

Phase 2 Site Investigation

Parsonage Street Redevelopment

for

Mawlawi Kurdish Cultural Centre

civil

structural

earth sciences

strategic land

special projects

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07 / 02 / 2023



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Phase 2 Site Investigation

Parsonage Street Redevelopment

Mawlawi Kurdish Cultural Centre

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1.0 Introduction

1.1 Background

- 1.1.1 RoC Consulting has been appointed by Glide Construction, on behalf of the Mawlawi Kurdish Cultural Centre, to conduct a Phase 2 Site Investigation across the Mawlawi Kurdish Cultural Centre, Parsonage Street (the site). It is understood that the site is to be redeveloped with the incorporation of a new extension along the western elevation of the existing building along with the construction of an internal mezzanine structure in accordance with BARCX architect's drawings (ref: T-0230-2-0200-Ground Floor Plan) provided within Appendix A.
- 1.1.2 The following assessment has been completed to support design and planning requirements for the redevelopment of the site and follows on from a desk study relating to the development site, specifically:
- 1) Phase 1 Desktop Study completed by RoC Consulting dated December 2022 (ref: 4423-ROC-ZZ-XX-RP-ES-P1DTS1)
- 1.1.3 It is recommended reference be made to the abovementioned report(s) when reviewing the current assessment.
- 1.1.4 The scope of the report and its assessment has been based around the redevelopment of the site proposals as outlined in the aforementioned architect's plans. It should be noted that any subsequent revision of the proposed redevelopment or site boundary away from the abovementioned drawing may result in the full or partial re-interpretation of this report and assessment.

1.2 Terms of Reference

- 1.2.1 The Phase 2 Site Investigation was carried out following receipt of an instruction from Tausif Zaman of Glide Construction.

1.3 Objectives

- 1.3.1 The scope of works has been tailored to meet both planning and design requirements to assist with the redevelopment of the site. These considerations include:
- 1) Design a programme of site investigation works to establish ground conditions beneath the site and target known or suspected sources of contamination (as revealed by the Phase 1 desktop study).
 - 2) Completion of site investigation field works including the formation of 3 window sample boreholes, and 3 foundation exposures / hand dug inspection pits to establish the geology of the site.
 - 3) Completion of geo-environmental and geotechnical laboratory analysis of soil samples to determine physical and chemical characteristics.



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- 4) Completion of a detailed geotechnical assessment of site conditions to inform new building foundation design. The scope of this assessment will also include reference to the findings and results of previous site investigation works.
- 5) Completion of a geo-environmental assessment utilising information provided by both the current and previous phases of site investigation works sufficient in its scope for submission to the relevant statutory authorities.

2.0 Limitations of Study Assessment

- 2.0.1 The report has been produced by RoC Consulting for the client solely for the purposes of a review of information for the abovementioned site. It may not be used by any person for any other purpose other than that specified without the express written permission of RoC Consulting. Any liability arising out of its use by a third party for purposes not wholly connected with the above shall be the responsibility of that party who shall indemnify RoC Consulting against all claims, costs, damages and losses arising out of such use.
- 2.0.2 This report is written in the context of an agreed scope of work and should not be used in a different context. The report should be read in its entirety. Furthermore, new information, improved practices and changes in legislation may require re-interpretation of this report in whole or in part after its original issue. RoC Consulting reserve the right to alter their conclusions and recommendations in the light of further information that may become available.
- 2.0.3 Ground conditions can change rapidly, especially in areas of made ground, however, it is assumed that the ground conditions observed are typical and representative of the site as a whole. The ground conditions have been determined from a limited number of exploratory holes formed across the property, therefore, only a small percentage of the total area of the property has been investigated. Interpolation between exploratory holes has enabled a general picture of the subsurface conditions to be produced.
- 2.0.4 Conclusions drawn from the ground investigation should be read in this context. RoC Consulting cannot accept responsibility for any situations resulting from locally unforeseen ground conditions occurring between exploratory holes.
- 2.0.5 RoC Consulting has exercised all reasonable due skill, care and diligence when collating the design and subsequent execution of ground investigation works. It should be noted we cannot anticipate the requirements and actions of the regulatory authorities when designing and implementing ground investigation works and, whilst thorough consideration has been given to all geo-environmental and geotechnical concerns; further additional fieldworks or assessment may be required at their request.
- 2.0.6 RoC Consulting cannot confirm that all ground conditions which may be uncovered during the works have been identified, rather this report is intended as an informative for use by experienced professionals and contractors.
- 2.0.7 Whilst the investigation and report has been scoped in accordance with our understanding of typical regulatory authority requirements, we cannot confirm that on submission regulators may require additional in situ testing or investigation.

3.0 Background Information

- 3.0.1 The overview below outlines the most salient points / considerations, and it is recommended reference be made to the complete findings of previous site investigation reports for additional information / clarification.

3.1 Site Description

- 3.1.1 The site comprises the buildings and grounds of the Mawlawi Kurdish Cultural Centre, a Grade 2 Listed former church school building now operated as a community centre and mosque. It is a roughly triangular plot of 0.14ha and is located at National Grid ref. 383380, 396040, approximately 1km south of the site.
- 3.1.2 The MKCC is a two storey Victorian former church school building in gothic revival style. It is constructed primarily of brick. The structure includes a large central hall constructed over two stories with a more recently added internal timber balcony at the south elevation. The remainder of the building comprises internal corridors and offices at ground floor level. The majority of these are in two brick extensions to the east and west elevations which appear to be mid-century construction. The building has a small basement beneath the southern part of the building and offices only. The exterior of the site comprises a hardstanding carparking area bound by a low brick wall. The site levels are generally flat.
- 3.1.3 The site is bound by Chichester Road to the northwest, Parsonage Street to the northeast and to the south by the carpark of a small office building. Beyond this to the north is the large Church of St. Mary, Hulme – which is historically associated with the site building. The surrounding local land uses are predominantly residential and associated services.

3.2 Geological Characteristics

- 3.2.1 Review of publicly available BGS geological map records indicate the site is underlain by the following:
- Drift Geology: Glaciofluvial Sheet Deposits** (predominantly sand and gravel)
Overlying:
Devensian Till (predominantly clay)
- Solid Geology:** Chester Formation - Sandstone
- 3.2.2 A search has also been completed using the BGS Borehole Scans facility to establish what (if any) historic site investigation or borehole data may be available for the development. The nearest relevant record to the site is located 230m northwest of the site and recorded sand and gravel to a depth of 3.80m, overlying clay soils which continued to the sandstone bedrock at a depth of 26.20m.
- 3.2.3 There are no geological faults or features indicated within 500m of the site.
- 3.2.4 The Envirocheck report indicates that the site is not located in an area which may be affected by historic Coal Mining or Brine extraction and a Coal Authority report is not required.

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- 3.2.5 The site is located in an area where less than 1% of homes are estimated to be at or above the action level for Radon and consequently is not deemed to be at risk from Radon.
- 3.2.6 No significant risks from ground stability were identified following review of the Envirocheck report for the site.

3.3 Site History and Environmental Characteristics

- 3.3.1 Historical records indicate the site to have formed part of the grounds of Yew Tree Cottage in 1848 until 1855 when the existing building was constructed on site with some subsequent extensions to the eastern and western elevation in the mid to late 20th century. The Corn Brook watercourse was located adjacent the site southern boundary and has subsequently been culverted. United Utilities records indicate the culvert to run east to west directly through the centre of the existing building on site.
- 3.3.2 The area surrounding the site was extensively developed through the mid to late 19th Century comprising predominantly residential buildings as well as the nearby Church of St Mary. During the 1990s a large area circa 60m east of the site was subject to extensive commercial and residential redevelopment.
- 3.3.3 The Envirocheck Groundwater Vulnerability Map indicates the drift geology is classified as a Secondary A Aquifer with the underlying Chester Formation bedrock classed as a Principal Aquifer.
- 3.3.4 The site is not said to be located within any Environment Agency Source Protection Zones or close proximity to any sensitive water abstraction points (e.g., potable water supply well).
- 3.3.5 The nearest groundwater abstraction point is located 220m southwest of the site at Hydes Brewery. There are no surface water abstractions within 1km of the site.
- 3.3.6 The nearest surface water feature is indicated 353m north of the site. However as detailed previously the Corn Brook River was historically located adjacent the site southern boundary. The Corn Brook has subsequently been culverted with United Utilities records showing it crossing the centre of the site east to west, whereas the Hidden Manchester Website positions the culvert outside the site close to the southern boundary.
- 3.3.7 The nearest discharge consent is located 625m northwest of the site and is for discharge of public sewage into the Manchester Ship Canal.
- 3.3.8 The nearest historic pollution incident was located 890m east of the site. This was a Category 3 minor incident for discharge of herbicide or fungicide to the Bridgewater Canal.
- 3.3.9 The Envirocheck database indicates that there have been no prosecutions relating to controlled waters or industrial processes within 500m of the site.

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- 3.3.10 Land to the east of the site, at a distance of 57m, is recorded as a historic landfill site and local authority registered landfill site which operated between 1994 and 1995. Records indicate this received deposited waste including inert and industrial waste, and that authorised waste was limited to rubble, hardcore, stone brick, and concrete. It is notable that most of the former landfill area is now covered with housing and commercial developments, and it is likely that this related to demolition of older housing and commercial developments before construction. There are no further landfill sites or waste facilities within 500m of the site.
- 3.3.11 There are no Contaminated Land Register Entries and Notices (CLREN), Local Authority Pollution Prevention and Controls (LAPPC), Integrated Pollution Control (IPC), Integrated Pollution Prevention Control (IPPC) or Local Authority Pollution Prevention and Control Enforcements (LAPPCE) relating to authorised processes at the site or within 250m of the site boundary.
- 3.3.12 The site is not said to be located in an area deemed to be at risk from flooding or extreme flooding events from either land or sea.

4.0 Site Investigation Design

General

- 4.0.1 The RoC intrusive investigation was designed and completed to further investigate geo-environmental issues identified during the Phase 1 Desktop Study as well as provide geotechnical information to facilitate new foundation and extension design.
- 4.0.2 The site investigation works comprised the formation of three window sample boreholes to a maximum depth of 3.41mbgl and 3 hand dug inspection pits / foundation exposures to a maximum depth of 1.50mbgl. Window sample boreholes were restricted to the northern portion of the site due to uncertainty as to the location of the Corn Brook Culvert. Hand dug inspection pits were dug in the southern portion of the site to confirm ground conditions in this area.
- 4.0.3 In the absence of identified isolated sources of contamination, exploratory holes were located primarily to provide overage of the site and for geotechnical purposes. Specifically, hand dug trial pits have been excavated to directly investigate existing building foundations which will be retained and may be subject to changes in loading. Following agreement with the client, it was decided not to disturb the building interior by excavating in the location of the foundation for the proposed mezzanine floor, and it is understood that this will be designed using the general profile of site soils.
- 4.0.4 Samples of soil collected during the investigation works are to be analysed for a variety of determinants associated with the pattern of current / historic industrial activity across the site as outlined within the preliminary conceptual site model.
- 4.0.5 Table 4.0 provided below provides location justification for each exploratory hole formed during the site investigation fieldworks. The purposes of this table is to illustrate the targeting of potential sources of contamination during the Phase 2 site investigation works.

Table 4.0: Borehole Locations & Justification

BH/WS ID.	Reason for selection
WS101	Assess ground condition and allow installation of a gas monitoring well.
WS102	Assess ground condition and allow installation of a gas monitoring well.
WS103	Assess ground condition and allow installation of a gas monitoring well.
HDP101	Expose foundations on northern building elevation
HDP102	Expose foundations on western building elevation
HDP103A	Assess ground conditions in the south of the site
HDP103B	Assess ground conditions in the south of the site.

- 4.0.6 Exploratory hole locations are shown on RoC Consulting drawing 4423-ROC-ZZ-XX-DR-ES-ES101 (Current Site) provided within Appendix A.

5.0 Site Investigation Fieldworks

- 5.0.1 Site investigation fieldworks were completed on the 20th December 2022 by drilling contractors PM Sampling Ltd. Boreholes were formed using a Competitor 150 Window Sample Rig and foundation exposures / hand excavated inspection pits were formed with hand digging tools.
- 5.0.2 Information with respect to buried services was obtained from relevant providers prior to commencement of the investigation works. However, as a precautionary measure all exploratory hole locations were scanned with Ground Penetrating Radar and a Cable Avoidance Tool prior to the commencement of works. In addition, hand dug service pits were completed to a depth of 1.20mbgl at all borehole locations deemed to fall in close proximity to the suspected location of possible buried service runs / infrastructure.
- 5.0.3 To ensure no new sources of contamination were introduced to underlying soils / bedrock during the formation of each borehole, steel casing was used throughout as well as vegetable oil as a lubrication medium for all drilling apparatus. Sampling equipment was also cleaned between sampling to reduce cross-contamination risks.
- 5.0.4 Soil and rock core samples were collected for subsequent chemical and geotechnical laboratory analysis. Soil samples used for geotechnical analysis were collected in 1kg plastic sample tubs, and polythene “bulk” bags. Samples collected for chemical testing were collected in 30g and 258g glass jars and 1kg plastic sample tubs. Samples were obtained from both made ground and natural strata to assess the overall quality of underlying soils. In situ soil strength was investigated using Standard Penetration Tests (SPT) within superficial deposits as well as to confirm rock head had been reached.
- 5.0.5 The shallow soils encountered during construction of the boreholes were described and logged by a suitably qualified engineer in accordance with BS 5930: Code of Practice for Site Investigations (the log sheets for which have been provided within Appendix B).
- 5.0.6 A total of 3 ground gas and ground water monitoring wells were installed within window sampler boreholes. Installation details are provided within Table 5.0 below, copies of ground water and gas monitoring records are provided within Appendix E.

Table 5.0: Monitoring Well Installations

BH ID	Monitoring well depth (mbgl)	Response zone (mbgl)	Response zone strata
WS101	1.00	0.50 to 1.00	Made Ground
WS102	2.00	0.50 to 2.00	Made Ground and Glaciofluvial Sheet Deposits
WS103	1.00	0.50 to 1.00	Made Ground and Glaciofluvial Sheet Deposits



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- 5.0.7 The site works have been undertaken with supervision from an Unexploded Ordnance specialist. No potential UXO was encountered during the works. UXO risks will also require management during the construction phase and specialist advice on this should be sought.

6.0 Encountered Ground Conditions

- 6.0.1 The following ground conditions are summarised from the exploratory holes formed during the RoC Consulting site investigation. The following represents an overview of encountered ground conditions, and it is recommended reference be made to the borehole and trial pit log sheets provided within Appendix B for a detailed strata description; all depths shown are given in metres below ground level (mbgl) unless otherwise stated).

6.1 Ground Conditions Overview

Made Ground

- 6.1.1 Made ground was reported at all 7 exploratory hole locations, the details of which are provided in table 6.1 below:

Table 6.1: Made Ground Strata Description

Strata description	Made ground was encountered from ground level at all exploratory hole locations in the form of asphalt / block paving surfacing underlain by a limestone subbase. Underlying the limestone subbase, predominantly cohesive made ground deposits were encountered containing brick, sandstone, ceramic, and occasional brick cobbles. Limited granular deposits were also encountered. At a depth of between 0.80 and 1.20 a soft organic clay was encountered at WS101, WS102 and HDP101.		
	No groundwater strikes were encountered within made ground deposits.		
Max Depth	1.50	Min Depth	0.60
Mean Depth	1.05	SPT Range	N = 2 to 5

Glaciofluvial Sheet Deposits

- 6.1.2 Natural soils were reported at the base of made ground deposits at 5 exploratory hole locations as described in Table 6.2 below.

Table 6.2 Glaciofluvial Sheet Deposits

Strata description	Glaciofluvial Sheet Deposits were found to comprise an initial relatively thin layer of soft to firm clay underlain by a medium dense to very dense gravelly sand and sand and gravel deposits. Glaciofluvial deposits continued to termination in all locations at a maximum depth of 3.45m, at which depth soils were too dense to penetrate further. SPTs varied from 2 to 15 in the clay and 19 to 92 in the granular deposits. No ground water strikes were encountered within Glaciofluvial deposits during the site investigation works.
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6.2 Groundwater & Contamination Observations

- 6.2.1 No visual or olfactory evidence of contamination was encountered during the site investigation works.
- 6.2.2 No groundwater strikes were encountered during the site investigation works.
- 6.2.3 Groundwater monitoring on three occasions to date has not observed any resting groundwater levels. Consequently, we do not consider groundwater to be present at the investigated depths.

6.3 Below Ground Obstructions

- 6.3.1 At HDP103a an electricity cable was encountered at 0.30mbgl. This is anticipated to be a private power or lighting cable and the excavation was aborted with no damage. No other obstructions were encountered during the site investigation works.

6.4 On-site Culvert

- 6.4.1 Records obtained from United Utilities indicate there is a culvert that runs below the existing building on site in a roughly east to west direction. Other records, specifically historic maps and the map assembles by Hidden Manchester, suggest that the culvert is located closer to the southern boundary of the site. Further evidence of the location of the watercourse was not encountered during the site investigation, including through manhole inspection and GPR surveys. While the proposed development is not extensive, there is meaningful potential for the proposed structure to interact with the culvert, and its location and the potential risks should be further investigated prior to construction. This should include an internal survey of the structure.

7.0 Laboratory Testing

- 7.0.1 To establish the physical and chemical properties of underlying soils, a programme of laboratory analysis was completed utilising samples obtained during site investigation works. This analysis comprised the testing of soil samples to assist with the estimation of risks posed by contaminated land related concerns.

Chemical Testing

- 7.0.2 RoC Consulting submitted a total of 4 soil samples to a UKAS accredited testing facility for analysis against a range of determinands synonymous with the site's former industrial activity.

Determinands	No. of Tests
Toxic and phytotoxic metals and metalloids	4
Total & Speciated Polycyclic Aromatic Hydrocarbons (PAH),	4
Other inorganic substances (e.g., Sulphate, Cyanide etc)	4
Asbestos ID	4
Water Soluble Sulfate & pH	4

- 7.0.3 Copies of chemical testing results have been provided within Appendix C.

Geotechnical Testing

- 7.0.4 A programme of geotechnical laboratory analysis was also completed on disturbed and bulk soil samples obtained during site investigation works.

Plasticity Index

- 7.0.5 A total of 2 soil samples were tested for the determination of the glacial clays plasticity index. The depth range of samples tested varied from 1.20 to 2.00m with a mean depth of 1.60mbgl. The plasticity index of the soft organic clay was found to be 22% whereas the plasticity index of the deeper firm clay was found to be 4%.

Particle Size Distribution

- 7.0.6 A total of 2 bulk samples of granular deposits were subject to particle size distribution testing to confirm their principal constituent parts. Results from these tests support the descriptions made of granular made ground material.

8.0 Geo-Environmental Assessment

- 8.0.1 The results from the intrusive Phase 2 ground investigation have been used to complete a refined assessment of risks posed by ground contamination and ground stability issues beneath the site, building on the model and assessment outlined in the Phase 1 Desktop Study. The assessment considers these risks both in terms of the current site arrangement and usage, as well as any potential future development (and associated construction process).
- 8.0.2 The assessment has been collated with reference to various statutory and non-statutory guidance documents relating to land contamination and ground stability. Specifically, the assessment has been conducted in accordance with the Environment Agency Land Contamination Risk Management (LCRM) guidance relating to the “Tier 2 Generic Quantitative Risk assessment” process (revised April 2021).
- 8.0.3 In accordance with this method, a Refined Conceptual Model has been collated for the site based on the results of the desktop review. This model is based around the Source / Pathway / Receptor methodology as outlined in Fig 8.0.

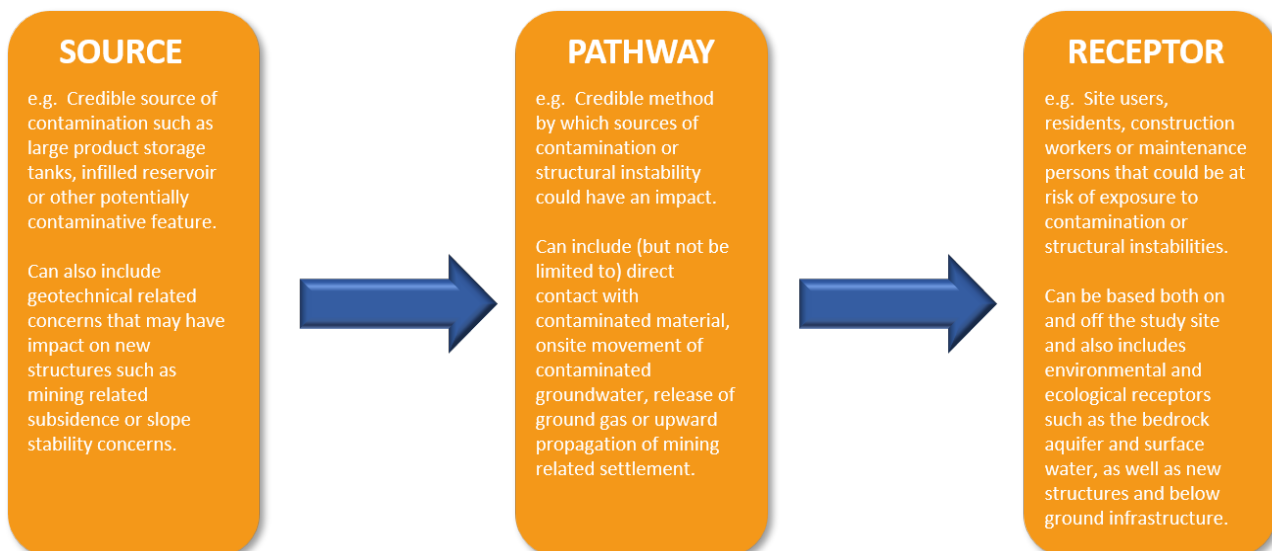


Figure 8.0 Source Pathway Receptor Diagram

- 8.0.4 Risk assessment is the process of collating known information on a hazard or set hazards in order to establish actual or potential risks to receptors. The receptor may be human health, controlled waters, a sensitive local ecosystem or even construction materials. Receptors can be connected with the hazard under consideration via one or several exposure pathways (e.g., the pathway of direct skin contact and oral exposure).

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- 8.0.5 Risks are generally managed by isolating or removing the hazard, isolating the receptor, or by intercepting the exposure pathway. Without the three essential components of a source (hazard), pathway and receptor, there is deemed to be no risk. In other words, the mere presence of a hazard at a site does not mean that there will necessarily be risks.
- 8.0.6 Potential sources of contamination have been identified across the site, where applicable, based on observations and information obtained during the desktop review. These sources are defined based on the results from site investigation fieldworks and subsequent laboratory analysis of samples / monitoring works. As previously discussed, the design of these investigations included judgemental elements of targeting known or suspected sources of contamination, based on the results of the Tier 1 Preliminary desktop assessment; as well as obtain site wide information on soil, groundwater, and ground gas quality.
- 8.0.7 The risk assessment has been completed with reference to the guidance outlined within CIRIA 552 "Contaminated land risk assessment. A good practice guide". This risk assessment methodology considers the potential consequence and severity of risks that may be present within soils, and then compares these with the likelihood of occurrence and exposure of said risk. A range of risk classifications are provided within CIRIA 552 further details of which are provided in Table 8.0 below.

Table 8.0: Definition of risk class and consequence

Risk Class	Definition	Example
Minor	Potential for harm, although not significant, which may result in financial loss to resolve. Ground conditions where the use of PPE would readily mitigate risks posed to human health.	Low level contamination hotspots within made ground / demolition fill materials. Stunted or impeded plant growth due to poor soil quality.
Mild	Pollution of non-sensitive water resources or damage to crops, plant growth, below ground utilities or structures.	Perched groundwater contamination overlying low permeability aquifer or aggressive sulphate concentrations in soils.
Medium	Sources of contamination identified on site have the potential to cause both long and short-term health effects on site residents / users. Alternatively (or in conjunction with) sources of contamination may have the potential to impact surface or groundwater quality or impede vegetation growth.	Elevated concentrations of hydrocarbon contamination reported within topsoil tested within residential gardens as a result of inadequate or incomplete previous remediation works. Movement of contaminated groundwater from leaking below ground storage tank into adjacent surface water course.
Severe	Sources of contamination pose a credible and acute risk to human health with potential for "Significant Harm" occurring as defined by the Part IIA of the Environmental Protection Act (1990). Alternatively (or in conjunction with risks posed to human health) sources of contamination may pose an immediate risk to controlled water resources or ecosystems.	Grossly contaminated soils are encountered or disturbed during excavation works, causing an immediate release of toxic soil vapour and leachate / contaminated groundwater flow across adjacent land.

- 8.0.8 As previously discussed the contaminated land risk assessment model evaluates the severity of risks that may be present within soils / groundwaters in the context of threats posed to identified receptors before deriving the actual risk rating based on the probability of occurrence. Table 8.1 (provided overleaf) outlines the range likelihood of risk.

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Table 8.1: Probability Assessment

Classification	Definition
High likelihood	A credible pollutant linkage has been identified and it is very likely contaminants will impact identified receptors in both the short or long term (or is already actively doing so). The potential for harm to be caused is thus highly likely.
Likely	Pollutant linkages between the sources of contamination and identified receptors are present and it is considered likely they will become active given the right set of circumstances (e.g. contaminants currently buried below ground that are likely to be exposed or disturbed during construction / excavation works. The circumstances are such that an event is not inevitable, however it is possible in the short term and likely over the longer term.
Low likelihood	A theoretical pollutant linkage has been identified that has the potential to expose receptors to contaminants under the correct circumstances. However, the likelihood of such an event occurring is not a certainty, even in the long term
Unlikely	There is no / minimal likelihood a pollutant linkage would occur, even over the long term.

- 8.0.9 The risk assessment process is a combination of probability and consequence, recognising that it may be possible to have a significant source of contamination beneath a site (such as a large below ground chemical storage tank) that may only present a relatively moderate to low risk (owing to the fact it may be contained within a secure concrete bund). Table 8.2 indicates how the actual nature of risk is established with Table 8.3 illustrating how the risk is interpreted in the context of contaminated land risk assessment.

Table 8.2: Risk Definition

		Consequence			
		Severe	Medium	Mild	Minor
Probability	High Likelihood	Very High Risk	High Risk	Moderate Risk	Moderate / Low Risk
	Likely	High Risk	Moderate Risk	Moderate / Low Risk	Low Risk
	Low Likelihood	Moderate Risk	Moderate / Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate / Low Risk	Low Risk	Very Low Risk	

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Table 8.3: Description of risks posed

Risk Definition	Description
Very High	Active pollutant linkages between a significant source of contamination and identified receptors have been established and there is a high likelihood of severe harm occurring to said receptors unless immediate investigation and remediation action is not taken.
High Risk	Harm is likely to arise to receptors from an identified hazard in the short and long term. Urgent investigation of the contaminant issue will be required, and remedial treatment is likely.
Moderate Risk	The possibility of harm has been identified toward receptors under the right circumstances, although the severity of harm would be relatively mild. Further investigation of identified issues would be prudent and possible need for remedial measures in the long term.
Low Risk	It is possible harm could arise to a designated receptor from identified hazard, but it is likely (if realised) any harm would be (at worst) mild.
Very Low Risk	No significant pollutant linkages have been identified and the possibility of harm occurring to receptors is low.

- 8.0.10 A Preliminary desk-based risk assessment has been completed for the site utilising the current and historical environmental information available (refer to RoC Consulting report ref: 4423-ROC-ZZ-XX-RP-ES-P1DTS1). This report formed the basis from which the current programme of ground investigations was designed and undertaken.
- 8.0.11 The Tier 2 risk assessment process can be divided based on the receptor group in question between:
- 1) Risks posed to human health by soil contamination (both construction persons and future site users).
 - 2) Risks posed to human health by hazardous ground gas ingress (both construction persons and future site users).
 - 3) Risks posed to controlled waters by soil or groundwater contamination (both surface water features and bedrock aquifers).
 - 4) Risks posed to new building construction by aggressive ground conditions (namely elevated sulphate concentrations).
- 8.0.12 It is noted that the site is being redeveloped with the demolition of an existing extension, building of a new extension and incorporation of a mezzanine floor. Given the site is predominantly hardstanding nature in the existing and proposed state any pathways to human health risk receptors will be significantly inhibited and it is unlikely that any pathways will be created. The greatest risk exists during the construction phase of the proposed development when workers will be exposed to site soils during any excavation works.
- 8.0.13 Appropriate assessments have been completed for each of the above utilising the latest statutory and non-statutory guidance documents; for details of risks posed to human health refer to Section 8.1 (soils) and Section 8.2 (ground gas), for details of risks posed to controlled waters refer to Section 8.3 and risks posed to new structures refer to Section 8.4.

8.1 Assessment of Soil Contamination

- 8.1.1 In order to estimate the risks posed to human health from soil contamination, a quantitative risk assessment has been completed utilising the latest Environment Agency CLEA methodology. The assessment utilises the chemical testing results obtained during the site investigation fieldworks to characterise site conditions and facilitate the completion of the risk assessment process.
- 8.1.2 The assessment is based on the comparison of soil chemical testing results with published Environment Agency Category Four Screening Levels (C4SL's) under the proposed end use scenario to determine the site suitability for use. C4SL values represent the highest acceptable values for contaminants within site soils under the proposed end use and are derived using the Environment Agency CLEA risk assessment methodology. A result in exceedance of a C4SL level may indicate the presence of contaminants within site soils and require further assessment.
- 8.1.3 It is noted only a limited number of C4SL values have been derived by the Environment Agency for use and reference has been made to LQM/CIEH Suitable For Use Values (S4UL's) for a wider range of other contaminants (Heavy Metals, Poly Aromatic Hydrocarbons, TPH, SVOC and VOC's) to increase the depth and robustness of our assessment.
- 8.1.4 Chemical testing results are compared against C4SL and S4UL values for each determinant with any results reported in exceedance of screening criteria identified and their significance reviewed. When determining the significance of any exceedances within the dataset the magnitude and frequency of the exceedance needs to be taken into account, for example, a single exceedance of a screening value may be considered a localised hotspot whereas consistently elevated levels of a substance at multiple locations across the site may indicate a more prevalent contamination issue.
- 8.1.5 In addition to this assessment, an Asbestos Identification test (via the visual inspection method) has been completed on all samples of made ground obtained during the investigation to determine risks posed. Any positive occurrences of Asbestos will be subject to quantification analysis to further assess the extent and significance of risks posed.
- 8.1.6 As required, for each exceedance reference will be made to the Conceptual Site Model to establish the most likely source of contaminants and initial commentary given as to the likely scope of remedial measures. In addition, reference will also be made to the assumptions used to derive generic assessment criteria (C4SL and S4UL values) to determine their comparability with the proposed end use.
- 8.1.7 For the purposes of this assessment we have assumed a "Commercial" end use scenario when reviewing chemical testing data against C4SL / S4UL values; a "worst case" Soil Organic Matter content value of 1% has been assumed for the initial assessment.

Summary and Assessment of Risks Posed by Soil Contamination

- 8.1.8 Results from chemical testing analysis indicate that no sources of contamination were encountered within site soils. Similarly, there was no positive identification of the presence of asbestos.
- 8.1.9 The findings of the above have been used to update the Refined Conceptual Site Model (provided within Section 9.0) as well as inform the scope of any further investigation or remedial works deemed necessary to support the sites development.

8.2 Ground Gas Risk Assessment

- 8.2.1 The Preliminary Conceptual Site model identified made ground as being a potential source of ground gas generation, in addition to off-site sources such as the nearby landfills discussed in section 3.3. The site is not said to be located within in an area at risk from Radon gas ingress.
- 8.2.2 It is considered that the most probable exposure pathways are likely to be limited to construction workers during the sites redevelopment, and future site users occupying buildings across the site. It is considered there will be no significant change to the existing site ground gas levels as a result of the development, and that the proposed structures will undergo traditional construction including a ground bearing floor slab, with no new proposed basement structures.
- 8.2.3 Risk Assessment methodology according to CIRIA 665 requires classification of developments as Situation A or Situation B, where Situation B comprises Low rise housing with a ventilated underfloor void and is subject to different assessment methodology, while Situation A includes all other developments. This development is classified as Situation A.
- 8.2.4 To estimate the risks posed by ground gas generation a total of three boreholes were installed with gas monitoring wells (WS101, WS102 and WS103). The purpose of these standpipes is to investigate ground gas generation potential of shallow and at depth soils and the associated implications this may have for new building design.
- 8.2.5 A total of six ground gas monitoring visits have been completed on site during the period between the 5th January 2023 and 7th February 2023 under varying atmospheric pressure conditions including periods of falling and rising pressure (refer to Appendix E for gas monitoring results). The works were completed using a GFM435 gas analyser which was suitably calibrated by the supplier throughout the duration of monitoring works, the calibration certificate for which is included in Appendix F. A summary of the gas monitoring results is presented below.
- Maximum CH₄ Value = 0% volume
 - Maximum CO₂ Value = 2.1% volume (WS102) on 5th January 2023
 - Minimum O₂ Value = 14.6% volume (WS101) on 12th January 2023
 - Maximum flow rate = 0.0l/s
 - H₂S and CO values 0ppm for all measurements
 - Variable atmospheric pressures between 991 and 1035Mb
- 8.2.6 A standard Ground Gas risk assessment has been undertaken to consider the risks posed to future site users from CO₂ and CH₄. The assessment undertaken followed guidelines in accordance with the principles outlined in the CIRIA guidance document (Assessing risk posed by hazardous ground gases to buildings, CIRIA C665).
- 8.2.7 The method used to categorise the site ground gas regime is covered in the CIRIA C665 document and defines gas concentrations and borehole flow rates to calculate a gas volume flow (Gas Screening Value) and classify a characteristic situation.
- 8.2.8 Gas Screening Values (GSVs) have been calculated using the formula:
- $$\text{GSV (l/hr)} = \text{borehole flow rate (l/hr)} \times \text{gas concentration (v / v \%)} / 100$$

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- 8.2.9 This calculation has been applied to the maximum Carbon Dioxide and flow rates recorded of the course of monitoring to represent a reasonable worst-case scenario for the entire site. Ground gas measurements from the site found no change in flow rates which remained at 0.0% for all of the six measurement visits. Where this has occurred a nominal flow rate of 0.1l/hr has been adopted for calculation purposes.

Table 8.4: Summary of GSVs

Monitoring Visit	Highest Flow Rate (l/hr)	Highest CO ₂ (% v / v)	CO ₂ GSV (l/hr)	Characteristic Situation*
Visit 1	0.1	2.1	0.0021	1 (Very Low Risk)
Visit 2	0.1	1.9	0.0019	1 (Very Low Risk)
Visit 3	0.1	1.2	0.0012	1 (Very Low Risk)
Visit 4	0.1	0.2	0.0002	1 (Very Low Risk)
Visit 5	0.1	1.8	0.0018	1 (Very Low Risk)
Visit 6	0.1	0.5	0.0005	1 (Very Low Risk)
*Where Characteristic Situation 2 < 0.07l/hr				

- 8.2.10 It is also noted that recorded oxygen levels at the site ranges between 14.6 and 20.8% v/v. Comparable oxygen concentrations are not uncommon in gas monitoring. However, CIRIA 665 notes that physiological effects will occur should oxygen concentration deplete below 18%v/v in confined spaces. Assuming no basements and below ground structures are present in the future then the risks from reduced oxygen to human health in the future development are considered to be low. However, during the construction phase confined space protocols for the safety of personnel should always be used where human entry into excavations is to be undertaken as low oxygen conditions may be present.
- 8.2.11 With reference to guidance provided in CIRIA C665 “*Assessing risks posed by hazardous ground gases to buildings*” and assuming the development comprises Situation A; the abovementioned worst case gas levels and borehole flow rates equate to a Gas Screening Value (GSV) of 0.002l/hr which corresponds to an anticipated Characteristic Situation of **CS-1** with no remedial measures required to mitigate against ground gas intrusion.
- 8.2.12 In addition to the above, CIRIA665 Table 8.5 also recommends that Characteristic Situation 2 (CS2) is adopted in instances where methane and carbon dioxide concentrations typically exceed the thresholds of 1% and 5% respectively. This recommendation is not applicable in this instance.

8.3 Controlled Waters

- 8.3.1 It is understood the site is underlain by a Secondary A and Principal Aquifer and is not said to be located within any Environment Agency Zone source protection zones or in close proximity to sensitive groundwater abstraction boreholes. The nearest surface water feature is indicated 353m to the north of the site and is not considered to be at risk of contaminant migration from the study site. However, it is also noted that the culverted Corn Brook watercourse runs either directly beneath the site or just to the south of the site and is a much more likely potential receptor for any contaminants present on site to impact.



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- 8.3.2 No groundwater was encountered during the site investigation works or subsequent monitoring works. The observations of the site investigation do not support the presence of significant sources of contamination onsite.



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9.0 Refined Conceptual Site Model

- 9.0.1 The Environmental Protection Act Part IIA: 1990, defines contamination as land containing levels of contamination which form a risk to human health, controlled waters or other ecosystems. Therefore, contamination in exceedance of the relevant screening values is considered a source. Table 9.0 assesses and summarises the sources, pathways and receptors that may exist at the site.

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Table 9		Refined Conceptual Site Model					
Source		Pathway	Receptor	Severity	Probability	Risk definition	Comments
On Site	Made Ground and carpark use (Not identified by testing)	Dermal contact and / or ingestion; inhalation of vapours / dusts	Current Site Users	Medium	Unlikely	Low	Significant sources limited and not confirmed by testing. Pathways to human health receptors will be significantly impeded by the presence of hardstanding across the site.
			Construction workers	Medium	Unlikely	Low	Significant sources limited and not confirmed by testing. Construction persons are considered to be at the greatest risk of exposure to contaminants during the site's redevelopment. The presence of as yet, unreported sources of contamination cannot be precluded.* However, identified potential sources are limited. It is considered the risks posed to construction personnel, be sources of contamination, can be adequately mitigated against via the use of full PPE and the adoption of good hygiene and site practices.*
			Future Site Users	Medium	Unlikely	Low	Significant sources limited and not confirmed by testing. Pathways to human health receptors will be significantly impeded by the presence of hardstanding across the site.
		Leaching of contaminated soil & impact beneath site	Controlled Waters: Aquifer	Mild	Unlikely	Low	Significant sources limited and not confirmed by site observations. Superficial deposits are classified as a Secondary A Aquifer while Bedrock is designated as a Principal Aquifer. A culverted watercourse is present between 10m and 30m of the southern site boundary. The superficial aquifer is of low sensitivity while the bedrock aquifer is located at an anticipated depth of at least 20m. The culverted watercourse is located relatively nearby and the details of its construction are unknown.
			Controlled Waters: Surface Water	Mild	Unlikely	Low	
		Below ground service runs	Below ground infrastructure & construction	Medium	Unlikely	Low	Significant sources limited and not confirmed by site observations.
		On Site	Ground Gas Generation	Migration / Accumulation	Current Site Users	Medium	Unlikely

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Table 9		Refined Conceptual Site Model					
Source	Pathway	Receptor	Severity	Probability	Risk definition	Comments	
		Construction workers *	Medium	Low likelihood	Moderate / low	Potential ground gas sources have been identified and pathways are present in the form of percolation through granular soils and accumulation in buildings and basements. However, the site investigation works have not observed putrescible materials and ground gas monitoring has not indicated the migration or production of significant volumes of ground gas at the site. Potential risks to construction workers are limited to scenarios of confined space working. These are not anticipated, but any risks should be mitigated by the application of standard risk assessment and management of confined space works such as personal ground gas detection equipment*	
		Future Site Users	Medium	Unlikely	Low	Potential ground gas sources have been identified and pathways are present in the form of percolation through granular soils and accumulation in buildings and basements. However, the site investigation works have not observed putrescible materials and ground gas monitoring has not indicated the migration or production of significant volumes of ground gas at the site.	
		Proposed development	Medium	Unlikely	Low	Potential ground gas sources have been identified and pathways are present in the form of percolation through granular soils and accumulation in buildings and basements. However, the site investigation works have not observed putrescible materials and ground gas monitoring has not indicated the migration or production of significant volumes of ground gas at the site.	

* It is considered the risks posed to construction personnel, by sources of contamination, can be adequately mitigated against via the use of full PPE and the adoption of good hygiene and site practices. As required, any suspected sources of contamination discovered during the site's development should be brought to the immediate attention of RoC Consulting to enable the implications to be established and appropriate remedial recommendations made. In the event of such a discovery the scope and findings of the current assessment will require re-assessment and revision.

Soil Contamination Remedial Requirements

- 9.0.2 Re-appraisal and reassessment of the conceptual site model (following completion of investigation works) has failed to reveal any specific sources of contamination that could require specific remedial measures.
- 9.0.3 It is recommended all construction contractors take reasonable precautions to control environmental impacts that may occur as a result of redevelopment works with respect of soil and groundwater quality. These measures should include (and not be limited to):
- 1) Any sources of contamination uncovered during site development works should be brought to the immediate attention of RoC Consulting for consideration and comment. As required, the findings and recommendations of the current assessment may require amendment to reflect changes in site condition.
 - 2) The operation of plant, refuelling facilities and general basement excavation works should include appropriate provision to reduce the risk of leakage / spillage, particularly into the site groundwater table or exposed natural soils.
 - 3) Appropriate dust mitigation measures should be deployed during basement excavation works, particularly when handling and excavating made ground deposits.
 - 4) All excavated materials stockpiled should be periodically dampened down to control dust release. Similarly, the disposal of any material from site should be completed using covered wagons.

Controlled Waters Remedial Requirements

- 9.0.4 The desk study indicated that potential contaminative sources at the site were limited, and the site investigation has not identified any significant evidence of contamination. Consequently, no risks to controlled waters have been identified and no remedial measures are recommended.

Ground Gas Protection Measures

- 9.0.5 Ground gas monitoring results and subsequent ground gas risk assessment have not identified a requirement for protection measures new buildings on site in accordance with a CIRA C665 Characteristic Situation 1 scenario.

10.0 Preliminary Waste Assessment

10.0.1 Site soils may be considered to comprise waste depending on the circumstances. The Waste Framework Directive (WFD) defines materials as waste if 'they are discarded, intended to be discarded or required to be discarded, by the holder'. Naturally occurring soils are not typically considered waste if reused on the site of origin for the purposes of development. Excavation arisings from the development may therefore be classified as waste if surplus to requirements or unsuitable for reuse. A large volume of laws, permitting and regulations govern the management of waste on construction sites, including Environmental Permits, Materials Management Plans and Construction Environmental Management Plans. The below assessment only provides some useful information which may inform future planning.

10.1 Hazardous Waste Assessment

Chemical Assessment

- 10.1.1 A methodology for the classification of waste, and requirement for sampling, is specified in Technical Guidance WM3 (EA, 2021). The level of sampling should be proportionate to the volume of waste and its heterogeneity. The preliminary assessment provided below is indicative based only upon the available sample results and may not be sufficient to adequately classify the waste.
- 10.1.2 Envirolab, an RSK company, has developed a waste soils characterisation assessment tool (HASWASTE), which follows the guidance within Technical Guidance WM3. The analytical results have been assessed using this tool to assess the hazardous properties to support potential off-site disposal of materials in the future. Note that it is ultimately for landfills to confirm what wastes they are able to accept within the constraints of their permit.
- 10.1.3 No samples were found to have hazardous properties based on this assessment. This suggests that if applicable the waste would require disposal at a suitably permitted inert or non-hazardous waste landfill. The results are summarised in the table below and presented in full in Appendix G.

Sample	Strata	Hazardous properties (if present)
WS101 @ 0.15m	Made Ground	None
WS102 @ 0.90m	Made Ground	None
WS103 @ 0.50m	Made Ground	None
HDP103B @ 0.40m	Made Ground	None

Asbestos Assessment

- 10.1.4 The Environment Agency publication '*Guidance on the classification and assessment of waste – WM3 (2018)*', requires that within a mixed waste the separately identifiable wastes be assessed separately. For instance, where waste soil contains identifiable pieces of asbestos (visible to the naked eye) the asbestos should, where feasible, be separated from the soil and classified separately. This should be disposed of within a hazardous, stable non-reactive hazardous waste landfill or a special cell in a non-hazardous waste landfill.

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- 10.1.5 With reference to WM3 (2018), wastes containing greater than 0.1% free and dispersed asbestos fibres are classified as hazardous waste with the code 17 05 03* (soils and stones containing hazardous substances). Where a waste contains identifiable pieces of ACM, then these pieces must be assessed separately.
- 10.1.6 While visible pieces of asbestos have not been identified during the site investigations, this does not comprise a specialist assessment and only a small portion of the site soils have been observed. The feasibility of removing visible pieces of ACM (and thus managing the hazardous potential of the soils) should be assessed by a contractor. It may be possible through additional sampling and analysis, to zone areas of asbestos containing soils, although, due to the density of sampling points required to provide confidence in this approach, this is likely to be a costly exercise with no guaranteed benefit.
- 10.1.7 Laboratory testing has not encountered positive identification of asbestos fibres within soils and consequently soils are not considered to be hazardous on account of asbestos.

10.2 WAC Assessment

- 10.2.1 Additionally, a testing regime has been established in '*Waste Sampling and Testing for Disposal to Landfill*' (2013) to determine the suitability of soils for disposal. This regime does not supersede the hazardous properties assessment presented above.
- 10.2.2 WAC testing is beyond the instructed scope of the works to date. Consequently, recommendations made here, with respect to waste, are limited to hazardous waste assessment.

10.3 Conclusions

- 10.3.1 Soils originating from both made ground at that site are likely to comprise non-hazardous waste.
- 10.3.2 With reference to the Environment Agency's *publications Waste Sampling and Testing for Disposal to Landfill (2013)* and *Waste acceptance at landfills (2010)*, naturally occurring soils not likely to be affected by contamination can be classified as inert waste, with a EWC code of 17 05 04. Should any of the naturally deposited soils be suspected to contain contamination (by virtue of visual or olfactory evidence) upon excavation, then such soils should be stockpiled appropriately, and additional testing carried out as considered necessary. Based on evidence obtained during our investigations, we are of the opinion that soils of the Glaciofluvial Sheet Deposits at the site are not likely to be affected by chemical contamination and thus can be classified as **inert waste**.
- 10.3.3 The assessment of this report in regard to waste is indicative only and provides useful information to support future management of waste of site, which should be comprehensive and address all other legal and regulatory requirements. Further environmental testing of soils and subsequent treatment and processing may also be required. It may be necessary to consult with the Environment Agency before works commence to verify the proposed works and establish that material can be declassified as waste and re used on site in accordance with the most current guidance and Article 6(1) of the Waste Directive. These applications are the responsibility of the contractor. We can consult on these matters on request.



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- 10.3.4 We recommend this report is provided to the selected contractors and landfill facilities to confirm (or otherwise) that waste can be managed and disposed of as above. Please be aware that landfill sites are obligated to undertake in house quality assurance tests and thus may require further WAC testing for any soils encountered as part of this investigation. There is no obligation on any landfill operator to accept waste if they choose not to and waste operators may require additional testing of untested waste soils prior to acceptance at landfill in accordance with the landfill regulations.

11.0 Geotechnical & Foundation Design Assessment

Background Information

- 11.0.1 It is understood the site is to be redeveloped with the construction of a new extension following the demolition of an existing extension and the construction of a mezzanine structure. Detailed foundation design recommendations are beyond the scope of this report. However, useful information that may inform design is presented below.
- 11.0.2 Site investigations indicate the site to be underlain by made ground varying in thickness from 0.60 to 1.50m. Made ground deposits were underlain by Glaciofluvial Sheet Deposits comprising a relatively thin layer of clay in turn underlain by granular deposits in the form of gravelly sand, sand, and gravel. Glaciofluvial Sheet Deposits were proven to a maximum depth of 3.45, beyond which the soils are too dense for window sample drilling. Bedrock was not encountered, and groundwater was not observed during the site investigation works.

11.1 New Building Foundation Design

- 11.1.1 It is understood that a traditional shallow foundation solution is proposed for the proposed extension and mezzanine development. The investigations indicate this foundation solution is likely to be feasible. However, it should be noted that investigation of the location of the mezzanine foundation is beyond the agreed scope of the works due to access limitations. Consequently, assessment of ground conditions in this location can only be based on general site ground conditions and observations during construction.
- 11.1.2 It is not recommended that new building foundations be constructed on top of made ground deposits. The variable composition and in situ strength of these materials is such that unacceptable levels of total and differential settlement will occur as a result. Consequently, we recommend that foundations are extended to natural soils of the Glaciofluvial Sheet deposits, likely present from depths of between 0.60m and 1.50m.
- 11.1.3 It is likely that shallow foundations will be supported by a combination of cohesive and granular soils. On the basis of in situ SPT testing and field observations, we have derived indicative shear strength and angle of shearing resistance (ϕ') values for soils at a depth of approximately 1.50m, using the methods established by Peck et al. respectively. Soil strength at the site increases steadily with depth and higher criteria can be obtained by deepening foundations to depths of 2.00m or more. As both soil types are likely to be present within the stress zone of shallow foundations, we recommend the foundation is designed using the criteria that give the most conservative values of bearing capacity and settlement. The proposed extension should be designed to minimise settlement, so that differential settlement between the existing and proposed elements does not cause cracking or other damage to the structure.

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	Made Ground	Cohesive Soils	Granular Soils
Density*	14kN/m ³	15kN/m ³	16kN/m ³
Representative SPT 'N' Value	-	9	15
Conservative representative shear strength (c)**	-	55kPa	-
Plasticity Index	22%	4%	-
Conservative representative angle of shearing resistance (ϕ')***	-	-	31°
*Worst case density values as BS8004, **Method established by Stroud & Butler, ***Method established by Peck et al			

- 11.1.4 Mature trees are present to the southern site boundary and a small number of proposed foundation locations may be located within the zone of root influence. A full arboricultural assessment has not been undertaken as part of this investigation and the final details of vegetation planting and removal are not known. Potentially the volume of soils near trees will have been affected by the moisture demands of the trees. Removal of trees may cause soils to change in volume as they rehydrate, producing heave. Retained vegetation will also cause seasonal drying. The influence of these effects should be accounted for in design in accordance with BS8004-1986 "*Code of practice for – Foundations*", Section 3.2.8 and National House Building Council (NHBC) Standards, Chapter 4.2. This may lead to a requirement for foundations to be deepened locally to up to 2m.

11.2 Ground Floor and Basement Construction

- 11.2.1 It is anticipated that the proposed development will retain the existing ground floor slab where possible. However, a new ground floor slab will be required in the area of the proposed extension. The site is underlain by a significant depth of Made Ground. Made Ground soils are not typically suitable to support ground bearing slabs due to variable density and the potential for differential settlement. As with the foundations, the slab should be designed to minimise settlement, to prevent breaks in the slab at the join with the existing structure. Consequently, the use of ground bearing slab may require ground improvement, or an alternative slab will be required.
- 11.2.2 An existing basement is present and is anticipated to be retained. This feature is in the vicinity of the proposed new elements and careful design will be required to prevent interaction of these features.

11.3 Below Ground Drainage

- 11.3.1 Records obtained from United Utilities indicate there is a culvert that runs below the existing building on site in a roughly east to west direction. Other records, specifically historic maps and the map assembles by Hidden Manchester, suggest that the culvert is located closer to the southern boundary of the site. Further evidence of the location of the watercourse was not encountered during the site investigation, including through manhole inspection and GPR surveys. While the proposed development is not extensive, there is meaningful potential for the proposed structure to interact with the culvert, and its location and the potential risks should be further investigated prior to construction. This should include an internal survey of the structure.

- 11.3.2 Buried services constructed in unimproved Made Ground soils may be subject to settlement and this should be considered during design. In particular water and sewerage pipes should not utilise shallow gradients that render them vulnerable to settlement.

11.4 General Comments

- 11.4.1 No entry should be permitted into excavations exceeding 1.2m depth without appropriate risk assessments, shoring and support.
- 11.4.2 Similarly it is not recommended foundation excavations to underlying clay be left open and exposed to the elements as rainwater ingress will damage and reduce its strength. Similarly, no vehicular movements should be permitted within exposed foundation locations.
- 11.4.3 The geotechnical assessment has been collated based on the proposed development type, layout, and likely loadings at the time of report publication. It should be noted that future alterations to these proposals or loadings (including alterations in the site layout or new building scale) will require the re-interpretation of the current assessment. In such an instance updated design information should be provided to RoC Consulting and the current assessment updated accordingly.

12.0 Aggressive Ground Conditions

- 12.0.1 The hazard of sulphide attack is addressed by reference to procedures described in Building Research Establishment (BRE) Special Digest 1: 2005 '*Concrete in Aggressive Ground*' to establish a design sulphate class (DS) and the '*aggressive Chemical Environment for Concrete*' (ACEC).
- 12.0.2 By the definitions provided the site is considered to comprise a brownfield site and the groundwater mobility is considered to be static.
- 12.0.3 The site may be considered to be in an area of elevated sulphate and sulphide bearing strata (as detailed in mapping in SD1 2005). Oxidisable Sulphides in site soils have been determined from laboratory testing of Total Sulphur and Total Sulphate, a single sample taken from WS105 at 3.80mbgl exceeds the 0.3% threshold (0.357%). We do not consider this single marginal concentration to be sufficient to demonstrate that pyrite is potentially present.
- 12.0.4 Peak potential sulphate concentrations range between 0.13 and 0.26g/l with soil pH values ranging between 7.1 and 11.1. Based on these results, it is considered that well compacted buried concrete should be designed in accordance with Class DS-1 AC1s requirements as specified in BRE Digest Special Digest 1:2005 *Concrete in aggressive ground: Version 3*.

Table 12.0: Summary Aggressive Ground Conditions

Geological Unit	Characteristic pH	Characteristic Sulphate (mg/l)	DS Class	ACEC Class
Site soils	7.0	100mg/l	DS-1	AC-1s

13.0 Conclusions & Recommendations

13.1 General

- 13.1.1 It is understood the site is to be redeveloped with the demolition of an existing extension building and construction of a new extension in addition to an internal mezzanine structure.

13.2 Geotechnical

- 13.2.1 Site investigations indicate that the site is underlain by Made Ground deposits and Glaciofluvial Sheet Deposits. The Made Ground Deposits comprise a layer of surface tarmac and subbase, supported by clay and gravel of demolition materials, to depths of between 0.60m and 1.50m. The underlying Glaciofluvial Sheet Deposits comprise a relatively thin band of soft to firm clay underlain by gravelly sand, sand, and gravel deposits. Due to the density of the granular deposits, they were only proven to a maximum depth of 3.41mbgl as the borehole could not be progressed any further. No groundwater was encountered during the site investigation works.
- 13.2.2 It is anticipated that the proposed extension and mezzanine structure will be constructed on simple shallow foundations. Investigation of the location of the internal foundation to the proposed mezzanine is beyond the agreed scope of this assessment. It is recommended that foundations are extended beneath any Made Ground soils to be supported on cohesive and granular soils of the Glaciofluvial Sheet Deposits. Potential design parameters are provided. Careful design of the foundations and ground floor will be required to prevent interaction with the basement or differential settlement with the existing structure.
- 13.2.3 Records obtained from United Utilities indicate there is a culvert that runs below the existing building on site in a roughly east to west direction. Other records, specifically historic maps and the map assembles by Hidden Manchester, suggest that the culvert is located closer to the southern boundary of the site. Further evidence of the location of the watercourse was not encountered during the site investigation, including through manhole inspection and GPR surveys. While the proposed development is not extensive, there is meaningful potential for the proposed structure to interact with the culvert, and its location and the potential risks should be further investigated prior to construction. This should include an internal survey of the structure.
- 13.2.4 Laboratory testing for aggressive ground conditions indicates that a DS class DS-1 and ACEC class of AC-1s should be adopted for the site.

13.3 Environmental

- 13.3.1 Chemical assessment of site soils has failed to reveal any sources of soil contamination when compared against a “commercial” end use scenario and consequently no remedial measures are recommended. Due care and attention should be taken at all times when excavating site soils and any suspected sources of contamination identified brought to the immediate attention of RoC Consulting.



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- 13.3.2 The Phase 1 Report identified viable pathways to controlled waters and the observations of the intrusive site investigation in particular the absence of any high concentrations of contaminants indicates there to only be a very low risk to controlled waters from site soils.
- 13.3.3 Laboratory testing indicates Made Ground soils at the site are suitable for disposal as non-hazardous waste.
- 13.3.4 Potential ground gas sources were identified in the form of onsite site made ground deposits and the nearby offsite landfill. Ground gas monitoring results indicate the absence of significantly elevated hazardous ground gas concentration within site soils. Consequently, ground gas results indicate a CS1 scenario with no envisaged remedial requirements.
- 13.3.5 Earthworks at the site may require Environmental Permits and Materials Management Plans. Environmental testing of soils and subsequent treatment and processing may also be required. It may be necessary to consult with the Environment Agency before works commence to verify the proposed works and establish that the material can be declassified as waste and re used on site in accordance with the most current guidance and Article 6(1) of the Waste Directive. These applications are the responsibility of the contractor. We can consult on these matters on request.
- 13.3.6 As required, any suspected sources of contamination discovered during the site development (outside those discussed in this report) should be brought to the attention of RoC Consulting and their implications assessed. Depending on the extent and severity, the findings and assessment of the current study may require re-interpretation and a remediation strategy proposed to support the site development.

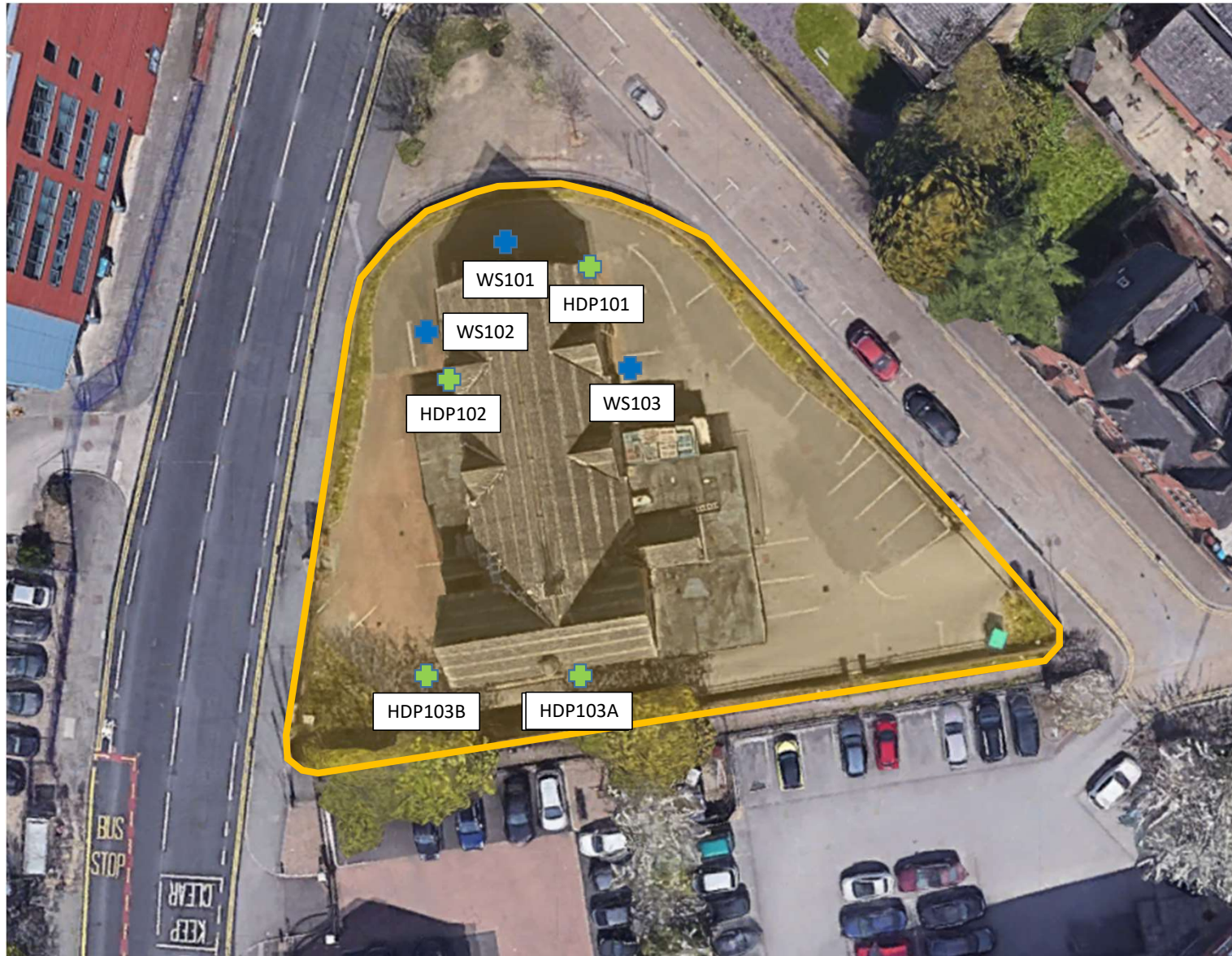
13.4 Additional

- 13.4.1 Copies of the current report, along with the Phase 1 Desktop Study, should be submitted to the local planning authority for consideration and comment. As required, any feedback received from the local authority should be passed back to RoC Consulting for review.



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX A – SITE DRAWINGS



Key

- + Window Sample Borehole
- + Hand Excavated Inspection Pit
- Site Boundary

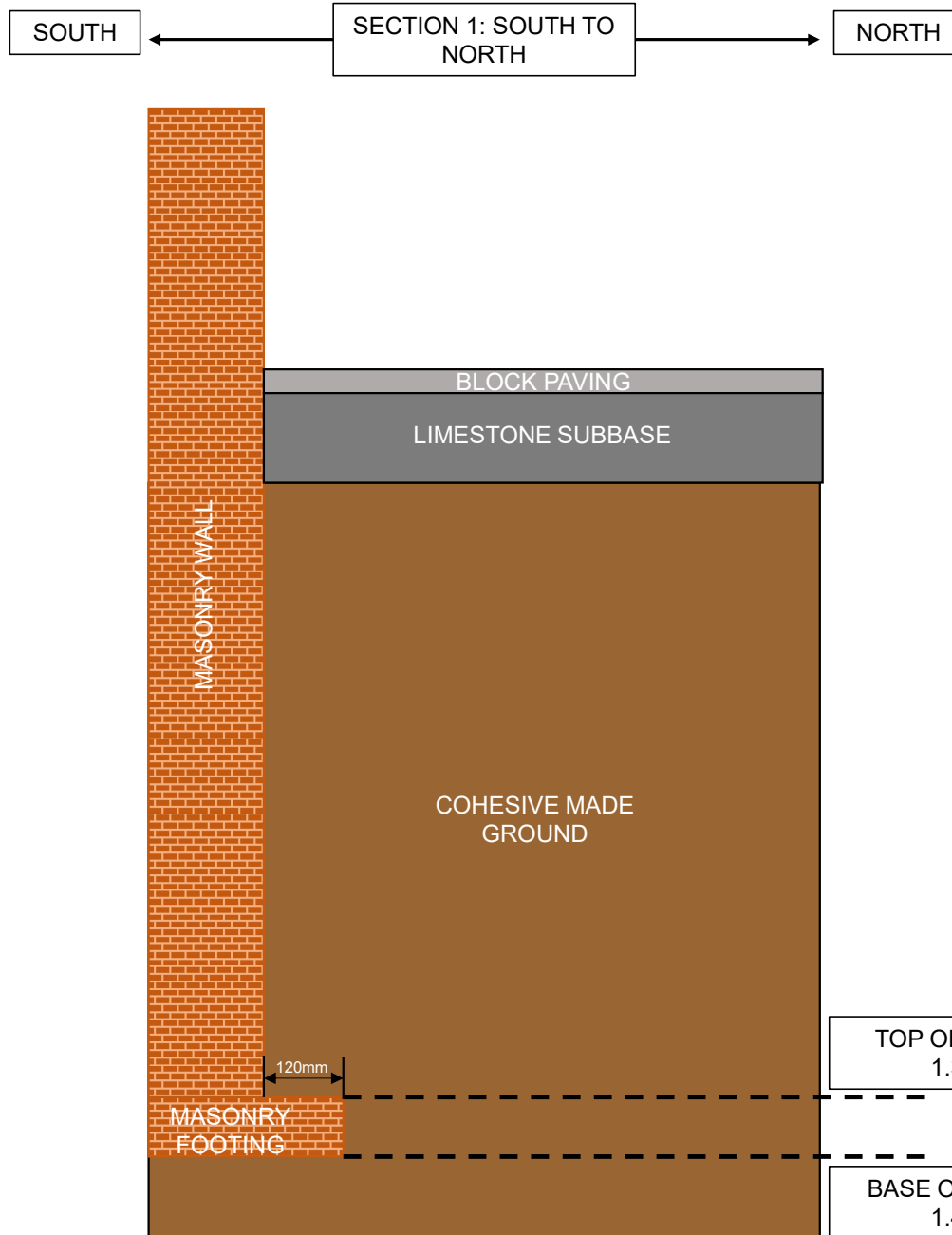


North

ROC CONSULTING	JOB NO	4423	SKETCH NO	4423-ROC-ZZ-XX-DR-ES-ES101	DRAWN BY
	PROJECT TITLE	Mawladi Kurdish Cultural Centre	SKETCH TITLE	Draft Site Investigation Locations	LR



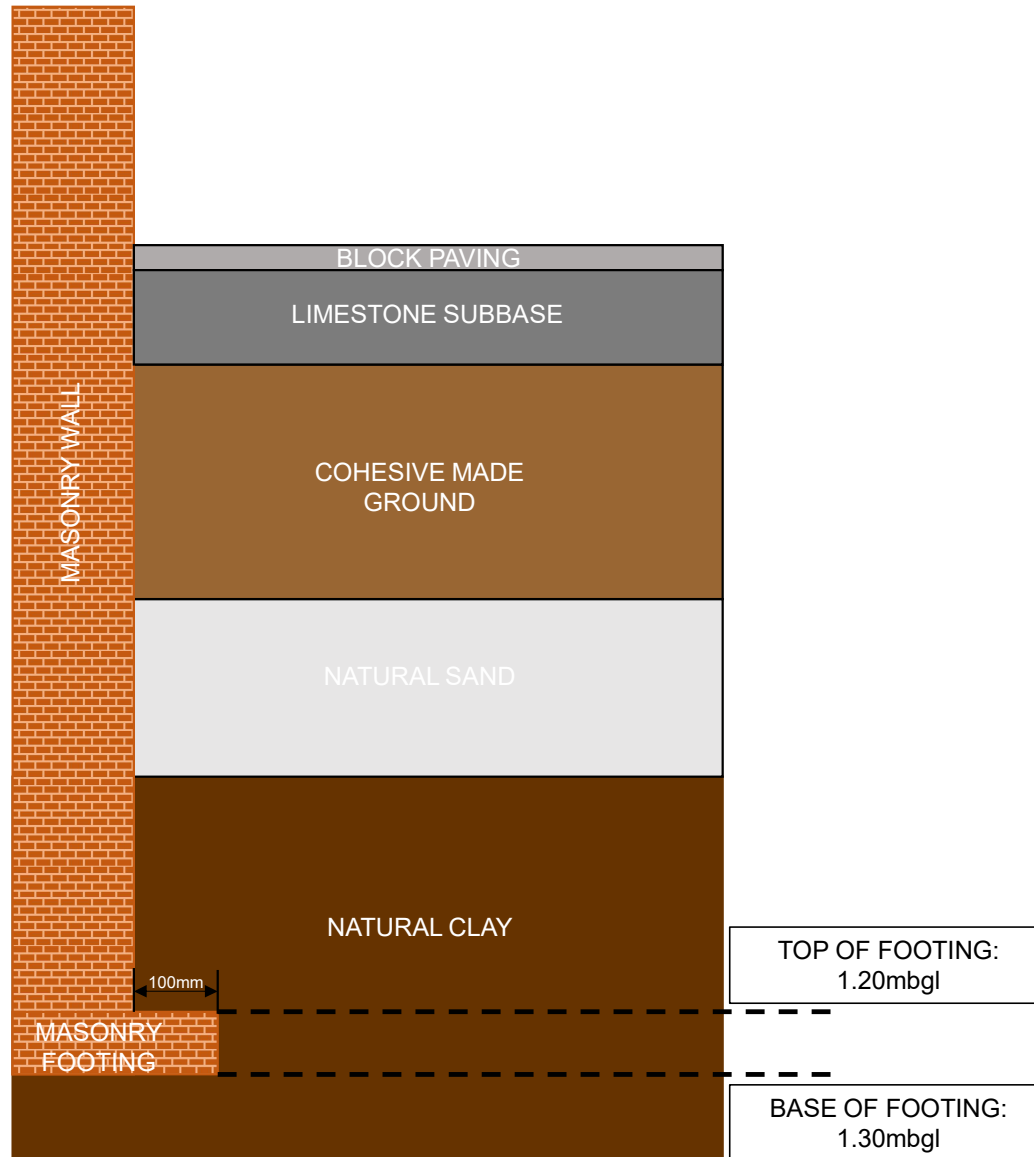
COMPLEX CHALLENGES ... MADE SIMPLE



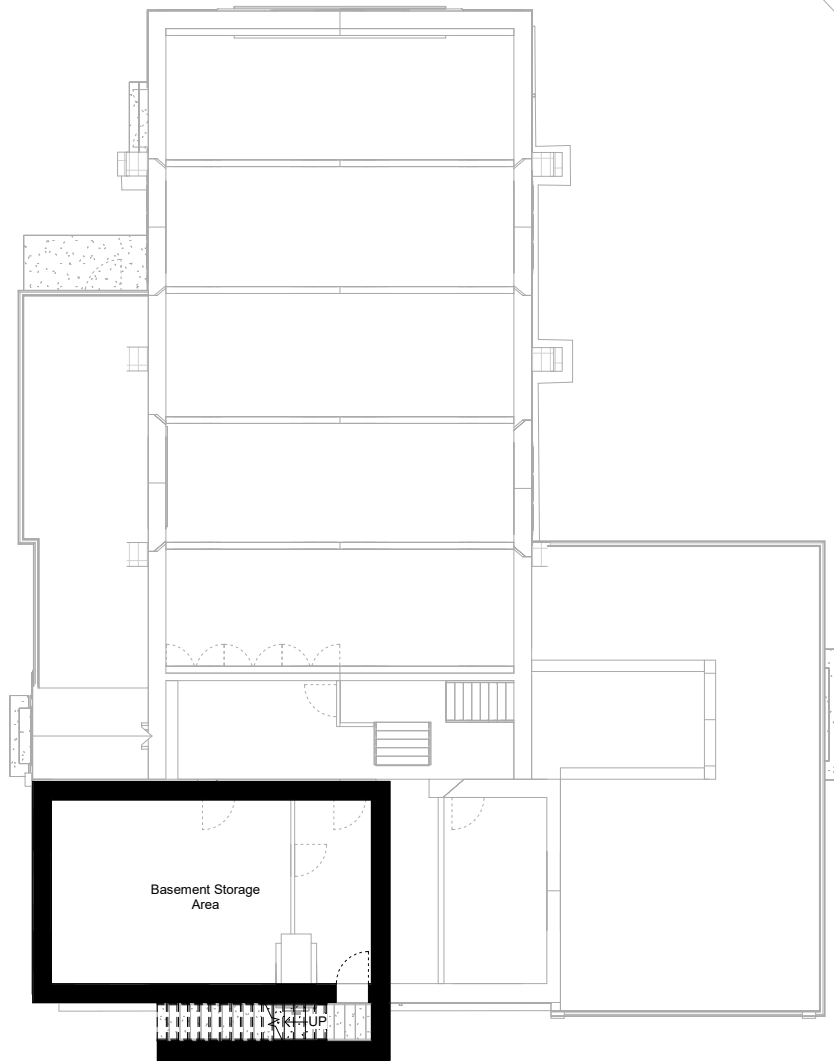
ROC CONSULTING	JOB NO	4423	SKETCH NO	4423-ROC-ZZ-XX-DR-ES-ES102	DRAWN BY RM
	PROJECT TITLE	Parsonage Street Redvelopment	SKETCH TITLE	HDP101	



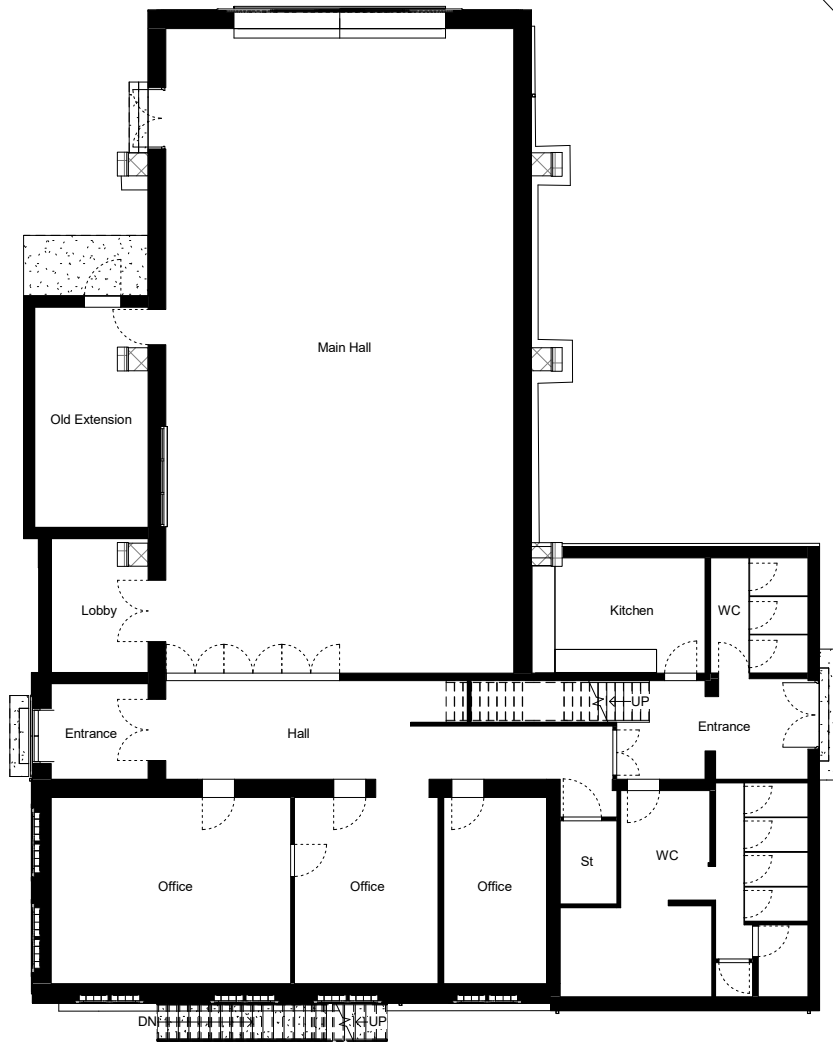
COMPLEX CHALLENGES ... MADE SIMPLE



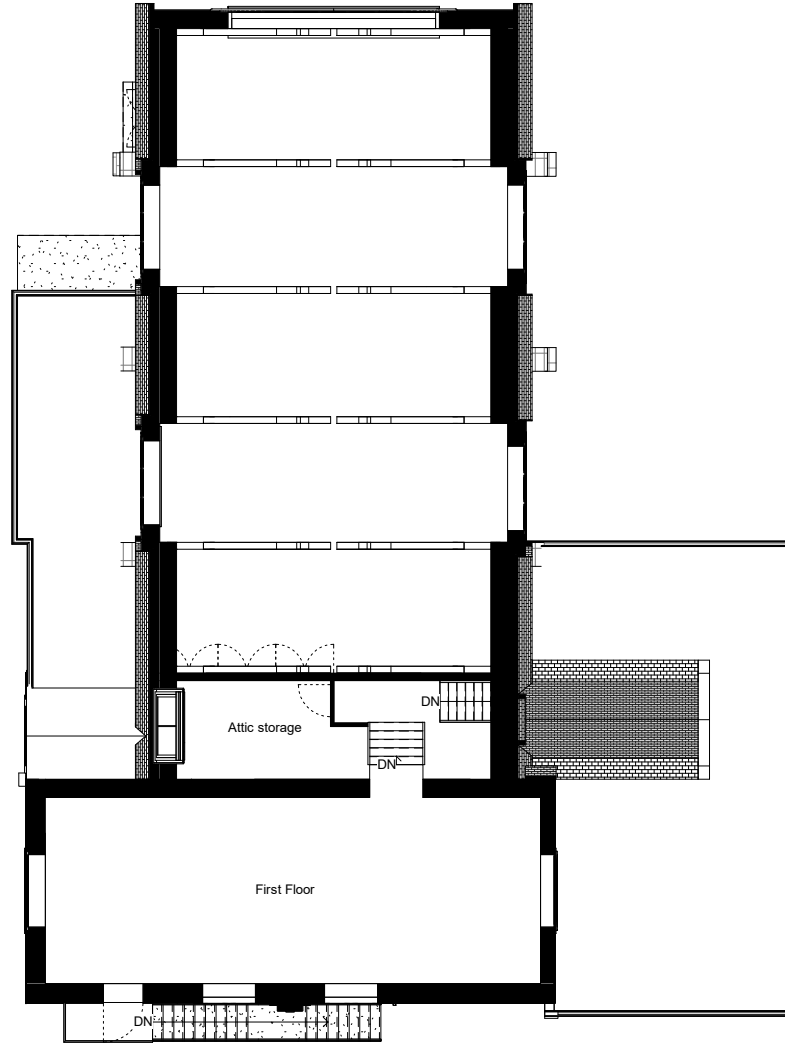
ROC CONSULTING	JOB NO	4423	SKETCH NO	4423-ROC-ZZ-XX-DR-ES-ES102	DRAWN BY RM
	PROJECT TITLE	Parsonage Street Redvelopment	SKETCH TITLE	HDP102	



3 Basement Plan
1 : 100



2 Ground Floor Plan
1 : 100



1 First Floor Plan
1 : 100

revision	date	drawn	description
-	06.03.20	TH3M	Issued For Planning



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T H 3 M

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

Floor Plans
Existing

MKCC Parsonage St

FOR PLANNING

T-0230-2-0003-Floor Plans

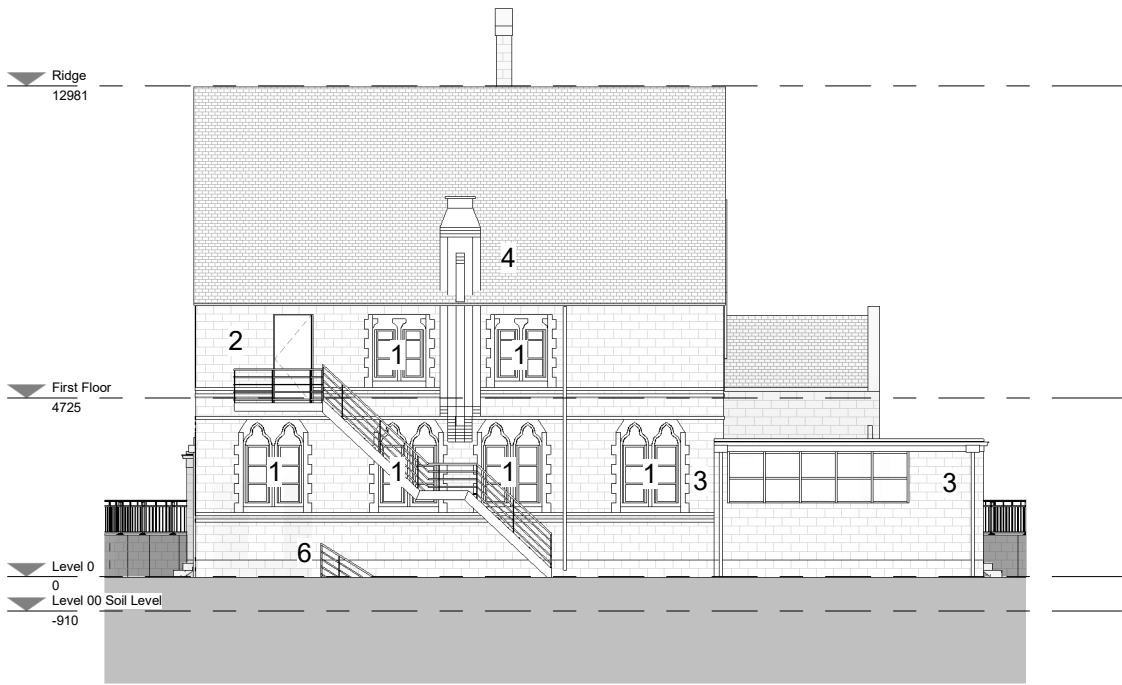
number

1:100 @ A1
scale

0230
job reference

MGS
drawn

revision

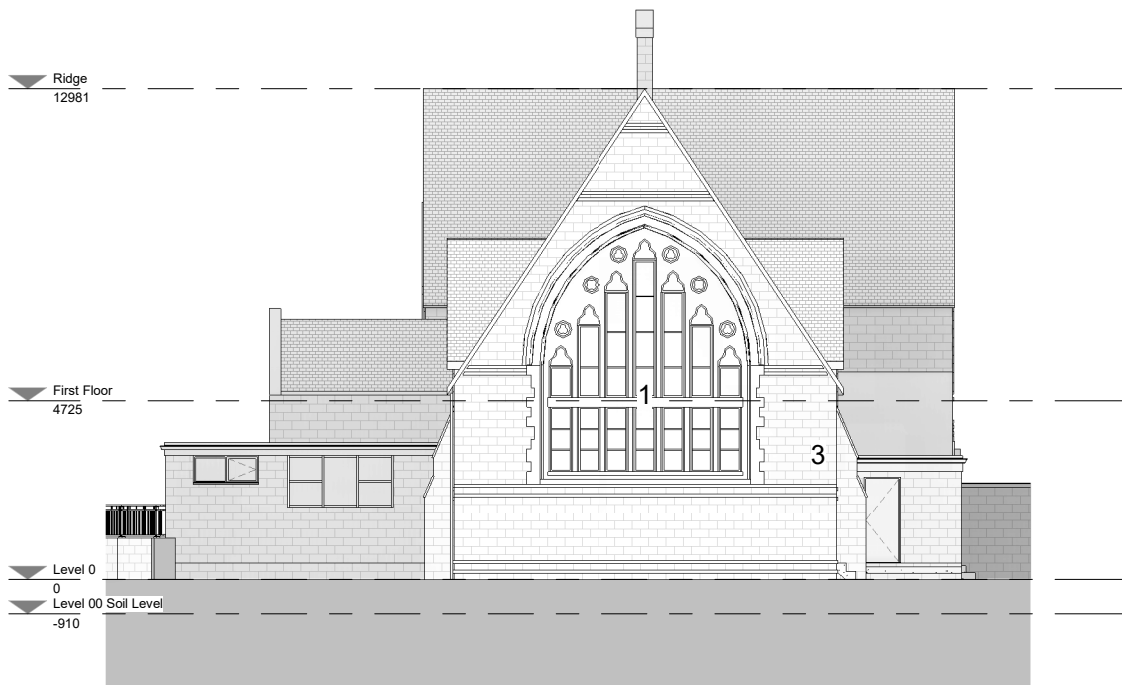


1 South Elevation
1 : 100



2 East Elevation
1 : 100

Items in Need of Repair	
ITEM	ACTION
1	All Windows cleaned and repaired where required
2	Graffiti to be removed and brickwork cleaned
3	Brickwork spalling and staining to be rectified
4	Repair or replace like for like roof tiles that are damaged
5	Damp by skylight to be rectified
6	Degradation at basement level. To be repaired



3 North Elevation
1 : 100



4 West elevation
1 : 100

revision	date	drawn	description
-	06.03.20	TH3M	Issued For Planning



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Elevations - Restoration Notes
Existing

MKCC Parsonage St

T-0230-2-0004-Elevations -
Restoration Notes

1:100 @ A1
scale

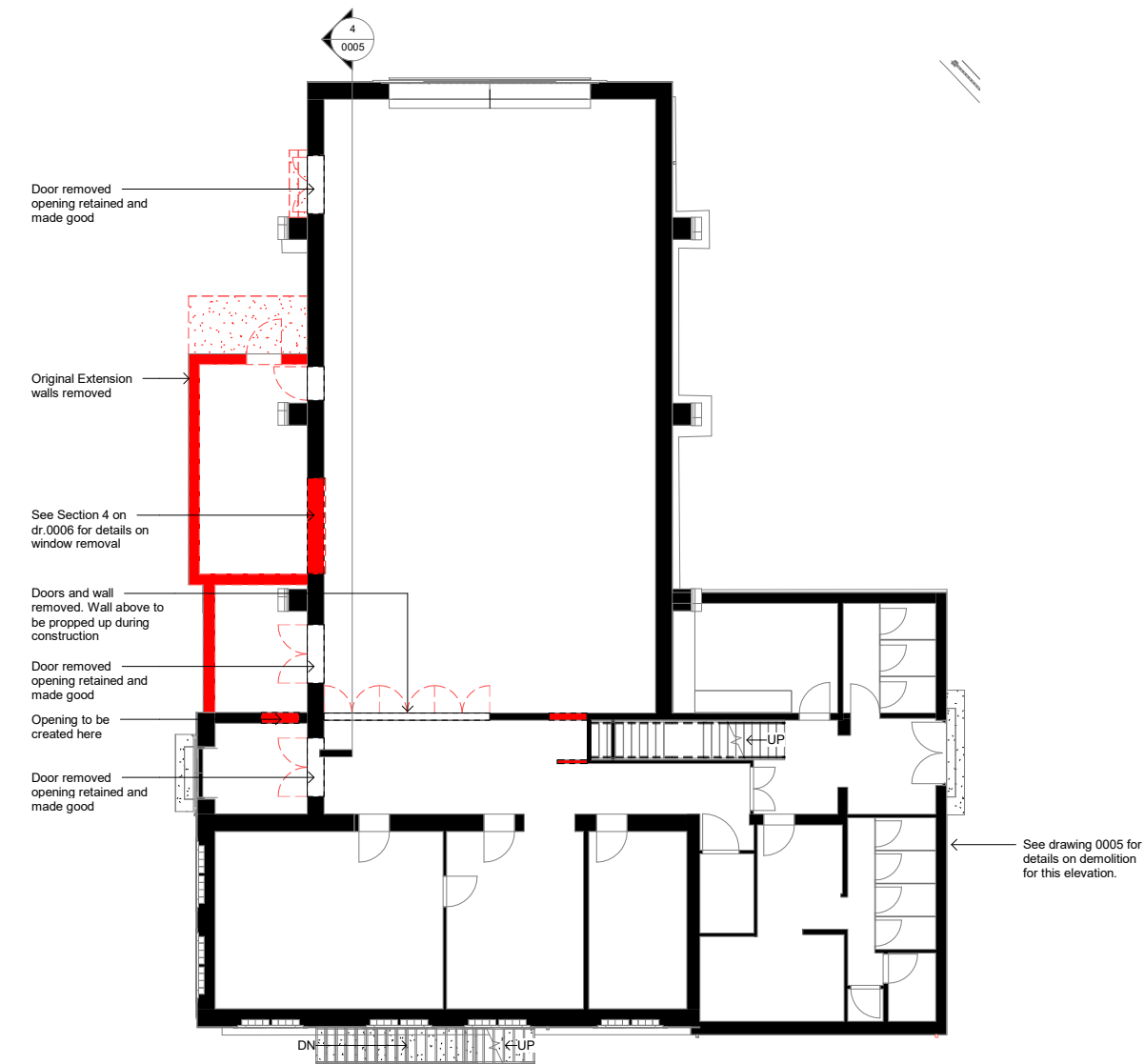
0230
job reference

MGS
drawn

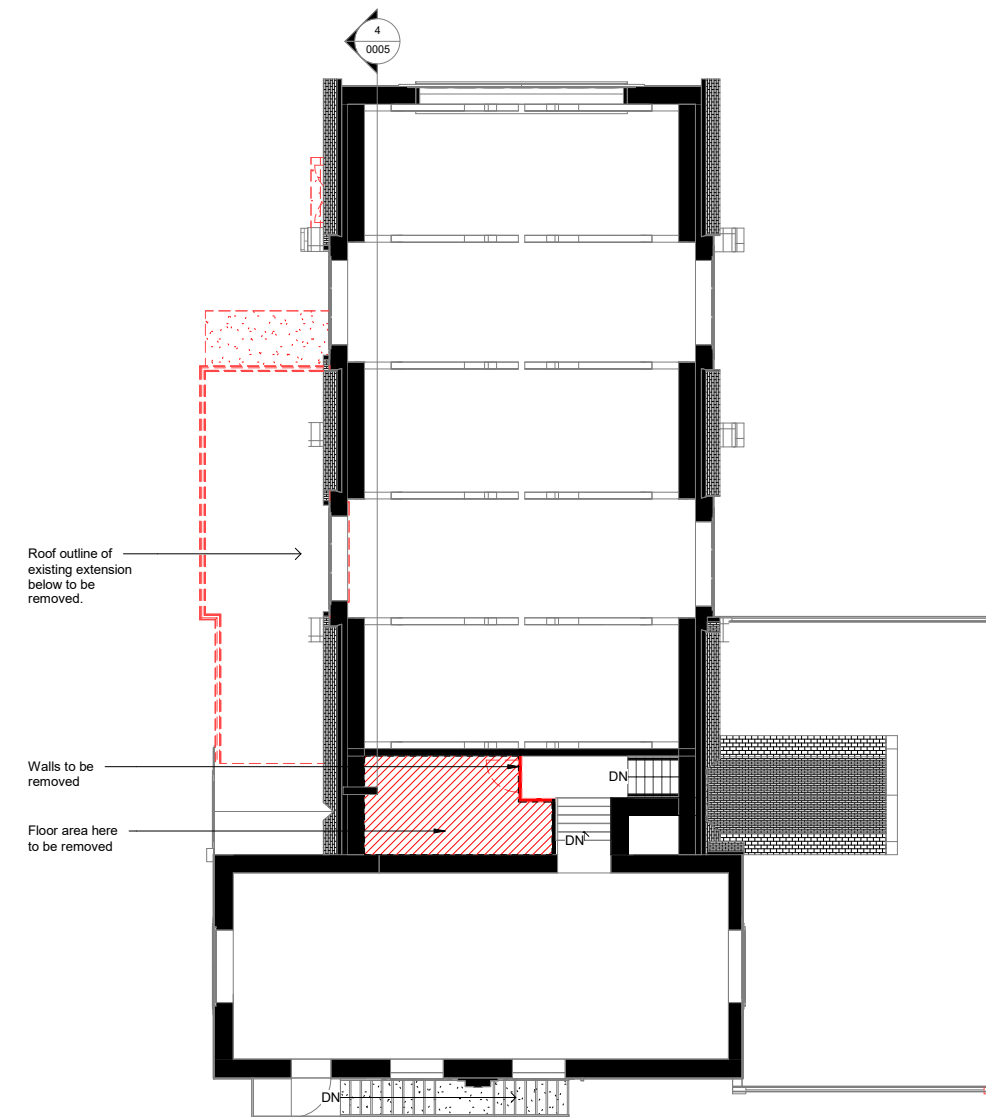
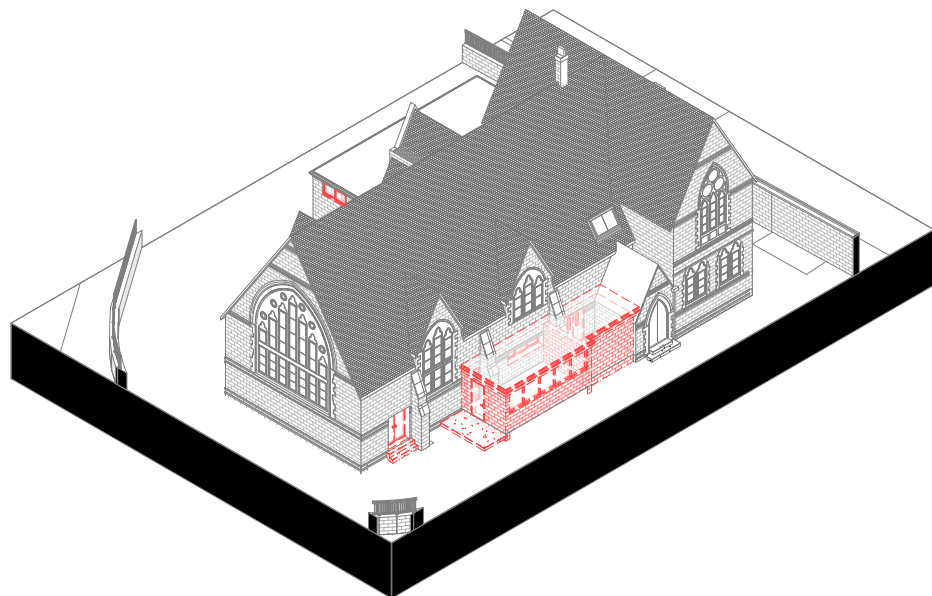
T H 3 M

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

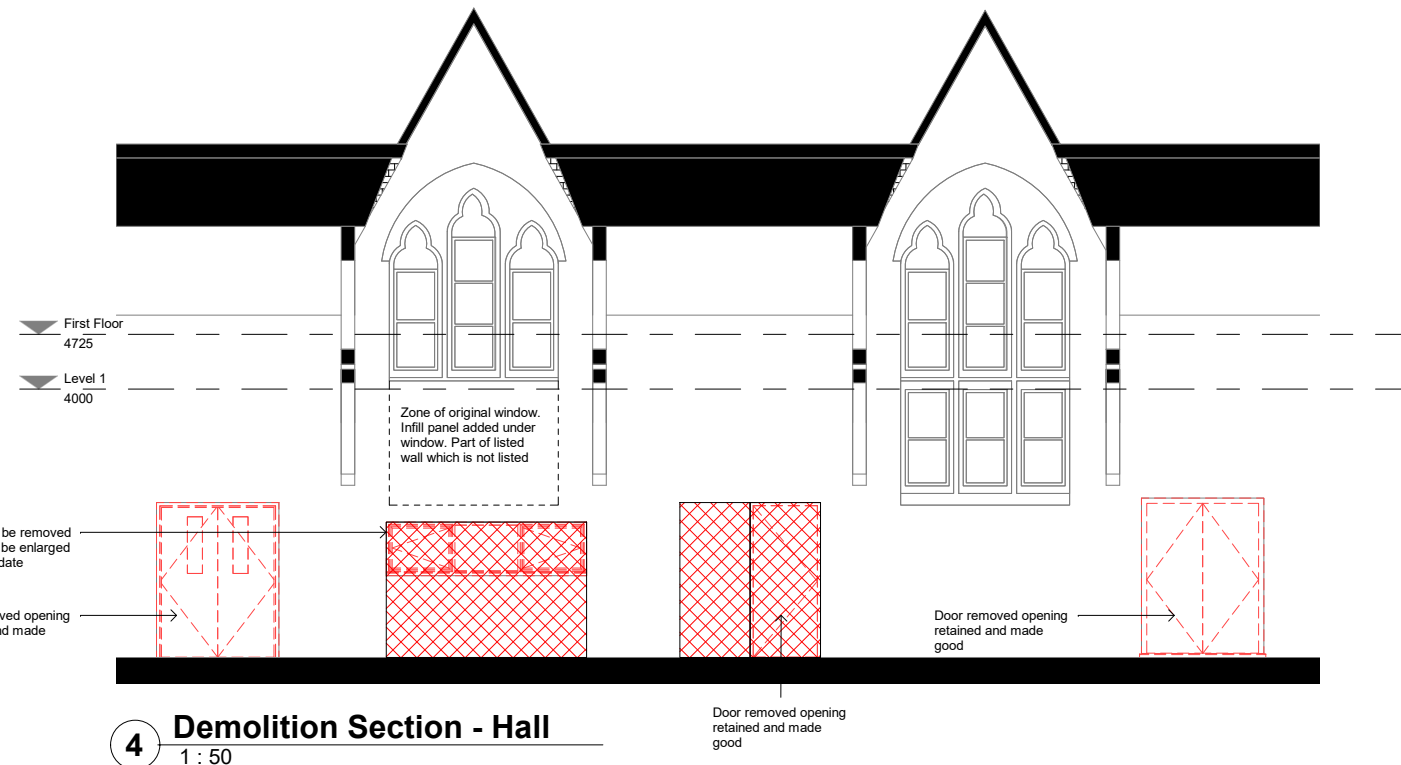
FOR PLANNING



1 Demolition - Ground Floor
1 : 100

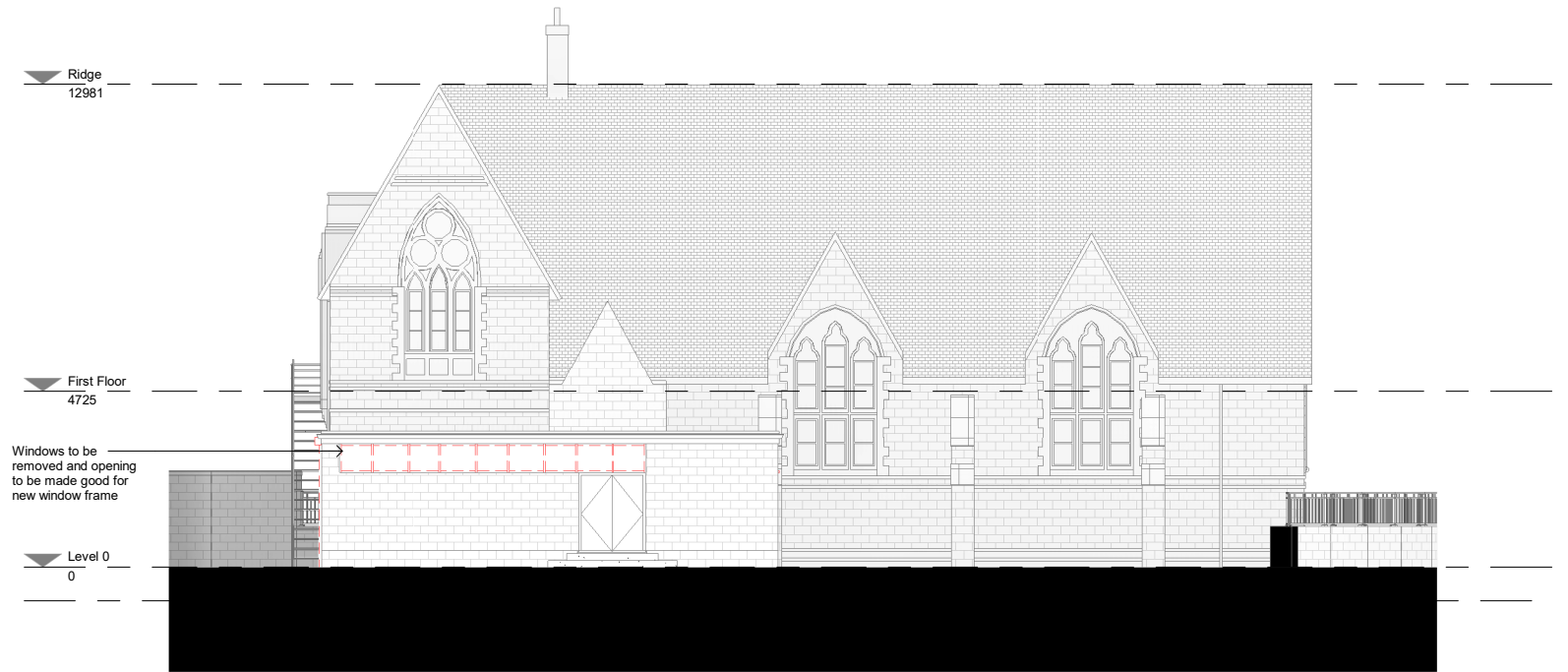


2 Demolition - First Floor
1 : 100

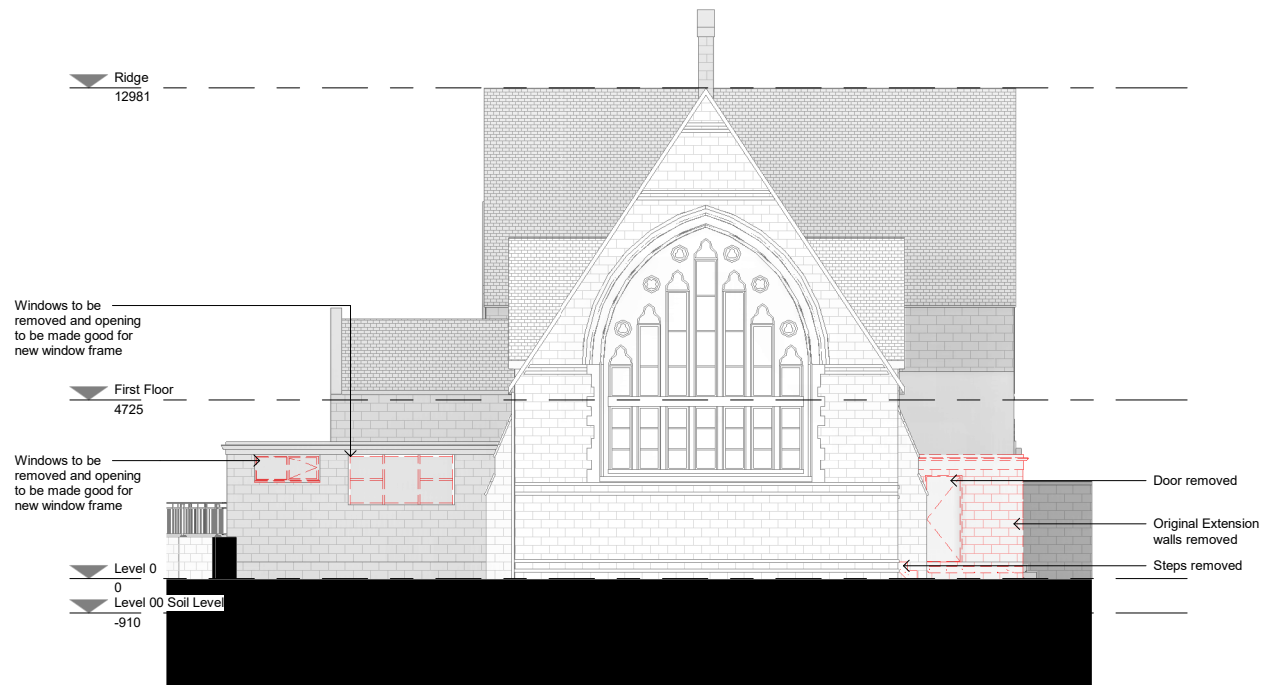




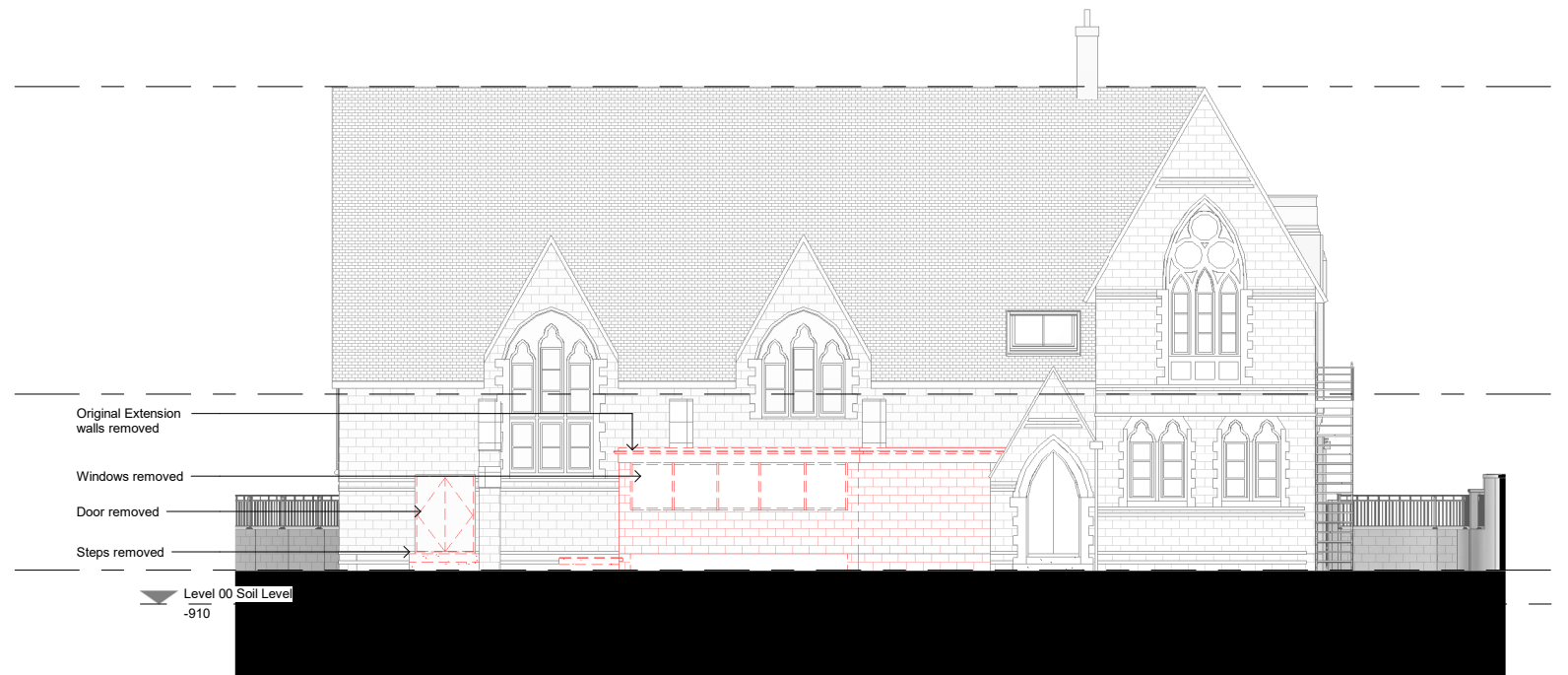
1 Demolition - South Elevation
1 : 100



2 Demolition - East Elevation
1 : 100



3 Demolition - North Elevation
1 : 100



4 Demolition - West elevation
1 : 100

revision	date	drawn	description
-	06.03.20	TH3M	Issued For Planning



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Demolition Elevations
Existing

MKCC Parsonage St

T-0230-2-0006-Demolition Elevations -
number revision

1:100 @ A1
scale

0230
job reference

MGS
drawn

TH3M

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

FOR PLANNING



revision	date	drawn	description
-	06.03.20	TH3M	Issued For Planning

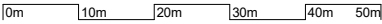
Site Boundary Line



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TH3M



Site Plan
Existing

MKCC Parsonage St

FOR PLANNING

T-0230-2-0007-Site Plan

number

1:500 @ A1
scale

0230

job reference

-
revision

MGS

drawn



revision	date	drawn	description
-	XX.03.20	TH3M	Issued For Planning

Site Boundary Line



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Site Plan
Proposed

MKCC Parsonage St

T-0230-2-0100-Site Plan

number

1:500 @ A1
scale

0230
job reference

MGS
drawn

TH3M

0m 10m 20m 30m 40m 50m

FOR PLANNING



revision	date	drawn	description
-	XX.03.20	TH3M	Issued For Planning



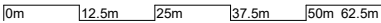
Site Boundary Line



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T H 3 M



Site Location Plan

MKCC Parsonage St

FOR PLANNING

T-0230-2-0101-Site Location Plan

number

1:1250 @ A4
scale

0230
job reference

revision

MGS
drawn



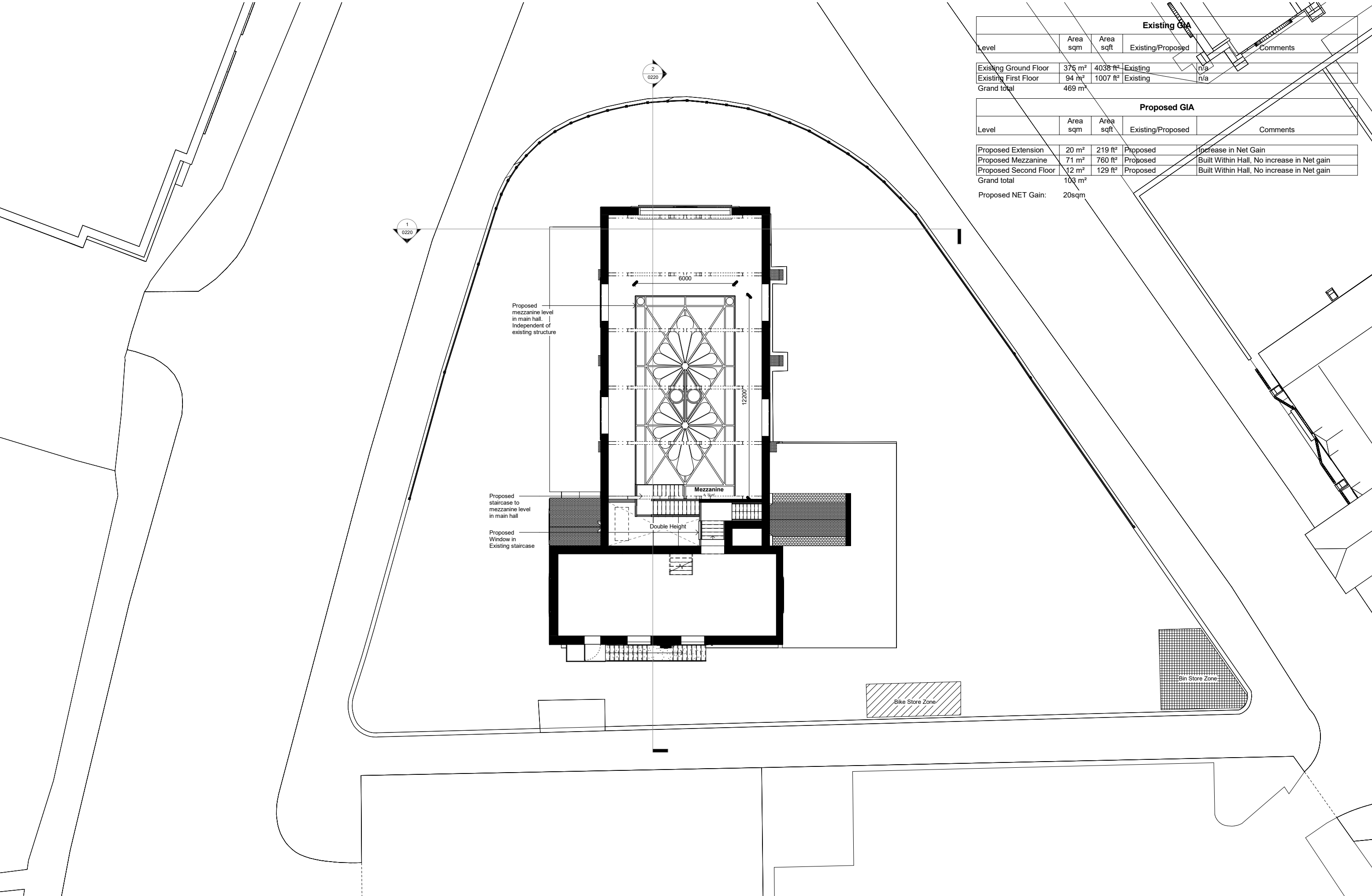
Existing GIA				
Level	Area sqm	Area sqft	Existing/Proposed	Comments
Existing Ground Floor	375 m²	4038 ft²	Existing	n/a
Existing First Floor	94 m²	1007 ft²	Existing	n/a
Grand total	469 m²			

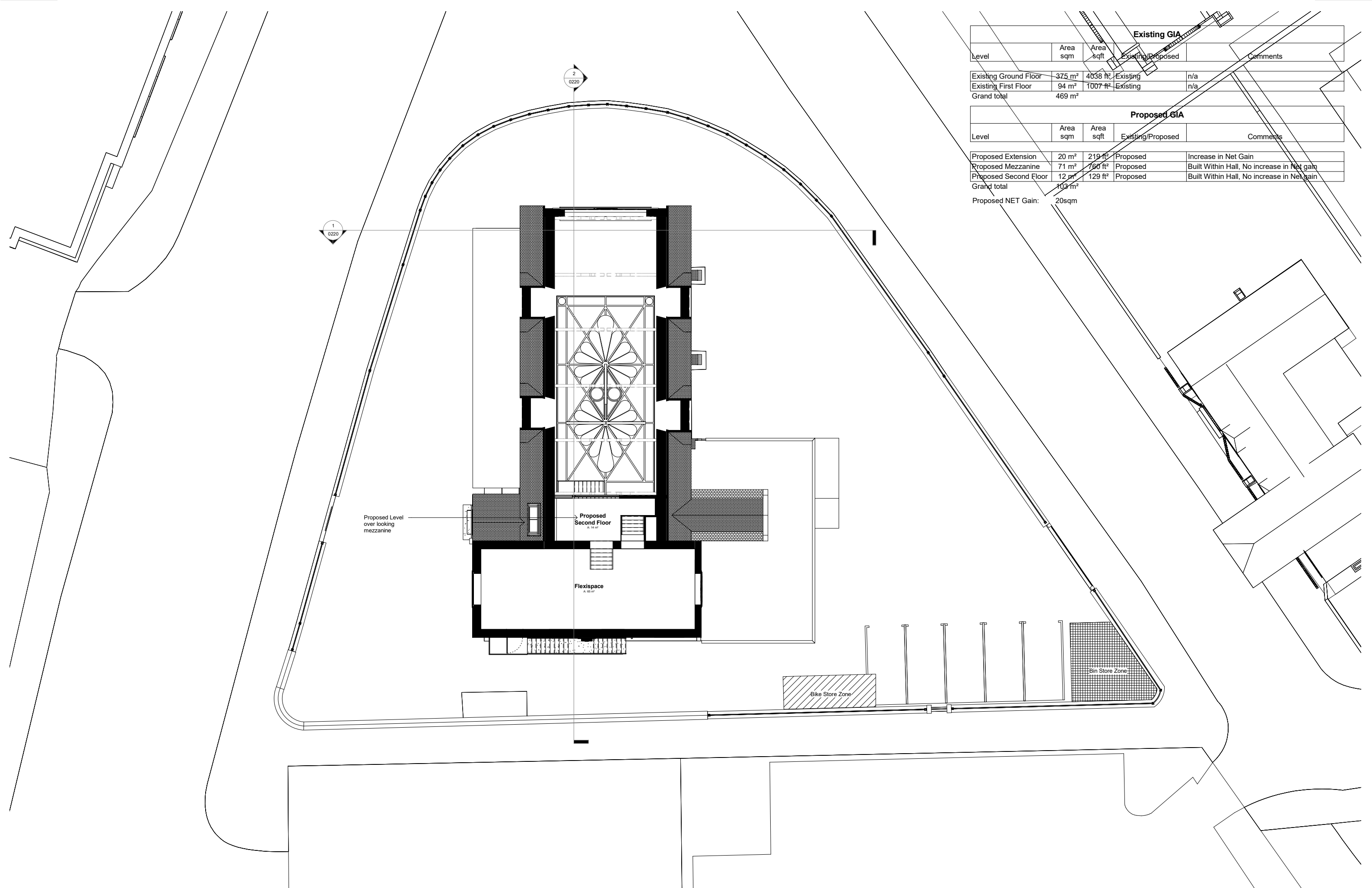
Proposed GIA				
Level	Area sqm	Area sqft	Existing/Proposed	Comments
Proposed Extension	20 m²	219 ft²	Proposed	Increase in Net Gain
Proposed Mezzanine	71 m²	760 ft²	Proposed	Built Within Hall, No increase in Net gain
Proposed Second Floor	12 m²	129 ft²	Proposed	Built Within Hall, No increase in Net gain
Grand total	103 m²			

Proposed NET Gain: 20sqm

Existing GIA				
Level	Area sqm	Area sqft	Existing/Proposed	Comments
Existing Ground Floor	375 m²	4038 ft²	Existing	n/a
Existing First Floor	94 m²	1007 ft²	Existing	n/a
Grand total	469 m²			

Proposed GIA				
Level	Area sqm	Area sqft	Existing/Proposed	Comments
Proposed Extension	20 m²	219 ft²	Proposed	Increase in Net Gain
Proposed Mezzanine	71 m²	760 ft²	Proposed	Built Within Hall, No increase in Net gain
Proposed Second Floor	12 m²	129 ft²	Proposed	Built Within Hall, No increase in Net gain
Grand total	103 m²			
Proposed NET Gain:		20sqm		





Existing GIA				
Level	Area sqm	Area sqft	Existing/Proposed	Comments
Existing Ground Floor	375 m²	4038 ft²	Existing	n/a
Existing First Floor	94 m²	1007 ft²	Existing	n/a
Grand total	469 m²			
Proposed GIA				
Level	Area sqm	Area sqft	Existing/Proposed	Comments
Proposed Extension	20 m²	219 ft²	Proposed	Increase in Net Gain
Proposed Mezzanine	71 m²	760 ft²	Proposed	Built Within Hall, No increase in Net gain
Proposed Second Floor	12 m²	129 ft²	Proposed	Built Within Hall, No increase in Net gain
Grand total	103 m²			
Proposed NET Gain:		20sqm		

revision	date	drawn	description
-	XX.03.20	TH3M	Issued For Planning

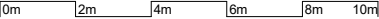
Do not scale from drawings unless by agreement with architect. Use figured dimensions only. Check all dimensions on site prior to commencing the works. Drawing to be read in conjunction with other relevant consultant information.

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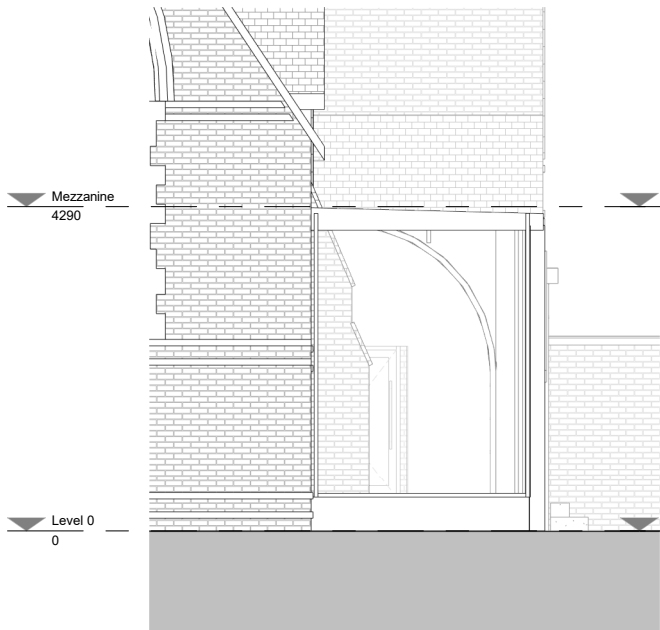
Second Floor Plan
Proposed
MKCC Parsonage St

T-0230-2-0202-Second Floor Plan
number
1:100 @ A1
scale
0230
job reference
MGS
drawn

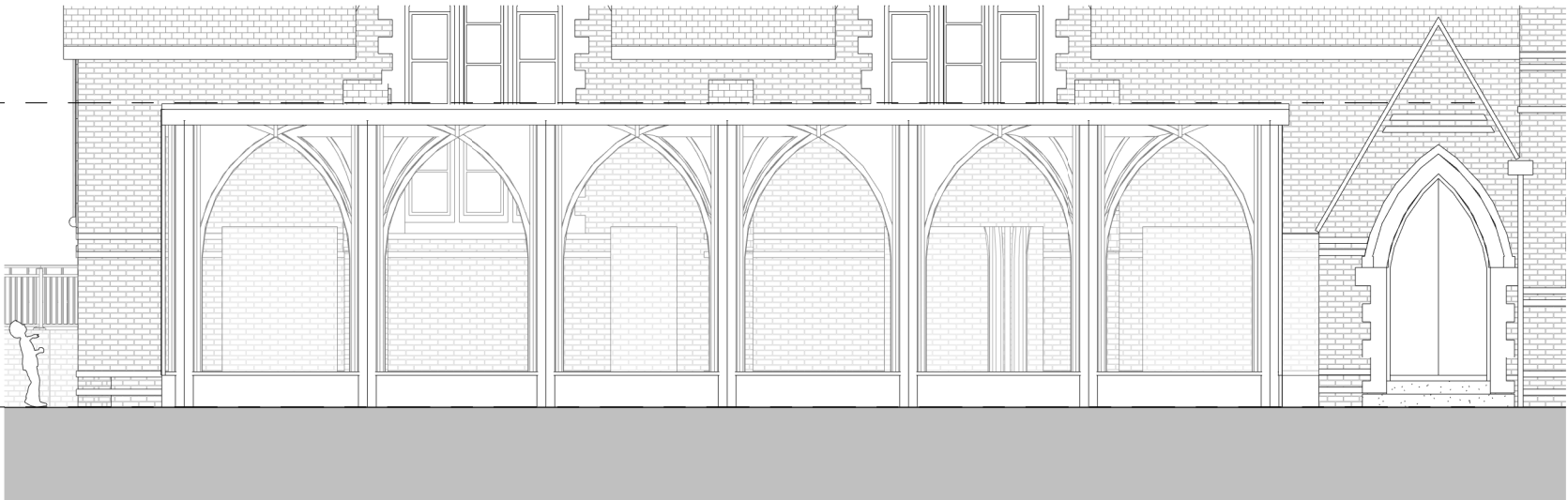
T H 3 M



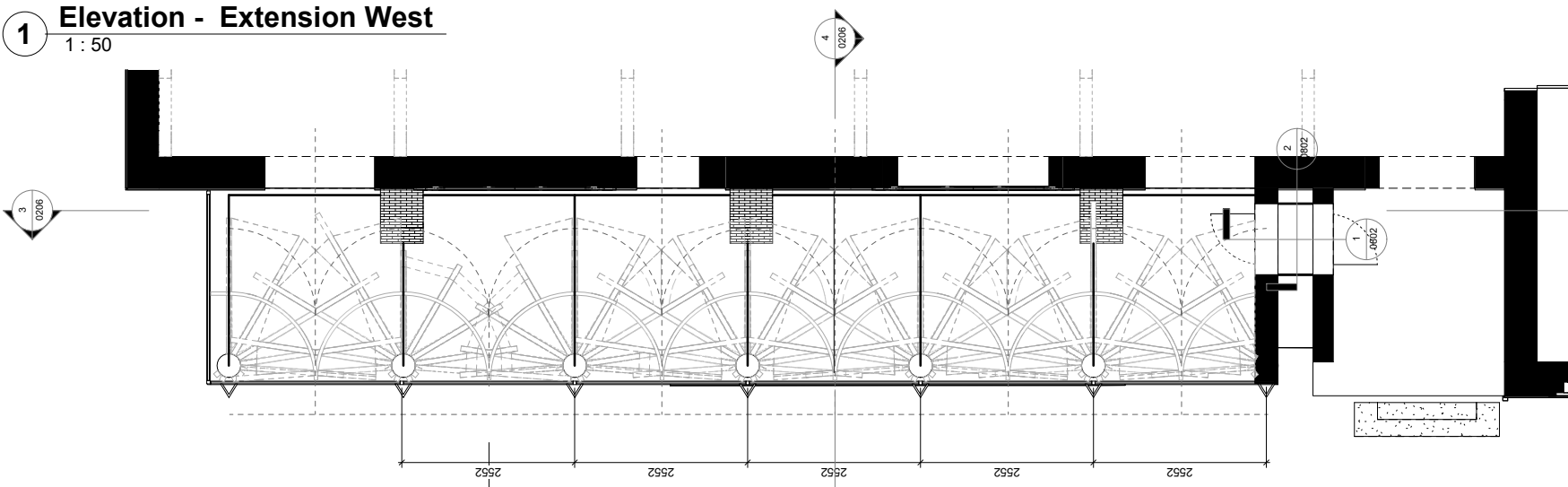
FOR PLANNING



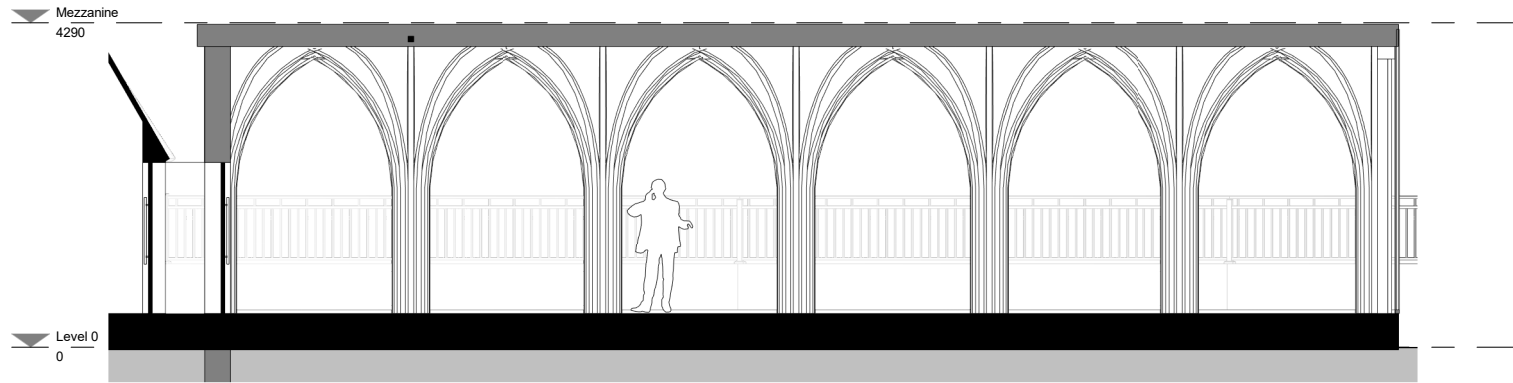
2 Elevation - Extension North
1 : 50



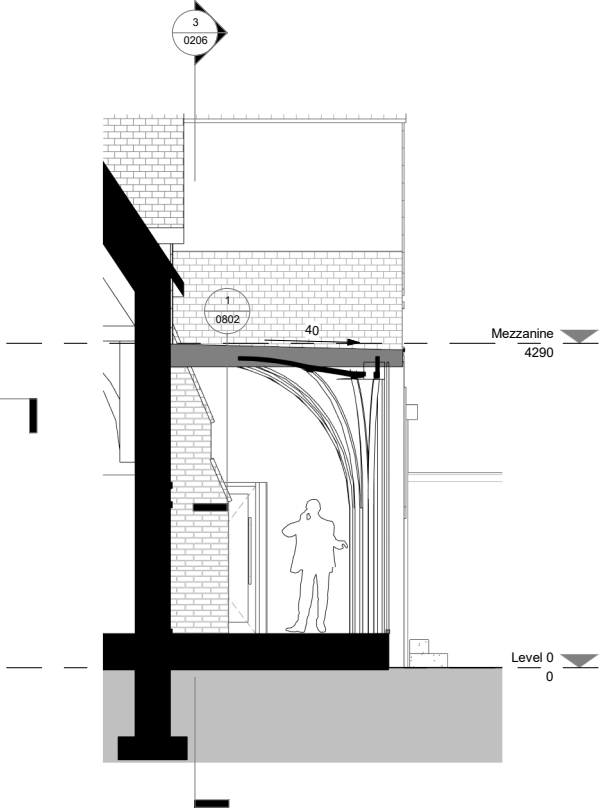
1 Elevation - Extension West
1 : 50



5 Joist Layout - Extension
1 : 50



3 Long Section - Extension - internal column
1 : 50



4 Short Section - Extension
1 : 50

revision	date	drawn	description
-	XX.03.20	TH3M	Issued For Planning

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Extension Layout
Proposed

MKCC Parsonage St

T-0230-2-0206-Extension Layout
number

1:50 @ A1
scale

0230
job reference

MGS
drawn

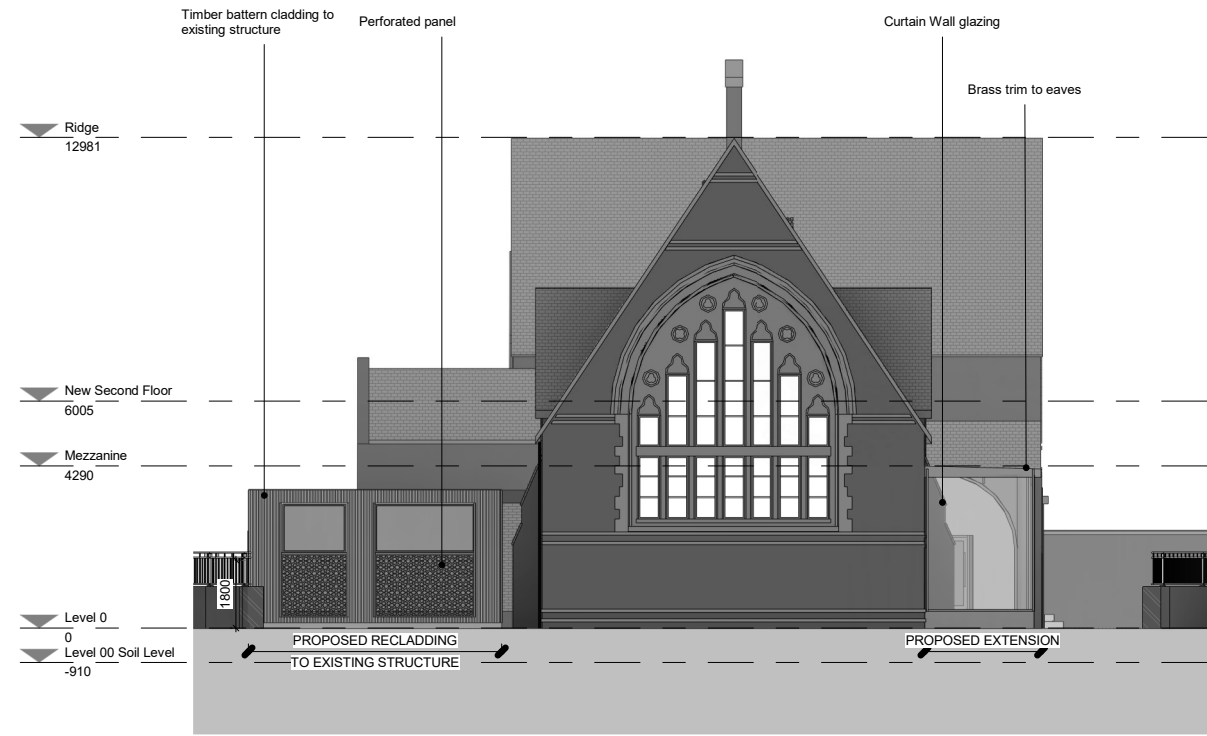
T H 3 M

0m 1m 2m 3m 4m 5m

FOR PLANNING



1 **Proposed West elevation**
1 : 100



3 **Proposed North Elevation**
1 : 100



2 **Proposed East Elevation**
1 : 100



4 **Proposed South Elevation**
1 : 100

revision	date	drawn	description
-	XX.03.20	TH3M	Issued For Planning

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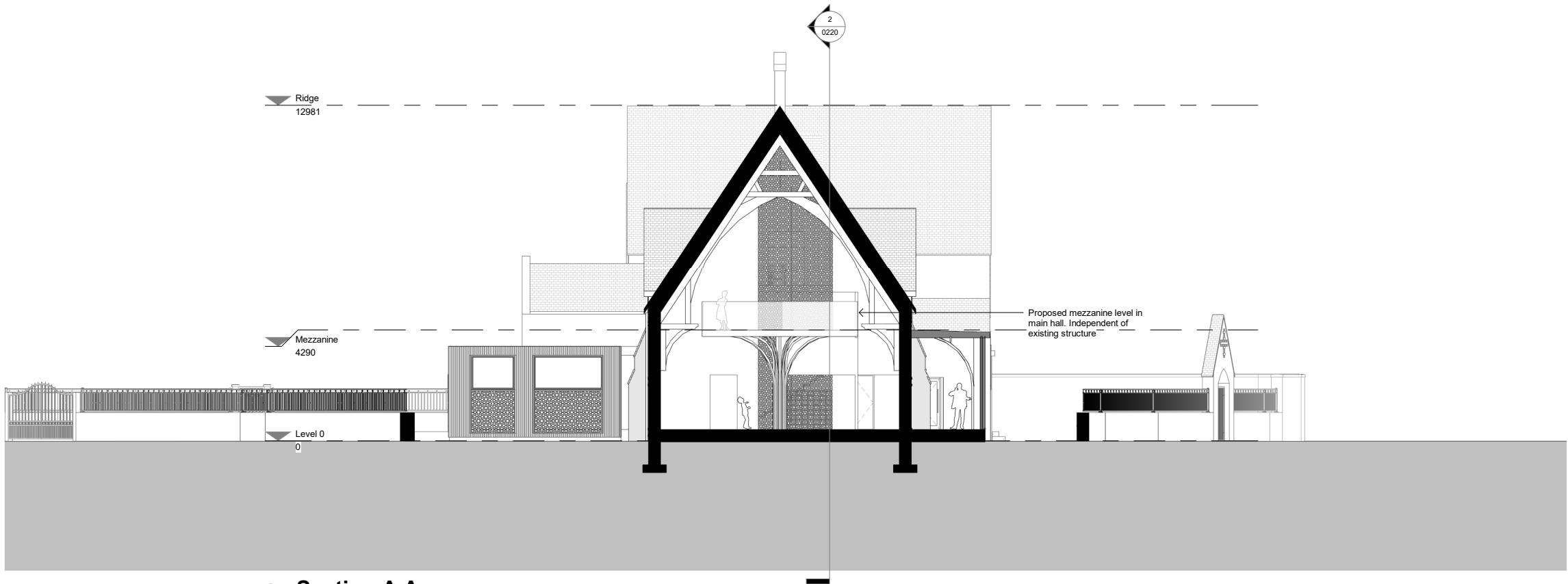
Proposed Elevations
Proposed
MKCC Parsonage St

T-0230-2-0210-Proposed Elevations
number
1:100 @ A1
scale
0230
job reference
MGS
drawn

T H 3 M

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

FOR PLANNING



1 Section A A
1 : 100



2 Section B B
1 : 100

revision	date	drawn	description
-	XX.03.20	TH3M	Issued For Planning

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**Sections
Proposed**

MKCC Parsonage St

T-0230-2-0220-Sections

number

revision

1:100 @ A1
scale

0230
job reference

mgs
drawn

T H 3 M

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

FOR PLANNING



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX B – EXPLORATORY HOLE LOGSHEETS

Trial Pit Log

Project Name: Parsonage Street Redevelopment		Client: Mawlawi Kurdish Cultural Centre	Date: 20/12/2022	
Location: Hulme, Manchester		Contractor: PM Sampling Ltd		
Project No. : 4423		Crew Name:		Equipment: Unknown
Location Number HDP101	Location Type TP	Level	Logged By RM	Scale 1:25
				Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.05			Block paving (MADE GROUND)	1
					0.20			Light grey slightly sandy fine to medium subangular limestone GRAVEL (MADE GROUND)	
								Brown slightly sandy gravelly CLAY. Gravel is fine to coarse subangular to angular of brick and rare asphalt (MADE GROUND)	
					0.60			Soft to firm light orangish brown mottled grey slightly gravelly sandy CLAY. Gravel is fine rounded of quartzite and sandstone (MADE GROUND)	
					1.20			Dark brown slightly sandy slightly gravelly CLAY. Gravel is fine to medium sub angular of brick. low whole brick cobble content (MADE GROUND)	
					1.40			...at 1.30 to 1.40mbgl masonry footing	2
								End of Borehole at 1.400m	
									3
									4
									5

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

Remarks

1. Location CAT scanned before breaking ground. 2. Groundwater was not observed. 3. Terminated at 1.40mbgl. 4. On completion, borehole backfilled with arisings.

Trial Pit Log

Project Name: Parsonage Street
Redevelopment

Client: Mawlawi Kurdish Cultural Centre

Date: 20/12/2022

Location: Hulme, Manchester

Contractor: PM Sampling Ltd

Project No. : 4423

Crew Name:

Equipment: Unknown

Location Number
HDP102Location Type
TP

Level

Logged By
RMScale
1:25Page Number
Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.05			Block paving (MADE GROUND)	1
					0.20			Light grey slightly sandy fine to medium subangular GRAVEL of limestone (MADE GROUND)	
								Brown slightly sandy slightly gravelly CLAY. Gravel is fine to coarse subangular to angular of brick (MADE GROUND)	
					0.65			Light grey gravelly fine to medium SAND. Gravel is fine to medium subangular to subrounded of sandstone and quartzite (GLACIOFLUVIAL SHEET DEPOSITS)	
					0.90			Soft dark brown slightly sandy CLAY (GLACIOFLUVIAL SHEET DEPOSITS)	
					1.10			Firm locally stiff brown slightly sandy slightly gravelly CLAY. Gravel fine rounded of sandstone and quartzite (GLACIOFLUVIAL SHEET DEPOSITS)	
					1.50			...at 1.20 to 1.30mbgl masonry footing	
								End of Borehole at 1.500m	
									2
									3
									4
									5

Dimensions

Trench Support and Comment

Pumping Data

Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks

Remarks

1. Location CAT scanned before breaking ground. 2. Groundwater was not observed. 3. Terminated at 1.50mbgl. 4. On completion, borehole backfilled with arisings.

Trial Pit Log

Project Name: Parsonage Street Redevelopment		Client: Mawlawi Kurdish Cultural Centre	Date: 20/12/2022	
Location: Hulme, Manchester		Contractor: PM Sampling Ltd		
Project No. : 4423		Crew Name:		Equipment: Unknown
Location Number HDP103a	Location Type TP	Level	Logged By RM	Scale 1:25
				Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10			Asphalt (MADE GROUND)	
					0.30			Light grey sandy fine to medium subangular to angular limestone GRAVEL (MADE GROUND)	
								End of Borehole at 0.300m	
									1
									2
									3
									4
									5

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

Remarks

1. Location CAT scanned before breaking ground. 2. Groundwater was not observed. 3. Terminated at 0.30mbgl due to electric cable in base of pit. 4. On completion, borehole backfilled with arisings.

Trial Pit Log

Project Name: Parsonage Street Redevelopment		Client: Mawlawi Kurdish Cultural Centre	Date: 20/12/2022	
Location: Hulme, Manchester		Contractor: PM Sampling Ltd		
Project No. : 4423		Crew Name:		Equipment: Unknown
Location Number HDP103b	Location Type TP	Level	Logged By RM	Scale 1:25
				Page Number Sheet 1 of 1

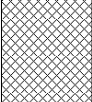
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.05			Block paving (MADE GROUND)	1
					0.21			Light grey sandy fine to medium subangular limestone GRAVEL (MADE GROUND)	
		0.40	ES					Soft brown slightly gravelly slightly sandy CLAY. Gravel is fine to medium sub angular of brick (MADE GROUND)	
		0.60 - 1.00	B		0.60			Brown slightly clayey very gravelly SAND. Gravel is fine to coarse rounded of sandstone and quartzite (GLACIOFLUVIAL SHEET DEPOSITS)	
		1.00 - 1.20	B		1.00			Brown slightly gravelly slightly sandy CLAY. Gravel is fine to medium rounded to sub angular of sandstone and quartzite (GLACIOFLUVIAL SHEET DEPOSITS)	
					1.20			End of Borehole at 1.200m	2
									3
									4
									5

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

Remarks 1. Location CAT scanned before breaking ground. 2. Groundwater was not observed. 3. Terminated at 1.20mbgl. 4. On completion, borehole backfilled with arisings.						
--	--	--	--	--	--	---

Percussion Drilling Log

Project Name: Parsonage Street Redevelopment		Client: Mawlawi Kurdish Cultural Centre		Date: 20/12/2022	
Location: Hulme, Manchester		Contractor: PM Sampling Ltd			
Project No. : 4423		Crew Name:		Drilling Equipment: Unknown	
Borehole Number WS101	Hole Type WS	Level	Logged By RM	Scale 1:25	Page Number Sheet 1 of 1

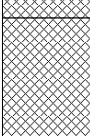
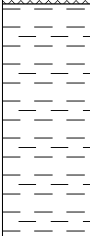
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15 - 0.25	ES		0.07 0.15 0.25			Asphalt (MADE GROUND)	1
								Light greyish brown sandy fine to medium subangular limestone GRAVEL (MADE GROUND)	
								Brown sandy fine to coarse subangular GRAVEL of brick and clinker (MADE GROUND)	
								Firm brown slightly sandy gravelly CLAY. Gravel is fine to medium angular to sub rounded of brick, sandstone and quartzite (MADE GROUND)	
		1.00	SPT	N=4 (0,0/1,1,1,1)	0.70 0.80			Light grey gravelly fine to medium SAND. Gravel is fine to medium sub angular to sub rounded of sandstone and quartzite (MADE GROUND)	2
		1.20	D					Soft dark brown slightly gravelly organic CLAY. Gravel is fine to medium rounded to subangular of brick, ceramic and sandstone (MADE GROUND)	
								Firm grey mottled orange CLAY (GLACIOFLUVIAL SHEET DEPOSITS)	
		2.00	SPT	N=15 (2,3/4,4,3,4)	1.50				3
		2.25 - 3.00	B		2.25			Medium dense becoming very dense with depth yellow and orangish brown fine to medium SAND & GRAVEL of quartz and sandstone (GLACIOFLUVIAL SHEET DEPOSITS)	
		3.00	SPT	70 (8,14/70 for 120mm)	3.27				
								End of Borehole at 3.270m	4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
								0.00	3.27	90	

Remarks 1. Location CAT scanned before breaking ground. 2. Groundwater was not observed. 3. Terminated at 3.27mbgl. 4. On completion, borehole was installed with a 50mm standpipe with a response zone between 0.50 and 1.00mbgl.										
--	--	--	--	--	--	--	--	--	--	---

Percussion Drilling Log

Project Name: Parsonage Street Redevelopment		Client: Mawlawi Kurdish Cultural Centre		Date: 20/12/2022	
Location: Hulme, Manchester		Contractor: PM Sampling Ltd			
Project No. : 4423		Crew Name:		Drilling Equipment: Unknown	
Borehole Number WS102	Hole Type WS	Level	Logged By RM	Scale 1:25	Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.20 - 0.60	ES	N=2 (0,0/0,0,1,1)	0.10			Asphalt (MADE GROUND)	1		
					0.20			Grey slightly sandy fine to medium subangular limestone GRAVEL (MADE GROUND)			
							Brown sandy fine to coarse sub angular to angular GRAVEL of brick. Low whole brick cobble content (MADE GROUND)				
		0.90 - 1.20 1.00	ES SPT	N=2 (0,0/0,0,1,1)	0.60			Light grey gravelly fine to medium SAND. Gravel is fine to medium sub angular to sub rounded of sandstone and quartzite (MADE GROUND)	2		
					0.90			Soft dark brown slightly gravelly organic CLAY. Gravel is fine to medium rounded to sub angular of brick, ceramic and sandstone (MADE GROUND)			
					1.30			Firm grey mottled orange CLAY (GLACIOFLUVIAL SHEET DEPOSITS)			
		1.90 - 2.00 2.00 2.10 - 3.00	D SPT B	N=19 (3,4/5,5,4,5)	2.10			Medium dense becoming very dense with depth brown slightly gravelly fine to medium SAND. Gravel is fine rounded of sandstone, chert and quartzite (GLACIOFLUVIAL SHEET DEPOSITS)	3		
		3.00	SPT	N=90 (6,9/90 for 255mm)	3.41			End of Borehole at 3.410m			
											4
											5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation
								0.00	3.41	90	

Remarks 1. Location CAT scanned before breaking ground. 2. Groundwater was not observed. 3. Terminated at 3.41mbgl. 4. On completion, borehole was installed with a 50mm standpipe with a response zone between 0.50 and 2.00mbgl.										
--	--	--	--	--	--	--	--	--	--	---

Percussion Drilling Log

Project Name: Parsonage Street Redevelopment		Client: Mawlawi Kurdish Cultural Centre	Date: 20/12/2022	
Location: Hulme, Manchester		Contractor: PM Sampling Ltd		
Project No. : 4423		Crew Name:		Drilling Equipment: Unknown
Borehole Number WS103	Hole Type WS	Level	Logged By RM	Scale 1:25
				Page Number Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			0.05			Asphalt (MADE GROUND)	1
					0.30			Light yellowish brown sandy subangular fine to coarse GRAVEL of limestone (MADE GROUND)	
		0.50	ES					Soft light brown slightly gravelly very sandy CLAY. Gravelly is fine to coarse sub angular of brick and sandstone (MADE GROUND)	
		1.00	SPT	N=5 (1,1/1,1,1,2)	1.20			Light grey mottled orange soft to firm slightly gravelly sandy CLAY. Gravelly is fine rounded of quartzite and sandstone (GLACIOFLUVIAL SHEET DEPOSITS)	2
		1.80 - 1.90	D		1.90			Light brown slightly gravelly fine to medium SAND. Gravel is fine rounded of sandstone (GLACIOFLUVIAL SHEET DEPOSITS)	
		2.00 - 3.00 2.00	B SPT	N=13 (2,3/3,3,2,5)	2.00			Soft brown mottled dark brown slightly gravelly sandy CLAY. Gravel is fine to medium rounded of sandstone, chert and quartzite (GLACIOFLUVIAL SHEET DEPOSITS)	
					2.40			Very dense brown slightly gravelly fine to medium SAND. Gravel is fine rounded of sandstone, chert and quartzite (GLACIOFLUVIAL SHEET DEPOSITS)	3
		3.00	SPT	N=92 (7,9/92 for 250mm)					
					3.40			End of Borehole at 3.400m	



COMPLEX CHALLENGES ...
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APPENDIX C – CHEMICAL TESTING RESULTS

FINAL ANALYTICAL TEST REPORT

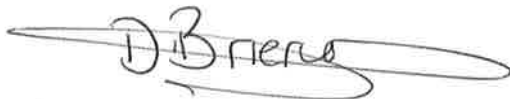
Envirolab Job Number: 22/12572
Issue Number: 1

Date: 10 January, 2023

Client: ROCP LIMITED
Commercial Wharf 6 Commercial Street
Castlefield
Manchester
M15 4PZ

Project Manager: Reece McGuinness
Project Name: MKCC
Project Ref: 4423
Order No: 1826
Date Samples Received: 22/12/22
Date Instructions Received: 22/12/22
Date Analysis Completed: 10/01/23

Approved by:



Danielle Brierley
Deputy Client Services Supervisor

Envirolab Job Number: 22/12572

Client Project Name: MKCC

Client Project Ref: 4423

Lab Sample ID	22/12572/1	22/12572/2	22/12572/3	22/12572/4				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	HDP103B	WS103	WS101	WS102						
Depth to Top	0.40	0.50	0.15	0.90						
Depth To Bottom			0.25	1.20						
Date Sampled	20-Dec-22	20-Dec-22	20-Dec-22	20-Dec-22						
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES						
Sample Matrix Code	5AB	4AB	4AB	5A						
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1				% w/w	0.1	A-T-044
pH _D ^{M#}	8.48	7.46	8.49	7.30				pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1) _D ^{M#}	<10	<10	66	<10				mg/l	10	A-T-026s
Cyanide (total) _A ^{M#}	<1	<1	<1	<1				mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2				mg/kg	0.2	A-T-050s
Fraction of organic carbon _D [#]	0.0228	0.0208	0.0424	0.0505				N/A	0.0003	A-T-032s
Antimony _D	<5	<5	<5	<5				mg/kg	5	A-T-024s
Arsenic _D ^{M#}	7	4	23	6				mg/kg	1	A-T-024s
Barium _D	89	920	151	282				mg/kg	1	A-T-024s
Beryllium _D	0.6	0.9	1.9	1.0				mg/kg	0.5	A-T-024s
Boron (water soluble) _D	<1.0	<1.0	<1.0	2.2				mg/kg	1	A-T-027s
Cadmium _D ^{M#}	0.6	<0.5	1.4	0.6				mg/kg	0.5	A-T-024s
Copper _D ^{M#}	39	41	89	39				mg/kg	1	A-T-024s
Chromium _D ^{M#}	10	21	22	23				mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1				mg/kg	1	A-T-040s
Chromium (trivalent)	10	21	22	23				mg/kg	1	Calc
Lead _D ^{M#}	214	96	125	88				mg/kg	1	A-T-024s
Mercury _D	0.99	0.46	1.00	0.42				mg/kg	0.17	A-T-024s
Molybdenum _D ^{M#}	<1	1	3	2				mg/kg	1	A-T-024s
Nickel _D ^{M#}	12	15	25	19				mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	1	1	2				mg/kg	1	A-T-024s
Vanadium _D ^{M#}	11	30	46	31				mg/kg	1	A-T-024s
Zinc _D ^{M#}	49	56	104	64				mg/kg	5	A-T-024s

Envirolab Job Number: 22/12572

Client Project Name: MKCC

Client Project Ref: 4423

Lab Sample ID	22/12572/1	22/12572/2	22/12572/3	22/12572/4				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	HDP103B	WS103	WS101	WS102						
Depth to Top	0.40	0.50	0.15	0.90						
Depth To Bottom			0.25	1.20						
Date Sampled	20-Dec-22	20-Dec-22	20-Dec-22	20-Dec-22						
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES						
Sample Matrix Code	5AB	4AB	4AB	5A						
Asbestos in Soil (inc. matrix)										
Asbestos in soil _D [#]	NAD	NAD	NAD	NAD						A-T-045
Asbestos Matrix (visual) _D	-	-	-	-						A-T-045
Asbestos Matrix (microscope) _D	-	-	-	-						A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	N/A	N/A						A-T-045

Envirolab Job Number: 22/12572

Client Project Name: MKCC

Client Project Ref: 4423

Lab Sample ID	22/12572/1	22/12572/2	22/12572/3	22/12572/4				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	HDP103B	WS103	WS101	WS102						
Depth to Top	0.40	0.50	0.15	0.90						
Depth To Bottom			0.25	1.20						
Date Sampled	20-Dec-22	20-Dec-22	20-Dec-22	20-Dec-22						
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES						
Sample Matrix Code	5AB	4AB	4AB	5A						
PAH-16MS										
Acenaphthene _A ^{M#}	0.05	0.06	2.19	0.03				mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	0.06	1.62	0.01				mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	0.09	0.27	7.34	0.08				mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	0.28	0.75	18	0.22				mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	0.30	0.68	13.8	0.19				mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	0.31	0.74	15.2	0.20				mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.16	0.34	5.24	0.08				mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	0.10	0.25	5.20	<0.07				mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	0.31	0.75	16.3	0.22				mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	0.08	1.52	<0.04				mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	0.66	1.63	42.1	0.49				mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	0.03	0.11	3.19	0.04				mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.17	0.38	6.60	0.11				mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	0.08	<0.03				mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	0.34	0.93	22.3	0.31				mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	0.61	1.50	35.8	0.43				mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	3.41	8.53	196	2.41				mg/kg	0.01	A-T-019s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.

The results reported herein relate only to the material supplied to the laboratory.

The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Subscript "A" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.

EPH CWG results have humics mathematically subtracted through instrument calculation

TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these

humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: ROCP LIMITED, Commercial Wharf 6 Commercial Street, Castlefield,
Manchester, M15 4PZ

Project: MKCC

Clients Project No: 4423

Project No: 22/12572

Date Received: 22/12/2022 (am)

Cool Box Temperatures (°C): 7.6

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	22/12572/1	22/12572/2	22/12572/3	22/12572/4
Client Sample No				
Client Sample ID/Depth	HDP103B 0.40m	WS103 0.50m	WS101 0.15-0.25m	WS102 0.90-1.20m
Date Sampled	20/12/22	20/12/22	20/12/22	20/12/22
A-T-019s	04/01/2023	04/01/2023	04/01/2023	04/01/2023
A-T-024s	09/01/2023	09/01/2023	09/01/2023	09/01/2023
A-T-026s	05/01/2023	05/01/2023	05/01/2023	05/01/2023
A-T-027s	05/01/2023	05/01/2023	05/01/2023	05/01/2023
A-T-031s	04/01/2023	04/01/2023	04/01/2023	04/01/2023
A-T-032s	10/01/2023	10/01/2023	10/01/2023	10/01/2023
A-T-040s	05/01/2023	05/01/2023	05/01/2023	05/01/2023
A-T-042sTCN	06/01/2023	06/01/2023	06/01/2023	06/01/2023
A-T-044	04/01/2023	04/01/2023	04/01/2023	04/01/2023
A-T-045	23/12/2022	23/12/2022	23/12/2022	23/12/2022
A-T-050s	04/01/2023	04/01/2023	04/01/2023	04/01/2023
Calc	09/01/2023	09/01/2023	09/01/2023	09/01/2023

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report



COMPLEX CHALLENGES ...
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APPENDIX D – GEOTECHNICAL TESTING RESULTS (AWAITING RESULTS)



COMPLEX CHALLENGES ...
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APPENDIX E – GROUND GAS / WATER MONITORING RESULTS

ROC CONSULTING Civil, Structural & Environmental Engineers Commercial Wharf, 6 Commercial St, MCR, M15 4PZ		Job No:		4423		Site:		Parsonage Street Redevelopment									
		Date:		05/01/2023		Client:		MKCC									
		Engineer:		RM		Equipment:		GFM 435									
		2 Days Prior			1 Day Prior			On day of Monitoring									
Weather Conditions:		Overcast / Raining			Scattered Cloud			Scattered Cloud / Raining									
Barometric Pressure Trend:		Falling			Rising			Falling									
Surface Ground Conditions:		Damp															
VISIT ONE		Start					Finish										
Time:		1230					Time:		1300								
Barometric Pressure:		1010					Barometric Pressure:		1010								
Background Oxygen:		20.8					Background Oxygen:		20.8								
Monitoring Point		Gas Concentration											Groundwater			Remarks	
BH N°		Flow Rate (l/h)	Peak					Flow Rate (l/h)	Steady					Depth to Water	Depth to Base		Head of water
			CH ₄ %	CO ₂ %	O ₂ %	LEL %	H2S/C O (ppm)		CH ₄ %	CO ₂ %	O ₂ %	LEL %	H2S/C O (ppm)				
WS101		0	0	1.4	15.3	0	0/0	0	0	1.4	15.3	0	0/0	Dry	1.06	N/A	
WS102		0	0	2.1	18	0	0/0	0	0	2.1	18	0	0/0		1.98		
WS103		0	0	1	19.5	0	0/0	0	0	1	19.5	0	0/0		1.02		
Comments:																	

 Civil, Structural & Environmental Engineers Commercial Wharf, 6 Commercial St, MCR, M15 4PZ	Job No:	4423	Site:	Parsonage Street Redevelopment
	Date:	12/01/2023	Client:	MKCC
	Engineer:	RM	Equipment:	GFM 435

	2 Days Prior	1 Day Prior	On day of Monitoring
Weather Conditions:	Raining	Cloudy	Raining
Barometric Pressure Trend:	Falling	Fluctuating	Falling
Surface Ground Conditions:	Wet		

VISIT TWO	Start	Finish
Time:	1300	1345.00
Barometric Pressure:	996	996
Background Oxygen:	20.9	20.9

Monitoring Point	Flow Rate (l/h)	Gas Concentration											Groundwater			Remarks
		Peak						Steady					Depth to Water	Depth to Base	Head of water	
BH N°		CH ₄ %	CO ₂ %	O ₂ %	LEL %	H2S/C O (ppm)	Flow Rate (l/h)	CH ₄ %	CO ₂ %	O ₂ %	LEL %	H2S/C O (ppm)				
WS101	0	0	1.7	14.6	0	0/0	0	0	1.7	14.6	0	0/0	Dry	1.06	N/A	
WS102	0	0	1.9	17.7	0	0/0	0	0	1.9	17.7	0	0/0		1.98		
WS103	0	0	0.9	19	0	0/0	0	0	0.9	19	0	0/0		1.02		

Comments:

ROC CONSULTING Civil, Structural & Environmental Engineers Commercial Wharf, 6 Commercial St, MCR, M15 4PZ	Job No:		4423		Site:		Parsonage Street Redevelopment									
	Date:		18/01/2023		Client:		MKCC									
	Engineer:		RM		Equipment:		GFM 435									
		2 Days Prior		1 Day Prior		On day of Monitoring										
Weather Conditions:		Cloudy		Cloudy		Clear										
Barometric Pressure Trend:		Fluctuating		Rising		Rising										
Surface Ground Conditions:		Damp														
VISIT THREE	Start			Finish												
Time:				1030	Time:											
Barometric Pressure:				991	Barometric Pressure:											
Background Oxygen:				20.6	Background Oxygen:											
Monitoring Point	Gas Concentration												Groundwater			Remarks
	Flow Rate (l/h)	Peak					Flow Rate (l/h)	Steady								
BH N°		CH ₄ %	CO ₂ %	O ₂ %	LEL %	H2S/C O (ppm)		CH ₄ %	CO ₂ %	O ₂ %	LEL %	H2S/C O (ppm)	Depth to Water	Depth to Base	Head of water	
WS101	0	0	0.9	18.6	0	0/0	0	0	0.9	18.6	0	0/0	Dry	1.06	N/A	
WS102	0	0	1.2	19.1	0	0/0	0	0	1.2	19.1	0	0/0		1.98		
WS103	0	0	1.1	18.9	0	0/0	0	0	1.1	18.9	0	0/0		1.02		
Comments:																

 Civil, Structural & Environmental Engineers Commercial Wharf, 6 Commercial St, MCR, M15 4PZ	Job No:	4423	Site:	Parsonage Street Redevelopment
	Date:	24/01/2023	Client:	MKCC
	Engineer:	RM	Equipment:	GFM 435

	2 Days Prior	1 Day Prior	On day of Monitoring
Weather Conditions:			
Barometric Pressure Trend:	Rising	Rising	Fluctuating
Surface Ground Conditions:	Dry		

VISIT FOUR	Start	Finish
Time:	1000	1030
Barometric Pressure:	1035	1035
Background Oxygen:	20.7	20.7

Monitoring Point	Flow Rate (l/h)	Gas Concentration											Groundwater			Remarks
		Peak						Steady					Depth to Water	Depth to Base	Head of water	
BH N°		CH ₄ %	CO ₂ %	O ₂ %	LEL %	H ₂ S/C O (ppm)	Flow Rate (l/h)	CH ₄ %	CO ₂ %	O ₂ %	LEL %	H ₂ S/C O (ppm)				
WS101	0	0	0.2	20.4	0	0/0	0	0	0.2	20.4	0	0/0	Dry	1.06	N/A	
WS102	0	0	0.2	20.4	0	0/0	0	0	0.2	20.4	0	0/0		1.98		
WS103	Inaccessible at time of visit due to a van being parked over well.															

Comments:

ROC CONSULTING Civil, Structural & Environmental Engineers Commercial Wharf, 6 Commercial St, MCR, M15 4PZ	Job No:		4423		Site:		Parsonage Street Redevelopment									
	Date:		01/02/2023		Client:		MKCC									
	Engineer:		RM		Equipment:		GFM 435									
		2 Days Prior		1 Day Prior		On day of Monitoring										
Weather Conditions:		Cloudy		Cloudy		Light showers										
Barometric Pressure Trend:		Rising		Falling		Steady										
Surface Ground Conditions:		Wet														
VISIT FIVE		Start				Finish										
Time:		1030				Time:		1100.00								
Barometric Pressure:		1018				Barometric Pressure:		1018								
Background Oxygen:		20.9				Background Oxygen:		20.9								
Monitoring Point		Gas Concentration											Groundwater			Remarks
		Flow Rate (l/h)	Peak					Flow Rate (l/h)	Steady							
CH ₄ %	CO ₂ %		O ₂ %	LEL %	H ₂ S/C O (ppm)	CH ₄ %	CO ₂ %		O ₂ %	LEL %	H ₂ S/C O (ppm)					
BH N°														Depth to Water	Depth to Base	Head of water
WS101	0		0	1.2	18.7	0	0/0		0	0	1.2	18.7	0	0/0	Dry	1.06
WS102	0	0	1.8	18.9	0	0/0	0	0	1.8	18.9	0	0/0	1.98			
WS103	0	0	1	18.8	0	0/0	0	0	1	18.8	0	0/0	1.02			
Comments:																

 Civil, Structural & Environmental Engineers Commercial Wharf, 6 Commercial St, MCR, M15 4PZ	Job No:		4423		Site:		Parsonage Street Redevelopment										
	Date:		07/02/2023		Client:		MKCC										
	Engineer:		RM		Equipment:		GFM 435										
		2 Days Prior		1 Day Prior		On day of Monitoring											
Weather Conditions:		Clear		Overcast		Overcast											
Barometric Pressure Trend:		Rising		Falling		Steady											
Surface Ground Conditions:		Dry															
VISIT SIX		Start				Finish											
Time:		1000				Time:		1030									
Barometric Pressure:		1035				Barometric Pressure:		1035									
Background Oxygen:		21.2				Background Oxygen:		21.2									
Monitoring Point		Gas Concentration											Groundwater			Remarks	
BH N^o		Flow Rate (l/h)	Peak					Flow Rate (l/h)	Steady					Depth to Water	Depth to Base		Head of water
			CH₄ %	CO₂ %	O₂ %	LEL %	H2S/C O (ppm)		CH₄ %	CO₂ %	O₂ %	LEL %	H2S/C O (ppm)				
WS101		0	0	0.4	20.8	0	0/0	0	0	0.4	20.8	0	0/0	Dry	1.06	N/A	
WS102		0	0	0.5	20.7	0	0/0	0	0	0.5	20.7	0	0/0		1.98		
WS103		0	0	0.5	20.7	0	0/0	0	0	0.5	20.7	0	0/0		1.02		
Comments:																	



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX F – EQUIPMENT CALIBRATION CERTIFICATES

TEST DATE AND CONDITIONS			
Date		08/07/2022	
Atmospheric Pressure		1015	mB
Ambient Temperature		21.4	°C
Envionics Serial No.		5089	

***GFM436 Final Inspection & Calibration
Check Certificate***

GAS DATA LTD

Unit 4, Fairfield Court

Seven Stars Estate

Wheler Rd

Coventry

CV3 4LJ

Tel 02476303311



Fax 02476307711

Customer	ROC Consulting
Certificate Number	123330
Order Number	331480

Serial Number	12229
Software Version	G436-00.0027/0009

Recalibration DUE Date
08/07/23

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	500	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	True Gas Value %	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %
	Readings %		Readings %		Readings %	
	59.7	60	40.0	40	20.9	20.9
	Accept ±3.0		Accept ±3.0		Accept ±0.5	
	4.9	5	4.9	5	6.0	6
	Accept ±0.3		Accept ±0.3		Accept ±0.3	
Zero Reading 100% N2	0.0	0	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	995	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		995		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		1015	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	-30.4	Accept ± 3.0	-377	-383	Accept ± 50
-3	-3.0	Accept ± 1.0	-17	-17	Accept ± 6.0
0	0.0	Accept ± 0.0	0	0	Accept ± 0.5
3	3.0	Accept ± 0.5	15	14	Accept ± 3.0
30	30.0	Accept ± 3.0	295	294	Accept ± 50
60	60.0	Accept ± 6.0	880	876	Accept ± 130
90	89.8	Accept ± 9.0	1690	1703	Accept ± 250

Temperature Checks		
Calibration Temperature	Instrument Temperature Reading $^{\circ}\text{C}$	
Applied Temperature $^{\circ}\text{C}$		
-10	-10.0	Accept ± 2.0
0	0.0	Accept ± 1.0
30	30.0	Accept ± 1.0
60	60.0	Accept ± 1.0
100	100.0	Accept ± 1.0

Technician:
<i>Jack Rutland</i>

Date Tested:
<i>08/07/2022</i>

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, BS EN ISO14001:2015, BS EN ISO45001:2018 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, BS EN ISO14001:2015, BS EN ISO45001:2018.



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX G – WASTE ASSESSMENT



Haswaste, developed by Dr. Iain Haslock.

11781: Bollinhurst Brook, Lyme Park

Ref. 1

Ref. 2

Date

% Moisture

pH (soil)

pH (leachate)

Arsenic

Cadmium

Copper

CrVI or Chromium

Lead

Mercury

Nickel

Selenium

Zinc

Barium

Beryllium

Vanadium

Cobalt

Manganese

Molybdenum

Antimony

Aluminium

Bismuth

Cobalt

Iron

Strontium

Tellurium

Thallium

Titanium

Tungsten

Ammoniacal N

ws Boron

PAH (Input Total PAH **OR** individual PAH results)

Acenaphthene

Acenaphthylene

Anthracene

Benzo(a)anthracene

Benzo(a)pyrene

Benzo(b)fluoranthene

Benzo(ghi)perylene

Benzo(k)fluoranthene

Chrysene

Dibenzo(ah)anthracene

Fluoranthene

Fluorene

Indeno(123cd)pyrene

Naphthalene

Phenanthrene

Pyrene

Coronene

Total PAHs (16 or 17)

TPH

Petrol

Diesel

Lube Oil

Crude Oil

White Spirit / Kerosene

Creosote

Unknown TPH with ID

Unknown TPHCWG

Total Sulphide

Complex Cyanide

Free (or Total) Cyanide

Thiocyanate

Elemental/Free Sulphur

Phenols Input Total Phenols HPLC **OR** individual Phenol results.

Phenol

Cresols

Xylenols

Resourcinol

Phenols Total by HPLC

BTEX Input Total BTEX **OR** individual BTEX results.

Benzene

Toluene

Ethylbenzene

Xylenes

Total BTEX

PCBs (POPs)

PCBs Total (eg EC7/WHO12)

PBBs (POPs)

Hexabromobiphenyl (Total or

PBB153; 2,2',4,4',5,5'- if only

available)

soil & stones

soil & stones

soil & stones

soil & stones

%

mg/kg

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Haswaste, developed by Dr. Iain Haslock.

11781: Bollinhurst Brook, Lyme Park

Ref. 1

Ref. 2

Date

soil & stones soil & stones soil & stones soil & stones

HDP103B	WS103	WS101	WS102					
0.40	0.50	0.15	0.90					
20-Dec-22	20-Dec-22	20-Dec-22	20-Dec-22					

POPs Dioxins and Furans Input Total Dioxins and Furans**OR** individual Dioxin and Furan results.

2,3,7,8-TeCDD	mg/kg							
1,2,3,7,8-PeCDD	mg/kg							
1,2,3,4,7,8-HxCDD	mg/kg							
1,2,3,6,7,8-HxCDD	mg/kg							
1,2,3,7,8,9-HxCDD	mg/kg							
1,2,3,4,6,7,8-HpCDD	mg/kg							
OCDD	mg/kg							
2,3,7,8-TeCDF	mg/kg							
1,2,3,7,8-PeCDF	mg/kg							
2,3,4,7,8-PeCDF	mg/kg							
1,2,3,4,7,8-HxCDF	mg/kg							
1,2,3,6,7,8-HxCDF	mg/kg							
2,3,4,6,7,8-HxCDF	mg/kg							
1,2,3,7,8,9-HxCDF	mg/kg							
1,2,3,4,6,7,8-HpCDF	mg/kg							
1,2,3,4,7,8,9-HpCDF	mg/kg							
OCDF	mg/kg							
Total Dioxins and Furans	mg/kg							

Some Pesticides (POPs unless otherwise stated)

Aldrin	mg/kg							
α Hexachlorocyclohexane (alpha-HCH) (leave empty if total HCH results used)	mg/kg							
β Hexachlorocyclohexane (beta-HCH) (leave empty if total HCH results used)	mg/kg							
α Cis-Chlordane (alpha) OR Total Chlordane	mg/kg							
δ Hexachlorocyclohexane (delta-HCH) (leave empty if total HCH results used)	mg/kg							
Dieldrin	mg/kg							
Endrin	mg/kg							
γ Hexachlorocyclohexane (gamma-HCH) (lindane) OR Total HCH	mg/kg							
Heptachlor	mg/kg							
Hexachlorobenzene	mg/kg							
o,p'-DDT (leave empty if total DDT results used)	mg/kg							
p,p'-DDT OR Total DDT	mg/kg							
γ Trans-Chlordane (gamma) (leave empty if total Chlordane results used)	mg/kg							
Chlordecone (kepone)	mg/kg							
Pentachlorobenzene	mg/kg							
Mirex	mg/kg							
Toxaphene (camphechlor)	mg/kg							
Tin								
Tin (leave empty if Organotin and Tin excl Organotin results used)	mg/kg							
Organotin								
Dibutyltin; DiBT	mg/kg							
Tributyltin; TriBT	mg/kg							
Triphenyltin; TriPT	mg/kg							
Tetrabutyltin; TeBT	mg/kg							
Tin excluding Organotin								
Tin excl Organotin	mg/kg							



Haswaste, developed by Dr. Iain Haslock.

11781: Bollinhurst Brook, Lyme Park

Ref. 1

Ref. 2

Date

soil & stones soil & stones soil & stones soil & stones

HDP103B 0.40 20-Dec-22	WS103 0.50 20-Dec-22	WS101 0.15 20-Dec-22	WS102 0.90 20-Dec-22						
------------------------------	----------------------------	----------------------------	----------------------------	--	--	--	--	--	--

Asbestos in Soil	Thresholds
Asbestos detected in Soil (enter Y or N)	Y
Asbestos % Composition in Soil (Matrix Loose Fibres or Microscopic Identifiable Pieces only)	see "Carc HP7 % Asbestos in Soil (Fibres)" below
Carcinogenic HP7 % Asbestos in Soil (fibres or micro pieces)	≥0.1%
Please be advised, if the calculation cell is "0.00000" DOES NOT MEAN asbestos testing has been undertaken and the result is zero.	

%

Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y
---	---

N	N	N	N						
If Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7									
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
If Asbestos in Soil above is "Y", but Asbestos % above is "<0.1%", the soil is Non Hazardous Waste. You can only use Asbestos % results where loose fibres or micro pieces are only present. You cannot use Asbestos % results when visual identifiable pieces are present.									
N	N	N	N						

If visual identifiable pieces of asbestos are present, you cannot use Asbestos % results and the whole soil sample is Hazardous Waste HP5 and HP7 Construction material containing Asbestos 17 06 05. Therefore, if Asbestos in Soil above is "Y", the Asbestos % above is "<0.1%", but the Asbestos Identifiable Pieces visible with the naked eye is "Y", the soil is Hazardous Waste.

Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres.

All visual asbestos pieces need to be removed leaving only fibres (or micro pieces) with an Asbestos % Composition in Soil result of <0.1% for the soil to become non-hazardous waste.

Hazardous Property	Thresholds	Cut Off Value	If cells below turn yellow and the text turns red, the samples should be classified as Hazardous Waste.							
Corrosive HP8	≥5%	<1%	0.01174	0.09656	0.02236	0.03341	0.00000	0.00000	0.00000	0.00000
Irritant HP4	≥10%	<1%	0.00729	0.01050	0.02128	0.01072	0.00000	0.00000	0.00000	0.00000
Irritant HP4	≥20%	<1%	#VALUE!	0.00936	0.04295	0.00933	0.00000	0.00000	0.00000	0.00000
Specific Target Organ Toxicity HP5	≥1%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Specific Target Organ Toxicity HP5	≥20%		0.00196	0.00534	0.01960	0.00552	0.00000	0.00000	0.00000	0.00000
Specific Target Organ Toxicity HP5	≥1%		0.00242	0.00534	0.00819	0.00552	0.00000	0.00000	0.00000	0.00000
Specific Target Organ Toxicity HP5	≥10%		0.02140	0.00960	0.01250	0.00880	0.00000	0.00000	0.00000	0.00000
Aspiration Toxicity HP5	≥10%		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00102	0.00057	0.00314	0.00083	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥5%	<0.1%	0.01123	0.00658	0.02033	0.03335	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥25%	<1%	#VALUE!	#VALUE!	0.06275	#VALUE!	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.25%	<0.1%	0.00010	0.00005	0.00010	0.00004	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥2.5%	<0.1%	0.00192	0.00403	0.00422	0.00442	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥15%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥5%	<1%	0.00066	0.00065	0.00074	0.00066	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.1%	<0.1%	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥0.5%	<0.1%	0.00235	0.00454	0.00533	0.00497	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥3.5%	<0.1%	0.00014	0.00014	0.00014	0.00028	0.00000	0.00000	0.00000	0.00000
Acute Toxicity HP6	≥22.5%	<1%	0.03909	0.11460	0.05090	0.05076	0.00000	0.00000	0.00000	0.00000
Carcinogenic HP7	≥0.1%		0.02140	0.00960	0.01960	0.00880	0.00000	0.00000	0.00000	0.00000
Carcinogenic HP7	≥0.1%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
Carcinogenic HP7	≥1%		0.00196	0.00534	0.01960	0.00552	0.00000	0.00000	0.00000	0.00000
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5		8.48	7.46	8.49	7.30	0.00	0.00	0.00	0.00
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2		8.48	7.46	8.49	7.30	0.00	0.00	0.00	0.00
Toxic for Reproduction HP10	≥0.3%		0.02140	0.00960	0.01960	0.00880	0.00000	0.00000	0.00000	0.00000
Toxic for Reproduction HP10	≥3%		0.00196	0.00534	0.00819	0.00552	0.00000	0.00000	0.00000	0.00000
Mutagenic HP11	≥0.1%		0.00192	0.00403	0.01960	0.00442	0.00000	0.00000	0.00000	0.00000
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	≥0.01%		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Mutagenic HP11	≥1%		0.00242	0.00534	0.01960	0.00552	0.00000	0.00000	0.00000	0.00000
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HP13 Sensitising	≥10%		0.00242	0.00403	0.01960	0.00442	0.00000	0.00000	0.00000	0.00000
Ecotoxic HP14 amended v6	≥25%	<0.1%	#VALUE!	#VALUE!	0.08667	#VALUE!	0.00000	0.00000	0.00000	0.00000



Haswaste, developed by Dr. Iain Haslock.

11781: Bollinhurst Brook, Lyme Park

soil & stones soil & stones soil & stones soil & stones

Ref. 1

Ref. 2

Date

HDP103B

WS103

WS101

WS102

0.40

0.50

0.15

0.90

20-Dec-22

20-Dec-22

20-Dec-22

20-Dec-22

Ecotoxic HP14

amended v6

≥25%

<0.1%
(except Ba, V,
Te, Ti, Petrol,
Diesel, Crude
Oil, Kerosene,
White Spirit,
Cresols,
TPH,
TPHCWG,
Phenol,
Cresols,
Xylenols, T-
Phenols,
CompCN,
Thiocyanate,
Toluene,
Ethylbenzene,
Xylene +
BTX 1%).

#VALUE!

#VALUE!

0.09573

#VALUE!

0.00000

0.00000

0.00000

0.00000

0.00000

Ecotoxic HP14

amended v6

≥25%

<0.1%
(except Ba, V,
Te, Ti, Petrol,
Diesel, Crude
Oil, Kerosene,
White Spirit,
Cresols,
TPH,
TPHCWG,
Phenol,
Cresols,
Xylenols, T-
Phenols,
CompCN,
Thiocyanate,
Toluene,
Ethylbenzene,
Xylene +
BTX 1%).

#VALUE!

#VALUE!

8.75794

#VALUE!

0.00000

0.00000

0.00000

0.00000

0.00000

Persistent Organic Pollutant
(PCB, PBB or POP Pesticides)

>0.005%

0.00000000

0.00000000

0.00000000

0.00000000

0.00000000

0.00000000

0.00000000

0.00000000

0.00000000

Persistent Organic Pollutant
(Total Dioxins+Furans)

>0.0000015%

0.0000000000

0.0000000000

0.0000000000

0.0000000000

0.0000000000

0.0000000000

0.0000000000

0.0000000000

0.0000000000

Persistent Organic Pollutant
(Individual Dioxins+Furans)

>0.0000015%

0.0000000000

0.0000000000

0.0000000000

0.0000000000

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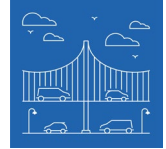
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