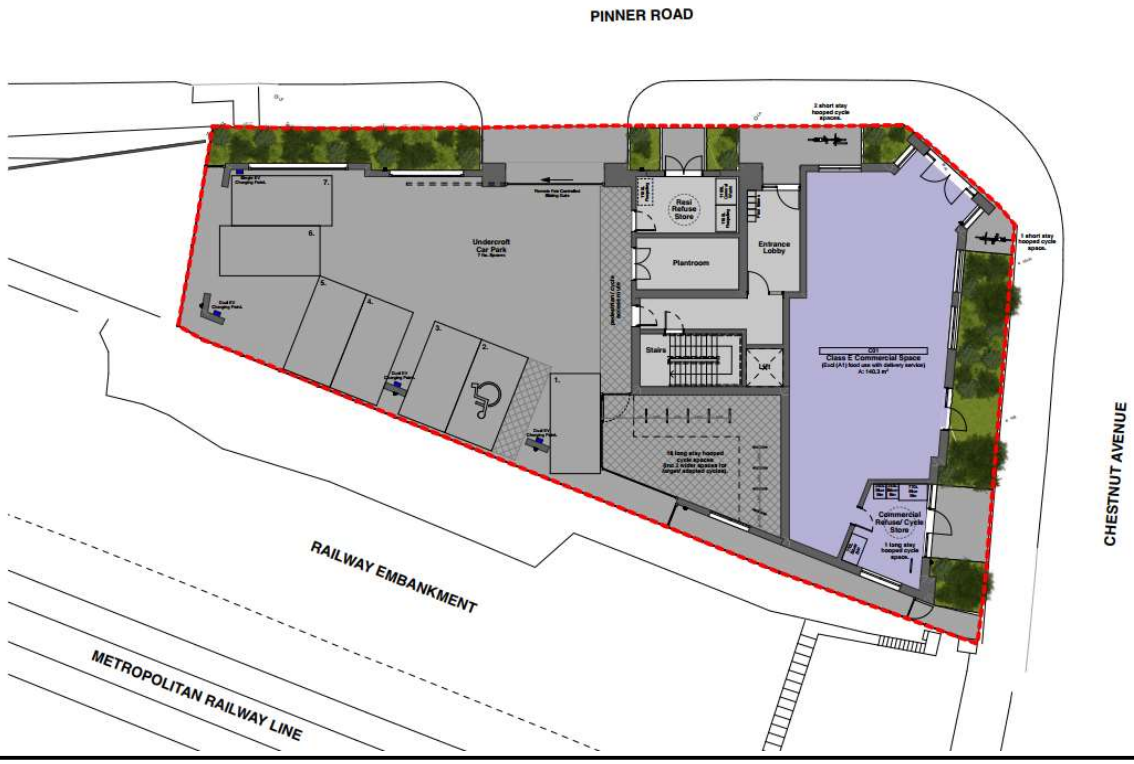

Figure One: Proposed Development Plans (Ground Floor)

2 Review of Desk Study Information

2.1 Site Description, Location and Setting

Site Description	The site comprises a second hand car dealership with a small office building. The majority of the site is predominantly paved with hard standing. Further information, obtained during our site inspection, is included in Section Three.		
Grid Reference	509700 190710	Location	Corner of Pinner Road and Chestnut Avenue, Northwood. Approximately 23km north west of London City.
Elevation (approx)	80m AOD		
Size (approx)	0.05ha		

Table Three: Site Location and Setting

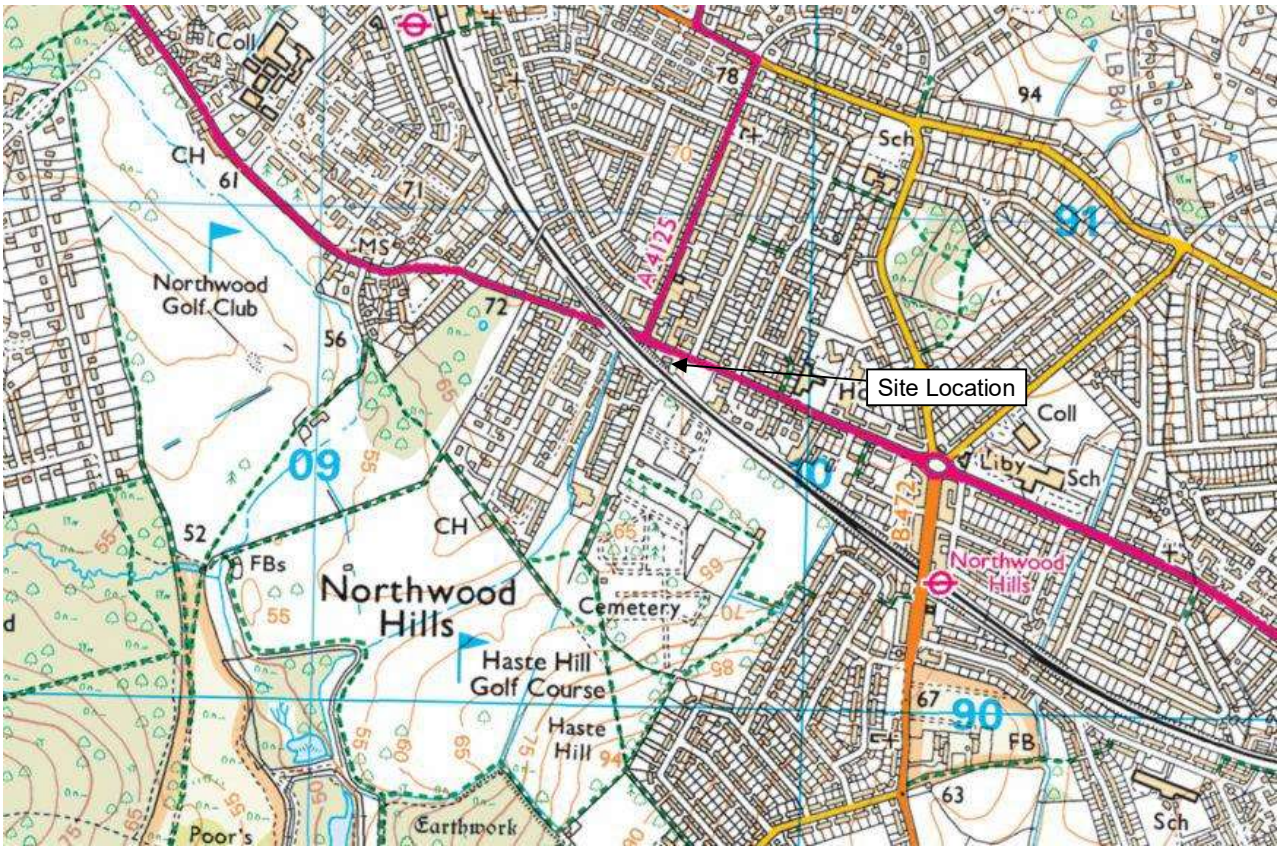

Figure Two: Site Location Map

13 Triangle Business Park, Stoke Mandeville, HP22 5BL
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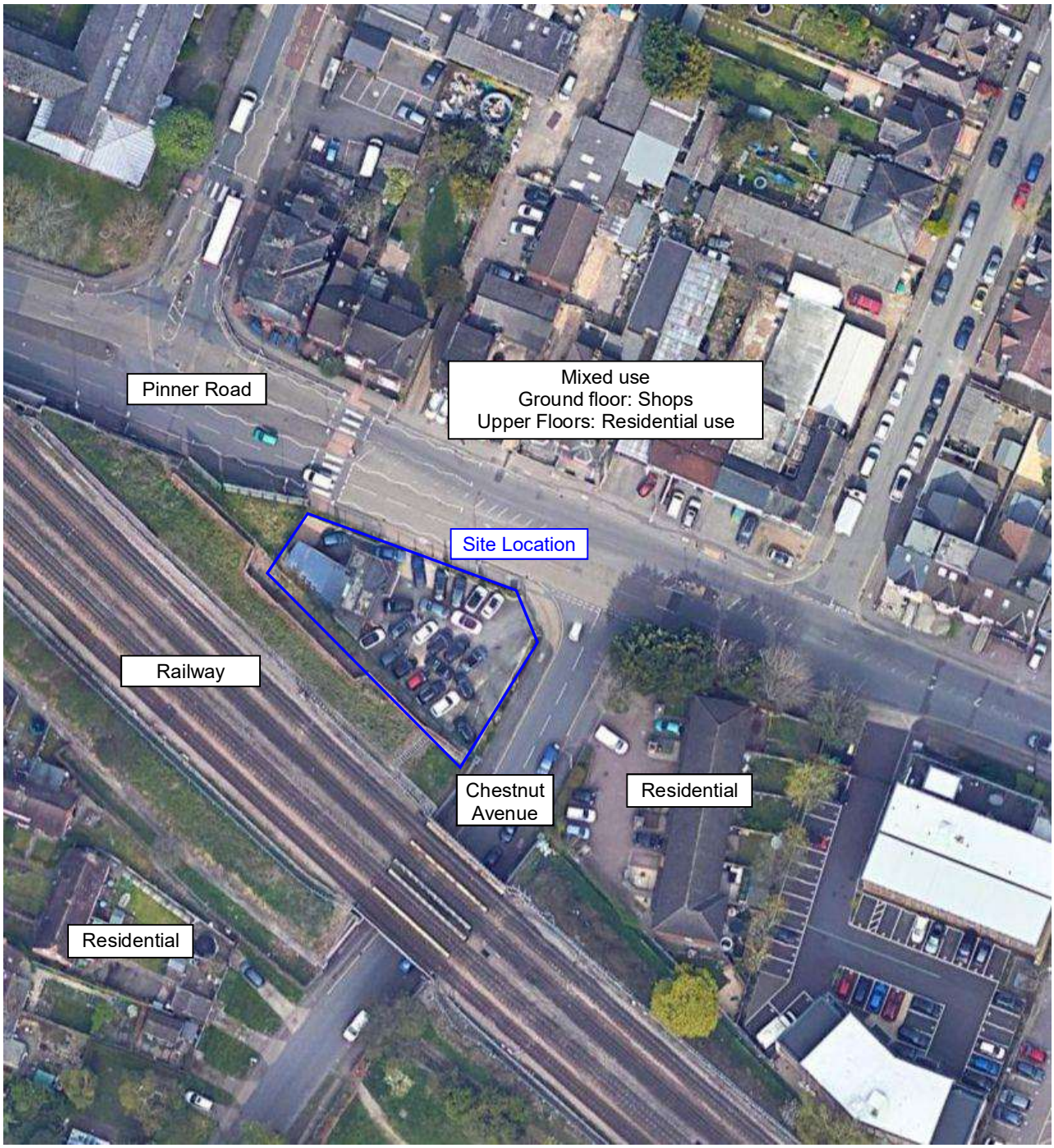

Figure Three: Aerial Photograph Showing Site and Surrounding Area

Direction	Details
North	Pinner Road, followed by mixed use building (ground floor retail with upper floor residential), car sales business and cafe directly to the north (~20m), with residential properties beyond.
East	Chestnut Avenue, followed by residential properties (~40m) beyond.
South and West	Railway embankment and railway line (10m), with residential properties beyond (~40m).

Table Four: Surrounding Land Use

2.2 Geology, Hydrogeology and Hydrology

	Geological Unit	Description	Estimated Thickness	Data Source
Drift Geology	None recorded at site's location			British Geological Survey (BGS)
Solid Geology	London Clay [mapped across eastern half of site only)	Blue-grey or grey-brown silty clay.	Up to 15m	
	Lambeth Group (likely to extend across entire site)	Sequences mainly of clay, some silty or sandy, with some sands and gravels,	30m	
	Upper Chalk	Chalk with flints.	>90m	
Existing Investigation Data	The BGS hold records for several boreholes constructed at the site. Borehole ref. TQ09SE359 records geology Made Ground to 2.1m over the Lambeth Group, comprising firm to stiff greenish grey mottled orange clay to 4.8m over blueish green grey very clayey sand to borehole termination depth of 4.9m (refusal on hard ground). A second borehole constructed ~100m to the north-west (ref. TQ09SE1) records brow mottled clay to 2.3m over brown and green sand to >9.5m, with flint peddles from ~9m, and then chalk to a termination depth of 11.2m.			
	Previous investigation reports following the removal of underground infrastructure described the underlying geology as Made Ground to a maximum depth of ~0.5m consisting of orange brown sandy clay with flints with brick and cobbles. The Made Ground was underlain by firm to stiff greenish clay which became orange brown below ~1.0m.			Ref. 2

Table Five: Regional Geology

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	Geological Unit	Aquifer Classification	Groundwater Vulnerability	Data Source
Drift Geology	None recorded at site's location			Environment Agency
Solid Geology	London Clay	Unproductive Stratum	Low	
	Lambeth Group	Secondary Aquifer (Class A)	Medium	
	Upper Chalk Formation	Principal Aquifer	High	
Existing Investigation Data	No groundwater was recorded in either of the BGS boreholes referenced above. However, a borehole located ~400m to the south-east (ref.TQ19SW40), records groundwater strike at 40m within the underlying chalk, rising to 27m.			BGS
	Groundwater was not recorded as being present within either of the previous investigation reports.			Ref. 2

Table Six: Regional Hydrogeology

	Description	Distance	Direction	Data Source
Surface Water Features	Land drain, flowing south-west into Ruislip Lido (~1km) (in the absence of alternatives, we assume this was the land drain identified in Ref.1 as having contained product).	55m	West	Ordnance Survey

Table Seven: Regional Hydrology

Abstraction	Surface Water			Groundwater		
	Distance	Direction	Purpose	Distance	Direction	Purpose
Nearest Nearest Public Water Supply	None within 2km of the site			1.1km	South west	Potable water supply
Source Protection Zone	The site lies within an SPZ Zone 2 - Outer Protection Zone. This abstraction will draw groundwater from the deep chalk units.					
Site located in an Environment Agency defined 'Drinking Water Safeguard Zone'				Surface Water		Yes
				Groundwater		No
Data sourced from Environment Agency						

Table Eight: Nearest Surface and Groundwater Abstractions

2.3 Site History

2.3.1 Historical Maps

Date	Review of Map – Description of Land Use at Site and in the Immediate Surrounding Area	Potentially Contaminative Land-use	
		On-site	Off-site
1868 / 1883	The site is undeveloped with three farms visible in the surrounding area. Pinner Road forms the northern site boundary and is orientated east-west.	None identified	None
1896 / 1987	The site remains undeveloped. There is a railway line forms the south western boundary (in the same location as the present day railway line. There are residential properties located 25m to the north and 75m to the north west.		Railway land
1913 / 1916	The site remains undeveloped. There are additional properties located to the north of the site, along the opposite side of Pinner Road, Including a Public House.		
1923 /1932	The site remains unused. The surrounding area has been substantially developed, primarily with residential properties but also with nurseries, a mortuary, tennis courts and council yard, which are all present within 125m of the site. There is a laundry ~150m to the north east.		Railway line and laundry
1959 - 1965	The site has been redeveloped and is identified as a garage. There is a large central building (likely including a canopy over the forecourt) with a large entrance at the front of the site. No significant changes to the surrounding area.	Garage (assumed retail filling station)	
1970-79	The site is still identified as a garage, but building has been relocated to the south east corner, along the site boundary with the neighbouring railway line. To the east of the site, the formerly vacant plot of land has been designated as a car park. The former laundry is no longer present. .		Railway line
1978-1988/ 1992/ 1993	The site has undergone further changes. There are now two buildings, one near the western boundary (assumed shop currently used as an office) and a larger structure (assumed forecourt canopy) in the centre of the site. The site layout reflects the maps included in previous reports (Ref. 1 and 2). No significant changes to the surrounding area.		
Historical maps are included as as attachment in our Phase I report (ref.3).			

Table Nine: Historical Maps Review

2.3.2 *Planning Records*

Hillingdon Borough Council have the following historical planning applications on their internet based planning portal which pertain to the site.

Date	Application Number	Local Planning Authority – Planning Records (from local planning authority website)	Evidence of Development
March 1976	10430/T3/1703	Erection of forecourt canopy with new pump island and widening of the pavement corridor at Northwood service station.	Approved - unknown if implemented, no visible signs of filling station remain.
January 1982	10430/F/82/0090	Redevelopment of the existing petrol filling station to provide self service facilities at Northwood Service Station.	
June 1982	10430/G/82/0810	Redevelopment of existing petrol station, with the erection of a new sales building, pumps and canopy.	
September 1982	10430/H/82/1198	Details in compliance with 10430/82/0810(P).	
April 1985	5098/E/85/0687	Change of use of existing hard standing to car display area.	
January 1995	10430/J/95/0144	Change of use from petrol filling station to sale of used commercial vehicles, erection of 1.8m high perimeter fencing and landscaping.	

Table Ten: Summary of Online Planning Records

2.3.3 *Petroleum Officer Search*

As part of our assessment we have contacted the site's Petroleum Officer in order to obtain details relating to the site's petroleum installation. The petroleum officer has reported that they do not have any information on file for the site.

2.3.4 *Review of Permits and Regulatory Actions*

Date	Licence Number	Details	Issuing Authority
No identified records of active or past permits or licenses associated with the site			District Council

Table Eleven: Current or Past Permits or Licences

Date	Details	Data Source
March 1993	Pollution incident to controlled waters. Unknown sewage created a Minor Incident [category 3] (Incident Ref. N1930076). Located ~115m south west of the site	Environment Agency
April 1993	Pollution incident to controlled waters. Miscellaneousness pollutants caused a Minor Incident [category 3] (Incident Ref. N1930144). Located ~230m south west of site	
August 1995	Pollution incident to controlled waters. Unknown sewage created a Significant Incident [category 2] (Incident Ref. N1960501). Located ~80m south west of the site	
August 1995	Pollution incident to controlled waters. Unknown sewage created a Minor Incident [category 3] (Incident Ref. N1950416). Located ~80m south west of the site	
February 1996	Pollution incident to controlled waters. Oils created a Minor Incident [category 3] (Incident Ref. N1960051). Located ~230m south west of site	
September 1996	Pollution incident to controlled waters. Unknown sewage created a Minor Incident [category 3] (Incident Ref. N1960501). Located ~150m south west of the site	
October 1996	Pollution incident to controlled waters. Unknown sewage created a Minor Incident [category 3] (Incident Ref. N1960558). Located ~180m west of the site	
January 1997	Pollution incident to controlled waters. Storm sewage created a Minor Incident [category 3] (Incident Ref. THN11997030862). Located ~230m south west of the site	
January 1997	Pollution incident to controlled waters. Storm sewage created a Minor Incident [category 3] (Incident Ref. THN11997030957). Located ~180m west of the site	
Notes	We have not identified any registered pollution incidents or regulatory actions specifically associated with the site, including any records (outside of those contained in historic reports) relating to the fuels identified in a nearby stream in 1987.	

Table Twelve: Registered Pollution Incidents and Regulatory Actions

2.3.5 *Anecdotal Information / Other Historical Information*

Historical Reports	Two historical reports (Ref. 1 and Ref. 2) describe the site as an operational filling station with underground storage tanks (at least 6 tank vessels), and three pump islands. The historical reports describe the site as being closed in December 1994, which correlates with the planning application for a change of use to vehicle sales in January 1995.

Table Thirteen: Additional Information

2.4 Additional Information

Flood Risk Zone	Flood Risk	Data Source
Zone 1	The site lies within Flood Zone 1. Land and property within a Flood Zone 1 are defined as having a low probability of flooding. On this basis, and as the site is smaller than 1 hectare, a flood risk assessment is not likely to be required as part of future planning applications.	Environment Agency

Table Fourteen: Preliminary Flood Risk Assessment

Risk	Description	Data Source
Radon Risk	The radon 'Affected Area' maps that have been produced from radon measurements in homes by Public Health England can be used to indicate whether or not radon is likely to be a hazard in typical workplaces and can be used to inform risk assessment and need for radon measurements. The site is located in an area where the National Radiological Protection Board have determined that <1% houses exceed the recommended Action Level for radon for existing homes in the UK of 200Bqm^{-3} (averaged over a year). The site is therefore in an area of low radon risk and no radon protective measures are necessary in the construction of new structures.	Public Health England
Nearest Landfill	The Environment Agency records show that there are no current or past landfill sites within 250m of the site.	Environment Agency
Degradable material within Made Ground	Historical reports indicated there is potentially >2m of Made Ground at the site (potentially greater given below ground tanks were removed). However, we have not identified any records of or evidence of any degradable material present.	Ref. 1 and Ref. 2
Peat and organic matter within alluvial deposits	No source identified. No superficial deposits shown to be present beneath site or immediate surrounding area.	BGS
Degradation of spilled or leaked petroleum hydrocarbons	Hydrocarbon impact of shallow soils was recorded during environmental investigation works at the site in 1994. Remedial works, including the excavation and removal of 120m^3 of soil was carried out. Residual hydrocarbon impact of shallow soils may be present and would be considered a source of ground gas.	Ref. 1 and Ref. 2
Natural deposits (e.g. coal measure strata).	Near surface geology comprises Lambeth Group / London Clay. These units are not commonly associated with the generation of elevated concentrations of hazardous ground gases.	BGS
Organic rich silt formed in water bodies	No significant source identified.	OS maps
Conclusions	We have not identified any significant potential sources of hazardous ground gases associated with the site, although the completion of ground gas monitoring as part of any future investigation work would be prudent to verify these conclusions.	

Table Fifteen: Hazardous Ground Gas Risk

Risk	Description	Data Source
Risk of Coal Mining	The site is not located in an area considered to be at potential risk from coal mining.	Coal Authority
Solution Feature Risk	The site's location has been classified as No Hazard. Soluble rocks are either not thought to be present within the ground, or not prone to dissolution. Dissolution features are unlikely to be present.	BGS
Shrinking or Swelling Clay	The sites site's location has been classified as Moderate Risk. Shallow soils are likely to comprise clays with a high plasticity.	
Compressible Deposits	The site's location has been classified as No Hazard. No indicators for compressible deposits have been identified. No special actions required to avoid problems due to compressible deposits.	
Running Sands	The sites site's location has been classified as very low risk. We consider there to be a very low potential for running sand problems.	
Landslides	The sites site's location has been classified as very low risk. Slope instability problems are unlikely to be present on site, although the stability of the wall retaining the railway embankment must be investigated.	
Potential for Unexploded Ordnance	London bombing density classified as 'Low', indicating the risk of encountering unexploded ordnance at the site location is considered low.	Zetica Ltd

Table Sixteen: Other Geological Hazards

Receptor	Description	Data Source
Other Sensitive Sites	None identified	Environment Agency

Table Seventeen: Other Environmental Receptors

3 Site Walkover and Inspection

A summary of observations that we made during our initial site walkover is provided below and supported by the photographs provided.

- The main site building is constructed from brick and is located towards the western end of the site. The building is currently disused and comprises offices and a former workshop (no access was provided to the workshop area).
- The yard/(former forecourt) area is covered with hardstanding, a mixture of concrete and tarmac.
- There is a metal storage container positioned to the rear of the main building (western boundary).
- There is a soil embankment rising upwards to a railway just beyond the western site boundary;
- The rear boundary is formed by a metal security fence and then sheet piles (metal), which is presumably acting as a retaining wall for the railway line to the south (several metres above the subject site).

- Chestnut Avenue forms the eastern boundary. There are several semi-mature trees along this boundary.
- There is a three-chambered drainage interceptor (presumably the former forecourt interceptor) located in the south-eastern corner of the site. This is constructed from three brick chambers with metal lids. There is standing water present within all three chambers, with a hydrocarbon sheen in chambers 1 and 3.

Photograph One: Site building (disused) - office and former vehicle maintenance workshop

Photograph Two: trees along eastern boundary

Photograph Three: Retailing wall (sheet piles) and railway line to rear / south of site

Photograph Four: Middle chamber of drainage interceptor.

4 Intrusive Investigation Results

4.1 Details of Our Investigation

Activity		Description of Works
Service Clearance	Public utility drawings	We have obtained and reviewed public utility drawings from the relevant service provider. This provides information regarding major services that supply the site and neighbouring properties.
	Underground Utilities Survey	We carried out a survey using radio detection methods of utilities buried underneath the site. Our survey was suitable for identifying power cables, metallic fuel pipework, surface water and foul water drainage. The technique that we used is unable to detect any plastic pipework or fibre optic cabling that might be present.
	On-site	Prior to drilling all boreholes locations underwent a final service check using a Cable Avoidance Tool (CAT) scanner.
Drilling	Our site investigation was completed on 29th June to 1st July 2022. We investigated the site by constructing 4No. Boreholes using our Comacchio Geo205 drill rig, using a combination of dynamic sampling followed by rotary (water flush) coring. Boreholes BH001, BH002 and BH003 were constructed to 4.5m and BH004 extended to 13.5m (terminating on hard ground). Borehole locations were positioned a minimum of 5m from the site boundary and a minimum 15m from the railway line (in accordance with Section 3.13.1 of Transport for London G0023 Guidance Document which states: *Driven or percussive piling shall be no closer than 15m from any LU substructure tunnel or surface infrastructure*). A site plan showing borehole locations is provided on the following page, and also included, along with our borehole logs, as Attachment Two.	
Geotechnical Classification Testing	In Situ Soil Testing	We carried out SPT testing at all four of our borehole locations. The results from these tests are presented on the borehole logs in Att. 3.
	Ex Situ Soil Testing	We carried out pocket penetrometer tests on cohesive soil samples to determine their undrained shear strength. Each test was carried out in triplicate, with the mean of the three results reported. Where there was a significant variance between the three test results, we carried out further tests until a consistent set of data had been obtained.
Monitoring Wells	Boreholes BH001, BH002 and BH003 were completed as shallow gas monitoring wells. The wells were completed with a flush mounted cover and cemented into position. Borehole BH004 was backfilled upon completion.	
Soil Sampling Procedures	Representative soil samples were recovered from each borehole in sealed liners and logged onsite by a suitably qualified technician.	
Sample Preservation	Sub-samples were preserved in glass jars or bottles and stored in cool boxes during transportation to the laboratory for subsequent analysis.	

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Monitoring for Hazardous Ground Gas and Hydrocarbon Vapours	We carried out preliminary screening for hazardous ground gases of all three monitoring wells on 30th June 2022. Monitoring was carried out using a GA5000 series landfill gas monitor, designed to record concentrations of methane, carbon dioxide, carbon monoxide, hydrogen sulphide and oxygen (and flow readings). We also carried out preliminary (semi-quantitative) screening for hydrocarbon vapour concentrations on these three wells using a photo-ionisation detector (PID) calibrated with isobutylene gas.

Table Eighteen: Drilling and Sampling Methodologies

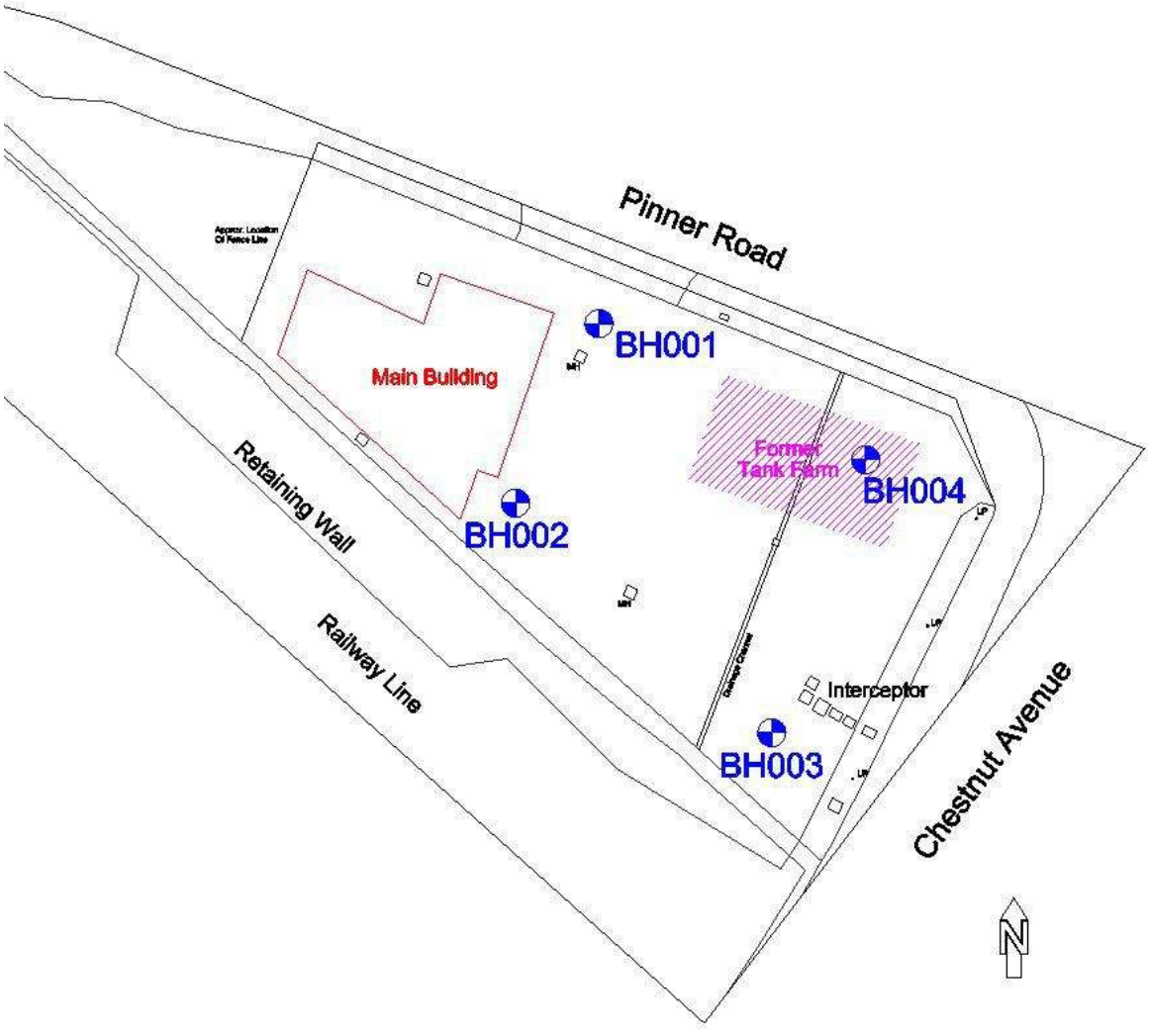

Figure Four: Borehole Locations

4.2 Site Geology

	Unit	Description
Layer I	Made Ground	BH001 to BH003: Beige brown sand and gravel. BH004: sand and gravel with large lumps of concrete (likely to represent backfill material within former below ground fuel tank excavation).
Layer IIa	Lambeth (clay)	SOFT to FIRM light brown clay with light grey green mottling. Slightly sandy in places.
Layer IIb	Lambeth (clay with sand layers)	STIFF to VERY STIFF light grey green clay with orange mottling (slightly clayey in places) with layers of sandy clay and light grey green SAND.

	Depth to Base of Layer			
	BH101	BH002	BH003	BH004
Layer I	0.3m	0.5m	0.5m	4.4m*
Layer IIa	1.5m	2.0m	1.6m	-
Layer IIb	>4.5	>4.5	>4.5	>13.5m

All dimensions in metres below ground level

Table Nineteen: Soil Lithology

4.3 Groundwater Monitoring Data

Monitoring well installation details and monitoring data are included in the following table.

	BH101	BH002	BH003	BH004
Depth to Base of Well (m bgl)	2.9	2.9	3.3	No well installed
Well Response Zone (m bgl)	0.2 to 2.9	0.2 to 2.9	0.2 to 3.3	
Diameter of Well (mm)	50	50	50	
Gas tap fitted?	Yes	Yes	Yes	
Groundwater - At Rest (m bgl)	Dry -No groundwater encountered			

Note: m bgl denotes metres below ground level

Table Twenty: Groundwater Monitoring Data (July 2022)

4.4 Visual and Olfactory Signs of Hydrocarbon Contamination

	BH001	BH002	BH003	BH004
Soil	Hydrocarbon odour (faint) 1.4 to 1.5m	Hydrocarbon odour (faint) 1.3 to 2.0m	Hydrocarbon odour (faint) 2.0 to 2.1m	Hydrocarbon odour (faint) 5.0 to 6.4m

Table Twenty-one: Visual and Olfactory Signs of Hydrocarbon Contamination

4.5 Hazardous Ground Gases Assessment

The results of our Preliminary Risk Assessment (ref.3) did not record any significant potential sources of hazardous ground gases associated with the site. In the absence of a tangible source and the absence of a viable gas migration pathway, we concluded the risk to site users from hazardous ground gases was low. However, as a precautionary measure, we have carried out a single round of ground gas monitoring as part of our current assessment. The results of this monitoring and subsequent assessment are presented below.

4.5.1 Hazardous Ground Gases Monitoring Data

The result of our monitoring for hazardous ground gases are provided in the following table.

		BH001	BH002	BH003
Groundwater - At Rest (m bgl)		All monitoring wells dry		
VOCs (PID reading (ppm)	Peak	0.0	0.0	2
	Stable	0.0	0.0	2
CH_4 (%)	Peak	0.1	0.0	0.0
	Stable	0.0	0.0	0.0
CO_2 (%)	Peak	0.1	0.1	0.9
	Stable	0.1	0.1	0.7
O_2 (%)	Min	20.8	20.3	19.1
	Stable	20.8	20.3	19.4
Flow (L/hr)	Peak	0.2	0.1	0.1
	Stable	0.2	0.1	0.1
Time to Stabilise (mins)		5	5	5
Atmospheric Pressure (mmb)		1005 rising to 1006		
Weather		Sunny		
Notes		Clay soils present from 0.5m are likely to be relatively impermeable; response zone /migration pathway is therefore likely to be limited to shallow Made Ground (generally only 0.3m in thickness).		

Table Twenty-two: Ground Gas Monitoring Data

4.5.2 Hazardous Ground Gas Screening Assessment

The Gas Screening Value (GSV) risk assessment technique is a generic, conservative screening assessment. The method is described in CIRIA C665 (2006) and BS8485 (2007) and it is commonly adopted and applied to construction projects in the UK. In order to determine the GSV at a given location the maximum flow rate is multiplied by the maximum gas concentration to create a worst case scenario.

The NHBC traffic light system is a risk-based approach to quickly identify potential ground gas protection measures for low rise residential developments. The approach adopts the GSVs derived above, coupled with the maximum concentration observed to establish a 'traffic light classification'.

The results of our preliminary assessment are presented in the table below.

		BH001	BH002	BH003
Gas Screening Value (l/hr)	CO_2	<0.07	<0.07	<0.07
	CH_4	<0.07	<0.07	<0.07
Risk Classification (CIRIA C665)		CS1	CS1	CS1
Characteristic Situation (Ciria 149)		Very low risk	Very low risk	Very low risk
Traffic light classification (NHBC)		Green	Green	Green

Table Twenty-three: Gas Screening Value for CO_2 and Methane

4.5.3 Conclusions

The results of our ground gas assessment have confirmed our initial conclusions that site users are not at risk from hazardous ground gases.

5 Chemical Analysis Results

5.1 Chemical Analysis Rationale

Analysis	Rationale	No of Soil Samples Analysed
Total Petroleum Hydrocarbons (TPH) - reported by carbon range and with aromatic and aliphatic speciation	Representative of compounds present in petrol, diesel and lube oils but with additional information regarding composition of contaminant source	8
Benzene, Toluene, Ethylbenzene and Xylenes (BTEX)	Representative of compounds present in petrol	8
Polycyclic Aromatic Hydrocarbons	Representative of compounds present in diesel and lube oil	4
Metals and Asbestos Screen	Representative of compounds commonly encountered in imported Made Ground	2

Table Twenty-four: Schedule of Analysis

5.2 Soil Analysis

Analyte	Sample Details and Concentration (mg/kg)							
	BH001	BH002	BH002	BH003	BH004	BH004	BH004	BH004
	1.4m	0.5m	1.3m	2.0m	0.5m	4.7m	5.3m	6.3m
C_{6-8} Aliphatic TPH	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
$>C_{8-10}$ Aliphatic TPH	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
$>C_{10-12}$ Aliphatic TPH	**34**	<5	**37.9**	**55.5**	<5	<5	<5	<5
$>C_{12-16}$ Aliphatic TPH	**38.9**	<5	**75.5**	**105**	<5	<5	<5	<5
$>C_{16-21}$ Aliphatic TPH	**17.9**	<5	<5	**8.57**	<5	<5	<5	<5
$>C_{21-35}$ Aliphatic TPH	<20	<20	<20	**167**	**38.5**	<20	**29.3**	<20
C_{6-8} Aromatic TPH	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
$>C_{8-10}$ Aromatic TPH	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
$>C_{10-12}$ Aromatic TPH	**16.9**	<5	<5	**8.74**	<5	<5	<5	<5
$>C_{12-16}$ Aromatic TPH	**25.6**	<5	**8.94**	**12.1**	<5	<5	<5	<5
$>C_{16-21}$ Aromatic TPH	**36.2**	<5	<5	<5	**29**	<5	<5	<5
$>C_{21-35}$ Aromatic TPH	<20	<20	<20	<20	**32.3**	<20	<20	<20

Table Twenty-five: Speciated TPH Analysis Results – Soil

Analyte	Sample Details and Concentration (mg/kg)							
	BH001	BH001	BH002	BH003	BH003	BH004	BH004	BH004
	0.4m	1.8m	2.2m	0.5m	2.4m	0.5m	5.7m	6.7m
MTBE	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p+m Xylene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o Xylene	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Table Twenty-six: BTEX and MTBE Analysis Results – Soil

Analyte	Sample Details and Concentration (mg/kg)			
	BH001	BH002	BH003	BH004
	0.4m	0.5m	0.9m	0.5m
Naphthalene	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	< 0.1	**0.44**	< 0.1	**1.01**
Anthracene	< 0.1	< 0.1	< 0.1	**0.24**
Fluoranthene	< 0.1	**0.54**	< 0.1	**1.74**
Pyrene	< 0.1	**0.49**	< 0.1	**1.62**
Benzo(a)anthracene	< 0.1	**0.22**	< 0.1	**0.9**
Chrysene	< 0.1	**0.21**	< 0.1	**0.86**
Benzo(b)fluoranthene	< 0.1	**0.22**	< 0.1	**0.99**
Benzo(k)fluoranthene	< 0.1	< 0.1	< 0.1	**0.38**
Benzo(a)pyrene	< 0.1	**0.18**	< 0.1	**0.82**
Indeno(1,2,3-cd)pyrene	< 0.1	**0.13**	< 0.1	**0.54**
Dibenzo(ah)anthracene	< 0.1	< 0.1	< 0.1	**0.12**
Benzo(ghi)perylene	< 0.1	**0.13**	< 0.1	**0.49**
Total PAHs (EPA16)	< 1.6	**2.6**	< 1.6	**9.7**

Table Twenty-seven: PAH Analysis Results – Soil

Analyte	Sample Details	
	BH001	BH004
	0.4m	0.5m
Asbestos Screen	Not Detected	Detected
Asbestos Matrix	-	Chrysotile present as bundles
Asbestos Type	-	Chrysotile

Table Twenty-eight: Asbestos Screening and Speciation Results - Soil

Certificates for all laboratory analysis are included in Attachment Three.

5.3 Generic Quantitative Risk Assessment - Human Health

In order to establish whether any of the contaminants of concern we have identified in the soil samples analysed pose an unacceptable risk to future site residents, we have compared the results of the chemical analysis against industry standard Generic Acceptance Criteria, protective of a commercial end use. Details of these screening criteria and the results of our assessment are provided below.

Receptor	Generic Risk Assessment Methodology: Human Health
Soil	We have compared contaminant concentrations recorded in soil samples against Generic Acceptance Criteria (GAC). We have used the following GACs in order of preference: ➢ C4SLs published by CL:AIRE (CL;AIRE, 2014); ➢ S4ULs published by Land Quality Management Ltd (in conjunction with the Chartered Institute of Environmental Health) [1]; ➢ Soil Guideline Values (SGVs) published by the Environment Agency. GACs have been produced for a range of standard land uses: residential (with/without produce), allotments, commercial and public open spaces (residential/parks). For the purposes of this assessment we have considered all potential risks associated with both a typical commercial and residential end use, given the proposed development scheme (mixed use). This approach is designed to assess potential risks for any future commercial end use of the site, not just the current petrol station use. [1Note: Copyright Land Quality Management Ltd reproduced with permission; Publication Number S4UL3461. All rights reserved]. No risk-based criteria (UK) currently published for asbestos. The presence of asbestos is therefore likely to require further assessment, with respect to specific pollutant migration pathways. This will be considered within Section 8.4.
Groundwater	Not applicable (no groundwater samples analysed).

Table Twenty-nine: GACs: Methodology: Human Health Receptors

In carrying out our risk assessment we have adhered to the following assumptions:

- Contaminants of concern for our risk assessment for soil are limited to those listed in the tables below.
- The results of the chemical analyses carried out on soil samples have been used to determine concentrations of these contaminants at the site.
- Where available, criteria for hydrocarbons are based on a scenario with a Soil Organic Matter of 1% to ensure a conservative assessment.

Table Thirty: Generic Acceptance Criteria: Assumptions

13 Triangle Business Park, Stoke Mandeville, HP22 5BL
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Contaminant	Maximum Concentration Recorded in Soil (mg/kg)	GAC (mg/kg)		Source of Assessment Criteria	Does Maximum Concentration Exceed GAC?	
		Commercial	Residential		Commercial	Residential
Anthracene	0.24	520,000	31,000**	S4UL	No	No
Benz[a]anthracene	0.9	170	11		No	No
Benzo[a]pyrene	0.82	36	2.5	C4SL	No	No
Benzo[b]fluoranthene	0.99	44	3.9	S4UL	No	No
Benzo[ghi]perylene	0.49	3,900	360		No	No
Benzo[k]fluoranthene	0.38	1,200	110		No	No
Chrysene	0.86	350	30		No	No
Dibenz[ah]anthracene	0.12	3.5	0.31		No	No
Fluoranthene	1.74	23,000	1,500		No	No
Indeno[123-cd]pyrene	0.54	500	45		No	No
Phenanthrene	1.01	22,000	1,300*		No	No
Pyrene	1.62	54,000	3,700		No	No
TPH Aliphatic C_{10-12}	55.5	9,700*	130**	S4UL	No	No
TPH Aliphatic C_{12-16}	105	59,000*	1,100*		No	No
TPH Aliphatic C_{16-35}	176	1,600,000	65,000*		No	No
TPH Aromatic C_{10-12}	16.9	16,000*	250		No	No
TPH Aromatic C_{12-16}	25.6	36,000*	1,800		No	No
TPH Aromatic C_{16-21}	36.2	28,000	1,900		No	No
TPH Aromatic C_{21-35}	32.3	28,000	1,900		No	No

Note: * GAC exceeds solubility saturation limit / **GAC exceeds vapour saturation limit

Table Thirty-one: Generic Risk Assessment - Human Health/Soil - Commercial Site Use

The results of our quantitative risk assessment indicates that none of the contaminants of concern we have assessed pose an unacceptable risk to future site users.

6 Conceptual Site Model

6.1 Summary of Investigation Findings

Items		Details
Geology		Site geology comprises a layer of granular Made Ground, generally recorded to depths of ~0.5m, overlying the Lambeth Group. The Lambeth Group comprised soft grading quickly to very stiff clay, sandy in places, with sand bands below 4.5m. Made Ground was present to greater depths at BH004, which is likely to represent backfill material within former below ground fuel tank excavation.
Hydrogeology		No groundwater was recorded in the monitoring wells installed (maximum depth of well 3.3m). We were unable to verify the presence groundwater in BH004 due to the drilling technique employed (rotary coring with water flush).
Surface Water Features		No further information.
Site Users and Neighbours		No further information.
Identified Contaminants	Soil	During the logging of soil cores we observed hydrocarbon odours in discrete layers, generally at shallow depths (less than 2.2m). Odours were also recorded at BH004 at depths of ~2.0m below the base of the former tank farm excavation. The results of the chemical analysis carried out on selected soil samples, collected during our investigation, confirm the presence of low concentrations of total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAHs) in shallow soils. However, the results of our quantitative risk assessment indicates that none of the contaminants of concern we have assessed pose an unacceptable risk to future site users. Asbestos fibres (Chrysotile) were also recorded in Made Ground collected from BH004 (requires further consideration - see CSM below and development considerations in Section 8.4.
	Hydrocarbon Vapour	No significant hydrocarbon vapours were recorded in the monitoring wells screened.
	Hazardous Ground Gases	No significant concentrations of hazardous ground gasses recorded. Clay soils present from 0.5m are likely to be relatively impermeable; response zone /migration pathway is therefore likely to be limited to shallow Made Ground (generally only 0.3m in thickness).

Table Thirty-two: Summary of Investigation Findings

6.2 Conceptual Site Model

We have used the information obtained during the course of our site inspection and ground investigation to compile a conceptual model of the site and it's environs. Our model and resulting pollutant linkages are summarised below.

Contaminant	Pathway	Receptor	Viable Pollutant Linkage
Asbestos in shallow Made Ground	Disturbance of Made Ground during construction with fibres becoming airborne leading to possible inhalation	Construction workers during redevelopment	Yes - contractors should be made aware of the potential for asbestos fibres and suitable controls measures should be adopted (and included within the Construction Management Plan).
		Future site users	Possible. However, risk can be mitigated by removal of Made Ground and/or placement of cover system in landscaped areas.
Low concentrations of hydrocarbons in shallow soils	Ingestion and dermal contact	Future site users	No - our quantitative risk assessment indicates hydrocarbons recorded do not pose a risk to site users.
	Permeation of volatile contaminants into drinking water supply service pipes		Possible. However, risk can be mitigated by use of hydrocarbons impervious 'barrier' pipe for all new water supply pipework.
	Volatilisation of volatile contaminants to indoor/outdoor air (either direct from soils or dissolved in groundwater)		No - our quantitative risk assessment indicates concentrations do not pose a risk to site users.
	Off-site migration of contaminants: volatilisation to indoor/outdoor air	Nearby residential / commercial	
	Downward migration of contaminants to groundwater	Lambeth Group - Secondary Aquifer	No. The results of our soil analysis indicates clay soils are impeding downward migration of hydrocarbons
	Off-site migration of contaminants dissolved in groundwater leading to direct impact of environmental receptors	Land drain	No. No viable migration pathway identified.
		Surface water or groundwater abstractions	
Hazardous Ground Gas	Accumulation within shallow soils and permeation into buildings	Future site users	No. No viable source or migration pathway identified.

Table Thirty-three: Possible Pollutant Linkages

7 Environmental Assessment Conclusions

The results of our environmental assessment indicate the following:

- The results of our environmental investigation has identified low concentrations of hydrocarbons (TPH and PAHs) in shallow soils. However, the results of our quantitative risk assessment indicates that none of the contaminants of concern we have assessed pose an unacceptable risk to future site users.
- In the absence of any viable pollutant linkages, we do not consider any further investigation, risk assessment and/or remedial works are required at the site, prior to the commencement of the development.

Note: These conclusions are based upon the assumption that various engineering control measures will be be adopted during construction to mitigate risk to construction workers and future site users. These are considered in more detail in Section 8.4.

Your attention is drawn to the Notice to Interested Parties included as Attachment One.

Table Thirty-four: Conclusions

8 Geotechnical Investigation Data

8.1 Geotechnical Testing Rationale

The details of the geotechnical testing we competed are summarised in the following table.

Test		Rationale	No of tests
In situ Tests	Standard Penetration Test (SPT)	An in-situ test to provide information about the engineering properties of soils.	10
Ex situ Tests	Pocket Penetometer	Semi-quantitative test to provide an assessment of the undrained shear strength of cohesive soils.	31
Laboratory Tests	Atterberg Limits	Provides information about the plasticity of cohesive soils.	3
	Moisture Content	Part of our geotechnical profiling of the site.	
	Unconsolidated Undrained Triaxial	Provides undrained shear strength of cohesive soils.	
	Particle Size Distribution	A laboratory test which provides information about the classification of the particle size.	1
	Sulphates and/or pH	To identify hazardous ground conditions and to assist with determining suitable concrete to be used during the proposed redevelopment.	6

The results of our SPT results are provided on our borehole logs, which along with our DPT logs, are included in Attachment Two. The results of our laboratory testing analysis are summarised in the tables below. Certificates for all laboratory analysis are included in Attachment Three.

Table Thirty-five: Schedule of Testing

8.2 Review of In/Ex-situ Testing

8.2.1 SPT, PP and UU Test Results

A composite strength profile summarising our geotechnical data is provided on the Figure below.

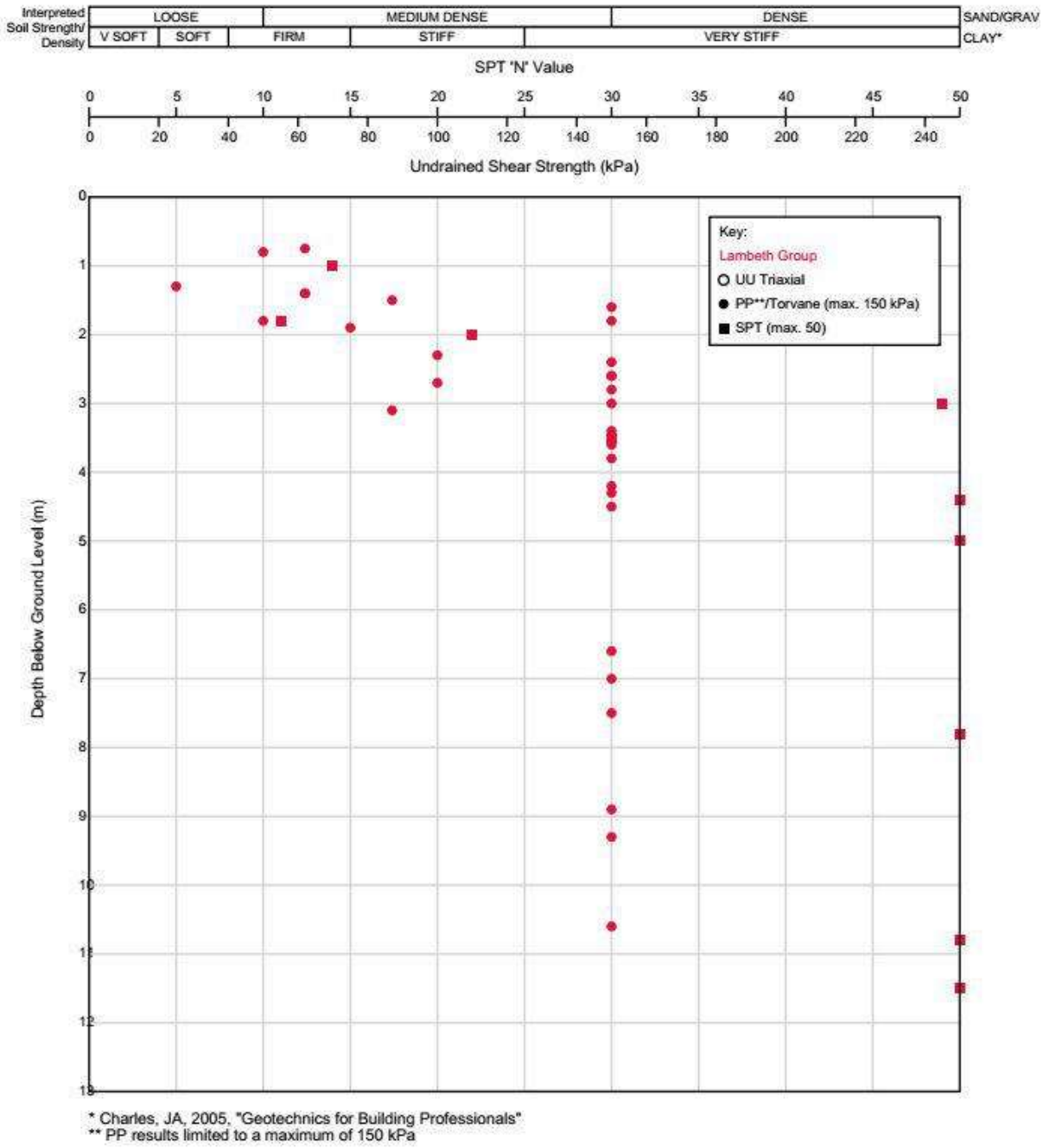

Figure Five: SPT, PP and UU Test Results

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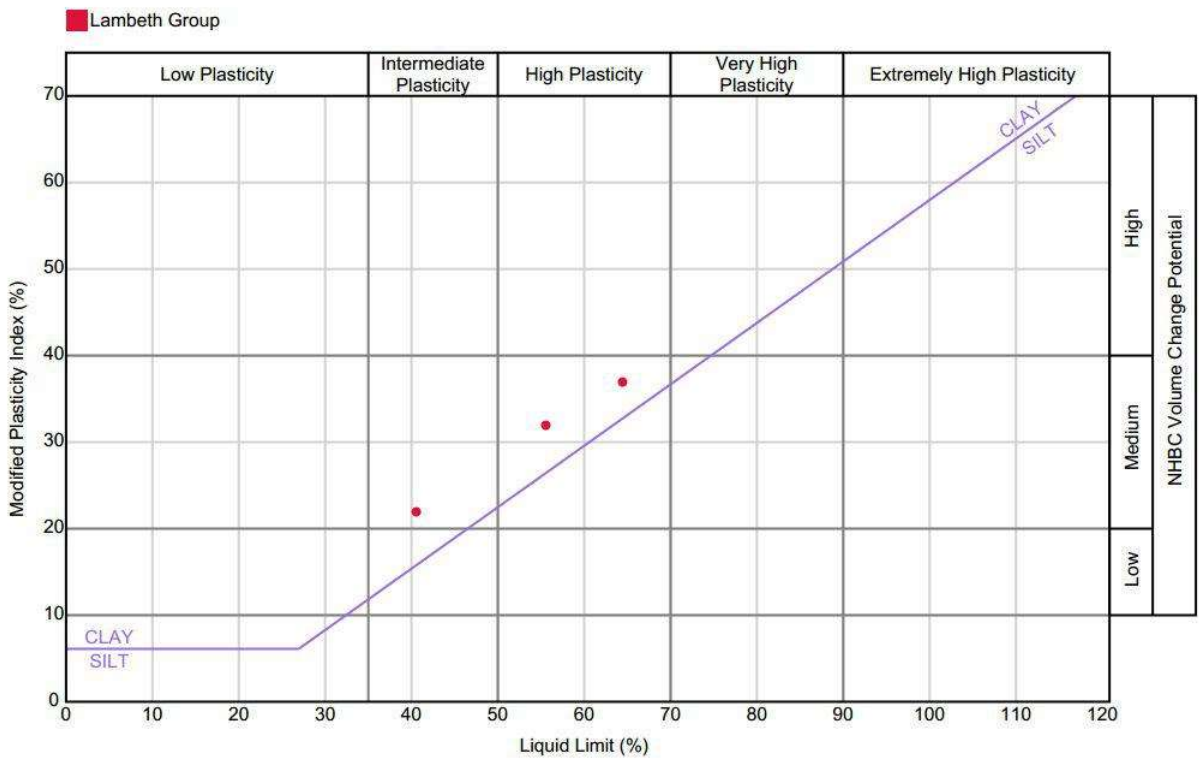
8.3 Geotechnical Laboratory Testing Results

The results from our laboratory testing are summarised below.

	BH001	BH002	BH004
	1.80	1.30	7.30
Liquid Limit	55	40	64
Plastic Limit	23	18	27
Plasticity Index	32	22	37
% Passing 425um sieve	100	100	100
Plasticity Classification	CH	CI	CH
NHBC Volume Change Potential	Medium	Medium	Medium



Note: Plasticity: CL = Low Plasticity, CI =- Intermediate Plasticity, CH = High Plasticity, MI = Intermediate Plasticity Silt

Table Thirty-six: Atterberg Test Results

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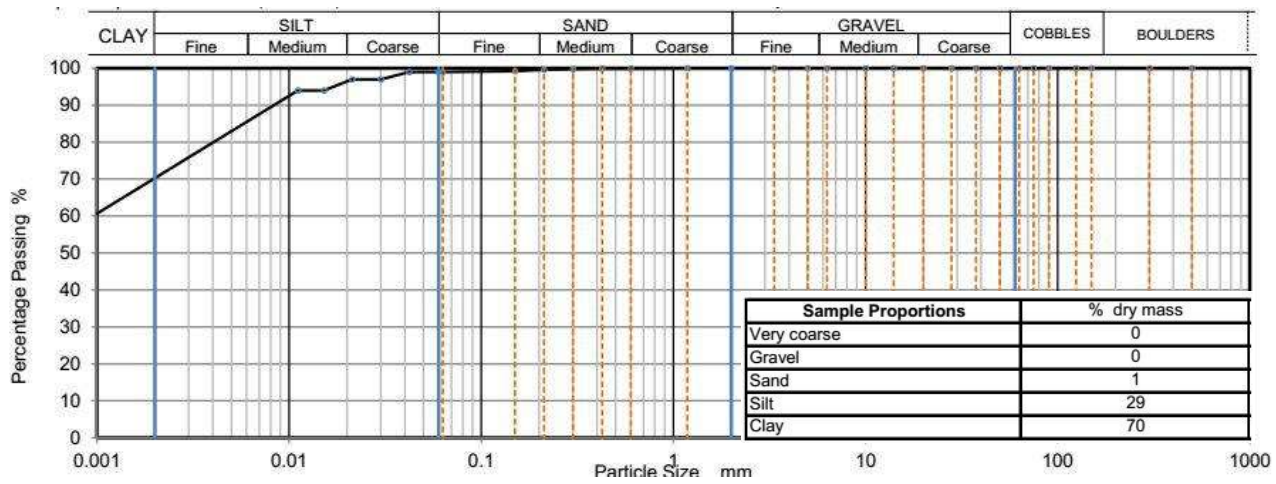
Analyte	Unit	Sample Details		
		BH002	BH004	BH004
		1.7m	4.8m	7.4m
Moisture Content	%	36	8.1	15
Length	mm	143	140	140
Diameter	mm	72.2	71	70.4
Bulk Density	Mg/m3	1.92	2.19	2.17
Dry Density	Mg/m3	1.41	2.03	1.89
Axial Strain	%	20	19.6	5.5
Undrained Shear Strength	kN/m2	32	213	149

Table Thirty-seven: Undrained Triaxial Test Results

Sample Details: **BH004 / 6.7**



Soil Description: Brown silty clay

Table Thirty-eight: PSD Test Results

Analyte	Unit	Sample Details				
		BH001	BH001	BH002	BH004	BH004
		1.4m	4.3m	4.2m	6.3m	9.6m
pH	pH units	6.39	7.96	7.65	9.4	8.45
Water Soluble Sulphate	(g/l)	21	12	13	77	187
Design Class for Concrete		DS1 AC-1				

Table Thirty-nine: Sulphate and pH Analysis Results

8.4 Recommendations Relating to the Proposed Development

Item	Details
Foundations	We consider pad foundations, extending down into the more competent clay soils, would be a suitable solution for the proposed scheme. Alternatively a raft or ring beam foundation solution could be adopted. Our investigation indicates that the former below ground tank farm, which extends to depths of ~4m and has been backfilled with concrete fragments/layers (of unknown size) extends across the footprint of the proposed structure. This material may need to be removed and replaced with an engineered fill material, subject to the foundation solution that is adopted. Allowable bearing capacities can be provided once preliminary foundation design has been determined and column loads are known.
Trees and High Plasticity Soils	Cohesive soils, and in particular those with a high plasticity, can experience significant volume change (i.e. Shrink and/or swelling) in response to changes in water contents, commonly as a direct result of interaction with vegetation. Our investigation results indicate that the soils beneath the site are classified as 'intermediate to high' plasticity clays and there are there are a series of semi-mature trees present towards the south-eastern site boundary. More detailed information about the trees should be sought from specialist arboriculturist, including the height, species and maturity of the trees. This information, along with the data contained within our report, can then be used to determine minimum foundation depths for the new structures.
Protection of buried concrete	The sulphate concentrations and pH values indicate that the site falls within 'Class DS1 - AC1' with respect to buried concrete (BRE Digest 1:2005). This indicates that the concentrations of sulphates in the underlying soils will not have an adverse affect on buried concrete. The ground beneath the site is classed as 'non-aggressive' and we consider standard Portland cement will be suitable for use.

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Side slope stability	Shallow excavations (e.g. service trenches) are likely to be formed within clay soil, which is likely to remain stable for short periods without support or being battered back. We recommend that a detailed inspection of the side slopes be carried out in order to assess fully any support measures required. Any excavation that requires worker entry should be either supported using sheet piling or battered back.	
Contamination Risk	The results of our environmental investigation has identified low concentrations of hydrocarbons (TPH and PAHs) in shallow soils. However, the results of our quantitative risk assessment indicates that none of the contaminants of concern we have assessed pose an unacceptable risk to future site users. In the absence of any viable pollutant linkages, we do not consider any further investigation, risk assessment and/or remedial works are required at the site, prior to the commencement of the development.	
Engineering Controls	We recommend the following engineering controls area adopted as part of the proposed redevelopment in order to mitigate risk to future site users. If these controls are not implemented, then further investigation, risk assessment and potentially remedial works may be required.	
	Barrier pipe	Hydrocarbons present in shallow soils can permeate standard PVC water supply pipework and leach into drinking water leading to tainting and in extreme cases can pose a risk to human health. We have identified hydrocarbons, in soil and water samples recovered from depths consistent with the likely depth of new service pipes. We therefore recommend that water supply pipework be constructed from a hydrocarbon impervious material (e.g. ductile steel or plastic/aluminium composite) and installed within clean fill material as precautionary measure and to protect from possible future impact.
	Cover System in landscaped Areas	A cover layer comprising sub-soil and topsoil dressing should be applied to all areas that are to be used for landscaping, to provide a barrier between site users and any residual contaminants that maybe present in shallow Made Ground. The thickness of top soil should be sufficient to sustain the proposed plant growth, as specified by a horiculturalist (usually no less than 100mm). Total thickness of the cover system should be in excess of 300mm. Analysis certificates for all imported materials should be requested from the supplier to verify the material is suitably inert and appropriate for use at site. Additionally, the contractor should be advised to carry out a visual inspection of soil on delivery in order to confirm the soil visually compares with that described on suppliers test report.
Presence of Buried Obstructions and Services	The site has undergone redevelopments on more than one occasion. As a result, there is the potential for buried obstructions (i.e. Former foundation, services, abandoned fuel storage tanks) to be present beneath the site. The site is likely to have connections to all primary utilities, including electricity, gas, water, sewerage. Our investigation indicates that the former below ground tank farm has been backfilled with a mixture of sand, gravels and concrete fragments/layers.	

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Asbestos in Made Ground	We undertook asbestos screening of the Made Ground samples, which identified asbestos fibres in shallow Made Ground. Any contractors carrying out groundworks should be made aware of the presence / potential for asbestos fibres and suitable controls measures should be adopted and included within their Construction Management Plan. Asbestos containing materials (ACMs) are often present in discrete pockets, sometime adhered to concrete slabs, and our investigation boreholes are of a narrow diameter. These results may therefore not fully reflect the extent and/or severity of asbestos contamination in Made Ground across the site. A watching brief should therefore also be adopted by the contractor during any groundworks and further inspection/sampling be carried out if any additional ACMs are discovered or suspected. The presence of asbestos in Made Ground will not pose a significant risk to site users, provided a suitable cover layer is adopted in all landscaped areas.
Protection of construction workers	Construction and maintenance workers, particularly those working on below ground utilities, should be made aware of the hydrocarbon concentrations encountered in soil. Strict hygiene practices should be followed during any below ground works. To minimise potential exposure of workers to potential hydrocarbon contaminants, site clothing should be removed after each working period. A clean area should be made available with washing facilities for use after each shift. Changing and washing areas should be positioned to ensure that no field equipment enters the clean area. Eating, drinking and smoking should be restricted to the clean area.
Use of Soakaways	Our preliminary investigation data indicates that shallow geology at the site is unlikely to be suitable for the construction of soakaways, to receive surface water run-off from the site buildings etc
Waste Classification	We recommend that waste classification analysis be carried out to assist in the classification of any waste soils that are to be produced as part of the proposed redevelopment. Classification should be carried out using the characterisation assessment and analysis described within the Environment Agency's technical guidance 'Waste Classification (WM3, 1st edition 2015). All waste soils and fill materials must be disposed of at an appropriately licensed disposal site. A registered waste haulage contractor must transport all waste soils. It is the responsibility of the site owner to ensure that wastes are safely transported and disposed of correctly.
Dewatering	No groundwater was encountered within the shallow monitoring wells we installed as part of our investigation (maximum depth 3.3m). Dewatering is therefore unlikely to be required for excavations extending to these depths. Groundwater may be present at grater depths, within sand layers within the Lambeth Group. Seasonal fluctuations in groundwater level due to extended periods of heavy rain may lead to the presence of groundwater being present at shallow depths under the site.
Your attention is drawn to the Notice to Interested Parties included as Attachment One.	

Table Forty: Temporary Works and Construction Issues

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ATTACHMENT ONE:
NOTICE TO INTERESTED PARTIES

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NOTICE TO INTERESTED PARTIES

The purpose of our work Is to provide general information on the environmental And/Or geotechnical conditions existing at the site And related to soil And/Or groundwater. The Client Or others specified the scope of the investigation And the validity of our conclusions Is limited by the scope of work specified. We are Not responsible for any such limitations Or omissions.

Where stated in this report, we have used information supplied by third parties. While we have evaluated As far As possible the validity Of this information, we cannot guarantee its accuracy In any way whatsoever.

No investigation technique Is capable Of completely identifying all Of the contaminants that might be present In the soil Or groundwater under a site. Where specified In our report, we have examined the ground by constructing a number Of boreholes And/Or trial pits. We recovered samples Of soil And/Or groundwater from available exposures.

The depth And spacing Of our Sampling locations were selected To ensure With a reasonable probability that they would be representative Of the actual conditions across the whole site. However, safety considerations relating To existing site infrastructure may have restricted our ability To investigate all potential contaminant sources. Specifically, we were unable To investigate the soil And groundwater condition immediately adjacent To the underground structures And/Or buried services. These limitations must be borne In mind When considering the conclusions reached In this report.

Soil Is intrinsically variable And the spread Of contaminants within the soil Is therefore subject To a degree Of non-uniformity. For these reasons no sampling technique can completely eliminate the possibility Of obtaining samples that are Not representative Of the actual conditions. Our sampling techniques are intended To reduce the possibility To an acceptable level, within the limits imposed by the scope of the investigation.

Groundwater levels And soil vapour levels that we report were accurate at the time of the investigation. Groundwater And soil vapour levels are variable. Long term monitoring may be required to ensure that the levels recorded during our investigation are representative of long term And possible 'worst case' conditions. In accepting our recommendations and/or conclusions the Client acknowledges that further, more detailed investigation would allow a more accurate assessment of site conditions to be made and that this would reduce any consequential risk to the Client.

Our investigation was carried out to assess the significance of contamination resulting from use of the site as identified in this report. Unless we have indicated otherwise, no assessment of the potential impact of any other previous uses has been made. No investigation was carried out to determine whether or not any deleterious or hazardous materials (such as asbestos) have been used in the construction of the buildings present on the site. Unless otherwise stated no investigation or assessment has been made of the presence or otherwise of invasive plant species including but not limited to Japanese Knotweed.

Unless specifically stated otherwise, we have not assessed the effect of any proposed future construction activities on existing structures on or near to the site. Nor, unless stated otherwise, have we assessed the likely effect of trees on existing or proposed structures on or near the site.

We do not accept any responsibility for the cost of remedial works or other costs incurred in whatever way whatsoever as a result of any omissions, errors or other shortcomings in this report unless we have been given reasonable opportunity to verify ourselves that such faults exist and we have been given a reasonable opportunity to carry out works to remedy such faults ourselves using the most practicable means available to us. We do not accept liability for any consequential losses incurred by you while either we or others carry out any remedial works we deem necessary.

This report has been prepared for the Client, as specified on the cover page of this report. In accepting our recommendations and/or conclusions the Client accepts that the terms of our appointment were as detailed in the Proposal, or Proposals, that we provided to the Client before being appointed and that these terms supersede any other terms and/or conditions set out in any contracts agreed between ourselves and the Client, regardless of when such terms and/or conditions were agreed to by us and/or signed by us.

Use of, and reliance on, this report by other third parties will be at such third parties own risk, and we do not accept any liability or responsibility to them.

Neither the whole nor any part of this report, or any reference to it, may be included in any published document circular or statement or published in any way without our prior written approval.

SUBADRA
Environmental - Geotechnical - Laboratory - Foundations
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ATTACHMENT TWO:
SITE PLANS AND BOREHOLE LOGS

Pinner Road, Northwood

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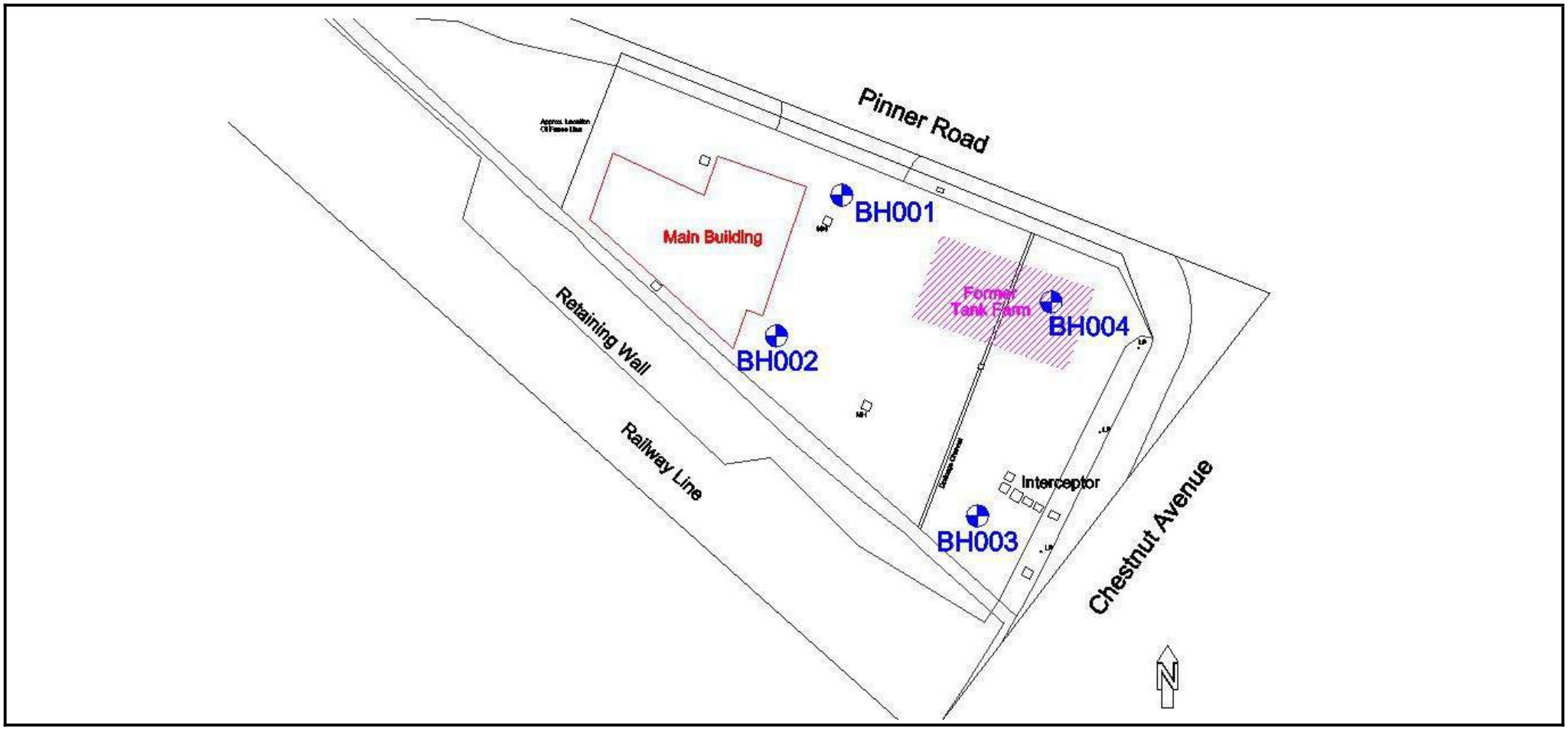
13 Triangle Business Park, Stoke Mandeville, HP22 5BL
Tel: 01296 739400 Email: consultants@subadra.com



Client: Polaris Property Developments Limited	Borehole Locations	Drawing Reference	IN22732 CL 002
		Date	July 2022
		Page	1

Borehole Log
BH001

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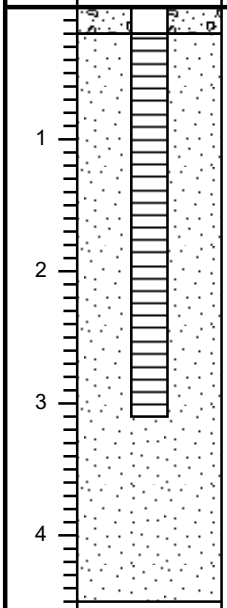
Environmental - Geotechnical - Laboratory - Foundations
13 Triangle Business Park, Stoke Mandeville, HP22 5BL
Tel: 01296 739400 Email: consultants@subadra.com

Project Name	IN22732 Pinner Road	Coordinates	
Date	29th June 2022	Ground Level	
Site Engineer	Megan Chan	Drilling Method	



Depth (m)	Sample Number/ Depth (m)	Sample Type/ Blowcount/ Recovery (cm)	PP or TV Su (kPa)	Description
				0.00m - 0.30m Made Ground Hardstanding over light red brown/beige granular sand and gravel.
	S1/0.40 - 0.40	D1, D4		0.30m - 1.50m Lambeth Group FIRM grey brown CLAY. Gravels 1.3 to 1.4m. Hydrocarbon odour 1.4 to 1.5m.
	S2/0.70 - 1.00	U		
	SPT1/1.00	N=14 1,2,4,3,4,3		
	S3/1.40 - 1.40	D1	Su = 62 Su = 87 Su = 150	1.50m - 4.50m Lambeth Group STIFF TO VERY STIFF brown mottled green grey and orange red CLAY. Friable from 3m onwards.
	S4/1.80 - 1.80	D1, D4	Su = 150	
			Su = 100	
	S5/2.50 - 2.50	D1, D4	Su = 150	
			Su = 150	
	SPT2/3.00	N=49 6,5,8,13,19,9		
	S6/3.20 - 3.20	D1		
	S7/3.40 - 3.40	D4	Su = 150	
	S8/3.50 - 3.60	U		
			Su = 150	
	S9/4.30 - 4.30	D1, D4	Su = 150	
				Borehole terminated at 4.50m

B = Bulk Bag, D1 = 60g Jar, D2 = 250g Jar, D3 = 500g Tub, D4 = 1,000g Tub, D5 = Small Bag, C = Core, U = U100
PP = Pocket Penotrometer, TV = Torvane

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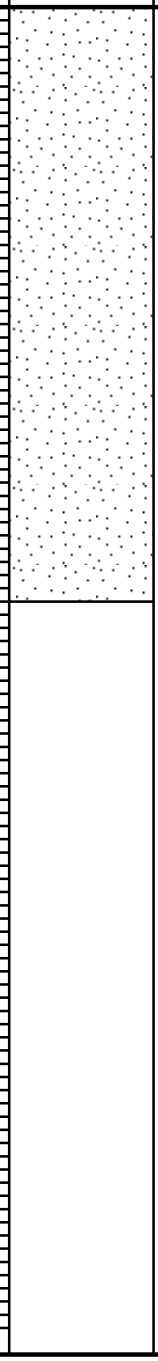
Well Diameter	50mm	Depth of Borehole	4.50m
Well Casing Length	0.20m	Depth to Groundwater	Dry
Well Screen Length	2.70m	Page	One of One

Borehole Log
BH002

SUBADRA
Environmental - Geotechnical - Laboratory - Foundations
13 Triangle Business Park, Stoke Mandeville, HP22 5BL
Tel: 01296 739400 Email: consultants@subadra.com

Project Name	IN22732 Pinner Road	Coordinates	
Date	29th June 2022	Ground Level	
Site Engineer	Megan Chan	Drilling Method	



Depth (m)	Sample Number/ Depth (m)	Sample Type/ Blowcount/ Recovery (cm)	PP or TV Su (kPa)	Description
				0.00m - 0.50m Made Ground Hardstanding over brown clay with gravels, rootlets and wood.
	S1/0.50 - 0.50	D1, D4		0.50m - 2.00m Lambeth Group SOFT TO FIRM brown slightly sandy CLAY with occasional fine gravel.
	S2/0.70 - 0.70	D1, D4	Su = 62	
	S3/1.30 - 1.30	D1, D4	Su = 62	
	S4/1.70 - 2.00	U	Su = 50	
	SPT1/2.00	N=22 1,2,4,4,6,8		2.00m - 4.50m Lambeth Group STIFF TO VERY STIFF light green grey mottled light brown CLAY with occasional fine gravel. More sandy from 3.8m.
	S5/2.20 - 2.20	D1		
	S6/2.70 - 2.70	D1	Su = 100	
	S7/3.20 - 3.50	U	Su = 87	
			Su = 150	
	S8/3.90 - 3.90	D1, D4		
	S9/4.20 - 4.20	D1	Su = 150	
	SPT2/4.40	N=50 5,8,12,13,14,11		Borehole terminated at 4.50m

B = Bulk Bag, D1 = 60g Jar, D2 = 250g Jar, D3 = 500g Tub, D4 = 1,000g Tub, D5 = Small Bag, C = Core, U = U100
PP = Pocket Penotrometer, TV = Torvane

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Well Diameter	50mm	Depth of Borehole	4.50m
Well Casing Length	0.20m	Depth to Groundwater	Dry
Well Screen Length	2.70m	Page	One of One

Borehole Log
BH003

SUBADRA
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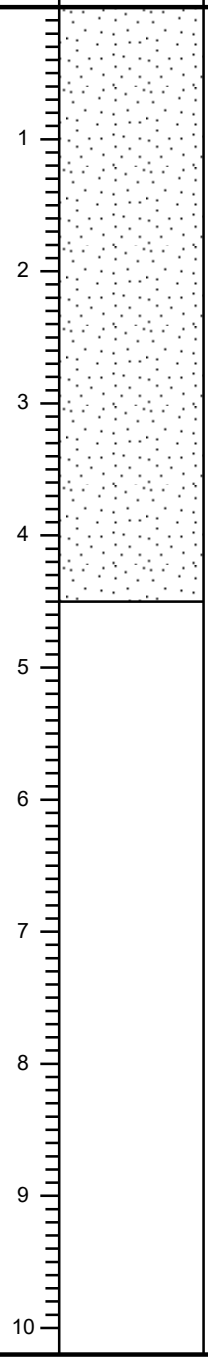
13 Triangle Business Park, Stoke Mandeville, HP22 5BL
Tel: 01296 739400 Email: consultants@subadra.com

Project Name	IN22732 Pinner Road	Coordinates	
Date	29th June 2022	Ground Level	
Site Engineer	Megan Chan	Drilling Method	



Depth (m)	Well	Casing & Water Level	Log	Sample Number/ Depth (m)	Sample Type/ Blowcount/ Recovery (cm)	PP or TV Su (kPa)	Description
0							0.00m - 0.50m Made Ground Hardstanding over light brown/beige granular sand and gravel.
				S1/0.50 - 0.50	D1, D4		0.50m - 1.60m Lambeth Group SOFT TO FIRM brown sandy CLAY with occasional fine gravel. Sand layer 1.6 to 1.8m.
1				S2/0.90 - 0.90	D1, D4	Su = 50	
						Su = 25	
				SPT1/1.80	N=11 1,1,2,2,3,4	Su = 75	1.60m - 4.50m Lambeth Group STIFF TO VERY STIFF green grey and light brown with red mottled slightly sandy CLAY. Hydrocarbon odour 2.0 to 2.1m. Friable from 2.9m onwards.
2				S3/2.00 - 2.00	D1		
				S4/2.40 - 2.40	D1, D4	Su = 150	
						Su = 150	
3				S5/2.80 - 2.80	D1		
						Su = 150	
				S6/3.30 - 3.30	D1, D4	Su = 150	
				SPT2/3.50	N=30 5,5,6,7,8,9		
4				S7/4.00 - 4.00	D1		
						Su = 150	Borehole terminated at 4.50m
5							
6							
7							
8							
9							
10							

B = Bulk Bag, D1 = 60g Jar, D2 = 250g Jar, D3 = 500g Tub, D4 = 1,000g Tub, D5 = Small Bag, C = Core, U = U100
PP = Pocket Penotrometer, TV = Torvane

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Well Diameter	50mm	Depth of Borehole	4.50m
Well Casing Length	0.20m	Depth to Groundwater	Dry
Well Screen Length	3.10m	Page	One of One

Borehole Log
BH004

SUBADRA
Environmental - Geotechnical - Laboratory - Foundations
13 Triangle Business Park, Stoke Mandeville, HP22 5BL
Tel: 01296 739400 Email: consultants@subadra.com

Project Name	IN22732 Pinner Road	Coordinates	
Date	30th June-1st July 2022	Ground Level	
Site Engineer	Megan Chan	Drilling Method	MC205 - Percussion Cased/Rotary Water Flush

Depth (m)	Well	Casing & Water Level	Log	Sample Number/ Depth (m)	Sample Type/ Blowcount/ Recovery (cm)	PP or TV Su (kPa)	Description
1				S1/0.50 - 0.50	D1, D4		0.00m - 4.40m Made Ground Sand and gravel with large lumps of concrete.
				S2/1.50 - 1.50	D1, D4		
2							
3							
4							
5				S3/4.70 - 4.70 S4/4.80 - 5.00 SPT1/5.00 S5/5.30 - 5.30	D1, D4 U N=50 26,24,50,0,0,0 D1, D4		4.40m - 6.40m Lambeth Group DENSE orange mottled light green grey slightly clayey SAND. Hydrocarbon odour from 5.0m.
6				S6/5.70 - 5.70	D1		
7				S7/6.30 - 6.30 S8/6.70 - 6.70 S9/7.30 - 7.30 S10/7.40 - 7.60	D1 D1, D4 D1, D4 U	Su = 150 Su = 150 Su = 150	6.40m - 13.50m Lambeth Group VERY STIFF orange mottled light green grey CLAY. Very sandy layer 7.6 to 8.5m. Sand layer 11.5 to 12.0m.
8				SPT2/7.80 S11/8.00 - 8.00	N=50 9,14,14,15,14,7 D1		
9				S12/8.70 - 8.70	D1, D4	Su = 150 Su = 150	
10				S13/9.60 - 9.60	D1, D4		

B = Bulk Bag, D1 = 60g Jar, D2 = 250g Jar, D3 = 500g Tub, D4 = 1,000g Tub, D5 = Small Bag, C = Core, U = U100
PP = Pocket Penotrometer, TV = Torvane

Well Diameter	50mm	Depth of Borehole	13.50m
Well Casing Length		Depth to Groundwater	
Well Screen Length		Page	One of Two

Borehole Log
BH004

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Tel: 01296 739400 Email: consultants@subadra.com

Project Name	IN22732 Pinner Road	Coordinates	
Date	30th June-1st July 2022	Ground Level	
Site Engineer	Megan Chan	Drilling Method	MC205 - Percussion Cased/Rotary Water Flush

Depth (m)	Well	Casing & Water Level	Log	Sample Number/ Depth (m)	Sample Type/ Blowcount/ Recovery (cm)	PP or TV Su (kPa)	Description
11				SPT3/10.80	N=50 8,42,50,0,0,0	Su = 150	6.40m - 13.50m Lambeth Group VERY STIFF orange mottled light green grey CLAY. Very sandy layer 7.6 to 8.5m. Sand layer 11.5 to 12.0m.
12				SPT4/11.50	N=0 50,50,0,0,0,0		
13				S14/12.70 - 12.70	D1, D4		
							Borehole terminated at 13.50m
14							
15							
16							
17							
18							
19							
20							

B = Bulk Bag, D1 = 60g Jar, D2 = 250g Jar, D3 = 500g Tub, D4 = 1,000g Tub, D5 = Small Bag, C = Core, U = U100
PP = Pocket Penotrometer, TV = Torvane

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Well Diameter	50mm	Depth of Borehole	13.50m
Well Casing Length		Depth to Groundwater	
Well Screen Length		Page	Two of Two

Composite Strength Profile

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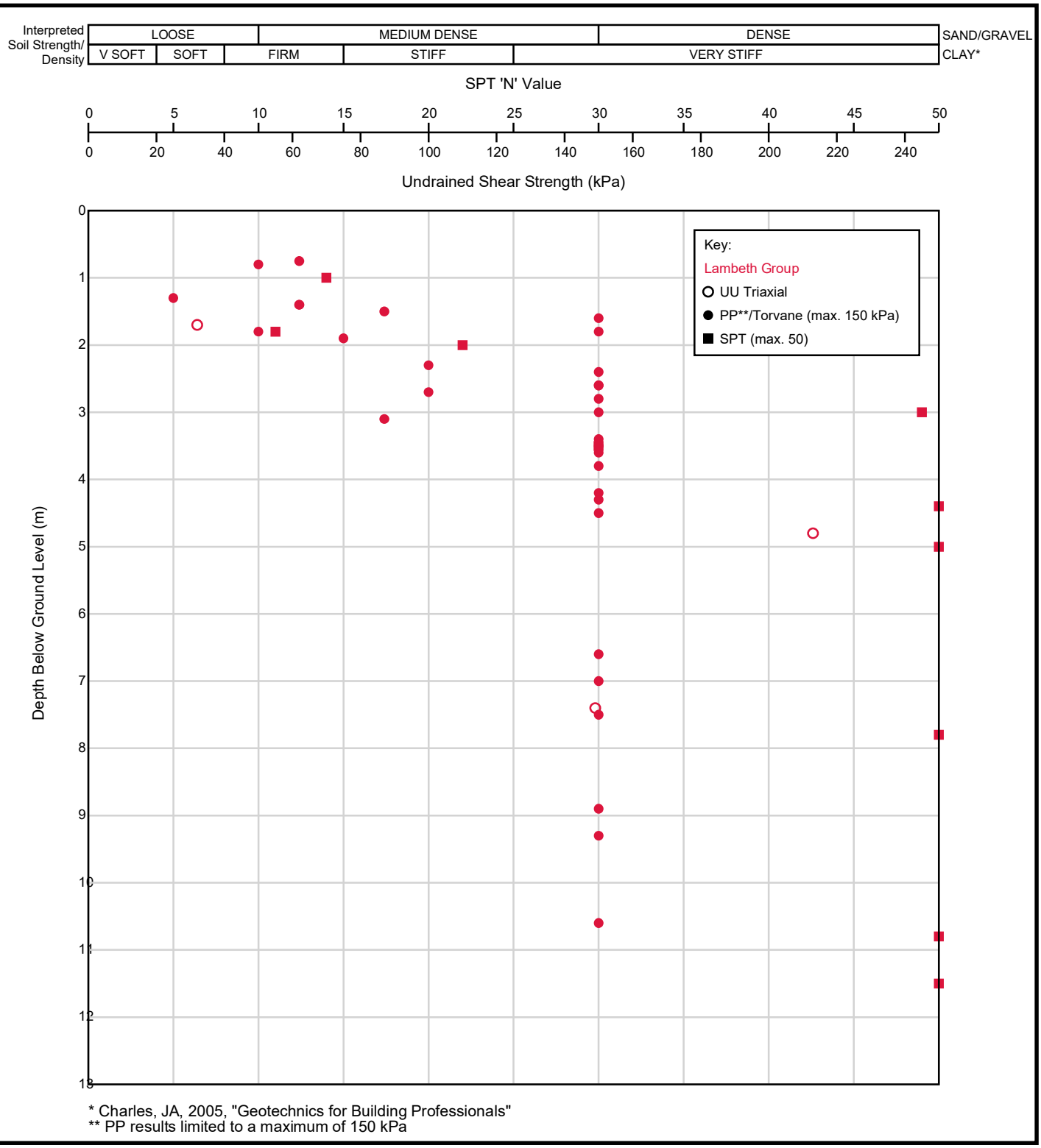
Tel: 01296 739400 Email: consultants@subadra.com

Project Name	Pinner Road, Northwood		
Project Code	IN22732		



* Charles, JA, 2005, "Geotechnics for Building Professionals"
** PP results limited to a maximum of 150 kPa

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13 Triangle Business Park, Stoke Mandeville, HP22 5BL
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ATTACHMENT THREE:
ANALYSIS CERTIFICATES

Report No 11773

fastanalysis.co.uk
E: lab@fastanalysis.co.uk T: 01296 739 423
13 Triangle Business Park, Stoke Mandeville, HP22 5BL

Project	IN22732 Pinner Road	Sampled	30th June 2022
Client	Subadra Consulting Ltd/Priyen Shah	Report Approved By	Duty Reporting Manager
Sample Type	Soil		

Soil - Atterberg Limits - 30th June 2022

Analyte	Unit	Method Detection Limit	Sample Details									
			BH001	BH002	BH004							
			S4	S3	S9							
			1.80m	1.30m	7.30m							
Liquid Limit [3]	%	0	55	40	64							
Plastic Limit [3]	%	0	23	18	27							
Moisture Content [3]	%	0	22	27	25							
Passing 425um Sieve [3]	%	0	100.00	100.00	100.00							

Method: Detemined according to BS1377:1990 methodology; Soil dried at 110oC. Moisure content calculated as dry weight of sample Method based on BS1377

3. Subcontracted

Chain of Custody	23890	Analysed	KC 06/07/22
Received	BO 05/07/22	Reported	KC 29/07/22
Prepared	BO 06/07/22	Page	One of One

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Report No 11774

fastanalysis.co.uk
E: lab@fastanalysis.co.uk T: 01296 739 423
13 Triangle Business Park, Stoke Mandeville, HP22 5BL

Project	IN22732 Pinner Road	Sampled	30th June 2022
Client	Subadra Consulting Ltd/Priyen Shah	Report Approved By	Duty Reporting Manager
Sample Type	Soil		

Soil - UU Triaxial - Single Stage - 30th June 2022

Analyte	Unit	Method Detection Limit	Sample Details										
			BH002	BH004	BH004								
			S4	S4	S10								
			1.70m	4.80m	7.40m								
Moisture Content [3]	%	0	36	8.1	15								
Length [3]	mm	0	142.54	139.78	140.29								
Diameter [3]	mm	0	72.18	71.03	70.39								
Bulk Density [3]	Mg/m3	0	1.92	2.19	2.17								
Dry Density [3]	Mg/m3	0	1.41	2.03	1.89								
Axial Strain [3]	%	0	20.0	19.6	5.5								
Undrained Shear Strength [3]	kN/m2	0	32	213	149								

Method: Detemined according to BS1377:1990 methodology; Soil dried at 110oC. Moisure content calculated as dry weight of sample Method based on BS1377

3. Subcontracted

Chain of Custody	23892	Analysed	
Received	BO 05/07/22	Reported	KC 29/07/22
Prepared		Page	One of One

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Report No 11775

fastanalysis.co.uk
E: lab@fastanalysis.co.uk T: 01296 739 423
13 Triangle Business Park, Stoke Mandeville, HP22 5BL

Project	IN22732 Pinner Road	Sampled	30th June 2022
Client	Subadra Consulting Ltd/Priyen Shah	Report Approved By	Duty Reporting Manager
Sample Type	Soil		

Soil - PSD Sieve and Hydrometer - 30th June 2022

Analyte	Unit	Method Detection Limit	Sample Details									
			BH004									
			S8									
			6.70m									
125mm 3	%	0	100.0									
90mm 3	%	0	100.0									
75mm 3	%	0	100.0									
63mm 3	%	0	100.0									
50mm 3	%	0	100.0									
37.5mm 3	%	0	100.0									
28mm 3	%	0	100.0									
20mm 3	%	0	100.0									
14mm 3	%	0	100.0									
10mm 3	%	0	100.0									
6.3mm 3	%	0	100.0									
5mm 3	%	0	100.0									
3.35mm 3	%	0	100.0									
2mm 3	%	0	100.0									
1.18mm 3	%	0	100.0									
0.6mm 3	%	0	99.9									
0.425mm 3	%	0	99.9									

Method: Detemined according to BS1377:1990 methodology; Determined according to BS1377:1990 methodology

3. Subcontracted

Report No 11775

fastanalysis.co.uk
E: lab@fastanalysis.co.uk T: 01296 739 423
13 Triangle Business Park, Stoke Mandeville, HP22 5BL

Project	IN22732 Pinner Road	Sampled	30th June 2022
Client	Subadra Consulting Ltd/Priyen Shah	Report Approved By	Duty Reporting Manager
Sample Type	Soil		

Soil - PSD Sieve and Hydrometer - 30th June 2022

Analyte	Unit	Method Detection Limit	Sample Details									
			BH004									
			S8									
			6.70m									
0.3mm[3]	%	0	99.8									
0.212mm[3]	%	0	99.6									
0.15mm[3]	%	0	99.2									
0.063mm[3]	%	0	98.7									
0.0430mm[3]	%	0	99									
0.0306mm[3]	%	0	97									
0.0215mm[3]	%	0	97									
0.0153mm[3]	%	0	94									
0.0111mm[3]	%	0	94									
0.0008mm[3]	%	0	57									

Method: Detemined according to BS1377:1990 methodology; Determined according to BS1377:1990 methodology

3. Subcontracted

Report No 11681

fastanalysis.co.uk
E: lab@fastanalysis.co.uk T: 01296 739 423
13 Triangle Business Park, Stoke Mandeville, HP22 5BL

Project	IN22732 Pinner Road	Sampled	30th June 2022
Client	Subadra Consulting Ltd/Priyen Shah	Report Approved By	Duty Reporting Manager
Sample Type	Soil		

Soil - Water Soluble Sulphate - 30th June 2022

Analyte	Unit	Method Detection Limit	Sample Details									
			BH001	BH001	BH002	BH004	BH004	BH004				
			S3	S9	S9	S1	S7	S13				
			1.40m	4.30m	4.20m	0.50m	6.30m	9.60m				
W/S Sulphate as SO4 (2:1)[3]	mg/l	10	21	12	13	1070	77	187				

Method: Determination of water soluble sulphate by extraction with water and analysed by ICP-OES

3. Subcontracted

Report No 11648

fastanalysis.co.uk
E: lab@fastanalysis.co.uk T: 01296 739 423
13 Triangle Business Park, Stoke Mandeville, HP22 5BL

Project	IN22732 Pinner Road	Sampled	30th June 2022
Client	Subadra Consulting Ltd/Priyen Shah	Report Approved By	Duty Reporting Manager
Sample Type	Soil		

Soil - pH - 30th June 2022

Analyte	Unit	Method Detection Limit	Sample Details									
			BH001	BH001	BH002	BH004	BH004	BH004				
			S3	S9	S9	S1	S7	S13				
			1.40m	4.30m	4.20m	0.50m	6.30m	9.60m				
pH [3]	pH units	0	6.39	7.96	7.65	9.48	9.4	8.45				

Method: Determination of pH by addition of water followed by measurement with an electronic pH probe

3. Subcontracted

Report No 11680

fastanalysis.co.uk
E: lab@fastanalysis.co.uk T: 01296 739 423
13 Triangle Business Park, Stoke Mandeville, HP22 5BL

Project	IN22732 Pinner Road	Sampled	30th June 2022
Client	Subadra Consulting Ltd/Priyen Shah	Report Approved By	Duty Reporting Manager
Sample Type	Soil		

Soil - Asbestos Screen - 30th June 2022

Analyte	Unit	Method Detection Limit	Sample Details				
			BH001	BH004			
			S1	S1			
			0.40m	0.50m			
Asbestos Screen [3]	N/a	0	Not Detected	Detected			
Asbestos Matrix [3]	Material Type	0		Chrysotile present as bundles			
Asbestos Type [3]	PLM Result	0		Chrysotile			

Method: Samples are screened by optical microscopy. Identification is performed using dispersion staining and polarised light microscopy.

3. Subcontracted

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Chain of Custody	23889	Analysed	KC 06/07/22
Received	BO 05/07/22	Reported	KC 14/07/22
Prepared	BO 07/07/22	Page	One of One

Report No 11679

fastanalysis.co.uk
E: lab@fastanalysis.co.uk T: 01296 739 423
13 Triangle Business Park, Stoke Mandeville, HP22 5BL

Project	IN22732 Pinner Road	Sampled	30th June 2022
Client	Subadra Consulting Ltd/Priyen Shah	Report Approved By	Duty Reporting Manager
Sample Type	Soil		

Soil - PAHs (EPA16) - 30th June 2022

Analyte	Unit	Method Detection Limit	Sample Details									
			BH001	BH002	BH003	BH004						
			S1	S1	S2	S1						
			0.40m	0.50m	0.90m	0.50m						
Naphthalene[3]	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1						
Acenaphthylene[3]	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1						
Acenaphthene[3]	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1						
Fluorene[3]	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1						
Phenanthrene[3]	mg/kg	0.1	< 0.1	0.44	< 0.1	1.01						
Anthracene[3]	mg/kg	0.1	< 0.1	< 0.1	< 0.1	0.24						
Fluoranthene[3]	mg/kg	0.1	< 0.1	0.54	< 0.1	1.74						
Pyrene[3]	mg/kg	0.1	< 0.1	0.49	< 0.1	1.62						
Benzo(a)anthracene[3]	mg/kg	0.1	< 0.1	0.22	< 0.1	0.90						
Chrysene[3]	mg/kg	0.1	< 0.1	0.21	< 0.1	0.86						
Benzo(b)fluoranthene[3]	mg/kg	0.1	< 0.1	0.22	< 0.1	0.99						
Benzo(k)fluoranthene[3]	mg/kg	0.1	< 0.1	< 0.1	< 0.1	0.38						
Benzo(a)pyrene[3]	mg/kg	0.1	< 0.1	0.18	< 0.1	0.82						
Indeno(1,2,3-cd)pyrene[3]	mg/kg	0.1	< 0.1	0.13	< 0.1	0.54						
Dibenzo(ah)anthracene[3]	mg/kg	0.1	< 0.1	< 0.1	< 0.1	0.12						
Benzo(ghi)perylene[3]	mg/kg	0.1	< 0.1	0.13	< 0.1	0.49						
Total PAHs (EPA16)[3]	mg/kg	1.6	< 1.6	2.6	< 1.6	9.7						

Method: The results reported here relate only to the material supplied to the laboratory Determination of PAH compounds by extration in acetone and hexane followed by GC-MS

3. Subcontracted

Report No 11647

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Project	IN22732 Pinner Road	Sampled	30th June 2022
Client	Subadra Consulting Ltd/Priyen Shah	Report Approved By	Duty Reporting Manager
Sample Type	Soil		

Soil - BTEX and MTBE - 30th June 2022

Analyte	Unit	Method Detection Limit	Sample Details									
			BH001	BH001	BH002	BH003	BH003	BH004	BH004	BH004		
			S1	S4	S5	S1	S4	S1	S6	S8		
			0.40m	1.80m	2.20m	0.50m	2.40m	0.50m	5.70m	6.70m		
MTBE [2]	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Benzene [2]	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Toluene [2]	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
Ethylbenzene [2]	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
p+m Xylene [2]	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		
o Xylene [2]	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		

UKAS TESTING 2628

Method: Analysis is carried out on samples as submited. Results are reported on a dry weight basis. Determination of BTEX by headspace GC-FID; The results reported relate only to the material supplied to the laboratory. Soil dried at 110oC. Moisture content calculated as dry weight of sample. Method based on BS1377

2. UKAS 17025

Prism.NET www.prismerp.co.uk

Chain of Custody	23887	Analysed	KC 06/07/22
Received	BO 05/07/22	Reported	KC 08/07/22
Prepared	BO 07/07/22	Page	One of One

Report No 11646

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Project	IN22732 Pinner Road	Sampled	30th June 2022
Client	Subadra Consulting Ltd/Priyen Shah	Report Approved By	Duty Reporting Manager
Sample Type	Soil		

Soil - TPH CWG - 30th June 2022

Analyte	Unit	Method Detection Limit	Sample Details									
			BH001	BH002	BH002	BH003	BH004	BH004	BH004	BH004		
			S3	S1	S3	S3	S1	S3	S5	S7		
			1.40m	0.50m	1.30m	2.00m	0.50m	4.70m	5.30m	6.30m		
C6-8 Aliphatic TPH	mg/kg	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5		
>C8-10 Aliphatic TPH	mg/kg	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5		
>C10-12 Aliphatic TPH	mg/kg	5	34	<5	37.9	55.5	<5	<5	<5	<5		
>C12-16 Aliphatic TPH	mg/kg	5	38.9	<5	75.5	105	<5	<5	<5	<5		
>C16-21 Aliphatic TPH	mg/kg	5	17.9	<5	<5	8.57	<5	<5	<5	<5		
>C21-35 Aliphatic TPH	mg/kg	20	<20	<20	<20	167	38.5	<20	29.3	<20		
C6-8 Aromatic TPH	mg/kg	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5		
>C8-10 Aromatic TPH	mg/kg	2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5		
>C10-12 Aromatic TPH	mg/kg	5	16.9	<5	<5	8.74	<5	<5	<5	<5		
>C12-16 Aromatic TPH	mg/kg	5	25.6	<5	8.94	12.1	<5	<5	<5	<5		
>C16-21 Aromatic TPH	mg/kg	5	36.2	<5	<5	<5	29	<5	<5	<5		
>C21-35 Aromatic TPH	mg/kg	20	<20	<20	<20	<20	32.3	<20	<20	<20		

Method: Analysis is carried out on samples as submited. Results are reported on a dry weight basis. Determination of BTEX by headspace GC-FID; Determination of hexane/acetone extractable hydrocarbons by GCxGC-FID.; The results reported relate only to the material supplied to the laboratory. Soil dried at 110oC. Moisture content calculated as dry weight of sample. Method based on BS1377