



Great Jones Street, Manchester

Phase 2 Geo-Environmental Investigation

For: Oslady Homes Ltd

Geo-Environmental Engineering Services

IGE Consulting
Office 16
Bartle House
Oxford Court
Manchester
M2 3WQ

Ref: 4015-02
Job: 4015
Rev: -
By: TP

Tel 0161-914-9170
Email contact@igeconsulting.co.uk

Date: Aug 2023

REVISIONS

Revision	Date	Prepared By	Checked By	Authorised By	Remarks
First Issue	31 st August 2023	 Tom Pudifoot BSc (Hons)	 Liam McMahon MSci (Hons), MSc, FGS	 Andrew Edwards MSc, PIEMA, MIEEnvSoc, FGS, CEnv	-



CONTENTS

1.0 INTRODUCTION

- 1.1 Brief
- 1.2 Third Parties

2.0 SCOPE OF INVESTIGATION WORK

- 2.1 Foundation Inspection Pits
- 2.2 Dynamic Sampling Boreholes
- 2.3 Site Testing and Sampling
- 2.4 Laboratory Testing

3.0 FINDINGS

- 3.1 Ground Conditions
- 3.2 Visual and Olfactory Contamination Findings
- 3.3 Water Strikes
- 3.4 Services
- 3.5 Geotechnical Site Testing
- 3.6 Geotechnical Laboratory Testing
- 3.7 Environmental Laboratory Test Results
- 3.8 Ground Gas Risk Assessment

4.0 ENVIRONMENTAL CONCLUSIONS

- 4.1 Assessment of Environmental Results
- 4.2 Revised Conceptual Models
- 4.3 Outline Remedial Strategy

5.0 GEOTECHNICAL CONCLUSIONS

- 5.1 Geotechnical Assessment of Ground Conditions
- 5.2 Groundwater
- 5.3 Foundations
- 5.4 Piled Foundations
- 5.5 Earthworks and External Areas

6.0 RECOMMENDATIONS

APPENDICES

APPENDIX 1	LIMITATIONS OF INVESTIGATION WORK AND REPORT
-------------------	--

APPENDIX 2	FIGURES AND DRAWINGS
-------------------	----------------------

- Proposed Development Plan
- SI-01 Site Location Plan
- SI-05 Exploratory Hole Location Plan

APPENDIX 3	FOUNDATION INSPECTION PIT LOGS AND PHOTOGRAPHS
-------------------	--

APPENDIX 4	DYNAMIC SAMPLE BOREHOLE LOGS AND PHOTOGRAPHS
-------------------	--

APPENDIX 5	GEOTECHNICAL LABORATORY TEST RESULTS
-------------------	--------------------------------------

APPENDIX 6	CHEMICAL LABORATORY TEST RESULTS
-------------------	----------------------------------

APPENDIX 7	CHEMICAL LABORATORY SCREENING TABLES
-------------------	--------------------------------------

1.0 INTRODUCTION

This Phase 2 Geo-Environmental Investigation Report has been prepared at the request of Oslady Homes Ltd. Instructions to proceed were received in August 2023.

This report pertains to a c. 0.02 Ha site located to the north of Great Jones Street, Manchester, c. 3.6km southeast of Manchester City Centre, at the approximate post code M12 5PA. The National Ordnance Survey Grid Reference for the centre of the site is 387394E, 396598N.

The site currently comprises an open parcel of land. The site is bound by residential properties to the north and the west, Milne Close to the east and Great Jones Street to the south. Access to the site is off Great Jones Street. An aerial photo of the site is included below and a Site Location Plan is contained in Appendix 2.



Figure 1: Aerial image of the site dated May 2019.

This Phase 2 Geo-Environmental Investigation Report is to be used for submission to the Local Authority as part of a planning application. It is the Client's intention to develop the site into 4 No. terraced dwellings (mixed 2 and 3 -storey) with associated private gardens as shown in Figure 2, below.

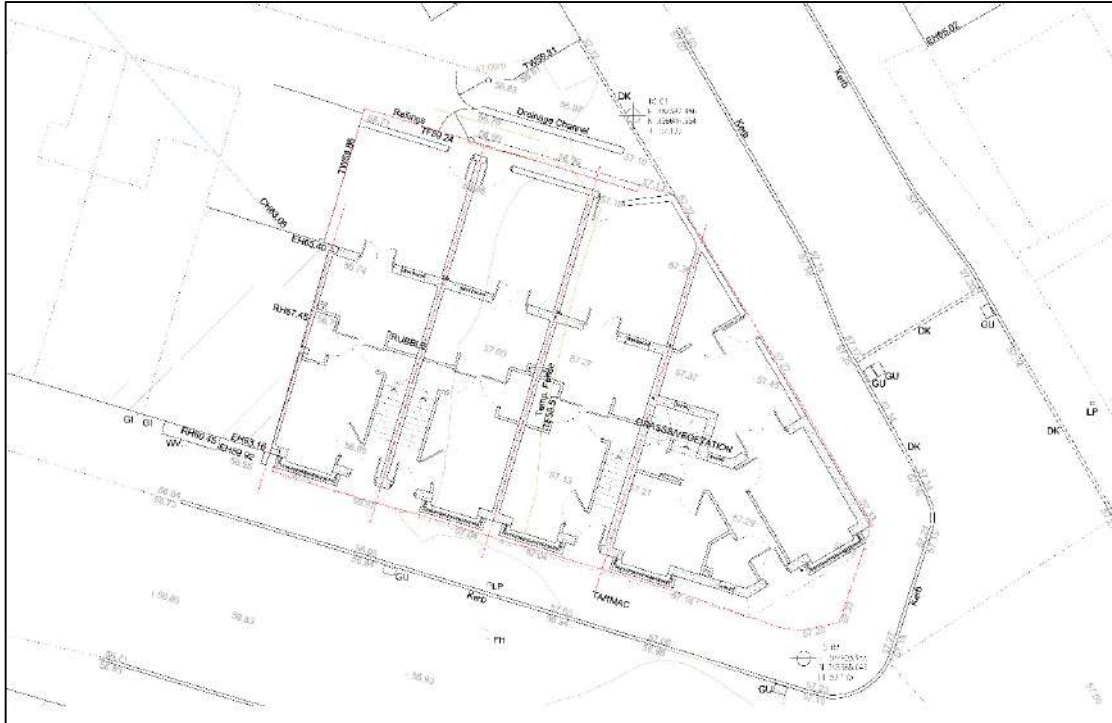


Figure 2: Extract from the proposed development plan.

A proposed development plan is contained in Appendix 2.

1.1 Brief

The brief was to carry out an intrusive geo-environmental ground investigation for the site based upon the findings of the IGE Consulting *Phase 1 Geo-Environmental Report (4015-01, August 2023)* and the proposed development outlined in Section 1.0. The investigation was to include the following tasks:

- a) Undertake appropriate exploratory holes and collect representative samples from exploratory holes and arrange appropriate chemical testing in accordance with the latest legal framework, record olfactory and / or visual evidence of contamination during intrusive works and undertake on site in-situ and laboratory geotechnical testing;
- b) Formulate conceptual models to accommodate the findings of the ground investigation works in terms of the risk to human health, ground gas, controlled waters and the wider environment;

- c) Identify the risks and evaluate whether a Phase 3 numerical risk assessment and / or a Remedial Strategy, is required.
- d) Undertake an assessment of the ground conditions to provide outline recommendations for the proposed foundations.

A report was to be provided to summarise the findings and recommendations.

1.2 Third Parties

This report has been prepared for the sole use of Oslady Homes Ltd. The report must not be copied or passed onto any third party or used for any purpose other than which it was prepared without the permission of the author. This report is copyright.

2.0 SCOPE OF INVESTIGATION WORK

This Phase 2 Geo-Environmental Investigation has been designed based on the findings of the IGE Consulting *Phase 1 Geo-Environmental Report (4015-01, August 2023)* and the Client's requirements in relation to the proposed development outlined in Section 1.0.

The ground investigation works were undertaken on the 26th July 2023 and comprised 4 No. dynamic sampling boreholes and 2 No. foundation inspection pits undertaken spatially across the site and targeting the foundations of third party walls along the western boundary. Subsequent laboratory testing was undertaken between 28th July and 7th August 2023.

Drilling of dynamic sampling boreholes was carried out by GP Drilling Ltd. Testing of soil samples for environmental purposes was carried out by i2 Analytical and testing of soils for geotechnical laboratory testing was undertaken by Murray Rix Ltd in accordance with the Environment Agency's MCERTS (Monitoring Certification) quality assurance accreditation scheme. These organisations were appointed directly by IGE Consulting to carry out these contracting works.

The locations of the exploratory holes were topographically surveyed (X-Y-Z axis) with an accuracy of 20mm.

The ground investigation was undertaken in general accordance with:

- BS 5930 (2015) + A1 (2020) Code of Practice for Ground Investigation;
- BS EN ISO 17892 Geotechnical investigation and testing - Laboratory testing of soil;
- BS 10175 (2011) Investigation of Potentially Contaminated Sites – Code of Practice; and
- BS EN 1997-2 (2007) Eurocode 7 – Geotechnical Design – Ground Investigation and Testing.

The environmental sampling strategy for the site has been completed in accordance with CLR4 and the design of the investigation was carried out in accordance with R&D Technical Report P 5-TR066, LCRM (2020) and BS:8485 (2015) + A1 (2019).

Further details pertaining to the ground investigation works are outlined in the following sections.

The limitations of the investigation work and report are included in Appendix 1.

The dynamic sample boreholes and foundation inspection pits were undertaken in order to achieve the following:

- to establish the thickness, extent and characteristics of Made Ground and underlying natural superficial deposits;
- to undertake in-situ geotechnical testing within these deposits;
- to obtain samples from these deposits for classification and laboratory testing;
- to allow a qualitative ground gas risk assessment to be carried out based on CL:AIRE RB17 (2013) given the nature of the site and the development;
- to determine the size, extent and dimensions of third party foundations along the western boundary as well as possible historical basements.

An Exploratory Hole Location Plan, contained within Appendix 2, indicates the location of the foundation inspection pits and dynamic sample boreholes as shown by the below extract.

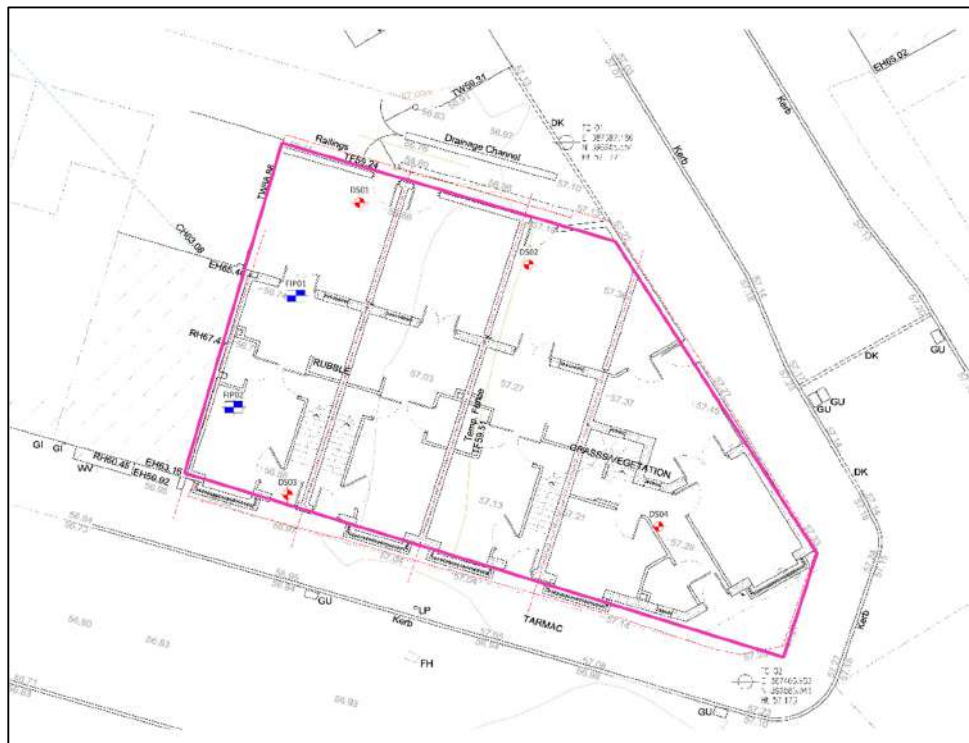


Figure 3: Extract from the Exploratory Hole Location Plan.

2.1 Foundation Inspection Pits

In total, 2 No. foundation inspection pits (FIP01 and FIP02) were excavated to depths of between 1.50m and 3.00m bgl (55.32m and 53.70m AOD). The foundation inspection pits were specifically positioned to target the foundations of the residential properties which bound the western site section.

The locations of the foundation inspection pits are shown on the exploratory hole location plan in Appendix 2 and foundation inspection pit logs and photographs are contained in Appendix 3.

2.2 Dynamic Sampling Boreholes

In total, 4 No. dynamic sampling boreholes (DS01 to DS04, inclusive) were constructed spatially across the site to depths of between 3.42m and 5.45m bgl (53.42m to 51.32m AOD).

The locations of the dynamic sampling boreholes are shown on the exploratory hole location plan in Appendix 2 and the dynamic sampling borehole logs are contained in Appendix 4.

2.3 Site Testing and Sampling

The following site tests and sampling were carried out:

- a) Retrieval of environmental samples and bulk disturbed samples from foundation inspection pits and dynamic sampling sleeves for the purposes of chemical and geotechnical laboratory testing and classification.
- b) Where possible, in-situ and ex-situ shear strength testing was undertaken within fine grained material (clay) from the foundation inspection pits and dynamic sampling borehole sleeve samples using a 19mm hand shear vane in accordance with BS1377-9.
- c) Standard Penetration Tests (SPTs) were undertaken at regular 1.00m intervals between 1.00m and 5.00m bgl within the dynamic sampling boreholes.

2.4 Laboratory Testing

2.4.1 Chemical Laboratory Testing

7 No. soil samples were obtained during exploratory hole construction and sent to i2 Analytical laboratories for chemical testing. These samples were placed into sterile sealed containers to facilitate MCERTS chemical laboratory testing of potential contaminants. Chemical testing suites are outlined below and are based upon a wide range of possible contaminative sources.

Asbestos ID, sulfate, pH, nitrate, total and free cyanide, arsenic, barium, beryllium, boron, cadmium, chromium, chromium (hexavalent), copper, lead, mercury, nickel, selenium, vanadium, zinc, Total Petroleum Hydrocarbon screen and Speciated Polyaromatic Hydrocarbons.

2.4.2 Geotechnical Laboratory Testing

The following geotechnical laboratory tests were carried out on selected samples obtained from across the site:

- a) Determination of moisture content, liquid limit and plastic limit in accordance with BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 and Clause 5.5 and BS EN ISO 17892-1:2014+A1:2022.
- b) Determination of particle size analysis by dry / wet sieving in accordance with BS EN ISO 17892-4:2016.
- c) BRE Special Digest Suite for aggressive ground conditions in accordance with BRE Special Digest 1: Concrete in Aggressive Ground (2005),

3.0 FINDINGS

3.1 Ground Conditions

The typical ground conditions encountered across the site are as follows:

- **Made Ground** comprising brown, gravelly, slightly clayey fine to coarse SAND, to a depth of between 0.30m and 2.60m bgl (56.60m and 54.55m AOD), underlain by:
- **Made Ground** comprising soft, brown, slightly sandy, gravelly CLAY to a depth of between 1.00m and 2.90m bgl (55.90m and 53.85m AOD), underlain by:
- **Made Ground** comprising soft, brown mottled grey, slightly sandy, slightly gravelly CLAY to a depth of between 2.00m and 4.00m bgl (54.90m and 52.77m AOD), underlain by:
- **Glacial Till** comprising firm, brown, slightly sandy, slightly gravelly CLAY to a depth of at least 5.45m bgl (51.32m AOD).

3.2 Visual and Olfactory Contamination Findings

During the intrusive exploratory hole investigation works, the soils were examined carefully for both visual and olfactory evidence of contamination. No visual and / or olfactory evidence of contamination was encountered during the ground investigation.

3.3 Water Strikes

Water was encountered in FIP01 at a depth of 1.90m bgl within coarse grained Made Ground. It was assessed on site that this was representative of perched groundwater, rather than a natural groundwater body.

3.4 Services

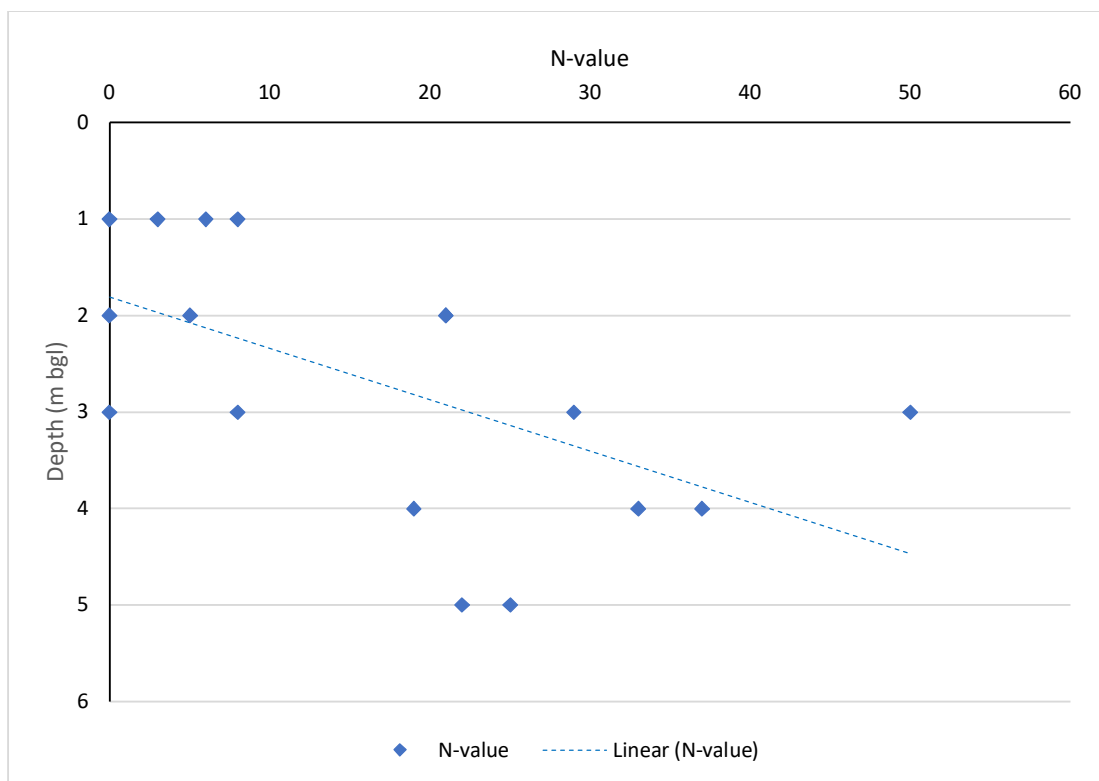
As identified in the *IGE Consulting Phase 1 Report*, no overhead or underground services were noted on site. However, following a Linesearch of the site, services are known to run beneath the pavements which bound the site. For example, water services run parallel to the northern boundary, while electricity and gas services run parallel to the southern boundary.

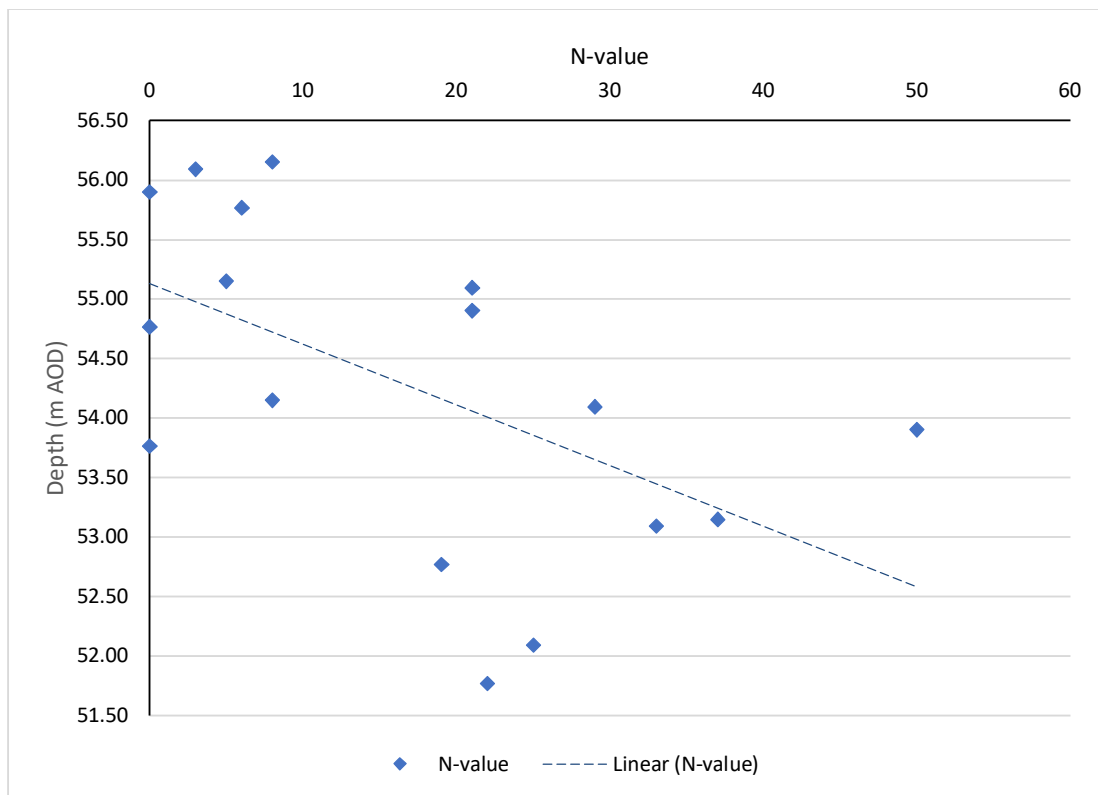
3.5 Geotechnical Site Testing

The results of the geotechnical testing undertaken during the ground investigation are summarised below.

3.5.1 Standard Penetration Tests

Standard penetration tests (SPTs) were undertaken at regular 1.00m intervals during the construction of the dynamic sampling boreholes. The following scatter graph shows that there was a positive correlation between increasing N-value with depth.





SPT results are included on the dynamic sample borehole logs presented in Appendix 4.

3.5.2 Hand Shear Vane (19mm) Tests

Where possible, both in-situ and ex-situ undrained shear strength testing was undertaken on samples of fine-grained material (clay) within foundation inspection pits and dynamic sampling boreholes using a 19mm hand shear vane in accordance with BS1377-9. It should be noted that undertaking hand shear vane tests below 2.00m bgl within dynamic sample boreholes is considered inappropriate; the increased sampling disturbance at depth can produce unrepresentative results.

Due to the high proportion of granular Made Ground encountered in the foundation inspection pits and the lack of cohesive material within the dynamic sample boreholes at depths of less than 2.00m bgl, there was an insufficient amount of hand shear vane tests undertaken to make any correlations with confidence between depth and shear strength. Hand shear vane test results which were undertaken are included on the foundation inspection pit logs and dynamic sampling borehole logs, contained within Appendices 3 and 4, respectively.

3.6 Geotechnical Laboratory Testing

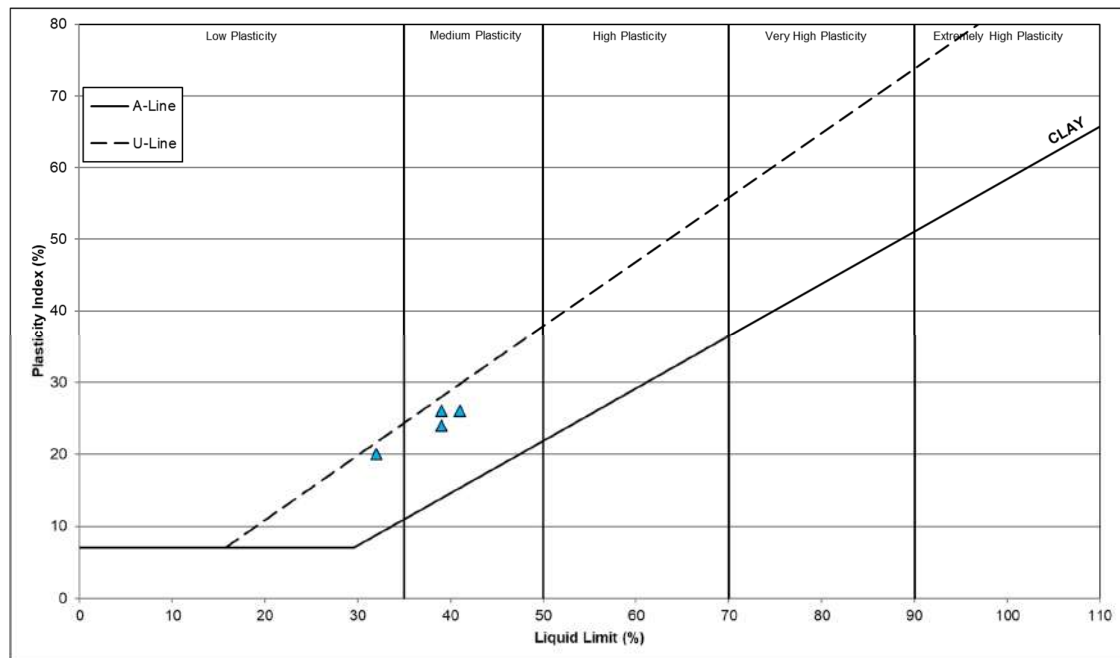
The results of the geotechnical laboratory tests undertaken during the ground investigation are summarised below. The full geotechnical laboratory test results are included in Appendix 5.

3.6.1 Atterberg Limit Tests

Atterberg limit tests were undertaken on 2 No. samples of Made Ground and 2 No. samples of natural Glacial Till. The results of the Atterberg testing are as follows:

Sample	Sample Depth (m bgl)	Strata	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Passing through 425 micron (%)	Modified Plasticity Index
DS01	1.20	MG	24.7	41	15	26	92	24
DS02	1.20	MG	25	39	13	26	90	23
DS03	2.30	GT	8.9	32	12	20	65	13
DS02	4.20	GT	24.3	39	15	24	65	16
Average			20.73	37.75	13.75	24	78	18.98

GT= Glacial Till deposits. MG = Made Ground. Green = low volume change potential. Orange = medium volume change potential.



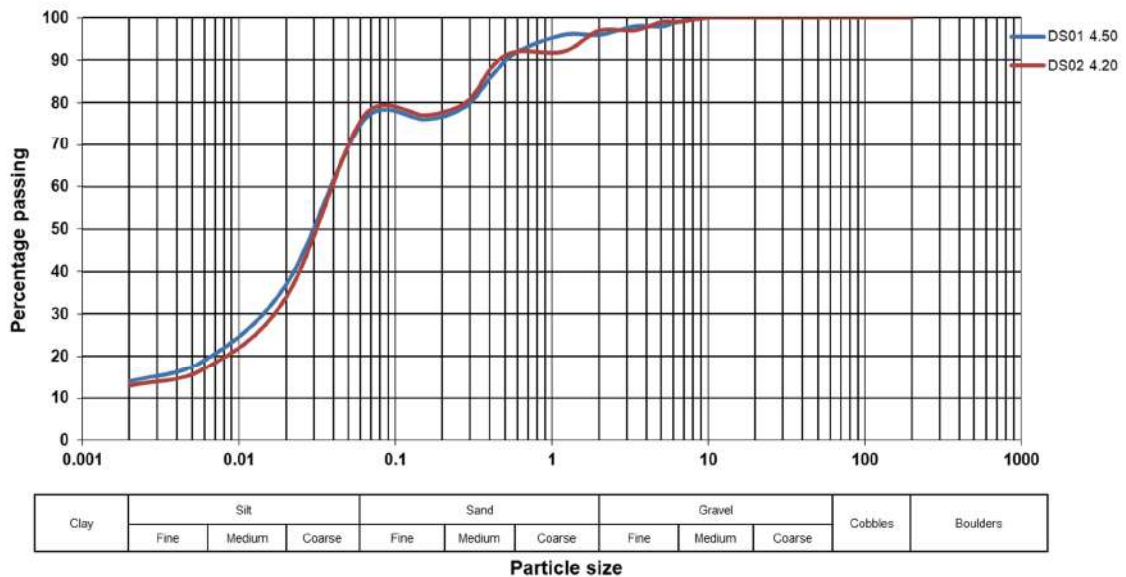
The Atterberg Limit tests indicate that the Made Ground is generally of medium plasticity and the Glacial Till is of low to medium plasticity in-line with BS14688 Part 2.

The Made Ground is generally of medium volume change potential and the Glacial Till is generally of low volume change potential in-line with NHBC Chapter 4.2 guidance.

3.6.2 Particle Size Distribution Tests

Particle size distribution (PSD) tests were undertaken on 2 No. Glacial Till samples. The results have been summarised below:

Exploratory Hole	Depth (m bgl)	Clay and Silt (%)	Sand (%)	Gravel (%)
DS02	4.20	77	20	3
DS01	4.50	76	20	4



3.6.3 BRE Special Digest Suite Testing

In accordance with BRE Special Digest 1: Concrete in Aggressive Ground (2005), the site has been classified as Brownfield with static groundwater. BRE SD1 testing

suites were undertaken on 2 No. samples of Glacial Till and 1 No. sample of Made Ground in order to determine the Design Sulfate (DS) levels and the Aggressive Chemical Environment for Concrete (ACEC), with the findings summarised below:

Sample	Depth (m bgl)	Strata	DS Class	ACEC Class
DS01	2.50	Made Ground	3	AC-2s
DS02	3.50	Glacial Till	2	AC-1s
DS04	3.30	Glacial Till	1	AC-1s

3.7 Environmental Laboratory Test Results

The findings of the chemical test results, summarised below, will be assessed against generic assessment criteria (GAC) for the purposes of screening allowable concentrations in comparison to the measured site concentrations. The GAC are defined based on the critical receptors identified at the site, detailed in the Phase 1 Investigation. Receptors are considered in relation to:

- Human health receptors (e.g. end-users, construction workers and the general public) via measured solid concentrations, and;
- Additional receptors which may be relevant e.g. flora/fauna, water, buried concrete.

The GAC adopted for assessment of soils in relation to Human Health are based on published LQM/CIEH S4ULs (2015) for those compounds for which published criteria are available for varying scenarios (residential, commercial, allotment, public open space). In the absence of LQM/CIEH S4ULs (2015) the following GAC defining documents are adopted - CL:AIRE Soil GAC for Human Health Assessment (2010) and Category 4 Screening Levels (C4SLs) (2014).

The primary risk to human receptors from free cyanide in soils is an acute risk (i.e. a single dose could have a lethal affect as opposed to adverse effects from cumulative intake (chronic affect)). There is no current UK guidance available for calculating acute risks from free cyanide, therefore an in-house methodology has been used to derive an acute GAC of 60 mg/kg for all exposure scenarios. The value is given for

Free or Easily Liberatable Cyanide but should be used to assess Total Cyanide in the absence of cyanide speciation. In cases where the Total Cyanide exceeds the GAC then analysis for Free or Easily Liberatable Cyanide should be completed.

Appendix 7 contains the full screening tables for 4 No. samples of Made Ground (DS01 at 0.50m bgl, DS02 at 0.20m bgl, DS03 at 1.20m bgl and DS04 at 0.20m bgl). Any exceedances of GACs are indicated below.

It is not clear on the proposed development plans whether the private gardens will be suitable for growing produce or if they will be 'low maintenance' garden areas covered in hardstanding. In order to be conservative, it has been assumed that the gardens will be suitable for produce; all results have therefore been assessed against the relevant GACs for a **residential with home grown produce** scenario based on a measured organic matter content of **2.5%**.

3.7.1 Asbestos

An asbestos screen was performed on all samples. 2 No. samples were found to contain asbestos (DS02 at 0.20m bgl and DS04 at 0.20m bgl). Both samples tested positive for asbestos in the form of chrysotile loose fibres, quantified by weight to be <0.001%, the laboratory detection limit.

3.7.2 Polycyclic aromatic hydrocarbons (PAHs)

Of the sixteen PAH compounds, 2 No. samples of Made Ground (DS02 at 0.20m bgl and DS04 at 0.20m bgl) each recorded exceedances of the relevant GACs including benzo(b)fluoranthene, benzo(a)pyrene and dibenz(a,h)anthracene. It should be noted that the concentration for benzo(a)pyrene is in excess of both the S4UL threshold (2.70mg/kg) and the C4SL threshold (5.0mg/kg). The exceedances are detailed in the table below.

3.7.3 Metals and metalloids

The same samples of Made Ground that recorded PAH exceedances (DS02 at 0.20m bgl and DS04 at 0.20m bgl) recorded exceedances of lead above the S4UL threshold and C4SL threshold of 200 mg/kg.

Determinand	DS02 @ 0.20m bgl Result (mg/kg)	DS04 @ 0.20m bgl Result (mg/kg)	GAC (mg/kg)
benzo(b)fluoranthene	6.7	6.4	3.30
benzo(a)pyrene	5.7	5.9	2.70
dibenz(a,h)anthracene	0.45	0.63	0.28
Lead	470	340	200

3.7.4 Total Petroleum Hydrocarbons (TPH)

TPH compounds were recorded in excess of the laboratory detection limit in 4 No. Made Ground samples (DS01 at 0.50m bgl, DS02 at 0.20m bgl, DS03 at 1.20m bgl and DS04 at 0.20m bgl). Speciated TPH (TPH-CWG) analysis was carried out to determine if any GAC exceedances were present. The speciated TPH analysis confirmed that there were no concentrations of TPH compounds present in excess of the residential with home grown produce GAC.

3.7.5 Total Organic Carbon (TOC)

Following the findings of the Phase 1 investigation and on the basis that the the Made Ground generally comprised coarse inert material such as rubble and demolition waste, installation of ground gas monitoring wells was not deemed necessary. Instead, a qualitative ground gas risk assessment in line with CL:AIRE RB17 (2013) was envisaged to sufficiently evaluate the ground gas risk of the site.

Therefore, 4 No. samples of Made Ground were sent to i2 Analytical laboratories for MCERTS chemical laboratory testing of Total Organic Carbon (%). The following table shows the percentage TOC value recorded in each sample.

Exploratory Hole	Depth (m bgl)	TOC (%)
DS01	0.50	0.9
DS02	0.20	3.5
DS03	1.20	0.8
DS04	0.20	1.4

The environmental laboratory test results are contained in Appendix 6.

4.0 ENVIRONMENTAL CONCLUSIONS

4.1 Assessment of Environmental Results

Soil sample analyses have assessed the presence of contaminants on a spatial basis, and the concentrations at which they occur across the site.

8 No. GAC exceedances for the '*residential with home grown produce*' land use scenario were recorded within the Made Ground. This included 2 No. heavy metal exceedances of lead and 6 No. exceedances of speciated PAHs including benzo(b)fluoranthene, benzo(a)pyrene and dibenz(a,h)anthracene.

Asbestos was found in 2 No. samples of the Made Ground, testing positive for loose fibres of Chrysotile (<0.001%).

No other visual or olfactory evidence of contamination was found.

Depending on the nature of the private garden areas, the existing subsoil and topsoil may not be suitable for re-use within the proposed development. If the soils are to be used beneath private gardens potentially used for growing produce, the import and placement of a clean cover system to sever the pathway between contaminated soils and sensitive receptors will be required.

4.2 Revised Conceptual Models

The original conceptual models produced in the *IGE Consulting Phase 1 Geo-Environmental Investigation Report* have been revised and updated using the findings from the Geo-Environmental Ground Investigation.

4.2.1 Human Health Risk Assessment

The possible sources of on-site contamination identified within the Phase 1 report include:

- Made Ground
- Offsite Historical Industrial Activities

The human health receptors identified within the Phase 1 report include:

- End users (residents – ‘residential with home grown produce’ land use scenario).
- Construction workers.
- The general public and adjacent site users including from possible changes in ground gas regime following development.

The human health pathways identified within the Phase 1 report include:

- Ingestion of soil directly (including on home grown produce) and indoor dust*;
- Inhalation of soil dust (indoor and outdoor);
- Dermal contact with soil (indoor and outdoor);
- Inhalation of soil vapours (indoor and outdoor);
- Oral background;
- Inhalation background.

** Treated as one pathway*

Revised Conceptual Model for Human Health Risk Assessment

Based on the findings of the ground investigation works and subsequent chemical testing, the Made Ground should be considered a contaminative source. This is due to a number of human health GAC exceedances and the positive identification of asbestos in the form of chrysotile loose fibres (maximum percentage by weight 0.001%).

Based on the proposed development plans, there is anticipated to be a significant covering of hardstanding at the site upon completion. This will significantly reduce the pathways via which the contamination present in the Made Ground may reach end users. However, pathways may remain within private gardens.

An asbestos risk assessment was undertaken to determine whether any remedial measures (i.e. dust supersession and decontamination) will be necessary during construction. The disturbance of the soil during works may lead to fibre release and an increased risk to construction workers.

Based on the findings of the chemical laboratory test results, a risk assessment has been undertaken for the Made Ground using the *JIWG Decision Support Tool for the Categorisation of Work Activities Involving Asbestos in Soil or Construction & Demolition Materials in accordance with CAR 2012* (FINAL Version 2.1, March 2017). The risk assessment for the Made Ground has been undertaken based on the worst case scenario: identified 0.001% chrysotile loose fibres.

The JIWG risk assessment concludes that the Made Ground is suitable for re-use in the proposed development outside of areas of soft landscaping (i.e. beneath hardstanding or beneath a cover system). According to the risk assessment, **Control of Asbestos Regulations (CAR) do not apply** to the works involving the re-use of the Made Ground, and no dust suppression or decontamination is required. However, care should be taken during earthworks as possible asbestos containing material (ACM) may be present within the Made Ground. Groundworkers should be trained in asbestos awareness and empowered to stop works if suspected ACM are identified.

Therefore, the site is considered to pose a **moderate risk** to the human health of site occupants, the general public and construction workers. Any increase in risk to construction workers associated with acute interaction with soils can be mitigated with appropriate PPE and health and safety procedures. Therefore, remedial measures will **only** be required in private gardens. An outline remedial strategy is contained in Section 4.3.

4.2.2 Ground Gas Risk Assessment

Potential ground gas sources identified within the Phase 1 report include:

- Made Ground
- Possible On Site Historical Pond

Potential ground gas pathways identified within the Phase 1 report include:

- Preferential migration beneath hardstanding
- Foundations, service ducts and trenches
- Dissolved gases within groundwater
- Ingress through wall cavities / floors and subsequent accumulation
- Inhalation of ground gas and vapours

- Vertical and lateral migration through granular deposits / granular bands in cohesive deposits

Potential ground gas receptors identified within the Phase 1 report include:

- End users, and to a lesser extent, site workers, if confined spaces are present in which gases are able to accumulate
- Building and structures

Revised Conceptual Model for Ground Gas Risk Assessment

Made Ground was identified in all exploratory holes during the site investigation works. No evidence of putrescible or organic rich material was encountered in the location of the possible on-site pond and the Made Ground generally consisted of coarse, inert, demolition waste. As a result, installation of ground gas monitoring wells was not deemed necessary and instead a qualitative ground gas risk assessment in line with CL:AIRE RB17 (2012) was undertaken. 4 No. samples of Made Ground were sent to i2 Analytical laboratories for MCERTS chemical laboratory testing of Total Organic Carbon (%). The results are presented below.

Exploratory Hole	Depth (m bgl)	TOC (%)
DS01	0.50	0.9
DS02	0.20	3.5
DS03	1.20	0.8
DS04	0.20	1.4

With the exception of the sample at DS02, all TOC concentrations were below 1.5%. Given the nature of the material encountered at DS02, it is likely that the TOC value is due to a small, unrecorded piece of ash or timber, rather than any readily putrescible material. It is therefore assessed that the risk of on-site material generating gas is low. However, it is deemed prudent to install ground gas protection measures in line with Characteristic Situation 2 at all plots.

Mine Gas Risk Assessment

Although a known underground coal working exists beneath the site, it is recorded at a depth of c. 345 - 349m bgl. Therefore, it underlies the Etruria Formation, the

Halesowen Formation and c. 17 - 24m of cohesive Glacial Till. Also, no mine entries are recorded in close proximity to the worked seam or near the site itself. As a result, pathways of vertical mine gas migration are deemed negligible and the risk associated with possible mine gas ingress is considered very low.

Conclusions

Consequently, the ground gas risk on-site is deemed to be **low** and in-line with Characteristic Situation 2 (CS2). Consequently, based on the proposed development (Type A Building) and in accordance with BS8485 (2015) +A1 (2019), ground gas protection measures will be required at all plots to mitigate the ground gas risk, achieving a minimum of **3.5 points**. Details of suitable ground gas protection measures to achieve the required points are outlined in Section 4.3.2.

Radon

A site-specific radon map included in the Groundsure Enviro + Geo Insight report contained in the *IGE Consulting Phase 1 Geo-Environmental Investigation Report* finds that the site lies within an area where less than 1% of homes are above the Action Level. Consequently, no radon protection measures are required, in line with BR211 (2023).

4.2.3 Controlled Waters Risk Assessment

The possible sources of on-site contamination identified within the Phase 1 report include:

- On site Made Ground
- Possible Off-Site Historical Industrial Activities

The controlled water receptors identified within the Phase 1 report include:

- Groundwater contained within the underlying Secondary Undifferentiated Aquifer within the superficial deposits and the Secondary A Aquifer within the bedrock (unknown depth).
- Surface Water – Including Corn Brook (495m north of the site).

The controlled waters pathways identified within the Phase 1 report include:

- Vertical migration along future foundations and pooling at base / beneath foundations.
- Vertical migration through possible granular Made Ground (if present) and granular lenses in natural cohesive deposits.
- Lateral migration along low permeability natural deposits and pooling at relative low points.
- Negligible infiltration through low-permeability natural cohesive deposits.
- Migration through underlying bedrock.
- Migration along groundwater flow.
- Overland flow.

Revised Conceptual Model for Controlled Waters Risk Assessment

Made Ground was encountered in all exploratory holes during the site investigation works. However, given that the nature of the Made Ground generally comprised demolition waste and rubble, any contamination is likely to be low in solubility and mobility. Also, given that cohesive Glacial Till was also encountered underlying the Made Ground in all exploratory holes, any vertical migration of contamination into the underlying aquifers will likely be negated. Therefore, due to the lack of significant contaminative on-site sources and the large distance that Corn Brook is from the site (495m north), the risk to controlled waters is deemed **very low** as no contaminative linkages have been identified. No further assessment or remedial measures are considered necessary.

4.2.4 Conceptual Model for Building Materials & Services

In accordance with BRE Special Digest 1: Concrete in Aggressive Ground (2005), the site has been classified as Brownfield with static groundwater. The Made Ground has been classified as Design Sulfate level DS3 and subsequently within the Aggressive Chemical Environment for Concrete (ACEC) class AC-2s; the Glacial Till has been classified as DS-2, AC-1s. Therefore, special precautions are required regarding the use of concrete within the Made Ground and Glacial Till.

The chemical laboratory testing results are contained within Appendix 6.

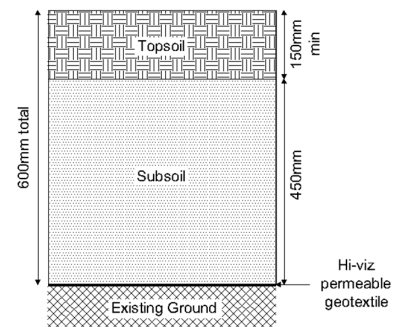
4.3 Outline Remedial Strategy

As discussed in section 4.2.1, due to the human health GAC exceedances for the residential with plant uptake scenario recorded within the Made Ground on-site as well as the presence of asbestos, remedial measures are required for the proposed development. A clean cover system will be required in all private gardens in order to break the contaminative linkages. Details of the required clean cover system are included below.

4.3.1 Clean Cover System

Made Ground is present to depths greater than 600mm below finalised garden levels (300mm in areas of soft landscaping) across the site. The following procedure is outlined for use in all private gardens and in areas of soft landscaping:

1. Excavate to 600mm bgl in private gardens (300mm in soft landscaping areas).
2. A 600mm clean cover system is recommended to be added to the proposed private gardens (300mm in soft landscaping areas). This is to consist of:
 - No less than 150mm and no more than 300mm suitable topsoil, underlain by;
 - Suitable subsoil to a total (topsoil + subsoil) depth of 600mm (300mm in areas of soft landscaping), underlain by;
 - A high vis geotextile marker
 - Validate in line with the below strategy.



Clean Cover System Validation

Once the 600mm clean cover system is required to break contaminative linkages (300mm in areas of soft landscaping), validation requirements include:

- Details of the source of the cover material;
- Chemical test results to demonstrate that the soil is free from contamination and 'suitable for use' in-line with the below chemical testing suites and rates.

- Waste transfer notes to provide evidence of source;
- Confirmation of cover depth by either measurement tape or topographical survey with photographs at a frequency of one pit per three plots.

No topsoil or subsoil is present on-site therefore all topsoil and subsoil will need to be imported and this must be validated as detailed below to ensure its suitability for use (i.e., no glass or plastic is to be included and meets chemical testing acceptability criteria).

Imported topsoil and subsoil is required to be tested at source prior to import to confirm suitability. All topsoil and subsoil, whether site-won or imported is required to be tested at the following frequency:

Source	Material End Use	Sampling Frequency ¹	Testing Suites ³ (see below)
Greenfield Source:	Topsoil	1 per 200m ³	A, B, C, D, F
	Subsoil	1 per 200m ³	A, B, C, D, F
Brownfield Source:	Topsoil	1 per 50m ³	A, B, C, D, F, H
	Subsoil	1 per 100m ³	A, B, C, D, F
	General Fill ²	1 per 1000m ³	A, B, C, E, G

- 1) Minimum 3 samples regardless of volume.
- 2) 'General Fill' is material used primarily to raise levels, specifically not within areas of private gardens, public open space, or soft landscaping, e.g. 6F2.
- 3) In addition to the standard suites given, the laboratory testing suite should include any additional contaminants of concern based on the source of the samples.

Testing Suites:

- A. Asbestos ID, Asbestos quantification.
- B. pH, total and free cyanide, soluble sulfate, organic matter.
- C. Arsenic, Beryllium, Boron, Cadmium, Chromium (III and VI) Copper, Lead, Inorganic Mercury, Nickel, Selenium, Vanadium, Zinc.
- D. Speciated PAHs: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, Benzo(ghi)perylene.
- E. Total (non-speciated) PAHs.
- F. Speciated Total Petroleum Hydrocarbons (TPH): Aliphatic >EC5 - EC6, >EC6 - EC8, >EC8 - EC10, >EC10 - EC12, >EC12 - EC16, >EC16 - EC21, >EC21 - EC35, and > EC35 - EC44, and Aromatic >EC5 - EC7, >EC7 - EC8, >EC8 - EC10, >EC10 - EC12, >EC12 - EC16, >EC16 - EC21, >EC21 - EC35, > EC35 - EC44.
- G. Total Petroleum Hydrocarbons (TPH): TPH EC6 – EC40.
- H. BTEX: Benzene, Toluene, Ethylbenzene, p- & m-xylene, o-xylene. Methyl tertiary butyl ether (MTBE).

Once tested, the results are to be compared against the following Acceptability Criteria:

Suite	Determinand (mg/kg unless stated)	Acceptability Criteria for:			
		Private Gardens	Public Open Space (residential)	Soft Landscaping or Public Open Space (Park)	General Fill
A	Asbestos (%)	ND	ND	ND	<0.001 – 0.01%
B	pH	>6 - <8 ⁽³⁾	>6 - <8 ⁽³⁾	>6 - <8 ⁽³⁾	>5 - <10 ⁽³⁾
	Total Cyanide	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾
	Free Cyanide	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾	0.5 ⁽³⁾
	Soluble Sulfate (mg/l)	500 ⁽³⁾	500 ⁽³⁾	500 ⁽³⁾	500 ⁽³⁾
C	Arsenic	37	79	170	640
	Beryllium	1.7	2.2	63	12
	Boron	290	21000	46000	240000
	Cadmium	11	120	560	190
	Chromium (III)	910	1500	33000	8600
	Chromium (VI)	6	7.7	220	33
	Copper	2400	12000	44000	68000
	Lead	200 ⁽¹⁾	630 ⁽¹⁾	1300	2330 ⁽¹⁾
	Inorganic Mercury	40	120	240	1100
	Nickel	130	230	800	980
	Selenium	250	1100	1800	12000
	Vanadium	410	2000	5000	9000
	Zinc	3700	81000	170000	730000
D	Naphthalene	2.3	4900	1200	
	Acenaphthylene	170	15000	29000	
	Acenaphthene	210	15000	29000	
	Fluorene	170	9900	20000	
	Phenanthrene	95	3100	6200	
	Anthracene	2400	74000	150000	
	Fluoranthene	280	3100	6300	
	Pyrene	620	7400	15000	
	Benzo(a)anthracene	7.2	29	49	
	Chrysene	15	57	93	
	Benzo(b)fluoranthene	2.6	7.1	13	
	Benzo(k)fluoranthene	77	190	370	
	Benzo(a)pyrene	2.2	5.7	11	
	Indeno(1,2,3-cd)pyrene	27	82	150	
	Dibenz(a,h)anthracene	0.24	0.57	1.1	
E	Benzo(ghi)perylene	320	640	1400	
	Total PAHs				1000 ⁽⁴⁾
F	TPH-CWG - Aliphatic >EC5 - EC6	42	570000	95000	
	TPH-CWG - Aliphatic >EC6 - EC8	100	600000	150000	
	TPH-CWG - Aliphatic >EC8 - EC10	27	13000	14000	
	TPH-CWG - Aliphatic >EC10 - EC12	130	13000	21000	
	TPH-CWG - Aliphatic >EC12 - EC16	1100	13000	25000	
	TPH-CWG - Aliphatic >EC16 - EC21	65000	250000	450000	
	TPH-CWG - Aliphatic >EC21 - EC35				
	TPH-CWG - Aliphatic > EC35 - EC44	65000	250000	450000	
	TPH-CWG - Aromatic >EC5 - EC7	70	56000	76000	
	TPH-CWG - Aromatic >EC7 - EC8	130	56000	87000	
	TPH-CWG - Aromatic >EC8 - EC10	34	5000	7200	
	TPH-CWG - Aromatic >EC10 - EC12	74	5000	9200	
	TPH-CWG - Aromatic >EC12 - EC16	140	5100	10000	
	TPH-CWG - Aromatic >EC16 - EC21	260	3800	7600	
	TPH-CWG - Aromatic >EC21 - EC35	1100	3800	7800	
	TPH-CWG - Aromatic > EC35 - EC44	1100	3800	7800	
G	TPH > EC6 - EC40				5000 ⁽⁴⁾
H	Benzene	0.087	72	90	

	Toluene	130	56000	87000*	
	Ethylbenzene	47	24000	17000*	
	p & m-xylene	56	41000	17000*&***	
	o-xylene	60	41000	17000*	
	MTBE (Methyl Tertiary Butyl Ether)	LOD ⁽³⁾	LOD ⁽³⁾	LOD ⁽³⁾	

LQM/CIEH S4ULs for Human Health Risk Assessment (3rd edition, 2015) used unless stated:

- 1) Category 4 Screening Levels (March 2014)
- 2) CL:AIRE Soil GAC for Human Health Assessment (January 2010)
- 3) In-house screening criteria used as no GAC methodology currently exists
- 4) Hazardous waste thresholds. This limit only applies to imported material, not to in-situ soil.

Assumed 1% SOM (most conservative) for those values dependent upon SOM.

ND = Not Detected

LOD = Limit of Detection

*Exceeds vapour saturation limit

**Exceeds solubility saturation limit

The above acceptability criteria for PAHs for imported topsoil and subsoil are based on the published LQM/CIEH S4ULs (2015) for each individual PAH and not based on the Category 4 Screening Level using benzo(a)pyrene as a surrogate marker. This is as the source of the imported material is unknown therefore using the surrogate marker approach may not be suitable as the distribution of PAHs in the imported material may not be similar to those in the Culp et al. (1998)¹ study. Once chemical testing had been undertaken on imported soil and the distribution of PAHs compared to the distribution in the Culp et al. (1998) study, it may be suitable to use the surrogate marker approach / C4SL.

4.3.2 Ground Gas Protection Measures

As stated in Section 4.2.2, ground gas protection measures achieving a minimum of 3.5 points are required for the proposed development. Based on the developments having no basement and a suspended floor slab, three examples of how the required 3.5 points can be achieved are given below:

BS:8485 (2015) + A1 (2019) Scores			Floor Slab Design Options			
			Pre-cast Beam and Block Suspended Slab		Cast In-situ Suspended Slab	
			Design Choice	Score	Design Choice	Score
Floor Slab	Precast suspended segmental subfloor	0	✓	0		
	Cast in-situ ground bearing floor slab (with only nominal mesh reinforcement)	0.5				
	Cast in-situ monolithic reinforced ground bearing raft or reinforced cast in-situ	1 or 1.5*			✓	1.5

¹ Culp et al. (1998), *A comparison of the tumors induced by coal tar and benzo[a]pyrene in a 2-year bioassay*, **Carcinogenesis**, vol.19, no.1, pp.117–124

	suspended floor slab with minimal penetrations					
Ventilation	Pressure relief pathway	0.5			✓	0.5
	Passive sub-floor dispersal layer	1.5 or 2.5**	✓	2.5		
	Active dispersal layer	1.5 to 2.5				
	Active positive pressurisation	1.5 to 2.5				
Membrane	Ground gas resistant membrane***	2	✓	2	✓	2
Total Points Achieved			4.5		4.0	

* To achieve a score of 1.5 the raft or suspended floor slab should be well reinforced to control cracking and have minimal penetrations cast in.

** 2.5 points = very good performance. 1.5 points = good performance.

*** To achieve the 2 points the gas membrane must meet all criteria set out in BS:8485 (2015) + A1 (2019) Table 7.

The exact construction company appointed to install the gas protection measures is unknown at the time of writing. The installers will be trained and experienced in the installation of ground gas resistant membranes.

4.3.4 Ground Gas Membrane Installation Guidance

Some ground gas resistant membranes which meet the above required specification are:

- Visqueen 'Gas Barrier'
- Radbar 'Amber 2 Foil Barrier'
- Juta 'GP1'
- Monarflex 'Reflex Super'
- Protech 'GM Super'

Please note IGE Consulting are not affiliated with any of these brands and do not endorse any specific brand. All membrane installation must be undertaken to manufacturer's specification.

Where aluminium foil gas membranes are utilised consideration upon the detrimental effect from concrete should be considered i.e. the use of a sand blinding to protect the membrane.

Installation accessories will also be necessary, including:

- Jointing tape (double sided, gas resistant tape)
- Pre-formed top hats
- Jubilee clips
- Although not essential, gas resistant 'detail tape' is an easy way to install complex joints such as corners and non-standard service entries.

All service entry points should be fitted with pre-formed gas resistant 'top hats'. Top hats should be sealed to the pipe and gas membrane utilising double sided jointing tape and fixed with a jubilee clip. An example of the method of installation of these top hats is shown in Figure 5, below.

Adequate ventilation through internal obstructions to be installed in line with above recommendations. Joints between sheets of gas membrane should be lapped (minimum overlap of 150mm) and taped between sheets with appropriate double-sided tape in accordance with the manufacturer's recommendations.

4.3.5 Verification of Ground Gas Protection Measures

In line with CIRIA 735 (2014), IGE Consulting will independently verify the installation of the gas protection measures. A visual inspection method, including pick testing, will be undertaken and this will be carried out at every plot. This will be undertaken following the laying of the beam and block pre-cast floor units and laying of the gas membrane, but prior to laying insulation and finishes. The IGE Consulting verifier will:

- Identify that the correct membrane has been used, including sealing / jointing tape and pre-formed components e.g. tophats, corners.
- Inspect the general condition of the membrane for rips, tears and punctures.
- Check that all jointing has been carried out to the manufacturer's specification.
- Check that the membrane has been installed correctly across cavities, including correct jointing in these areas.
- Check that top hats have been correctly installed around service entries, including jubilee clip around pipe and correct lapping and jointing to membrane at base.

- Check that vents have been installed around the perimeter of the building in sufficient number and in the correct locations, including inspecting the condition i.e. not blocked or otherwise restricted.
- Check the presence of a clear >100mm clear void, including measuring that this is of a sufficient depth and the void has not been filled or otherwise compromised. Check that internal sleeper walls are also vented to provide adequate flow-through within the void so that none of the walls are blocking off unvented sections within the void.
- Take photographs to provide evidence of the above.

The IGE Consulting verifier will record the above information using the IGE Consulting 'Ground Gas Resistant Membrane Inspection Record' sheet.

4.3.6 Ground Gas Protection Measures Validation Procedure and Report

The following plan details the required actions to demonstrate the successful installation of ground gas protection on the site. In accordance with BS8485 (2015) + A1 (2019), the verification shall include, as a minimum, the following:

- Objectives of the verification.
- A brief overview of the site conditions and summary of the ground gas regime.
- A description of the installation, including gas-resistant membrane manufacturer and type used (including sealing / jointing tape and pre-formed components e.g. top hats, corners). The manufacturer specification / datasheet shall be included.
- Installer and verifier and credentials of such organisations, i.e. level of competency of installer – NVQ Level 2 or general groundworker.
- Detailed description of any deviations from the specification provided in this report, with explanation and justification of such deviations.
- As-built construction drawings and product specifications of components used.
- A description of the verification approach – in this case visual inspection, including pick testing, at a rate of one per plot.
- Verification evidence – in this case photographic evidence of each verified plot at the frequency outlined above.
- Any record of relevant communications with regulatory bodies.

- Verification conclusions, including any future monitoring or management requirements (anticipated none in this case due to passive approach), and limitations of the measures installed.

When the above has been completed and prior to occupation, this information will be compiled in a validation / completion report which will be submitted to and approved in writing by the local planning authority.

Cross-Sectional Slab Details

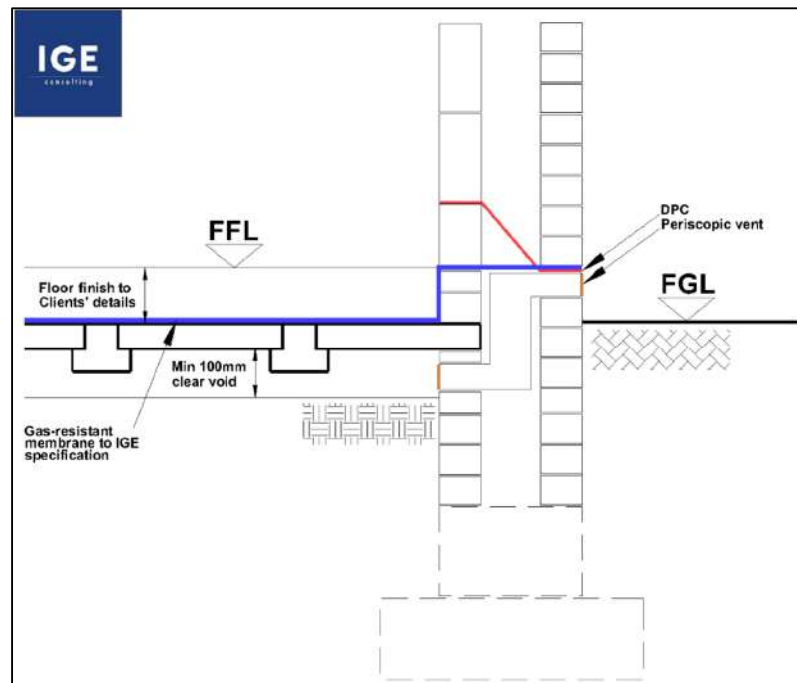


Figure 4: Edge detail including periscopic vents (brown) and location of ground gas-resistant membrane (blue). This drawing is not to scale. Use detailed dimensions only.

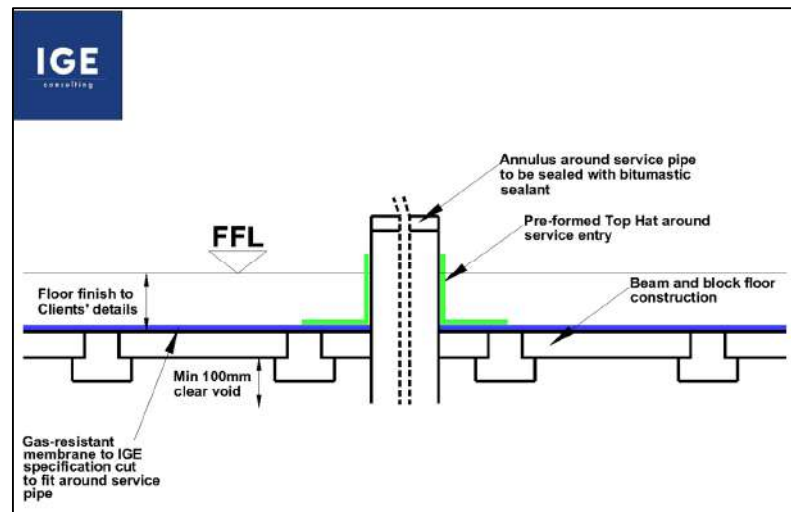


Figure 5: Service entry detail including pre-formed top hat (green) and location of ground gas-resistant membrane (blue). This drawing is not to scale. Use detailed dimensions only.

4.3.7 Potable Water Supply

Based on the chemical laboratory testing results contained within Appendix 6 and the human health GAC exceedances discussed in section 4.2.1 it is recommended that a United Utilities Risk Assessment (UURA) is undertaken for the site.

5.0 GEOTECHNICAL CONCLUSIONS

5.1 Geotechnical Assessment of Ground Conditions

The proposed development of the site includes a low-rise 2-storey residential development comprising 4 No. terraced dwellings with associated private gardens.

The intrusive investigation works have revealed that the ground conditions at the site generally comprise Made Ground underlain by Glacial Till.

The principal strata identified are outlined in further detail below.

5.1.1 Made Ground

Made Ground was recorded in all exploratory holes to varying depths and of varying composition. At shallow depths the Made Ground material generally comprised brown, gravelly, slightly clayey fine to coarse sand to a depth of between 0.20 and 2.60m bgl.

This was underlain by a layer of cohesive Made Ground which generally comprised soft, brown, slightly sandy, gravelly clay to a depth of between 0.30m and 3.00m bgl.

In the north western and south eastern site sections, a deeper Made Ground stratum was recorded which generally comprised brown mottled grey, slightly sandy, slightly gravelly clay to a maximum depth of 4.00m bgl.

It should be noted that medium to high cobble contents of red brick and concrete was encountered in FIP01 and FIP02.

7 No. SPTs were undertaken within Made Ground, recording N-values of between 0 and 8, with an average of 3.

2 No. Atterberg tests were undertaken on samples of Made Ground (DS01 at 1.20m bgl and DS02 at 1.20m bgl) which indicated that the Made Ground deposits were of medium plasticity and medium volume change potential.

5.1.2 Glacial Till

Glacial Till deposits were encountered in all exploratory holes, with the exception of FIP01 which recorded Made Ground until termination at 3.00m bgl. The Glacial Till was noted to be consistent across the site, comprising firm, brown, slightly gravelly, slightly sandy clay.

10 No. SPTs were undertaken in this stratum recording N-values of between 8 and 50 (average 27) which increased with depth.

2 No. Atterberg tests were undertaken on samples of Glacial Till (DS03 at 2.30m bgl and DS01 at 4.20m bgl), which indicated that the Glacial Till deposits are clays of low to medium plasticity and low volume change potential.

5.2 **Groundwater**

No natural water strikes were recorded in any of the dynamic sample boreholes, however a slight water ingress was recorded in FIP01 at 1.90m bgl. It is suspected that this is a by-product of recent rainfall and does not represent shallow groundwater.

Consequently, temporary works including dewatering are not envisaged to be required for excavation works at the site. However, given the limited time over which the investigation has taken place, the full seasonal and temporal fluctuations likely to occur at the site will not have been recorded. It is therefore considered prudent to make an allowance for localised dewatering during excavations on site.

5.3 **Foundations**

Traditional shallow (strip and trench) foundations are deemed unsuitable for the proposed development. This is due to deep Made Ground existing in the north western and south eastern site sections comprising extremely weak, granular soils (SPT N-values of 0). Whilst the Glacial Till may be a suitable founding stratum for the proposed structure, given the varying depths to Glacial Till across the site, it is not considered feasible to use this stratum for shallow foundations. Given the varying depths to competent founding strata across the site and to avoid issues with

differential settlement, a deep (piled) foundation solution is recommended for the proposed development.

An assessment of the impact of existing services upon the proposed foundations should be made before selecting a final foundation solution.

5.4 Piled Foundations

Based on existing site levels, and the ground conditions encountered, it is envisaged that a deep (piled) foundation solution will be suitable across the majority of the proposed development. Consideration should be given to the impact on third party foundations along the western boundary, particularly with regards any potential undermining issues. It is recommended that a third party wall survey assessment and agreement is undertaken prior to any works commencing on site. Given the nature of the site, consideration should be given to the use of a mini piling rig in conjunction with vibration monitoring under site engineer supervision whilst piling takes place in order to reduce the impact on third party walls and foundations.

In order to inform pile design, it is recommended that further ground investigation works are undertaken in order to understand the deeper ground conditions. The formation of a deep cable percussive borehole to c. 20.00m bgl is recommended in order to recover soil samples of the Glacial Till at greater depth and submit these for laboratory analysis.

5.5 Earthworks and External Areas

5.5.1 Earthworks

A full earthworks programme should be designed and completed for the works once finalised levels are known. The Made Ground may be suitable for re-engineering and use in certain applications, though this should be confirmed with further laboratory testing. The Glacial Till is likely to be suitable for re-engineering with care, though given its cohesive nature, protection from groundwater and excess trafficking will be paramount in determining the success of the earthworks.

The proposed earthworks and engineering works are to be undertaken to achieve the following key geotechnical outcomes:

- Excavate and remove any ground obstructions including historical foundations and re-engineer to an engineering specification appropriate to specific site areas.
- Undertake appropriate excavation works and suitable backfill to permit the installation by Third Parties of the required drainage and services across the site to the agreed drainage design.

Classification

This Specification should be read in conjunction with the following:

- The Manual of Contract Documents for Highway Works, Volume 1, Specification for Highway Works, Series 600, Earthworks as amended in (November 2005); and,
- Soils for Civil Engineering Purposes (BS1377) 1999.

The contractor should ensure that all earthworks materials comply with Clause 601 of the Specification for Highway Works and shall fall into one of the other of the following general classifications as defined in Table 6/1 of the Specification for Highway Works:

- General granular fill (Class 1),
- General cohesive fill (Class 2), excluding class 2A and 2E,
- Selected granular fill (Class 6).

In addition to any grading requirement the maximum particle size of any fill material shall be no more than two-thirds of the compacted layer thickness. The only exception to this shall be that cobbles having an equivalent diameter of more than 150mm shall not be deposited within the restored surface level unless directed otherwise by the engineer. Un-burnt colliery spoil, pulverised fuel ash (PFA) or furnace bottom ash shall not be used as a fill material.

Engineering Specification

The contractor should employ a suitably experienced engineer to be present on site during these earthwork operations to ensure soil suitability, placement, compaction and testing is undertaken in accordance with this specification and to ensure that any

unforeseen circumstances, such as adverse weather, do not compromise the earthworks process.

Works should be halted during periods of intermittent or prolonged rainfall to ensure the materials are not placed in a manner that would result in softening of either the formation or the newly placed material. It will be the contractor's responsibility to determine appropriate weather conditions and determine the suitability of works. Particular attention must be given to variable weather conditions when re-engineering clay soils as a moisture content fluctuation (2%+/-) of the tolerable limit will result in unacceptable degree of compaction loss.

Due to presence of deep Made Ground it is considered necessary that all excavations are supported or battered back in accordance with guidance contained in CIRIA R97. Given the lack of recorded groundwater or perched water, the requirement for temporary works including dewatering is not considered likely.

Earthworks Placement Specification

END USE	DETAILS	REQUIREMENT
External Areas - Highways, driveways, drainage runs, backfill behind retaining walls	Site	Method of compaction in line with Department of Transport Specification for Earthworks Series 600 Method 2 to achieve CBR >5%. Formation level for adoptable highways to achieve CBR >15% utilising 450mm diameter plate and in line with local / county highways guidance. Engineering advice to be sort if unachievable / uneconomic.
Soft Landscaping - Private Gardens / Public Open Space	Site	Compacted to achieve <30mm settlement. Subsoil material should not be excessively tracked with plant – should permit surface water drainage.

5.5.2 Export of Materials

Any soils to be removed from site must be classified in accordance with WM3 under the definition of waste and chemically tested to determine their destination, i.e. reuse or landfill. Waste ticket records must also be retained as proof of the export of materials from site.

6.0 RECOMMENDATIONS

- Following any variation in a finalised proposed development detailed design including earthworks design or proposed levels, it is recommended that the above conclusions are re-appraised to determine the suitability.
- The conclusions of this report should be agreed with relevant regulatory authorities prior to the commencement of works.
- It is deemed prudent to install ground gas protection measures in line with CS2 requirements for all plots at the site.
- A clean cover system is deemed necessary in private garden areas only.
- A United Utilities Risk Assessment (UURA) should be completed for the site.
- Further ground investigation works are recommended in the form of a deep cable percussion borehole given the lack of information regarding the Glacial Till stratum at depth.
- If any hereto unidentified visual or olfactory evidence of contamination is encountered during earthworks or construction work, then the Local Authority Environmental Health Officer and Environment Agency should be contacted immediately to determine appropriate mitigation measures.
- It is recommended that the presence and associated constraints of all site services are established prior to significant intrusive works beginning.

APPENDIX 7

LIMITATIONS OF INVESTIGATION WORK AND REPORT

LIMITATIONS OF REPORT

This consultancy report was compiled and carried out by IGE Consulting Limited ('IGE') for the client, as defined in the main report (the 'client'), on the basis of a defined programme and scope of works and the terms of a contract between IGE and the client. IGE undertook this with all reasonable skill and care, taking into account the limits of the scope of works required by the client, the prevailing site conditions, the time scale involved and the resources, including financial and manpower resources, agreed between IGE and the client. IGE cannot accept responsibility to any parties whatsoever, following the issue of this report, for any matters arising which may be considered outwith the agreed scope of works.

Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted consulting practices. This report may not be relied upon, or transferred to, by any other party without the written agreement of its author. If a third party relies on this report, it does so wholly at its own and sole risk and IGE disclaims any liability to such parties.

It is IGE's understanding that this report is to be used for the purpose described in the 'Brief' section of this report. That purpose was a significant factor in determining the scope and the services to be provided. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of, or reliance upon the report in those circumstances by the client without IGE's review and advice shall be at the client's sole and own risk.

The information contained in this report is protected by disclosure under Part 3 of the Environmental Information Regulations 2004 pursuant to the provisions of Regulation 12(5) without the consent in writing of a Director of IGE.

This report is a function of the date it was written and should be read in light of any subsequent changes in legislation, statutory requirements and industry practices. Ground conditions can also change over time and further investigations or assessment should be made if there is any significant delay in acting on the findings of this report. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of IGE. In the absence of such written advice of IGE, reliance on the report in the future shall be at the client's own and sole risk. Should IGE be requested to review the report in the future, IGE shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between IGE and the client.

The observations and conclusions described in this report are based solely upon the scope of works agreed between the client and IGE. IGE has not performed any observations, investigations, studies or testing not specifically set out or mentioned within this report. IGE is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the agreed scope of works. For the avoidance of doubt, this report is strictly limited to the nature of contamination contained within the ground and groundwater at the site. The report does not cover environmental aspects such as air or noise pollution and ground vibrations and the like. In addition, ecological matters relating to wildlife, flora and fauna have not been investigated as part of this report. In particular, the site has not been inspected for the presence or otherwise of invasive species (e.g. Japanese Knotweed). It is recommended that the client appoints a specialist in this subject to carry out a detailed inspection / survey of the site if its presence is suspected. Where mention has been made to the identification of asbestos or asbestos-containing materials this is for indicative purposes only and does not constitute or replace full and proper surveys.

LIMITATIONS OF INVESTIGATION WORK

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable and as investigation excavations only allow examination of the ground at discrete locations, the potential exists for ground conditions to be encountered which are different to those considered in this report. The explored extent of the site area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition, chemical analysis was carried

out for a limited number of parameters, based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The normal speed of investigation usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Exploratory Holes

Where exploratory holes have been carried out as part of this investigation, the spacing has been determined to provide a reasonable indication of the general ground conditions across the site, but the number has ultimately been limited by commercial constraints. The findings of the exploratory holes relate specifically to the exploratory hole locations and are no absolute guarantee of the ground conditions between such locations. Due allowance should be made for the possibility of variation in conditions between exploratory hole locations.

Extent of Contamination Testing

The extent of contaminated land testing carried out on samples obtained from the site has been determined in accordance with the latest legal guidance issued by the government to provide, with reasonable certainty, the probable general levels of contamination present on site that could pose a significant hazard to human health or waters. The extent of site investigation works including chemical testing has also been limited by reasonable commercial constraints. Although extensive testing of samples has been carried out, the volume of samples taken for testing are a minute fraction of the total volume of soils and groundwater present on site. Therefore, there is a residual risk that undetected pockets of contamination may be present on site, situated between testing locations.

When investigating or developing potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and temporally. The absence of certain ground, ground gas, contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

Extent of Geo-Environmental Studies

This report is strictly limited to the nature of contamination contained within the ground and groundwater at the site. The report does not cover environmental aspects such as air or noise pollution and ground vibrations and the like. In addition, ecological matters relating to wildlife, flora and fauna have not been investigated as part of this report. In particular, the site has not been inspected for the presence or otherwise of invasive species e.g. Japanese Knotweed. It is recommended that the Client appoints a specialist in this subject to carry out a detailed inspection / survey of the site if its presence is suspected. Where mention has been made to the identification asbestos or asbestos-containing materials this is for indicative purposes only and does not constitute or replace a full and proper survey. If an Unexploded Ordnance (UXO) report has been obtained within the report, it has been so on the basis of Health and Safety concerns and no assessment has been made other than transcribing the recommendations of the sub-contractor contained within the report. In terms of a potential contaminative source, unless ordnance has been manufactured / stored on site, UXOs will only be determined as a contaminative source following a positive identification on site.

APPENDIX 2

FIGURES AND DRAWINGS

Disclaimer:
Do not scale from this drawing. All dimensions and levels are to be checked on site. All areas are approximate and are for information only.
This drawing is to be read in conjunction with all other relevant documents and all works are to comply with the current Building regulations, British Standards and Codes of Practice etc.
All details of the existing structure are to be verified by others on site prior to any works commencing.
The copyright of this drawing and all works executed from this drawing remain the property of View Associates Ltd. Any 3rd party survey information contained on this drawing is not the responsibility of View Associates Ltd.

GENERAL NOTES:

- For all finishes refer to specification.
- For mechanical and electrical information layout and specifications refer to ME drawings and specifications, points indicated on Architectural drawings are indicative only and final agreement with client required.
- For all structural information layout and specifications. Refer to Structural Engineers drawings and specification.
- For all Kitchen information layout and specifications. Refer to Sub-Contractor / Clients information.
- For all sanitary information layout and specifications. Refer to Sub-Contractors / Clients information.
- Builder to confirm all dimensions on site prior to commencement and satisfy himself the work specified and drawn can be achieved.
- All above ground drainage is to M+E Engineers details. All below ground drainage is to Structural Engineers details.

WALL TYPE SCHEDULE:

- T1 ----- 1no. layer of 12.5mm plasterboard each side on metal stud with 50mm Isover Acoustic Partion roll (APR 1200), thickness total 100mm.
- T2 ----- 1no. layer of 12.5mm plasterboard each side on metal stud thickness total 100mm.
- T3 ----- 100mm blockwork wall plaster both sides density and type to Structural Engineers details
- T4 ----- 2No 100mm blockwork leafs with 50mm clear cavity block min density 1840kg/m³ 13mm wet plaster both sides min mass 10kg/m². If plasterboard dot and dab 6mm parge coat to be applied. Wall ties to be Type A as described by Building Regulations

All plasterboard around bath and shower enclosures to be water resistant and where blockwork enclosures also to be waterproof treated

NOTE: All wall types are to be in accordance with the manufactures details and current Building Regulations. All for sound testing as deemed necessary to achieve Building Regulations site testing requirements.

ACOUSTIC DESIGN INTENT

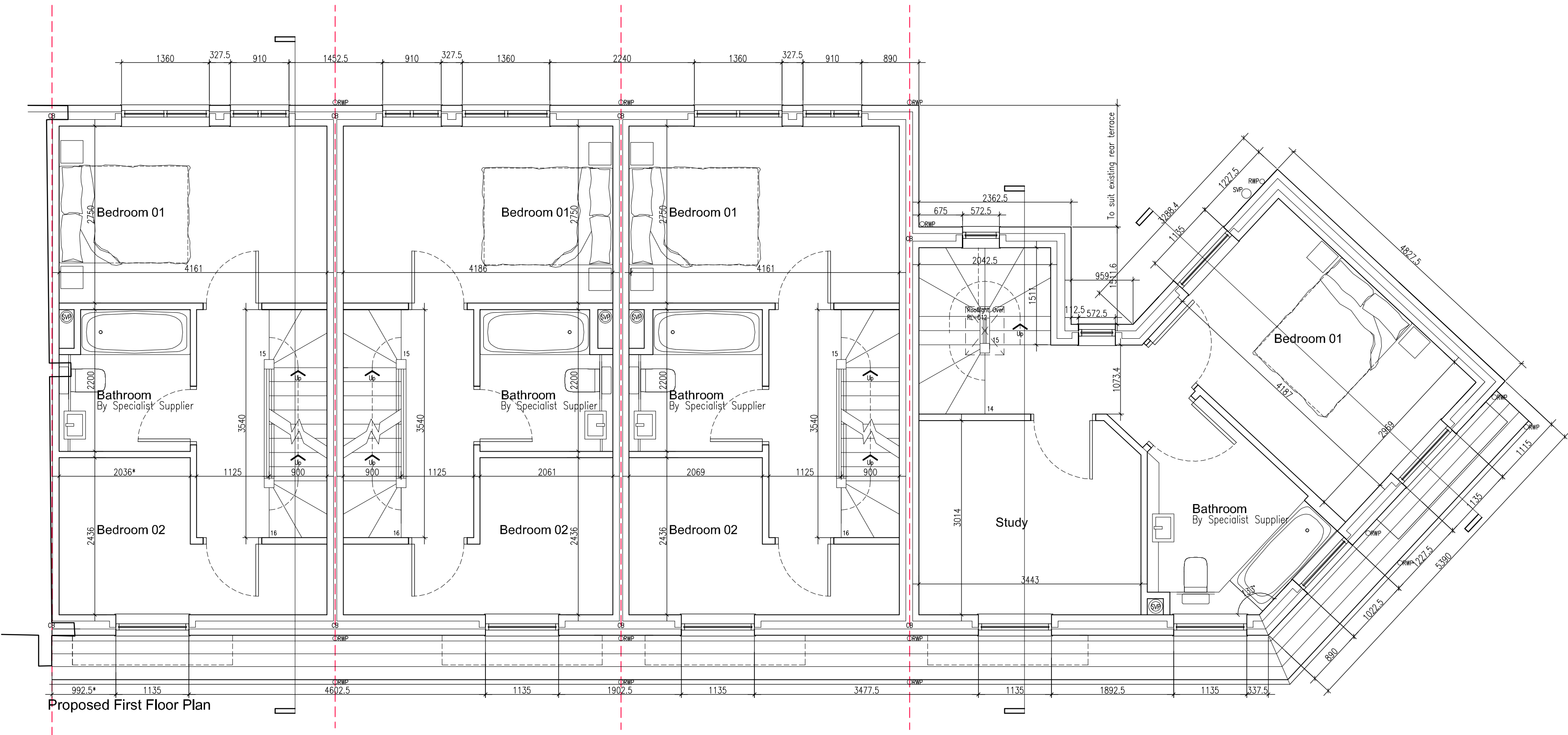
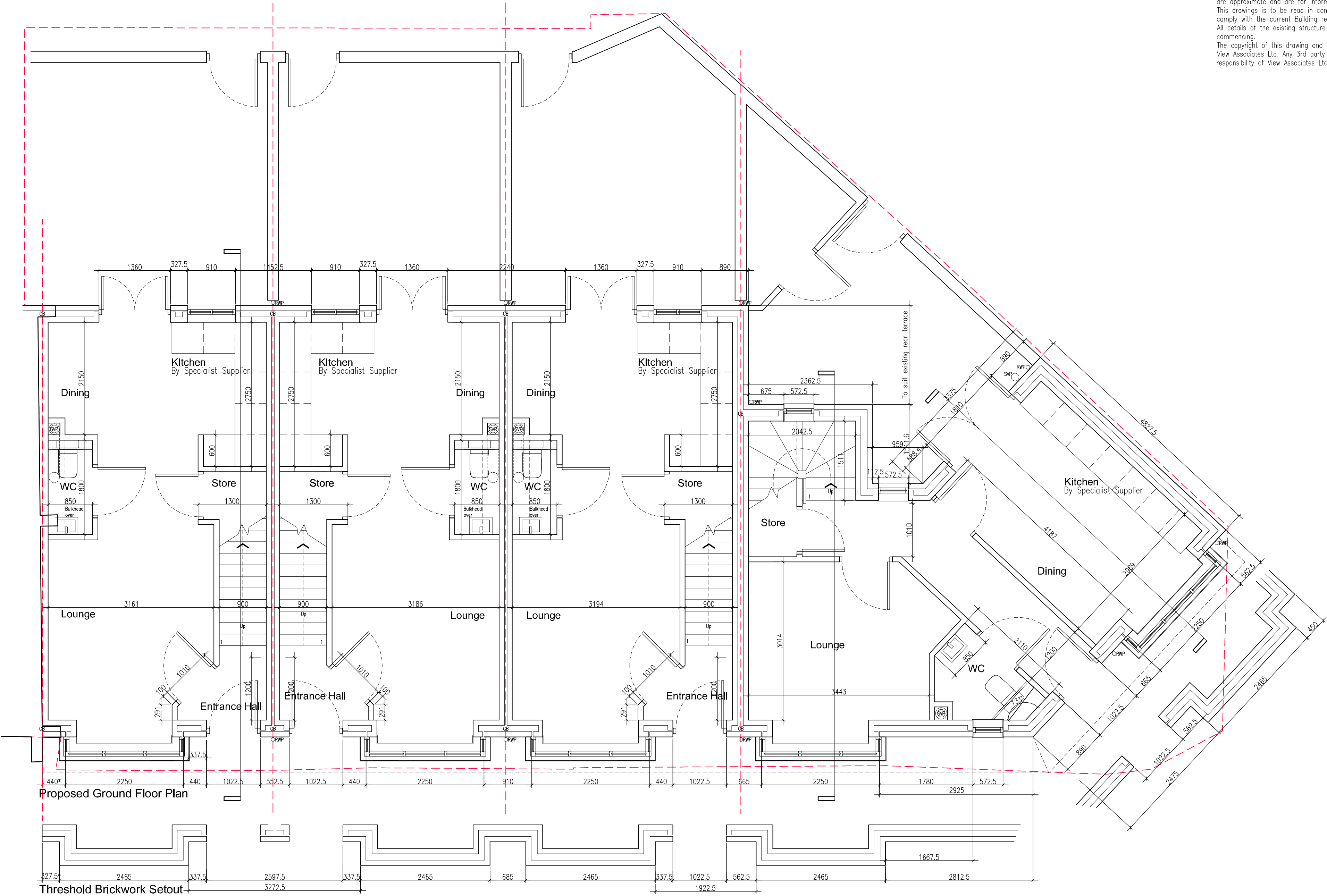
The contractor is responsible for ensuring the finished works comply in all respects with the current building regulations and the works must comply with the final acoustics testing together with building control sign off as a minimum. Any details, notes, specifications and reports are given as guidance and design intent only.

Builder must comply with requirements and the Builder to employ Acoustic Engineer to cover all client and Building Regulation requirements

FIRE DESIGN INTENT

----- Indicates extent of ½ hour fire separation walls. All to be fully sealed at head and base constructed as type notes. Any wall mounted sockets to have fire rated backing plate to maintain integrity and never to be back to back. Door set in wall to be 20 minute fire and smoke rated including frames. Walls to extend to underside of slab or roof structure depending on floor and fully sealed and fire rated. Existing walls to remain as constructed but to be reviewed and made good as necessary to ensure fire ratings are fully achieved. Cavity barriers to be provided where staircase protected walls about external cavity wall construction to provide minimum ½ hour fire separation. CB=Cavity Barrier both vertically and horizontally as noted.

Fire detection and alarm system to be installed to a minimum Grade D2 Cat LD3 standard as defined by BS 5839-6. Mains operated smoke alarm system to BS EN 14604 Main operated heat alarm system to BS 5446-2 both systems should have a standby power supply battery or capacitor.



Rev	Description:	Date:	By:

Project:

Great Jones Street
Manchester

Client:

xxxxxx

Drawing Title:

Proposed Ground + First
Floor Plans

Drawing Number:

(BR)001 Rev-

Drawn By:

GRS

Checked By:

IJ

Stage:

Preliminary

Date:

12.07.2022

Scale:

1:50@A1

VIEW
ASSOCIATES
CHARTERED ARCHITECT

RIBA

T 0161 941 7458
W viewassociates.co.uk
View Associates Ltd
Greystone House, Moss Lane
Altrincham WA15 8HW

Disclaimer:
Do not scale from this drawing. All dimensions and levels are to be checked on site. All areas are approximate and are for information only.
This drawing is to be read in conjunction with all other relevant documents and all works are to comply with the current Building regulations, British Standards and Codes of Practice etc.
All details of the existing structure are to be verified by others on site prior to any works commencing.
The copyright of this drawing and all works executed from this drawing remain the property of View Associates Ltd. Any 3rd party survey information contained on this drawing is not the responsibility of View Associates Ltd.

GENERAL NOTES:

- For all finishes refer to specification
- For mechanical and electrical information layout and specifications refer to ME drawings and specifications, points indicated on Architectural drawings are indicative only and final agreement with client required.
- For all structural information layout and specifications. Refer to Structural Engineers drawings and specification
- For all Kitchen information layout and specifications. Refer to Sub-Contractor / Clients information
- For all sanitary information layout and specifications. Refer to Sub-Contractors / Clients information
- Builder to confirm all dimensions on site prior to commencement and satisfy himself the work specified and drawn can be achieved.
- All above ground drainage is to M+E Engineers details. All below ground drainage is to Structural Engineers details.

WALL TYPE SCHEDULE:

- T1 ----- 1no. layer of 12.5mm plasterboard each side on metal stud with 50mm Isover Acoustic Parton roll (APR 1200), thickness total 100mm.
- T2 1no. layer of 12.5mm plasterboard each side on metal stud thickness total 100mm.
- T3 100mm blockwork wall plaster both sides density and type to Structural Engineers details
- T4 2No 100mm blockwork leafs with 50mm clear cavity block min density 1840kg/m³ 13mm wet plaster both sides min mass 10kg/m². If plasterboard dot and dab 6mm parge coat to be applied. Wall ties to be Type A as described by Building Regulations

All plasterboard around bath and shower enclosures to be water resistant and where blockwork enclosures also to be waterproof treated

NOTE: All wall types are to be in accordance with the manufactures details and current Building Regulations. All for sound testing as deemed necessary to achieve Building Regulations site testing requirements.

ACOUSTIC DESIGN INTENT

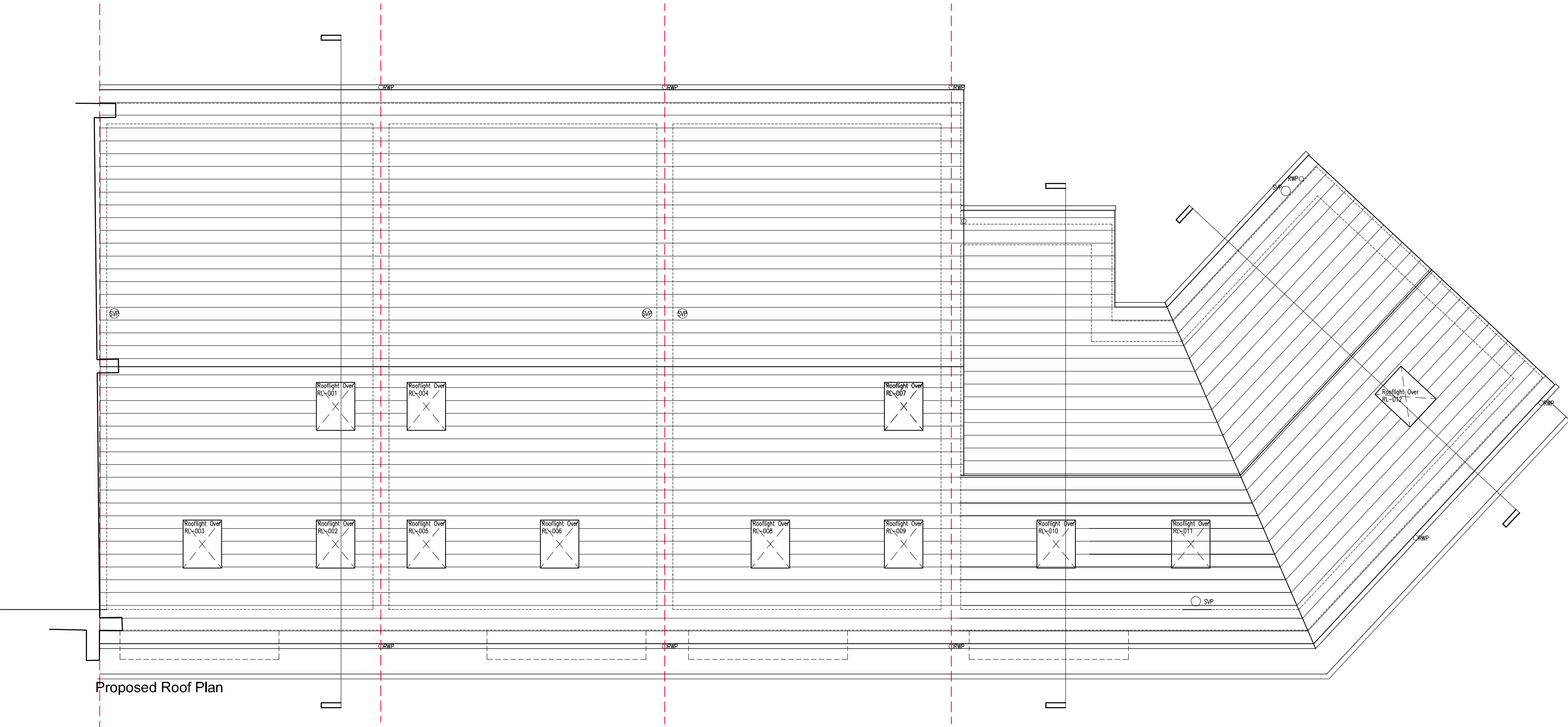
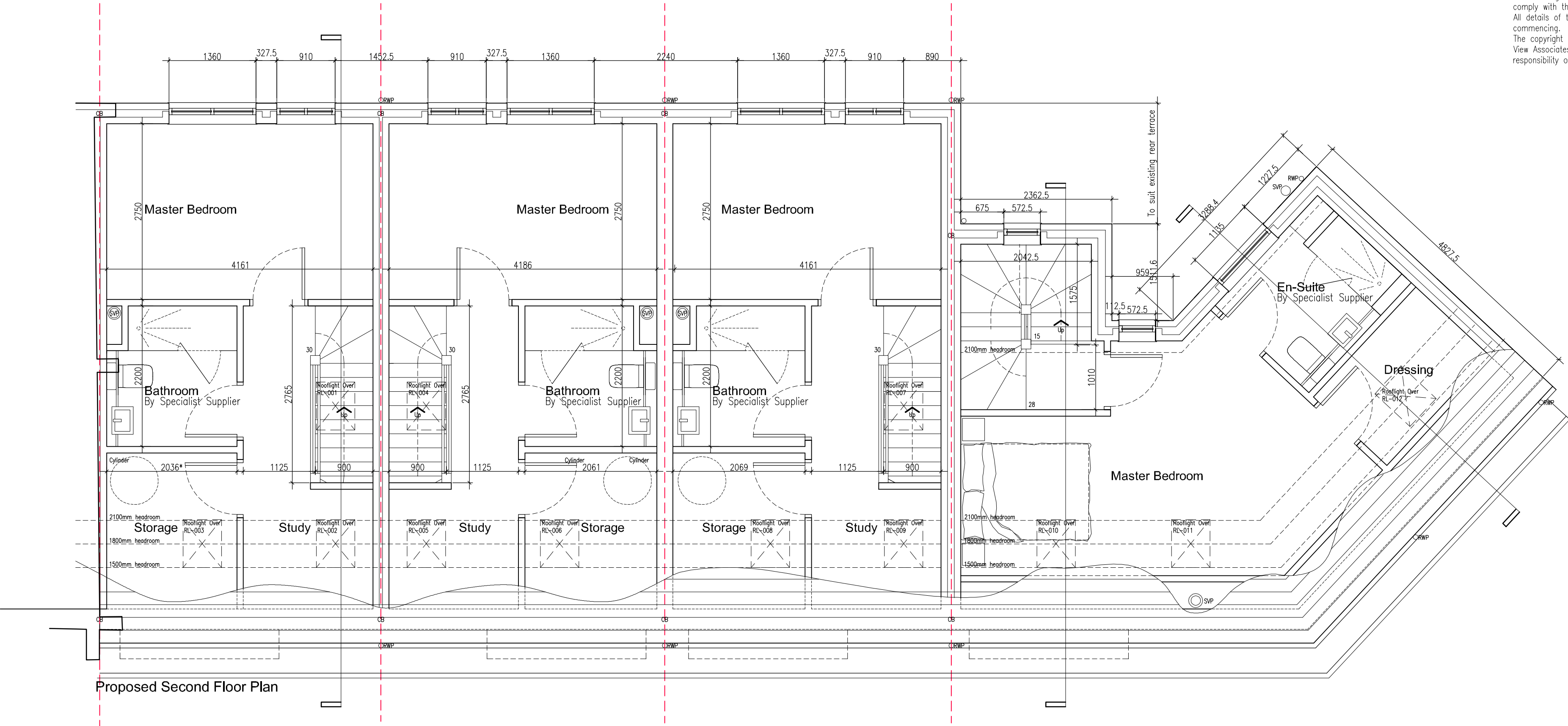
The contractor is responsible for ensuring the finished works comply in all respects with the current building regulations and the works must comply with the final acoustics testing together with building control sign off as a minimum. Any details, notes, specifications and reports are given as guidance and design intent only.

Builder must comply with requirements and the Builder to employ Acoustic Engineer to cover all client and Building Regulation requirements

FIRE DESIGN INTENT

Indicates extent of ½ hour fire separation walls. All to be fully sealed at head and base constructed as type notes. Any wall mounted sockets to have fire rated backing plate to maintain integrity and never to be back to back. Door set in wall to be 20 minute fire and smoke rated including frames. Walls to extend to underside of slab or roof structure depending on floor and fully sealed and fire rated. Existing walls to remain as constructed but to be reviewed and made good as necessary to ensure fire ratings are fully achieved
Cavity barriers to be provided where staircase protected walls abut external cavity wall construction to provide minimum ½ hour fire separation
CB=Cavity Barrier both vertically and horizontally as noted.

Fire detection and alarm system to be installed to a minimum Grade D2 Cat LD3 standard as defined by BS 5839-6.
Mains operated smoke alarm system to BS EN 14604
Main operated heat alarm system to BS 5446-2 both systems should have a standby power supply battery or capacitor.



Rev	Description:	Date:	By:

Disclaimer:
Do not scale from this drawing. All dimensions and levels are to be checked on site. All areas are approximate and are for information only.
This drawing is to be read in conjunction with all other relevant documents and all works are to comply with the current Building regulations, British Standards and Codes of Practice etc.
All details of the existing structure are to be verified by others on site prior to any works commencing.
The copyright of this drawing and all works executed from this drawing remain the property of View Associates Ltd. Any 3rd party survey information contained on this drawing is not the responsibility of View Associates Ltd.



Rev	Description:	Date:	By:

Project:

Great Jones Street Manchester

Client:

xxxxxx

Drawing Title:

Proposed Elevations and Section
Elevation

Drawing Number:

(BR)003 Rev-

Drawn By:

GRS

Checked By:

IJ

Stage:

Preliminary

Date:

12.07.2022

Scale:

1:50@A1

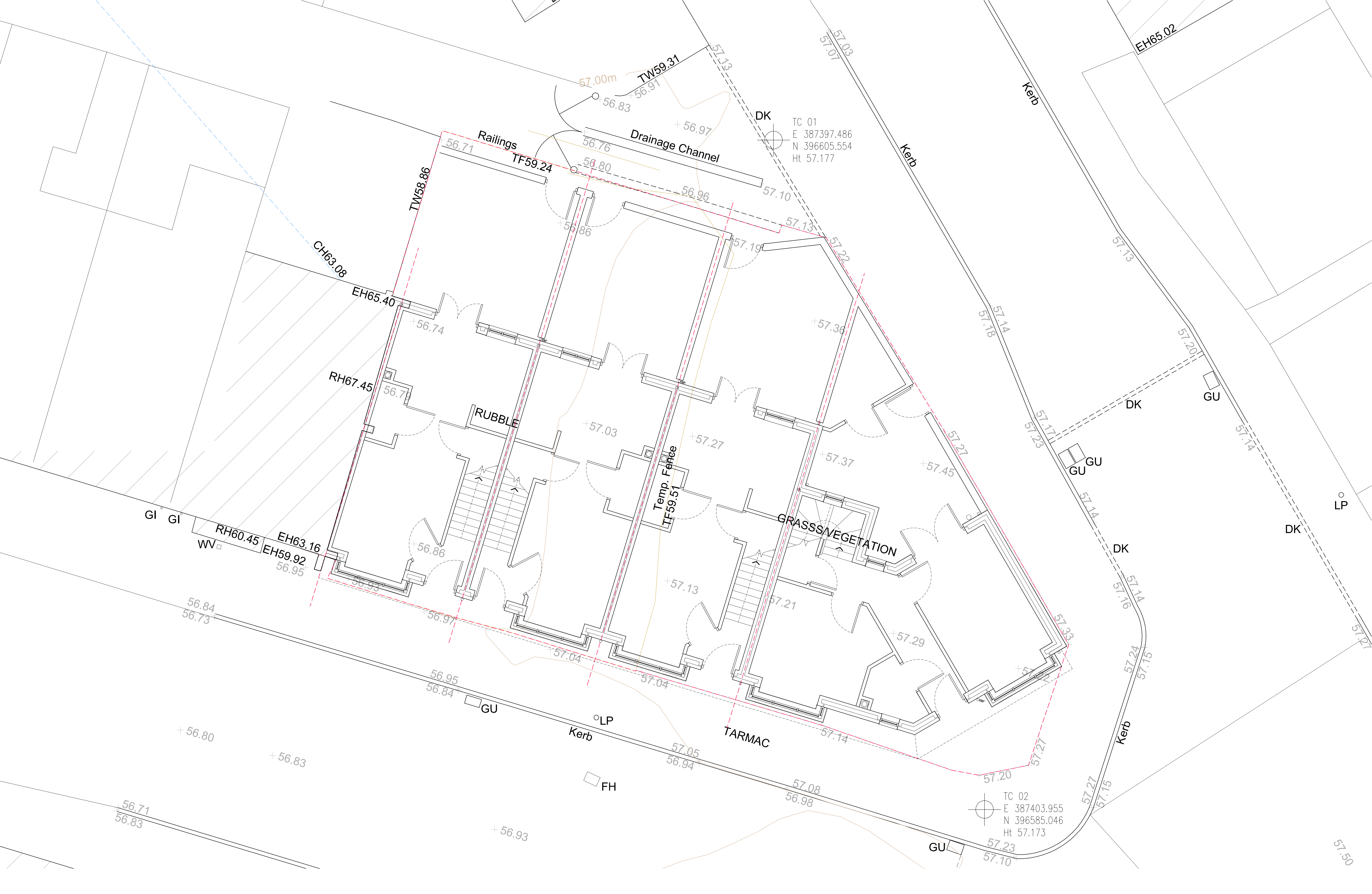
VIEW
ASSOCIATES
CHARTERED ARCHITECT

RIBA 

T 0161 941 7458

W viewassociates.co.uk

View Associates Ltd
Greystone House, Moss Lane
Altrincham WA15 8HW



Project:

Great Jones Street Manchester

Disclaimer:

Do not scale from this drawing. All dimensions and levels are to be checked on site. All areas are approximate and are for information only. This drawing is to be read in conjunction with all other relevant documents and all works are to comply with the current Building regulations, British Standards and Codes of Practice etc. All details of the existing structure are to be verified by others on site prior to any works commencing. The copyright of this drawing and all works executed from this drawing remain the property of View Associates Ltd. Any 3rd party survey information contained on this drawing is not the responsibility of View Associates Ltd.

Rev Description:

Date:

By:

Client:

XXXXXX

Drawing Title:

Site Plan

Drawing Number:

(BR)005 Rev -

Drawn By:

GRS

Checked By:

IJ

Stage:

Building Control

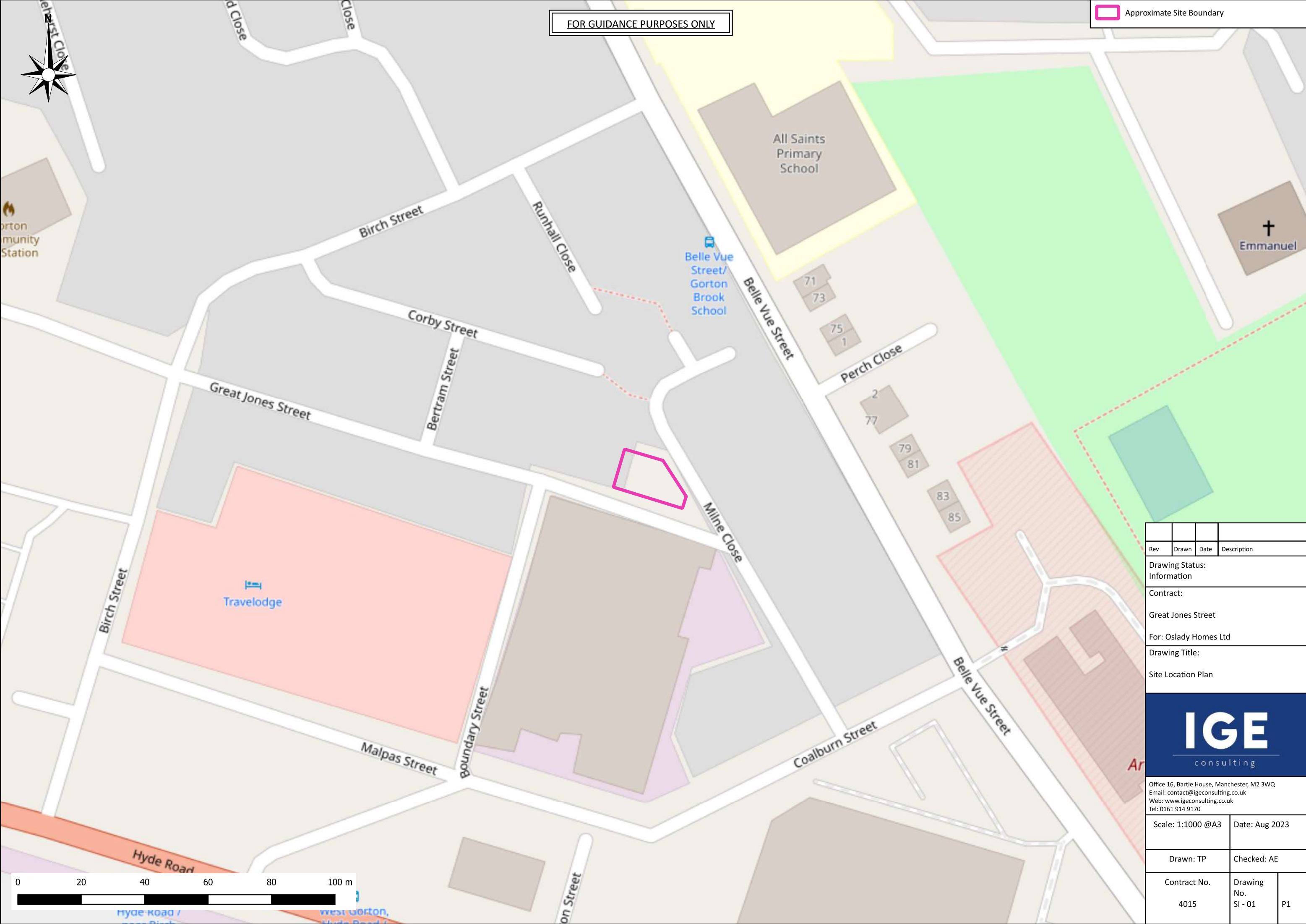
Date:

Scale:

VIEW
ASSOCIATES
CHARTERED ARCHITECT

RIBA

T 0161 941 7458
W viewassociates.co.uk
View Associates Ltd
Greystone House, Moss Lane
Altrincham WA15 8HW



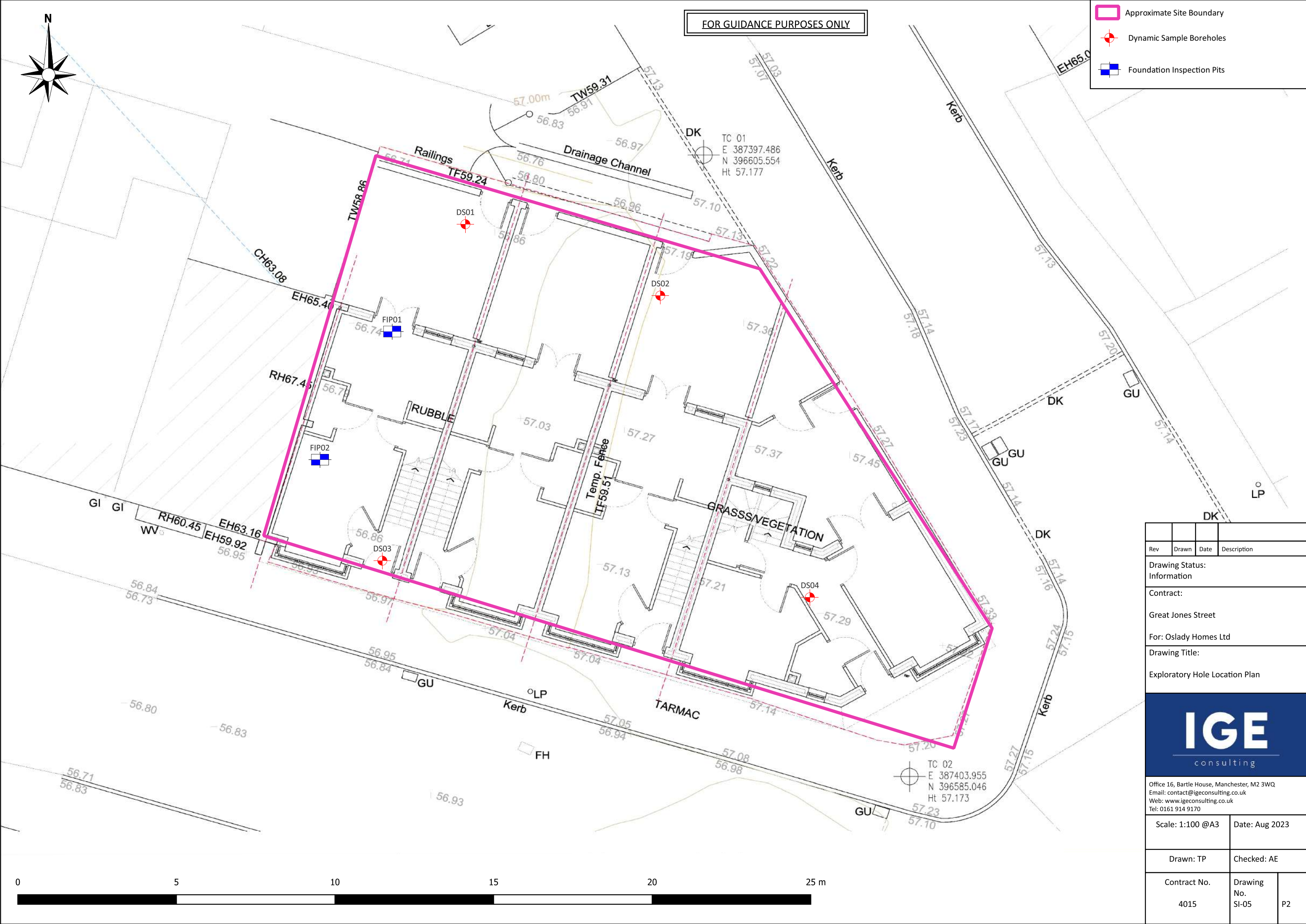
FOR GUIDANCE PURPOSES ONLY

Approximate Site Boundary

Rev	Drawn	Date	Description
Drawing Status: Information			
Contract: Great Jones Street For: Oslady Homes Ltd			
Drawing Title: Site Location Plan			
			
Office 16, Bartle House, Manchester, M2 3WQ Email: contact@igeconsulting.co.uk Web: www.igeconsulting.co.uk Tel: 0161 914 9170			
Scale: 1:1000 @A3		Date: Aug 2023	
Drawn: TP		Checked: AE	
Contract No. 4015		Drawing No. SI - 01	P1



-  Approximate Site Boundary
 Dynamic Sample Boreholes
 Foundation Inspection Pits



Rev	Drawn	Date	Description
Drawing Status: Information			
Contract:			
Great Jones Street			
For: Oslady Homes Ltd			
Drawing Title:			
Exploratory Hole Location Plan			
			
Office 16, Bartle House, Manchester, M2 3WQ Email: contact@igeconsulting.co.uk Web: www.igeconsulting.co.uk Tel: 0161 914 9170			
Scale: 1:100 @A3		Date: Aug 2023	
Drawn: TP		Checked: AE	
Contract No. 4015		Drawing No. SI-05	P2

APPENDIX 3

FOUNDATION INSPECTION PIT LOGS AND PHOTOGRAPHS



Trial Pit No.
FIP01
Sheet 1 of 1

ver. 1.1

Project No.
4015

Logged By
TP

Checked By
AJ

Water Strike	Samples & In Situ Testing			Depth (mbgl)	Level (mAOD)		Stratum Description	
	Depth (m)	Type	Results					
	0.50	B	HVP=45	1.20	55.50		Brown, gravelly, slightly clayey, fine to coarse SAND with high cobble content. Cobbles are angular to subangular of red brick (70%) and concrete (30%). Gravel is angular to subrounded, fine to coarse of red brick (30%), concrete (20%), sandstone (20%), glass (10%), plastic (10%) and ceramic (10%). MADE GROUND <i>Concrete foundation encountered to 0.30m bgl along the western pit wall.</i>	1
	1.50 1.50	B		Soft, orangish brown, slightly sandy, gravelly CLAY with medium cobble content. Cobbles are angular to subangular of red brick. Gravel is angular to subrounded, fine to coarse of red brick (40%), concrete (20%), sandstone (20%), plastic (10%), glass (5%) and mudstone (5%). MADE GROUND	2			
	2.20 2.30	B	HVP=38	2.10	54.60		Soft, greyish brown, slightly sandy, gravelly CLAY with low cobble content. Cobbles are angular to subangular of red brick. Gravel is angular to subangular, fine to coarse of asphalt (50%), red brick (30%), concrete (10%) and sandstone (10%). MADE GROUND <i>High cobble content encountered at 2.50m bgl. Cobbles are subangular of red brick.</i> <i>Wooden beam encountered at 2.60m bgl trending east to west. Dimensions: c. 0.1m x 0.1m x 1.0m.</i>	3
	Trial Pit terminated at 3.00m.							4

Water Strike	
Depth Strike (mbgl)	Remarks
1.90	Slight water ingress encountered at 1.90m bgl.
Stability: Stable	
Remarks: Foundation Inspection Pit terminated at 3.00m bgl at the maximum reach of the excavator.	



Trial Pit Photos

FIP01

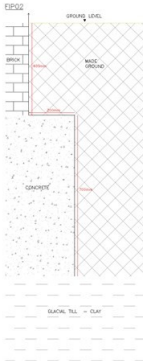
Great Jones Street



Image 1. FIP01
Photo 26-07-2023, 11 23 12



Image 2. FIP01
Photo 26-07-2023, 11 23 25

IGEconsulting Office 16, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170		Trial Pit Log ver. 1.1			Trial Pit No. FIP02 Sheet 1 of 1				
Project Name: Great Jones Street				Level (mAOD): 56.82		Date: 26/07/2023		Project No. 4015	
Location: Manchester				Weather: Sunny				Logged By TP	
Client: Oslady Homes Ltd				Co-ords: 387385E - 396596N				Checked By AJ	
Water Strike	Samples & In Situ Testing			Depth (mbgl)	Level (mAOD)		Stratum Description		
	Depth (m)	Type	Results						
	0.20	B		0.40	56.42		Brown, slightly clayey, gravelly, fine to coarse SAND with high cobble content. Cobbles are angular to subangular of red brick (70%), concrete (20%) and wood (10%). Gravel is angular to subrounded, fine to coarse of red brick (40%), concrete (30%), plastic (10%), glass (10%) and ceramic (10%). MADE GROUND		
	0.50	B	HVP=61				Firm, orangish brown mottled grey, slightly gravelly, slightly sandy CLAY with low cobble content. Cobbles are angular to subangular of red brick. Gravel is angular to subrounded, fine to coarse of red brick (30%), concrete (20%), sandstone (20%), mudstone (20%) and plastic (10%). MADE GROUND		
	0.60								
	0.80		HVP=82	1.00	55.82		Firm, orangish brown mottled grey, slightly gravelly, slightly sandy CLAY. Gravel is surrounded to rounded, fine to coarse of sandstone (60%) and mudstone (40%) GLACIAL TILL <i>Concrete foundation encountered to 1.10m bgl along the western pit wall.</i>		
	1.40	B					<i>Becoming stiff at 1.40m bgl.</i>		
1.40	HVP=116		1.50	55.32		Trial Pit terminated at 1.50m.			
							1		
							2		
							3		
							4		
							5		
Water Strike									
Depth Strike (mbgl)		Remarks							
		No strike.							
Stability: Stable.									
Remarks: Foundation Inspection Pit terminated at 1.50m bgl at target depth.									

Trial Pit Photos

FIP02

Great Jones Street



Image 1. FIP02
Photo 26-07-2023, 13 25 36



Image 2. FIP02
Photo 26-07-2023, 13 25 42

APPENDIX 4

DYNAMIC SAMPLE BOREHOLE LOGS AND PHOTOGRAPHS

IGE consulting		Office 16, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170		Dynamic Sample Borehole Log ver. 1.5				Dynamic Sample No. DS01 Sheet 1 of 1		
Project Name: Great Jones Street				Co-ords: 387390E - 396603N		Project No. 4015				
Location: Manchester				Level (m AOD): 56.77		Logged By TP				
Client: Oslady Homes Ltd				Date: 26/07/2023		Checked By AJ				
Weather: Sunny										
Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)		Stratum Description		
		Depth(m)	Type	Results						
		0.50	ES		2.90	53.87		Soft, brown, slightly sandy, gravelly CLAY. Gravel is angular to subrounded, fine to coarse of red brick (40%), concrete (30%), sandstone (10%), glass (10%) and plastic (10%). MADE GROUND	1	
		1.00	SPT	N=6 (3,3/2,2,1,1)						
		1.20	B							
		2.00	SPT	N=0 (0,0/0,0,0,0)						
		2.50	ES							
		3.00	SPT	N=0 (0,0/0,0,0,0)						
		4.00	SPT	N=19 (3,3/4,4,5,6)	4.00	52.77		Very soft, greyish brown, slightly gravelly, slightly sandy CLAY. Gravel is subangular to subrounded of sandstone (50%), mudstone (30%) and red brick (20%). MADE GROUND	3	
		4.30	ES							
		4.50	B							
		5.00	SPT	N=22 (3,4/5,5,5,7)						
					5.45	51.32		Firm, brown, slightly gravelly, slightly sandy CLAY. Gravel is aubangular to subrounded of sandstone (60%) and mudstone (40%). GLACIAL TILL	4	
Dynamic Sample terminated at 5.45m.									5	
									6	
Remarks:				Water Strike		Casing Details		Sample Sleeve Runs		
Dynamic Sample Borehole terminated at 5.45m at target depth.				Depth Strike	Remarks	Depth Base	Diameter	Depth Top (m)	Depth Base (m)	Diameter (mm)
					No strike.			0.00	1.00	87 40%
								1.00	2.00	77 60%
								2.00	3.00	67 50%
								3.00	4.00	57 50%
								4.00	5.00	47 70%

Dynamic Sample Borehole Photos

DS01

Great Jones Street



Image 1. DS01::

DS01:

Viewed left to right, top to bottom:

0.00 - 1.00m bgl

1.00 - 2.00m bgl

2.00 - 3.00m bgl

3.00 - 4.00m bgl

4.00 - 5.00m bgl



ver. 1.5

Dynamic Sample No.

DS02

Sheet 1 of 1

Project Name: Great Jones Street

Co-ords: 387396E - 396601N

Project No.
4015

Location: Manchester

Level (m AOD): 57.09

Logged By
TP

Client: Oslady Homes Ltd

Date: 26/07/2023

Checked By
AJ

Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)		Stratum Description	
		Depth(m)	Type	Results					
		0.20	ES					Brown, gravelly, slightly clayey, fine to coarse SAND. Gravel is subangular to subrounded of red brick (40%), concrete (30%), plastic (10%), glass (10%) and ceramic (10%). MADE GROUND	1
		1.00	SPT	N=3 (2,1/0,1,1,1)	1.00	56.09		Very soft to soft, brown, slightly gravelly, slightly sandy CLAY. Gravel is subangular to subrounded, fine to coarse of red brick (30%), concrete (20%), sandstone (20%), plastic (10%), glass (10%) and ceramic (10%). MADE GROUND	
		1.20	B						
		1.60	ES		1.50	55.59	Firm, brown, slightly gravelly, slightly sandy CLAY. Gravel is subangular to subrounded, fine to coarse of sandstone (50%) and mudstone (50%). GLACIAL TILL	2	
		2.00	SPT	N=21 (3,4/4,4,6,7)					
		3.00	SPT	N=29 (5,5/6,6,7,10)			3		
		3.50	ES						
		4.00	SPT	N=33 (6,6/7,7,8,11)			4		
		4.20	B						
		5.00	SPT	N=25 (5,5/6,5,6,8)			5		
5.45			5.45	51.64	Dynamic Sample terminated at 5.45m.	6			

Remarks:

Dynamic Sample Borehole terminated at 5.45m bgl at target depth.

Water Strike		Casing Details		Sample Sleeve Runs		
Depth Strike	Remarks	Depth Base	Diameter	Depth Top (m)	Depth Base (m)	Diameter (mm)
	No strike.			1.00	2.00	87 100%
				2.00	3.00	77 80%
				3.00	4.00	67 75%
				4.00	5.00	57 95%



Image 1. DS02::

DS02:

Viewed from left to right, top to bottom:

1.00 - 2.00m bgl

2.00 - 3.00m bgl

3.00 - 4.00m bgl

4.00 - 5.00m bgl

IGE consulting		Office 16, Bartle House, Oxford Court Manchester M2 3WQ email: contact@igeconsulting.co.uk web: www.igeconsulting.co.uk tel: 0161 914 9170		Dynamic Sample Borehole Log ver. 1.5				Dynamic Sample No. DS03 Sheet 1 of 1		
Project Name: Great Jones Street				Co-ords: 387387E - 396592N		Project No. 4015				
Location: Manchester				Level (m AOD): 56.90		Logged By TP				
Client: Oslady Homes Ltd				Date: 26/07/2023		Checked By AJ				
Well / Backfill	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)		Stratum Description		
		Depth(m)	Type	Results						
		0.10	ES		0.30	56.60		Brown, slightly clayey, gravelly, fine to coarse SAND. Gravel is angular to subrounded of red brick (40%), concrete (30%), plastic (10%), glass and ceramic (10%). MADE GROUND <i>Concrete slab encountered at 0.10 - 0.30m bgl.</i>		
								Soft, brown, gravelly, sandy CLAY. Gravel is angular to subrounded, fine to coarse of red brick (30%), concrete (30%), sandstone (20%), mudstone (10%) and glass (10%). MADE GROUND		
		1.00	SPT	N=0 (0,0/0,0,0,0)	1.00	55.90		Soft, brown mottled grey, slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded, fine to coarse, of red brick (30%), sandstone (20%), concrete (20%) mudstone (20%) and glass (10%). MADE GROUND	1	
		1.20	ES							
		2.00	SPT	N=21 (3,3/3,4,6,8)	2.00	54.90		Firm, brown, slightly gravelly, slightly sandy CLAY. Gravel is subangular to rounded, fine to coarse of sandstone (50%) and mudstone (50%) GLACIAL TILL	2	
2.30	B									
3.00	SPT	N=50 (6,7/50 for 280mm)	3.42	53.48		Dynamic Sample terminated at 3.42m.	3			
								4		
								5		
								6		
Remarks:				Water Strike		Casing Details		Sample Sleeve Runs		
Dynamic Sample Borehole terminated at 3.42m bgl due to refusal.				Depth Strike	Remarks	Depth Base	Diameter	Depth Top (m)	Depth Base (m)	Diameter (mm)
					No strike.			1.00 2.00	2.00 3.00	87 40% 77 85%

Dynamic Sample Borehole Photos

DS03

Great Jones Street



Image 1. DS03::

DS03:

Viewed from left to right, top to bottom:

1.00 - 2.00m bgl

3.00 - 3.00m bgl



ver. 1.5

Sheet 1 of 1

Checked By
AJ

[illegible]

Remarks:	
----------	--

Dynamic Sample Borehole terminated at 4.45m bgl due to collapses.

Water Strike		Casing Details		Sample Sleeve Runs		
Depth Strike	Remarks	Depth Base	Diameter	Depth Top (m)	Depth Base (m)	Diameter (mm)
	No strike.			0.00	1.00	87 30%
				1.00	2.00	77 20%
				2.00	3.00	67 30%
				3.00	4.00	57 95%

Dynamic Sample Borehole Photos

DS04

Great Jones Street



Image 1. DS04::

DS04:

Viewed from left to right, top to bottom:

0.00 - 1.00m bgl

1.00 - 2.00m bgl

2.00 - 3.00m bgl

3.00 - 4.00m bgl

APPENDIX 5

GEOTECHNICAL LABORATORY TESTING RESULTS

TEST REPORT

Client IGE Consulting Ltd

Address Office 16
Bartle House
Oxford Court
Manchester
M2 3WQ

Contract Great Lane Street

Job Number MRN 4601/47

Date of Issue 23 August 2023

Page 1 of 7

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

Murray Rix is the trading name of Murray Rix (Northern) Limited. Registered in England 2878361

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014

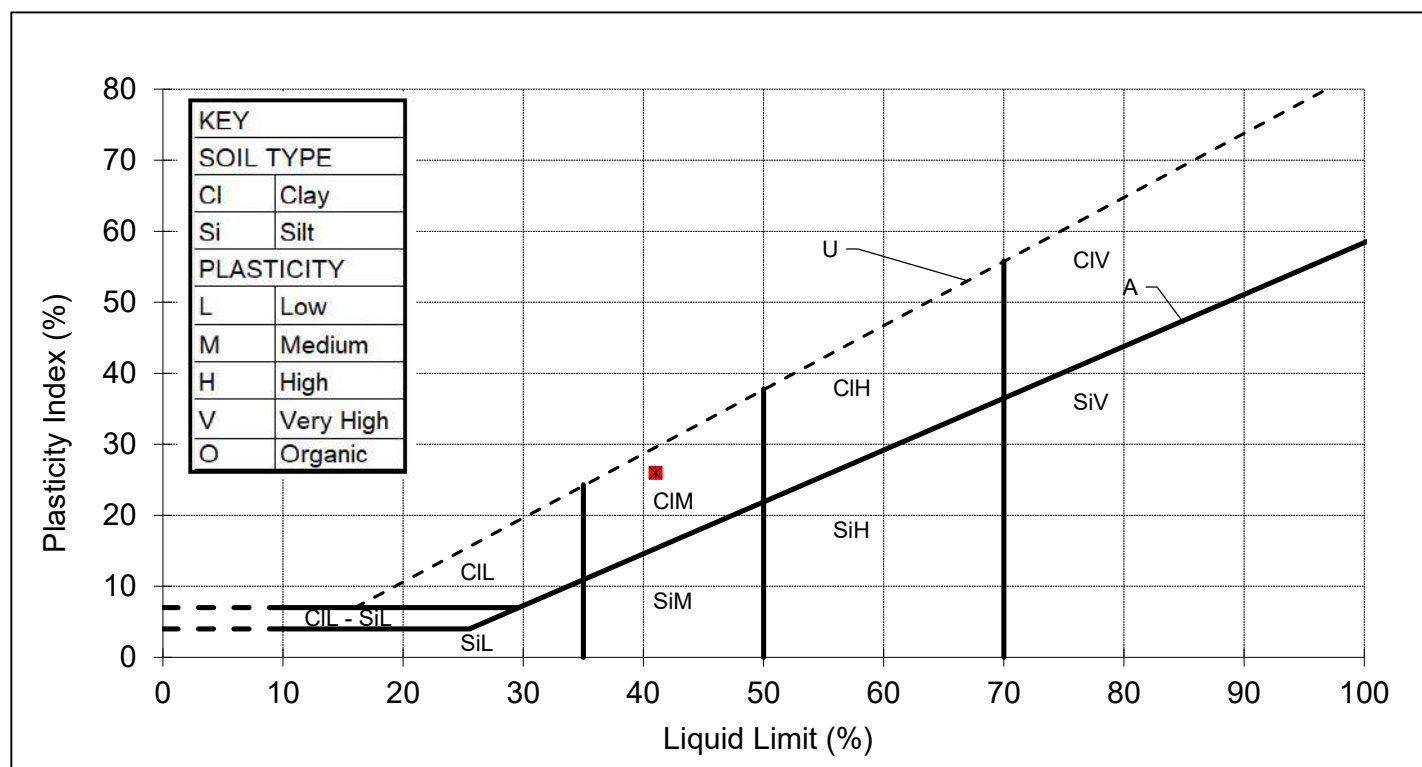
CLIENT	IGE Consulting Ltd
SITE	Great Jones Street
JOB NUMBER	MRN 4601/47

SAMPLE LABEL	DS01 - 1.20	DATE SAMPLED	26-Jul-23
SAMPLE No.	129108	DATE RECEIVED	31-Jul-23
DATE TESTED	07-Aug-23	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly slightly organic CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.7	40.0	1.020	
Determination 2 (avg)	18.9	40.4		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
24.7	41	15	26	92



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

23-Aug-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014

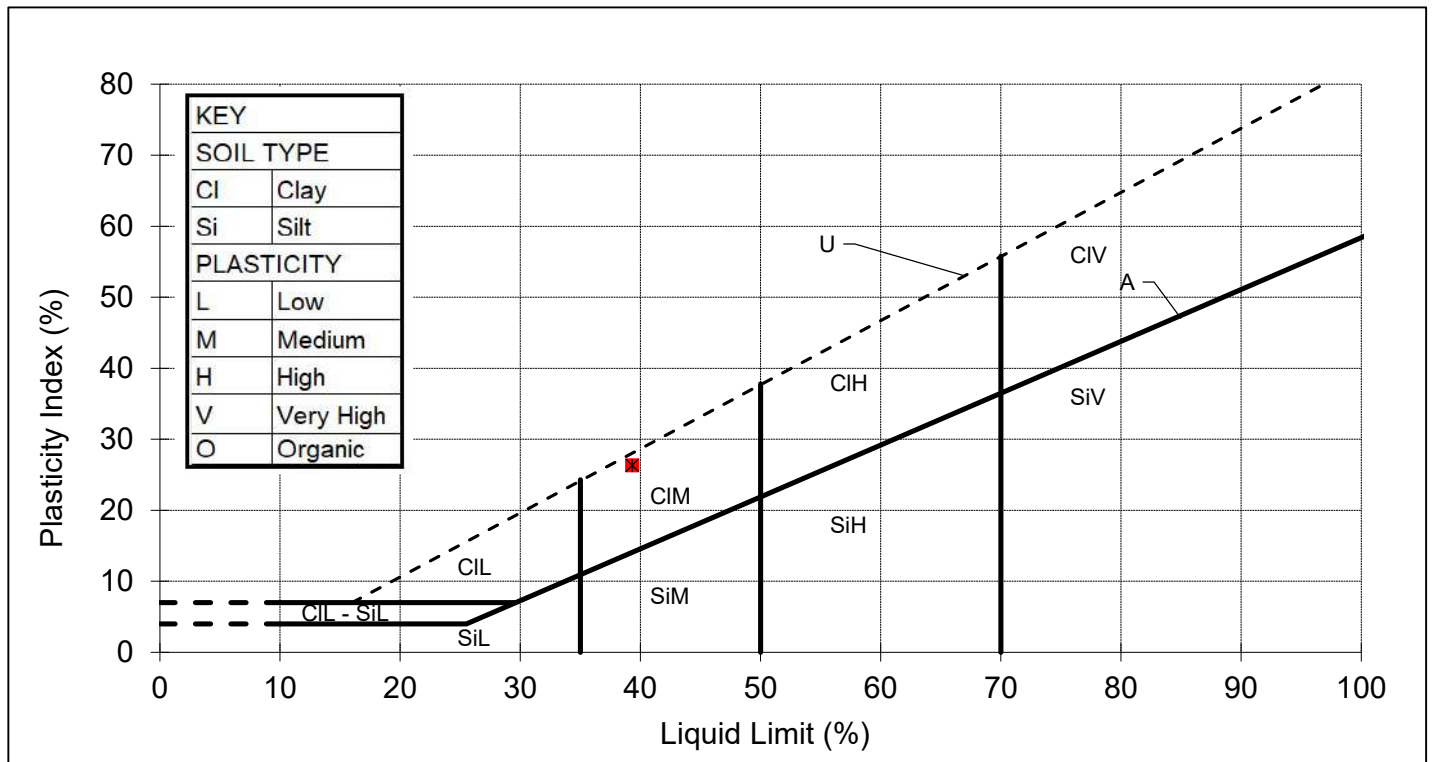
CLIENT	IGE Consulting Ltd
SITE	Great Jones Street
JOB NUMBER	MRN 4601/47

SAMPLE LABEL	DS02 - 1.20	DATE SAMPLED	26-Jul-23
SAMPLE No.	129108	DATE RECEIVED	31-Jul-23
DATE TESTED	07-Aug-23	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly slightly organic CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.2	37.0	1.016	
Determination 2 (avg)	19.2	40.4		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
25.0	39	13	26	90



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

23-Aug-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014

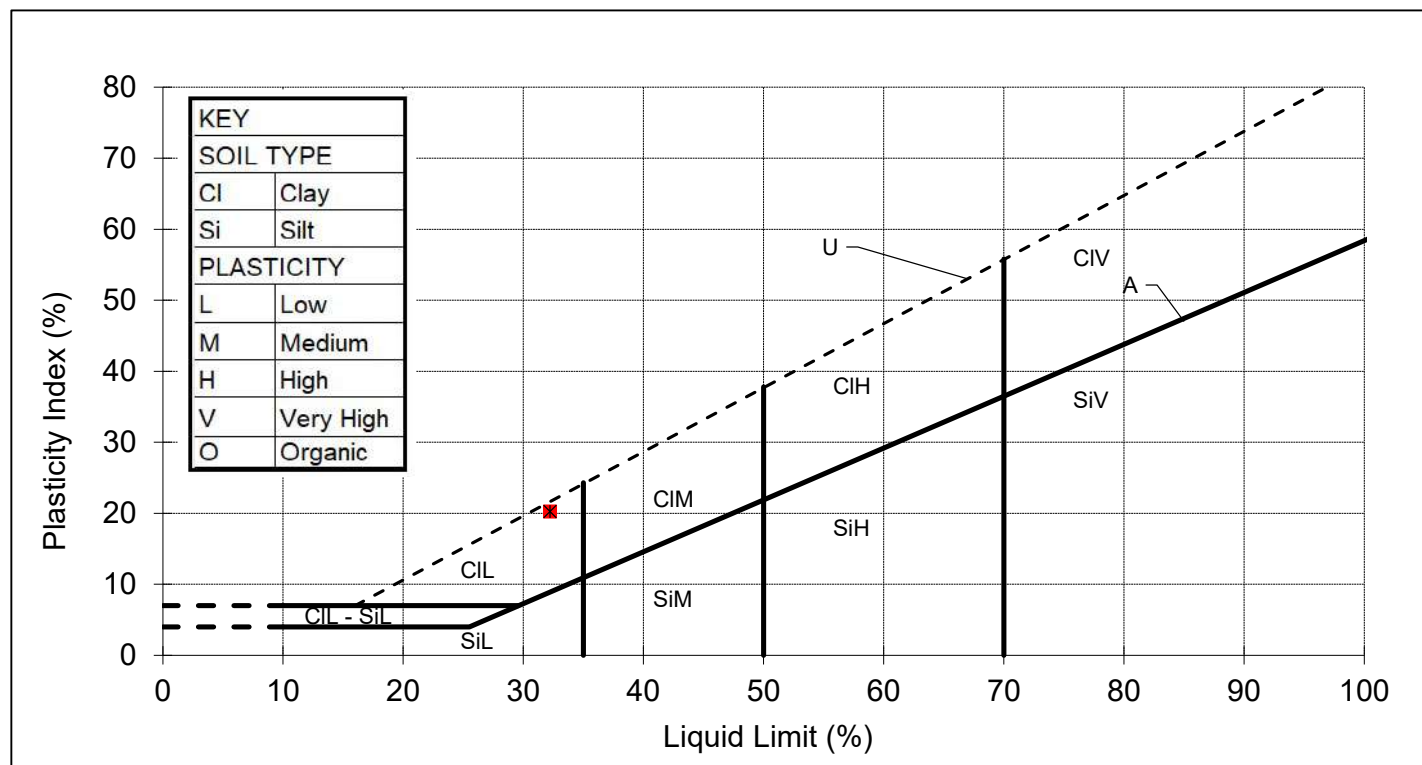
CLIENT	IGE Consulting Ltd
SITE	Great Jones Street
JOB NUMBER	MRN 4601/47

SAMPLE LABEL	DS03 - 2.30	DATE SAMPLED	26-Jul-23
SAMPLE No.	129110	DATE RECEIVED	31-Jul-23
DATE TESTED	07-Aug-23	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.5	31.8	1.023	
Determination 2 (avg)	18.4	31.2		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
8.9	32	12	20	65



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

23-Aug-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014

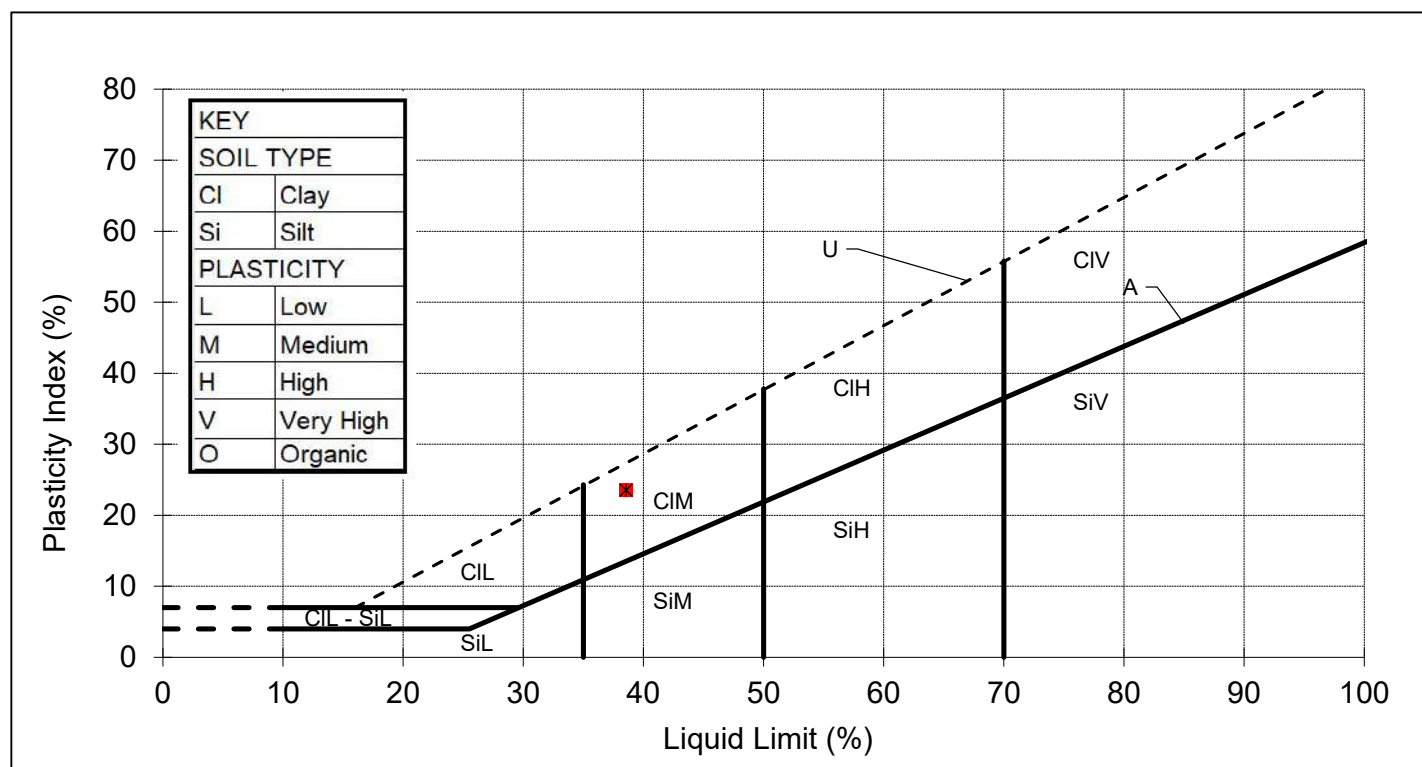
CLIENT	IGE Consulting Ltd
SITE	Great Jones Street
JOB NUMBER	MRN 4601/47

SAMPLE LABEL	DS02 - 4.20	DATE SAMPLED	26-Jul-23
SAMPLE No.	129111	DATE RECEIVED	31-Jul-23
DATE TESTED	07-Aug-23	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.6	38.2	1.012	
Determination 2 (avg)	19.2	38.0		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
24.3	39	15	24	65



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

23-Aug-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

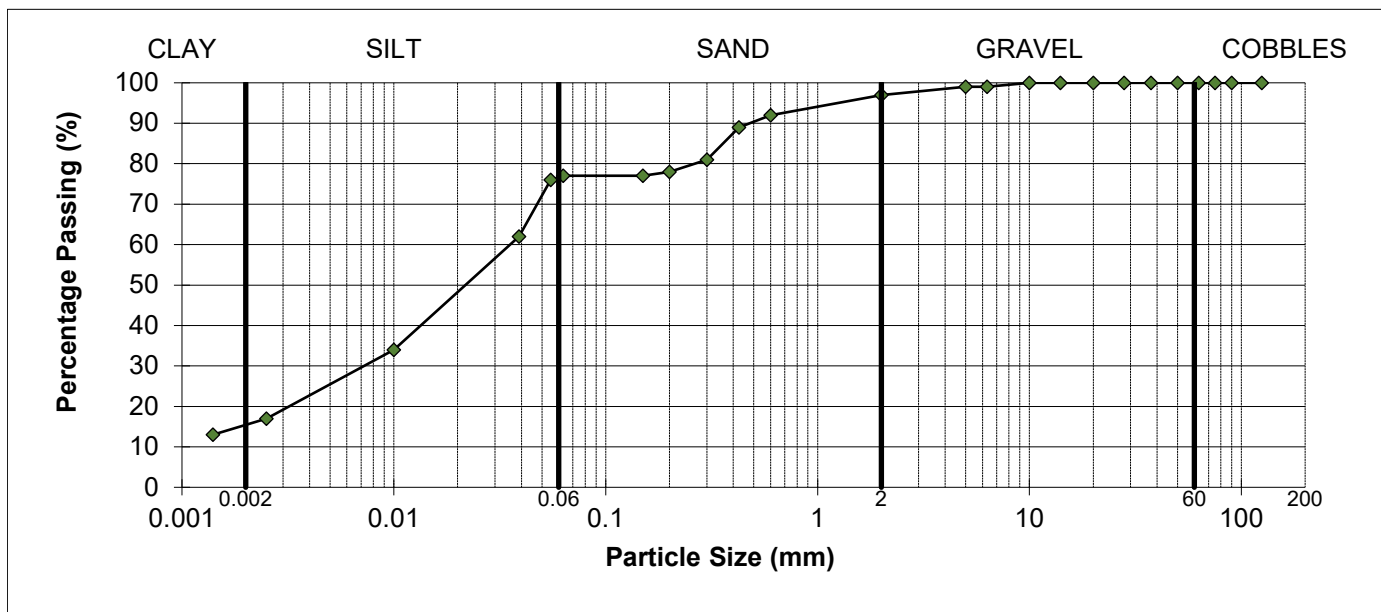
Determination of Water Content in accordance with BS EN ISO 17892-1:2014 (Oven Dry)

CLIENT	IGE Consulting Ltd
SITE	Great Jones Street
JOB NUMBER	MRN 4601/47

SAMPLE LABEL	DS02 - 4.20	DATE SAMPLED	26-Jul-23
LAB SAMPLE No	129111	DATE RECEIVED	31-Jul-23
DATE TESTED	07-Aug-23	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	97	
90	100		0.6	92	
75	100		0.425	89	
63	100		0.3	81	
50	100		0.2	78	
37.5	100		0.15	77	
28	100		0.063	77	
20	100		0.055	76	
14	100		0.039	62	
10	100		0.010	34	
6.3	99		0.0025	17	
5	99		0.0014	13	



REMARKS

As received water content = 24.3%

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

23-Aug-23

MURRAY RIX
ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

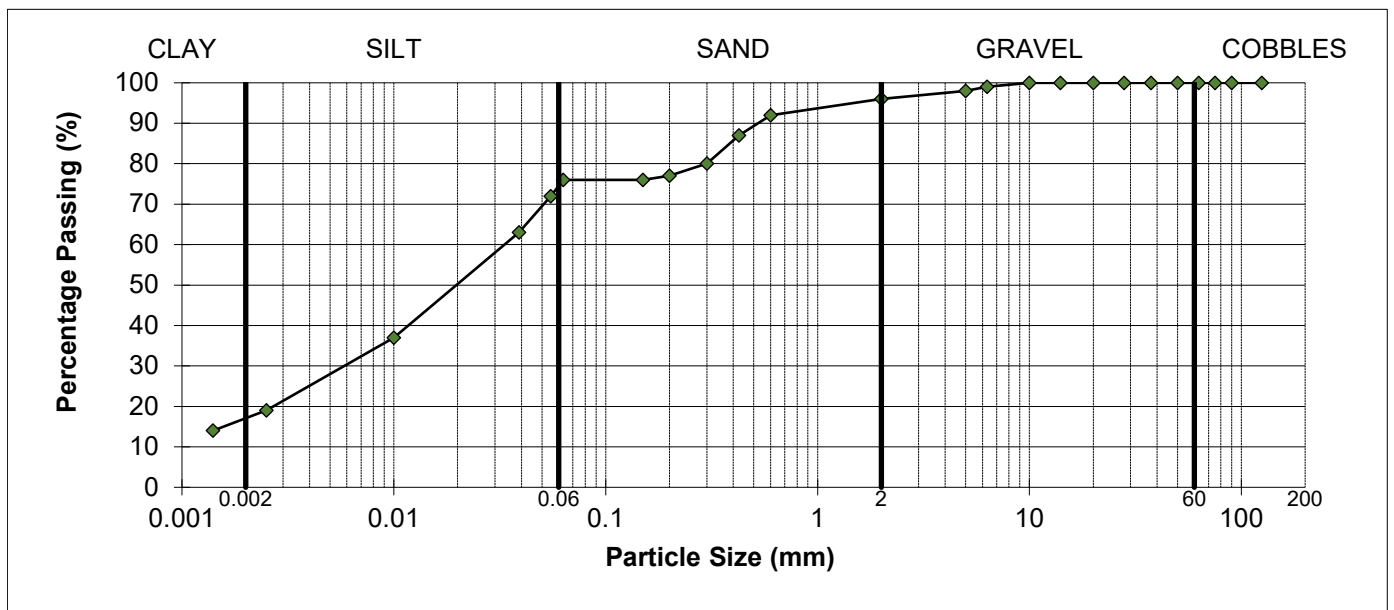
Determination of Water Content in accordance with BS EN ISO 17892-1:2014 (Oven Dry)

CLIENT	IGE Consulting Ltd		
SITE	Great Jones Street		
JOB NUMBER	MRN 4601/47		

SAMPLE LABEL	DS01 - 4.50	DATE SAMPLED	26-Jul-23
LAB SAMPLE No	129112	DATE RECEIVED	31-Jul-23
DATE TESTED	07-Aug-23	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	96	
90	100		0.6	92	
75	100		0.425	87	
63	100		0.3	80	
50	100		0.2	77	
37.5	100		0.15	76	
28	100		0.063	76	
20	100		0.055	72	
14	100		0.039	63	
10	100		0.010	37	
6.3	99		0.0025	19	
5	98		0.0014	14	



REMARKS

As received water content = 12.2%

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

23-Aug-23

APPENDIX 6

CHEMICAL LABORATORY TEST RESULTS



Tom Pudifoot
IGE Consulting
Office 11
Bartle House
Oxford Court
Manchester
M2 3WQ

e: tompudifoot@igeconsulting.co.uk

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 : 23-47973

Project / Site name: Great Jones Street

Samples received on: 28/07/2023

Your job number: 4015

**Samples instructed on/
Analysis started on:** 28/07/2023

Your order number: 4015 28 07 2023

Analysis completed by: 07/08/2023

Report Issue Number: 1

Report issued on: 07/08/2023

Samples Analysed: 6 soil samples

Signed:

Joanna Wawrzeczko
Reporting 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: 23-47973
Project / Site name: Great Jones Street
Your Order No: 4015 28 07 2023

Lab Sample Number				2765245	2765246	2765247	2765248	2765249
Sample Reference				DS01	DS02	DS03	DS04	DS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.20	1.20	0.20	2.50
Date Sampled				26/07/2023	26/07/2023	26/07/2023	26/07/2023	26/07/2023
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	16	14	13	10	35
Total mass of sample received	kg	0.001	NONE	1.1	1.1	1	0.9	1.1

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile	-	Chrysotile	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Detected	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	-	< 0.001	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	-	< 0.001	-
Asbestos Analyst ID	N/A	N/A	N/A	SPU	SPU	SPU	SPU	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3	8	8.5	8.8	6.9
Total Cyanide	mg/kg	1	MCERTS	< 1.0	1.6	< 1.0	< 1.0	-
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Total Sulphate as SO4	%	0.005	MCERTS	-	-	-	-	0.102
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	99	61	110	150	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0493	0.0307	0.0561	0.0742	0.35
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	49.3	30.7	56.1	74.2	350
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	-	14
Total Sulphur	%	0.005	MCERTS	-	-	-	-	0.287
Ammoniacal Nitrogen as NH4	mg/kg	0.5	MCERTS	-	-	-	-	46
Ammonium as NH4 (10:1 leachate equivalent)	mg/l	0.05	MCERTS	-	-	-	-	4.62
Organic Matter (automated)	%	0.1	MCERTS	1.5	6.1	1.3	2.5	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.9	3.5	0.8	1.4	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	-	-	< 2.0
Water Soluble Nitrate (2:1) as NO3	mg/kg	2	NONE	13	56	3.7	2.6	-
Water Soluble Nitrate (2:1) as NO3 (leachate equivalent)	mg/l	5	NONE	6.2	28	< 5.0	< 5.0	-

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.8	1.3	0.06	0.33	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.26	< 0.05	0.1	-
Acenaphthene	mg/kg	0.05	MCERTS	1.7	1.9	< 0.05	0.68	-
Fluorene	mg/kg	0.05	MCERTS	0.8	1.6	< 0.05	0.51	-
Phenanthrene	mg/kg	0.05	MCERTS	7.7	13	0.05	6.7	-
Anthracene	mg/kg	0.05	MCERTS	1.5	2.5	< 0.05	1.6	-
Fluoranthene	mg/kg	0.05	MCERTS	5.6	14	0.06	12	-
Pyrene	mg/kg	0.05	MCERTS	5.1	14	0.06	11	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.1	5.9	< 0.05	5.2	-
Chrysene	mg/kg	0.05	MCERTS	2.3	6	< 0.05	5.1	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	2.1	6.7	< 0.05	6.4	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.66	2	< 0.05	2.8	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.7	5.7	< 0.05	5.9	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.73	2.5	< 0.05	3	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.45	< 0.05	0.63	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.86	2.9	< 0.05	3.2	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	34.5	80.3	< 0.80	64.6	-
-----------------------------	-------	-----	-----------	------	------	--------	------	---

Analytical Report Number: 23-47973
Project / Site name: Great Jones Street
Your Order No: 4015 28 07 2023

Lab Sample Number				2765245	2765246	2765247	2765248	2765249
Sample Reference				DS01	DS02	DS03	DS04	DS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.20	1.20	0.20	2.50
Date Sampled				26/07/2023	26/07/2023	26/07/2023	26/07/2023	26/07/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	11	9	14	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	120	680	170	520	-
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.6	0.4	1	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.8	< 0.2	1.2	-
Chromium (hexavalent)	mg/kg	1.2	NONE	< 1.2	< 1.2	< 1.2	< 1.2	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	33	31	33	31	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	31	76	29	75	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	31	470	16	340	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	1	< 0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	36	19	37	20	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	35	21	33	29	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	71	460	63	270	-

Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	-	42
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	-	21

Monoaromatics & Oxygenates

Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	-
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	-
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	-
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	-
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0	< 5.0	< 5.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	-

Analytical Report Number: 23-47973
Project / Site name: Great Jones Street
Your Order No: 4015 28 07 2023

Lab Sample Number				2765245	2765246	2765247	2765248	2765249
Sample Reference				DS01	DS02	DS03	DS04	DS01
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	0.20	1.20	0.20	2.50
Date Sampled				26/07/2023	26/07/2023	26/07/2023	26/07/2023	26/07/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	-
TPH C10 - C40 EH_CU_1D_TOTAL	mg/kg	10	MCERTS	30	240	20	220	-
TPH2 (C6 - C10) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	-
TPH C6 - C40 EH_CU+HS_CU_1D_TOTAL	mg/kg	10	NONE	30	240	20	220	-
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	2.5	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	10	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	54	8.4	58	-
TPH-CWG - Aliphatic > EC35 - EC44 EH_CU_1D_AL	mg/kg	8.4	NONE	< 8.4	46	< 8.4	22	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	59	12	71	-
TPH-CWG - Aliphatic (EC5 - EC44) EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	110	17	92	-
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	-
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	-
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.1	NONE	< 0.10	< 0.10	< 0.10	< 0.10	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	3.5	2.6	< 2.0	3.3	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	24	< 10	26	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	89	< 10	81	-
TPH-CWG - Aromatic > EC35 - EC44 EH_CU_1D_AR	mg/kg	8.4	NONE	< 8.4	56	< 8.4	30	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	NONE	23	120	< 10	110	-
TPH-CWG - Aromatic (EC5 - EC44) EH_CU+HS_1D_AR	mg/kg	10	NONE	23	170	< 10	140	-
TPH (C10 - C25) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	21	57	18	72	-
TPH (C25 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	180	< 10	150	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number: 23-47973
Project / Site name: Great Jones Street
Your Order No: 4015 28 07 2023

Lab Sample Number				2765250
Sample Reference				DS04
Sample Number				None Supplied
Depth (m)				3.30
Date Sampled				26/07/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	24
Total mass of sample received	kg	0.001	NONE	1.2

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-
Asbestos in Soil	Type	N/A	ISO 17025	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-
Asbestos Quantification Total	%	0.001	ISO 17025	-
Asbestos Analyst ID	N/A	N/A	N/A	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1
Total Cyanide	mg/kg	1	MCERTS	-
Free Cyanide	mg/kg	1	MCERTS	-
Total Sulphate as SO4	%	0.005	MCERTS	0.213
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.716
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	716
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	20
Total Sulphur	%	0.005	MCERTS	0.088
Ammoniacal Nitrogen as NH4	mg/kg	0.5	MCERTS	< 0.5
Ammonium as NH4 (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05
Organic Matter (automated)	%	0.1	MCERTS	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0
Water Soluble Nitrate (2:1) as NO3	mg/kg	2	NONE	-
Water Soluble Nitrate (2:1) as NO3 (leachate equivalent)	mg/l	5	NONE	-

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	ISO 17025	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	-
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	ISO 17025	-
-----------------------------	-------	-----	-----------	---



Analytical Report Number: 23-47973
Project / Site name: Great Jones Street
Your Order No: 4015 28 07 2023

Lab Sample Number				2765250
Sample Reference				DS04
Sample Number				None Supplied
Depth (m)				3.30
Date Sampled				26/07/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-
Chromium (hexavalent)	mg/kg	1.2	NONE	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-
Magnesium (water soluble)	mg/kg	5	NONE	73
Magnesium (leachate equivalent)	mg/l	2.5	NONE	37
Monoaromatics & Oxygenates				
Benzene	µg/kg	5	MCERTS	-
Toluene	µg/kg	5	MCERTS	-
Ethylbenzene	µg/kg	5	MCERTS	-
p & m-xylene	µg/kg	5	MCERTS	-
o-xylene	µg/kg	5	MCERTS	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	-



Analytical Report Number: 23-47973
Project / Site name: Great Jones Street
Your Order No: 4015 28 07 2023

Lab Sample Number				2765250
Sample Reference				DS04
Sample Number				None Supplied
Depth (m)				3.30
Date Sampled				26/07/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Petroleum Hydrocarbons				
Petroleum Range Organics (C6 - C10) HS_1D_TOTAL	mg/kg	0.1	NONE	-
TPH C10 - C40 EH_CU_1D_TOTAL	mg/kg	10	MCERTS	-
TPH2 (C6 - C10) HS_1D_TOTAL	mg/kg	0.1	NONE	-
TPH C6 - C40 EH_CU+HS_CU_1D_TOTAL	mg/kg	10	NONE	-
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.1	NONE	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.1	NONE	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.1	NONE	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	-
TPH-CWG - Aliphatic > EC35 - EC44 EH_CU_1D_AL	mg/kg	8.4	NONE	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	NONE	-
TPH-CWG - Aliphatic (EC5 - EC44) EH_CU+HS_1D_AL	mg/kg	10	NONE	-
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.1	NONE	-
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.1	NONE	-
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.1	NONE	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-
TPH-CWG - Aromatic > EC35 - EC44 EH_CU_1D_AR	mg/kg	8.4	NONE	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	NONE	-
TPH-CWG - Aromatic (EC5 - EC44) EH_CU+HS_1D_AR	mg/kg	10	NONE	-
TPH (C10 - C25) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	-
TPH (C25 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



Analytical Report Number: 23-47973
Project / Site name: Great Jones Street
Your Order No: 4015 28 07 2023

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
2765246	DS02	0.20	170	Loose Fibres	Chrysotile	< 0.001	< 0.001
2765248	DS04	0.20	131	Loose Fibres	Chrysotile	< 0.001	< 0.001

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.



Analytical Report Number : 23-47973
Project / Site name: Great Jones Street

* 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 *
2765245	DS01	None Supplied	0.5	Brown clay and sand with gravel and vegetation.
2765246	DS02	None Supplied	0.2	Brown loam and sand with gravel.
2765247	DS03	None Supplied	1.2	Brown clay and loam with gravel and vegetation.
2765248	DS04	None Supplied	0.2	Brown loam and sand with gravel and vegetation.
2765249	DS01	None Supplied	2.5	Brown clay with gravel.
2765250	DS04	None Supplied	3.3	Brown clay and sand with gravel.

Analytical Report Number : 23-47973
Project / Site name: Great Jones Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

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 dispersion 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
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Nitrate, water soluble, in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE
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
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	NONE
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
TPH2 (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
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 and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS

Analytical Report Number : 23-47973
Project / Site name: Great Jones Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPH Oils (Soils)	Determination of extractable hydrocarbons in soil by GC-MS/FID.	In-house method with silica gel split/clean up.	L076-PL	D	MCERTS
DRO (Soil)	Determination of extractable hydrocarbons in soil by GC-MS/FID.	In-house method with silica gel split/clean up.	L076-PL	D	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 in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
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	D	MCERTS
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
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
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
TPH C6 - C40 (soil)	Determination of TPH bands by HS-GC-MS/GC-FID	TPH> C10 Dry soil n-house method with silica gel split/clean up. TPH <C10 by Wet by HS-GC-MS	L088/L076		NONE
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Water Soluble Nitrate (leachate equivalent)	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	D	NONE



Analytical Report Number : 23-47973
Project / Site name: Great Jones Street

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil	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

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' 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.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total



Tom Pudifoot
IGE Consulting
Office 11
Bartle House
Oxford Court
Manchester
M2 3WQ

e: tompudifoot@igeconsulting.co.uk

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 : 23-48010

Project / Site name: Great Jones Street

Samples received on: 28/07/2023

Your job number: 4015

**Samples instructed on/
Analysis started on:** 31/07/2023

Your order number: 4015 28 07 2023

Analysis completed by: 08/08/2023

Report Issue Number: 1

Report issued on: 08/08/2023

Samples Analysed: 1 soil sample

Signed: _____

Anna Goc
PL Head of 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.



Analytical Report Number: 23-48010
Project / Site name: Great Jones Street
Your Order No: 4015 28 07 2023

Lab Sample Number				2765469
Sample Reference				DS02
Sample Number				None Supplied
Depth (m)				3.50
Date Sampled				26/07/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	8
Total mass of sample received	kg	0.001	NONE	0.6

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.3
Total Sulphate as SO4	%	0.005	MCERTS	0.024
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.0349
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	34.9
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	5.8
Total Sulphur	%	0.005	MCERTS	0.019
Ammoniacal Nitrogen as NH4	mg/kg	0.5	MCERTS	< 0.5
Ammonium as NH4 (10:1 leachate equivalent)	mg/l	0.05	MCERTS	< 0.05
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	21
Magnesium (leachate equivalent)	mg/l	2.5	NONE	11

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



Analytical Report Number : 23-48010
Project / Site name: Great Jones Street

* 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 *
2765469	DS02	None Supplied	3.5	Brown clay.

Analytical Report Number : 23-48010
Project / Site name: Great Jones Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

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
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
Ammonium as NH ₄ in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	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

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' 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.

APPENDIX 7

CHEMICAL LABORATORY SCREENING TABLES

IGE CONSULTING																						
Project: Great Jones Street																						
Job No: 4015																						
Lab Sample Number			2765245		2765246		2765247		2765248		Statistical Analysis							GAC - S4UL unless stated			C4SL	
Sample Reference			DS01		DS02		DS03		DS04		Statistical Results											
Depth (m)			0.50		0.20		1.20		0.20		Count	Standard Deviation	Minimum	Maximum	Average	Maximum	2.5% Residential with Home Grown Produce	Pass/ Fail	Exceedances	Residential with home grown produce	Pass/ Fail	Exceedances
Date Sampled			26/07/2023		26/07/2023		26/07/2023		26/07/2023													
Analytical Parameter (Soil Analysis)			Units	LoD																		
Stone Content			%	0.1	0.1		0.1		0.1		4	0.00	0.1	0.1	0.1	0.1						
Moisture Content			%	0.01	16		14		13		4	2.50	10.00	16.00	13.25	16.00						
Total mass of sample received			kg	0.001	1.1		1.1		1		4	0.10	0.900	1.100	1.025	1.100						
Asbestos																						
Asbestos in Soil Screen			Type	N/A	Not-detected		Chrysotile		Not-detected		4	-	-	-	-	-						
Asbestos Quantification (Stage 2)			%	0.001	-		<0.001		-		2	-	0.00	0.00	-	-						
Asbestos Quantification Total			%	0.001	-		<0.001		-		2	-	0.00	0.00	-	-						
General Inorganics																						
pH - Automated			pH Units	N/A	8.3		8		8.5		4	0.34	8.00	8.80	8.40							
Total Cyanide			mg/kg	1	1		1.6		1		4	0.30	1.00	1.60	1.15	1.60	60	Pass	0			
Free Cyanide			mg/kg	1	1		1		1		4	0.00	1.00	1.00	1.00	1.00	60	Pass	0			
Water Soluble Sulphate as SO4 16hr extraction (2:1)			mg/kg	2.50	99		61		110		4	36.62	61.00	150.00	105.00							
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)			g/l	0.00125	0.0493		0.0307		0.0561		4	0.01798	0.03070	0.07420	0.05258							
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)			mg/l	1.25	49.3		30.7		56.1		4	17.98	30.70	74.20	52.58							
Organic Matter (automated)			%	0.10	1.50		6.10		1.30		4	2.23	1.30	6.10	2.85							
Total Organic Carbon (automated)			%	0.00	0.90		3.50		0.80		4	1.26	0.80	3.50	1.65							
Water Soluble Nitrate (2:1) as NO3			mg/kg	2	13		56		3.7		4	25.22	2.60	56.00	18.83							
Water Soluble Nitrate (2:1) as NO3 (leachate equivalent)			mg/l	5	6.2		28		5		4	11.31	5.00	28.00	11.05							
Speciated PAHs																						
Naphthalene			mg/kg	0.05	1.8		1.3		0.06		4	0.82	0.06	1.80	0.87	1.80	5.60	Pass	0			
Acenaphthylene			mg/kg	0.05	0.05		0.26		0.05		4	0.10	0.05	0.26	0.12	0.26	420	Pass	0			
Acenaphthene			mg/kg	0.05	1.7		1.9		0.05		4	0.87	0.05	1.90	1.08	1.90	510	Pass	0			
Fluorene			mg/kg	0.05	0.8		1.6		0.05		4	0.65	0.05	1.60	0.74	1.60	400	Pass	0			
Phenanthrene			mg/kg	0.05	7.7		13		0.05		4	5.32	0.05	13.00	6.86	13.00	220	Pass	0			
Anthracene			mg/kg	0.05	1.5		2.5		0.05		4	1.01	0.05	2.50	1.41	2.50	5400	Pass	0			
Fluoranthene			mg/kg	0.05	5.6		14		0.06		4	6.34	0.06	14.00	7.92	14.00	560	Pass	0			
Pyrene			mg/kg	0.05	5.1		14		0.06		4	6.21	0.06	14.00	7.54	14.00	1200	Pass	0			
Benzo(a)anthracene			mg/kg	0.05	2.1		5.9		0.05		4	2.73	0.05	5.90	3.31	5.90	11.00	Pass	0			
Chrysene			mg/kg	0.05	2.3		6		0.05		4	2.71	0.05	6.00	3.36	6.00	22	Pass	0			
Benzo(b)fluoranthene			mg/kg	0.05	2.1		6.7		0.05		4	3.27	0.05	6.70	3.81	6.70	3.30	Fail	2			
Benzo(k)fluoranthene			mg/kg	0.05	0.66		2		0.05		4	1.25	0.05	2.80	1.38	2.80	93	Pass	0			
Benzo(a)pyrene			mg/kg	0.05	1.7		5.7		0.05		4	2.92	0.05	5.90	3.34	5.90	2.70	Fail	2	5.00	Fail	2
Indeno(1,2,3-cd)pyrene			mg/kg	0.05	0.73		2.5		0.05		4	1.41	0.05	3.00	1.57	3.00	36	Pass	0			
Dibenz(a,h)anthracene			mg/kg	0.05	0.05		0.45		0.05		4	0.29	0.05	0.63	0.30	0.63	0.28	Fail	2			
Benzo(ghi)perylene			mg/kg	0.05	0.86		2.9		0.05		4	1.54	0.05	3.20	1.75	3.20	340	Pass	0			
Total PAH																						
Speciated Total EPA-16 PAHs			mg/kg	0.8	34.5		80.3		0.8		4	35.09	0.80	80.30	45.05							
Heavy Metals / Metalloids																						
Arsenic (aqua regia extractable)			mg/kg	1	10		11		9		4	2.16	9.00	14.00	11.00	14.00	37	Pass	0			
Barium (aqua regia extractable)			mg/kg	1	120		680		170		4	271.46	120.00	680.00	372.50	680.00	-	Pass	0			
Boron (water soluble)			mg/kg	0.2	0.5		0.6		0.4		4	0.26	0.40	1.00	0.63	1.00	290	Pass	0			
Cadmium (aqua regia extractable)			mg/kg	0.2	0.2		0.8		0.2		4	0.49	0.20	1.20	0.60	1.20	11	Pass	0	22	Pass	0
Chromium (hexavalent)			mg/kg	1.2	1.2		1.2		1.2		4	0.00	1.20	1.20	1.20	1.20	6	Pass	0	21	Pass	0
Chromium (aqua regia extractable)			mg/kg	1	33		31		33		4	1.15	31.00	33.00	32.00	33.00	910	Pass	0			
Copper (aqua regia extractable)			mg/kg	1	31		76		29		4	26.29	29.00	76.00	52.75	76.00	2400	Pass	0			
Lead (aqua regia extractable)			mg/kg	1	31		470		16		4	226.65	16.00	470.00	214.25	470.00	200	Fail	2	200	Fail	2
Mercury (aqua regia extractable)			mg/kg	0.3	0.3		1		0.3		4	0.35	0.30	1.00	0.48	1.00	40	Pass	0			
Nickel (aqua regia extractable)			mg/kg	1	36		19		37		4	9.83	19.00	37.00	28.00	37.00	130	Pass	0			
Selenium (aqua regia extractable)			mg/kg	1	1		1		1		4	0.00	1.00	1.00	1.00	1.00	250	Pass	0			
Vanadium (aqua regia extractable)			mg/kg	1	35		21		33		4	6.19	21.00	35.00	29.50	35.00	410	Pass	0			
Zinc (aqua regia extractable)			mg/kg	1	71		460		63		4	188.76	63.00	460.00	216.00	460.00	3700	Pass	0			
Monoaromatics & Oxygenates																						
Benzene			µg/kg	5	5		5		5		4	0.00	5	5	5.00	5	170	Pass	0			
Toluene			µg/kg	5	5		5		5		4	0.00	5	5	5.00	5	290000	Pass	0			
Ethylbenzene			µg/kg	5	5		5		5		4	0.00	5	5	5.00	5	110000	Pass	0			
p & m-xylene			µg/kg	5	5		5		5		4	0.00	5	5	5.00	5	130000	Pass	0			
o-xylene			µg/kg	5	5		5		5		4	0.00	5	5	5.00	5	140000	Pass	0			
MTBE (Methyl Tertiary Butyl Ether)			µg/kg	5	5		5		5		4	0.00	5	5	5.00	-	-					
Petroleum Hydrocarbons																						
Petroleum Range Organics (C6 - C10)			mg/kg	0.1	0.1		0.1		0.1		4	0.00	0.10	0.10	0.10							
TPH C10 - C40			mg/kg	10	30		240		20		4	118.71	20.00	240.00	127.50							
TPH2 (C6 - C10)			mg/kg	0.1	0.1		0.1		0.1		4	0.00	0.10	0.10	0.10							
TPH C6 - C40			mg/kg	10	30		240		20		4	118.71	20.00	240.00	127.50							
TPH-CWG - Aliphatic >EC5 - EC6			mg/kg	0.1	0.1		0.1		0.1		4	0.000	0.100	0.100	0.100	0.100	78	Pass	0			
TPH-CWG - Aliphatic >EC6 - EC8			mg/kg	0.1	0.1		0.1		0.1		4	0.000	0.100	0.100	0.100	0.100	230	Pass	0			
TPH-CWG - Aliphatic >EC8 - EC10			mg/kg	0.1	0.1		0.1		0.1		4	0.000	0.100	0.100	0.100	0.100	65	Pass	0			
TPH-CWG - Aliphatic >EC10 - EC12			mg/kg	1	1		1		1		4	0.00	1.00	1.00	1.00	1.00	330	Pass	0			
TPH-CWG - Aliphatic >EC12 - EC16			mg/kg	2	2		2		2.5		4	0.25	2.00	2.50	2.13	2.50	2400	Pass	0			
TPH-CWG - Aliphatic >EC16 - EC21			mg/kg	8	8		8		10		4	1.00	8.00	10.00	8.50	10.00	-					
TPH-CWG - Aliphatic >EC21 - EC35			mg/kg	8	8		54		8.4		4	27.65	8.00	58.00	32.10	58.00	92000	Pass	0			
TPH-CWG - Aliphatic >EC35 - EC44			mg/kg	8.4	8.4		46		8.4		4	17.73	8.40	46.00	21.20	46.00	92000	Pass	0			
TPH-CWG - Aliphatic (EC5 - EC35)			mg/kg	10	10		59		12		4	31.57	10.00	71.00	38.00	-	-					
TPH-CWG - Aliphatic (EC5 - EC44)			mg/kg	10	10		110		17		4	51.13	10.00	110.00	57.25	-	-					
TPH-CWG - Aromatic >EC5 - EC7			mg/kg	0.1	0.1		0.1		0.1		4	0.000	0.100	0.100	0.100	0.100	140	Pass	0			
TPH-CWG - Aromatic >EC7 - EC8			mg/kg	0.1	0.1		0.1		0.1		4	0.000	0.100	0.100	0.100	0.100	290	Pass	0			
TPH-CWG - Aromatic >EC8 - EC10			mg/kg	0.1	0.1		0.1		0.1		4	0.000</										