47 Spear Street, Manchester

Phase II Ground Investigation Report

March 2023

Zidane Projects

The Sharp Project

Thorp Road

Manchester

M40 5BJ

Final Report

Report No. 70539-1 Rev1

Document Verification

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1 Introduction

A Phase II ground investigation report was issued by GPCL in December 2020 to Pearl Hub Lt for the site at 47 Spear Street, Manchester, M1 1DF. The proposals for the site comprised the construction of a five storey residential building with a basement.

The revised proposals for the site as of March 2023 comprise the construction of a six-storey mixed-use residential and office building with a basement. Our assessments have been updated to consider the new proposals for the site.

A Desk Study (Preliminary Risk Assessment) was previously carried out by Geoinvestigate, and a copy is included in Appendix B. A summary of the pertinent information is included in this report, however, the Desk Study conducted by Geoinvestigate should be referred to for more detail.

The objectives of this report are to ascertain the expected ground conditions and to carry out a preliminary contamination risk assessment of the site.

The scope of this report and approach are as follows:

- Summarise the previous desk study;
- A ground investigation including two cable tool boreholes and machine excavated trial pits;
- Development of a ground model that summarises the ground investigation data, and characteristic values for the strata at the site and highlight any uncertainties;
- Provide a geo-environmental appraisal for the site;
- Provide a geotechnical appraisal of the proposals for the site.

2 Phase I Desk Study Summary

2.1 Site Location

The site is located in Manchester City Centre at Grid Reference SJ 84568 98532. The site address is 47 Spear Street, Manchester, M1 1DF. The site lies at an elevation of approximately 45m AOD on a relatively flat area of land.



Figure 1: Site Location and Topography (Ordnance Survey, copyright 2020)

2.2 Proposals

The proposals for the site comprise the construction of a six-storey mixed-use residential and office building with a basement. The proposed basement and ground floor will comprise of office and utility room space, with two lightwells proposed along the north side of the property. The basement will be founded at a depth of 2.7m bgl. The remaining floors (1st Floor to 5th Floor) will comprise of 5No. residential apartments.

2.3 Site Description

The site comprises of a rectangular piece of land with dimensions of approximately 16m by 7m and a total area of 0.01ha. Access to the site is gained via Spear street to the southeast and the surrounding three boundaries are enclosed by multi-storey residential and commercial developments. The site currently lies undeveloped, covered in gravel hardstanding and is secured by a 2m high metal fence.

2.4 Geology

The geology of the site is indicated on BGS Sheet 85 (Manchester) and the BGS Viewer. The available geological maps indicate the site stratigraphy comprises of superficial deposits of Glacial Till overlying sandstone forming part of the Chester Formation.

It was noted by the client that prior to demolition, the previous development on-site included a basement, which was subsequently infilled with the resulting building rubble. Therefore, it is expected that at least 2.0m of demolition waste is present below the site.

There is one major fault located in close proximity to the site. The Ardwick fault trends in a Northwest-Southeast direction and is located approximately 150m to the west of the site.

Historical borehole records (BGS Ref: SJ89NW545) located 150m to the west of the site indicate the thicknesses of the Glacial Till deposits is proven to between 10-12m. Sandstone was not proven. No groundwater was recorded on the historical borehole records.

The site in within a coal mining reporting area, however, the site is not in a development risk area. A Coal Authority report obtained by Geoinvestigate confirms that the site is not in an area that could be affected by past underground mining and that there are no mine entries within 20m of the site. Therefore, the risk from coal mining at the site is considered to be negligible.



Figure 2: Geology (BGS Manchester 85)

The radon risk for the site is very low with less than 1% of properties above the action level.

2.5 Hydrology and Hydrogeology

The Glacial Till deposits are identified as being a Secondary Undifferentiated Aquifer. The sandstone comprising part of the Chester Formation acts as the regions Principal Aquifer. It is described as having high intergranular and/or fracture permeability and may support water supply and/or river base flow on a strategic scale.

The site is not located within a Source Protection Zone and there are no active groundwater abstractions located within 250m of the site.

Historical flood records indicate that there have been no prior river or coastal flooding events within 250m of the site and as such, the risk of flooding from surface water, river or coastal sources is determined to be very low. A medium risk from surface water flooding has been identified on Spear Street, but not on the site.

2.6 Site History

The earliest available historical map, dated 1850, indicates that an outhouse was present on site and the surrounding area consists of residential developments and public houses. During the period 1891 to 1999, the site contained a residential dwelling that was demolished in 1999. Notable historical contaminative industries within the surrounding area during the period 1950 to 1891 include an iron foundry, timber yard and brass foundry. A printing works located 20m east of the site was also present during the period 1931 to 1986.

2.7 Environmental Information

Records of existing potentially contaminative industrial sites within 250m of the site include a transport and storage facility, two electricity substations and an engineering works.

There are no active or historical landfill sites located within 250m of the site.

There are no environmentally sensitive sites within the immediate surrounding area of the site, however the site lies within a Site of Special Scientific Interests (SSSI) Risk Zone. This relates to any proposed new development from industries such as infrastructure, wind and solar energy, and any development that produces significant combustion or air pollution, which may have the potential to impact upon an SSSI site and will require advice on how these impacts may be avoided or mitigated.

There is one recorded historical petrol and fuel site located 250m to the northeast of the site.

2.8 Preliminary Risk Assessment

The overall findings from the qualitative risk assessment conducted by Geoinvestigate indicate that the current risk posed to current and future site uses is a low to moderate risk, assuming that the proposed end use of the site is residential. The conceptual model developed by Geoinvestigate highlights historical off-site industries and electricity substations within the immediate area as a potential source of contaminants. The low permeability of the superficial deposits present on-site reduces the possibility of pathways.

Ground gas originating from the anticipated Made Ground on site is also highlighted as a potential source of contamination. However, the volume of gas being produced is anticipated to be small based on the anticipated demolition fill (low organics with the potential to produce gases).

A summary of the conceptual site model and associated relevant pollutant linkages are presented below in Table 1.

Table 1: Copy of the Conceptual Site Model by Geoinvestigate

Potential Source	Nature of Hazard	Associated Contaminants	Pathway	Receptor	Preliminary Risk Rating
Historical on site and nearby land use and development Historical industrial land uses Electrical Substations	Inorganic and organic chemical contaminants	Trace metals PAHs Petroleum hydrocarbons PCBs	• Direct Contact • Ingestion of soil • Ingestion of dust • Inhalation of vapour • Leaching into groundwater	• Site operatives • End users • Vegetation • Controlled waters • Structures and services • Neighbouring sites/users	Low - Moderate
Possible Made Ground	Ground Gas migration	Hazardous Gas (CO_2, CH_4)	• Inhalation • Explosion risk	• Site operatives • End users	Low

3 Ground Investigation

3.1 Fieldwork and Laboratory Testing

A ground investigation was undertaken by Sub Surface on the 24th September 2020 and a copy is included in Appendix C. The scope of the ground investigation included the following:

- 2 No. cable percussive boreholes drilled to a depth of 8.5 m and 15.25m bgl;
- 2 No. foundation inspection pits.

Geotechnical testing included the following:

- 4 No. Moisture Content and Atterberg tests;
- 7 No. Unconsolidated Undrained Triaxial shear strength tests;
- 5 No. samples tested for BRE SD1 chemical and ground aggressivity.

Chemical testing was carried out on six samples of the Made Ground. The testing included a common suite of contaminants including the following:

- Metals;
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Total Petroleum Hydrocarbon Criteria Working Group (TPH CWG);
- Phenols;
- Benzene, Toluene, Ethylbenzene And Xylene (BTEX); and
- asbestos screen.

One groundwater and ground gas monitoring installation has been placed in BH1. Six monitoring visits have been scheduled to confirm the low risk rating.

3.2 Ground Model

A summary of the ground conditions encountered on site during the investigation is detailed below in Table 2.

Table 2: Summary of Ground Conditions

Strata	Description	Depth to base of strata (m bgl)	SPT N Values
Made Ground	Limestone gravel over geomembrane	0.1	N/A
	Slightly clayey slightly silty sandy fine to coarse gravel of brick, stone, metal, wood, plastic and clinker. Frequent brick cobbles.	2.4 – 3.0	N/A
	Slightly gravelly slightly sandy silty clay. Gravel is fine to coarse brick and stone.	3.6 - 3.7	12 - 14
Glacial Till Deposits	Firm to stiff slightly sandy silty clay with some lenses of sandy silt and bands of sand.	6.0 – 7.0	18 - 19
	Firm to stiff thinly laminated slightly gravelly slightly sandy silty clay. Gravel is fine to coarse sandstone, siltstone and quartz. Becoming very stiff and sandy from 12.4m bgl	>15.25	16 - >50

3.2.1 Made Ground

Made Ground was encountered in each exploratory hole up to 3.6m and 3.7m bgl. The Made Ground comprised:

- a hardstanding layer of limestone of around 0.1m in thickness;
- geomembrane;
- demolition fill comprising slightly clayey slightly sandy gravel with frequent brick cobbles to depths of up to 3.0m bgl;
- reworked Glacial Till comprising slightly gravelly slightly silty clay to depth of up to 3.7m bgl.

The granular Made Ground was of very poor stability with excavations spalling.

SPT testing conducted within the reworked Glacial Till gave N-values of 12 and 14.

3.2.2 Glacial Till Deposits

The Glacial Till deposits encountered in BH1 and BH2 are described as having an upper layer of firm to stiff slightly sandy silty clay to depths of 6m and 7m bgl, overlying firm to stiff laminated slightly gravelly slightly sandy silty clay proven to refusal at 15.25m bgl.

SPT tests carried out in the Glacial Till Deposits recorded N-values of between 16 and 20, with refusals at 13.5m and 15.0m bgl (stiff to very stiff). An SPT versus depth plot is included in Appendix C.

Unconsolidated Undrained Triaxial tests conducted within the Glacial Till indicate a shear strength of between 41 and 113kN/m^2, corresponding with firm to stiff. A shear strength versus depth plot is included in Appendix C.

Atterberg limit testing carried out on the deposits between 4.5m bgl and 8.5m bgl indicate a Liquid Limit of between 32% and 47%; Plastic Limit of between 15% and 20% and a Plasticity Index of between 16% and 27% (corrected to between 16% and 23%). Results from the Atterberg limit testing indicate that the Glacial Till are of a low to medium plasticity and shrink/swell potential. No correlation with respect to plasticity was identified between the upper and lower Glacial Till. The plasticity chart is included in Appendix C.

3.2.3 Groundwater and Ground Gas

A standpipe was installed BH1 that was screened between 1.0m and 6.0m bgl, within the Made Ground and upper Glacial Till.

It is understood that a significant proportion of the Made Ground will be removed to construct the basement and the absence of any landfills in the area, there is considered limited sources that may pose a risk to the site. In addition, the site is underlain by low permeability cohesive Glacial Till deposits that are likely to inhibit the pathway.

To quantitatively assess the risk gas monitoring has been carried out alongside the groundwater monitoring for confirmatory purposes.

SIx ground gas and groundwater monitoring visit has been carried, between 9 October and 8 December 2020. Methane was at less than detection limit, carbon dioxide up to 0.1% and oxygen results were near normal atmospheric concentration at 20.4% and 20.7%. Flow was recorded at <0.1l/hr on each occasion. The initial GSV has been calculated as 0.0001l/hr, corresponding with Characteristic Situation 1, very low risk.

No groundwater strikes were recorded during the site work. However groundwater monitoring recorded water levels of between 2.6m and 2.85m bgl, which correspond with the base of the granular Made Ground and may represent perched water sat on top of the Glacial Till.

3.3 Soil Parameters

The soil parameters for use in the pile design were interpreted from the above information and are presented in Table 3 below.

Table 3: Soil Parameters

Soil Parameters	Units	Symbol	Made Ground	Glacial Till
Unit weight of unsaturated soil	kN/m^3	γ	18	17[1]
Unit weight of saturated soil	kN/m^3	γ	20	20[1]
Poisson's ratio	-	ϖ	0.3	0.2
Undrained Shear strength	kN/m^2	C_u	N/A	41 - 113[1]
Angle of internal friction	°	ϕ	30	25

4 Geo-environmental Assessment

The results of the testing carried out by Sub Surface have been assessed for a proposed end use being residential without plant uptake, assuming 1% soil organic matter. The results are included in the Appendices with a summary sheet in Appendix C.

The results show that the screening criteria has been exceeded for mercury and dibenzo[a,h,i]perylene in the granular 'demolition fill' Made Ground. In addition, two samples of the six tested encountered chrysotile asbestos.

Table 4: Chemical test results summary

Determinand	Number of samples tested	Results (mg/kg)	Number of samples exceeded	Screening value (mg/kg)
Mercury	6	<0.1 – 1.7	2 (TP1 and TP2)	1.2
Dibenzo[a,h,i]perylene	6	<0.1 – 0.85	1 (TP1)	0.31
Asbestos	6	Chrysotile	2 (TP1 and TP2)	Present

The source of mercury is unknown but can be encountered in products such as electrical equipment, batteries, fluorescent bulbs and thermostats. The exceedances, being marginally above screening values, are not considered significant.

From PAH analysis using a double ratio plot, the PAH can be attributed to a variety of coal derived, petroleum and combustion products. The ratios of the mean concentrations are within the limits of the Culp et al. study and therefore the surrogate marker approach should be used. Using the C4SL benzo[a]pyrene surrogate marker approach, the results are below screening values and therefore the risk is considered low.

The asbestos on site was encountered as cement sheeting containing chrysotile. The presence of any amounts of asbestos can pose a risk. However, since it is bound in cement, the main risk is if it is disturbed.

Based on the excavation of the majority of the Made Ground to construct the proposed basement and the proposed construction of hardstanding throughout it is not considered that these exceedances pose a risk to end users or controlled water receptors.

Construction workers should wear appropriate PPE and should be made aware of the risks, particularly relating to asbestos containing material (ACM). A risk assessment should be carried out and methods of safe working included in the construction method statement.

Based on the presence of asbestos in the 'demolition fill' Made Ground is likely to be classified as hazardous. However, the cement sheeting was visible by the naked eye. Therefore, it may be possible for a specialist to hand pick the asbestos material out of the stockpiles sent for disposal to reduce the hazard rating with agreement of the receiving landfill operator. The limestone gravel at the surface, reworked Glacial Till and Glacial Till will likely be classified as inert.

5 Geotechnical Assessment

The general ground conditions beneath the proposed footprint comprise Made Ground to 3.6m and 3.7m bgl, overlying firm to stiff Glacial Till. Perched groundwater may be encountered within the Made Ground.

The proposals for the site comprise a six-storey mixed-use residential and office building with basement. The drawings included in Appendix A indicate that the basement floor level is approximately 2.7m bgl. The lightwells will be founded at a depth of 1.8m bgl. No pavements or soakaways are proposed at the site.

5.1 Foundations

Conventional shallow strip foundations bearing within the Glacial Till from 3.7m bgl would be possible for a lightly loaded structures (<100kN/m^2). However, based on the building height and depth of Made Ground anticipated to be approximately 3.7m bgl it may be more feasible to consider a piled foundation.

Pile safe working loads will depend upon the pile type, building loads and tolerances. Once more details are available on loads, we can advise on pile type and typical loads. The final pile design should be developed by a specialist piling contractor. It is also recommended that the piles are tested in compression to confirm design calculations. The use of static load tests should be adopted to confirm the design calculations.

5.2 Floor Slab

A ground bearing slab will be viable bearing onto the Glacial Till. Where Made Ground is still present this should be excavated and replaced with suitable granular fill and compacted to a suitable specification.

No ground gas protection measures are required.

5.3 Excavations and Basement

Excavations will be required to form the basement. It is not known at this stage how the basement will be constructed. The basement is directly adjacent to existing structures and careful consideration will need to be given to the design, method and process of construction. The walls of the adjacent buildings may require underpinning. Consideration will need to be

given to the generation of ground movement which may affect and potentially damage the adjacent properties and others close by. Groundwater seepages may be encountered in the Made Ground. An allowance for groundwater control should be made for the temporary works. Care should be taken not to draw out finer materials from the ground during any dewatering process as the ground loss caused may lead to significant settlements of affected properties. The waterproofing of the basement should follow BS 8102 “Code of practice for protection of below ground structures against water from the ground”.

5.4 Concrete and Pipe Precautions

Five samples of Made Ground and Glacial Till were send for BRE sulphate tests. In addition, five samples of Made Ground were tested for total sulphate as part of the generic contamination assessment suite. The characteristic values for the concrete class design are as follows:

Table 5: Summary of Sulphate Results

Stratum	Water soluble sulphate (mg/l)	Total potential sulphate (%)	pH	Design Sulphate Class	ACEC Class
Made Ground	84	0.72	8.2	DS-3	AC-3
Glacial Till	100	N/A	8.4	DS-1	AC-1

The BRE sulphate tests have identified the site as Design Sulphate Class DS-3 and the Aggressive Chemical Environment for Concrete being AC-3. Therefore, special precautions are required for concrete if the Made Ground is to remain. Based on much of the Made Ground being removed as part of the basement construction, it is considered that the concrete class can be downgraded to Design Sulphate Class DS-1 and the Aggressive Chemical Environment for Concrete being AC-1.

No hydrocarbons have been found at elevated concentrations that would adversely impact the setting of concrete. Water supply companies have their own screening criteria, however, based on the chemical test results it is anticipated that no special precautions are required for the design and installation of water supply pipes.

6 Conclusions

- The anticipated ground conditions at the site comprise Made Ground to 3.6m and 3.7m bgl, overlying firm to stiff Glacial Till. Perched groundwater may be encountered within the Made Ground.
- The chemical testing has found mercury and dibenzo[a,h,i]perylene above screening criteria for residential without plant uptake end use. However, the results are not considered significant and based on removal of the majority of the Made Ground for the proposed basement there will be a negligible risk to end users and controlled waters.
- Chrysotile asbestos was encountered in the form of cement sheeting in two out of six samples. This should be considered within the contractor's risk assessments and method statement.
- A piled foundation solution is considered likely based on the temporary shoring required during excavations and the anticipated loads of the proposed five-storey building.
- The formation of the basement will require careful consideration in design and execution. The basement construction has the potential to adversely affect adjacent and other nearby properties.
- Based on much of the Made Ground being removed as part of the basement construction, it is considered that the concrete class is Design Sulphate Class DS-1 and the Aggressive Chemical Environment for Concrete being AC-1. If the Made Ground is to remain at the site the concrete class will need to be increased.
- The site has been calculated to be Characteristic Situation 1 where no ground gas protection measures are considered necessary.
- Groundwater was recorded during monitoring at depths of between 2.6m and 2.85m bgl. The waterproofing of the basement should follow BS 8102.

7 References

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- The Soil Code. Code for Good Agricultural Practice for the Protection of Soil. MAFF 1998.
- SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document. DEFRA. December 2014.
- United Kingdom Water Industry Research (UKWIR) Report 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites' 2011.
- Waste (England and Wales) Regulations. 2014.

Appendix A

Drawings



PLANNING
LOCATION PLAN

Location Plan 1:1250 / A4

Applicant's Ownership

Application Demise Line

1:1250

25m 0m 25m

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Location Plan		
SCALE @ A4	1 : 1250	DATE	12/12/22
DRAWING NO.	LP2110-3-001	REV	

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EXISTING BLOCK PLAN

1:500

10m 0m 10m

Application Demise Line

Applicant's Ownership

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Existing Block/Site Plan		
SCALE @ A3	As indicated	DATE	12/12/22
DRAWING NO.	LP2110-3-002	REV	

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Existing Block/Site Plan 1:500 / A3



PROPOSED BLOCK PLAN

1:500

10m 0m 10m

Application Demise Line

Applicant's Ownership

PLANNING

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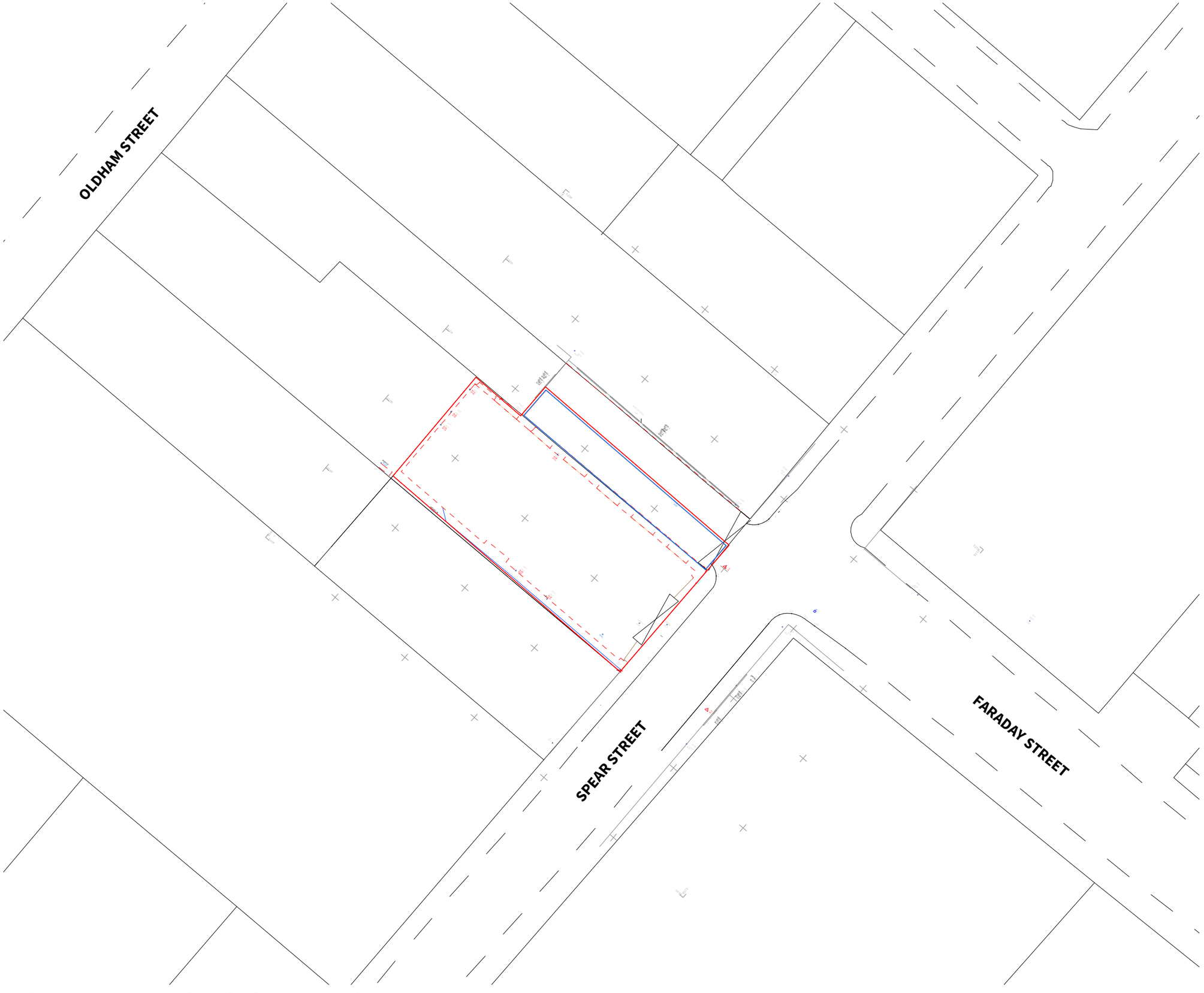
REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Block/Site Plan		
SCALE @ A3	As indicated	DATE	12/12/22
DRAWING NO.	LP2110-3-003	REV	

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Proposed Block/Site Plan 1:500 / A3



EXISTING
TOPOGRAPHICAL

1:250

10m 0m 10m

Application Demise Line
Applicant's Ownership
Demolished Building

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Existing Topographical Plan		
SCALE @ A3	1 : 200	DATE	12/12/22
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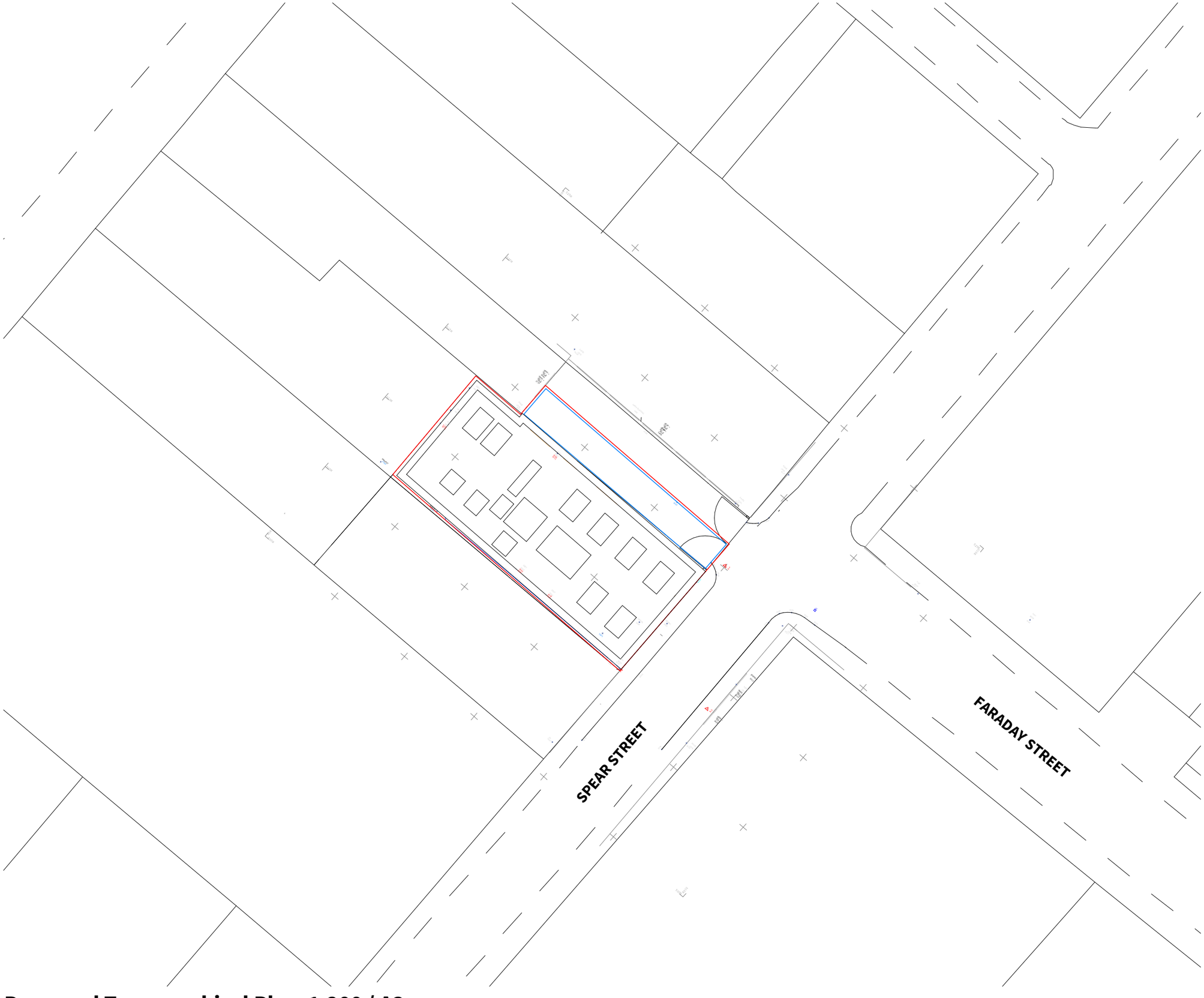
Existing Topographical Plan 1:200 / A3

PROPOSED

TOPOGRAPHICAL

1:250

10m 0m 10m



Application Demise Line

Applicant's Ownership

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Topographical Plan		
SCALE @ A3	1 : 200	DATE	12/12/22
DRAWING NO.	LP2110_3_005	REV	

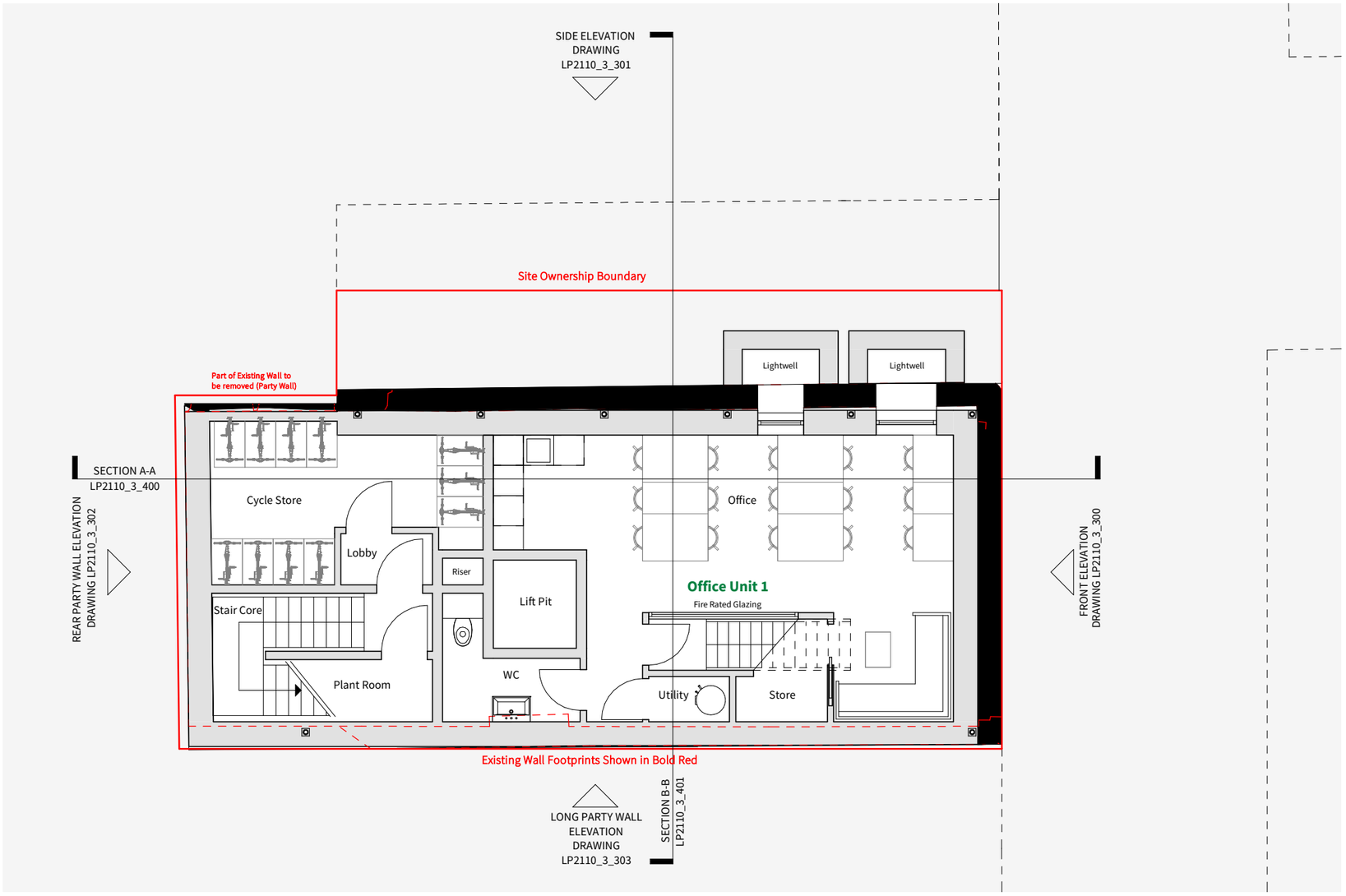
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Proposed Topographical Plan 1:200 / A3

PROPOSED BASEMENT PLAN

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Basement Floor Plan 1:100 / A3

Gross Internal Area (GIA):
All areas indicated on the LP2110_3_Spear Street Accommodation Schedule

0 1 2 3 4m

1:100

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Basement Plan		
SCALE @ A3	As indicated	DATE	12/12/22
DRAWING NO.	-LP2110_3_199	REV	

Existing

Proposed

Site Boundary

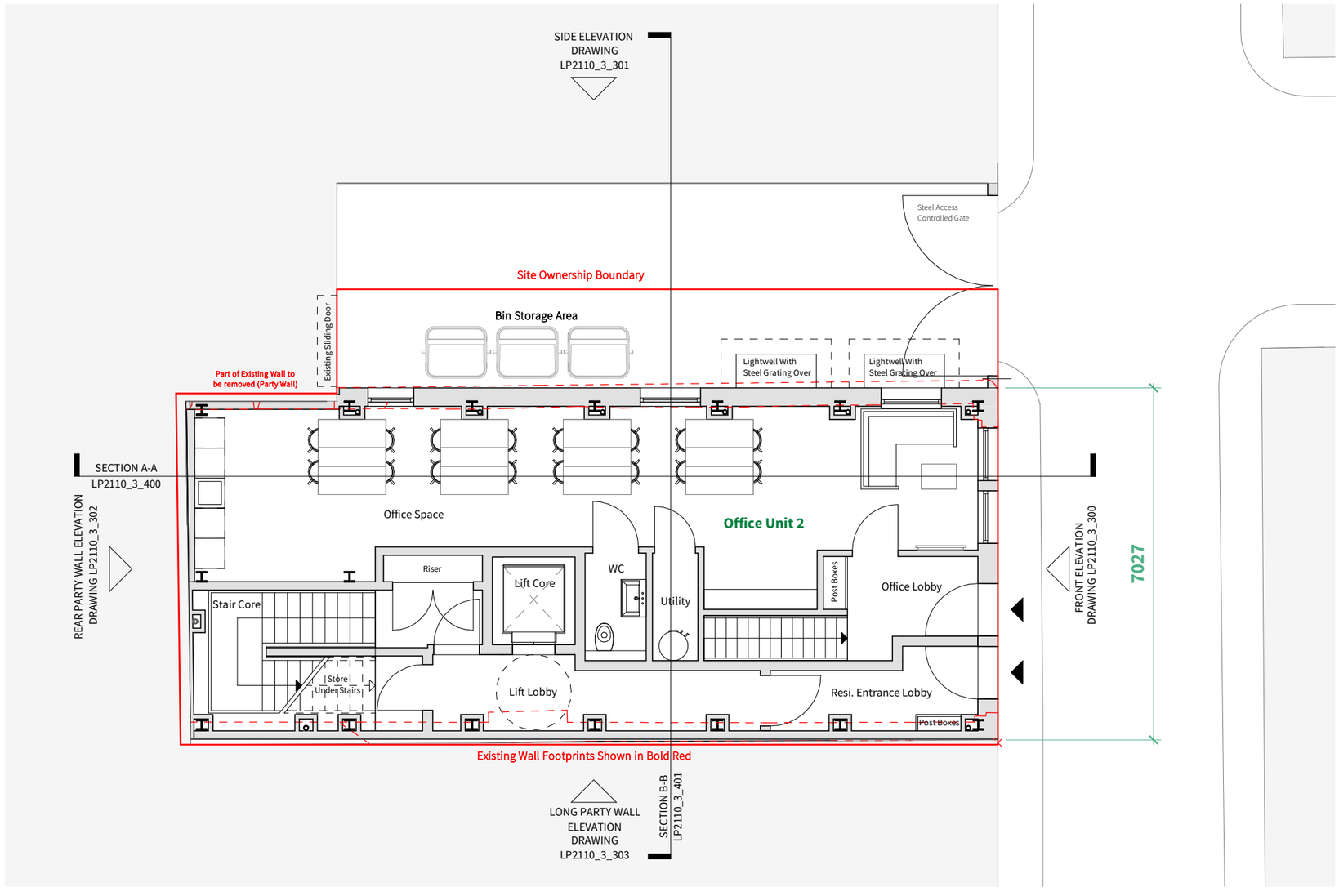
Former Building Footprint

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PROPOSED GROUND FLOOR PLAN

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Ground Floor Plan 1:100 / A3

Gross Internal Area (GIA):
All areas indicated on the LP2110_3_Spear Street Accommodation Schedule

0 1 2 3 4m

1:100

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Ground Floor Plan		
SCALE @ A3	As indicated	DATE	12/12/22
DRAWING NO.	-LP2110_3_200	REV	

Existing

Proposed

Site Boundary

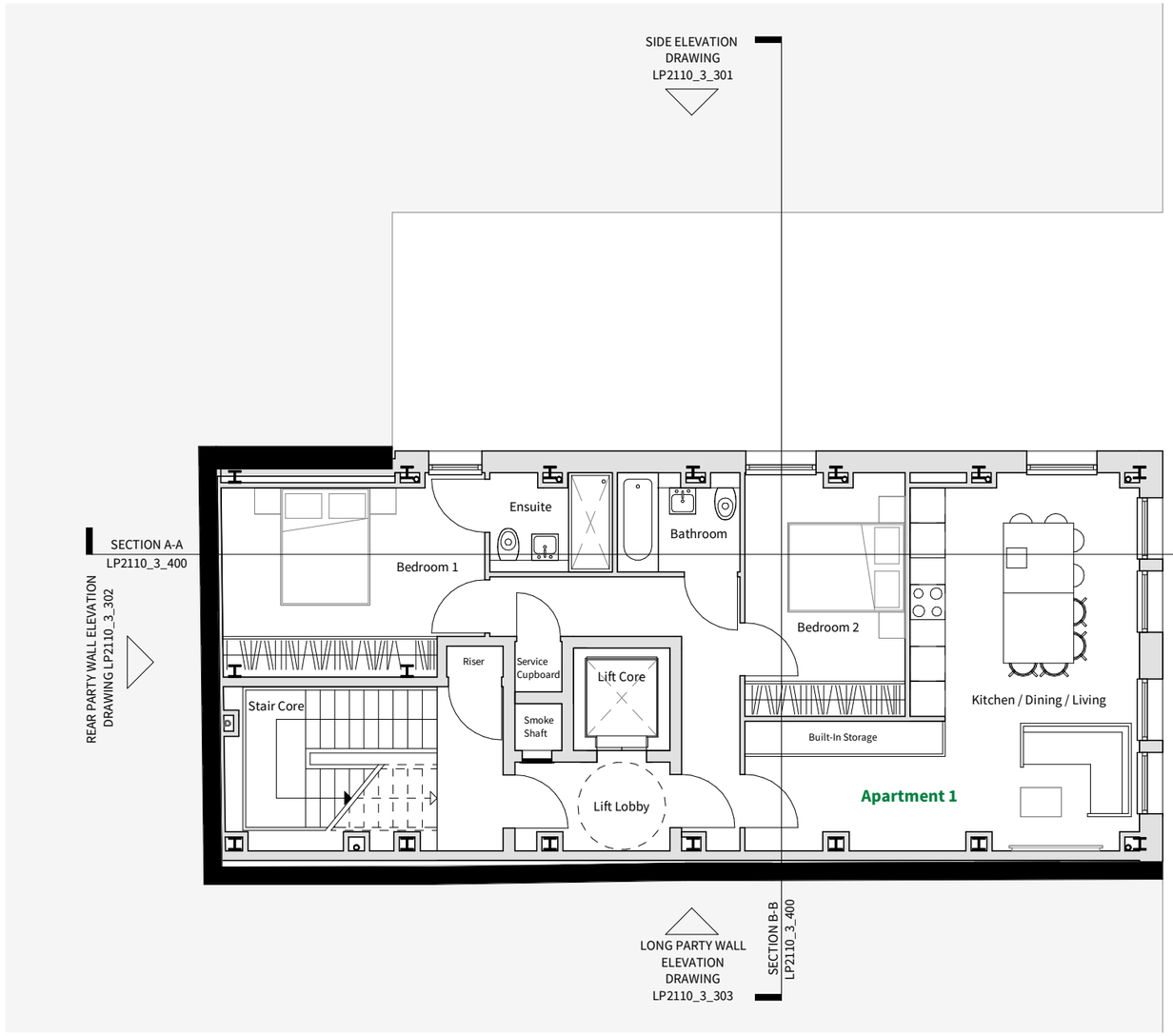
Former Building Footprint

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PROPOSED FIRST FLOOR PLAN

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed First Floor Plan 1:100 / A3

Gross Internal Area (GIA):
All areas indicated on the LP2110_3_Spear Street Accommodation Schedule

0 1 2 3 4m

1:100

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed First Floor Plan		
SCALE @ A3	As indicated	DATE	12/12/22
DRAWING NO.	-LP2110_3_201	REV	

Existing

Proposed

Site Boundary

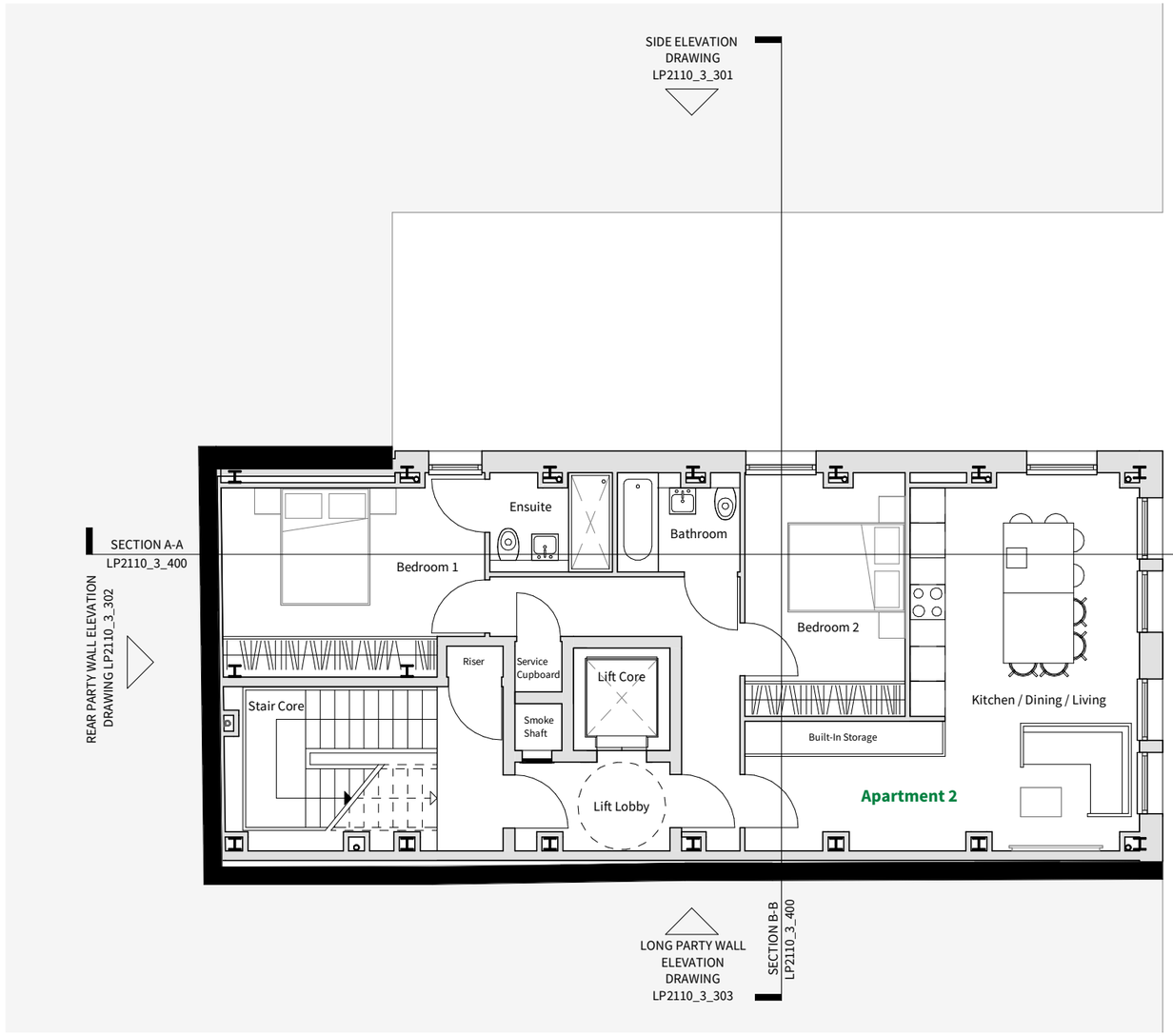
Building Footprint

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PROPOSED SECOND FLOOR PLAN

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Second Floor Plan 1:100 / A3

Gross Internal Area (GIA):
All areas indicated on the LP2110_3_Spear Street Accommodation Schedule

0 1 2 3 4m

1:100

Existing

Proposed

Site Boundary

PLANNING

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REV	DESCRIPTION	DATE

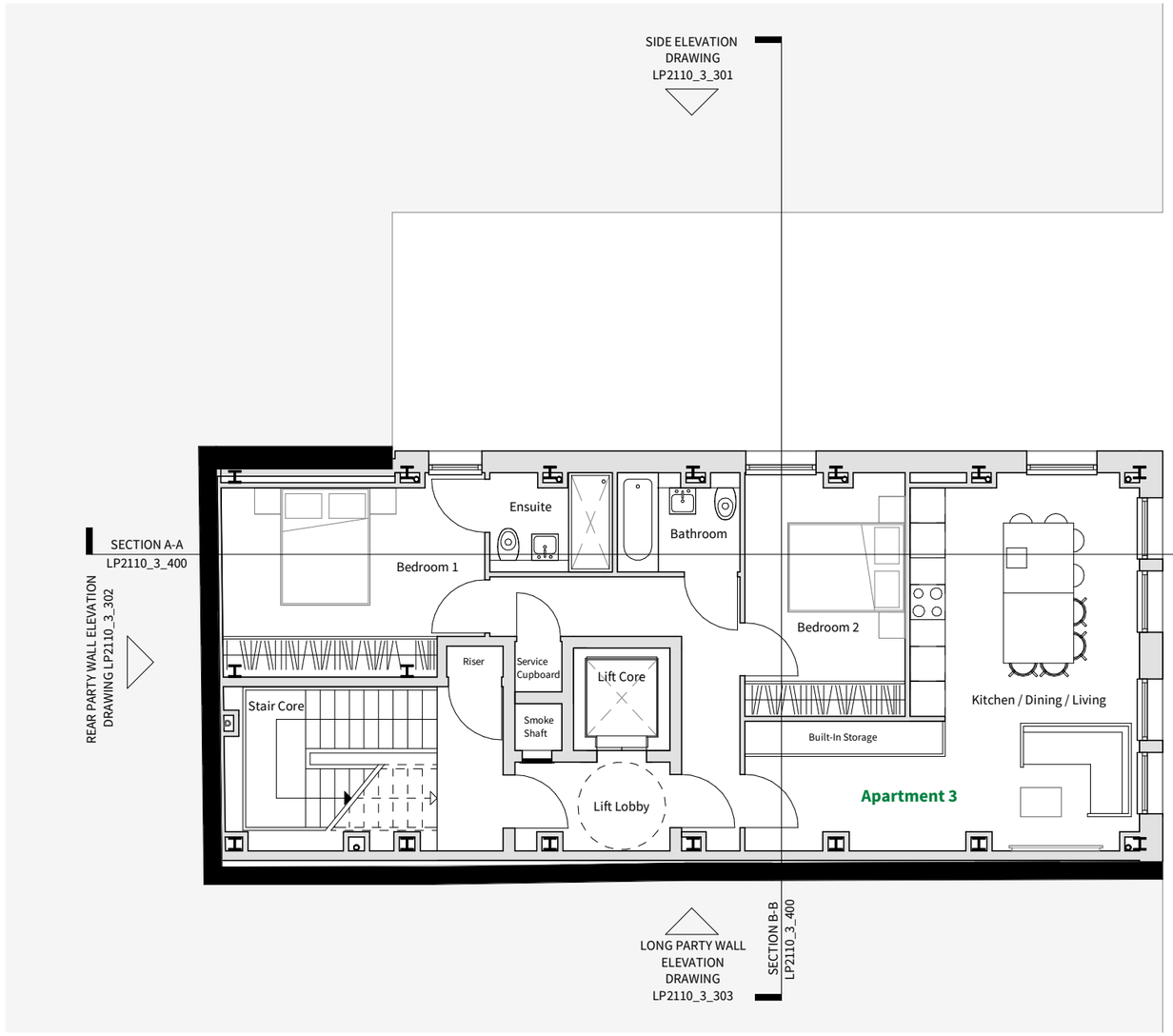
CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Second Floor Plan		
SCALE @ A3	As indicated	DATE	12/12/22
DRAWING NO.	-LP2110_3_202	REV	

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PROPOSED THIRD FLOOR PLAN

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Third Floor Plan 1:100 / A3

Gross Internal Area (GIA):
All areas indicated on the LP2110_3_Spear Street Accommodation Schedule

0 1 2 3 4m

1:100

Existing

Proposed

Site Boundary

PLANNING

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REV	DESCRIPTION	DATE

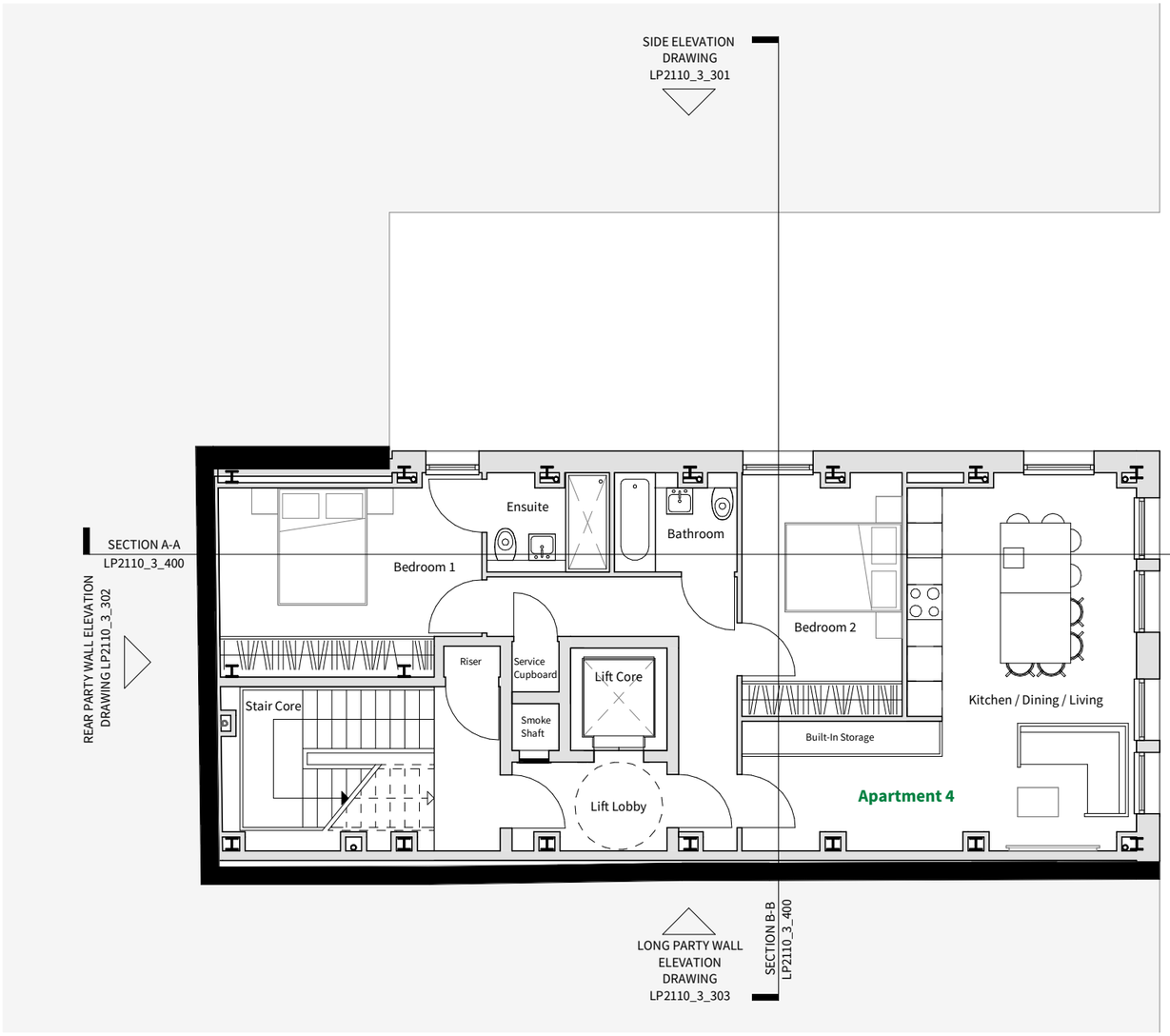
CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Third Floor Plan		
SCALE @ A3	As indicated	DATE	12/12/22
DRAWING NO.	-LP2110_3_203	REV	

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PROPOSED FOURTH FLOOR PLAN

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Fourth Floor Plan 1:100 / A3

Gross Internal Area (GIA):
All areas indicated on the LP2110_3_Spear Street Accommodation Schedule

0 1 2 3 4m

1:100

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Fourth Floor Plan		
SCALE @ A3	As indicated	DATE	12/12/22
DRAWING NO.	-LP2110_3_204	REV	

Existing

Proposed

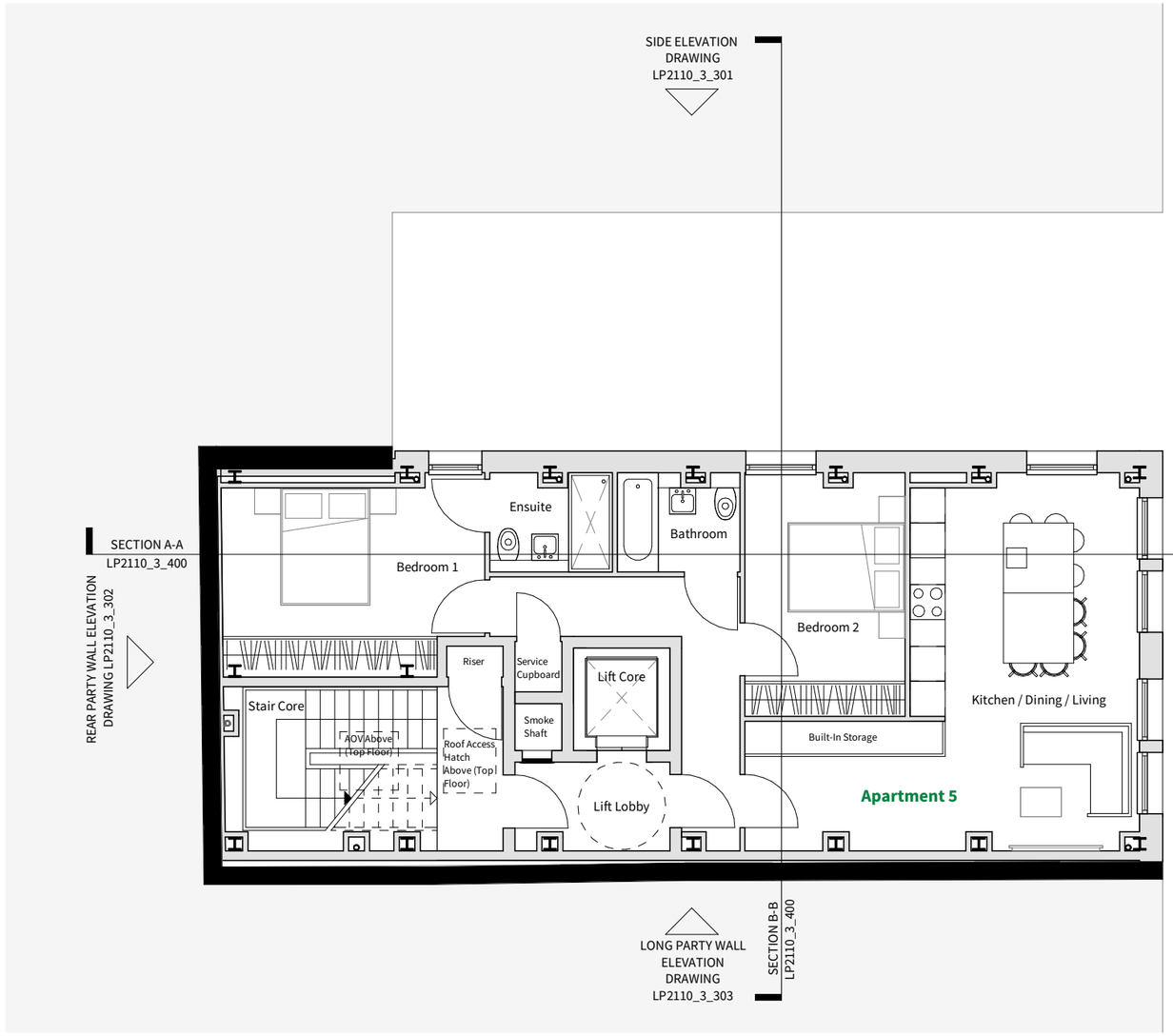
Site Boundary

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PROPOSED FIFTH FLOOR PLAN

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Fifth Floor Plan 1:100 / A3

Gross Internal Area (GIA):
All areas indicated on the LP2110_3_Spear Street Accommodation Schedule

0 1 2 3 4m
1:100

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Fifth Floor Plan		
SCALE @ A3	As indicated	DATE	12/12/22
DRAWING NO.	-LP2110_3_205	REV	

Existing

Proposed

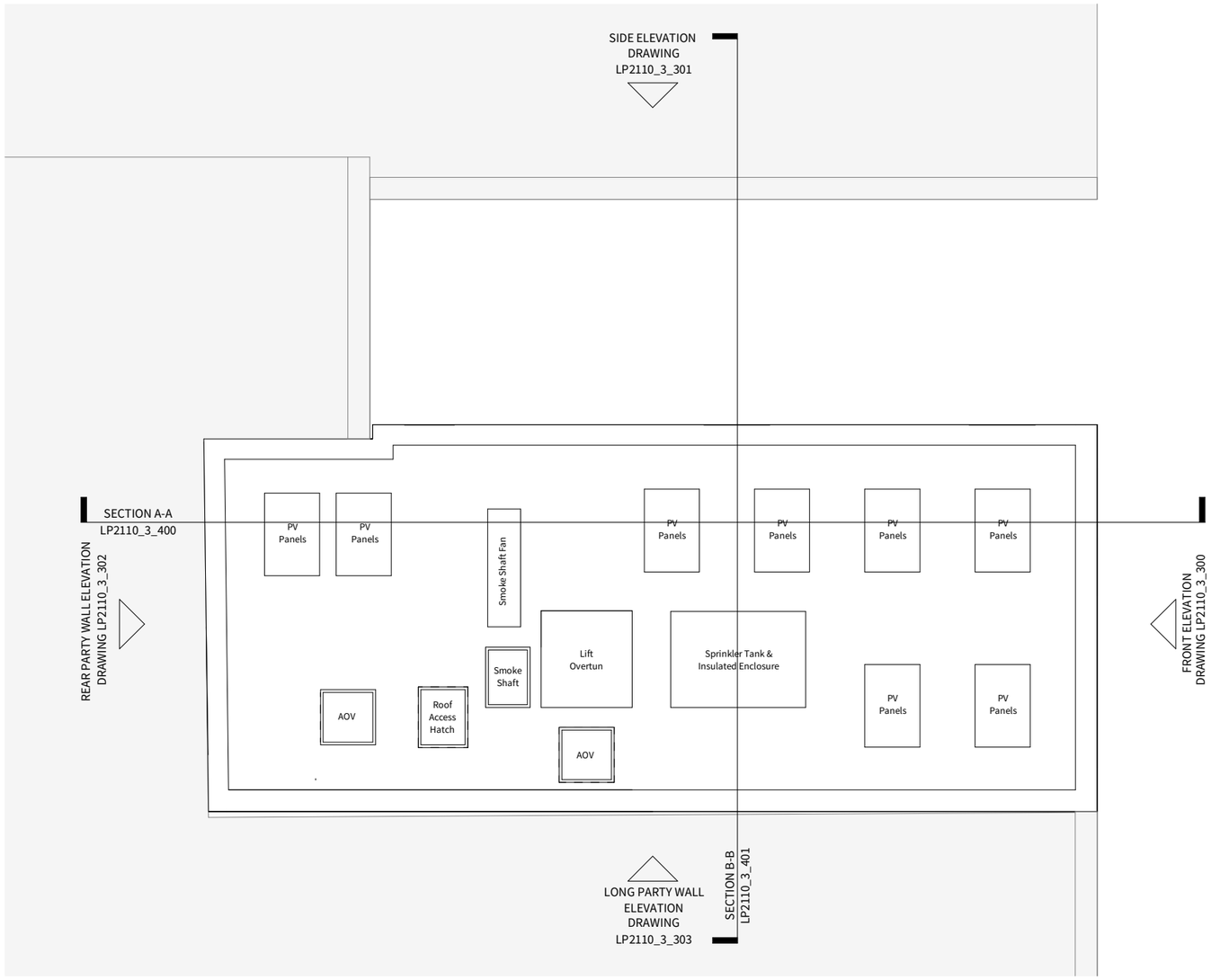
Site Boundary

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PROPOSED ROOF PLAN

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Roof Plan 1:100 / A3

Gross Internal Area (GIA):
All areas indicated on the LP2110_3_47 Spear Street Accommodation Schedule

0 1 2 3 4m

1:100

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Roof Plan		
SCALE @ A3	1 : 100	DATE	12/12/22
DRAWING NO.	-LP2110_3_206	REV	

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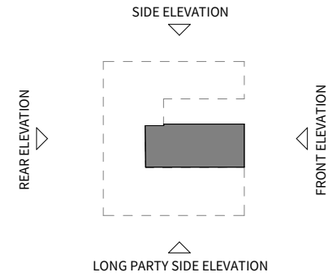
Tel: 0161 531 6203 / Web: www.materialstudio.co.uk / Address: M1 2WQ

PROPOSED FRONT ELEVATION

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Front Elevation 1:100 / A3



PROPOSED MATERIAL KEY:

1. Facing Brick Wall
2. Recessed Facing Brick Wall
3. Facing Brick Recessed Soldier Coursing
4. Anodised Aluminum Framed Windows & Doors*
5. Anodised Aluminium Coping*
6. Anodised Metal Gates*
7. Bin Storage
8. Brick Air Vents
9. Coated Metal Water Tank Enclosure (Set Back)
10. Lift Overrun (Set Back)

* Matching Colour

0 1 2 3 4m

1:100

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Front Elevation		
SCALE @ A3	As indicated	DATE	12/12/22
DRAWING NO.	-LP2110_3_300	REV	

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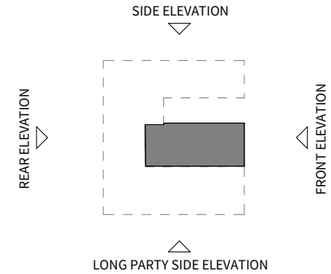
Tel: 0161 531 6203 / Web: www.materialstudio.co.uk / Address: M1 2WQ

PROPOSED SIDE ELEVATIONS

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Side Elevation 1:100 / A3



PROPOSED MATERIAL KEY:

1. Facing Brick Wall
2. Recessed Facing Brick Wall
3. Facing Brick Recessed Soldier Coursing
4. Anodised Aluminum Framed Windows & Doors*
5. Anodised Aluminium Coping*
6. Anodised Metal Gates*
7. Bin Storage
8. Brick Air Vents
9. Coated Metal Water Tank Enclosure (Set Back)
10. Lift Overrun (Set Back)

* Matching Colour

0 1 2 3 4m

1:100

PLANNING

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REV	DESCRIPTION	DATE

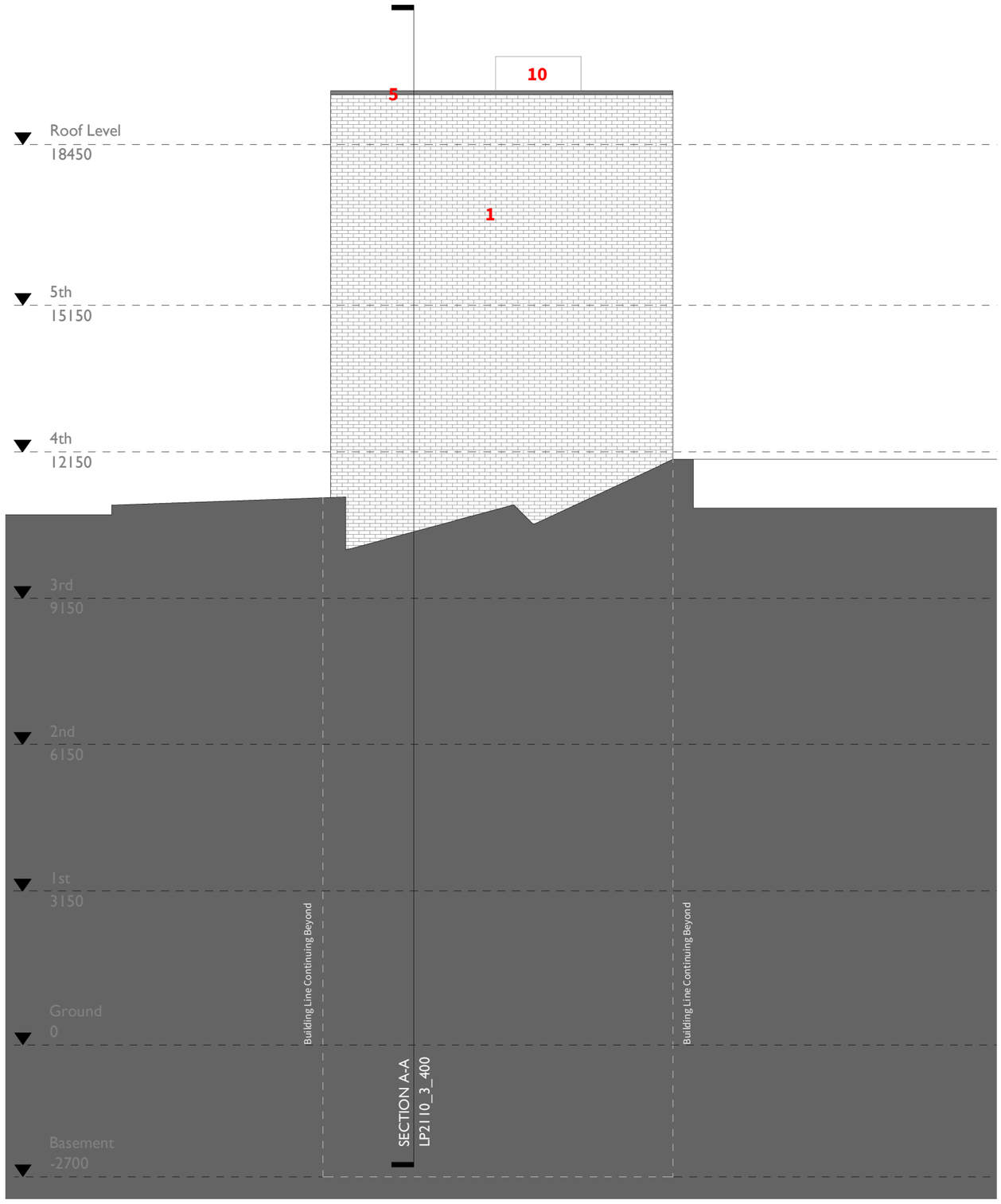
CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Side Elevation		
SCALE @ A3	As indicated	**DATE**	12/12/22
DRAWING NO.	-LP2110_3_301	**REV**	

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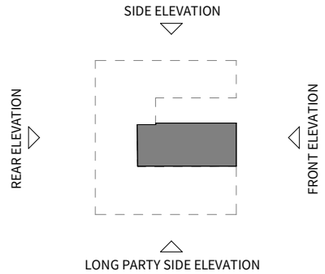
Tel: 0161 531 6203 / Web: www.materialstudio.co.uk / Address: M1 2WQ

PROPOSED REAR P/W ELEVATION

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Rear Party Wall Elevation 1:100 / A3



PROPOSED MATERIAL KEY:

1. Facing Brick Wall
2. Recessed Facing Brick Wall
3. Facing Brick Recessed Soldier Coursing
4. Anodised Aluminum Framed Windows & Doors*
5. Anodised Aluminium Coping*
6. Anodised Metal Gates*
7. Bin Storage
8. Brick Air Vents
9. Coated Metal Water Tank Enclosure (Set Back)
10. Lift Overrun (Set Back)

* Matching Colour

0 1 2 3 4m

1:100

PLANNING

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REV	DESCRIPTION	DATE

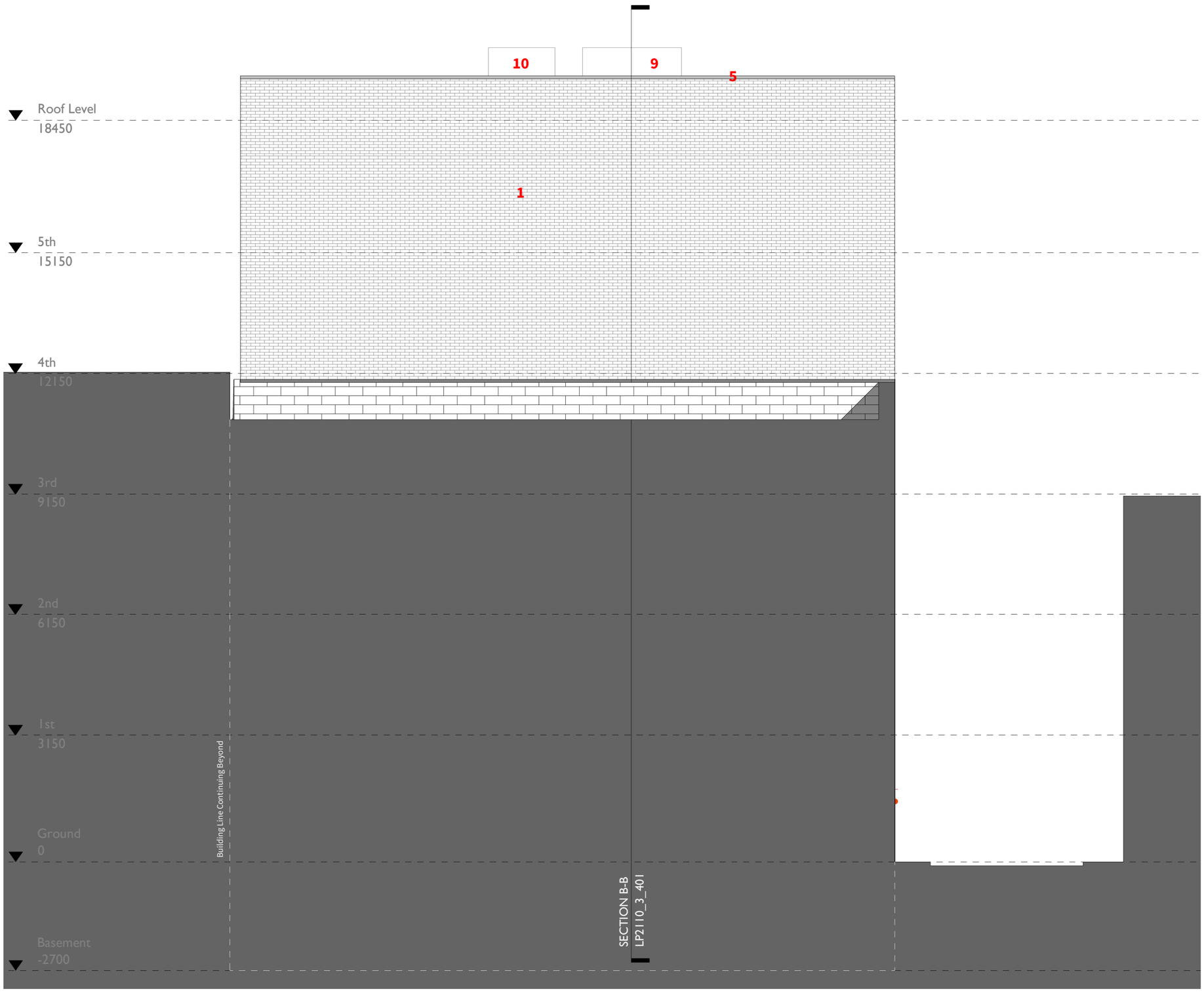
CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Rear Party Wall Elevation		
SCALE @ A3	As indicated	**DATE**	12/12/22
DRAWING NO.	-LP2110_3_302	**REV**	

material studio architects

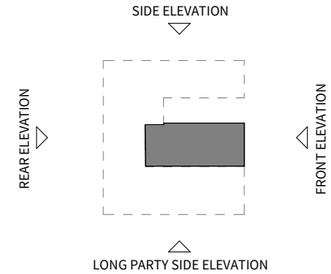
Tel: 0161 531 6203 / Web: www.materialstudio.co.uk / Address: M1 2WQ

PROPOSED SIDE P/W ELEVATION

SEE BLOCK PLAN FOR PROPOSED BUILDING POSITION



Proposed Long Party Wall Elevation (South) 1:100 / A3



PROPOSED MATERIAL KEY:

1. Facing Brick Wall
2. Recessed Facing Brick Wall
3. Facing Brick Recessed Soldier Coursing
4. Anodised Aluminum Framed Windows & Doors*
5. Anodised Aluminium Coping*
6. Anodised Metal Gates*
7. Bin Storage
8. Brick Air Vents
9. Coated Metal Water Tank Enclosure (Set Back)
10. Lift Overrun (Set Back)

* Matching Colour

0 1 2 3 4m

1:100

PLANNING

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REV	DESCRIPTION	DATE

CLIENT	Zidane Projects		
PROJECT	Spear Street Fourty Seven		
ADDRESS	47 Spear Street, Manchester, M1 1DF		
DRAWING TITLE	Proposed Long Party Wall Elevation		
SCALE @ A3	As indicated	**DATE**	26/10/21
DRAWING NO.	-LP2110_3_303	**REV**	

material studio architects

Tel: 0161 531 6203 / Web: www.materialstudio.co.uk / Address: M1 2WQ

Appendix B

Ground Investigation Factual Report



INVESTIGATE



REMEDIATE



REGENERATE

SUB SURFACE
Site Investigation Specialists,
Geotechnical & Environmental Consultants

GROUND INVESTIGATION REPORT

FOR
SPEAR STREET,
MANCHESTER,
M1 1DF,

PREPARED FOR
GROUND & PROJECT CONSULTANTS LTD

FACTUAL REPORT NO. 7069
OCTOBER 2020



SUB SURFACE NORTH WEST LIMITED
3 Peel Street
Preston
Lancashire
PR2 2QS
Tel: (01772) 561135 Fax: (01772) 204907
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2. INVESTIGATION	2.1 Investigation Details 2.2 Sub Surface Detail
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4. GENERAL	
APPENDICES	Insitu Test results Laboratory Test results Contamination Analysis results Gas Monitoring Results Borehole Record sheets Trial Pit Record sheets Figures

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GROUND INVESTIGATION AT SPEAR STREET, MANCHESTERM M1 1DF

CLIENT: GROUND AND PROJECT CONSULTANTS LTD

---

1. INTRODUCTION

This report has been prepared in accordance with an email, dated 16th September 2020, from the Client.

The brief was set out in our estimate, ref. E4350A and dated 15th September 2020, with amendments as the investigation proceeded and includes:

- 2 No. cable percussive boreholes
- 2 No. trial pits
- Insitu testing
- Geotechnical laboratory testing
- Contamination analysis
- Installation of a standpipe followed by groundwater and ground gas monitoring
- Provision of a factual report on the above.

1.1 Site Location and Description

The site is located off Spear Street on the junction of Faraday Street, Manchester, M1 1DF, as indicated on Figure 1. The approximate National Grid Reference of the centre of the site is E384568 N398531.

The rectangular shaped site is bound to the north and east by industrial buildings possibly abandoned, to the south by Spear Street, and to the west by Greater Manchester Youth Network building.

1.2 Proposed Development and Purpose of the Ground Investigation

We understand that the proposed development is to construct a five storey apartment block with associated basement, as shown on Figure 3.

The purpose of the ground investigation is to determine the ground conditions at the exploratory hole positions and to provide results for assessment by the Engineer/ others.

2. INVESTIGATION

2.1 Investigation Details

Two 150mm diameter boreholes were put down by cable percussive boring techniques at the positions determined and set out by the Client, as shown on Figure 2. The boreholes were put down to depths of between 8.50 and 15.25 metres, samples taken were logged in accordance with BS EN ISO 14688-1: 2018 and BS EN ISO 14689-1: 2018 and the resulting Borehole Records are appended.

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Two trial pits were taken out by a mechanical excavator at the positions determined and set out by the Client, as shown on Figure 2. The trial pits were excavated to depths of 2.40 and 2.52 metres, representative samples were taken and the materials were logged in accordance with BS EN ISO 14688-1: 2018 and BS EN ISO 14689-1: 2018. The resulting Trial Pit Records are appended.

On completion the trial pits were backfilled with arisings by the excavator and it is therefore likely that loose or soft pockets will still remain.

3. SAMPLING, TESTING AND MONITORING

3.1 Sampling

Seven 100mm diameter undisturbed samples were taken at appropriate intervals in cohesive strata, for testing in the laboratory.

Small disturbed and bulk disturbed samples were obtained for the strata encountered and were subjected to careful examination.

The samples will be retained for a period of one month after the issue of this report, for reference purposes, and then disposed of unless otherwise instructed.

3.2 Field Testing

Seven Standard Penetration Tests (SPTs) and two Cone Penetration Tests (CPTs) were performed, the results of which are recorded on the appended Standard Penetration Test Results Sheet with 'N' values and indicative relative density and shear strength, where appropriate, given on the Borehole Records.

3.3 Installations and Monitoring

On completion of BH1 an hdpe standpipe was installed to a depth of 6.00 metres. The standpipe is slotted from 1.00 metres depth, has an internal diameter of 50mm and have removable quick release gas valves to enable both ground gas and groundwater monitoring and sampling to be undertaken. Details of the installation is given on the Borehole Records.

Monitoring of the standpipes for ground gas and groundwater has been undertaken on 1 of 6 scheduled occasions to date using portable equipment. A Gas Data GFM 435 was used for monitoring methane, carbon dioxide, oxygen, gas flows and atmospheric pressure. The results of the monitoring is given on the appended Ground Gas and Groundwater Monitoring Results sheet.

3.4 Laboratory Testing

The following laboratory tests were carried out in accordance with BS.1377: 1990, where applicable, and the results are appended.

- Moisture content, plastic limit and liquid limit tests
- Quick undrained triaxial tests
- Soluble sulphate content and pH value tests

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Contamination analyses have been performed on six soil samples to determine: pH, organic matter content, and concentrations of sulphate, sulphide, cyanide, arsenic, boron (soluble), cadmium, chromium, hexavalent chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, speciated total petroleum hydrocarbons (TPHs), the speciated polynuclear aromatic hydrocarbons (PAHs) suite, the benzene/ ethylbenzene/ toluene/ xylene (BTEX) suite and phenols. In addition, six soil samples were subjected to an asbestos screen.

The results of the above analyses are appended.

4. GENERAL

We trust that this report fulfils your present requirements but if you have any queries or we can be of further assistance please contact Miss Anna Marsden at our Preston office.

SUB SURFACE CONSULTANTS LIMITED
FACTUAL REPORT No. 7069
OCTOBER 2020

Sub Surface North West Limited
3 Peel Street, Preston, Lancashire, PR2 2QS
Tel: 01772 561135 Fax: 01772 204907 Email: preston@subsurface.co.uk

INSITU TEST RESULTS

SUB SURFACE
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3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Standard Penetration Test Results

Site : SPEAR STREET, MANCHESTER

Client : GROUND AND PROJECT CONSULTANTS LTD

Engineer :

Job Number 7069

Sheet 1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH1	3.00	3.15	3.45	CPT	2	2	2	3	3	4	N=12	
BH1	5.00	5.15	5.45	SPT	2	3	4	4	5	6	N=19	
BH1	7.00	7.15	7.45	SPT	2	3	4	3	4	5	N=16	
BH2	3.00	3.15	3.45	CPT	2	2	2	3	4	5	N=14	
BH2	5.00	5.15	5.45	SPT	2	3	4	5	5	4	N=18	
BH2	7.50	7.65	7.95	SPT	2	3	4	5	5	6	N=20	
BH2	10.50	10.65	10.95	SPT	3	3	4	4	5	7	N=20	
BH2	13.50	13.65	13.82	SPT	4	15	16	16	18		50/170mm	
BH2	15.00	15.15	15.25	SPT	8	13	31	19			50/95mm	

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LABORATORY TEST RESULTS

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Laboratory Test Results

Site : SPEAR STREET, MANCHESTER

Client : GROUND AND PROJECT CONSULTANTS LTD

Engineer :

Job Number 7069

Sheet 1 / 1

DETERMINATION OF MOISTURE CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY AND LIQUIDITY INDEX

Borehole/ Trial Pit	Depth (m)	Sample	Natural Moisture Content %	Sample Passing 425µm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Group Symbol	Laboratory Description
				Percentage %	Moisture Content %						
BH1	4.50	D	20	81	25	47	20	27	0.19	CI	Brown and occasional light brown mottled slightly sandy silty CLAY with some lenses of sandy silt.
BH1	8.50	D	17	93	18	32	15	17	0.18	CL	Brown slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to coarse sandstone, siltstone and quartz.
BH2	4.50	D	25	98	26	34	18	16	0.50	CL	Brown thinly laminated brown slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse sandstone, siltstone and quartz.
BH2	6.50	D	21	96	22	43	19	24	0.13	CI	Brown slightly sandy silty CLAY with some pockets of silt.

Method of Preparation : BS 1377:PART 1:1990:7.4 Preparation of samples for classification tests BS 1377:PART 2:1990:4.2 & 5.2 Sample preparations

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:4 Determination of the liquid limit BS 1377:PART 2:1990:5 Determination of the plastic limit and plasticity index

Remarks :

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Laboratory Test Results

Site : SPEAR STREET, MANCHESTER

Client : GROUND AND PROJECT CONSULTANTS LTD

Engineer :

Job Number 7069

Sheet 1 / 1

DETERMINATION OF DENSITY, MOISTURE CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole/ Trial Pit	Depth (m)	Sample	Moisture Content %	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Cell Pressure (kN/m^2)	Deviator Stress (kN/m^2)	Apparent Cohesion (kN/m^2)	Angle of Shearing Resistance (degrees)	Laboratory Description
BH1	4.00	U	20	2.08	1.73	100 150 200	182 0 0	91	0.0	Brown and occasional light brown mottled slightly sandy silty CLAY with some lenses of sandy silt.
BH1	6.00	U	20	2.08	1.73	125 175 225	99 99 100	50	0.0	Brown and occasional light brown mottled slightly sandy silty CLAY with some lenses of sandy silt.
BH1	8.00	U	18	2.13	1.81	175 225 275	130 135 136	67	0.0	Brown slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to coarse sandstone, siltstone and quartz.
BH2	4.00	U	24	1.97	1.59	100 150 200	81 84 0	41	0.0	Brown thinly laminated brown slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse sandstone, siltstone and quartz.
BH2	6.00	U	19	2.14	1.80	125 175 225	200 205 207	102	0.0	Brown slightly sandy clayey SILT.
BH2	9.00	U	19	2.11	1.78	200 250 300	113 124 127	61	0.0	Brown thinly laminated brown slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse sandstone, siltstone and quartz.
BH2	12.00	U	14	2.24	1.96	250 300 350	226 0 0	113	0.0	Brown slightly sandy silty CLAY with some pockets of silt.

Method of Preparation : BS 1377:PART 1:1990:7.4.2 Moisture content 1990: Preparation of undisturbed samples for testing BS 1377:PART 2:1990:7.2

Method of Test : BS 1377:PART 2:1990:3 Determination of moisture content 1990:7 Determination of density BS 1377:PART 7:1990:8 Undrained shear strength 1990:9 Multistage loading

Remarks :

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Laboratory Test Results

Site : SPEAR STREET, MANCHESTER

Client : GROUND AND PROJECT CONSULTANTS LTD

Engineer :

Job Number 7069

Sheet 1 / 1

DETERMINATION OF pH, SULPHATE CONTENT AND TOTAL SULPHUR OF SOIL AND GROUNDWATER AND MAGNESIUM, CHLORIDE, AMMONIA AND NITRATE CONTENT

Borehole/ Trial Pit	Depth (m)	Sample	Concentration of Sulphate			Total Sulphur %	Magnesium mg/l	Ammonium NH4 mg/l	Water Soluble Chloride mg/l	Water Soluble Nitrate mg/l	pH	Design Class	Laboratory Description
			Soil		Ground Water g /l								
			Total S03 %	S04 in 2:1 water:soil g /l									
BH1	3.00	D		0.08							8.7	DS-1	MADE GROUND: brown slightly gravelly slightly sandy silty clay. Gravel sized fragments are fine to coarse brick and stone.
BH1	8.50	D		0.03							8.7	DS-1	Brown slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to coarse sandstone, siltstone and quartz.
BH2	3.00	D		0.08							8.2	DS-1	MADE GROUND: brown slightly gravelly slightly sandy silty clay. Gravel sized fragments are fine to coarse brick and stone.
BH2	4.50	D		0.10							8.4	DS-1	Brown thinly laminated brown slightly gravelly slightly sandy silty CLAY. Gravel is subangular to subrounded fine to coarse sandstone, siltstone and quartz.
BH2	14.50	D		0.02							8.6	DS-1	Brown slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to coarse sandstone, siltstone and quartz.

Method of Preparation : BS 1377:PART 1:1990:7.5 Preparation of soil for chemical tests BS 1377:PART 3:1990:5.2, 5.3, 5.4 & 9.4

Method of Test : Lab in-house methods based on BS1377: Part 3 for contents of water sol sulphate, pH, chloride and magnesium. Lab in-house method based on MEWAM (EA, 2006) for total sulphur

Remarks : Classification relates to Design Sulphate Class of BRE Special Digest 1 (2005)

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AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) SITE CLASSIFICATION

Table C1 Aggressive Chemical Environment for Concrete (ACEC) classification for natural ground locations[a]

Sulfate				Groundwater		
Design Sulfate Class for Location	2:1 water/soil extract[b]	Groundwater	Total potential sulfate[c]	Static water	Mobile water	ACEC Class for location
1	2 (SO_4 mg/l)	3 (SO_4 mg/l)	4 (SO_4 %)	5 (pH)	6 (pH)	7
DS-1	<500	<400	<0.24	≥2.5		AC-1s
					>5.5d	AC-1[d]
					2.5 - 5.5	AC-2z
DS-2	500 - 1500	400 - 1400	0.24 - 0.6	>3.5		AC-1s
					>5.5	AC-2
				2.5-3.5		AC-2s
					2.5 - 5.5	AC-3z
DS-3	1600-3000	1500-3000	0.7 - 1.2	>3.5		AC-2s
					>5.5	AC-3
				2.5 - 3.5		AC-3s
					2.5 - 5.5	AC-4
DS-4	3100 - 6000	3100 - 6000	1.3 - 2.4	>3.5		AC-3s
					>5.5	AC-4
				2.5 - 3.5		AC-4s
					2.5 - 5.5	AC-5
DS-5	>6000	>6000	>2.4	>3.5		AC-4s
				2.5 - 3.5	≥2.5	AC-5

Notes

a Applies to locations on sites that comprise either undisturbed ground that is in its natural state (ie not brownfield - Table C2) or clean fill derived from such ground

b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous Digests (Box C7).

c Applies only to locations where concrete will be exposed to sulfate ions (SO_4) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).

d For flowing water that is potentially aggressive to concrete owing to high purity or an aggressive carbon dioxide level greater than 15mg/l (Section C2.2.3), increase the ACEC Class to AC-2z.

Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static
- Concrete placed in ACEC Classes that included the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements or combinations listed in Table D2 on page 42.

Table C2 Aggressive Chemical Environment for Concrete (ACEC) classification for brownfield locations[a]

Sulfate						Groundwater		
Design Sulfate Class for Location	2:1 water/soil extract[b]		Groundwater		Total potential sulfate[c]	Static water	Mobile water	ACEC Class for location
1	2 (SO_4 mg/l)	3 (Mg mg/l)	4 (SO_4 mg/l)	5 (Mg mg/l)	6 (SO_4 %)	7 (pH)[d]	8 (pH)[d]	9
DS-1	<500		<400		<0.24	≥2.5		AC-1s
							>6.5[d]	AC-1
							5.5 - 6.5	AC-2z
							4.5 - 5.5	AC-3z
							2.5 - 4.5	AC-4z
DS-2	500 - 1500		400 - 1400		0.24 - 0.6	>5.5		AC-1s
							>6.5	AC-2
						2.5 - 5.5		AC-2s
							5.5 - 6.5	AC-3z
							4.5 - 5.5	AC-4z
							2.5 - 5.5	AC-5z
DS-3	1600 - 3000		1500 - 3000		0.7 - 1.2	>5.5		AC-2s
							>6.5	AC-3
						2.5 - 5.5		AC-3s
							5.5 - 6.5	AC-4
							2.5 - 5.5	AC-5
DS-4	3100 - 6000	≤1200	3100 - 6000	≤1000	1.3 - 2.4	>5.5		AC-3s
							>6.5	AC-4
						2.5 - 5.5		AC-4s
							2.5 - 6.5	AC-5
DS-4m	3100 - 6000	>1200[e]	3100 - 6000	>1000[e]	1.3 - 2.4	>5.5		AC-3s
							>6.5	AC-4m
						2.5 - 5.5		AC-4ms
							2.5 - 6.5	AC-5m
DS-5	>6000	≤1200	>6000	≤1000	>2.4	>5.5		AC-4s
						2.5 - 5.5	≥2.5	AC-5
DS-5m	>6000	>1200[e]	>6000	>1000[e]	>2.4	>5.5		AC-4ms
						2.5 - 5.5	≥2.5	AC-5m

Notes

a Brownfield sites are those sites, or parts of sites, that might contain chemical residues produced by or associated with industrial production (Section C5.1.3).

b The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous Digests (Box C7).

c Applies only to locations where concrete will be exposed to sulfate ions (SO_4) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance (Appendix A1 and Box C8).

d An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content (Section C5.1.3).

e The limit on water-soluble magnesium does not apply to brackish groundwater (chloride content between 12 000 mg/l and 17000 mg/l). This allows 'm' to be omitted from the relevant ACEC Classification. Seawater (chloride content about 18 000 mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

- Suffix 's' indicates that the water has been classified as static.
- Concrete placed in ACEC Classes that included the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements or combinations listed in Table D2 on page 42.
- Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.

CONTAMINATION ANALYSIS RESULTS

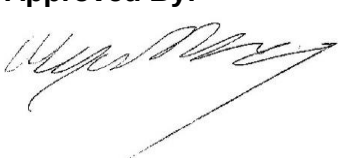
Eurofins Chemtest Ltd
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Email: info@chemtest.com

Final Report

Report No.:	20-26711-1
Initial Date of Issue:	13-Oct-2020
Client	Sub Surface
Client Address:	3 Peel Street Preston Lancashire PR2 2QS
Contact(s):	Simon Gabbatt
Project	7069 Spear Street, Manchester

Quotation No.:		**Date Received:**	05-Oct-2020
Order No.:		**Date Instructed:**	05-Oct-2020
No. of Samples:	9		
Turnaround (Wkdays):	7	**Results Due:**	13-Oct-2020
Date Approved:	13-Oct-2020		

Approved By:



Details: Glynn Harvey, Technical Manager

Results - Soil

Project: 7069 Spear Street, Manchester

Client: Sub Surface				**Chemtest Job No.:**	20-26711	20-26711	20-26711	20-26711	20-26711	20-26711	20-26711	20-26711	20-26711
Quotation No.:				**Chemtest Sample ID.:**	1074752	1074753	1074754	1074755	1074756	1074757	1074758	1074759	1074760
				Client Sample ID.:	908	909	919	920	921	923	943	323	319
				Sample Location:	BH1	BH1	BH1	BH2	BH2	BH2	BH2	TP1	TP2
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.10	3.00	8.50	0.00	3.00	4.50	14.50	0.70	2.10
				Bottom Depth (m):	2.70	3.45		3.00	3.45			0.90	2.30
				Date Sampled:	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020
				Asbestos Lab:	COVENTRY	COVENTRY		COVENTRY	COVENTRY			COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-		-	-			Cement	Cement
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected			Chrysotile	Chrysotile
ACM Detection Stage	U	2192		N/A	-	-		-	-			Screen Visible by Eye	Stereo Microscopy
Moisture	N	2030	%	0.020	6.4	17	13	12	18	20	15	21	31
pH	U	2010		4.0	8.5	8.5	8.7	8.5	8.2	8.4	8.6	8.8	8.2
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40	0.62		0.81	0.59			1.3	2.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		0.076	0.027		0.084	0.096	0.025		
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50		< 0.50	< 0.50			0.90	1.2
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	3.8	1.6		9.9	1.7			13	9.1
Sulphate (Total)	U	2430	%	0.010	0.037	0.056		0.11	0.046			0.17	0.72
Arsenic	U	2450	mg/kg	1.0	14	14		19	8.6			35	30
Cadmium	U	2450	mg/kg	0.10	0.45	0.20		11	0.18			0.39	0.29
Chromium	U	2450	mg/kg	1.0	6.7	43		19	26			14	26
Molybdenum	U	2450	mg/kg	2.0	< 2.0	< 2.0		< 2.0	< 2.0			2.1	4.5
Copper	U	2450	mg/kg	0.50	16	32		65	50			80	94
Mercury	U	2450	mg/kg	0.10	0.16	< 0.10		0.59	0.16			1.7	1.2
Nickel	U	2450	mg/kg	0.50	5.4	50		18	34			19	35
Lead	U	2450	mg/kg	0.50	94	42		200	86			260	680
Selenium	U	2450	mg/kg	0.20	< 0.20	0.28		< 0.20	< 0.20			< 0.20	< 0.20
Zinc	U	2450	mg/kg	0.50	41	77		69	61			81	190
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50		< 0.50	< 0.50			< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	3.1	1.1		1.9	1.7			4.8	6.4
TPH >C6-C10	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	< 1.0
TPH >C10-C21	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	41
TPH >C21-C40	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	260
Total TPH >C6-C40	U	2670	mg/kg	10	< 10	< 10		< 10	< 10			< 10	300
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10			< 0.10	0.60
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10			< 0.10	0.18
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10			< 0.10	0.47
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10			< 0.10	0.39
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10		1.4	< 0.10			0.78	2.8
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10		0.31	< 0.10			0.11	0.51
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10		1.5	< 0.10			0.78	2.6
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10		1.7	< 0.10			0.95	3.0
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10		0.76	< 0.10			0.55	1.1

Results - Soil

Project: 7069 Spear Street, Manchester

Client: Sub Surface			**Chemtest Job No.:**		20-26711	20-26711	20-26711	20-26711	20-26711	20-26711	20-26711	20-26711	20-26711
Quotation No.:			**Chemtest Sample ID.:**		1074752	1074753	1074754	1074755	1074756	1074757	1074758	1074759	1074760
			Client Sample ID.:		908	909	919	920	921	923	943	323	319
			Sample Location:		BH1	BH1	BH1	BH2	BH2	BH2	BH2	TP1	TP2
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.10	3.00	8.50	0.00	3.00	4.50	14.50	0.70	2.10
			Bottom Depth (m):		2.70	3.45		3.00	3.45			0.90	2.30
			Date Sampled:		24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020	24-Sep-2020
			Asbestos Lab:		COVENTRY	COVENTRY		COVENTRY	COVENTRY			COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10		0.55	< 0.10			0.65	2.3
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10			0.67	1.3
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10			1.0	0.55
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10			0.57	1.0
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10			0.43	0.82
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10			0.85	0.19
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10			0.48	1.1
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0		6.2	< 2.0			7.8	19
Benzene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	< 1.0
Toluene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	< 1.0
Ethylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	< 1.0
m & p-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	< 1.0
o-Xylene	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	< 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	< 1.0
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30		< 0.30	< 0.30			< 0.30	< 0.30

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

GAS MONITORING RESULTS

SUB SURFACE
SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Insitu Test Results

Site: SPEAR STREET, MANCHESTER, M1 1DF

Client: GROUND AND PROJECT CONSULTANTS LTD

Engineer:

Job Number: 7069

Sheet: 1 / 1

GROUND GAS AND GROUNDWATER MONITORING RESULTS SHEET

Date	Hole No.	Methane (% Volume)	Carbon Dioxide (% Volume)	Oxygen (% Volume)	Gas Flow Rate (l/hr)	Atmospheric Pressure (millibars)	Depth to Groundwater (m)
09/10/20	BH1	0.0	0.0	20.5	<0.1	1009	2.60

Remarks: Elevated levels of methane and carbon dioxide and depleted levels of oxygen are shown in ***bold/italics*** .

BOREHOLE RECORD SHEETS

SUB SURFACE

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Site	Borehole Number
SPEAR STREET, MANCHESTER	BH1

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
LIGHT CABLE PERCUSSIVE	150mm to 7.50m		GROUND AND PROJECT CONSULTANTS LTD	7069
	Location AS PLAN	**Dates** 25/09/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.10-2.70	B					0.10	MADE GROUND: fine to coarse gravel sized fragments of stone (drillers description).			
							MADE GROUND: dark brown ashy slightly clayey slightly silty sandy fine to coarse gravel sized fragment of stone, brick and clinker.			
						(2.60)				
						2.70	MADE GROUND: brown slightly gravelly slightly sandy silty clay. Gravel sized fragments are fine to coarse brick and stone.			
3.00-3.45	SPT(C) N=12			2,2/2,3,3,4						
3.00-3.45	B					(1.00)				
						3.70	Stiff high strength locally medium strength brown and occasional light brown mottled slightly sandy silty CLAY with some lenses of sandy silt and bands of sand.			
4.00-4.45	U c=91kPa									
4.50	D									
5.00-5.45	SPT N=19			2,3/4,4,5,6						
5.00-5.45	D									
5.00-5.50	B					(3.30)				
6.00-6.45	U c=50kPa						.... at 6.00m : medium strength			
6.50	D									
7.00-7.45	SPT N=16			2,3/4,3,4,5		7.00	Firm medium strength thinly laminated brown slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to coarse sandstone, siltstone and quartz.			
7.00-7.45	D									
7.00-7.50	B					(1.50)				
8.00-8.45	U c=67kPa									
8.50	D			25/09/2020:DRY		8.50	Complete at 8.50m			

Remarks
On completion backfilled with arisings and installed a 50mm dia slotted standpipe with a gas valve and a gravel surround to 6.00m, a Bentonite seal from 1.00m to 0.20m and a concreted in lockable steel protective cover from 0.20m to GL.

Scale (approx)	Logged By
1:50	TDC/SJ

Figure No. 7069.BH1

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SUB SURFACE

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Site	Borehole Number
SPEAR STREET, MANCHESTER	BH2

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
LIGHT CABLE PERCUSSIVE	150mm to 13.80m		GROUND AND PROJECT CONSULTANTS LTD	7069
	Location AS PLAN	**Dates** 25/09/2020-28/09/2020	**Engineer**	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-3.00	B					(3.00)	MADE GROUND: dark brown ashy slightly clayey slightly silty sandy fine to coarse gravel sized fragments of stone, brick and clinker with low cobble sized fragments of brick.		
3.00-3.45 3.00-3.45	SPT(C) N=14 B			2,2/2,3,4,5		3.00 (0.60)	MADE GROUND: brown slightly gravelly slightly sandy silty clay. Gravel sized fragments are fine to coarse brick and stone.		
4.00-4.45	U c=41kPa			25/09/2020:DRY 28/09/2020:DRY		3.60 (0.40) 4.00	Firm brown slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to coarse sandstone, siltstone and quartz.		
4.50	D						Firm medium strength brown slightly sandy silty CLAY with some pockets of silt and bands of sand.		
5.00-5.45 5.00-5.45 5.00-5.50	SPT N=18 D B			2,3/4,5,5,4		(2.00)			
6.00-6.45	U c=102kPa					6.00	Stiff high strength locally firm medium strength thinly laminated brown slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to coarse sandstone, siltstone and quartz.		
6.50	D								
7.00	D								
7.50-7.95 7.50-7.95 7.50-8.00	SPT N=20 D B			2,3/4,5,5,6					
8.50	D								
9.00-9.45	U c=61kPa					(6.40)	.... below 9.00m : firm medium strength		
9.50	D								

Remarks
Chiselling from 14.50m to 15.00m - 1hr
On completion backfilled with arisings.

Scale (approx)	Logged By
1:50	TDC/SJ

Figure No. 7069.BH2

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SUB SURFACE

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Site	Borehole Number
SPEAR STREET, MANCHESTER	BH2

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
LIGHT CABLE PERCUSSIVE	150mm to 13.80m		GROUND AND PROJECT CONSULTANTS LTD	7069
	Location AS PLAN	**Dates** 25/09/2020-28/09/2020	**Engineer**	**Sheet** 2/2

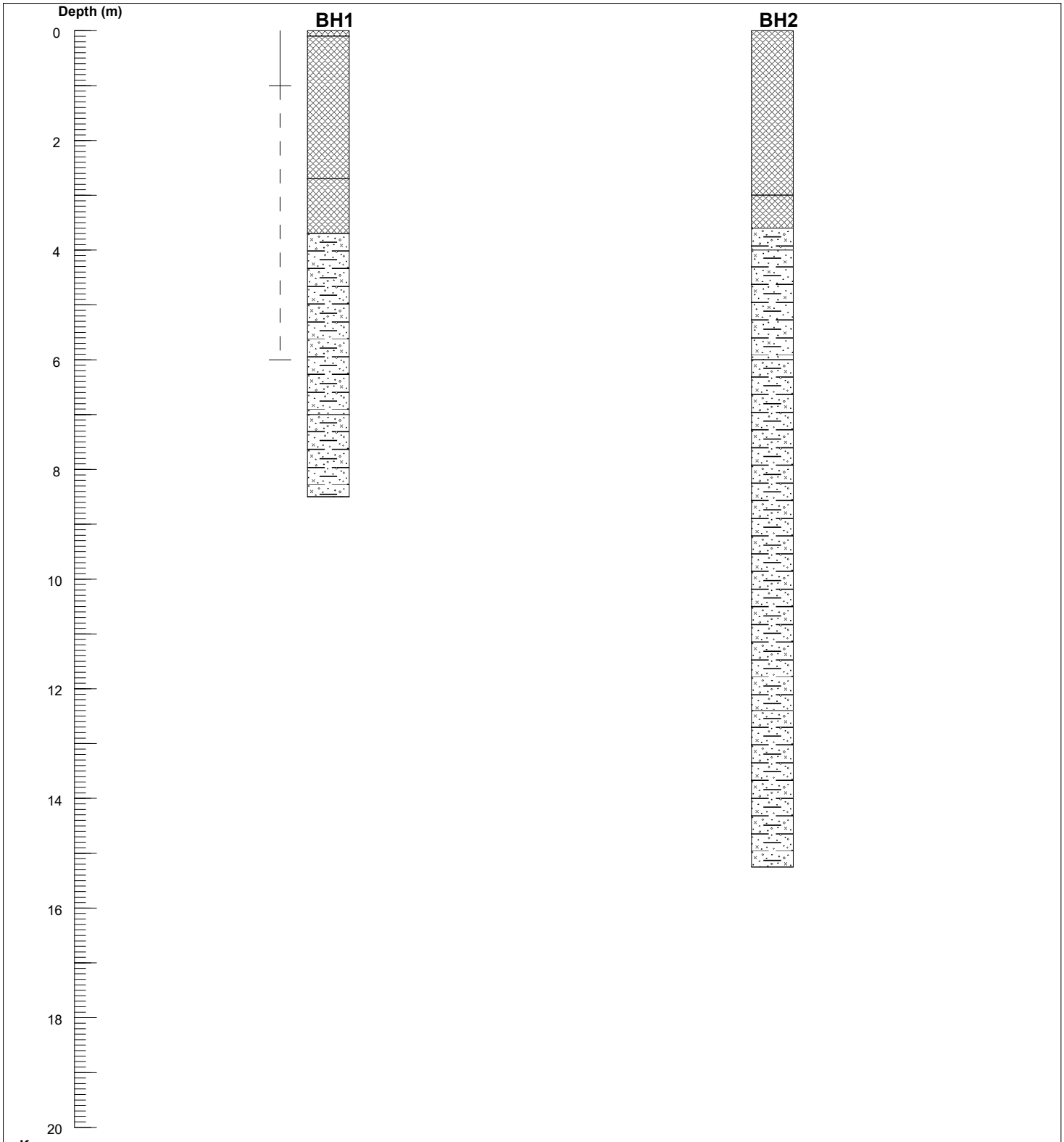
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00	D						Stiff high strength locally firm medium strength thinly laminated brown slightly gravelly slightly sandy silty CLAY. Gravel is subrounded fine to coarse sandstone, siltstone and quartz.		
10.50-10.95	SPT N=20			3,3/4,4,5,7					
10.50-10.95	D						.... below 10.65m : stiff high strength		
10.50-11.00	B								
11.50	D								
12.00-12.45	U c=113kPa								
						12.40			
12.50	D						Very stiff very high strength brown slightly gravelly sandy silty CLAY. Gravel is subrounded fine to coarse sandstone, siltstone and quartz.		
13.00	D								
13.50-13.82	SPT 50/170			4,15/16,16,18					
13.50-13.82	D								
13.50-14.00	B					(2.85)			
14.50	D								
15.00-15.25	SPT 50/95			8,13/31,19					
15.00-15.25	D								
				28/09/2020:DRY		15.25	Complete at 15.25m		

Remarks

Scale (approx)	Logged By
1:50	TDC/SJ

Figure No. 7069.BH2

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Key

- Groundwater Strike
- Strike Rise Level
- Highest recorded piezo level
- Piezometer Tip
- Slotted Standpipe
- MADE GROUND
- Silty sandy CLAY
- Silty sandy gravelly CLAY

SUB SURFACE
SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Nominal Section

Site	Date Drawn	Date Checked	Sheet	Job Number
SPEAR STREET, MANCHESTER	16/10/2020		1/1	7069
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
GROUND AND PROJECT CONSULTANTS LTD			1:100[V]	7069.1

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TRIAL PIT RECORD SHEETS

SUB SURFACE

SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Site	Trial Pit Number
SPEAR STREET, MANCHESTER	TP1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
MECHANICAL EXCAVATOR	2.30m x 1.50m		GROUND AND PROJECT CONSULTANTS LTD	7069
	Location AS PLAN	**Dates** 25/09/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15) 0.15	MADE GROUND: light grey fine to coarse gravel sized fragments of stone. .... at 0.15m : fabric mesh membrane		
0.20-0.40	B				(0.35) 0.50	MADE GROUND: yellowish brown slightly silty sandy fine to coarse gravel sized fragments of stone.		
0.70-0.90	B				(1.90)	MADE GROUND: reddish brown slightly silty slightly sandy gravel with cobble sized fragments of brick and metal. Gravel sized fragments are fine to coarse stone, brick, metal, wood and plastic.		
1.90-2.10	B					.... at 2.40m : basement floor		
			25/09/2020:DRY		2.40	Complete at 2.40m		

Plan

Remarks

Pit sides collapsing from 0.15m.
Approximate basement depth 2.40m, sides were too unstable to accurately measure.
No groundwater encountered.
On completion backfilled with arisings.

Scale (approx)	Logged By	Figure No.
1:25	TM/SJ	7069.TP1

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SUB SURFACE

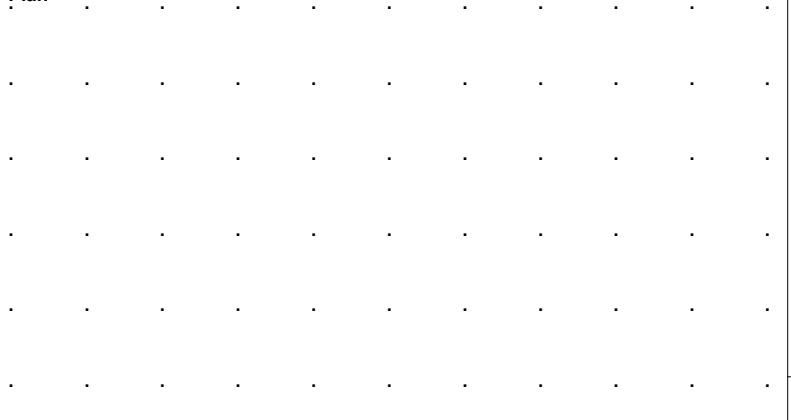
SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Site	Trial Pit Number
SPEAR STREET, MANCHESTER	TP2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
MECHANICAL EXCAVATOR	3.60m x 2.30m		GROUND AND PROJECT CONSULTANTS LTD	7069
	Location AS PLAN	**Dates** 25/09/2020	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15) 0.15	MADE GROUND: light grey fine to coarse gravel sized fragments of stone. .... at 0.15m : fabric mesh membrane		
0.20-0.40	B				(0.35) 0.50	MADE GROUND: yellowish brown slightly silty sandy fine to coarse gravel sized fragments of stone.		
0.70-0.90	B				(2.02)	MADE GROUND: reddish brown slightly silty slightly sandy gravel with cobble sized fragments of brick and metal. Gravel sized fragments are fine to coarse stone, brick, metal, wood and plastic.		
2.10-2.30	B		25/09/2020:DRY		2.52	.... at 2.52m : basement floor Complete at 2.52m		

Plan

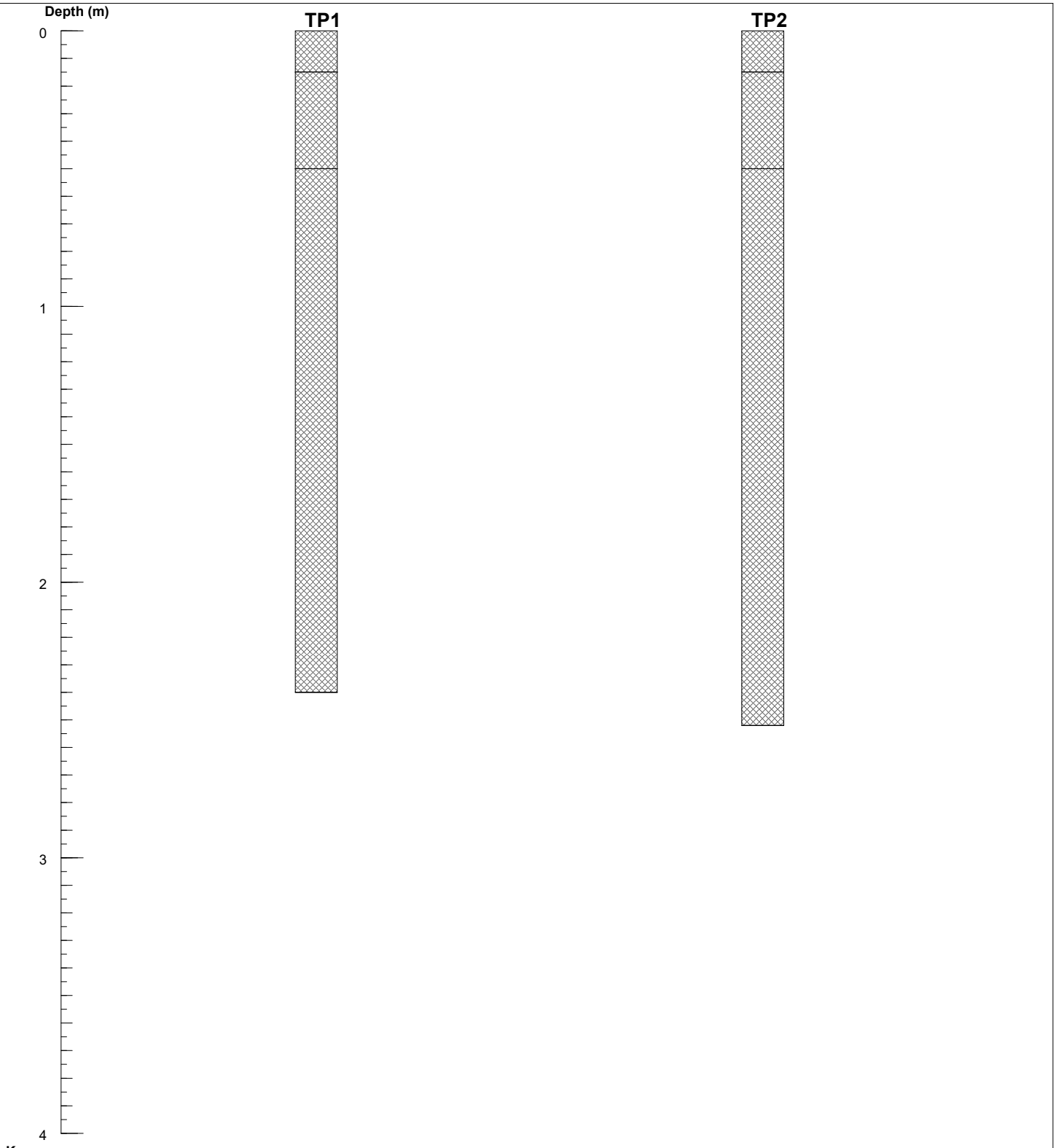


Remarks

Pit sides collapsing from 0.50m
Approximate basement depth 2.52m, sides were too unstable to accurately measure.
No groundwater encountered.
On completion backfilled with arisings.

Scale (approx)	Logged By	Figure No.
1:25	TM/SJ	7069.TP2

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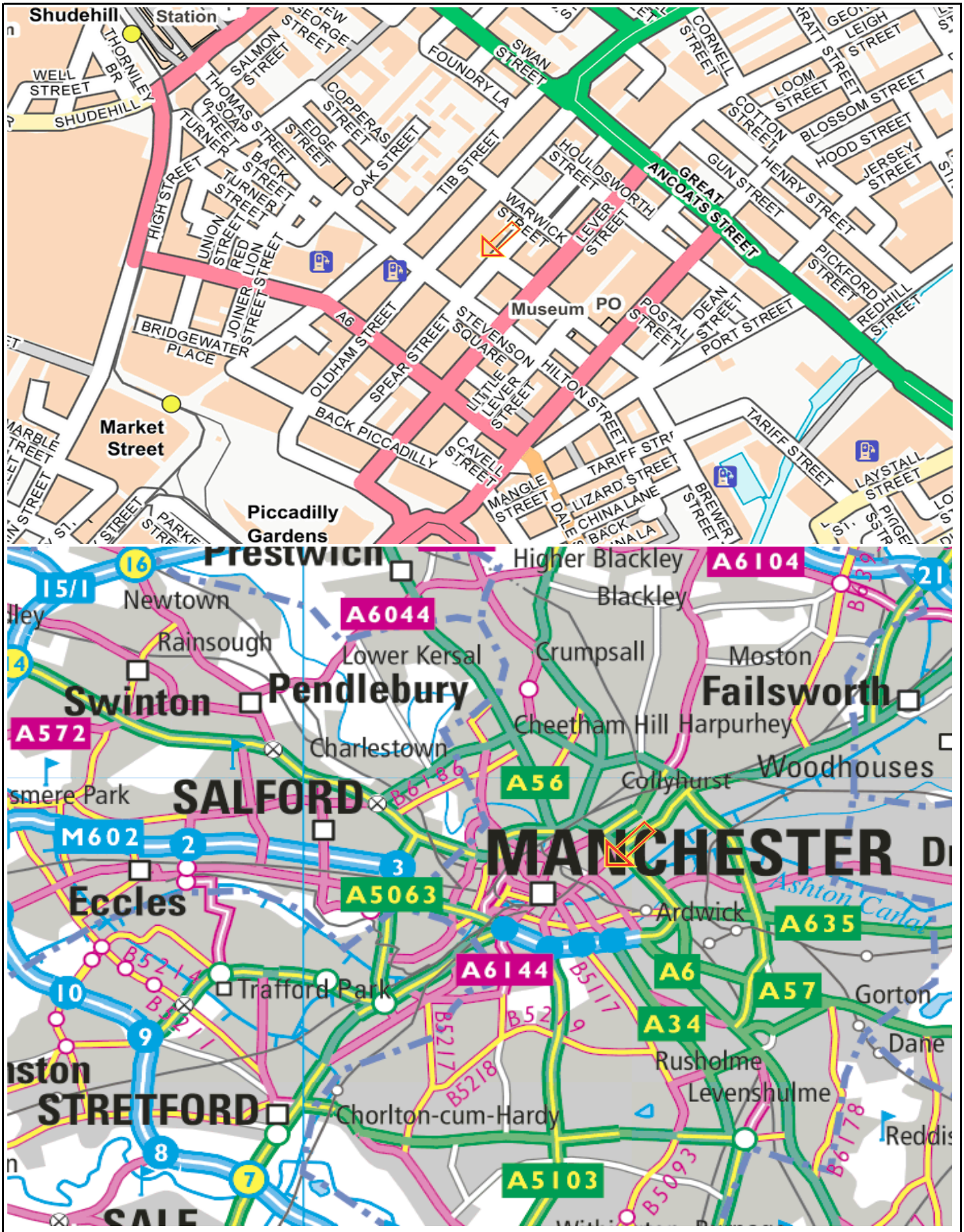
SUB SURFACE
SITE INVESTIGATION SPECIALISTS, GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
3 Peel Street, Preston, Lancashire, PR2 2QS. Tel: (01772) 561135 Fax: (01772) 204907

Nominal Section

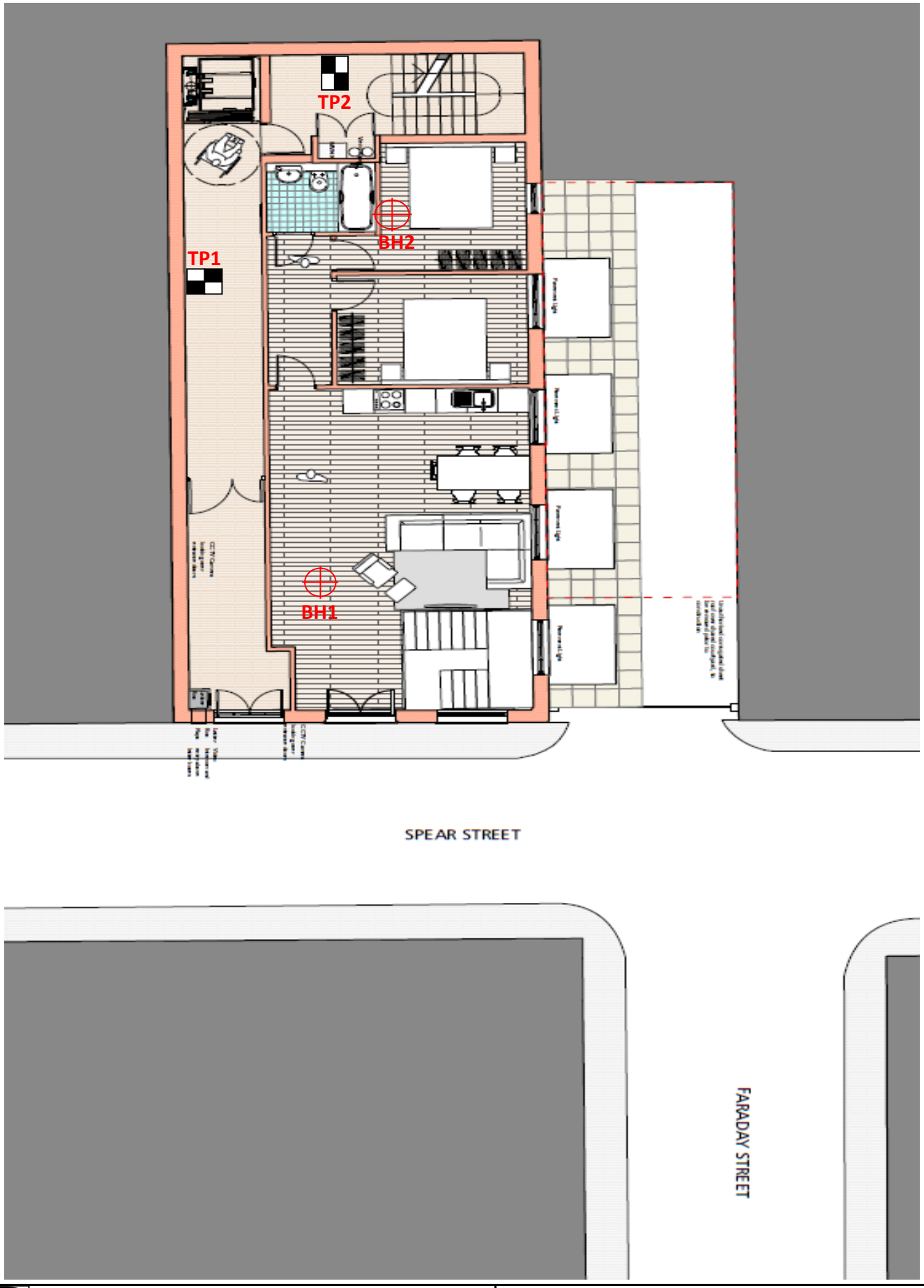
Site	Date Drawn	Date Checked	Sheet	Job Number
SPEAR STREET, MANCHESTER	16/10/2020		1/1	7069
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
GROUND AND PROJECT CONSULTANTS LTD			1:20[V]	7069.1

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FIGURES



SUB SURFACE SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS 3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907	General Site Location			
Site SPEAR STREET, MANCHESTER	Date Drawn 09-Oct-20	Date Checked	Orientation N	Job No. 7069
Client GROUND AND PROJECT CONSULTANTS LTD	Drawn By TDC	Checked By	Scale _	Figure No. 1



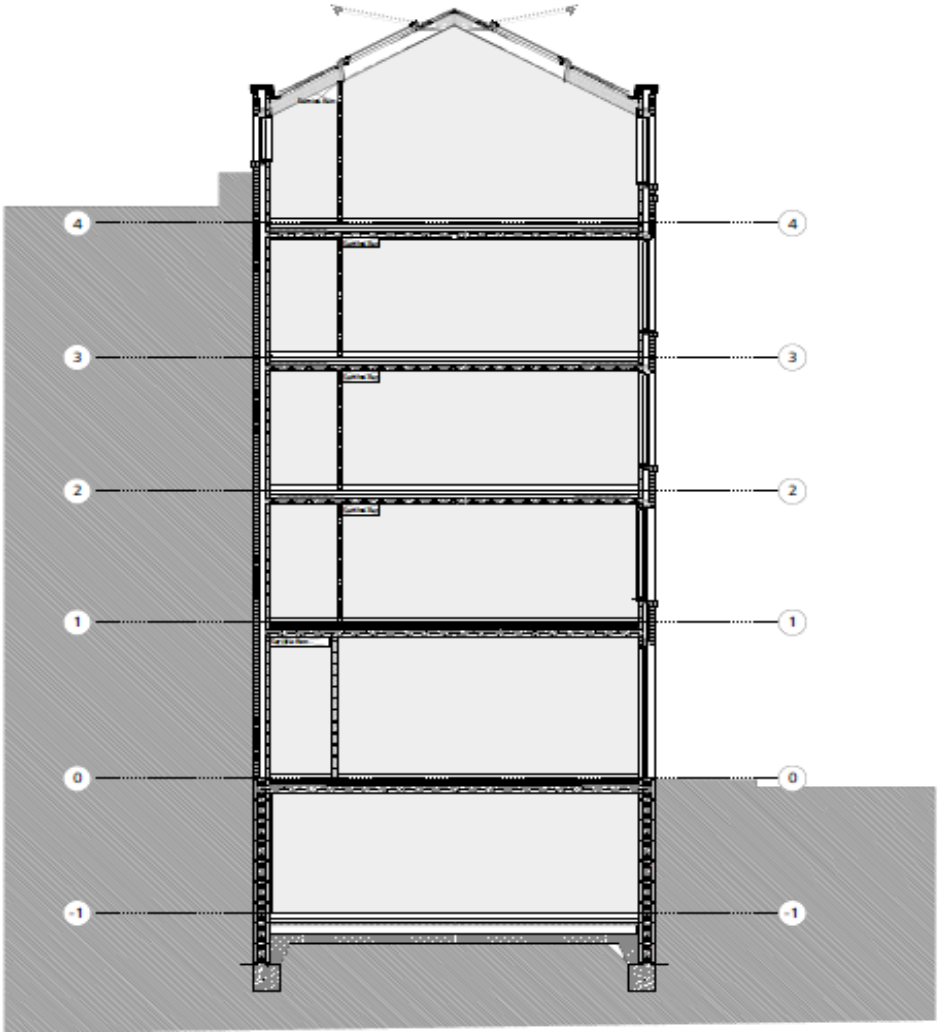
SUB SURFACE

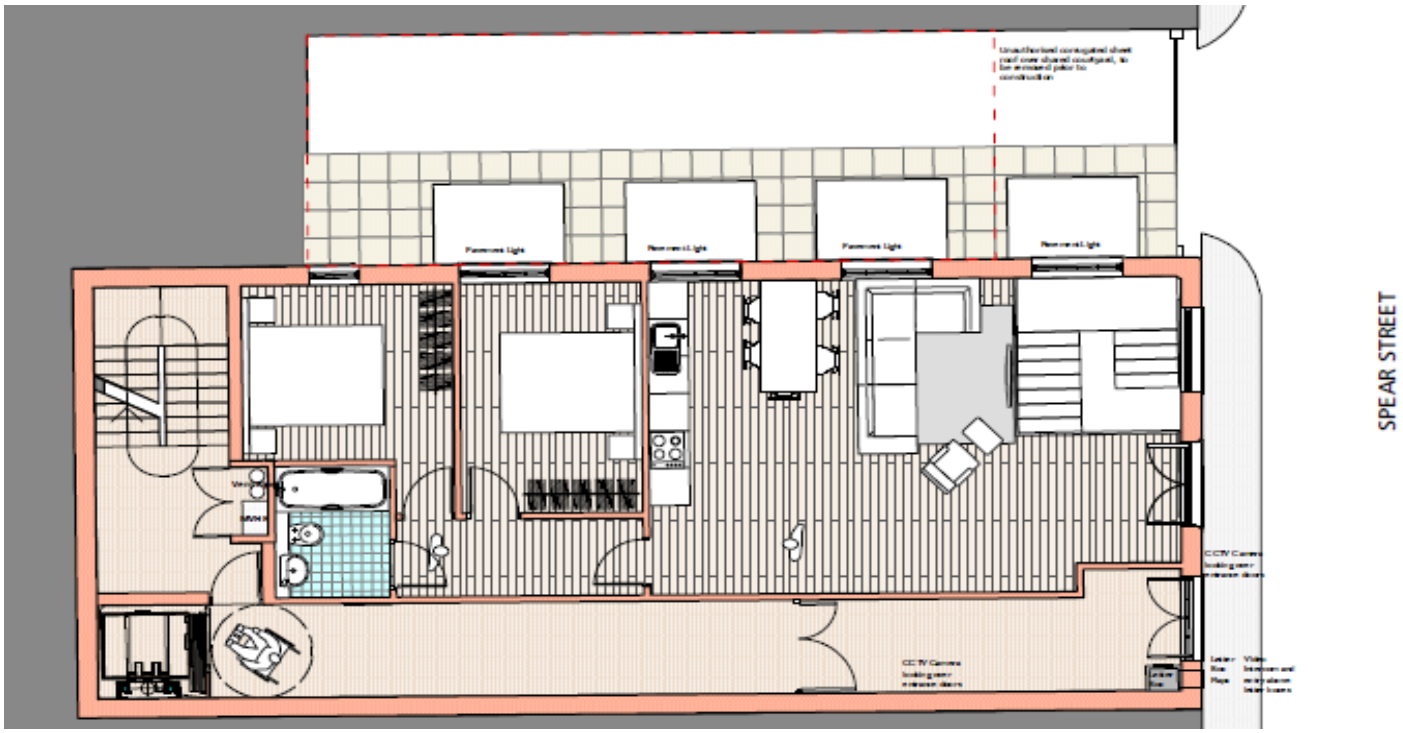
SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS

3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Borehole Location Plan

Site	Date Drawn	Date Checked	Orientation	Job No.
SPEAR STREET, MANCHESTER	09-Oct-20			7069
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
GROUND AND PROJECT CONSULTANTS LTD	TDC		_	2





SUB SURFACE
SITE INVESTIGATION AND SPECIALIST GEOTECHNICAL CONSULTANTS
3 Peel Street, Preston, PR2 2QS. Tel. (01772) 561135 Fax (01772) 204907

Proposed Development Plan

Site	Date Drawn	Date Checked	Orientation	Job No.
SPEAR STREET, MANCHESTER	09-Oct-20			7069
Client	**Drawn By**	**Checked By**	**Scale**	**Figure No.**
GROUND AND PROJECT CONSULTANTS LTD	TDC		_	3

TEST DATE AND CONDITIONS		
Date	23/07/2020	
Atmospheric Pressure	998	mB
Ambient Temperature	21.8	°C
Environics Serial No.	5089	

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

GFM435 Final Inspection & Calibration Check Certificate

Customer	Sub Surface North West
Certificate Number	121863
Order Number	326077

Serial Number	11133
Software Version	G435-00.0024/0004

Recalibration DUE Date
23/07/21

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	450	*Accept > 200 cc/min*	Pump Flow @ -200mB	250	*Accept > 200 cc/min*
Clock Set / Running	✓		Labels Fitted	✓	

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

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings *(ppm)*			
Gas Type	Range *(ppm)*		Zero Reading		Instrument Gas Reading	
H2S	5000	*1500*	0	*Accept ±0.0*	1500	*Accept ±5.0*
CO	2000	*1000*	0	*Accept ±0.0*	1001	*Accept ±5.0*
Hexane	*2.0%*	2.0%	0	*Accept ±0.0*	1.99	*Accept ±10.0*

Cross Gas Effects									
Applied Gas *(ppm)*		Instrument Readings *(ppm)*							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	*1500*	1500		0		0			
CO	*1000*	50		1001		0			
Hexane	*2.0%*	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] *(mB)*			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		997	*Accept ±2.0*
AP Port (Internal)	*+800 mB*	800	*Accept ±5.0*
	+1200mb	1200	*Accept ±5.0*

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading *(l/h)*	Instrument Reading *(l/h)*		Applied Pressure *(Pa)*	Instrument Reading *(Pa)*	
-30	-30	*Accept ±3.0*	-240	-240	*Accept ±50*
-3	-3	*Accept ±1.0*	-12	-12	*Accept ±6.0*
0	0	*Accept ±0.0*	0	0	*Accept ±0.5*
3	3.1	*Accept ±0.5*	13	13	*Accept ±3.0*
30	29.8	*Accept ±3.0*	249	245	*Accept ±50*
60	60.3	*Accept ±6.0*	732	742	*Accept ±130*
90	90.6	*Accept ±9.0*	1429	1453	*Accept ±250*

Temperature Checks		
Calibration Temperature Applied Temperature °C	Instrument Temperature Reading °C	
-10	-10	*Accept ±2.0*
0	0	*Accept ±1.0*
30	30	*Accept ±1.0*
60	60	*Accept ±1.0*
100	100	*Accept ±1.0*

Technician:	Date Tested:
Jack Rutland	*24/07/2020*

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to BS EN ISO9001:2015. Certificate NQA 8374. Valid until 21/03/2022

TEST DATE AND CONDITIONS	
Date	23.7.20
Atmospheric Pressure	998 mB
Ambient Temp	21.8 °C
Environics Serial No.	5089

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

GFM435-1 (MCERTS) OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Type	Instrument Serial Number + SW Version	Job Number(s)
326077	GFM435	11133 G435-24/04	121863

Calibration Technician ..... **Date** 23.7.20

Inspection Technician ..... **Date** 24.7.20

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable (NA)
Function Tests	Dust Caps Fitted	P
	Keyboard Test (All Keys)	P
	Backlight	P
	Clock Set / Running	P
	Comms Test	P
	Pump Flow Test (In & Out)	P
	Overall Leak Test (30mB)	n/a
	Battery Charge Test	P
	Service Date set to?	23-7-21
Channel Tests	Data Logging Enabled?	P
	Verify CH4/LEL/Hexane/PID	P
	Verify CO2	P
	Verify O2	P
	Verify H2S	P
	Verify CO	P
	Verify LEL	P
	Verify 1st Option Gas	N/A
	Verify Atmospheric pressure	P
	Verify differential pressure	P
	Verify flow	P
	Verify temperature probe input	P
	Verify vane anemometer input	P
DataBase Checks	Jobcard(s) completed and signed	P
	Jobcard(s) booked off database	P
	Calibration certificate completed	P
	Complete & print QI record	n/a
Label Checks	No. of Calibration label fitted	GDC 089460
	MCERTS label displayed	P
	Warranty label fitted	P
H2S Range	H2S Range from Sales Order	5000 ppm
	H2S Range from Cal Cert	5000 ppm
	Over-range value correct?	P

INSTRUMENT PACKING LIST		Tick if included
Instrument		✓
Leather Case		X
Instrument Strap		✓
AC Battery Charger (UK)		X
AC Battery Charger (EURO)		X
AC Battery Charger (US)		X
AC Battery Charger (AUS)		X
Gas Sample Pipe - *(new issue)*		✓
Flow Sample Pipe - *(new issue)*		✓
Hard Carry Case		X
Spares Pot		X
Allen Key		X
Temperature Probe		X
Vane Anemometer		X
USB Cable		X
USB Memory stick		X
SiteMan Software	Ver 4.13	X
Internal Filter Pack	Qty	X
External Filter Pack	Qty	X
Field Guide		X

Extra Items:
Sample Tubes

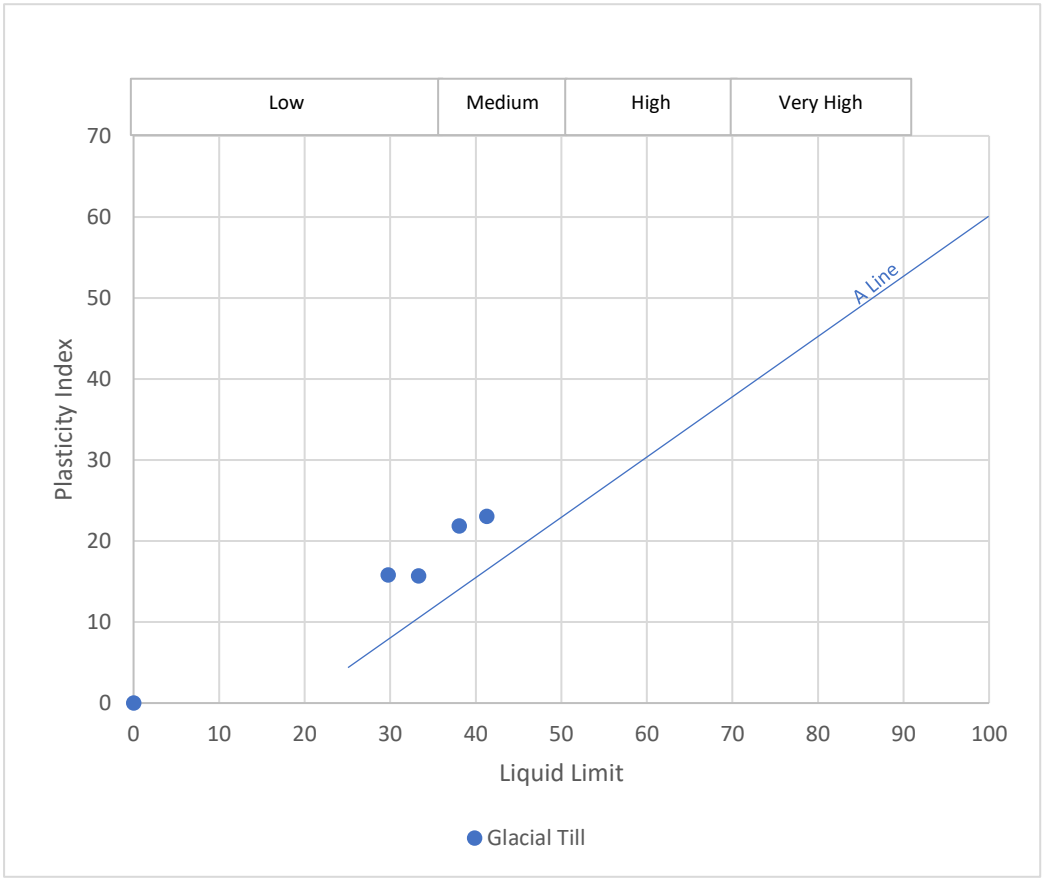
Comments:

Appendix C

Plots

Ground and Project CONSULTANTS LTD

Project:	Spear Street		
Project No.	70539		
Calc Title:	Plasticity Chart - corrected		
Date:	19 October 2020	**Rev**	0



Ground and Project CONSULTANTS LTD

Project:	Spear Street, Manchester		
Project No.	70539		
Calc Title:	Chemical test results against screening values		
Date:	19 October 2020	**Rev**	0

Screening Criteria for 1 % SOM

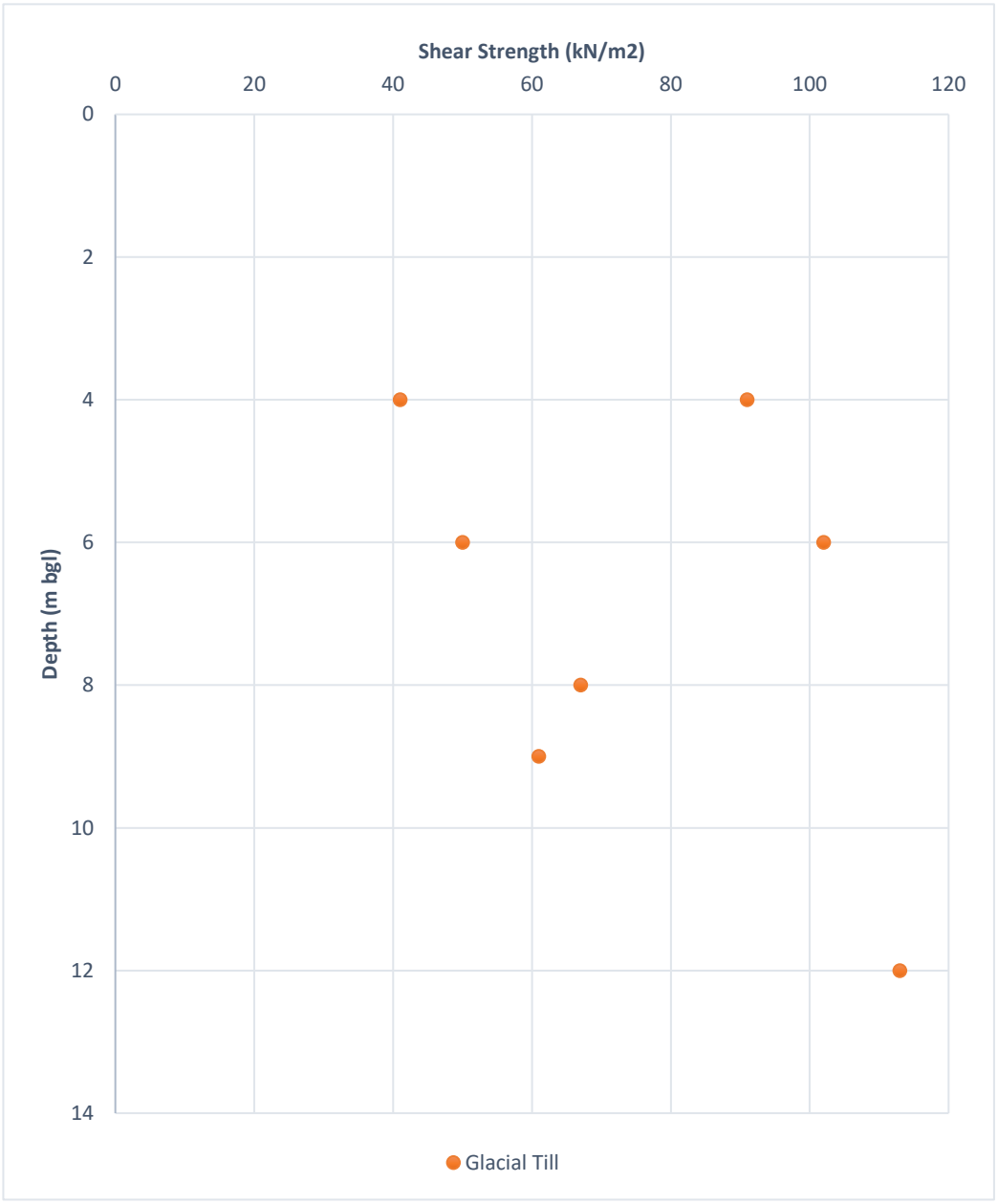
	Location Reference		**BH1**	**BH1**	**BH2**	**BH2**	**TP1**	**TP2**	**Residential without Plant Uptake**	**Commercial / Industrial**	**Public Open Space (Residential)**
	Depth (m bgl)		**0.1 - 2.7**	**3.0 - 3.45**	**0 - 3.0**	**3.0 - 3.45**	**0.7 - 0.9**	**2.1 - 2.3**			
	Stratum		**MG**	**MG**	**MG**	**MG**	**MG**	**MG**			
	Determinand	**Units**									
	Organic Matter (%)	%	**3.1**	**1.1**	**1.9**	**1.7**	**4.8**	**6.4**			
Metalloids	Arsenic	mg/kg	14	14	19	8.6	35	30	40	640	79
	Boron	mg/kg	<0.4	0.62	0.81	0.59	1.3	2.1	11000	240000	21000
	Cadmium	mg/kg	0.45	0.2	11	0.18	0.39	0.29	85	190	120
	Chromium VI	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6	33	7.7
	Chromium (total)	mg/kg	6.7	43	19	26	14	26	910		
	Copper	mg/kg	16	32	65	50	80	94	7100	68000	12000
	Lead	mg/kg	94	42	200	86	260	680	310	2330	630
	Mercury (total)	mg/kg	0.16	<0.1	0.59	0.16	1.7	1.2	1.2	58	16
	Nickel	mg/kg	5.4	50	18	34	19	35	180	980	230
	Selenium	mg/kg	<0.2	0.28	<0.2	<0.2	<0.2	<0.2	430	12000	1100
	Zinc	mg/kg	41	77	69	61	81	190	40000	730000	81000
Polycyclic Aromatic Hydrocarbons (PAH) Congeners	Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	2.3	190	4900
	Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.18	3000	84000	15000
	Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.47	2900	83000	15000
	Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	0.39	2800	63000	9900
	Phenanthrene	mg/kg	<0.1	<0.1	1.4	<0.1	0.78	2.8	1300	22000	3100
	Anthracene	mg/kg	<0.1	<0.1	0.31	<0.1	0.11	0.51	31000	520000	74000
	Fluoranthene	mg/kg	<0.1	<0.1	1.5	<0.1	0.78	2.6	1500	23000	3100
	Pyrene	mg/kg	<0.1	<0.1	1.7	<0.1	0.95	3	3700	54000	7400
	Benzo[a]anthracene	mg/kg	<0.1	<0.1	0.76	<0.1	0.55	1.1	11	170	29
	Chrysene	mg/kg	<0.1	<0.1	0.55	<0.1	0.65	2.3	30	350	57
	Benzo[b]fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.67	1.3	3.9	44	7.1
	Benzo[k]fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	1	0.55	110	1200	190
	Benzo[a]pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.57	1	3.2	35	5.7
	Indeno[1,2,3-cd]pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.43	0.82	45	500	82
	Dibenzo[a,h]anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.85	0.19	0.31	3.5	0.57
	Benzo[g,h,i]perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.48	1.1	360	3900	640
	C4SL BaP surrogate marker	*mg/kg*							*5.3*	*77*	*10*
	Phenols	mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	750	760	760
BTEX	Benzene	mg/kg	<1	<1	<1	<1	<1	<1	0.38	27	72
	Toluene	mg/kg	<1	<1	<1	<1	<1	<1	880	56000	56000
	Ethylbenzene	mg/kg	<1	<1	<1	<1	<1	<1	83	5700	24000
	m&p Xylene	mg/kg	<1	<1	<1	<1	<1	<1	79	5900	41000
	o-Xylene	mg/kg	<1	<1	<1	<1	<1	<1	88	6600	41000
Petroleum Hydrocarbon Fractions	Aliphatic EC >C5-C6	mg/kg							42	3200	570000
	Aliphatic EC >C6-C8	mg/kg							100	7800	600000
	Aliphatic EC >C8-C10	mg/kg							27	2000	13000
	Aliphatic EC >C10-C12	mg/kg							130	9700	13000
	Aliphatic EC >C12-C16	mg/kg							1100	59000	13000
	Aliphatic EC >C16-C21	mg/kg							-	-	-
	Aliphatic EC >C21-C35	mg/kg							65000	1600000	250000
	Aliphatic EC >C35-C44	mg/kg							65000	1600000	250000
	Total Aliphatic Hydrocarbons	mg/kg									
	Aromatic EC >C5-C7 (benzene)	mg/kg							370	26000	56000
	Aromatic EC >C7-C8 (toluene)	mg/kg							860	56000	56000
	Aromatic EC >C8-C10	mg/kg							47	3500	5000
	Aromatic EC >C10-C12	mg/kg							250	16000	5000
	Aromatic EC >C12-C16	mg/kg							1800	36000	5100
	Aromatic EC >C16-C21	mg/kg							1900	28000	3800
	Aromatic EC >C21-C35	mg/kg							1900	28000	3800
	Aromatic EC >C35-C44	mg/kg							1900	28000	3800
	TPH >C6-C10	mg/kg	<1	<1	<1	<1	<1	41			
	TPH >C10-C21	mg/kg	<1	<1	<1	<1	<1	260			
	TPH >C21-C40	mg/kg	<10	<10	<10	<10	<10	300			

The source of screening values are taken from LQM / CIEH Suitable 4 Use Levels (S4ULs), 2015, as an initial screen to inform the generic quantitative risk assessment (GQRA). These are considered 'trigger values' above which further assessment may be carried out for the site, if considered neccessary, as part of a detailed quantitative risk assessment (DQRA).

Public Health England recommends the use of a surrogate marker approach for PAHs. This involves using benzo[a]pyrene (BaP) which provides a consistent indicator of the amount of PAHs in contaminated soil. The C4SL for BaP is given seperately for the surrogate marker approach which should be used in the event that the ratio of the mean concentrations are

C4SL has been used for lead since there is no S4UL

Project:	Spear Street, Manchester		
Project No.	70539		
Calc Title:	Shear Strength vs Depth Plot		
Date:	19 October 2020	**Rev**	0



Ground and Project CONSULTANTS LTD

Project:	Spear Street, Manchester		
Project No.	70539		
Calc Title:	SPT vs Depth Plot		
Date:	19 October 2020	**Rev**	0

