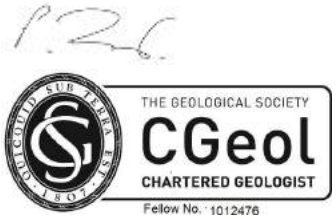
LMB GEOSOLUTIONS LTD

GROUND INVESTIGATION & ASSESSMENT

11-12 INGESTRE ROAD, LONDON NW5

July 2021

DOCUMENT RECORD

Document Title	Ground Investigation & Assessment
Site	11-12 Ingestre Road, London NW5 1UX
Document Date	20th July 2021
Document Version	Issue 1
Document Authorisation	Philip Lewis BSc (Hons), MSc, CGeol, FGS
	

LMB

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Company No. 8303397
LMB Home

TABLE OF CONTENTS

Contents

Executive Summary
Introduction 1
Summary of Previous Report Findings 5
Ground Investigation & Findings 21
Assessment of Analytical Results 41
Updated Conceptual Site Model & Pollutant Linkage Assessment 46
Conclusions & Recommendations 47
REFERENCES & GUIDANCE 51

FIGURES
Appendices

Executive Summary

Site Details	11-12 Ingestre Road, London NW5 1UX
Proposed Development	The development proposal comprises demolition of existing structures and erection of a new six storey building plus basement to provide 50no. assisted living units with communal facilities and associated areas of soft landscaping and car parking.
Ground & Groundwater Conditions	Made Ground overlying possible Head Deposits (northern and eastern site area) which in turn overlie the London Clay Formation. Made Ground thickness was noted to increase to a maximum thickness of 4.30m in the southern and south-eastern area of the site where there is a notable increase in site levels and a large retaining wall. Water strikes were recorded at depths of between 0.78m (47.47m AOD) and 1.20m (45.49m AOD). Observations in trial pits suggest that water has built up behind the retaining wall along the southern boundary. During return monitoring groundwater was recorded at depths of between 0.51m and 2.37m. Water levels were generally observed to rise over the monitoring period.
Preliminary Risk Assessment	Very low to Moderate risk rating (based on previous desk study information)
Generic Quantitative Risk Assessment	Based on the information reviewed and Generic Quantitative Risk Assessment completed, no plausible pollutant linkages are considered to exist. On this basis no remedial measures are considered necessary.
Geotechnical Appraisal	A preliminary pile assessment has been undertaken in accordance with EC7 which considers different partial factors for piles base/shaft and design approach. The assessment of pile capacities has looked at varying pile lengths and diameters varying between 450mm and 600mm. The preliminary pile assessment should be confirmed and/or amended by a competent piling contractor. • Buried concrete: Made Ground: DS2 & AC-2. Natural Deposits DS2 & AC-2.
Recommendations	The full set of recommendations should be reviewed, but in summary the following are provided: • It is recommended that this report is submitted to the Environmental Health Team at London Borough of Camden to support discharge of Condition 16 of the planning permission. • It is recommended that the use of appropriate potable water supply pipes be agreed with the statutory undertaker. • It is recommended that soils used in the 'raised' areas of proposed soft landscaping are certified 'clean' by the supplier who should provide certificates of chemical analysis. • It is recommended that Maintenance and Construction Workers involved in any below ground works adopt appropriate management procedures to mitigate direct contact with potentially contaminated soils.
This executive summary is not a stand alone document and should be read in conjunction with the full report text, including conclusions and recommendations.	

INTRODUCTION

Introduction

AUTHORISATION

LMB Geosolutions Ltd (LMB) was instructed by Symmetrys Ltd (Consultant Engineers) on behalf of Four Quarter Ingestre Road Ltd (the Client) in February 2021 to undertake additional ground investigation and assessment works in relation to the proposed development at 11-12 Ingestre Road, London NW5 1UX (the Site).

PROJECT AND SITE DETAILS

Site Address	11-12 Ingestre Road, London NW5 1UX (the Site). A Site Location Plan is provided as **Figure 1**.
Proposed Development	The site was most recently utilised as a care home and is currently occupied by live in guardians. It is understood that the development will comprise comprises, '*Erection of a six storey building plus single storey basement to provide 50 Assisted Living residential units (1 x 1 bed, 41 x 2 bed, 8 x 3 bed), following demolition of the existing building together with associated communal facilities, plant equipment, landscaping and 8 car parking spaces.*' A development schematic is provided as **Appendix A**.
Previous Reports	The following previous report completed on behalf of the Client has been provided: • Create Consulting Engineers (ref. CB/CS/P17-1282/05, July 2018). 11-12 Ingestre Road, London NW5 1UX. Basement Impact Assessment. In addition to the Basement Impact Assessment (BIA) the above report also contains Preliminary Risk Assessment and Generic Quantitative Risk Assessment sections.
Development Planning	Planning permission has been granted for the proposed development (ref. 2018/4449/P, dated 14th September 2018) but that condition 16 requires an assessment of potential land contamination issues as follows: *At least 28 days before the development hereby permitted commences a written detailed scheme of assessment consisting of site reconnaissance, conceptual model, risk assessment and proposed schedule of investigation must be submitted to the*

INTRODUCTION

	planning authority. The scheme of assessment must be sufficient to assess the scale and nature of potential contamination risks on the site and shall include details of the number of sample points, the sampling methodology and the type and quantity of analyses proposed. The scheme of assessment must be approved by the LPA and the documentation submitted must comply with the standards of the Environment Agency's Model Procedures for the Management of Contamination (CLR11).
Correspondence with Pollution Control Team	Prior to commencement of the additional ground investigation works, contact was made with Julien Diaz (Environmental Health Team Leader) at London Borough of Camden to discuss Condition 16 and agree in principle the use of the existing Preliminary Risk Assessment section within the BIA report to help inform requirements and ground investigation design.

AIMS & OBJECTIVES

This report aims to provide information sufficient to aid the Consultant Engineers in design of the proposed new development and to aid in discharge of Condition 16 of the planning permission.

SCOPE OF WORKS

To supplement the ground investigation works completed as part of the BIA the following scope of works has been completed:

Summary & Review of Previous Report

The Preliminary Risk Assessment and Generic Quantitative Risk Assessment sections presented in the Create Consult BIA report have been reviewed and summarised as section within this report.

Ground Investigation

- Site set up including appointment of sub-contractors.
- Completion of a service avoidance, level and positioning survey.
- Completion of 6no. dynamic (windowless) sampler boreholes to depths of between 3.35m and 5.45m below ground level (bgl) with insitu SPTs and collection of samples for laboratory testing.
- Completion of 4no. hand excavated trial pits to observe and record existing foundations along retaining structures and enable collection of samples for laboratory testing;
- Field headspace testing of soil arisings sampled at 0.50-1.0m intervals using a *minirae lite* photo-ionisation detector (PID) fitted with a standard 10.6ev lamp;
- Installation of 3no. groundwater and gas monitoring wells and return monitoring of the new and existing monitoring wells using a *minirae lite* PID and GFM 436 gas analyser on six occasions;

INTRODUCTION

- Supervision and geological logging of the soil arisings in general accordance with BS5930 by an appropriately experienced geo-environmental engineer.
- Chemical laboratory testing of soil for an appropriate suite of determinands including heavy metals, petroleum hydrocarbons and asbestos screening and quantification.
- Completion of a factual and interpretive report that utilises the existing ground investigation and newly acquired data that includes:
  - Details of the ground and groundwater conditions encountered;
  - Geological logs (AGS format if required);
  - Presentation of chemical laboratory testing results;
  - Schematic sections of exposed foundations;
  - Geotechnical laboratory testing and provision of advice on the material properties of the soil horizon including parameters to aid in retaining wall design and foundation options;
  - Provision of a Generic Quantitative Risk Assessment (GQRA) considering the proposed end use and; &
  - Conclusions and recommendations.

CONTRIBUTORS

This preliminary risk assessment section of the report has been completed by Christopher Hall, an environmental consultant with an MSc in Applied Environmental Hydrogeology and over nine years of experience. Christopher specialises in contaminated land and hydrogeology having worked on a wide range of investigations and assessments across a multitude of sectors.

The geotechnical appraisal has been completed by Corrado Candian (CEng, MICE) a chartered engineer with over ten years experience as a geotechnical engineer.

This report has been reviewed and compiled by Philip Lewis, a hydrogeologist and chartered Geologist with over twenty years' experience as a geoscience professional, including over eighteen years' experience as a professional adviser (consultant) in hydrogeology, engineering geology and contaminated land.

LIMITATIONS

LMB has prepared this report solely for the use of the named Client and those parties with whom a warranty agreement and/or assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from LMB and the Client.

LMB accepts no responsibility or liability for:

a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and

b) issue of this document to any third party with whom an agreement has not been executed.

INTRODUCTION

The risk assessment and opinions provided, among other things, take into consideration currently available guidance and best available techniques relating to acceptable contamination concentrations and interpretation of these values. No liability can be accepted for the retrospective effects of any future changes or amendments to these value.

Summary of Previous Report Findings

It has been assumed that persons reading this report are familiar with the findings of the Basement Impact Assessment (BIA) produced by Create Consulting Engineers Ltd (ref. CB/CS/P17-1282/05, dated July 2018). The BIA was undertaken to support a planning application for the site. A summary of the salient information contained within this document is included in the following section.

The information within the Create Consulting Engineers Ltd report has been used to produce an updated preliminary conceptual site model and pollutant linkages assessment.

PRELIMINARY RISK ASSESSMENT

A summary of the Preliminary Risk Assessment (PRA) completed by Create Consulting Engineers Ltd has been undertaken and is presented in this section in order to provide further background and context for the ground investigation and assessment presented in the later sections of this report.

DATA SOURCES

The following data sources have been used to inform the PRA:

- Basement Impact Assessment of 11-12 Ingestre Road, London, Create Consulting Engineers Ltd (ref. CB/CS/P17-1282/05, dated July 2018);
- British Geological Survey – 1:50,000 Geological Sheet 256, North London (Solid & Drift);
- British Geological Survey borehole archive records;
- Environment Agency Groundwater Vulnerability Mapping (1:100,000 series) Sheet 40, Thames;
- Information contained on the gov.uk website (https://flood-warning-information.service.gov.uk/long-term-flood-risk/map);
- NERC (2008). UK Hydrometric Register;
- River Basin Management Plan (RBMP). Thames River Basin District (2009); and
- Groundsure Enviro Insight Report (ref. GS-4125670, 25th July 2017), procured by Create Consulting Engineers Ltd.

SITE DESCRIPTION

The site is currently occupied by live in guardians. The site was most recently utilised as a care home with administration offices comprising four wings arranged over part two storey and part three storey with a central courtyard and a 'sunken garden' in the southwestern area of the site (see Photos 1 to 4 inclusive).

The site is arranged over split levels such that the building fronting Ingestre Road along the northern and western boundaries is at ground level and slopes gently down from east to west. The eastern boundary slopes

up from north to south such that the southern boundary is elevated with the sunken garden enclosed within a retaining wall structure approximately 4.0m in height.

The main site entrance is from the elevated southern boundary with a gate off Ingestre Road on the northern boundary providing access to the central courtyard area. The courtyard is currently used for bicycle and vehicles storage and for storage of building materials.

A number of mature and semi-mature trees were observed within and around the site.

During the site walkover no visual or olfactory evidence of contamination was identified. The desk study information within the CC report highlights a brick shed with black staining, however this was not accessible.

A photographic record is provided in **Appendix B**.

ENVIRONMENTAL SETTING

Published Geology & Aquifer Designations	Reference to British Geological Survey (BGS) Digital Map (1:50,000), accessible information contained on the Environment Agency (EA) website and within the Groundsure report (ref. GS-4125670) indicates the site is directly underlain by the London Clay Formation. No superficial deposits are anticipated at the site based on available sources of information. The London Clay Formation has an aquifer designation of 'Unproductive Strata' and is anticipated to be >50m in thickness in this area.
Local Hydrology	Reference to information on local mapping indicates that the nearest surface water feature is a 'drain' located approximately 50m north east of the site. The drain trends in a southwest to northeast direction and is approximately 125m in length. The drain does not appear to be connected to any other water courses and it is not clear what function it holds but it may be related to the adjacent railway line. There are no main surface water features within 250m of the site. It was noted in the Create Consulting Engineers Ltd BIA, that a culvert was identified approximately 400m southwest of the site. This is understood to be associated with a 'lost' tributary of the former River Fleet which historically flowed through the area. Information relating to the Thames region within the UK Hydrometric Register indicates that the average annual rainfall is in the region is 710mm. Publicly accessible information contained in the groundsure report (ref. GS-4125670) and on the gov.uk website indicates that the site is located in an area at Very Low risk of flooding from rivers and sea. The site is located in an area at Very Low risk from surface water flooding but is within a critical drainage area.

SUMMARY OF PREVIOUS REPORT FINDINGS

	Information in the Groundsure Enviro Insight Report (ref. GS-4125670) indicates that site is located in an area with a 'not prone' susceptibility to groundwater flooding.
Resource Potential & Ecological Quality	**Surface Water**: The nearest surface water feature is a drain located approximately 50m north of the site. The drain is not included within the relevant RBMP.
	Groundwater: The groundwater in the London Clay Formation is designated Unproductive Strata and as such is not characterised as a groundwater body within the relevant RBMP. In addition, the site is not located within an EA designated Source Protection Zone (SPZ).
Surrounding Land Use	Surrounding land uses are primarily residential and commercial.
Local Designations	Reference to information contained in the Groundsure Enviro Insight Report (ref. GS-4125670) indicates there are no designated environmentally sensitive sites (e.g. Sites of Special Scientific Interest) located within 500m of the site.

SUMMARY OF LIKELY GROUND & GROUNDWATER CONDITIONS

The information presented in the following sections is based on review of available BGS borehole logs for the local area and information presented within the Groundsure Enviro Insight Report (ref. GS-4125670).

The interpretation of this information should be considered preliminary pending completion of a site-specific ground investigation.

Local Ground Conditions

One pertinent available BGS borehole log is located within 250m of the site and is situated approximately 200m west of the site (TQ28NE23).

The BGS borehole record reports a stiff brown or blue clay (assumed to be the London Clay Formation), to a proven depth of 21.3m bgl. No groundwater strikes or visual or olfactory evidence of contamination was recorded on the reviewed BGS borehole log.

POTENTIALLY CONTAMINATIVE HISTORICAL LAND USE

A review of historical data within the Groundsure Enviro Insight Report (GS-4125670) has been completed to identify potentially contaminative previous land uses on site and within 250m of the site.

SUMMARY OF PREVIOUS REPORT FINDINGS

Date	On Site Features	Off Site Features
1869	-	Cuttings 35m northwest Railway station 150m west Cuttings 153m northeast Railway sidings 199m southwest Unspecified pit 206m west Railway building 206m southwest Unspecified ground workings 241m southwest
1879	-	Cuttings 35m northwest Railway station 150m west Cuttings 153m northeast Railway sidings 199m southwest Unspecified pit 206m west Railway building 206m southwest Unspecified ground workings 241m southwest
1894	-	Cuttings 35m northwest Railway station 100m west Railway station 146m west Cuttings 149m northeast Railway sidings 203m west Cuttings 213m southwest
1915	-	Unspecified tank 225m southwest
1920	Electric Generating Station (eastern boundary)	Railway sidings 4m northwest Unspecified ground workings 14m southwest Unspecified ground workings 34m northeast

SUMMARY OF PREVIOUS REPORT FINDINGS

Date	On Site Features	Off Site Features
		Cuttings 37m northwest Unspecified ground workings 41m south Miniature riffle range 57m north Railway station 149m west Cuttings 159m northeast Railway sidings 173m southwest Railway sidings 179m southwest Locomotive sheds 186m southwest Railway sidings 189m west Railway sidings 193m west Railway sidings 213m southwest Bottling store 230m southwest
1938	Electric Generating Station (eastern boundary) Unspecified Heap (south eastern boundary)	Railway sidings 15m north Miniature riffle range 44m north Railway station 142m west Cuttings 147m northeast Locomotive sheds 178m southwest Railway building 184m west Railway building 198m west Unspecified stores 243m south
1949	Unspecified Heap	Cuttings 42m north Cuttings 46m northwest Locomotive sheds 166m southwest Cuttings 173m northeast

SUMMARY OF PREVIOUS REPORT FINDINGS

Date	On Site Features	Off Site Features
		Bottling stores 174m southwest Railway sidings 176m west Railway sidings 196m southwest
1952	-	Garage 134m west Transport maintenance sheds 157m southwest Transport maintenance sheds 173m southwest Garage 233m west
1958	Unspecified Heap	Tunnel 28m northwest Tunnel 55m west Cuttings 160m northeast Unspecified commercial/industrial 166m southwest Railway sidings 166m southwest Unspecified commercial/industrial 174m southwest Railway sidings 203m west
1965	Unspecified Heap	Tunnel 28m northwest Tunnel 55m west Unspecified commercial/industrial 166m southwest Railway sidings 166m southwest Unspecified commercial/industrial 174m southwest Chimney 222m southwest
1973	-	Electricity substation 127m south Electricity substation 137m northeast Electricity substation 165m northeast Electricity substation 184m southwest

SUMMARY OF PREVIOUS REPORT FINDINGS

Date	On Site Features	Off Site Features
		Electricity substation 219m south Garage 135m west
1974	-	Tunnel 28m northwest Tunnel 55m west Unspecified depot 134m southwest
1975	-	Electricity substation 242m north
1981	-	Electricity substation 128m south Electricity substation 137m northeast Electricity substation 165m northeast Electricity substation 184m southwest Electricity substation 218m south Garage 135m west
1991	-	Electricity substation 165m northeast Electricity substation 184m southwest Electricity substation 218m south Electricity substation 242m north Garage 135m west
1995	-	Electricity substation 126m south Electricity substation 139m northeast Electricity substation 166m northeast Electricity substation 183m southwest Electricity substation 218m south Garage 122m west
1996	-	Unspecified depot 219m southwest

SUMMARY OF PREVIOUS REPORT FINDINGS

It should be noted that in the Create Consulting Engineers Ltd BIA (CC report), it was reported that a Harbor Works was located at the site and adjacent areas to the northeast. The Harbor Works was reported to have been present between 1936 and 1967 and was involved in the manufacture of iron strip and bar.

The CC report also indicates that the site and surrounding residential buildings were developed into their current form between c. 1973-1975.

REVIEW OF PLANNING HISTORY

A search of planning applications on the London Borough of Camden council website has been completed to review any existing and proposed development in the vicinity of the site. Planning application (2018/4484/NEW) was submitted on 18 September 2018 for 'Demolition of the existing buildings and the erection of a six storey plus single storey basement building accommodating 50 Assisted Living residential units'. The site address was 11 Ingestre Road, London, NW5 1UX and the application status was 'withdrawn'.

Planning application (2018/4449/P) was submitted on 1 October 2018 for 'Erection of a six storey building plus single storey basement to provide 50 Assisted Living residential units (1 x 1 bed, 41 x 2 bed, 8 x 3 bed), following demolition of the existing building together with associated communal facilities, plant equipment, landscaping and 8 car parking spaces'. The site address was 12 Ingestre Road, London, NW5 1UX and the application status was not detailed.

ENVIRONMENTAL & PERMITTING DATA

The table below provides a summary of the environmental and permitting data for the site and surrounding area:

Item	On Site	0 – 250m	Description
Part A (2) and Part B Activities	0	9	The closest is for 'respraying of road vehicles' located 150m west. The permit status is 'current' and is a 'Part B' permit.
Discharge Consents	0	0	-
Pollution Incidents	0	0	-
Current Industrial Data	0	22	The nearest is for 'vehicle repair, testing and servicing' located 113m west. Electricity substations are located 131m south and 142m north.
Local Authority Pollution Prevention Controls	0	0	-

SUMMARY OF PREVIOUS REPORT FINDINGS

Item	On Site	0 – 250m	Description
Registered Radioactive Substances	0	0	-
IPC & IPPC Authorisations	0	0	-
Historical & Registered Landfills	0	0	-
Waste Sites	0	0	-

RADON

Information within the CC report (specifically the groundsure report therein) indicates that the site is not in a radon affected area as less than 1% of properties are above the Action Level.

However, the Environmental Health team at London Borough of Camden have highlighted the information within guidance documents (BRE report BR211 amongst others) that suggests that developments including basements will be at an increased risk from Radon regardless of geographical location. This will be given further consideration in later sections of the report.

ENVIRONMENTAL SENSITIVITY

Overall, the site setting is considered to be of **low/moderate** environmental sensitivity, for the following reasons:

- The site is located in a predominantly residential and commercial land use area;
- The site is underlain by the London Clay Formation, which is designated as Unproductive Strata;
- The site is not located within an SPZ and there are no active licensed groundwater abstractions located within 250m of the site;
- The site is located within an area at very low risk of flooding (rivers and sea);
- The site is located within an area at very low risk of flooding (surface water);
- The site is located within an area with a 'not prone' susceptibility to groundwater flooding;
- The nearest surface water feature is a drainage ditch located approximately 50m north of the site; and
- There are no designated environmentally sensitive sites within 500m of the site.

SUMMARY OF PREVIOUS REPORT FINDINGS

GROUND AND GROUNDWATER CONDITIONS

Ground Conditions

The table below provides a summary of ground conditions encountered during the first phase of ground investigation works, undertaken by CC in August 2017 as part of the BIA. The ground investigation comprised of two cable percussive boreholes and one rotary borehole to depths of 25.0m.

Strata	Depth Range to Top (m bgl)	Depth Range to (Base (m bgl)	Summary Description
Made Ground	Ground Level	2.10 – 2.20	The Made Ground comprised of both granular and cohesive horizons. The granular Made Ground generally comprised of a sandy gravel of brick and concrete. The cohesive Made Ground generally comprised of a gravelly clay with the gravel component typically flint, brick and concrete. Possible Made Ground was recorded at between 1.7 and 2.2m bgl in BH01 and BH02.
Alluvium (1)	2.10	2.50	The Alluvium was recorded at one location (BH03) and was recorded as a 'soft brown organic clay'. It was noted that this stratum could relate to the former River Fleet.
London Clay Formation	2.10 – 2.50	25.00(2)	Generally recorded as a weathered 'stiff mottled grey/orange brown silty clay' to depths of 11.80-14.10m bgl overlying a 'Very stiff grey slightly silty clay with trace of selenite crystals' to the depth of borehole.

(1) Not encountered in all locations.

(2) Base not determined.

Groundwater Conditions

During advancement of the three boreholes, groundwater was not encountered. The boreholes were installed with monitoring wells screened across the Made Ground, Alluvium (where present) and the London Clay Formation.

During subsequent groundwater monitoring of boreholes, groundwater was recorded at depths of between 0.88 and 6.30m bgl.

GENERIC QUANTITATIVE RISK ASSESSMENT

A summary of the findings of the previous Generic Quantitative Risk Assessment (GQRA), undertaken by CC as part of the BIA, is summarised in the section below.

SUMMARY OF PREVIOUS REPORT FINDINGS

Soil Assessment

The results of the GQRA indicated that soil contaminant concentrations are generally below the limit of detection of the laboratory method applied and below relevant criteria considering a residential (without plant uptake) end use scenario.

BH01 at 0.3m bgl (within the Made Ground) recorded an elevated petroleum hydrocarbon (C10-35) concentration of 2,400mg/kg. Following speciated petroleum hydrocarbon analysis on this sample, no carbon banding group concentrations exceeded the relevant assessment criteria. It was further stated that all Made Ground will be removed from the site as part of the proposed development (i.e. basement excavation).

Asbestos was not detected in the five samples of Made Ground soils screened.

There is potential for maintenance and construction workers to come into contact with Made Ground soils during construction works. However, it should be noted that this relates to acute and not chronic risk and as such cannot be assessed using the approach described within the statutory guidance.

Ground Gas & Volatile Vapours

Three rounds of ground gas monitoring were undertaken in between September and November 2017 from the three monitoring wells installed. Elevated methane concentrations were not recorded. The maximum recorded carbon dioxide concentration was 12.8% in BH03 and CC suggested that this could potentially be associated with the recorded organic Alluvium at this location. Gas flow at the boreholes were relatively low and ranged from between 0.4 and 0.8l/hr. A negative gas flow of -6.5l/hr was recorded at BH01.

As such a maximum Gas Screening Value (GSV) of 0.1024l/hr was determined, which corresponds to a Characteristic Situation (CS) 2. However, it was stated that Made Ground and the Alluvium will be removed as part of the proposed development (i.e. basement excavation) and therefore removing the potential source of carbon dioxide generation. It was stated that gas protection measures would likely not be required for the proposed development, however further monitoring would be required to confirm this.

However, it is noted that this would not negate the potential risk of ground gas/vapour migration from potential off-site sources onto the site.

UPDATED PRELIMINARY CONCEPTUAL SITE MODEL

The information presented in the previous sections of this report and within the former Environment Agency/DEFRA document; Priority Contaminants for the Assessment of Land (CLR8)[1] have been used to complete a Preliminary Conceptual Site Model (PCSM) that details the potential contaminant sources, pathways and receptors.

[1] This document has been withdrawn but is considered to remain useful in proving technical background for identifying potential sources of contamination and designing ground investigation works.

SUMMARY OF PREVIOUS REPORT FINDINGS

The PCSM is presented in the table below:

Potential Contaminant Sources	On-site	• Electric generating station (1920-1938) • Unspecified heaps (1938-1965) • Harbor works (1936-1967) • Made Ground & Alluvium / organic soils
	Off-site	• Railway sidings (1920-1938), adjacent northwest • Ground workings (1869-1949), between 10-50m in all directions • Rifle range (1920-1938), 44m north
Associated Contaminant	On-site	• Potential contaminants associated with likely Made Ground including heavy metals, asbestos and organic contaminants. • Petroleum hydrocarbons and volatile organic compounds • Bulk ground gases & volatile vapours.
	Off-site	• Heavy metals and inorganic contaminants. • Organic contaminants (including petroleum hydrocarbons). • Bulk ground gases & volatile vapours.
Receptors		• Future Site Users. • Neighbouring residents. • Maintenance and construction workers (acute risk only). • Drainage ditch approximately 50m north. • New built development.
Pathways to Receptors		• Direct contact, inhalation and ingestion of contaminants within any shallow soils (Acute risk during below ground construction and maintenance). • Perched groundwater migration to surface waters. • Migration of ground gas & volatile vapours.

POLLUTANT LINKAGE ASSESSMENT

The likelihood of pollutant linkages being present between the potential contaminant sources, pathways and receptors identified in the PCSM are outlined in the table below:

SUMMARY OF PREVIOUS REPORT FINDINGS

Pathway Linkage	Likelihood of Pollutant Linkage	Consequences	Risk Rating	Reasoning
Future Site Users (Direct exposure pathway)				
Ingestion/Dermal Contact/Inhalation (Site Users).	Low	Medium	Moderate/Low	On and off-site sources of contamination have been identified and the site is likely to be underlain by Made Ground & Alluvium/organic soils. The majority of these soils (and associated potential contamination) will be removed as part of the proposed development (i.e. basement excavation). However, some residual soils will remain around the periphery of the site/development. Potential exposure for maintenance and construction workers will be acute and it is assumed they will adopt appropriate management procedures to mitigate potential risks.
Ingestion/Dermal Contact/Inhalation (Maintenance and Construction Workers).	Low	Medium	Moderate/Low	
Future Site Users (Indirect exposure pathway)				
Enclosed space accumulation of ground gas.	Low	Severe	Moderate	On and off-site sources of ground gas/vapour have been identified and elevated concentrations of carbon dioxide were recorded during monitoring. The majority of the Made Ground &
Outdoor volatile vapour exposure	Low	Medium	Moderate/Low	

SUMMARY OF PREVIOUS REPORT FINDINGS

Pathway Linkage	Likelihood of Pollutant Linkage	Consequences	Risk Rating	Reasoning
				Alluvium/organic soils will be removed as part of the proposed development (i.e. basement excavation), however this does not negate the risk of ground gas/vapour migration from the small areas of residual soil and potential off-site sources onto the site. The underlying London Clay Formation is not considered a potential ground gas source.
Ingress into potable water supply pipes	Low	Medium	Moderate/Low	Although the majority of Made Ground & Alluvium/organic soils will be removed as part of the development confirmation with the statutory undertaker is recommended.
Risks to Buildings via accumulation of ground gas in enclosed spaces and sub-floor voids.	Low	Severe	Moderate	On and off-site sources of ground gas/vapour have been identified and elevated concentrations of carbon dioxide were recorded during monitoring. The majority of the Made Ground & Alluvium/organic soils will be removed as part of the proposed development (i.e. basement excavation), however this does not negate the risk of ground gas/vapour migration from the small areas

SUMMARY OF PREVIOUS REPORT FINDINGS

Pathway Linkage	Likelihood of Pollutant Linkage	Consequences	Risk Rating	Reasoning
				of residual soil and potential off-site sources onto the site. The underlying London Clay Formation is not considered a potential ground gas source.
Water Environment				
Contaminant migration on to neighbouring land.	Unlikely	Medium	Low	On and off-site contaminant sources have been identified, however the site is by primarily cohesive soils and following development will be underlain primarily by the London Clay Formation and is considered unlikely to support a groundwater unit capable of significant contaminant migration. Perched groundwater was not observed within the Made Ground.
Contaminant migration from neighbouring land.	Unlikely	Medium	Low	
Contamination of groundwater	Unlikely	Medium	Low	
Contamination of surface water	Unlikely	Medium	Low	A drain is located approximately 50m north of the site. Given the distance from the site and the London Clay Formation unlikely to support a groundwater unit capable of potential contaminant migration, the risk to nearby surface waters is considered Low.

SUMMARY OF PREVIOUS REPORT FINDINGS

Pathway Linkage	Likelihood of Pollutant Linkage	Consequences	Risk Rating	Reasoning
Foundation Piling				
Creation of a pathway between any near surface contaminants and the underlying aquifers.	Unlikely	Mild	Very Low	If a piled foundation solution is adopted there is a substantial thickness of low permeability London Clay between potential contaminants and sensitive aquifers (e.g. Principal Chalk Aquifer).
Overall Risk Rating			**Very Low to Moderate**	

Ground Investigation & Findings

INTRODUCTION

The most recent phase of ground investigation works was undertaken on 18th March 2021 and comprised the progression of 6no. dynamic (windowless) sampler boreholes to depths of between 3.45m and 5.45m bgl, with sampling of soil for laboratory testing.

An exploratory hole location plan provided by the Consultant Engineers is provided as **Figure 2**.

Additional groundwater and ground gas monitoring was undertaken on six occasions between 26th March and 9th July 2021.

Details of the ground investigation completed, along with the findings of the investigation, are provided in the following sections. The exploratory hole logs and laboratory results are presented in **Appendix C, D** and **E** respectively.

Guidance Documents

Details of the best practice guidance documents and reference information used in undertaking the ground investigation and assessment are provided at the end of this report (see REFERENCES & GUIDANCE).

INVESTIGATION STRATEGY

The ground investigation was designed based on the information provided within the PRA presented within the CC report (ref. CB/CS/P17-1282/05, dated July 2018) and also to aid in discharge of Condition 16 of the planning permission (ref. 2018/4449/P, dated 14th September 2018).

In addition, the following exploratory hole locations were positioned to target historical features identified within the desk study and potentially sensitive areas in the proposed development:

Location	Feature Targeted
WS01	Historical electrical generating station to the east.
WS02	Historical electrical generating station to the east and brick shed with black staining identified in CC desk study.
WS03	Area of deeper Made Ground identified in CC investigation.
WS04	Existing area of external soft landscaping.
WS05	General coverage.
WS06	

GROUND INVESTIGATION & FINDINGS

Field Headspace Screening

Field screening of soil samples was undertaken using a *mini-rae Lite* photo ionisation detector (PID). Soil arisings were collected at regular intervals and placed in sealed plastic bags, agitated by shaking and left for a minimum of 30 minutes prior to testing of 'headspace' using the PID.

A calibration certificate is provided in **Appendix F**.

Soil Chemical Analysis & Laboratory Testing

Soil samples were submitted to the UKAS and MCERTS accredited laboratories of i2 Analytical for geotechnical and chemical analysis.

The results of the geotechnical and chemical analysis are presented in **Appendix D** and **E** respectively.

GROUND & GROUNDWATER CONDITIONS

Ground Conditions

The table below provides a summary of ground conditions encountered during the most recent investigation works (march 2021) with full descriptions provided in the associated exploratory hole logs provided in **Appendix C**:

Strata	Depth Range to Top (m bgl)	Depth Range to (Base (m bgl)	Summary Description
Made Ground	Ground Level	0.40 – 4.30	Hard surfacing was encountered in the form of tarmac and concrete in locations BH01 and WS01, with paving slabs encountered in BH02, WS04 and WS05. Sub-base materials were recorded beneath the paving slabs. Made Ground soils were typically found to comprise a slightly gravelly to gravelly clay with varying proportions of brick, concrete and flint. In locations BH03, WS02 and WS03 (south and south eastern site area) the deeper Made Ground soils were observed to have a black colouration and/or contain organic / carbonaceous materials.
Possible Head Deposits / Possible Made Ground (1)	1.10	2.20	Typically clay with occasional flint gravel.

Strata	Depth Range to Top (m bgl)	Depth Range to (Base (m bgl)	Summary Description
London Clay Formation(2)	0.40 – 4.30	3.45 – 5.45	Typically firm becoming stiff fissured clay with occasional selenite crystals, silty partings and claystone/mudstone bands.

(1) Only recorded in locations WS01, BH01 & BH02

(2) Base not determined.

Discussion of Ground Conditions

The ground conditions encountered in the recent LMB investigation are generally consistent with those recorded in the CC July 2018 report. However, there are some variations that have been observed, as follows:

- The CC investigation recorded possible Made Ground in locations BH01 and BH02 and review of the soil descriptions suggests that this is the same soil horizon encountered in WS01 (LMB investigation) and recorded as possible Head deposits.
- The maximum Made Ground thickness recorded in the CC investigation was 2.10m but in the LMB investigation a maximum of 4.30m was recorded. This is likely to be a consequence of the fact that the maximum thickness recorded was in an elevated area of the not investigated during the CC investigation.
- Based on the findings of the LMB investigation, it is considered likely that the black brown organic clay recorded in the CC investigation is Made Ground.

Based on the findings of the LMB and CC investigations it appears that the Made Ground thickness increases to the south and southeast where there is a notable increase in site levels and a large retaining wall.

Visual and Olfactory Observations

Observations of possible visual and olfactory evidence of contamination during the ground investigation works are summarised in the table below:

Location	Depth (m bgl)	Observation
BH02	0.30-1.90	Black colouration and clinker gravel.
BH03	2.10-2.50	Black colouration and organic odour.
WS01	0.65–1.10	Brown to black colouration.
WS02	0.50-4.00	Local clinker gravel and grey black colouration.
WS03	2.50-3.10	Black mottling and carbonaceous material.
WS04	1.10-2.10	Black staining.

Location	Depth (m bgl)	Observation
WS06	1.50-1.95	Black colouration.

In addition, Made Ground soils were encountered in all exploratory hole locations and can be indicative of the presence of contaminants.

Groundwater Conditions

During the CC ground investigation works no water strikes were encountered. During the LMB investigation water strikes were recorded in the following locations:

- WS04 at a depth of 1.20m bgl (45.49m AOD).
- TP02 at a depth of 0.82m, rising to 0.72m bgl (47.60m AOD).
- TP03 at a depth of 0.78m bgl (47.47m AOD). The water ingress was observed to be rapid.
- TP04 at a depth of 1.20m, rising to 0.94m bgl (47.298m AOD).

The observations in TP02 to TP04 inclusive are in locations around the existing retaining wall in the south of the site and is likely to be reflective of water that has built up behind the retaining wall.

The table below provides a summary of the groundwater monitoring results with the full monitoring results presented in **Appendix G**.

Location	Depth of Screened Section (m bgl)	Lithology of Screened Section	Depth Range to Groundwater	
			mbgl	mAOD
BH02	1.00 – 15.00	Made Ground & London Clay Formation	1.36 – 1.25	47.05 – 46.94
BH03	1.00 – 16.00		0.80 – 0.51	47.79 – 47.50
WS02	0.50 – 4.00	Made Ground	2.55 – 2.37(1)	47.95 – 47.77
WS03	0.50 – 3.00		1.90 – 1.43(1)	46.30 – 46.87
WS06	0.50 – 2.00		2.01 – 1.00(1)	47.22 – 46.21

(1) Dry in first two rounds (26/03/21 & 31/03/21)

Water levels were generally observed to rise over the monitoring period. However, it is considered unlikely that this is reflective of groundwater recharge in the London Clay and is more likely to be reflective of rapid rainfall infiltration through Made Ground soils and via monitoring well covers.

In addition, as previously noted, groundwater within the London Clay Formation is not considered to be representative of a permanent and laterally continuous aquifer unit, but rather present as discrete and confined units within (for example) micro fissures and local mudstone horizons and the recorded groundwater level will most likely be reflective of the pore water pressures within these discrete features.

Geotechnical Parameters

GROUND MODEL

The ground model presented below has taken into consideration the data from both the LMB and CC phases of ground investigation work.

The adopted ground model based on the information presented in the previous sections is presented in the table below:

Strata	Elevation to top of Strata (m AOD)	Thickness (m)
Made Ground	48.20 – 46.20	2.00
Weathered London Clay Formation	46.20 – 35.70	12.50
London Clay Formation	35.70 – 23.20	25.00

To add conservatism, it is recommended that a hydrostatic profile is adopted from ground level i.e. c. 48.2mAOD.

GEOTECHNICAL PARAMETERS

Characteristic Properties of Soils (Field & Lab Testing)

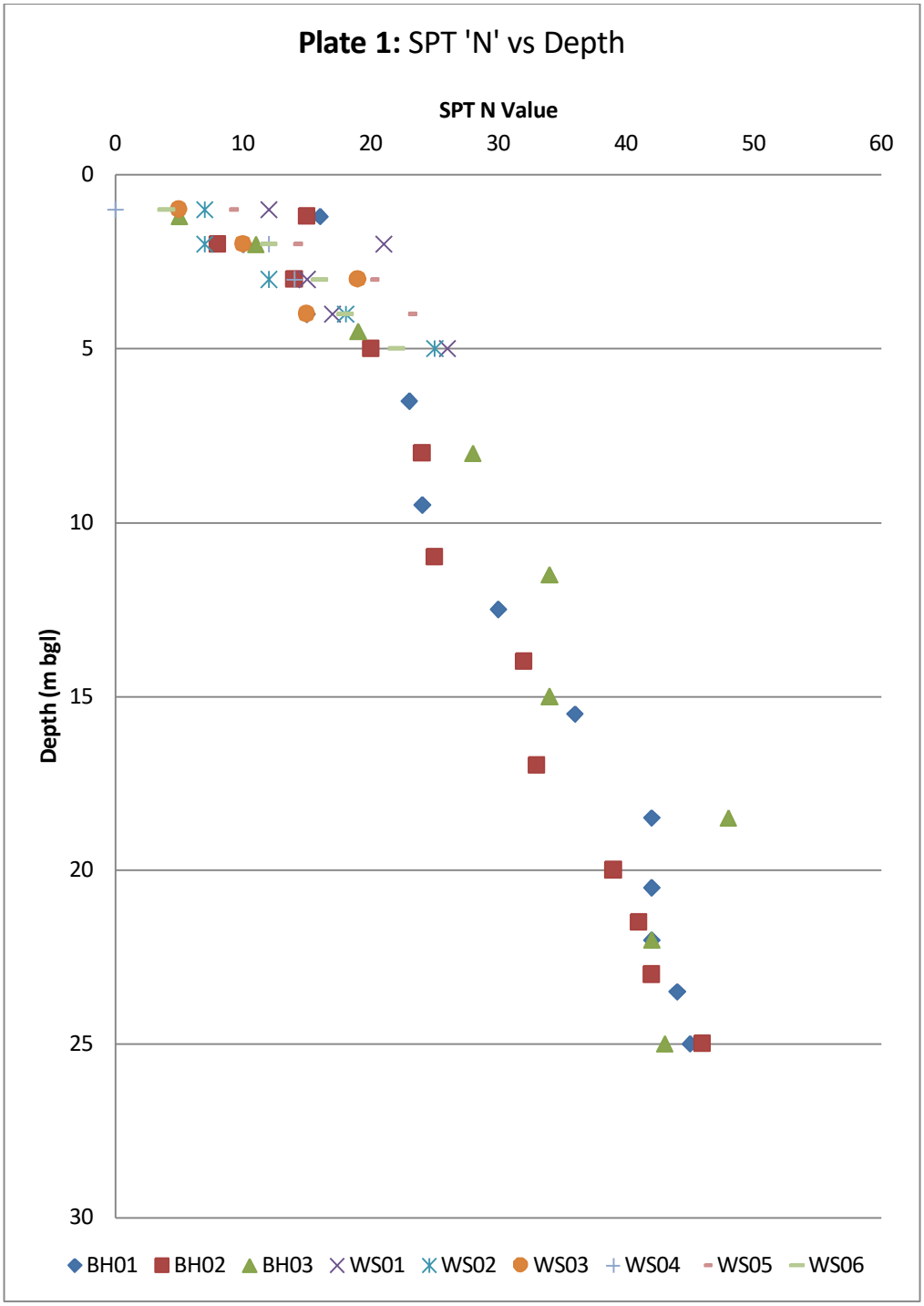
A summary of the geotechnical properties of the strata based on the field and laboratory testing is provided in the table below.

Soil Property	Stratum		
	Made Ground	Weathered London Clay Formation	London Clay Formation
SPT 'N' Value	0 – 18	8 – 34	32 – 48
Shear Strength (kN/m^2)	-	86 – 124	81 – 209
Bulk Density (mg/m^3)	1.70(1)	1.87 – 1.93	1.84 – 1.91
Moisture Content (%)	13 – 24	27.9 – 37.1	16.3 – 57.2
Plasticity Index (%)	-	42 – 52	42 – 51
pH	8.0 – 8.8	7.9 – 8.0	8.4
Sulphate (g/l)	0.05 – 0.55	0.84 – 1.5	0.59

(1) Value based on BS8002

GEOTECHNICAL PARAMETERS

A plot of SPT 'N' value against depth is provided in **Plate 1** below.



GEOTECHNICAL PARAMETERS

Made Ground

Effective Strength: SPT N values within the Made Ground soils varied between 0 and 18, which is indicative of its inherent variability. As such conservative values for the angle of shearing resistance has been adopted as 28˚.

Stiffness: Based on the available data a drained stiffness modulus of 5,000KPa has been considered appropriate.

Weathered London Clay Formation

Effective Strength: SPT N values within the weathered London Clay Formation varied between 8 and 34 which is indicative of the firm to stiff nature of the soils. Laboratory testing for undrained shear strength supports this with a range of values of 86 – 124kN/m^2 derived.

Stiffness: Based on the available data a drained stiffness modulus of 20800+2080z has been derived.

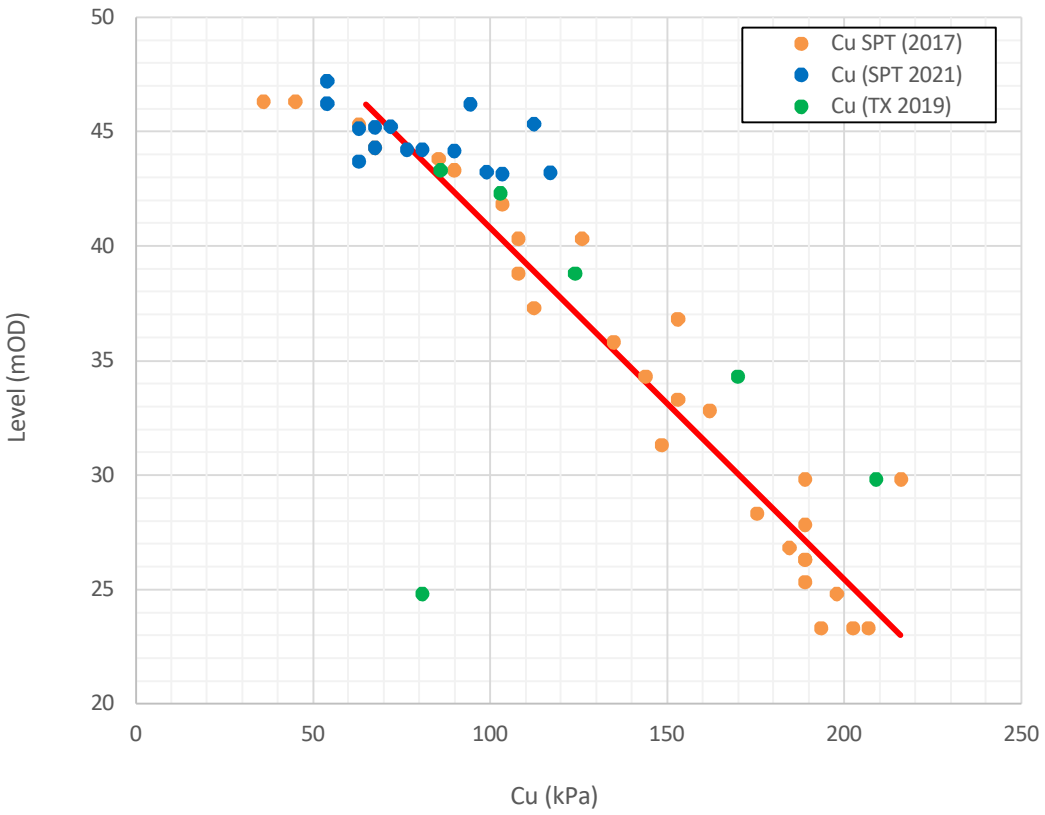
London Clay Formation

Effective Strength: SPT N values within the London Clay Formation varied between 32 and 48 which is indicative of the generally stiff nature of the soils. Laboratory testing for undrained shear strength supports this with a range of values of 81 – 209kN/m^2 derived.

Stiffness: Based on the available data a drained stiffness modulus of 42640+2080z has been derived.

Plate 2 overleaf illustrates the variation in Cu with depth in the London Clay. The data suggests a general increase in Cu with depth.

Plate 2: Variation in Cu with depth



Notes:

- The average ground level has been assumed at 48.2mOD. Max ground level was recorded at WS02 (50.32mOD); min ground level was recorded at WS04 (46.69mOD).
- An average thickness of 2.0m has been assumed for the Made Ground. However, Made Ground thickness increased to 4.3om in WS02 and 3.10m in WS03.
- The relationships applied in the London Clay are: Eu/Cu=400 and E'=0.8Eu
- z=0 at the top of LC i.e. 46.2m AOD
- Cu based on SPT has been based on correlation Cu/N=4.5
- Cu at top of London Clay at 35.7m AOD was calculated as 65+6.5*z(thickness of weathered LC).

GEOTECHNICAL PARAMETERS

Summary of Geotechnical Parameters in Ground Model

Geotechnical parameters considered within the ground model are presented in the table below:

Stratum	Thickness	γ	C_u, top	c'	Ø'	Eu	E',top	K0
	(m)	(kN/m^3)	(kPa)	(kPa)	(°)	(kPa)	(kPa)	-
Made Ground	2.00	18	-	-	28	-	5000	0.53
London Clay (weathered)	10.50	20	65+6.5z	-	-	26000+2600z	20800+2080z	1.20
London Clay	12.50	20	133.25+6.5z	-	-	53300+2600z	42640+2080z	1.20

Geotechnical Advice

INTRODUCTION

It is understood that the development proposal comprises demolition of existing structures and erection of a new six storey building plus basement to provide 50no. assisted living units with communal facilities and associated areas of soft landscaping and car parking.

Potential Influence of Trees

Structures constructed within influencing distance of trees (whether on or off site and whether to remain or be removed), should be in accordance with NHBC and BRE guidance.

Foundations that are carried deep to minimise lateral stresses on existing adjacent foundations/due to tree influence may be stepped up, in accordance with a suitable specification, such as BS8004:1986, as long as a suitable founding stratum is present at shallower depth.

It is recommended that any tree and/or root removal should be undertaken in accordance with the advice of an aboricultural consultant and that foundation options be appraised according to relevant NHBC/BRE guidance.

FOUNDATION OPTIONS

Based on the results of ground investigation and subsequent laboratory testing the natural London Clay soils are cohesive and appear to be typically firm to stiff and to have high to very high plasticity. The Consultant Engineers have indicated that a pile foundation solution is the preferred option.

At this stage the assessment of the likely pile capacities has been undertaken purely as an illustration of the feasibility of a piled solution and possible pile capacities.

The assessment has been undertaken in accordance with EC7 which considers different partial factors for piles base/shaft and design approach.

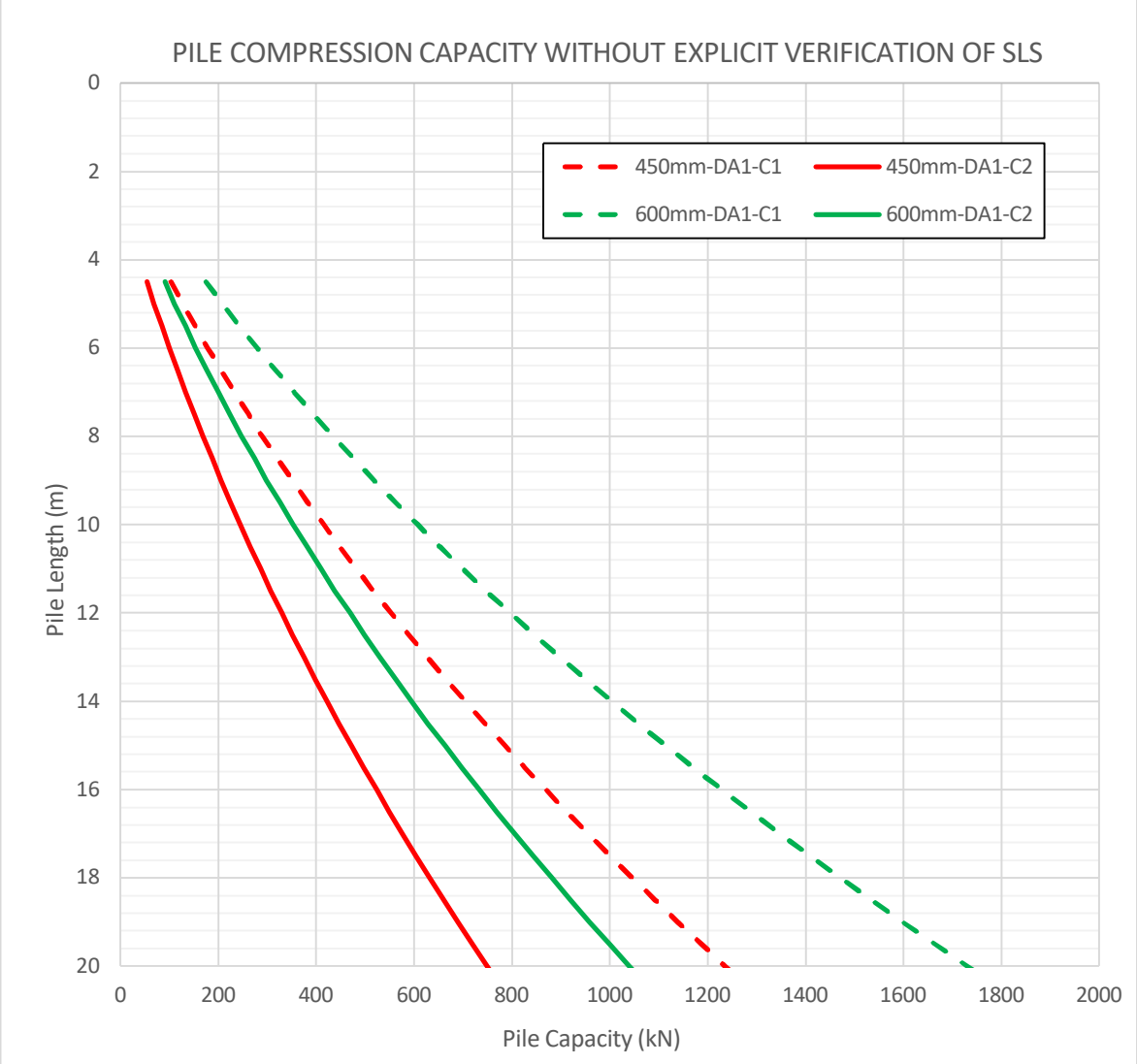
Based on the ground investigation data the following preliminary pile assessment is provided and should be confirmed and/or amended by a competent piling contractor.

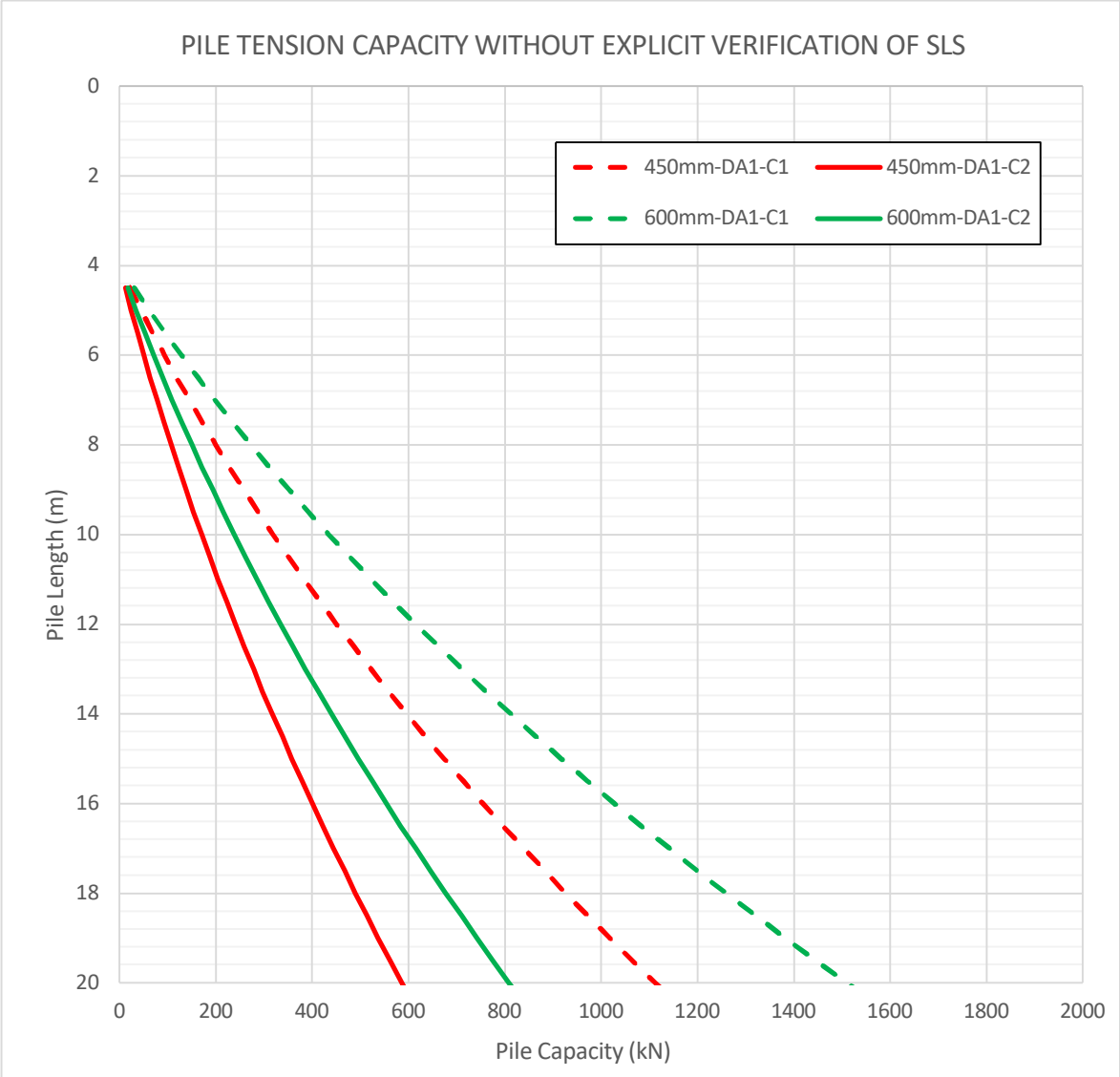
PILES WITHOUT EXPLICIT VERIFICATION OF SLS

		EUROCODE 7			
		Compression Capacity		Tension Capacity	
Pile Length	Pile Diameter	Rcd (M1+R1)	Rcd (M1+R4)	Rtd (M1+R1)	Rtd (M1+R4)
(m)	(mm)	(kN)	(kN)	(kN)	(kN)
6	450	178	100	93	50
8	450	290	168	199	107
10	450	415	244	318	171
12	450	553	329	451	241
14	450	704	422	596	317
16	450	868	523	755	400
18	450	1046	632	926	490
20	450	1236	749	1111	586

Pile 600mm **Pile lengths between 6-20m**

		EUROCODE 7			
		Compression Capacity		Tension Capacity	
Pile Length	Pile Diameter	Rcd (M1+R1)	Rcd (M1+R4)	Rtd (M1+R1)	Rtd (M1+R4)
(m)	(mm)	(kN)	(kN)	(kN)	(kN)
6	600	279	154	127	70
8	600	434	248	272	150
10	600	606	352	435	238
12	600	796	468	614	334
14	600	1004	595	812	440
16	600	1229	733	1027	554
18	600	1471	881	1259	677
20	600	1731	1041	1509	809


PILE COMPRESSION CAPACITY WITHOUT EXPLICIT VERIFICATION OF SLS
450mm-DA1-C1
450mm-DA1-C2
600mm-DA1-C1
600mm-DA1-C2
Pile Length (m)
0
2
4
6
8
10
12
14
16
18
20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Pile Capacity (kN)


PILE TENSION CAPACITY WITHOUT EXPLICIT VERIFICATION OF SLS
450mm-DA1-C1
450mm-DA1-C2
600mm-DA1-C1
600mm-DA1-C2
Pile Length (m)
0
2
4
6
8
10
12
14
16
18
20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Pile Capacity (kN)

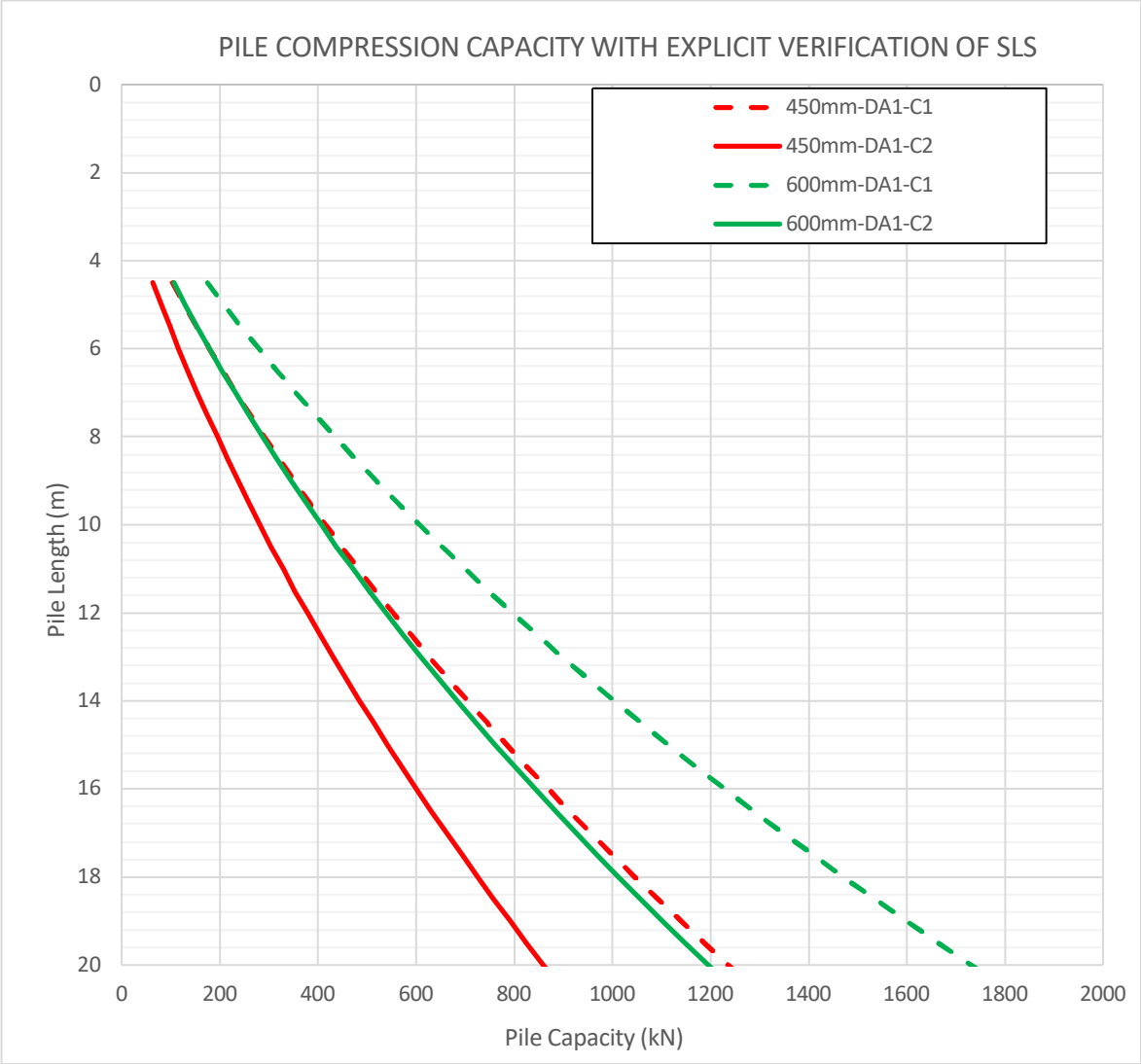
PILES WITH EXPLICIT VERIFICATION OF SLS

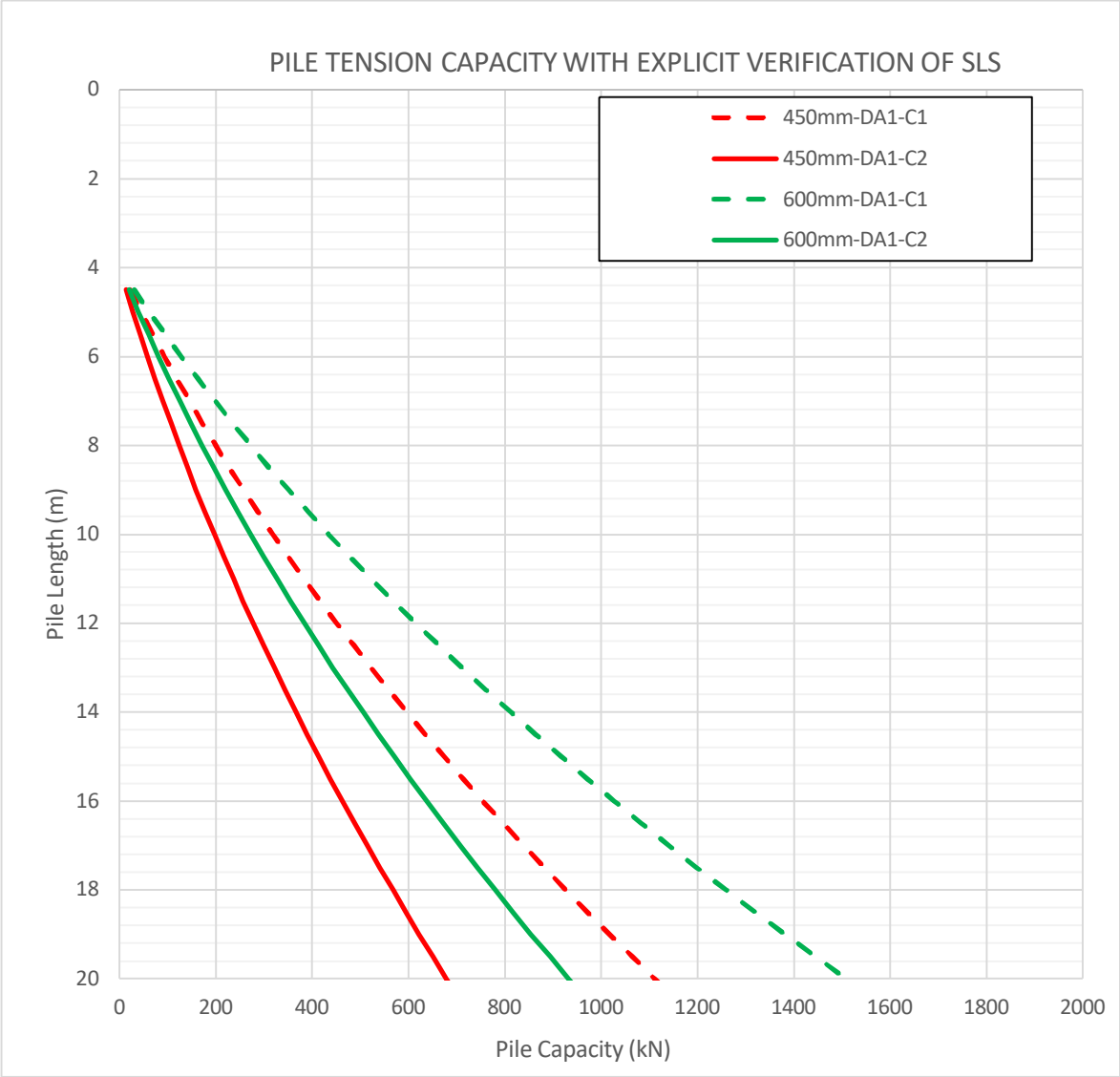
Pile 450mm **Pile lengths between 6-20m**

		EUROCODE 7			
		Compression Capacity		Tension Capacity	
Pile Length	Pile Diameter	Rcd (M1+R1)	Rcd (M1+R4)	Rtd (M1+R1)	Rtd (M1+R4)
(m)	(mm)	(kN)	(kN)	(kN)	(kN)
6	450	178	116	93	58
8	450	290	194	199	123
10	450	415	281	318	197
12	450	553	378	451	278
14	450	704	485	596	366
16	450	868	600	755	463
18	450	1046	725	926	567
20	450	1236	860	1111	679

Pile 600mm **Pile lengths between 6-20m**

		EUROCODE 7			
		Compression Capacity		Tension Capacity	
Pile Length	Pile Diameter	Rcd (M1+R1)	Rcd (M1+R4)	Rtd (M1+R1)	Rtd (M1+R4)
(m)	(mm)	(kN)	(kN)	(kN)	(kN)
6	600	279	179	127	80
8	600	434	286	272	171
10	600	606	406	435	272
12	600	796	539	614	384
14	600	1004	684	812	505
16	600	1229	842	1027	637
18	600	1471	1012	1259	780
20	600	1731	1195	1509	932


PILE COMPRESSION CAPACITY WITH EXPLICIT VERIFICATION OF SLS
450mm-DA1-C1
450mm-DA1-C2
600mm-DA1-C1
600mm-DA1-C2
Pile Length (m)
0
2
4
6
8
10
12
14
16
18
20
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Pile Capacity (kN)



Notes & Assumptions

- All piles lengths have been measured from ground level.
- Resistance of top 4.0m of soil has not been considered due to the basement excavation.
- Design undertaken to BS-EN-1997-1:2004 and relevant UK-NA using partial factors for CFA/bored piles.
- Pile diameters of 450mm and 600mm have been considered.
- Pile axial capacity is provided both with and without explicit verification of SLS (i.e. assuming pile load testing would/would not be undertaken).
- Pile group effect has not been considered.

- Groundwater level has been assumed at 1.3m below existing ground level.
- Undrained shear strength has been limited to 220kPa.
- Horizontal loads have not been considered in this preliminary analysis.

GROUND STABILITY & RETAINING STRUCTURES

It is understood that the retaining wall for the basement structure will be formed using a contiguous pile wall. As outlined, during the CC ground investigation works no water strikes were encountered.

Based on the ground and groundwater conditions observed a contiguous pile wall is likely to be a suitable option as a retaining wall solution. However, as water was encountered near the anticipated excavation depth the stability of unsupported excavations at the site should not be relied upon. Zones loosened by the removal of existing and relict construction may be particularly unpredictable and liable to collapse.

A discussion of potential heave, settlement and inward yielding is provided in the next section, however it is likely that any excavations into cohesive soils will need to be trimmed back following heave of clay at formation level.

Safe working conditions should be ensured where persons are required to work in excavations. It is recommended that reference be made to CIRIA Report No. 97,"Trenching Practice" 1992.

BURIED CONCRETE

The laboratory testing results presented in **Appendix D** and **E** have been reviewed in accordance with BRE Special Digest 1 (2005).

The results indicate that the design sulphate class and corresponding Aggressive Chemical Environment for Concrete (ACEC) class (mobile groundwater conditions) are as follows:

- Made Ground: DS2 & AC-2.
- Weathered London Clay Formation: DS2 & AC-2.
- London Clay Formation: DS2 & AC-2.

FURTHER CONSIDERATIONS

Existing Structures

If feasible, it is recommended that any existing buried construction is broken out and removed in a safe manner. However, if buried construction (such as existing foundations) are to remain close to the new basement structure, then care should be taken to avoid interaction i.e. to prevent the slab 'breaking its back' over the existing construction.

Potential for Uplift, Settlement & Inward Yielding

The London Clay is known to have high plasticity indices with a high volume change potential. Potential excavation works are anticipated to be primarily within the London Clay Formation but will also include Made Ground soils.

The removal of the overburden during the excavation is likely to result in some inward yielding of soils at formation level and possibly a subsequent settlement of the soils outside the excavation. In the soils to be excavated inward yielding would typically be in the range of 5-40mm mm (Tomlinson, M.J. (1986).

The total uplift will be a function of the soil heave pressure and water pressure. The estimated depth of excavation will be approximately 3.00-4.00m bgl, assuming an unsaturated unit weight of 20kN/m^3, the estimated unload due to the excavation would be in the order of 60-80kN/m^2.

Groundwater & Groundwater Management

During the LMB investigation water strikes were recorded in locations WS04 and TP02 to TP04 inclusive at depths of between 0.78m (47.47m AOD) and 1.20m bgl (45.49m AOD). The observations in TP02 to TP04 inclusive are in locations around the existing retaining wall in the south of the site and is likely to be reflective of water that has built up behind the retaining wall.

During return monitoring groundwater was recorded at depths of between 0.51m and 2.37m bgl. Water levels were generally observed to rise over the monitoring period. However, it is considered unlikely that this is reflective of groundwater recharge in the London Clay and is more likely to be reflective of rapid rainfall infiltration through Made Ground soils and via monitoring well covers.

In general, significant dewatering is not anticipated during the basement excavation and construction of foundations but groundwater seepages and/or surface water infiltration into the excavation should be anticipated. It is anticipated that any seepages or rates of inflow of groundwater would be slow and it is likely that seepages can be dealt with by pumping from sumps. However, in the area of the existing retaining wall it is recommended that the Contractor undertaking the excavation works should apply appropriate dewatering methods to ensure that perched water is removed and the excavation remains dry during construction.

Management of Formation Level

Should pockets of inferior material be present during the inspection of the foundation excavation, they should be removed and replaced with well graded, well compacted hardcore or lean mix concrete.

Potential Project Risk

Based on the information presented above it is recommended that the basement design takes into account the following:

GEOTECHNICAL ADVICE

- The potential for soft spots and inferior material to be left insitu following works.
- The potential for heave, inward yielding and settlement during construction.
- The potential for groundwater to cause both lateral and uplift pressure.
- The final design of the piles will need to consider the volume change potential of the soil (heave).
- The final design of the piles will need to consider the horizontal loading.

Assessment of Analytical Results

INTRODUCTION

It is understood that the client wishes to develop the site to house 50no. assisted living residential units. The development is understood to comprise a six-storey building with a single storey basement and associated plant, areas of soft landscaping and car parking.

Based on the information provided it is understood that the basement excavation will extend over the majority of the building footprint and that any soft landscaping will effectively be 'raised' such that there will be no potential for direct contact with insitu soils.

On this basis the most appropriate end use scenario for assessment is considered to be residential (without plant uptake) but a conservative approach has been adopted and an end use scenario of residential (with plant uptake) has been considered initially.

This section provides a Generic Quantitative Risk Assessment (GQRA) that considers the shallow soil horizons. No statistical analysis has been completed and recorded concentrations have been compared directly to 'Suitable 4 Use Levels' (S4ULs) considering a residential (with home grown produce) end use.

The LQM/CIEH 'Suitable 4 Use Levels' (S4ULs) applied have been developed in accordance with developments in UK human health risk assessment since 2009, in particular the additional land uses and exposure assumptions presented in Defra's C4SL guidance. The S4ULs are all based on Health Criteria that represent minimal or tolerable levels of risks to health as described in the Environment Agency's SR2 guidance, ensuring that the resulting assessment criteria are 'suitable for use' under planning.

In addition to the S4ULs the provisional Category 4 Screening Levels (pC4SL) developed by CL:AIRE for DEFRA in response to the new definitions within the Contaminated Land Statutory Guidance (ref. DEFRA, April 2012) have also been considered within the assessment. C4SL are, '*designed to reflect a more pragmatic approach to contaminated land risk assessment (albeit still strongly precautionary)*'.

It should be noted that C4SL have not yet been developed for a comprehensive range of contaminants and as such greater emphasis is placed on the S4ULs in determining potential risks to future site users.

To provide an overall assessment of soil analytical results at the site the results of the soil laboratory analysis from both the Create Consulting (CC) 2017 and LMB 2021 investigations have been appraised as a single dataset.

Based on laboratory test results a Soil Organic Matter (SOM) of 1% (lowest and most conservative value) has been applied when considering organic contaminants.

ASSESSMENT OF ANALYTICAL RESULTS

GENERIC QUANTITATIVE RISK ASSESSMENT

Assessment of Potential Risks to Future Site Users (Soil Contamination)

During the CC 2017 investigation, five samples of the shallow Made Ground soils were collected and analysed for a range of determinands including, heavy metals, petroleum hydrocarbons, Polycyclic Aromatic Hydrocarbons (PAH) and asbestos screening.

During the LMB 2021 investigation thirteen samples of the shallow soils (0.10 – 3.50m bgl) were collected, comprising eleven samples of Made Ground and two samples of the natural soils were collected and analysed for a range of determinands including, heavy metals, petroleum hydrocarbons, Semi-volatile Organic Compounds ((SVOC, including Polycyclic Aromatic Hydrocarbons (PAH)), volatile organic compounds (VOC) and asbestos screening. A GQRA worksheet is presented in **Appendix H**.

In addition, during the LMB 2021 investigation, field headspace screening of soils samples (for volatile vapours) was completed during the fieldworks with concentrations of <1.0ppm recorded.

The majority of the recorded concentrations of determinands were found to be below assessment criteria considering a residential (with home grown produce) end use. The exceptions are concentrations of Lead recorded in three samples of the Made Ground as summarised in the table below:

Location	**Depth (m bgl)**	**Recorded Lead Concentration (mg/kg)**	**Assessment Criteria (mg/kg)**	
			With Home Grown Produce	Without Home Grown Produce
TP04	0.50	510	210	310
WS02	3.35	210		
WS03	0.10	220		

Asbestos in Soils

Ten samples of the shallow soils (CC 2017 and LMB 2021 investigations) were screened for the presence of Asbestos Containing Materials (ACM). No ACM was detected.

Discussion of Soil Analytical Results

Slightly elevated concentrations of Lead have been recorded in the Made Ground soils. However, the highest concentrations have been recorded in the shallow Made Ground soils and these soils will be excavated to enable basement formation. In addition, the concentrations in the deeper Made Ground soils (WS02 at 3.35m) are lower and below the more appropriate residential (without home grown produce criteria). The results of

the chemical analysis suggest that there are unlikely to be residual risks to future site users from recorded contaminant concentrations.

The recorded concentrations should be considered by maintenance and construction workers.

GROUND GAS RISK ASSESSMENT

A ground gas risk assessment, based on six rounds of monitoring has been undertaken to provide an appraisal of the ground gas regime at the site.

The assessment has been undertaken with reference to guidance in CIRIA Report C665, BS8576:2013, BS8485:2015, NHBC guidance and The VOCs Handbook, as appropriate (see REFERENCES & GUIDANCE).

Worst Case Check

Based on the guidance within BS8485:2015, the ground gas screening value (GSV) has been derived based on the *worst case check* so that the GSV is based on the highest recorded ground gas concentration and highest recorded flow rate over the 6no. rounds of spot monitoring.

Gas screening value (l/hr) = maximum flow rate (l/hr) x maximum gas concentration (%/100).

CC Monitoring (Sept to Nov 2017)

As outline the CC investigation included three rounds of ground gas monitoring with a Gas Screening Value (GSV) of 0.1024l/hr determined, which corresponds to a Characteristic Situation (CS) 2.

However, it was stated that Made Ground and the Alluvium will be removed as part of the proposed development (i.e. basement excavation) and therefore removing the potential source of carbon dioxide generation. CC stated that gas protection measures would likely not be required for the proposed development, but it was recommended that additional monitoring should be completed to confirm this.

Review of the monitoring data indicates that it was completed during periods of relatively high atmospheric pressure (1013-1027mb).

LMB Monitoring (March to July 2021)

An additional six rounds of monitoring were completed between 26th March and 9th July 2021. A ground gas risk assessment worksheet is presented in **Appendix I** and the results are summarised in the table below:

Exploratory Hole	Screened Lithology	Max CH_4 (% v/v)	Max CO_2 (% v/v)	O_2 (% v/v)	Max Flow Rate (l/hr)	Gas Screening Value (l/hr)
BH02	Made Ground & London Clay	<0.10	1.90	15.90 – 19.10	0.10(1)	0.0032 (<0.07(2))
BH03		<0.10	6.40	18.20 – 20.50	0.10(1)	0.0031 (<0.07(2))
WS02	Made Ground	<0.10	3.20	17.00 – 19.00	0.10(1)	0.0033 (<0.07(2))
WS03		<0.10	3.10	19.00 – 20.80	0.10(1)	0.0019 (<0.07(2))
WS06		<0.10	3.30	5.50 – 20.20	0.10(1)	0.0064 (<0.07(2))

(1) All recorded at <LOD and manually set to LOD of 0.10l/hr
(2) Gas screening value threshold between very low risk and low risk

Review of the monitoring data indicates that the first round of monitoring (26th March 2021) was completed during a period of relatively low and falling atmospheric pressure (1004-1003mb).

VOLATILE VAPOUR RISK ASSESSMENT

The assessment of potential risks associated with volatile vapours has been completed in accordance with the VOCs Handbook (CIRIA C682). Details of the monitoring completed and results obtained are provided in the following sections.

Concentrations of volatile vapours were recorded between <0.10ppm and 1.90ppm during the six rounds of monitoring (March to July 2021) completed by LMB. No volatile vapour monitoring was completed during the CC investigation works.

Discussion of Ground Gas & Volatile Vapour Assessment

Based on the monitoring completed by LMB (October to November 2018) the worst case Gas Screening Value (GSV, monitoring well WS06) is 0.0064l/hr, which would be consistent with Characteristic Situation 1 (CIRIA, CS1) or Green (NHBC).

It should be noted that a peak flow rate of 100.3l/hr was recorded in BH03 during the first round of monitoring. However, this rapidly reduced to <0.1l/hr and remained at that rate during the subsequent 5no. rounds of monitoring. It is considered likely that the initial high flow rate was a result of the 'piston effect'

where rising groundwater reduces the volume of gas within pore spaces, causing increased gas pressure. In addition, slightly elevated concentrations of carbon dioxide were recorded in monitoring well BH03, but this is again considered to be an artefact of the groundwater flooding the monitoring well and reducing airspace and the overall resultant GSV is <0.07l/hr.

Further appraisal of the data and results indicates that the highest GSV are associated with monitoring wells screened entirely within the London Clay Formation, where typically sources of ground gas are negligible. Whereas consistently low GSV were recorded in monitoring well WS01, WS02 and WS03, which are screened entirely within the Made Ground soils.

Updated Conceptual Site Model & Pollutant Linkage Assessment

CONCEPTUAL SITE MODEL

Source-Pathway-Receptor Model

Contaminant Sources

Based on the results of the PRA and ground investigation, limited potential sources of on-site contamination have been identified in the form of elevated Lead concentrations in some samples of the Made Ground soils. However, the basement excavation will remove this source.

Contaminant Migration Pathways & Receptors

The potential exposure pathways and receptors described in the Error! Reference source not found. section have been reappraised and due to the basement excavation, none are considered to remain active in the context of future site users.

However, there is a potential risk to maintenance and construction workers without appropriate management measures being applied.

POLLUTANT LINKAGE ASSESSMENT

Based on the information reviewed and GQRA completed no plausible pollutant linkages are considered to exist following development.

There is also potential for maintenance and construction workers to come into contact with Made Ground soils during construction works. However, it should be noted that this relates to acute and not chronic risk and as such cannot be assessed using the approach described within the statutory guidance (ref. 2).

It is recommended that maintenance and construction workers involved in below ground works adopt appropriate management procedures to mitigate potential risks.

Conclusions & Recommendations

Ground & Groundwater Conditions

The ground conditions at the site comprise Made Ground overlying possible Head Deposits (northern and eastern site area) which in turn overlie the London Clay Formation. Made Ground thickness was noted to increase to a maximum thickness of 4.30m in the southern and south-eastern area of the site where there is a notable increase in site levels and a large retaining wall.

During the Create Consulting ground investigation works (2017) no water strikes were encountered. During the LMB investigation water strikes were recorded in locations WS04 and TP02 to TP04 inclusive at depths of between 0.78m (47.47m AOD) and 1.20m bgl (45.49m AOD). The observations in TP02 to TP04 inclusive are in locations around the existing retaining wall in the south of the site and is likely to be reflective of water that has built up behind the retaining wall.

During return monitoring groundwater was recorded at depths of between 0.51m and 2.37m bgl. Water levels were generally observed to rise over the monitoring period. However, it is considered unlikely that this is reflective of groundwater recharge in the London Clay and is more likely to be reflective of rapid rainfall infiltration through Made Ground soils and via monitoring well covers.

In addition, groundwater within the London Clay Formation is not considered to be representative of a permanent and laterally continuous aquifer unit, but rather present as discrete and confined units within (for example) micro fissures and local mudstone horizons and the recorded groundwater level will most likely be reflective of the pore water pressures within these discrete features.

Geotechnical Appraisal

Foundation Options

Based on the results of ground investigation and subsequent laboratory testing the natural London Clay soils are cohesive and appear to be typically firm to stiff and to have high to very high plasticity. The Consultant Engineers have indicated that a pile foundation solution is the preferred option.

At this stage the assessment of the likely pile capacities has been undertaken purely as an illustration of the feasibility of a piled solution and possible pile capacities. The assessment has been undertaken in accordance with EC7 which considers different partial factors for piles base/shaft and design approach.

The assessment of pile capacities has looked at varying pile lengths and diameters varying between 450mm and 600mm.

The preliminary pile assessment should be confirmed and/or amended by a competent piling contractor.

CONCLUSIONS & RECOMMENDATIONS

Buried Concrete

The results indicate that the design sulphate class and corresponding Aggressive Chemical Environment for Concrete (ACEC) class (mobile groundwater conditions) are as follows:

- Made Ground: DS2 & AC-2.
- Weathered London Clay Formation: DS2 & AC-2.
- London Clay Formation: DS2 & AC-2.

Groundwater & Groundwater Management

In general, significant dewatering is not anticipated during the basement excavation and construction of foundations but groundwater seepages and/or surface water infiltration into the excavation should be anticipated. It is anticipated that any seepages or rates of inflow of groundwater would be slow and it is likely that seepages can be dealt with by pumping from sumps. However, in the area of the existing retaining wall it is recommended that the Contractor undertaking the excavation works should apply appropriate dewatering methods to ensure that perched water is removed and the excavation remains dry during construction.

Management of Formation Level

Should pockets of inferior material be present during the inspection of the foundation excavation, they should be removed and replaced with well graded, well compacted hardcore or lean mix concrete.

Potential Project Risk

Based on the information presented above it is recommended that the basement design takes into account the following:

- The potential for soft spots and inferior material to be left insitu following works.
- The potential for heave, inward yielding and settlement during construction.
- The potential for groundwater to cause both lateral and uplift pressure.
- The final design of the piles will need to consider the volume change potential of the soil (heave).
- The final design of the piles will need to consider the horizontal loading.

Generic Quantitative Risk Assessment (GQRA)

Soil Assessment

The GQRA completed has identified slightly elevated concentrations of Lead within a number of Made Ground samples. However, the highest concentrations have been recorded in the shallow Made Ground soils and these soils will be excavated to enable basement formation. In addition, the concentrations in the deeper Made Ground soils (WS02 at 3.35m) are lower and below the more appropriate residential (without home grown produce criteria).

CONCLUSIONS & RECOMMENDATIONS

Based on the information reviewed and GQRA completed no plausible pollutant linkages are considered to exist following development.

There is also potential for maintenance and construction workers to come into contact with Made Ground soils during construction works. However, it should be noted that this relates to acute and not chronic risk and as such cannot be assessed using the approach described within the statutory guidance (ref. 2).

Ground Gas & Volatile Vapours

Based on the monitoring completed, recorded concentrations of bulk ground gases and volatile vapours are not considered to pose a risk to future site users and new buildings.

Planning Conditions

The information provided within this report is considered sufficient to aid in discharge of Condition 16 of the planning permission (ref. 2018/4449/P, dated 14th September 2018). No plausible pollutant linkages are considered to exist following development and as such no remedial measures are considered necessary.

RECOMMENDATIONS

Areas of 'Raised' Soft Landscaping

Based on the information provided it is understood that the basement excavation will extend over the majority of the building footprint and that any soft landscaping will effectively be 'raised' such that there will be no potential for direct contact with insitu soils.

However, it is recommended that any imported soils used within the soft landscaping areas are certified 'clean' by the supplier who should provide certificates of chemical analysis. The results of the chemical analysis should be compared to the criteria utilised within the GQRA that are provided in **Appendix H** of this report.

Radon Protection Measures

The site is not in a radon affected area as less than 1% of properties are above the Action Level. However, the Environmental Health team at London Borough of Camden have highlighted the information within guidance documents (BRE report BR211 amongst others) that suggests that developments including basements will be at an increased risk from Radon regardless of geographical location.

As such it is recommended that basement design takes into consideration the information and guidance within BR211 and that this is incorporated into the design, as appropriate.

CONCLUSIONS & RECOMMENDATIONS

General

Based on the proposed development and conclusions presented above, the following recommendations are provided.

- It is recommended that this report is submitted to the Environmental Health Team at London Borough of Camden to support discharge of Condition 16 of the planning permission.
- It is recommended that the use of appropriate potable water supply pipes be agreed with the statutory undertaker.
- It is recommended that Maintenance and Construction Workers involved in any below ground works adopt appropriate management procedures to mitigate direct contact with potentially contaminated soils.

REFERENCES & GUIDANCE

1. Land Contamination Risk Management Guidance (published 8th October 2020, ref https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm)
2. Environment Agency/Defra. Contaminated Land Statutory Guidance (April 2012).
3. BS 10175 (2011) Investigation of Potentially Contaminated Sites. Code of Practice.
4. BS5930 (2007) Code of Practice for Site Investigations.
5. BS 5667-11:2009. Water quality sampling. Part 11: Guidance on sampling of groundwaters.
6. BS 8002 (1994) Code of Practice for Earth Retaining Structures.
7. Tomlinson, M.J. (1986) Foundation Design and Construction.
8. Department of the Environment Industry Profiles.
9. Environment Agency/Defra (2002). Sampling strategies for contaminated land (CLR4)2
10. Environment Agency/Defra (2002). Priority Contaminants for the Assessment of Land (CLR8)3
11. CIRIA (2007). Assessing risks posed by hazardous ground gases to buildings.
12. BS 8485:2007. Code of Practice for the Characterisation and Remediation from Ground Gas in affected Development.
13. NHBC (2007). Guidance on the Evaluation of Development proposals on sites where Methane and Carbon dioxide are present.
14. CL:AIRE (December 2013). Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination.
15. CL:AIRE / CIEH (2008), Guidance on Comparing Soil Contamination Data with a Critical Concentration, May 2008;
16. CL:AIRE / EIC (2009), The Soil Generic Assessment Criteria for Human Health, December 2009.
17. Environment Agency (2003), Review of fate & transport of selected contaminants in the Environment, Report P5-079-TR1;
18. Environment Agency (2004), Model Procedures for the Management of Land Contamination, September 2004, ISBN: 1844322955;
19. Environment Agency (2008a), Compilation of Data for Priority Organic Pollutants, Report SC050021/SR7, November 2008;
20. Environment Agency (2009a), Human Health Toxicological Assessment of Contaminants in Soil, Report SC050021/SR2, January 2009;
21. Environment Agency (2009b), CLEA Software (Version 1.04) Handbook (and Software), Report SC050021/SR4, January 2009;
22. Environment Agency (2009c), Updated Technical Background to the CLEA Model, Report SC050021/SR3, January 2009;

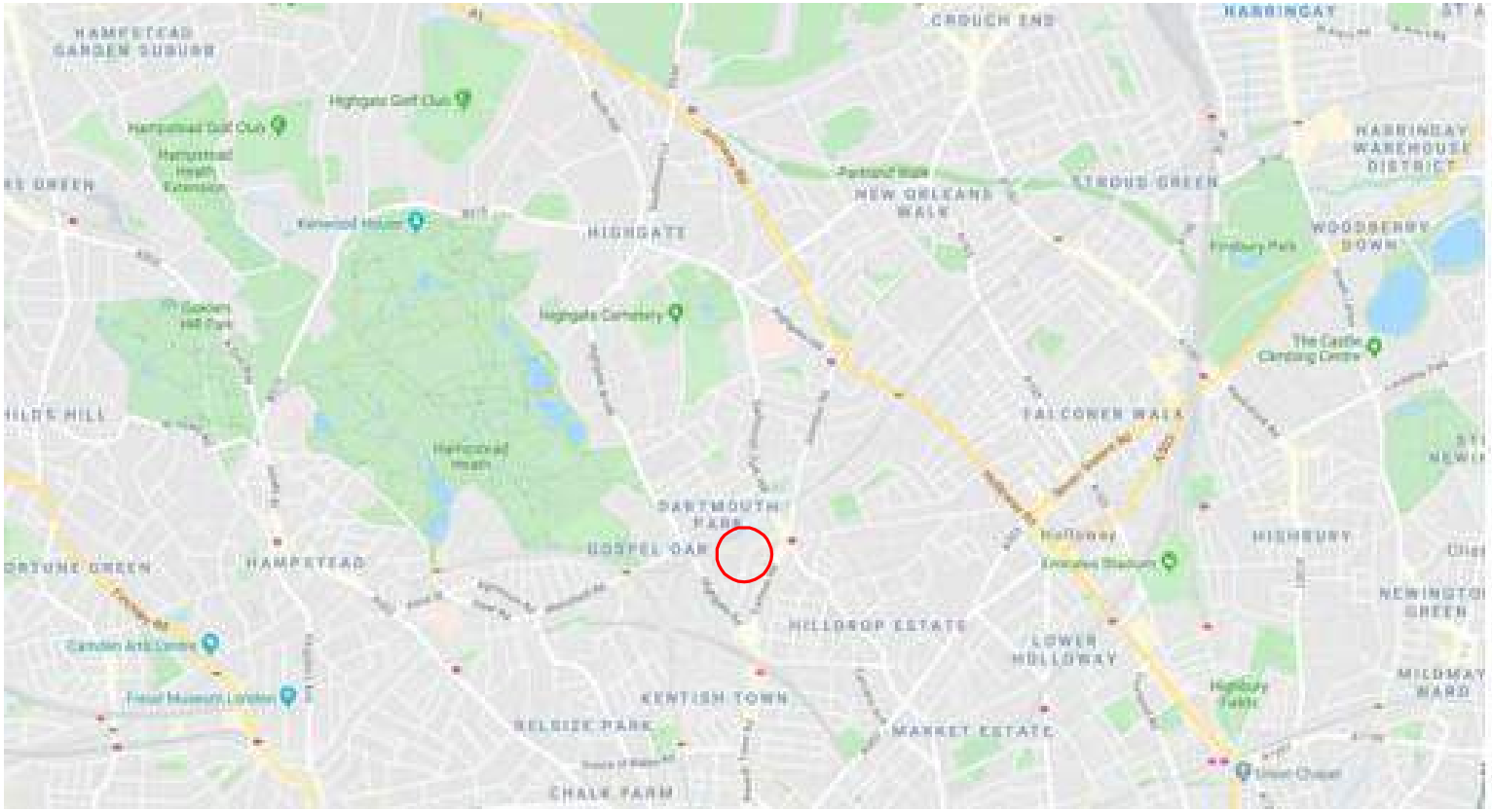
[2] This document has been withdrawn but is considered to remain useful in proving technical background for designing ground investigation works.

[3] This document has been withdrawn but is considered to remain useful in proving technical background for designing ground investigation works.

REFERENCES & GUIDANCE

23. Environment Agency (2009d), A Review of Body Weight and Height Data Used in the CLEA Model, Report SC050021/Final Technical Review 1, January 2009;
24. Nathanial et. al., (2009), The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd edition), Land Quality Press, Nottingham, ISBN 0-9547474-7-X
25. USEPA (2004), User's Guide for Evaluating Subsurface Vapour Intrusion into Buildings
26. Environment Agency (2013). Groundwater Protection: Principles and Practice (GP3)
27. Water Framework Directive (2000/60/EC)
28. Groundwater Regulations (2009).
29. Drinking Water Quality Standards England & Wales 2000 (Amended 2004, DWS).
30. World Health Organisation (WHO) Petroleum Products in Drinking Water.
31. Environmental Quality Standards (EQS). The River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) Directions 2010.
32. Environment Agency (2006). Remedial Targets Methodology. Hydrogeological Risk Assessment for Land Contamination.
33. Environment Agency (2013). Technical Guidance WM2 (v3). Interpretation of the definition and classification of hazardous waste.
34. CIRIA C760 - Guidance on embedded retaining wall design, London 2017.
35. CIRIA R143 - The Standard Penetration Test (SPT): Methods and Use, London 1995.
36. Clough, G.W. and Davidson, R.R. Effects of construction on geotechnical performance. Proceedings of the 9th International Conference on Soil Mechanics. Tokyo, Specialty Session, p. 3, 1977.
37. Clough, G.W. et al. Movement control of excavation support systems by iterative design procedure. ASCE Foundation Engineering: current principles and practices. Vol 1, pp. 869-884, 1989.

FIGURES



Key:

Approximate site location

IMPORTANT – Please Read

This drawing is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details below. LMB accepts no liability for the mis-interpretation or use of this illustration by any other parties.

LMB

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

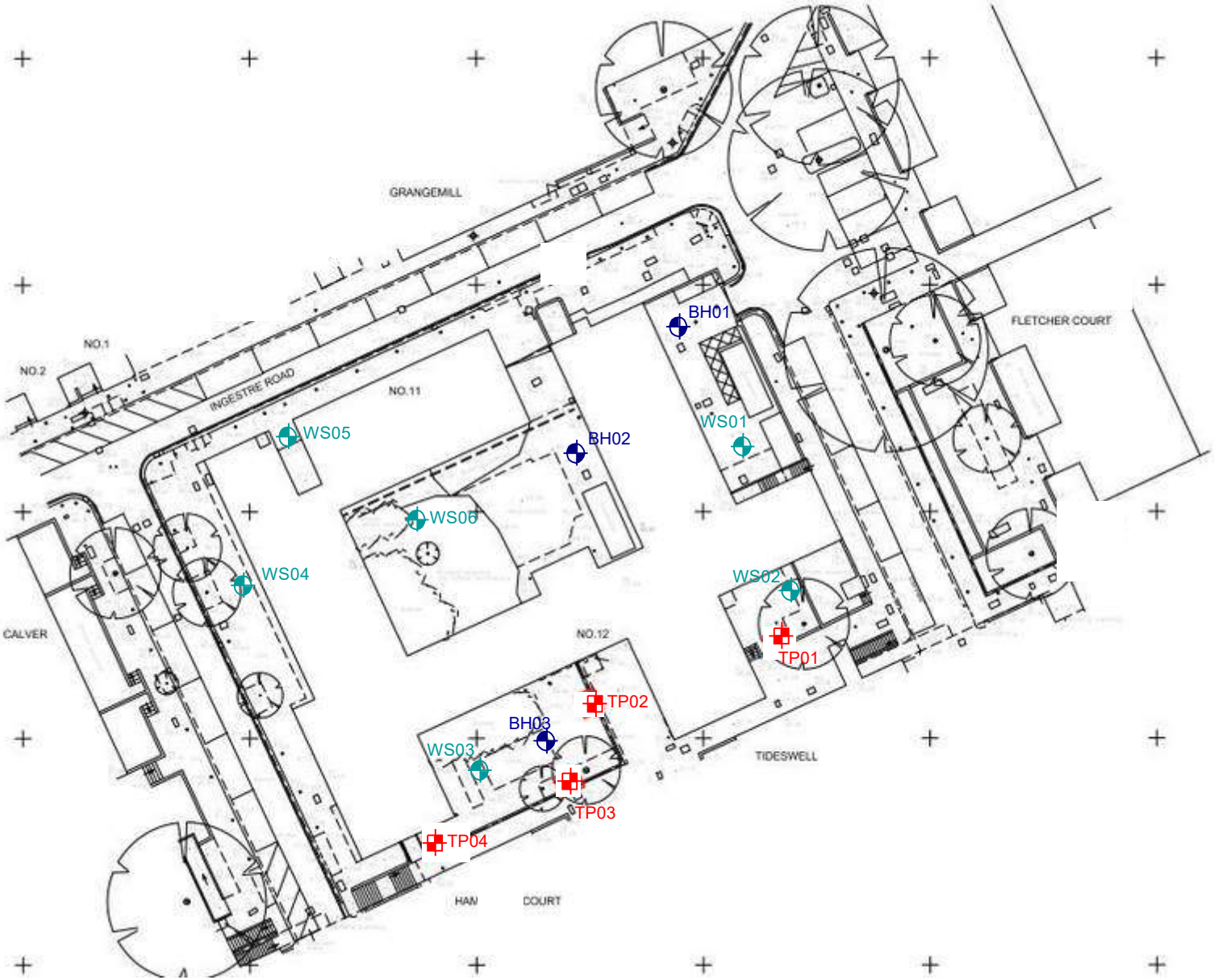
Site: 11-12 Ingestre Road, London NW5

Figure Number: Figure 1

Title: Site Location Plan

Project No:	Created By:	Date:
	PIL	June 2021

Client: Four Quarter Ingestre Road Ltd



Key:

BH — Cable Percussive Borehole location (Create Consulting 2018)

WS — Dynamic (windowless) Sampler Borehole location

TP — Hand excavated trial pit location

IMPORTANT – Please Read

This drawing is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details below. LMB accepts no liability for the mis-interpretation or use of this illustration by any other parties.

LMB

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Site: 11-12 Ingestre Road, London NW5

Figure Number: Figure 2

Title: Exploratory Hole Location Plan

Project No:	Created By:	Date:
	PIL	June 2020

Client: Four Quarter Ingestre Road Ltd

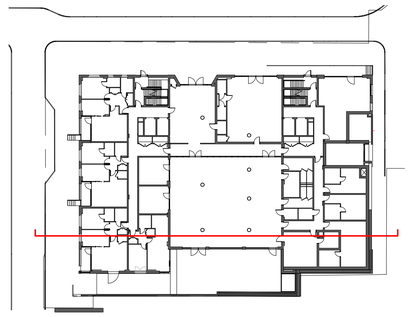
APPENDICES

Appendices

APPENDIX A DEVELOPMENT SCHEMATIC

The scaling of this drawing cannot be assured

Revision		Date	Drn	Ckd
T1	First Issue	03/03/21	AB	PN
T2	Wall, floor and roof types updated. Rooftop plant removed. Section revised in accordance with consultants current design	07/06/21	AB	GB



Notes

1. This drawing is to be read in conjunction with all other architects and consultants drawings
2. Do not scale from this drawing
3. Any discrepancies found on this drawing are to be brought to the immediate attention of the architect
4. All drawings are to be read in conjunction with the risk assessment documentation and fire strategy information
5. Materials and workmanship are to comply with all the relevant and current British and EN Standards and codes of practice. All proprietary products shall be used strictly in accordance with manufacturer's instructions.
6. Refer to Structural and Civil Engineers details for all superstructure, substructure, retaining walls, piling, slabs and below ground drainage
7. Refer to MEP design information for all MEP items
8. Ceiling service voids and above ground drainage strategy to be confirmed with MEP engineer
9. Parapet detail to be confirmed with roofing manufacturer
10. Curtain Walling and Window and balustrade fixing details to be confirmed
11. Acoustic consultant to review and confirm wall and floor build ups
12. Design to be reviewed by fire consultant
13. Fire stopping and cavity barrier locations to be reviewed and confirmed by fire engineer
14. Balustrade and Juliet balcony fixing details to be confirmed by manufacturer
15. Thermal modelling required to review balcony slab junctions
16. External footpath levels to be confirmed with landscape architect and local authority

GA Section 2

1 : 100

0m 2m 4m 6m 8m 10m

VISUAL SCALE 1:100 @ A1

TENDER

Project
11-12 Ingestre Road, Camden
Assisted Living Development

Drawing Title
GA Building Section
Building Section 2

Date	Scale	Drawn by	Check by
03/03/21	As indicated @ A1	AB	PN

Project No	Drawing No	Revision
30149	A-P12-02	T2

BARTON WILLMORE

Planning • Master Planning & Urban Design •
Architecture • Landscape Planning & Design • Environmental Planning • Graphics Communication • Public Engagement • Research

bartonwillmore.ok

Offices at Bristol Cambridge Cardiff Ebbsfleet Edinburgh Leeds London Manchester Newcastle Reading Solihull Southampton

APPENDICES

APPENDIX B PHOTOGRAPHIC RECORD

Photo 1 – View west along Ingestre Road.

Photo 2 – View south along eastern side of site.

LMB
Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Photographic Record

Project: Ingestre Road

Photos 1 & 2

Photo 3 – Sunken garden in southern area.

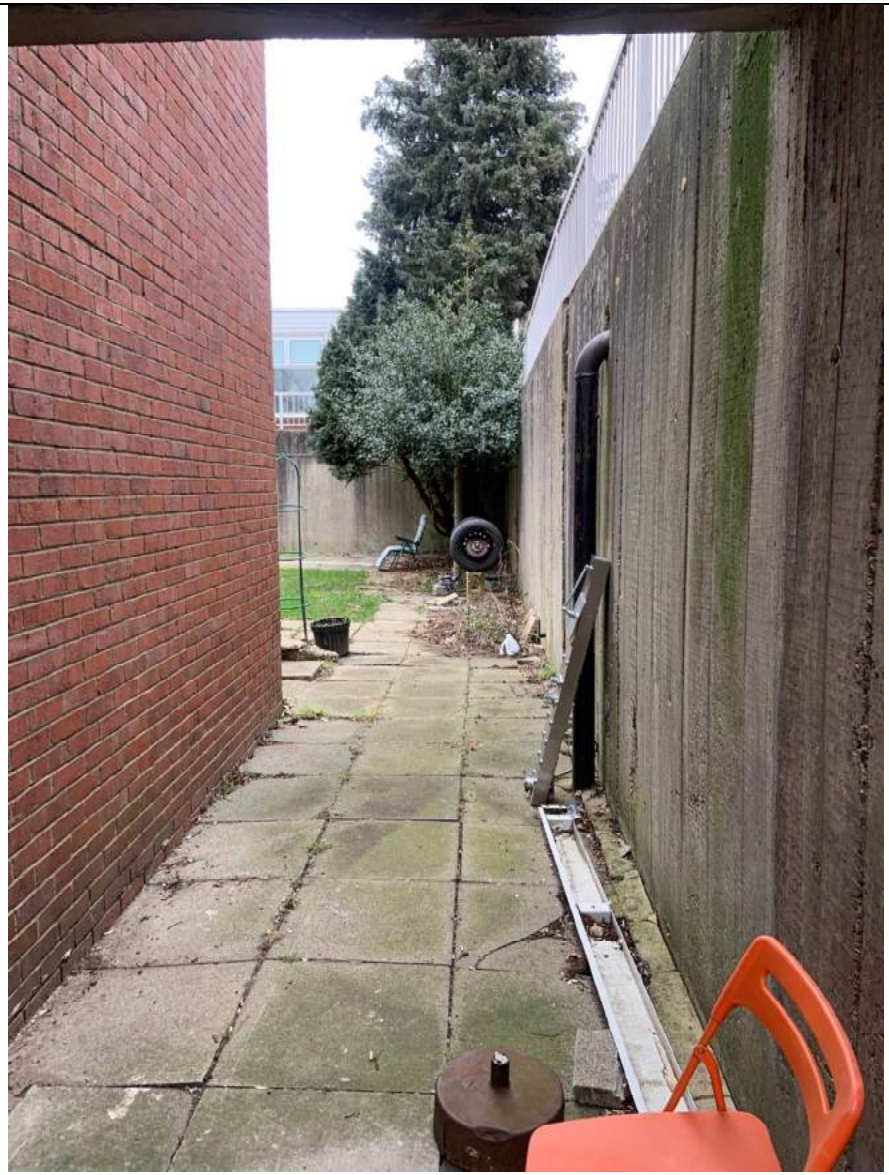


Photo 4 – Retaining wall along southern boundary.

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Photographic Record

Project: Ingestre Road

Photos 3 & 4

APPENDICES

APPENDIX C EXPLORATORY HOLE LOGS

Percussion Drilling Log

Project Name: 11-12 Ingestre Road	Client: Four Quarter Ingestre Road Ltd.	Date: 18/03/2021
Location: London NW5	Contractor: Smiths Drilling	Co-ords: E528822.50 N185766.83
Project No. : LMB_Ingestre	Crew Name:	Drilling Equipment:

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS01	WLS	48.20m AoD	PIL	1:40	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05	48.15		Tarmac
					0.15	48.05		Concrete screed.
		0.50	D					MADE GROUND: brown with grey brown mottling clay with occasional sub-angular fine to medium flint and brick gravel.
		0.50	ES					
		0.50	PID	PID=0.00	0.65	47.55		MADE GROUND: black to brown clay with rare brick gravel.
		0.80	D					
		0.80	ES					
		0.80	PID	PID=0.50	1.10	47.10		
		1.00	SPT	N=12 (2,2/3,3,3,3)				Firm brown with grey and orange brown mottling slightly gravelly CLAY. Gravel sub-angular to rounded medium flint. Occasional rootlets. (POSSIBLE HEAD DEPOSITS).
		1.50	D					
		1.50	ES					
		1.50	PID	PID=0.50	1.70	46.50		Firm becoming stiff brown with orange brown mottling CLAY. (LONDON CLAY FORMATION).
		2.00	D					*rare relict root traces.*
		2.00	SPT	N=21 (3,4/4,5,6,6)				*2.0m occasional blue grey veining and closely fissured.*
		3.00	D					*2.6m more frequent blue grey veining*
		3.00	SPT	N=15 (3,3/3,4,4,4)				
		3.50	ES					
		3.50	PID	PID=0.30				*3.5m becomes very closely fissured.*
		4.00	SPT	N=17 (3,3/3,4,5,5)				
		4.50	D					
		5.00	SPT	N=26 (4,5/5,7,7,7)				
					5.45	42.75		End of Borehole at 5.450m

1 2 3 4 5 6 7 8

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

AGS

Percussion Drilling Log

Project Name: 11-12 Ingestre Road	Client: Four Quarter Ingestre Road Ltd.	Date: 19/03/2021
Location: London NW5	Contractor: Smiths Drilling	Co-ords: E528827.59 N185753.96
Project No. : LMB_Ingestre	Crew Name:	Drilling Equipment:

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS02	WLS	50.32m AoD	NB	1:40	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10	50.22		MADE GROUND: dark brown sandy slightly gravelly clay. Gravel rounded fine to medium flint and occasional brick.
		0.30 - 0.40	ES					
					0.50	49.82		MADE GROUND: brown sandy slightly gravelly clay. Gravel sub-angular fine to coarse flint and occasional brick.
		0.80 - 1.00	ES					MADE GROUND: brown slightly sandy clay with occasional fine to coarse brick, concrete and flint gravel.
		1.00 - 1.45	D					
		1.00	SPT	N=7 (4,2/2,2,2,1)				*08m dark brown clinker cobble*
		1.60 - 1.70	ES					
		2.00 - 2.45	D					
		2.00	SPT	N=7 (1,1/1,2,2,2)				
		2.60 - 2.70	ES					*lense of greyish clay with occasional clinker gravel.*
		3.00 - 3.45	D					*>2.8m becomes mottled greenish brown and orange brown to grey.*
		3.00	SPT	N=12 (2,2/2,2,4,4)				
		3.35 - 3.50	ES					*3.3m thin lense of dark grey black silty sand (c. 2cm).*
								3.32m becomes dark grey and brown coloured.
		4.00 - 4.45	D		4.00	46.32		POSSIBLE MADE GROUND: firm greenish brown clay.
		4.00	SPT	N=18 (3,3/4,4,5,5)				
					4.30	46.02		Stiff brown CLAY. (LONDON CLAY FORMATION).
		4.50 - 4.60	ES					
		5.00 - 5.45	D					
		5.00	SPT	N=25 (7,7/7,6,6,6)				
					5.45	44.87		End of Borehole at 5.450m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

Percussion Drilling Log

Project Name: 11-12 Ingestre Road	Client: Four Quarter Ingestre Road Ltd.	Date: 18/03/2021
Location: London NW5	Contractor: Smiths Drilling	Co-ords: E528799.36 N185735.05
Project No. : LMB_Ingestre	Crew Name:	Drilling Equipment:

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS03	WLS	48.30m AoD	PIL	1:40	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10	ES		0.08	48.22		MADE GROUND: dark brown sandy clay with rootlets.
		0.10	PID	PID=0.00	0.20	48.10		MADE GROUND: brow sandy slightly gravelly clay. Gravel fine brick and rare flint.
								MADE GROUND: brown clay with rare fine brick gravel.
		1.00	D					
		1.00	ES					
		1.00	SPT	N=5 (1,1/1,1,1,2)				
		1.00	PID	PID=0.60				
								1.5m brown grey colouration some blue grey veining.
		2.00	ES					
		2.00	SPT	N=10 (2,1/2,2,3,3)				
		2.00	PID	PID=0.70				
					2.50	45.80		MADE GROUND: brown to grey brown with black mottling clay with rare brick gravel and carbonaceous materials.
		2.70	ES					
		2.70	PID	PID=0.70	2.85	45.45		MADE GROUND: brown to grey brown with rare black mottling clay with rare brick gravel and carbonaceous materials.
		3.00	SPT	N=19 (3,3/4,5,5,5)	3.10	45.20		Firm brown with grey brown mottling CLAY. (LONDON CLAY FORMATION).
		3.20	ES					
		3.20	PID	PID=0.90				
					3.50	44.80		Firm to stiff brown with occasional orange brown mottling CLAY with occasional blue grey veining. Closely fissured. (LONDON CLAY FORMATION).
		4.00	D					
		4.00	SPT	N=15 (3,3/3,3,4,5)				
					4.45	43.85		End of Borehole at 4.450m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

Percussion Drilling Log

Project Name: 11-12 Ingestre Road	Client: Four Quarter Ingestre Road Ltd.	Date: 18/03/2021
Location: London NW5	Contractor: Smiths Drilling	Co-ords: E528780.31 N185752.95
Project No. : LMB_Ingestre	Crew Name:	Drilling Equipment:

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS04	WLS	46.69m AoD	PIL	1:40	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05	46.64		MADE GROUND: paving slabs.
					0.15	46.54		MADE GROUND: yellow brown sand (sub-base).
		0.50	ES					MADE GROUND: brown slightly gravelly to gravelly clay with occasional brick cobbles.
		0.50	PID	PID=0.00				
	▼	1.00	SPT	N=0 (0,1/0,0,0,0)	1.10	45.59		MADE GROUND: grey brown to grey slightly sandy slightly gravelly clay with occasional black staining.
		1.50	ES					
		1.50	PID	PID=0.50				
		2.00	D					
		2.00	SPT	N=12 (1,2/2,2,4,4)	2.10	44.59		Firm brown occasional orange brown mottling CLAY. Very closely fissured with blue grey veining. (LONDON CLAY FORMATION).
		3.00	SPT	N=14 (2,3/3,3,4,4)				
					3.45	43.24		End of Borehole at 3.450m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

AGS

Percussion Drilling Log

Project Name: 11-12 Ingestre Road	Client: Four Quarter Ingestre Road Ltd.	Date: 18/03/2021
Location: London NW5	Contractor: Smiths Drilling	Co-ords: E528782.93 N185765.93
Project No. : LMB_Ingestre	Crew Name:	Drilling Equipment:

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS05	WLS	47.14m AoD	PIL	1:40	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.05	47.09		MADE GROUND: paving slab.
					0.25	46.89		MADE GROUND: brown sand (sub-base).
		0.30	ES					
		0.30	PID	PID=0.20	0.40	46.74		MADE GROUND: brown to orange brown slightly gravelly clay. Gravel sub-angular fine to coarse flint, concrete and brick with brick and concrete cobbles.
								Soft brown with occasional orange brown mottling CLAY with occasional relict/dead rootlets. (LONDON CLAY FORMATON).
		1.00	D					
		1.00	SPT	N=9 (1,1/1,2,3,3)				
		1.20	ES					*1.2m occasional selenite crystals.*
		1.20	PID	PID=0.40				
					1.50	45.64		Firm becoming stiff brown with occasional orange brown mottling CLAY with occasional relict/dead rootlets. (LONDON CLAY FORMATON).
								1.8m becomes closely fissured.
		2.00	D					*1.9m with occasional blue grey veining*
		2.00	SPT	N=14 (2,2/3,3,4,4)				
								2.8m becomes very closely fissured.
		3.00	SPT	N=20 (4,3/4,5,5,6)				
		4.00	D					
		4.00	SPT	N=23 (4,4/5,5,6,7)				
					4.45	42.69		End of Borehole at 4.450m

1 2 3 4 5 6 7 8

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

AGS

Percussion Drilling Log

Project Name: 11-12 Ingestre Road	Client: Four Quarter Ingestre Road Ltd.	Date: 18/03/2021
Location: London NW5	Contractor: Smiths Drilling	Co-ords: E528794.72 N185759.95
Project No. : LMB_Ingestre	Crew Name:	Drilling Equipment:

Borehole Number	Hole Type	Level	Logged By	Scale	Page Number
WS06	WLS	48.22m AoD	PIL	1:40	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.08	48.14		MADE GROUND: grass over brown clay with rootlets.
					0.25	47.97		MADE GROUND: red brown to grey gravelly sand (sub-base).
								MADE GROUND: brown with occasional orange brown mottling clay with rare sub-angular coarse concrete gravel and cobbles.
		0.90	D					
		0.90	ES					
		0.90	PID	PID=0.10				
		1.00	SPT	N=4 (1,0/1,1,1,1)				
					1.50	46.72		MADE GROUND: grey to black clay with rare sub-rounded medium flint and fine brick gravel.
		1.60	D					
		1.60	ES					
		1.60	PID	PID=0.40				
		2.00	D		1.95	46.27		Soft becoming firm brown with orange brown mottling CLAY. (LONDON CLAY FORMATION).
		2.00	SPT	N=12 (1,2/2,3,3,4)				*2.2m occasional blue grey veining.*
					2.50	45.72		Firm brown to orange brown slightly sandy CLAY with very weak fine to medium mudstone gravel. (LONDON CLAY FORMATION).
					2.60	45.62		Firm becoming stiff brown with rare orange brown mottling CLAY with occasional blue grey veining. Closely fissured. (LONDON CLAY FORMATION).
		3.00	SPT	N=16 (2,3/3,4,5,4)				*2.90m orange brown silty fine sand parting*
		3.20	ES					
		3.20	PID	PID=0.00				
		4.00	SPT	N=18 (3,3/4,4,4,6)				*4.50m frequent blue grey veining and very closely fissured.*
		5.00	SPT	N=22 (5,5/4,6,6,6)				
					5.45	42.77		End of Borehole at 5.450m

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

Trial Pit Log

Project Name: 11-12 Ingestre Road	Client: Four Quarter Ingestre Road Ltd.	Date: 19/03/2021
Location: London NW5	Contractor: Smiths Drilling	Co-ords: E528826.44 N185748.11
Project No. : LMB_Ingestre	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP01	TP	48.24m AoD	NB	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05	48.19		Concrete paving slab.
					0.10	48.14		MADE GROUND: yellow brown medium to coarse sand intermixed with dark brown silty sand and rootlets (bedding sand).
								MADE GROUND: soft brown slightly sandy clay.
					0.35	47.89		Firm brown CLAY with occasional rootlets and occasional coarse selenite crystals.
		0.45 - 0.55	D					
					0.60	47.64		End of Borehole at 0.600m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Trial Pit Log

Project Name: 11-12 Ingestre Road		Client: Four Quarter Ingestre Road Ltd.	Date: 19/03/2021
Location: London NW5		Contractor: Smiths Drilling	Co-ords: E528809.82 N185744.17
Project No. : LMB_Ingestre		Crew Name:	Equipment:
Location Number: TP02	Location Type: TP	Level: 48.32m AoD	Logged By: NB	Scale: 1:25	Page Number: Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.05	48.27		MADE GROUND; paving slab.
								MADE GROUND: orange brown fine to coarse sand (bedding sand).
					0.25	48.07		MADE GROUND: brown clay with occasional sub-angular fine to coarse flint, brick and concrete gravel and cobbles.
		0.40 - 0.50	D					
		0.40 - 0.50	ES					*0.40m old steel pipe.*
								0.70m occasional timber fragments.
		1.10 - 1.20	D					
		1.10 - 1.20	ES					
					1.20	47.12		End of Borehole at 1.200m

Dimensions: Pit Length	Pit Width	Trench Support and Comment: Pit Stability	Shoring Used	Remarks	Pumping Data: Date	Rate	Remarks

Remarks

Trial Pit Log

Project Name: 11-12 Ingestre Road	Client: Four Quarter Ingestre Road Ltd.	Date: 18/03/2021 - 19/03/2021
Location: London NW5	Contractor: Smiths Drilling	Co-ords: E528807.51 N185735.38
Project No. : LMB_Ingestre	Crew Name:	Equipment:

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP03	TP	48.26m AoD	NB	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.00 - 0.10	ES		0.10	48.16		MADE GROUND: soft dark brown sandy slightly gravelly clay. Gravel rounded fine to medium flint.
								MADE GROUND: dark brown and brown slightly sandy slightly gravelly clay. Gravel rounded fine to medium flint and occasional brick.
		0.60 - 0.70	D					
	▼	0.60 - 0.70	ES					*0.70m occasional brick cobbles.*
					1.02	47.24		End of Borehole at 1.020m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

Terminated due to service above foundation.

Trial Pit Log

Project Name: 11-12 Ingestre Road	Client: Four Quarter Ingestre Road Ltd.		Date: 19/03/2021
Location: London NW5	Contractor: Smiths Drilling		Co-ords: E528800.76 N185732.27
Project No. : LMB_Ingestre	Crew Name:		Equipment:

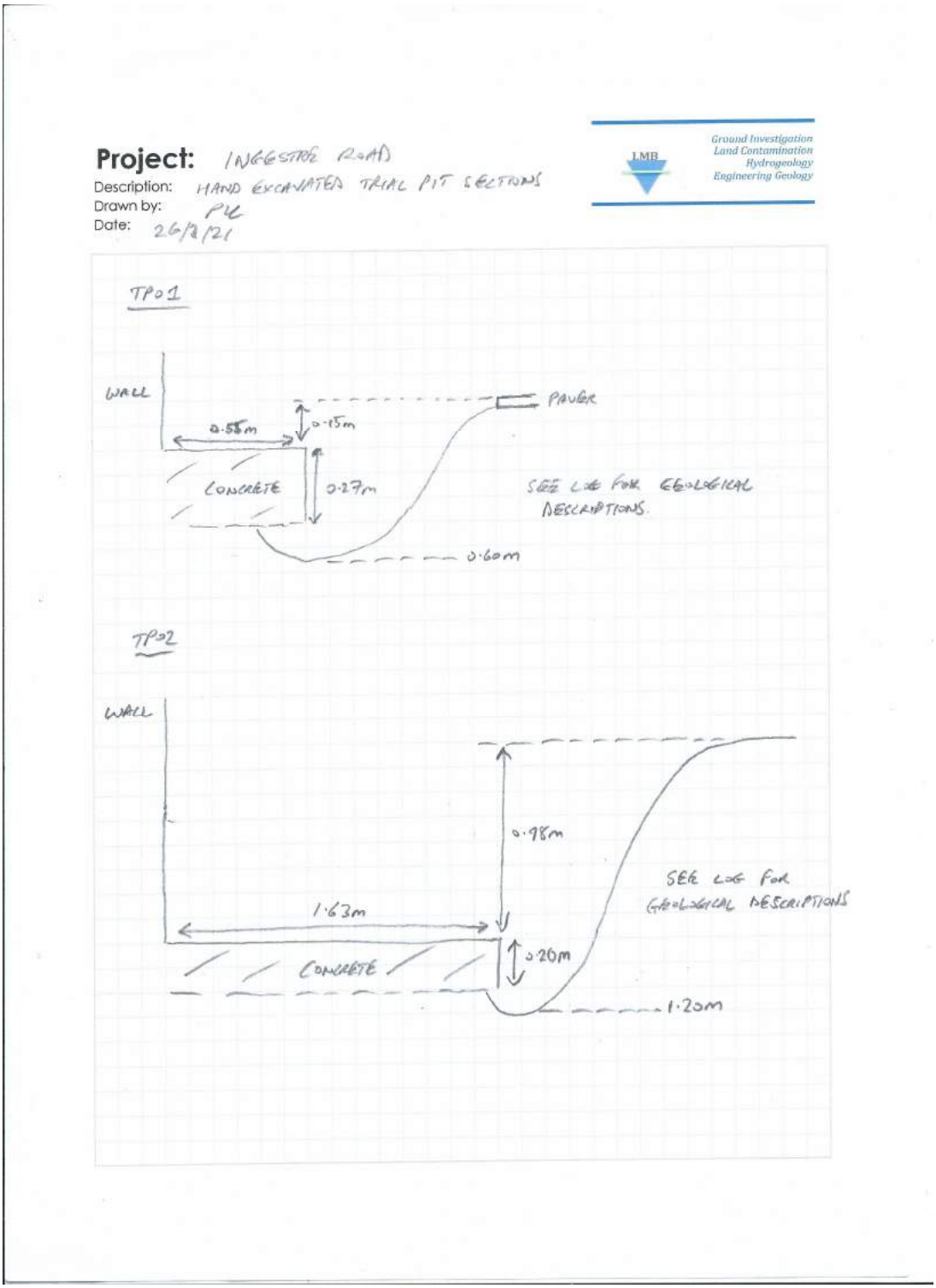
Location Number	Location Type	Level	Logged By	Scale	Page Number
TP04	TP	48.24m AoD	NB	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05	48.19		MADE GROUND: concrete paving slab.
								MADE GROUND: yellow fine to medium slightly silty sand.
					0.15	48.09		MADE GROUND: mid and dark brown clay intermixed with dark brown and brown sandy slightly gravelly clay. Gravel is fine to coarse flint with occasional concrete, brick and occasional concrete and brick cobbles.
								aerated block.
		0.50 - 0.60	ES					
					1.00	47.24		MADE GROUND: firm locally stiff brown clay.
		1.20 - 1.30	D					
		1.20 - 1.30	ES					
					1.36	46.88		End of Borehole at 1.360m

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

APPENDICES


Project: INGESTRE ROAD
Description: HAND EXCAVATED TRIAL PIT SECTIONS
Drawn by: PW
Date: 26/3/21
LMB
Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology
TP01
WALL
0.55m
0.15m
CONCRETE
0.27m
AUGER
SEE LOG FOR GEOLOGICAL DESCRIPTIONS.
0.60m
TP02
WALL
0.98m
1.63m
0.20m
CONCRETE
SEE LOG FOR GEOLOGICAL DESCRIPTIONS
1.20m

Project: INGLESTRE ROAD
Description: HAND EXCAVATED TRIAL PIT SECTIONS
Drawn by: PEE
Date: 26/3/21

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

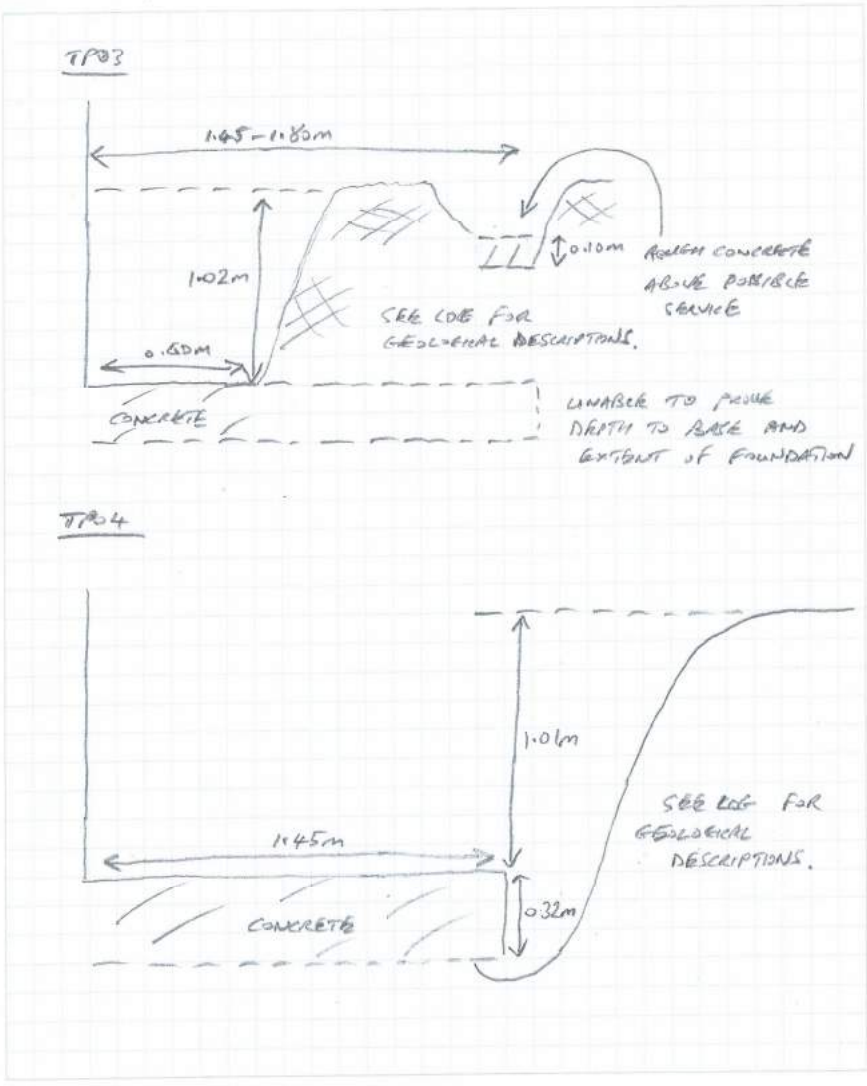


Photo 1 – TP01 arisings

Photo 2 – TP01 excavation

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Photographic Record

Project: Ingestre Road

Photos 1 & 2

Photo 3 – TP02 arisings.

Photo 4 – TP02 excavation.

Photo 5 – TP03 arisings.

Photo 6 – TP03 excavation.

Photo 7 – TP04 arisings.

Photo 8 – TP04 excavation.

APPENDICES

APPENDIX D CHEMICAL LABORATORY TESTING RESULTS

Philip Lewis
LMB Geosolutions Ltd
28 Dresden Road
London
N19 3BD

e: philip@lmbgeosolutions.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 21-63889

Project / Site name:	11 12 Ingestre Rd	**Samples received on:**	19/03/2021
Your job number:	LMB INGESTRE	**Samples instructed on/ Analysis started on:**	20/03/2021
Your order number:		**Analysis completed by:**	30/03/2021
Report Issue Number:	1	**Report issued on:**	30/03/2021
Samples Analysed:	8 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-63889
Project / Site name: 11 12 Ingestre Rd

Lab Sample Number				1810230	1810231	1810232	1810233	1810234
Sample Reference				WS01	WS01	WS03	WS03	WS03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	3.50	0.10	1.00	2.70
Date Sampled				18/03/2021	18/03/2021	18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	18	20	21	24	22
Total mass of sample received	kg	0.001	NONE	1.2	0.50	0.50	0.50	0.50
Asbestos in Soil	Type	N/A	ISO 17025	-	-	Not-detected	-	-
General Inorganics								
Organic Matter	%	0.1	MCERTS	-	0.8	-	-	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.84	-	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.10	-	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.5	-	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.40	-	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.77	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.53	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.39	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.55	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.22	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.28	-	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	6.85	-	-
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	14	26	13	18
Boron (water soluble)	mg/kg	0.2	MCERTS	1.7	1.4	1.3	3.1	4.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	29	48	42	47	35
Copper (aqua regia extractable)	mg/kg	1	MCERTS	37	26	75	35	44
Lead (aqua regia extractable)	mg/kg	1	MCERTS	180	17	220	17	160
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.1	< 0.3	0.9	< 0.3	1.0
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	41	38	43	23
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	51	74	140	76	65
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Petroleum Hydrocarbons								
TPH C10 - C40	mg/kg	10	MCERTS	-	32	-	-	< 10

Analytical Report Number: 21-63889
Project / Site name: 11 12 Ingestre Rd

Lab Sample Number				1810230	1810231	1810232	1810233	1810234
Sample Reference				WS01	WS01	WS03	WS03	WS03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	3.50	0.10	1.00	2.70
Date Sampled				18/03/2021	18/03/2021	18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	< 10	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	< 10	-
VOCs								
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Chloroethane	µg/kg	1	NONE	-	-	-	-	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
Benzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0

Analytical Report Number: 21-63889
Project / Site name: 11 12 Ingestre Rd

Lab Sample Number				1810230	1810231	1810232	1810233	1810234
Sample Reference				WS01	WS01	WS03	WS03	WS03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	3.50	0.10	1.00	2.70
Date Sampled				18/03/2021	18/03/2021	18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Styrene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Tribromomethane	µg/kg	1	NONE	-	-	-	-	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-	< 1.0

SVOCs

Aniline	mg/kg	0.1	NONE	-	-	-	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	-	-	-	< 0.2	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	< 0.1	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	< 0.1	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	< 0.2	< 0.2
Isophorone	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	< 0.1	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	< 0.1	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	< 0.1	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	< 0.1	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	< 0.1	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	< 0.1	< 0.1

Analytical Report Number: 21-63889
Project / Site name: 11 12 Ingestre Rd

Lab Sample Number				1810230	1810231	1810232	1810233	1810234
Sample Reference				WS01	WS01	WS03	WS03	WS03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	3.50	0.10	1.00	2.70
Date Sampled				18/03/2021	18/03/2021	18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	< 0.3	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
Fluorene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Carbazole	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	< 0.3	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	< 0.3	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	< 0.05	< 0.05

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-63889
Project / Site name: 11 12 Ingestre Rd

Lab Sample Number				1810235	1810236	1810237
Sample Reference				WS04	WS05	WS06
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.30	3.20
Date Sampled				18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	27	23	20
Total mass of sample received	kg	0.001	NONE	0.50	0.50	0.50
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-
General Inorganics						
Organic Matter	%	0.1	MCERTS	-	1.3	-
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-	-
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	20	8.8
Boron (water soluble)	mg/kg	0.2	MCERTS	-	1.6	1.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	47	56
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	37	28
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	150	20
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	38	42
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	120	79
Monoaromatics & Oxygenates						
Benzene	µg/kg	1	MCERTS	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-
Petroleum Hydrocarbons						
TPH C10 - C40	mg/kg	10	MCERTS	370	-	< 10

Analytical Report Number: 21-63889
Project / Site name: 11 12 Ingestre Rd

Lab Sample Number				1810235	1810236	1810237
Sample Reference				WS04	WS05	WS06
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.30	3.20
Date Sampled				18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-
VOCs						
Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-

Analytical Report Number: 21-63889
Project / Site name: 11 12 Ingestre Rd

Lab Sample Number				1810235	1810236	1810237
Sample Reference				WS04	WS05	WS06
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.30	3.20
Date Sampled				18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	-	< 0.1	-
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-

Analytical Report Number: 21-63889
Project / Site name: 11 12 Ingestre Rd

Lab Sample Number				1810235	1810236	1810237
Sample Reference				WS04	WS05	WS06
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.30	3.20
Date Sampled				18/03/2021	18/03/2021	18/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-
Phenanthrene	mg/kg	0.05	MCERTS	-	0.58	-
Anthracene	mg/kg	0.05	MCERTS	-	0.13	-
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-
Fluoranthene	mg/kg	0.05	MCERTS	-	1.8	-
Pyrene	mg/kg	0.05	MCERTS	-	1.8	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	1.1	-
Chrysene	mg/kg	0.05	MCERTS	-	0.85	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	1.2	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.43	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	0.95	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.46	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.61	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-63889
Project / Site name: 11 12 Ingestre Rd

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1810230	WS01	None Supplied	0.8	Brown clay and sand with gravel.
1810231	WS01	None Supplied	3.5	Brown clay.
1810232	WS03	None Supplied	0.1	Brown clay and sand with vegetation and gravel
1810233	WS03	None Supplied	1	Brown clay.
1810234	WS03	None Supplied	2.7	Brown clay and sand with gravel.
1810235	WS04	None Supplied	1.5	Brown clay and sand with vegetation and gravel
1810236	WS05	None Supplied	0.3	Brown clay and sand with gravel and brick.
1810237	WS06	None Supplied	3.2	Brown clay.

Analytical Report Number : 21-63889
Project / Site name: 11 12 Ingestre Rd

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Philip Lewis
LMB Geosolutions Ltd
28 Dresden Road
London
N19 3BD

e: philip@lmbgeosolutions.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 21-64095

Project / Site name:	11-12 Ingestre Rd	**Samples received on:**	22/03/2021
Your job number:	LMB_INGESTRE	**Samples instructed on/ Analysis started on:**	22/03/2021
Your order number:		**Analysis completed by:**	31/03/2021
Report Issue Number:	1	**Report issued on:**	31/03/2021
Samples Analysed:	5 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-64095
Project / Site name: 11-12 Ingestre Rd

Lab Sample Number				1811598	1811599	1811600	1811601	1811602
Sample Reference				TP02	TP03	TP03	TP04	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.00	0.60	0.50	3.35
Date Sampled				19/03/2021	19/03/2021	19/03/2021	19/03/2021	19/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	13	17	23	24
Total mass of sample received	kg	0.001	NONE	1.2	0.50	1.0	0.50	0.50
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	Not-detected	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	-	-	8.0	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivale	g/l	0.00125	MCERTS	-	-	0.55	-	-
Organic Matter	%	0.1	MCERTS	-	-	0.8	-	-
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	0.44	-	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	-	0.39	-	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	0.35	-	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	-	0.25	-	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	0.40	-	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.21	-	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	0.39	-	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.20	-	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.25	-	-	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	2.88	-	-	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	20	10	29	39	17
Boron (water soluble)	mg/kg	0.2	MCERTS	1.3	3.8	2.2	1.9	1.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	1.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	48	31	54	46	40
Copper (aqua regia extractable)	mg/kg	1	MCERTS	47	54	35	140	42
Lead (aqua regia extractable)	mg/kg	1	MCERTS	140	120	68	510	210
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	1.2	0.9
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	34	19	50	46	23
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	310	100	230	75
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Petroleum Hydrocarbons								

Analytical Report Number: 21-64095
Project / Site name: 11-12 Ingestre Rd

Lab Sample Number				1811598	1811599	1811600	1811601	1811602
Sample Reference				TP02	TP03	TP03	TP04	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.00	0.60	0.50	3.35
Date Sampled				19/03/2021	19/03/2021	19/03/2021	19/03/2021	19/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
TPH C10 - C40	mg/kg	10	MCERTS	-	-	-	< 10	< 10
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	-	< 10	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	< 10	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	-	< 10	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	11	-	< 10	-	-
SVOCs								
Aniline	mg/kg	0.1	NONE	< 0.1	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	< 0.2	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-

Analytical Report Number: 21-64095
Project / Site name: 11-12 Ingestre Rd

Lab Sample Number				1811598	1811599	1811600	1811601	1811602
Sample Reference				TP02	TP03	TP03	TP04	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.00	0.60	0.50	3.35
Date Sampled				19/03/2021	19/03/2021	19/03/2021	19/03/2021	19/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	0.23	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	0.83	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	0.78	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.63	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	0.48	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.65	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.30	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.61	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.26	-	-	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.35	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-64095
Project / Site name: 11-12 Ingestre Rd

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1811598	TP02	None Supplied	0.4	Light brown clay with gravel and vegetation.
1811599	TP03	None Supplied	0	Brown loam and sand with gravel and vegetation.
1811600	TP03	None Supplied	0.6	Light brown clay with vegetation.
1811601	TP04	None Supplied	0.5	Brown clay and loam with vegetation.
1811602	WS02	None Supplied	3.35	Brown clay and loam with vegetation.

Analytical Report Number : 21-64095
Project / Site name: 11-12 Ingestre Rd

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Philip Lewis
LMB Geosolutions Ltd
28 Dresden Road
London
N19 3BD

e: philip@lmbgeosolutions.com

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 21-63901

Project / Site name:	11 12 Ingestre Rd	**Samples received on:**	19/03/2021
Your job number:	LMB INGESTRE	**Samples instructed on/ Analysis started on:**	20/03/2021
Your order number:		**Analysis completed by:**	06/04/2021
Report Issue Number:	1	**Report issued on:**	06/04/2021
Samples Analysed:	1 10:1 WAC sample		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

i2 Analytical
7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results

Report No:	21-63901						
					Client: LMBGEOSOL		
Location	11 12 Ingestre Rd						
Lab Reference (Sample Number)	1810334 / 1810335				Landfill Waste Acceptance Criteria Limits		
Sampling Date	18/03/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS06						
Depth (m)	0.90						
Solid Waste Analysis							
TOC (%)**	0.5				3%	5%	6%
Loss on Ignition (%) **	5.2				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	< 0.85				100	--	--
pH (units)**	8.1				--	>6	--
Acid Neutralisation Capacity (mol / kg)	7.9				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.0010			< 0.0100	0.5	2	25
Barium *	0.0101			0.0755	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0005			< 0.0040	0.5	10	70
Copper *	0.0039			0.029	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0012			0.0093	0.5	10	30
Nickel *	0.0022			0.016	0.4	10	40
Lead *	< 0.0010			< 0.010	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.010			0.076	4	50	200
Chloride *	1.5			11	800	15000	25000
Fluoride	0.25			1.9	10	150	500
Sulphate *	22			160	1000	20000	50000
TDS*	71			530	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	7.03			52.5	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.0						
Dry Matter (%)	76						
Moisture (%)	24						

Results are expressed on a dry weight basis, after correction for moisture content where applicable.
*= UKAS accredited (liquid eluate analysis only)
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation
** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 21-63901
Project / Site name: 11 12 Ingestre Rd

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1810334	WS06	None Supplied	0.9	Brown clay and sand.

Analytical Report Number : 21-63901
Project / Site name: 11 12 Ingestre Rd

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025

Analytical Report Number : 21-63901
Project / Site name: 11 12 Ingestre Rd

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

APPENDICES

APPENDIX E GEOTECHNICAL LAB RESULTS

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client:	LMB Geosolutions Ltd	Client Reference:	LMB_INGESTRE
Client Address:	28 Dresden Road, London, N19 3BD	Job Number:	21-64921
		Date Sampled:	18/03/2021
		Date Received:	19/03/2021
Contact:	Philip Lewis	Date Tested:	08/04/2021
Site Address:	11-12 Ingestre Rd	Sampled By:	Client - PIL

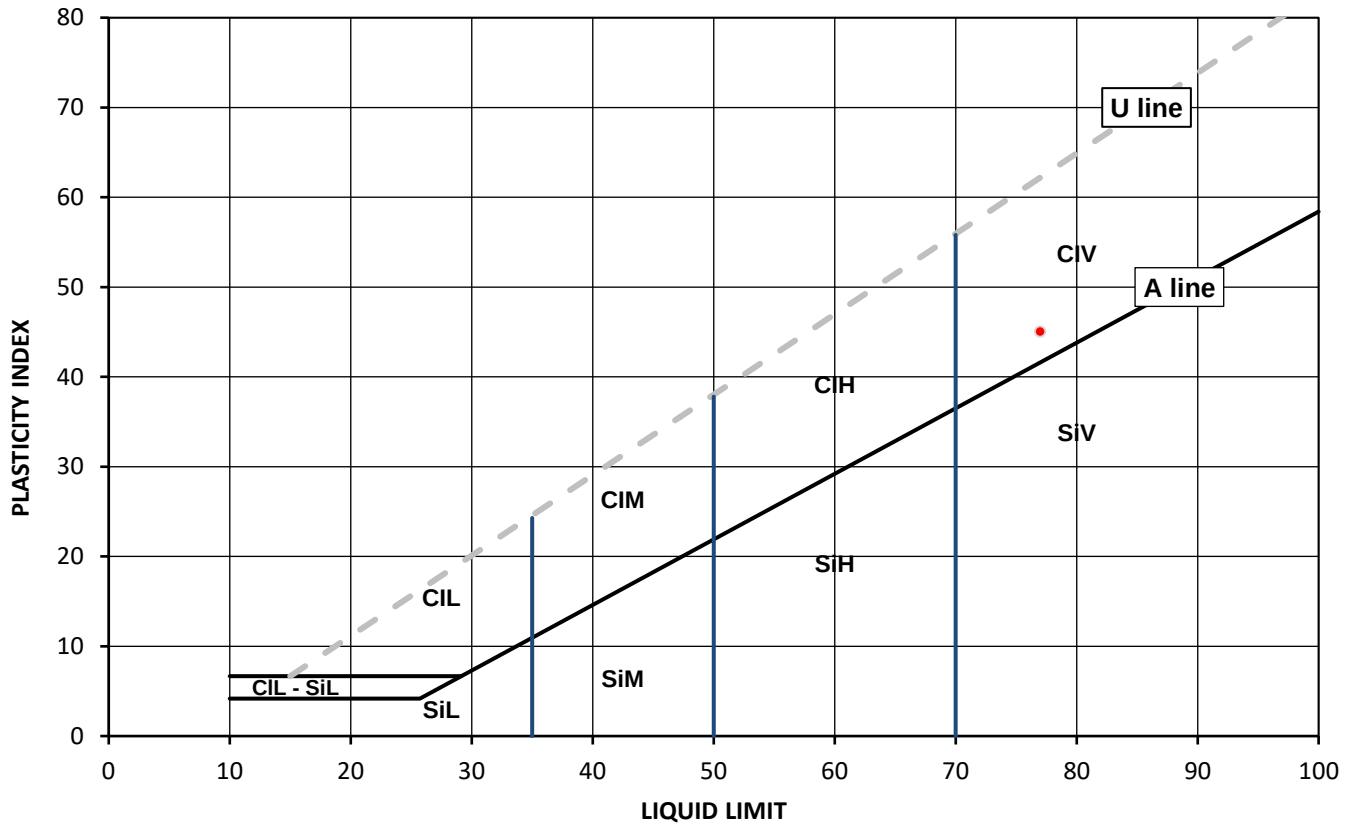
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1816075	Depth Top [m]:	3.00
Hole No.:	WS01	Depth Base [m]:	Not Given
Sample Reference:	D	Sample Type:	D
Soil Description:	Brown CLAY		

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
30	77	32	45	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 12/04/2021

GF 232.10

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: LMB Geosolutions Ltd
Client Address: 28 Dresden Road, London, N19 3BD
Contact: Philip Lewis
Site Address: 11-12 Ingestre Rd

Client Reference: LMB_INGESTRE
Job Number: 21-64921
Date Sampled: 18/03/2021
Date Received: 19/03/2021
Date Tested: 08/04/2021
Sampled By: Client - PIL

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

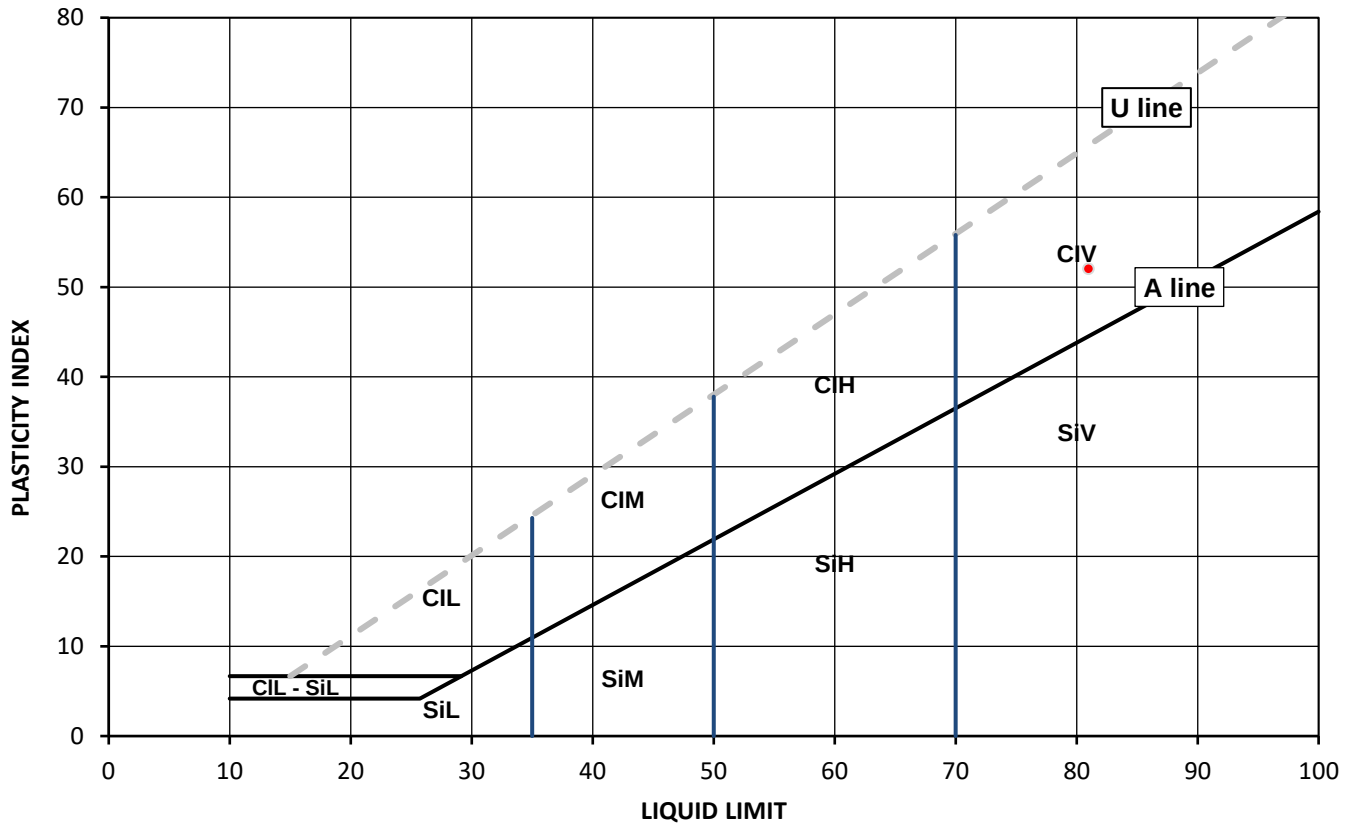
Test Results:

Laboratory Reference: 1816076
Hole No.: WS01
Sample Reference: D
Soil Description: Brown CLAY

Depth Top [m]: 4.50
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
31	81	29	52	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 12/04/2021

GF 232.10

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client:	LMB Geosolutions Ltd	Client Reference:	LMB_INGESTRE
Client Address:	28 Dresden Road, London, N19 3BD	Job Number:	21-64921
		Date Sampled:	19/03/2021
		Date Received:	19/03/2021
Contact:	Philip Lewis	Date Tested:	08/04/2021
Site Address:	11-12 Ingestre Rd	Sampled By:	Client - PIL

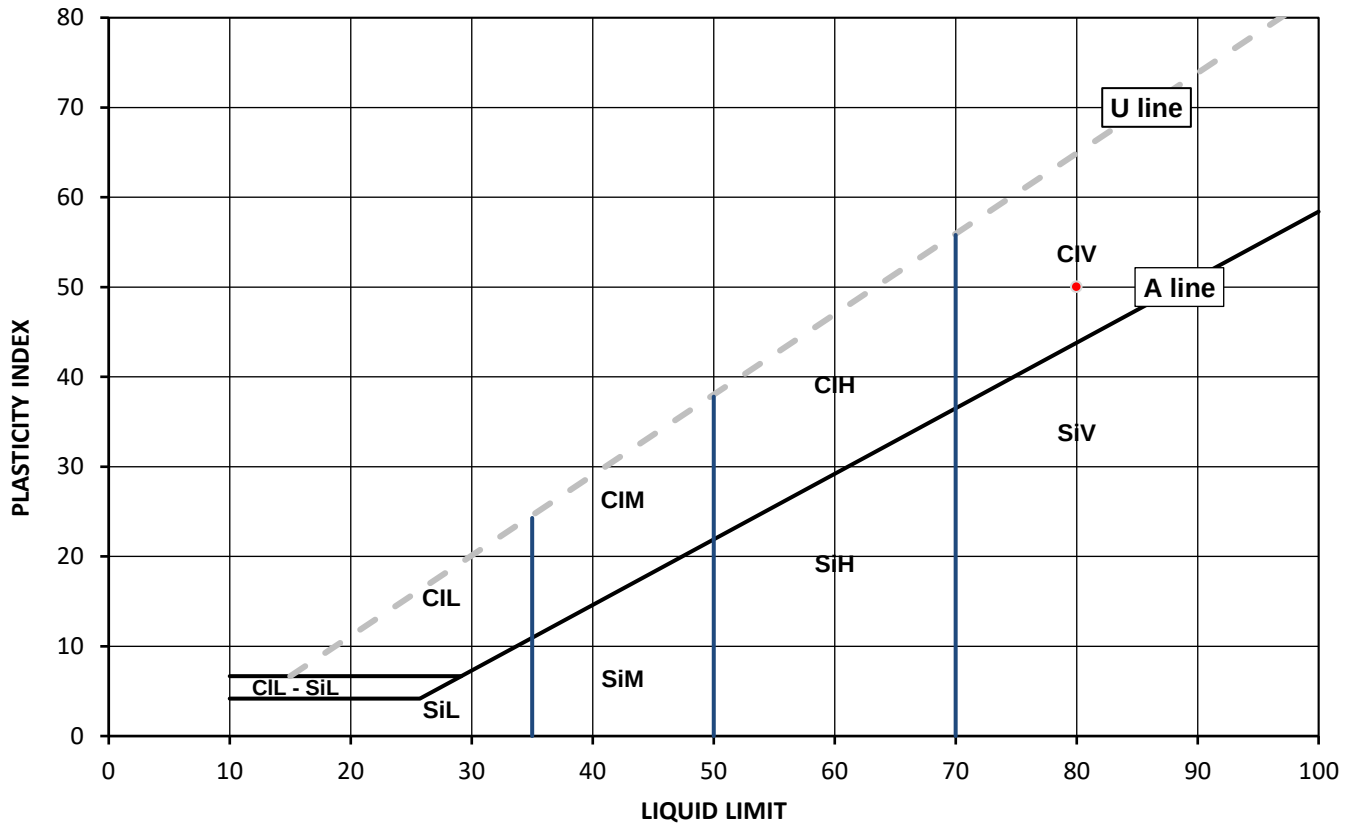
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1816077	Depth Top [m]:	4.00
Hole No.:	WS02	Depth Base [m]:	Not Given
Sample Reference:	D	Sample Type:	D
Soil Description:	Dark brown CLAY		

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
28	80	30	50	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 12/04/2021

GF 232.10

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: LMB Geosolutions Ltd
Client Address: 28 Dresden Road, London, N19 3BD
Contact: Philip Lewis
Site Address: 11-12 Ingestre Rd

Client Reference: LMB_INGESTRE
Job Number: 21-64921
Date Sampled: 18/03/2021
Date Received: 19/03/2021
Date Tested: 08/04/2021
Sampled By: Client - PIL

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

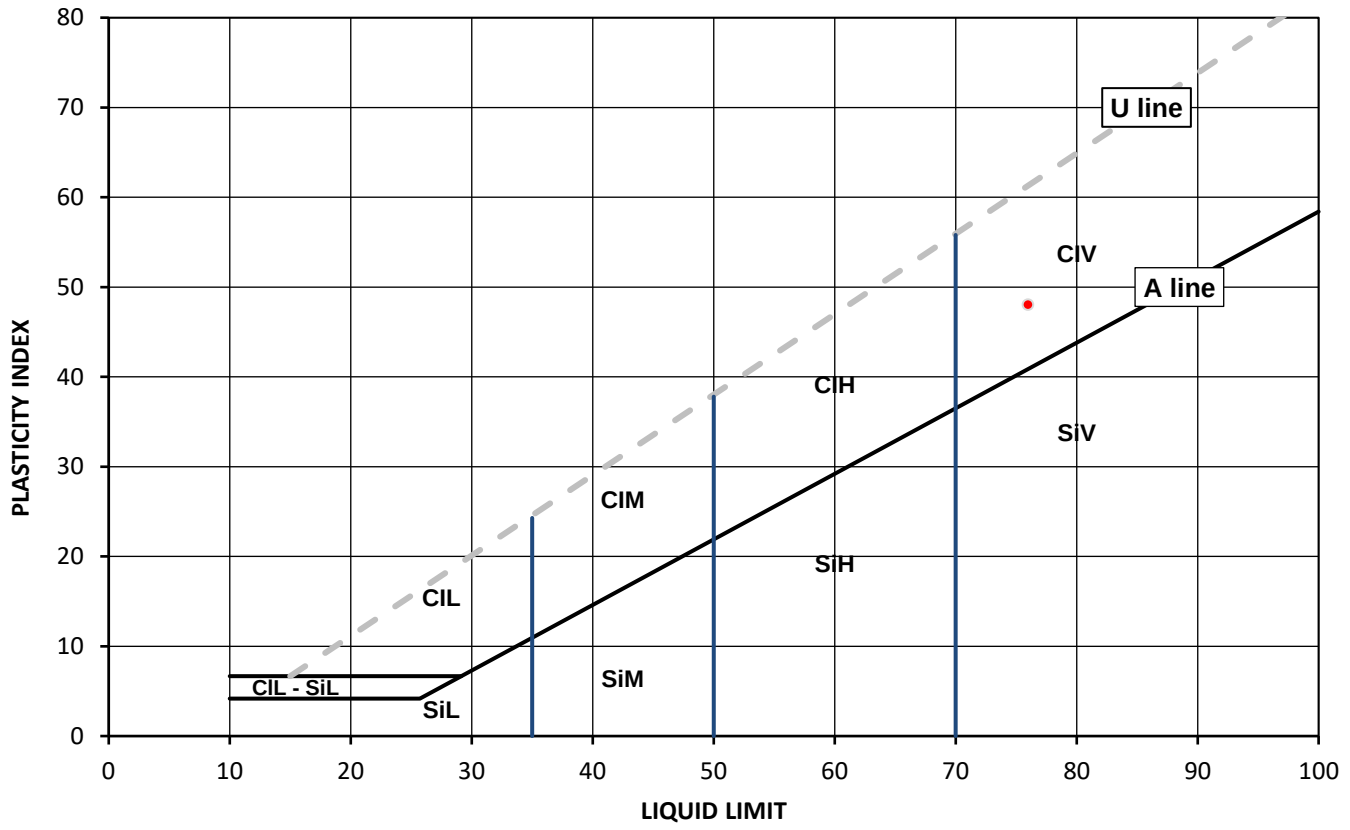
Test Results:

Laboratory Reference: 1816078
Hole No.: WS06
Sample Reference: D
Soil Description: Brown CLAY

Depth Top [m]: 3.20
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
29	76	28	48	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

		Plasticity		Liquid Limit
Cl	Clay	L	Low	below 35
Si	Silt	M	Medium	35 to 50
		H	High	50 to 70
		V	Very high	exceeding 70
		O	Organic	append to classification for organic material (eg ClHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 12/04/2021

GF 232.10

SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

Client: LMB Geosolutions Ltd

Client Address: 28 Dresden Road, London, N19 3BD

Contact: Philip Lewis

Site Address: 11-12 Ingestre Rd

Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

Client Reference: LMB_INGESTRE
Job Number: 21-64921
Date Sampled: 18/03 - 19/03/2021
Date Received: 19/03/2021
Date Tested: 09/04/2021
Sampled By: Client - PIL

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W]	Water Content [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top m	Depth Base m	Type			%	%	% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3	%		
1816075	WS01	D	3.00	Not Given	D	Brown CLAY	Atterberg 1 Point	30		100	77	32	45						
1816076	WS01	D	4.50	Not Given	D	Brown CLAY	Atterberg 1 Point	31		100	81	29	52						
1816077	WS02	D	4.00	Not Given	D	Dark brown CLAY	Atterberg 1 Point	28		100	80	30	50						
1816078	WS06	D	3.20	Not Given	D	Brown CLAY	Atterberg 1 Point	29		100	76	28	48						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 12/04/2021

GF 234.12

APPENDICES

APPENDIX F ANALYSER & PID CALIBRATION CERTIFICATES

TEST DATE AND CONDITIONS		
Date	09/06/2021	
Atmospheric Pressure	1003	mB
Ambient Temperature	21.9	°C
Environics Serial No.	5089	

GAS DATA LTD
Unit 4, Fairfield Court
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LJ
Tel 02476303311 Fax 02476307711

GFM436 Final Inspection & Calibration Check Certificate

Customer	LMB Geosolutions Ltd
Certificate Number	122514
Order Number	328243

Serial Number	12102
Software Version	G436-00.0027/0009

Recalibration DUE Date
09/06/22

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	500	*Accept > 200 cc/min*	Pump Flow @ -200mB	300	*Accept > 200 cc/min*
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
	CH_4		CO_2		O_2	
	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %	Instrument Gas Readings %	True Gas Value %
Sensor	59.5	60	39.5	40	20.9	20.9
	Accept ±3.0		*Accept ±3.0*		*Accept ±0.5*	
	5	5	5	5	6	6
	Accept ±0.3		*Accept ±0.3*		*Accept ±0.3*	
Zero Reading 100% N2	0	0	0	0	0	0
	Accept ±0.0		*Accept ±0.0*		*Accept ±0.1*	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings *(ppm)*			
			Zero Reading		Instrument Gas Reading	
Gas Type	Range *(ppm)*					
H2S	5000	*1500*	0	*Accept ±0.0*	1500	*Accept ±5.0*
CO	2000	*1000*	0	*Accept ±0.0*	996	*Accept ±5.0*
Hexane	*2.0%*	2.0%	0	*Accept ±0.0*	1.99	*Accept ±10.0*

TEST DATE AND CONDITIONS	
Date	9.6.21
Atmospheric Pressure	1003 mB
Ambient Temp	21.9 °C
Environics Serial No.	5089

GAS DATA LTD
Unit 4, Fairfield Court
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LJ
Tel 02476303311 Fax 02476307711

GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Type	Instrument Serial Number + SW Version	Job Number(s)
328243	GFM 436	12102 G436-27/09	122514

Calibration Technician ..... **Date** 9.6.21

Inspection Technician ..... **Date** 10.6.21

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable (NA)	INSTRUMENT PACKING LIST		Tick if included
Function Tests	Dust Caps Fitted	P	Instrument		✓
	Keyboard Test (All Keys)	P	Leather Case		✓
	Backlight	P	Instrument Strap		✓
	Clock Set / Running	P	AC Battery Charger (UK)		✓
	Comms Test	P	AC Battery Charger (EURO)		X
	Pump Flow Test (In & Out)	P	AC Battery Charger (US)		X
	Overall Leak Test (30mB)	n/a	AC Battery Charger (AUS)		X
	Battery Charge Test	P	Gas Sample Pipe - *(new issue)*		✓
	Service Date set to?	9.6.22	Flow Sample Pipe - *(new issue)*		✓
Channel Tests	Data Logging Enabled?	P	Hard Carry Case	Pelli	✓
	Verify CH4/LEL/Hexane/PID	P	Allen Key		✓
	Verify CO2	P	Spares Pot		X
	Verify O2	P	Temperature Probe		X
	Verify H2S	P	Vane Anemometer		X
	Verify CO	P	USB Cable		✓
	Verify LEL	P	USB Memory stick		✓
	Verify 1st Option Gas	N/A	SM V5 Software	Ver 6.05	✓
	Verify Atmospheric pressure	P	Internal Filter Pack	Qty 7	✓
	Verify differential pressure	P	External Filter Pack	Qty	X
	Verify flow	P	Field Guide		X
	Verify temperature probe input	P	**Extra Items:** Sample Tube, old certificates		
	Verify vane anemometer input	P			
DataBase Checks	Jobcard(s) completed and signed	P			
	Jobcard(s) booked off database	P			
	Calibration certificate completed	D			
	Complete & print QI record	n/a			
Label Checks	No. of Calibration label fitted	GDC 11189	**Comments:**		
	MCERTS label displayed	P			
	Warranty label fitted	P			
H2S Range	H2S Range from Sales Order	500 ppm			
	H2S Range from Cal Cert	500 ppm			
	Over-range value correct?	P			

In-Situ

Innovations in Water Monitoring

Calibration Certificate

Calibration Date: 28/10/2020

Customer: LMB Geosolutions
Model: MiniRAE Lite (PGM-7350)
Serial Number: 595-002144
Date of Purchase: 11/07/2017
Date of Last In-Situ Calibration: 31/10/2019

Visual Inspection: New inlet plastic filter fitted.

Calibrated at 0 ppm
Calibrated at 100 ppm
Method: Isobutelene Gas:- Batch No: WO229218-2

APPENDICES

APPENDIX G MONITORING RESULTS GAS

PROJECT: **Ingestre Rd, London NW5**

Date 26/03/2021 Operator PIL

Start 1004 Weather cloudy with sunny spells

Atmospheric Pressure (mb) Finish 1003 Time: 08:40

Location	Time(s)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO(ppm)	H_2S (ppm)	Flow (l/hr)	PID (ppm)	Groundwater Level		Ground Elevation
									m AOD	mbgl	
WS02	60	0.00	0.80	19.10	0.00	0.00	0.00	1.90		dry	50.320
	120	0.00	0.80	19.10	0.00	0.00					
	240	0.00	0.80	19.10	0.00	0.00					
WS03	60	0.00	2.90	18.20	0.00	0.00	0.00	0.00		dry	48.300
	120	0.00	2.90	18.20	0.00	0.00					
	240	0.00	2.90	18.20	0.00	0.00					
WS06	60	0.00	3.00	18.90	0.00	0.00	0.00	0.00		dry	48.220
	120	0.00	3.00	18.90	0.00	0.00					
	240	0.00	3.00	18.90	0.00	0.00					
BH02	60	0.00	0.60	20.00	0.00	0.00	0.00	0.00	46.95	1.35	48.300
	120	0.00	0.60	20.00	0.00	0.00					
	240	0.00	0.60	20.00	0.00	0.00					
BH03	60	0.00	0.00	20.20	0.00	0.00	100.3/0.0	1.00	47.50	0.80	48.300
	120	0.00	0.00	20.20	0.00	0.00					
	240	0.00	0.00	20.20	0.00	0.00					

PROJECT: **Ingestre Rd, London NW5**

Date 31/03/2021 Operator PIL

Start 1016 Weather dry & sunny
Atmospheric Pressure (mb) Finish 1016 Time: 08:50

Location	Time	CH_4 (%)	CO_2 (%)	O_2 (%)	CO(ppm)	H_2S (ppm)	Flow (l/hr)	PID (ppm)	Groundwater Level		Ground Elevation
									m AOD	mbgl	
WS02	60	0.00	1.40	18.10	0.00	0.00	0.00	0.60		dry	50.320
	120	0.00	1.40	18.10	0.00	0.00					
	240	0.00	1.40	18.10	0.00	0.00					
WS03	60	0.00	3.10	18.40	0.00	0.00	0.00	0.00		dry	48.300
	120	0.00	3.10	18.40	0.00	0.00					
	240	0.00	3.10	18.40	0.00	0.00					
WS06	60	0.00	2.10	18.90	0.00	0.00	0.00	0.00		dry	48.220
	120	0.00	2.10	18.90	0.00	0.00					
	240	0.00	2.10	18.90	0.00	0.00					
BH02	60	0.00	0.40	19.80	0.00	0.00	0.00	0.00	47.02	1.28	48.300
	120	0.00	0.40	19.80	0.00	0.00					
	240	0.00	0.40	19.80	0.00	0.00					
BH03	60	0.00	5.90	5.50	0.00	0.00	0.00	0.20	47.50	0.80	48.300
	120	0.00	5.90	5.50	0.00	0.00					
	240	0.00	5.90	5.50	0.00	0.00					

PROJECT: **Ingestre Rd, London NW5**

Date 02/06/2021 Operator PIL

Start 1008 Weather dry & sunny
Atmospheric Pressure (mb) Finish 1008 Time: 09:00

Location	Time	CH_4 (%)	CO_2 (%)	O_2 (%)	CO(ppm)	H_2S (ppm)	Flow (l/hr)	PID (ppm)	Groundwater Level		Ground Elevation
									m AOD	mbgl	
WS02	60	0.00	2.00	17.20	0.00	0.00	0.00	0.00	47.95	2.37	50.320
	120	0.00	2.00	17.20	0.00	0.00					
	240	0.00	2.00	17.20	0.00	0.00					
WS03	60	0.00	2.70	19.30	0.00	0.00	0.00	0.00	46.40	1.90	48.300
	120	0.00	2.70	19.30	0.00	0.00					
	240	0.00	2.70	19.30	0.00	0.00					
WS06	60	0.00	3.30	17.00	0.00	0.00	0.00	0.00	46.21	2.01	48.220
	120	0.00	3.30	17.00	0.00	0.00					
	240	0.00	3.30	17.00	0.00	0.00					
BH02	60	0.00	1.90	19.00	0.00	0.00	0.00	0.00	46.94	1.36	48.300
	120	0.00	1.90	19.00	0.00	0.00					
	240	0.00	1.90	19.00	0.00	0.00					
BH03	60	0.00	6.40	9.00	0.00	0.00	57.6/0.0	0.00	47.57	0.73	48.300
	120	0.00	6.40	9.00	0.00	0.00					
	240	0.00	6.40	9.00	0.00	0.00					

PROJECT: **Ingestre Rd, London NW5**

Date 23/06/2021 Operator PIL

Start 1016 Weather dry & sunny
Atmospheric Pressure (mb) Finish 1015 Time 15:40

Location	Time	CH_4 (%)	CO_2 (%)	O_2 (%)	CO(ppm)	H_2S (ppm)	Flow (l/hr)	PID (ppm)	Groundwater Level		Ground Elevation
									m bgl	mAOD	
WS02	60	0.00	2.70	17.10	0.00	0.00	0.00	0.00	2.53	47.79	50.320
	120	0.00	2.70	17.10	0.00	0.00					
	240	0.00	2.70	17.10	0.00	0.00					
WS03	60	0.00	1.00	20.50	0.00	0.00	0.00	0.00	1.67	46.63	48.300
	120	0.00	1.00	20.50	0.00	0.00					
	240	0.00	1.00	20.50	0.00	0.00					
WS06	60	0.00	1.80	18.60	0.00	0.00	0.00	0.00	1.82	46.40	48.220
	120	0.00	1.80	18.60	0.00	0.00					
	240	0.00	1.80	18.60	0.00	0.00					
BH02	60	0.00	0.20	20.70	0.00	0.00	0.00	0.00	1.25	47.05	48.300
	120	0.00	0.20	20.70	0.00	0.00					
	240	0.00	0.20	20.70	0.00	0.00					
BH03	60	0.00	3.10	16.80	0.00	0.00	0.00	0.10	0.69	47.61	48.300
	120	0.00	3.10	16.80	0.00	0.00					
	240	0.00	3.10	16.80	0.00	0.00					

PROJECT: Ingestre Rd, London NW5

Date 29/06/2021 Operator PIL

Atmospheric Pressure (mb) Start 1008 Finish 1008 Weather Time: cloudy with occasional light rain 18:50

Location	Time	CH_4 (%)	CO_2 (%)	O_2 (%)	CO(ppm)	H_2S (ppm)	Flow (l/hr)	PID (ppm)	Groundwater Level		Ground Elevation
									m bgl	mAOD	
WS02	60	0.00	3.20	15.90	0.00	0.00	0.00	0.00	2.54	47.78	50.320
	120	0.00	3.20	15.90	0.00	0.00					
	240	0.00	3.20	15.90	0.00	0.00					
WS03	60	0.00	1.20	19.60	0.00	0.00	0.00	0.00	1.57	46.73	48.300
	120	0.00	1.20	19.60	0.00	0.00					
	240	0.00	1.20	19.60	0.00	0.00					
WS06	60	0.00	0.90	18.40	0.00	0.00	0.00	0.00	1.00	47.22	48.220
	120	0.00	0.90	18.40	0.00	0.00					
	240	0.00	0.90	18.40	0.00	0.00					
BH02	60	0.00	0.10	20.60	0.00	0.00	0.00	0.00	1.25	47.05	48.300
	120	0.00	0.10	20.60	0.00	0.00					
	240	0.00	0.10	20.60	0.00	0.00					
BH03	60	0.00	1.00	19.50	0.00	0.00	0.00	0.10	0.51	47.79	48.300
	120	0.00	1.00	19.50	0.00	0.00					
	240	0.00	1.00	19.50	0.00	0.00					

PROJECT: Ingestre Rd, London NW5

Date 09/07/2021 Operator PIL

Start 1012 Weather dry with cloud & sunny spells
Atmospheric Pressure (mb) Finish 1011 Time 16:40

Location	Time	CH_4 (%)	CO_2 (%)	O_2 (%)	CO(ppm)	H_2S (ppm)	Flow (l/hr)	PID (ppm)	Groundwater Level		Ground Elevation
									m bgl	mAOD	
WS02	60	0.00	2.50	17.80	0.00	0.00	0.00	0.00	2.55	47.77	50.320
	120	0.00	2.50	17.80	0.00	0.00					
	240	0.00	2.50	17.80	0.00	0.00					
WS03	60	0.00	1.50	20.00	0.00	0.00	0.00	0.00	1.43	46.87	48.300
	120	0.00	1.50	20.00	0.00	0.00					
	240	0.00	1.50	20.00	0.00	0.00					
WS06	60	0.00	1.50	19.00	0.00	0.00	0.00	0.00	1.71	46.51	48.220
	120	0.00	1.50	19.00	0.00	0.00					
	240	0.00	1.50	19.00	0.00	0.00					
BH02	60	0.00	0.20	20.80	0.00	0.00	0.00	0.00	1.29	47.01	48.300
	120	0.00	0.20	20.80	0.00	0.00					
	240	0.00	0.20	20.80	0.00	0.00					
BH03	60	0.00	1.30	19.40	0.00	0.00	0.00	0.00	0.60	47.70	48.300
	120	0.00	1.30	19.40	0.00	0.00					
	240	0.00	1.30	19.40	0.00	0.00					

APPENDICES

APPENDIX H GQRA WORKSHEETS

1.00

Project Ref: LMB_Ingestre
Project Name: 1112 Ingestre Road
Soil Organic Matter 2.20

click to convert from text to numbers

Please select the appropriate end use scenario from the list below. Note only one can be selected.

Residential w/ plant	☑	TRUE
Residential no plant	☐	FALSE
Allotments	☐	FALSE
Commercial / Industrial	☐	FALSE

LMB
Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Sample Name →	BH01	BH02	BH02	BH02	BH03	TP02	TP03	TP03	TP04	WS02	WS01	WS01	WS03	WS03	WS03	WS04	WS05	WS06
Sample Depth →	0.30	0.70	1.40	0.60	1.70	0.40	0.00	0.60	0.50	3.35	0.80	3.50	0.10	1.00	2.70	1.50	0.30	3.20
SOM	7.70	0.90	1.10	1.00	2.60							0.80					1.3	
Selenium	0.5	0.5	0.5	0.5	0.5	1	1	1	1	1	1	1	1	1	1		1	1
Mercury	0.05	0.24	0.18	0.05	0.2	0.3	0.3	0.3	1.2	0.9	1.1	0.3	0.9	0.3	1		0.3	0.3
Arsenic	7	12	28	12	14	20	10	29	39	17	13	14	26	13	18		20	8.8
Cadmium	0.3	0.1	0.1	0.1	0.1	0.2	1.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2		0.2	0.2
Chromium	9.3	18	26	38	33	48	31	54	46	40	29	48	42	47	35		47	56
Copper	25	23	24	32	52	47	54	35	140	42	37	26	75	35	44		37	28
Nickel	6.6	12	14	33	29	34	19	50	46	23	20	41	38	43	23		38	42
Lead	17	68	59	20	88	140	120	68	510	210	180	17	220	17	160		150	20
Zinc	40	40	45	67	74	100	310	100	230	75	51	74	140	76	65		120	79
Naphthalene	0.03	0.03	0.03	0.03	0.03	0.05	0.05			0.05	0.05	0.05	0.05	0.05	0.05	0	0.05	0
Acenaphthylene	0.03	0.03	0.03	0.03	0.03	0.05	0.05			0.05	0.05	0.05	0.05	0.05	0.05	0	0.05	0
Acenaphthene	0.03	0.03	0.03	0.03	0.03	0.05	0.05			0.05	0.05	0.05	0.05	0.05	0.05	0	0.05	0
Fluorene	0.08	0.03	0.03	0.03	0.03	0.05	0.05			0.05	0.05	0.05	0.05	0.05	0.05	0	0.05	0
Phenanthrene	0.34	0.05	0.06	0.03	0.03	0.23	0.05			0.05	0.05	0.05	0.84	0.05	0.05	0	0.58	0
Anthracene	0.03	0.03	0.03	0.03	0.03	0.05	0.05			0.05	0.05	0.05	0.1	0.05	0.05	0	0.13	0
Fluoranthene	0.11	0.07	0.1	0.03	0.03	0.83	0.44			0.05	0.05	0.05	1.5	0.05	0.05	0	1.8	0
Pyrene	0.25	0.06	0.07	0.03	0.03	0.78	0.39			0.05	0.05	0.05	1.3	0.05	0.05	0	1.8	0
Benzo(a)anthracene	0.07	0.03	0.04	0.03	0.03	0.63	0.35			0.05	0.05	0.05	0.4	0.05	0.05	0	1.1	0
Chrysene	0.1	0.03	0.04	0.03	0.03	0.48	0.25			0.05	0.05	0.05	0.77	0.05	0.05	0	0.85	0
Benzo(k)fluoranthene	0.03	0.03	0.03	0.03	0.03	0.3	0.21	0	0	0.05	0.05	0.05	0.39	0.05	0.05	0	0.43	0
Benzo(b)fluoranthene	0.1	0.03	0.03	0.03	0.03	0.65	0.4	0	0	0.05	0.05	0.05	0.53	0.05	0.05	0	1.2	0
Benzo(a)pyrene	0.03	0.03	0.03	0.03	0.03	0.61	0.39			0.05	0.05	0.05	0.55	0.05	0.05	0	0.95	0
Indeno(1,2,3c,d)pyrene	0.03	0.03	0.03	0.03	0.03	0.26	0.2			0.05	0.05	0.05	0.22	0.05	0.05	0	0.46	0
Dibenzo(a,h)anthracene	0.03	0.03	0.03	0.03	0.03	0.05	0.05			0.05	0.05	0.05	0.05	0.05	0.05	0	0.05	0
Benzo(g,h,i)perylene	0.15	0.03	0.03	0.03	0.03	0.35	0.25			0.05	0.05	0.05	0.28	0.05	0.05	0	0.61	0
Aliphatic (>C5C6)	0.01	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0
Aliphatic (>C6C8)	0.01	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0
Aliphatic (>C8C10)	0.01	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0
Aliphatic (>C10C12)	1.5	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0
Aliphatic (>C12C16)	10	0	0	0	0	2	0	2	0	0	0	0	0	2	0	0	0	0
Aliphatic (>C16C21)	33	0	0	0	0	8	0	8	0	0	0	0	0	8	0	0	0	0
Aliphatic (>C21C35)	300	0	0	0	0	8	0	8	0	0	0	0	0	8	0	0	0	0
Aliphatic (>C35C40)	340	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aliphatic (>C40C44)	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aromatic (>C6C7)	0.01	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0
Aromatic (>C7C8)	0.01	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0
Aromatic (>C8C10)	0.01	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0
Aromatic (>C10C12)	0.9	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0
Aromatic (>C12C16)	12	0	0	0	0	2	0	2	0	0	0	0	0	2	0	0	0	0
Aromatic (>C16C21)	68	0	0	0	0	10	0	10	0	0	0	0	0	10	0	0	0	0
Aromatic (>C21C35)	760	0	0	0	0	10	0	10	0	0	0	0	0	10	0	0	0	0
Aromatic (>C35C40)	840	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aromatic (>C40C44)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00000
Benzene	0	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0.00000
Ethylbenzene	0	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0.00000
m+pXylene	0	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0.00000
MTBE	0	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0.00000
oXylene	0	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0.00000
TAME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00000
Toluene	0	0	0	0	0	0.001	0	0.001	0	0	0	0	0	0.001	0	0	0	0.00000
TPH (C1040)								< 10	< 10		32			< 10	370		< 10	

	Assessment Criteria	BH01	BH02	BH02	BH02	BH03	TP02	TP03	TP03	TP04	WS02	WS01	WS01	WS03	WS03	WS03	WS04	WS05	WS06
	↓	0.30	0.70	1.40	0.60	1.70	0.40	0.00	0.60	0.50	3.35	0.80	3.50	0.10	1.00	2.70	1.50	0.30	3.20
Selenium	350.24	0.50	0.50	0.50	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00
Mercury	170.00	0.05	0.24	0.18	0.05	0.20	0.30	0.30	0.30	1.20	0.90	1.10	0.30	0.90	0.30	1.00	0.00	0.30	0.30
Arsenic	32.00	7.00	12.00	28.00	12.00	14.00	20.00	10.00	29.00	39.00	17.00	13.00	14.00	26.00	13.00	18.00	0.00	20.00	8.80
Cadmium	10.00	0.30	0.10	0.10	0.10	0.10	0.20	1.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.00	0.20	0.20
Chromium	910.00	9.30	18.00	26.00	38.00	33.00	48.00	31.00	54.00	46.00	40.00	29.00	48.00	42.00	47.00	35.00	0.00	47.00	56.00
Copper	2300.00	25.00	23.00	24.00	32.00	52.00	47.00	54.00	35.00	140.00	42.00	37.00	26.00	75.00	35.00	44.00	0.00	37.00	28.00
Nickel	130.00	6.60	12.00	14.00	33.00	29.00	34.00	19.00	50.00	46.00	23.00	20.00	41.00	38.00	43.00	23.00	0.00	38.00	42.00
Lead	210.00	17.00	68.00	59.00	20.00	88.00	140.00	120.00	68.00	510.00	210.00	180.00	17.00	220.00	17.00	160.00	0.00	150.00	20.00
Zinc	3700.00	40.00	40.00	45.00	67.00	74.00	100.00	310.00	100.00	230.00	75.00	51.00	74.00	140.00	76.00	65.00	0.00	120.00	79.00
Naphthalene	2.30	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.05	0.00
Acenaphthylene	420.00	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.05	0.00
Acenaphthene	210.00	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.05	0.00
Fluorene	170.00	0.08	0.03	0.03	0.03	0.03	0.05	0.05	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.05	0.00
Phenanthrene	95.00	0.34	0.05	0.06	0.03	0.03	0.23	0.05	0.00	0.00	0.05	0.05	0.05	0.84	0.05	0.05	0.00	0.58	0.00
Anthracene	2400.00	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.00	0.00	0.05	0.05	0.05	0.10	0.05	0.05	0.00	0.13	0.00
Fluoranthene	280.00	0.11	0.07	0.10	0.03	0.03	0.83	0.44	0.00	0.00	0.05	0.05	0.05	1.50	0.05	0.05	0.00	1.80	0.00
Pyrene	620.00	0.25	0.06	0.07	0.03	0.03	0.78	0.39	0.00	0.00	0.05	0.05	0.05	1.30	0.05	0.05	0.00	1.80	0.00
Benzo(a)anthracene	7.20	0.07	0.03	0.04	0.03	0.03	0.63	0.35	0.00	0.00	0.05	0.05	0.05	0.40	0.05	0.05	0.00	1.10	0.00
Chrysene	15.00	0.10	0.03	0.04	0.03	0.03	0.48	0.25	0.00	0.00	0.05	0.05	0.05	0.77	0.05	0.05	0.00	0.85	0.00
Benzo(k)fluoranthene	77.00	0.03	0.03	0.03	0.03	0.03	0.30	0.21	0.00	0.00	0.05	0.05	0.05	0.39	0.05	0.05	0.00	0.43	0.00
Benzo(b)fluoranthene	2.60	0.10	0.03	0.03	0.03	0.03	0.65	0.40	0.00	0.00	0.05	0.05	0.05	0.53	0.05	0.05	0.00	1.20	0.00
Benzo(a)pyrene	2.20	0.03	0.03	0.03	0.03	0.03	0.61	0.39	0.00	0.00	0.05	0.05	0.05	0.55	0.05	0.05	0.00	0.95	0.00
Indeno(1,2,3-c,d)pyrene	27.00	0.03	0.03	0.03	0.03	0.03	0.26	0.20	0.00	0.00	0.05	0.05	0.05	0.22	0.05	0.05	0.00	0.46	0.00
Dibenzo(a,h)anthracene	0.24	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.05	0.00
Benzo(g,h,i)perylene	320.00	0.15	0.03	0.03	0.03	0.03	0.35	0.25	0.00	0.00	0.05	0.05	0.05	0.28	0.05	0.05	0.00	0.61	0.00
Aliphatic (>C5-C6)	24.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aliphatic (>C6-C8)	52.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aliphatic (>C8-C10)	13.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aliphatic (>C10-C12)	60 (203)	1.50	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Aliphatic (>C12-C16)	500 (141)	10.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
Aliphatic (>C16-C21)	41000.00	33.00	0.00	0.00	0.00	0.00	8.00	0.00	8.00	0.00	0.00	0.00	0.00	0.00	8.00	0.00	0.00	0.00	0.00
Aliphatic (>C21-C35)	41000.00	300.00	0.00	0.00	0.00	0.00	8.00	0.00	8.00	0.00	0.00	0.00	0.00	0.00	8.00	0.00	0.00	0.00	0.00
Aliphatic (>C35-C40)	41000.00	340.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aliphatic (>C40-C44)	41000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aromatic (>C6-C7)	50.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aromatic (>C7-C8)	100.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aromatic (>C8-C10)	20.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aromatic (>C10-C12)	63.00	0.90	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Aromatic (>C12-C16)	140.00	12.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
Aromatic (>C16-C21)	260.00	68.00	0.00	0.00	0.00	0.00	10.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
Aromatic (>C21-C35)	1100.00	760.00	0.00	0.00	0.00	0.00	10.00	0.00	10.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
Aromatic (>C35-C40)	1100.00	840.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aromatic (>C40-C44)	1100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzene	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylbenzene	47.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
m+p-Xylene	56.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MTBE	49.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
o-Xylene	59.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toluene	130.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

APPENDICES

APPENDIX I GROUND GAS RISK ASSESSMENT WORKSHEET

LMB Geosolutions Ltd
PROJECT: Ingestre Rd, London NW5
Title: Summary of Ground Gas Monitoring Results

Ground Investigation
Land Contamination
Hydrogeology
Engineering Geology

Location	CH_4 (%)		CO_2 (%)		O_2 (%)		Flow (l/hr)		Gas Screening Value	
	min	max	min	max	min	max	min	max	CH_4	CO_2
WS02	0.00	0.00	0.80	3.20	15.90	19.10	0.00	0.10	0.00E+00	3.20E-03
WS03	0.00	0.00	1.00	3.10	18.20	20.50	0.00	0.10	0.00E+00	3.10E-03
WS06	0.00	0.00	0.90	3.30	17.00	19.00	0.00	0.10	0.00E+00	3.30E-03
BH02	0.00	0.00	0.10	1.90	19.00	20.80	0.00	0.10	0.00E+00	1.90E-03
BH03	0.00	0.00	0.00	6.40	5.50	20.20	0.00	0.10	0.00E+00	6.40E-03

	Characteristic Situation (CIRIA R149)	Comparable PIT gas regime	Risk Classification	Gas Screening Value (l/hr)	Additional Factors
	1	A	Very Low Risk	<0.07	Typically methane ≤ 1% and/or carbon dioxide ≤ 5% otherwise consider increase to Characteristic Situation 2
	2	B	Low Risk	<0.7	Borehole air flow rate not to exceed 70l/hr. Otherwise consider increase to Characteristic Situation 3
	3	C	Moderate Risk	<3.5	
	4	D	Moderate to High Risk	<15	Quantitative Risk Assessment required to evaluate scope of protection measures
	5	E	High Risk	<70	
	6	F	Very High Risk	>70	

NHBC Report No. 4 - Table 14.1 (Refer to NHBC document for full table) (March 2007)

Traffic Light Classification	Methane		Carbon Dioxide	
	Typical Max Concentration (%v/v)	Gas Screening Value (l/hr)	Typical Max Concentration (%v/v)	Gas Screening Value (l/hr)
Green				
	1	0.13	5	0.78
Amber				
	5	0.63	10	1.6
Amber 2				
	20	1.6	30	3.1
Red				