



GEO-ENVIRONMENTAL CONSULTING

BEK Geo-Environmental Consulting

No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire BB5 5GY

mbuckley@bekenviro.co.uk

bekenviro.co.uk

01254 377622

LAND AT GREENBROW SOCIAL CLUB, WYTHENSHAW, MANCHESTER

Remediation & Enabling Works Strategy



Prepared for:

Report Ref: BEK-24100-1 (Rev A)



October 2024



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Project Quality Assurance Information Sheet

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Prepared For	THE CASEY GROUP LIMITED Rydings Road Rochdale OL12 9PS
Prepared By	BEK ENVIRO No 2 Landwick Court Metcalf Drive Altham Business Park Lancashire BB5 5GY
Author	Adam Hope BSc (Hons)
Checked	David Emmott BSc (Hons) MSc MEnvSc CEnv
Authorised	Michael Buckley BSc (Hons) MSc MEnvSc CEnv
Contact	mbuckley@bekenviro.co.uk www.bekenviro.co.uk Office: 01254 377622 Mobile: 07906753583



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Remediation & Enabling Works Strategy

PROJECT NO: 24100

REPORT REF: BEK-24100-1 (Rev A)

DATE: October 2024

REVISION STATUS / HISTORY

Rev	Date	Issue / Comment	Prepared	Checked
A	21/10/24	Addition of further SI works and associated changes to report	AH	MB

GENERAL REPORT LIMITATIONS

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Unless explicitly agreed otherwise, in writing, this report has been prepared under BEK's limited standard Terms and Conditions as included within our proposal to the Client. The report needs to be considered in the light of the BEK proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

EXECUTIVE SUMMARY

Site Address	Greenbrow Social Club, Wythenshawe, Manchester, M23 2TU
National Grid Reference	380839, 387147
Site Area	0.3 Ha
Background	The site occupies an irregularly shaped plot of land of some 0.3 hectares which contained a disused former social club (now demolished) which was present in the centre of the site. Hardstanding car parking areas and a courtyard are present to the exterior of the former social club building. Metal access gates are present off Greenbrow Road. Soft landscaped areas are present in the south and east of the site. Mature trees are present beyond the south of the site and in the east and north of the site, whilst a telephone mast is located adjacent to the east of the site. Historical mapping shows a road was present on site between 1876 and 1960, whilst the social club was constructed circa 1992. The proposed development is residential and comprises the <i>'Erection of a three storey building to form fifteen flats (10 x 1 bed, 5 x 2 bed) and eight two storey dwellinghouses (2 x 2 bed, 4 x 3 bed, 2 x 4 bed) with associated landscaping and parking, following demolition of existing social club'</i> at the site.
Summary of Site Remediation & Enabling Works	The site Remediation / Enabling Works Performance Specification details the contract requirements that will facilitate the regeneration of the land to negate identified pollutant linkages and construct a development platform that will be geotechnically suitable for the proposed end use. The salient features of the Remediation & Enabling Works Strategy are summarised below: • Implementing the works with appropriate consultancy supervision so that the works can be fully validated, together with verification reporting, to the satisfaction of the Local Planning Authority (LPA). • Management of all works so as to ensure that no environmental nuisance is created through dust emissions, noise or vibration levels. • General site clearance and legislatively compliant disposal of all surface vegetation, breaking out, excavation and removal of all slabs, hard-standing and buried structures to the base of the made ground (subject to structural engineer confirmation). • Removal of any previously unidentified contamination hotspots. • Excavation and removal of all previously unidentified materials deemed to be either a potential risk to the identified receptors or the built environment. • Breaking out and subsequent crushing / processing of all surface and sub-surface structures including foundations, redundant drains and any further buried obstacles (where present). • Importation of inert and geotechnically stable fill if required. Laboratory testing of all imported material to confirm chemical and geotechnical suitability for use, in accordance with the testing schedule presented within the Remediation Strategy. • Provide suitable development platform to facilitate the construction of the proposed roadways, drainage infrastructure, pavements and areas of hard-standing; to be delivered in accordance with the Engineers Specification. • Use of potable water supply infrastructure that will be compliant with UKWIR assessment criteria. • Removal and disposal of any perched water from within excavations (if required). • Ensure that all works are completed in a manner so as not to create any structural risk to the adjacent highways/infrastructure. • Implement all temporary works as necessary to support excavations throughout the duration of the works. • Construction of the apartment building in the north-east of the site with gas mitigation measures in accordance with Characteristic Situation 2 of BS8485:2015+A1:2019. • Implement a soft cover system of 600 mm thickness in all private garden areas and 300 mm thickness in all Public Open Spaces, underlain by a geotextile membrane or 100 mm granular no-dig layer to prevent mixing.

	• Retained soils on site then this should be managed through exemption for Permitting (if appropriate) or through the preparation of a Material Management Plan as part of compliance with the Definition of Waste:Code of Practice (DoW:CoP). • Validation sampling to confirm material retained on-site pose no unacceptable risk to the residential end users, controlled waters or wider environ; • Removal of all soil wastes deemed unsuitable for use from site in accordance with UK Waste Management Legislation and in accordance with the UK Landfill Directive • Development of a comprehensive Validation Report to document the successful completion of the aforementioned works.
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1. INTRODUCTION

1.1 Background

- 1.1.1 BEK Enviro (BEK) has been commissioned by The Casey Group to prepare a Remediation & Enabling Work Strategy (REWS) for the development works at the former Greenbrow Social Club, Greenbrow Road, Wythenshawe, Manchester, M23 2TU (hereafter referred to as 'the site').
- 1.1.2 It is understood that The Casey Group intend to redevelop the site for residential use, with 8 No. low-rise residential dwellings and 15 No. apartments with associated gardens, car parking and other associated infrastructure at the site.
- 1.1.3 Remediation & Enabling Works are required in a manner that will ensure full compliance with the specification documented herein.

1.2 Site Location & Description

- 1.2.1 The site is located to the west of Greenbrow Road, Wythenshawe, Manchester, M23 2TU. The grid reference for the approximate centre of the site is 380839, 387147.
- 1.2.2 The site occupies an irregularly shaped plot of land of some 0.3 hectares which contains a disused former social club which is present in the centre of the site. Hardstanding car parking areas and a courtyard are present to the exterior of the social club building. Historical mapping shows a road was present on site between 1876 and 1960, whilst the social club was constructed circa 1992.

1.3 Proposed Development

- 1.3.1 Manchester City Council has granted planning permission (subject to conditions) for the 'Erection of a three storey building to form fifteen flats (10 x 1 bed, 5 x 2 bed) and eight two storey dwellinghouses (2 x 2 bed, 4 x 3 bed, 2 x 4 bed) with associated landscaping and parking, following demolition of existing social club' at the site located to the west of Greenbrow Road, Wythenshawe, Manchester, M23 2TU (Approval Ref: 137485/FO/2023).

Land contamination issues for the development are to be dealt with through planning conditions 6 and 14 which state the following:

6) 'Before the development hereby approved commences, a report (the Preliminary Risk Assessment) to identify and evaluate all potential sources and impacts of any ground contamination, groundwater contamination and/or ground gas relevant to the site shall be submitted to and approved in writing by the City Council as local planning authority. The Preliminary Risk Assessment shall conform to the City Council's current guidance document (Planning Guidance in Relation to Ground Contamination).'

‘The measures for investigating the site identified in the Site Investigation Proposal shall be carried out before development commences and a report prepared outlining what measures, if any, are required to remediate the land (the Site Investigation Report and/or Remediation Strategy) which shall be submitted to and approved in writing by the City Council as local planning authority.’

‘In the event that ground contamination, groundwater contamination and/or ground gas, not previously identified, are found to be present on the site at any time before the development in each phase is occupied, then development shall cease and/or the development shall not be occupied until, a report outlining what measures, if any, are required to remediate the land (the Revised Remediation Strategy) is submitted to and approved in writing by the City Council as local planning authority and the development shall be carried out in accordance with the Revised Remediation Strategy, which shall take precedence over any Remediation Strategy or earlier Revised Remediation Strategy.’

Figure 1: Extract from BTP Architects ‘Proposed Site Plan’

1.4 Previous Works

- 1.4.1 The following works have been prepared to provide an assessment of the potential risks associated with contamination and ground gas at the site:
- Dice Environmental – Phase 1 Geo-Environmental Report, Ref: 100855, dated 19/12/2022
 - E3P – Phase II Geoenvironmental Site Assessment, Ref: 17-305-R1-2, dated July 2024
- 1.4.2 In addition to the above, further site investigation works have been undertaken at the site by BEK in September/October 2024 in accordance with recommendations provided within the original version of this Remediation & Enabling Works Strategy (Report Ref: BEK-24100-1, dated July 2024). Details pertaining to the further works can be found in sections succeeding Section 3.0.
- 1.4.3 For the avoidance of any doubt, the reports detailed above should be read as a precursor and in conjunction with the specification documented within this report.

1.5 Report Objectives

- 1.5.1 The purpose of this Remediation Strategy is to identify and evaluate feasible remedial technologies and to validate the successful implementation of a site remediation to ensure the safe, cost effective and regulatory compliant redevelopment of the site.

1.6 Scope of Remediation Works

- 1.6.1 With regard to the proposed development of the site, the main aims of the remedial works are as follows:
- To provide a remediated site that is suitable for its proposed redevelopment i.e. residential housing with gardens units, apartment buildings, associated parking and localised soft landscaping etc.
 - To provide a landform/ground surface which can accommodate the design levels and acceptable gradients for the proposed road layout, drainage systems and floor slab levels.
 - To provide a geotechnically suitable development platform to facilitate the subsequent construction of roads, installation of drainage and the construction of the proposed buildings.
 - To ensure that construction/groundworkers are not put at an unacceptable short-term risk during the remediation and/or redevelopment of the site.
 - To satisfy the requirements of the regulatory authorities (ie the Local Planning Authority, Environment Agency and National Housebuilders Council).

2.0 SITE CHARACTERISTICS

2.0.1 The following section provides a summary of the findings, conclusions and recommendations given by E3P in the 'Phase II Geoenvironmental Site Assessment' prepared for the site.

2.1 Site Location & Description

2.1.1 The site is located to the west of Greenbrow Road, Wythenshawe, Manchester, M23 2TU. The grid reference for the approximate centre of the site is 380839, 387147.

2.1.2 The site occupies an irregularly shaped plot of land of some 0.3 hectares which contains a disused former social club which is present in the centre of the site. Hardstanding car parking areas and a courtyard are present to the exterior of the social club building. Metal access gates are present off Greenbrow Road.

2.1.3 Soft landscaped areas are present in the south and east of the site. Mature trees are present beyond the south of the site and in the east and north of the site, whilst a telephone mast is located adjacent to the east of the site.

2.1.4 Historical mapping shows a road was present on site between 1876 and 1960, whilst the social club was constructed circa 1992.

2.2 Geology

2.2.1 Intrusive ground investigation has been carried out by others as part of the preparation of previous reporting, the details of which are provided within the reports denoted with Section 1.4 of this report. The previous site investigation provides information to characterise the shallow ground conditions across the site and is summarised in the sections below.

Made Ground

2.2.2 Made ground was encountered in all exploratory locations to depths between 0.3 m and 0.6 m bgl. The made ground in the south and east of the site comprised reworked topsoil described as 'dark brown slightly gravelly clay with brick, plastic, sandstone and coal fragments' to depths of between 0.2 m and 0.5 m BGL.

2.2.3 Other made ground encountered at the site are described as follows:

- Tarmacadam
- Light orangish brown and greyish brown sandy gravel with limestone and sandstone
- Black slightly clayey gravel of slag and clinker

- Dark greyish brown slightly gravelly clay with brick, siltstone, sandstone and coal fragments

Natural Strata

- 2.2.4 Superficial deposits were encountered below the made ground across the site to a depth of 2.0 m bgl and generally comprised 'Brown and grey slightly gravelly silty CLAY with sandstone and siltstone.
- 2.2.5 Bedrock was encountered at 2 m BGL and comprised 'Brown and light grey weathered siltstone' to a maximum proven depth of 2.42 m bgl.
- 2.2.6 No obstructions were noted during the site investigation, although all boreholes drilled refused on the shallow aforementioned bedrock.

Visual & Olfactory Evidence of Contamination

- 2.2.7 No visual or olfactory evidence of contamination was encountered during the site investigation.

2.3 Groundwater & Hydrology

- 2.3.1 The site is understood to overlie a Secondary Undifferentiated aquifer (drift deposits), which are underlain by a Secondary B aquifer within the bedrock.
- 2.3.2 Continuous groundwater monitoring encountered groundwater between depths of 1.14 m and 1.96 m which was considered to be representative of surface water collecting within the monitoring standpipes as oppose to a true representation of groundwater.
- 2.3.3 Fairywell Brook is located some 170 m south-west of the site.
- 2.3.4 The site is located within a Flood Zone 1 and is therefore not considered to be at risk of flooding.

2.4 Summary of Contaminant Distribution

Human Health

- 2.4.1 Throughout the risk assessment process carried out by E3P, elevated concentrations of Lead, Mercury, and PAH Compounds (Benzo(b)fluoranthene, Benzo(a)pyrene & Dibenzo(ah)anthracene) encountered when compared with residential (with homegrown produce) thresholds.
- 2.4.2 These elevations are summarised in the table below:

Determinands	Maximum Concentration (mg/kg)	Assessment Criteria (mg/kg)	Samples Fail
Lead	1400	200	WS102 (0.2 m), WS104 (0.15 m)
Mercury	2.1	1.2	
Benzo(b)fluoranthene	3.5	2.6	
Benzo(a)pyrene	3.3	2.2	
Dibenzo(ah)anthracene	0.45	0.24	

Table 1: Summary of Elevated Contaminants of Concern in Soils Throughout Risk Assessment (Results & Assessment Criteria from E3P Report)

2.4.3 A copy of the exploratory location plan is presented in Appendix F.

Human Health – End Users - Non-volatile Contamination

2.4.4 E3P concluded that the risk to chronic human health associated with the elevated concentrations of inorganic heavy metals and non-volatile PAH compounds should be mitigated through the installation of a suitable cover system in all proposed private gardens and soft landscaping in order to remove any potential for direct exposure to impacted soils. Details pertaining to the specifications of the cover system can be found in Section 3.19.

Human Health – End Users - Volatile Contamination

2.4.5 No elevated concentrations of volatile contaminants were identified within any of the samples tested, although due to elevated concentrations of mercury, it was recommended that speciated mercury analysis is undertaken in order to assess whether elemental mercury is present which may pose a risk to future site users through vapor inhalation.

2.4.6 Should elemental mercury be present then it may be necessary to delineate and excavate the soils as hotspots and place them in an area of low sensitivity, or remove the soils from site. Alternatively, it was concluded that if there is no elemental mercury present, then a clean cover system will be sufficient to mitigate the risks to end users.

Human Health – End Users - Asbestos

2.4.7 Asbestos was not identified during the ground investigation, although it was noted that asbestos may be present within the existing building on site and it was recommended that a pre-demolition asbestos survey should be undertaken. It was also recommended that if any visual asbestos be encountered remediation and construction works then the visible ACM will require removal off site and the impacted soils managed in a legislatively compliant manner.

Controlled Waters

2.4.8 With respect to controlled waters, BEK is in general agreement with E3P that risks to controlled waters are low.

- 2.4.9 Leachate and groundwater testing undertaken showed that concentrations of the inorganic compounds lead, selenium and zinc were found to be elevated against relevant criteria based on Drinking Water Standards/Environmental Quality Standards.
- 2.4.10 Notwithstanding the above, the solubility and mobility of the elevated concentrations of the inorganic compounds is low and migration to the controlled waters receptors is unlikely.
- 2.4.11 Low permeability, laterally continuous superficial deposits were also encountered which offer some protection to the underlying bedrock Secondary B aquifer.
- 2.4.12 The sensitivity of the Secondary B aquifer can also be reduced due to the absence of any groundwater abstractions within 2km of the site.
- 2.4.13 Fairwell Brook was also considered to be at low risk due to the significant distance from the site (170 m south-west).
- 2.4.14 Considering the above points made by E3P, no complete pollutant linkage can be determined and risks to controlled waters are considered to be low.

2.5 Risks from Ground Gases

- 2.5.1 E3P included a Ground Gas Risk Assessment within the most recent version of their 'Phase II Geoenvironmental Site Assessment Report' (Report Ref: 17-305-R1-2).
- 2.5.2 The potential impact on the development from ground gases has been assessed in accordance with guidelines published in CIRIA 665 (Assessing Risks Posed by Hazardous Ground Gases to Buildings, 2007) and BS8485:2015+A1:2019 (Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings).
- 2.5.3 E3P concluded that due to consistently elevated concentrations of carbon dioxide within WS101 during monitoring visits 3-6, the location of WS101 (north-east of the site) was classified as Characteristic Situation 2 (low risk). This area of the site corresponds to the proposed apartment building and gas protection measures are required in the building in accordance with BS8485.
- 2.5.4 The remainder of the site was classified as Characteristic Situation 1 (very low risk), meaning gas protection measures are not likely to be required in these areas (residential dwellinghouses).
- 2.5.5 E3P also recommended that made ground/organic materials in the location of an infilled pond within the vicinity of WS101 could be removed and a subsequent programme of gas monitoring undertaken in order to possibly reduce the ground gas classification.

- 2.5.6 However, liaison with the client by BEK confirmed that an additional period of gas monitoring is undesirable and gas mitigation measures in accordance with Characteristic Situation 2 of BS8485 will be installed within the apartment building as previously discussed.

2.6 Geotechnical Considerations

- 2.6.1 All geotechnical considerations within this section are taken from the 'E3P Phase II Geoenvironmental Site Assessment Report' (Report Ref: 17-305-R1-2). Further recommendations by BEK with respect to geotechnical assessment are outside the remit of this report. A summary of the sections of the geotechnical assessment are provided below.

Underground Obstructions & Subterranean Hazards

- 2.6.2 *'No obstructions were encountered during the ground investigation; however significant obstructions will be present beneath the existing building. As part of the process of creating a suitable platform for development, all subterranean obstructions will need to be excavated and removed beneath new structures and infrastructure. This will facilitate the construction of the proposed plots as intended.'*

Allowable Bearing Capacity

- 2.6.3 *'The underlying natural clay superficial deposits have been assessed as being stiff high strength with a net allowable bearing capacity (ABC) in the order of 166 – 197 kN/m² at circa 1.00 m bgl. SILT in WS103 is stiff high strength with an ABC of 207 kN/m² at 1.00 m bgl. The weathered siltstone bedrock is dense with an ABC of <450 kN/m² at 2.00m bgl.'*

Foundation Options

- 2.6.4 *'At this time, it is not possible to accurately define the foundation types due to the absence of a detailed tree survey and final development levels. A process of remediation and enabling works will be required to remove any buried obstructions. Dependent on development levels, it is likely that plots could be constructed using traditional strip or trench fill foundations bearing on the shallow stiff CLAY or siltstone bedrock. Further investigation is required to confirm the ground conditions in the location of the existing building'*

Foundations Near Trees

- 2.6.5 *'Foundation depths within the conjectured influence of former, existing or proposed trees will need to be deepened to ensure that structural loading bears within the underlying target founding stratum, which cannot be subject to volumetric instability associated with fluctuation in moisture content.'*

Heave Precautions Near Trees

- 2.6.6 *'Given that the underlying clay is of low volume change potential, heave precautions will not be required to the internal face of a foundation less than 1.5 m in depth. Heave precautions will be required to the underside of floor slabs (where there is no 200 mm void) and pile ground beams are required within the modelled influencing distance of trees.'*

Building Floor Slabs

- 2.6.7 *'Ground bearing floor slabs are not considered viable given the anticipated depths of Made Ground > 600 mm and shallow cohesive soils.'*

Soakaway Drainage

- 2.6.8 *'Falling head permeability tests suggest soakaway drainage is unlikely to be suitable due to the presence of cohesive superficial deposits.'*

Sulphate Assessment

- 2.6.9 *'Concrete classification will be DS-1 AC-1s.'*

CBR Design %

- 2.6.10 *'Natural clay soils will provide a CBR in the order of 3–5% during drier climatic periods. However, if water is allowed to shed onto the formation, the CBR will reduce to < 2%, which will require specialist engineering of the subgrade.'*

Enabling Earthworks

- 2.6.11 *'Development levels are unknown at this time; however, significant cut-and-fill works are not anticipated to prepare the development platform. As part of the earthworks design, materials should be assessed and characterised prior to re-use in the construction of upfill to a geotechnical design. All future earthworks should be completed in accordance with a Geotechnical Design Report (GDR) that will consider the ground model within the context of the potential for settlement induced by surcharge from earthworks, dynamic and permanent loading of the development and all known hazards.'*

Civil Engineering Excavations

- 2.6.12 *'The E3P Intrusive Ground Investigation has identified the presence of weathered/competent bedrock at a shallow depth, the presence of which will impede the excavation materials to form sewerage and drainage infrastructure and foundations.'*

Waste Characterisation

- 2.6.13 *'Any material that is to be disposed off-site should undergo assessment using Technical Guidance WM3: Waste Classification – Guidance on the classification and assessment of waste. This can be done upon request and in-line with the Environment Agency sampling frequencies.'*
- 2.6.14 The full geotechnical assessment can be found in the 'E3P Phase II Geoenvironmental Site Assessment Report' (Report Ref: 17-305-R1-2).

2.7 Identified Development Constraints

- 2.7.1 The following potential development constraints have been identified:
- Potential asbestos present within the existing building. A pre-demolition asbestos survey should be undertaken to assess the potential risks.
 - Ground conditions beneath the existing building are currently unknown and additional SI will be required following the demolition of the building.
 - Obstructions will be present beneath the existing building.
 - The presence of non-volatile contaminants of concern across the site requires a 600 mm clean cover system (with a no-dig layer or geotextile marker) in all landscaped/gardens areas.
 - Gas mitigation measures in accordance with Characteristic Situation 2 are required within the apartment building in the north-east of the site. The remainder of the site was classified as Characteristic Situation 1 (very low risk) and gas mitigation measures are not likely to be required in these areas.
 - Shallow bedrock at around 2 m bgl is likely to pose risks to the viability of excavations to install infrastructure using standard construction equipment.
- 2.7.2 Permit exemptions and/or a detailed Materials Management Plan (MMP) will need to be completed in accordance with CL:AIRE COP, when reusing natural materials on site.

2.8 Additional Assessment

- 2.8.1 Further site investigation will be undertaken following demolition of the existing building, as well as in the confines of the former pond. The findings and any recommendations made as a result of this work will be incorporated into a revised version of this report.
- 2.8.2 Elevated concentrations of mercury were encountered within the site investigation. Speciated mercury analysis will be undertaken for samples taken from the vicinity of WS102 and WS104 in order to assess whether elemental mercury is present which may pose a risk to future site users through vapor inhalation.

- 2.8.3 Should elemental mercury be present then it may be necessary to delineate and excavate the soils as hotspots and place them in an area of low sensitivity, or remove the soils from site. Alternatively, it was concluded that if there is no elemental mercury present, then a clean cover system will be sufficient to mitigate the risks to end users.
- 2.8.4 Further works required also include:
- Geotechnical Earthworks Strategy (Infrastructure)
 - Arboricultural Survey
 - Gas Verification Plan
 - UKWIR Risk Assessment for Water Pipes

3.0 FURTHER SITE INVESTIGATION

3.1 General

- 3.1.1 This section provides a summary of the further site investigation works undertaken by BEK during September/October 2024.
- 3.1.2 The site investigation was designed in order to provide indicative information for the ground conditions present beneath the now demolished Greenbrow Social Club building. Also targeted by the investigation was the location of a former pond and two locations of the site identified previously to contain elevated concentrations of mercury (WS102 & WS104).
- 3.1.3 13No. exploratory locations were set out by the engineer in order to establish representative conditions at the aforementioned areas of the site. The exploratory locations are illustrated on BEK Drawing No 24100-1, a copy of which is presented in Appendix F.

3.2 Machine Excavated Trial Pits

- 3.2.1 7No. trial pits were machine excavated to a maximum depth of 3.1 m, with in-situ testing (hand/shear vane) carried out in the trial pits where appropriate.
- 3.2.2 The ground conditions were recorded by an engineer from BEK and copies of the trial pits records are presented in Appendix A. A series of photographs showing the trial pits can be seen in Appendix B.

3.3 Hand pit (Location of WS104)

- 3.3.1 1No. hand pit was excavated to a depth of 0.15 m at the location of borehole WS104 which was drilled previously by E3P as part of the preparation of the 'Phase II Geoenvironmental Site Assessment'. This hand pit was necessary in order to obtain a sample for chemical testing of the same made ground subtype, and at approximately the same depth as the sample identified previously to contain an elevated concentration of mercury. This sample was tested for speciated mercury (See section 3.4) as per the recommendations within the E3P 'Phase II Geoenvironmental Site Assessment'. An assessment of the speciated mercury results can be seen in Section 3.6.
- 3.3.2 Consideration was given to the location of borehole WS102 (also drilled by E3P) which was also previously identified to contain an elevated concentration of mercury. Upon a visit to the site it became apparent that this area had been excavated as part of waste removal exercise undertaken by DHI Excavations Ltd. A segregation statement produced by DHI has been made available to BEK detailing the removal of made ground around the location of WS102 (E3P Borehole) to a depth of 400 mm. A copy of the segregation statement can be found in Appendix E.

- 3.3.3 Given that the made ground at the location of borehole WS102 has been removed off-site, BEK considered it prudent to undertake validation sampling around the excavation. This comprised the excavation of 5No. shallow trial pits in the base and along the edges of the excavation in order to sample the material remaining in-situ. The locations of the trial pits can be seen on BEK Drawing No 24100-1, a copy of which is presented in Appendix F and an extract of which can be seen below as Figure 2.

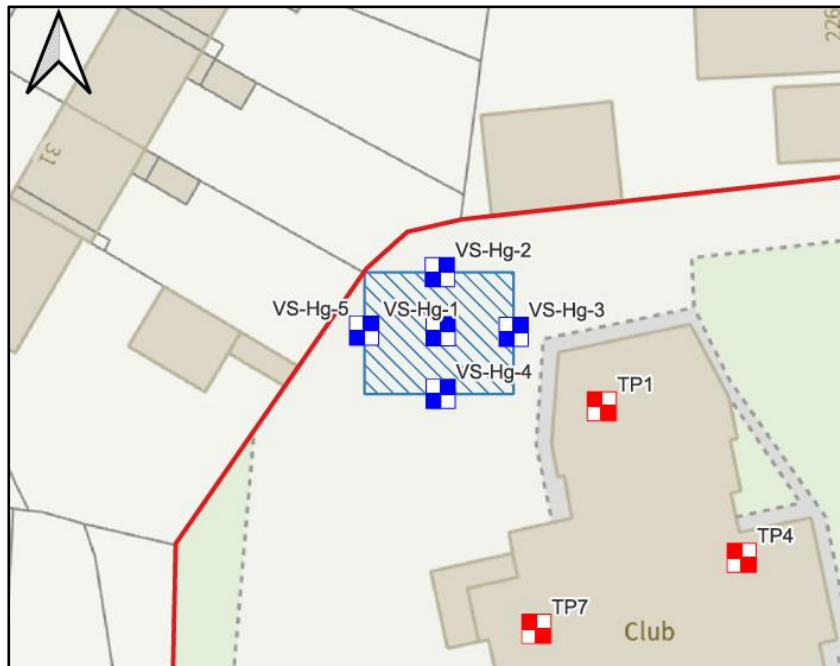


Figure 1: Extract from BEK Drawing No 24100-1

- 3.3.4 One sample of made ground was recovered from each validation trial pit (a total of 5No. samples), with each sample tested for mercury (See section 3.4). An assessment of the mercury results can be seen in Section 3.6. A series of photographs showing the validation trial pits is presented in Appendix C.

3.4 Laboratory Testing

- 3.4.1 Following a review of the ground conditions and based on the recommendations of previous reporting, BEK selected a number of representative samples for chemical testing.
- 3.4.2 All samples were submitted to the UKAS accredited laboratory of Envirolab for the following selected analyses:

6No. samples from the trial pitting exercise were tested for the standard BEK soil suite which includes: *Arsenic (Total), Cadmium (Total), Copper (Total), Lead (Total), Nickel (Total), Zinc (Total), Chromium (Total), Selenium (Total), Mercury (Total), Boron (Soluble), Hexavalent Chromium, Cyanide (Total), pH, 16 EPA Poly-Aromatic Hydrocarbons (PAH), Speciated Total Petroleum Hydrocarbons (TPH-CWG), Total Phenols, Sulphate (acid soluble), Sulphate 2:1 extract, Soil Organic Matter and Asbestos ID.*

5No. validation samples recovered from the site of the waste removal exercise were tested for: *Mercury (total).*

1No. sample recovered from the location of WS104 was tested for speciated mercury which includes: *Mercury (Elemental), Mercury (Inorganic), Mercury (Methyl), and Mercury (total).*

3.4.3 Copies of the chemical test results are presented in Appendix D.

3.5 Ground Conditions

3.5.1 The trial pitting exercise undertaken shows the footprint of the former Greenbrow Social Club building is underlain by laterally continuous, heterogeneous made ground which extends from the surface of each trial pit to a minimum depth of 0.2 m (TP1) and a maximum depth of 0.9 m (TP3). Made ground also extended to a depth of 1.2 m within Trial Pit TP4 although this was due to the trial pit being located on a large demolition stockpile. Trial Pit TP5 was situated in the basement of the former Greenbrow Social Club building.

3.5.2 The made ground encountered generally comprised the following subtypes:

Concrete of some 0.05 m thickness was encountered at the surface of TP1.

'Light reddish brown very sandy fine to coarse GRAVEL of angular concrete and mortar. Sand is fine to medium. Medium cobble content of concrete and mortar' – This strata was encountered beneath concrete in TP1 from 0.05 m to 0.2 m depth.

'Grey slightly clayey very sandy fine to coarse GRAVEL of angular limestone and brick. Sand is fine to coarse. Low cobble content of angular limestone and whole/broken brick' – This strata was encountered at the surface of TP2 to a depth of 0.3 m.

'Grass onto dark brown organic slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine stone of mixed lithologies. Frequent rootlets. Rare glass, plastic and fragmented clay pipe' – This strata was encountered at the surface of TP3 to a depth of 0.2 m

‘Brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium stone of mixed lithologies including siltstone. (Reworked Clay)’ – This strata was encountered in TP3 from 0.2 m to 0.9 m depth.

‘Light brown very sandy fine to coarse GRAVEL of angular brick and concrete. Sand is fine to coarse. High cobble content of angular brick and concrete. Rare wood, plastic, wire and metal. (DEMOLITION STOCKPILE)’ – This strata was encountered at the surface of TP4 to a depth of 1.2 m.

‘Reddish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse. Rare brick and fragmented clay pipe’ – This strata was encountered at the surface of TP5 to a depth of 0.8 m

‘Light brown and grey sandy fine to coarse GRAVEL of limestone and stone of mixed lithologies. Sand is fine to coarse’ – This strata was encountered at the surface of TP6 and TP7 to a minimum depth 0.2 m (TP6) and a maximum depth of 0.5 m (TP7).

‘Grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium stone of mixed lithologies’ – This strata was encountered in TP6 from 0.2 m to 0.3 m.

- 3.5.3 The base of the made ground was proven in all exploratory locations for which it was encountered.

Natural Strata

- 3.5.4 Natural strata underlying the made ground was consistent across all trial pits and comprised ‘Reddish brown and grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium angular, highly weathered, blue/grey siltstone (bedrock pieces) increasing in abundance towards base of pit. Rare lenses of sandy clay’ to a maximum proven depth of 2.4 m (TP2 & TP7).
- 3.5.5 All trial pits refused at depth due to presumed siltstone bedrock. Groundwater was not encountered in any of the trial pits.
- 3.5.6 No visual/olfactory evidence of contamination was encountered within any of the trial pits.
- 3.6 Risk Assessment: Human Health Risks from Exposure to Contaminated Soil**
- 3.6.1 The risks to human health have been assessed by inspection of shallow soils for the presence of elevated contaminants.

- 3.6.2 The soil contamination concentrations for the samples taken from the trial pits excavated in the footprint of the former Greenbrow Social Club building have initially been compared to a range of generic assessment criteria. These include the use of the Land Quality Management and Chartered Institute of Environmental Health assessment criteria (S4ULs) and Contaminated Land: Applications in Real Environments assessment criteria (CL:AIRE) Category 4 Screening Levels (C4SLs).
- 3.6.3 These assessment criteria have been derived using the CLEA model and fully justified input parameters. The derivation of the assessment criteria assumes a residential end use with plant uptake. The initial assessment assumes a soil organic matter (SOM) of 1% as a conservative approach.
- 3.6.4 Table 2 summarises the chemical test results for the samples tested and lists the relevant assessment criteria and the samples with a concentration in excess of the assessment criteria. Note that only determinands with a concentration above the laboratory limit of detection are presented in the table below:

Determinand	Range of Concentrations (mg/kg)	Assessment Criteria (mg/kg)	Samples Fail
Arsenic	<1 - 20	37 ¹	---
Cadmium	<0.5 – 0.9	11 ¹	---
Copper	5 - 89	2400 ¹	---
Chromium	7 - 35	910 ¹	---
Lead	4 - 170	210 ²	---
Mercury	<0.17 - 0.59	1.2 ¹	---
Nickel	5 - 31	180 ¹	---
Zinc	36 - 130	3700 ¹	---
Acenaphthene	<0.01 - 0.04	210 ¹	---
Acenaphthylene	<0.01 - 0.02	170 ¹	---
Anthracene	<0.02 – 0.19	2400 ¹	---
Benzo(a)anthracene	<0.04 – 0.75	7.2 ¹	---
Benzo(a)pyrene	<0.04 – 0.66	2.2 ²	---
Benzo(b)fluoranthene	<0.05 – 0.91	2.6 ¹	---
Benzo(ghi)perylene	<0.05 – 0.51	320 ¹	---
Benzo(k)fluoranthene	<0.07 – 0.32	77 ¹	---
Chrysene	<0.06 – 0.86	15 ¹	---
Dibenzo(ah)anthracene	<0.04 – 0.1	0.24 ¹	---
Fluoranthene	<0.08 – 1.4	280 ¹	---
Fluorene	<0.01 – 0.02	170 ¹	---
Indeno(123-cd)pyrene	<0.03 – 0.56	27 ¹	---
Phenanthrene	<0.03 – 0.47	95 ¹	---
Pyrene	<0.07 – 1.33	620 ¹	---
Ali HCs >C21-C35	<1 – 110	65000 ^{*1}	---
Aro HCs >C12-C16	<1 - 2	140 ¹	---
Aro HCs >C16-C21	<1 - 9	260 ¹	---
Aro HCs >C21-C35	<1 - 45	1100 ¹	---
Asbestos ID	0 of 6 samples	N.A.D	

1 CIEH/LQM Derived Assessment Criteria (S4ULs based on 1% SOM)

2 Category 4 Screening Levels (C4SL)

Table 2: Summary of Elevated Contaminants of Concern for the Footprint of the Former Greenbrow Social Club

- 3.6.5 It can be seen from the above table that there are no elevated contaminants of concern for the soil samples recovered from the footprint of the former Greenbrow Social Club. Moreover, no asbestos was identified within any of the samples.
- 3.6.6 Notwithstanding the above, site investigation and risk assessment carried out by E3P identified elevated concentrations of Lead, Mercury, and PAH Compounds (Benzo(b)fluoranthene, Benzo(a)pyrene & Dibenzo(ah)anthracene) within soil samples recovered from the site.
- 3.6.7 Given this it will still be necessary to implement a clean cover system within areas of soft landscaping at the site as initially recommended. The cover system will mitigate the identified risks to end users by forming a physical barrier between the source of contamination and the end user by breaking the major pathways of dermal contact, ingestion of soil and consumption of home grown produce.

Speciated Mercury Analysis (Vicinity of WS104)

- 3.6.8 The E3P investigation encountered elevated concentrations of total mercury upon comparison of the concentrations with the S4UL assessment criteria for elemental mercury (the lowest available assessment criteria for all mercury speciations).
- 3.6.9 In order to determine whether elemental mercury was present in the site soils, speciated mercury analysis has been undertaken on the sample obtained from the vicinity of WS104. Elemental mercury (if present) presents a potential risk to end users through vapor inhalation.
- 3.6.10 A review of the chemical test results for the sample (See Appendix D) shows that the concentration of elemental mercury is below the limit of detection of 0.6 µg/kg. The only speciation of mercury which is present in the sample recovered from the area encompassing WS104 was inorganic mercury. The assessment criteria for inorganic mercury is 40 mg/kg. With consideration to the speciated mercury analysis, BEK considers use of this assessment criteria more appropriate for this site and removes the risks from mercury on site.

Validation of Waste Removal (Vicinity of WS102)

- 3.6.11 5No. samples recovered from the base and sides of the excavation formed from the waste removal exercise in the vicinity of WS102 have been tested for mercury (total) in order to assess the potential for elevated mercury to still be present within the made ground remaining in-situ.
- 3.6.12 A review of the chemical test results for the samples show that the concentration of mercury is below the limit of detection for 3 of the 5 samples tested. The samples taken from the northern and eastern sides of the excavation (VS-Hg-2 & VS-Hg-3, see Figure 1) contained mercury concentrations of 2.16 mg/kg and 1.45 mg/kg, respectively.

- 3.6.13 The mercury present within the made ground sample recovered from WS104 has been conclusively proven to be made up of 100% inorganic mercury, with elemental mercury and methyl mercury being present below the limits of detection of 0.6 µg/kg and 100 µg/kg, respectively. The made ground samples recovered from the edges of the excavation for which mercury was found to be above the limit of detection (2 of 5 samples) have concentrations which are similar to both the sample recovered from WS104, and the samples tested previously by E3P as part of the preparation of the 'Phase II Geoenvironmental Site Assessment' (Concentrations of <0.3 to 3.5 mg/kg) which suggests the mercury contamination is a diffuse, evenly distributed source.
- 3.6.14 Considering the above BEK regards it prudent to apply the adopted assessment criteria of 40 mg/kg for mercury for the samples recovered during the waste exercise.
- 3.6.15 Using the criteria of 40 mg/kg the assessment shows that no elevations of mercury are present at the site (Maximum site concentration of 3.5 mg/kg). With consideration to both the speciated mercury analysis and the waste removal exercise, mercury is no longer considered to be a contaminant of concern at the site.

4.0 SITE REMEDIATION & ENABLING WORKS

4.1 Overview

4.1.1 The outline strategy for the site remediation and enabling works will comprise:

- Implementing the works with appropriate consultancy supervision so that the works can be fully validated, together with verification reporting, to the satisfaction of the Local Planning Authority (LPA).
- Management of all works so as to ensure that no environmental nuisance is created through dust emissions, noise or vibration levels.
- General site clearance and legislatively compliant disposal of all surface vegetation, breaking out, excavation and removal of all slabs, hard-standing and buried structures to the base of the made ground (subject to structural engineer confirmation).
- Removal of any previously unidentified contamination hotspots.
- Excavation and removal of all previously unidentified materials deemed to be either a potential risk to the identified receptors or the built environment.
- Breaking out and subsequent crushing / processing of all surface and sub-surface structures including foundations, redundant drains and any further buried obstacles (where present).
- Importation of inert and geotechnically stable fill if required. Laboratory testing of all imported material to confirm chemical and geotechnical suitability for use, in accordance with the testing schedule presented within the Remediation Strategy.
- Provide suitable development platform to facilitate the construction of the proposed roadways, drainage infrastructure, pavements and areas of hard-standing; to be delivered in accordance with the Engineers Specification.
- Use of potable water supply infrastructure that will be compliant with UKWIR assessment criteria.
- Removal and disposal of any perched water from within excavations (if required).
- Ensure that all works are completed in a manner so as not to create any structural risk to the adjacent highways/infrastructure.
- Implement all temporary works as necessary to support excavations throughout the duration of the works.

- Construction of the apartment building in the north-east of the site with gas mitigation measures in accordance with Characteristic Situation 2 of BS8485:2015+A1:2019.
- Implement a soft cover system of 600 mm thickness in all private garden areas and 300 mm thickness in all Public Open Spaces, underlain by a geotextile membrane or 100 mm granular no-dig layer to prevent mixing.
- Retained soils on site then this should be managed through exemption for Permitting (if appropriate) or through the preparation of a Material Management Plan as part of compliance with the Definition of Waste:Code of Practice (DoW:CoP).
- Validation sampling to confirm material retained on-site pose no unacceptable risk to the residential end users, controlled waters or wider environ;
- Removal of all soil wastes deemed unsuitable for use from site in accordance with UK Waste Management Legislation and in accordance with the UK Landfill Directive
- Development of a comprehensive Validation Report to document the successful completion of the aforementioned works.

4.2 Rationale

- 4.2.1 The rationale detailed below provides a synopsis of the proposed site enabling / remediation works required to produce the suitable platform for the construction of the proposed residential development. This is intended to demonstrate that the proposed activities are to be undertaken in full compliance with the relevant regulatory controls.
- 4.2.2 The remediation strategy should be implemented with appropriate consultancy supervision so that the works can be fully validated, along with validation reporting to the satisfaction of the Local Planning Authority (LPA). Site works will be supervised by a Resident Engineer (RE) appointed by The Casey Group.

4.3 Pre-Commencement Regulatory Compliance

- 4.3.1 Prior to commencement of any works on-site, all reports relating to the assessment of risk to contaminated land should be submitted to the regulatory authorities to gain written approval.
- 4.3.2 All relevant Standard Rules Permits should be registered with the EA.
- 4.3.3 The LAPC Part B Notification for deployment of mobile crushing plant should be implemented prior to the establishment of equipment on-site.

4.3.4 If the proposed volume of soils to be re-used (excluding crushed materials) exceeds the parameters of the Standard Rules Permit, a CL:AIRE MMP Qualified Declaration should be made by the contractor having obtained full written approval for the Remediation Strategy from the LPA and Environment Agency.

4.3.5 If it is intended to treat any materials on-site (such as hydrocarbon impact soil or groundwater) the contractor must either notify the EA of their intention to complete a minor works operation or arrange for the deployment of the appropriate Environmental Permit for the specified operation.

4.4 Materials Management & Legislation Compliance

4.4.1 All operations as outlined in detail within this report will be subject to regulation using either Permit Exemptions (if applicable) and/or a 'Materials Management Plan' (MMP) to be created in accordance with Version 2 of the CL:AIRE Definition of Waste - Industry Code of Practice.

4.4.2 If required, the MMP will be created with due consideration to all proposed remediation and enabling works operations prescribed within this document and will be undertaken by a Qualified Person and a signed declaration submitted to the EA prior to reuse of materials on the site.

4.4.3 The MMP will be completed once the Remediation Strategy has been approved by the appropriate regulatory bodies.

4.4.4 A Declaration must be completed and signed by the Qualified Person in the following circumstances:

- Site of Origin scenario – Prior to use;
- Direct Transfer scenario – Prior to dispatch. One for each receiving site;
- Cluster Project scenario – Prior to dispatch from a Hub site (including a fixed STF acting in that capacity) to each Receiver site within the defined Cluster Project.

4.5 Site Establishment & Welfare

4.5.1 Prior to the commencement of works on-site, the remediation contractor must establish all necessary plant, equipment and site welfare facilities as is necessary to complete the contract within the agreed timescales to the rationale as outlined in the sections below.

4.5.2 The contractor shall comply at all times with the conditions of contract, tender documents and health and safety requirements of The Casey Group. The contractor shall prepare and submit a programme for the works to be submitted to The Casey Group prior to commencement on site.

4.5.3 The contractor shall make adequate provision to secure the site boundary and prevent unauthorised access onto the site during the course of the works. The contractor shall agree access points and routes for heavy vehicles. Suitable precautions shall be taken to prevent the spread of mud and debris on public highways.

4.5.4 Noisy operations i.e. the use of hydraulic breakers should be restricted to the hours specified on the Planning Conditions.

4.6 Environment & Nuisance Control

4.6.1 Management of all works so as to ensure no dust emissions, or that noise levels or vibration levels are not exceed.

4.6.2 Ensure that all works are completed in a manner so as not to create any structural risk to the adjacent highways.

4.6.3 Implement all temporary works as necessary to support excavations throughout the duration of the works.

4.6.4 In the event that a complaint is made in respect of dust emissions, noise or vibration levels, remedial measures and a programme of ongoing monitoring should be agreed with the local authority and implemented on site.

4.7 Site Preparation and Clearance

4.7.1 The site should be cleared and any vegetation below areas of proposed development and stripped in accordance with Series 200 of the Specification for Highway Works. This should include:

- Once operations have been established at the site, in terms of site security and cabins/offices, the site should be cleared of all residual debris (fly tipped materials)
- Trees, bushes and shrubs that are required to be stripped and shredded to create a mulch for re-use on site. Any debris/matter not required shall be removed off site to a suitably licensed facility.
- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill;
- No invasive plant species have been identified on site. If identified during future works this material and the infested soils will require treatment / removal by a suitably qualified contractor;
- Any redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill;

- Consideration should be given to any proposed retaining structures on the site and should be assessed by a structural engineer prior to development.
- Where materials are removed from site all Waste Transfer Notes / Duty of Care certificates should be included within the validation statement.

4.8 Delineation of Previously Unidentified Hotspots

Rationale:

- 4.8.1 Any previously unidentified hotspots including but not limited to polycyclic aromatic hydrocarbons, speciated total petroleum hydrocarbon compounds, semi volatile, volatile compounds or asbestos encountered as a result of groundworks and/or additional sampling will require assessment to ensure no ongoing risks to groundworkers or risks to end users are present. Remedial strategies may include excavation, validation and treatment or installation of vapour membranes to ensure no risk to future site users.

Validation Requirements:

- 4.8.2 Upon completion of any delineation and excavation exercises, the sides and base of the resultant void(s) will be chemically validated to confirm no impacted materials remain in situ. The results of this validation testing will be directly compared to validation criteria (as defined within Section 3.21) to demonstrate that no unacceptable level of risk to human health, controlled waters or the wider environs remains in addition to being visually validated.
- 4.8.3 Any installed vapour membranes will require inspection and sign-off by a suitably qualified environmental consultant.

4.9 Excavation, Breaking & Processing of Sub-Surface Structures

- 4.9.1 As a recently demolished building will be present at the site, below ground obstructions will exist. All natural and artificially hard material (i.e. concrete, brick and stone etc.) comprising slabs, hardstanding, foundations etc. present at and below the existing site surface are to be broken out. This material is to be removed in its entirety (i.e. to full depth) from the area of the proposed new build footprint. The location and depth of all below ground obstructions removed during the works should be accurately recorded. Dust, noise and vibration should be monitored and recorded.
- 4.9.2 Appropriate care and diligence should be taken during excavation works across the site and the environmental consultant should be notified immediately should any unexpected ground conditions, structures, artefacts or contamination be encountered. Any wells encountered will need to be inspected and decommissioned in accordance with EA guidance.

- 4.9.3 The remediation contractor shall 'grub out' and remove from the site all relict drainage runs. This shall include the excavation and off-site removal of any unexpected contaminated liquids, sludges etc, as required and validation of site soils by the supervising engineer against the relevant site-specific remedial targets.
- 4.9.4 All suitable, clean, artificially hard materials recovered during the works should be crushed to a 125 mm down grading, for potential re-use on site. Stockpiles will be made, validation testing undertaken, and site won material reused on site where required, in line with suitable MMP's and regulatory permissions. Any geotechnically unsuitable/deleterious materials such as metal, plastic and wood should be removed from these materials prior to crushing and disposed offsite at a suitably licenced landfill facility.
- 4.9.5 Where any very loose or soft material is present at the base of excavations, removal of material will continue, and any material excavated will be reengineered to a suitable specification to minimise the risk of future settlement.
- 4.9.6 Site-won arisings will require chemical testing to demonstrate that they are suitable for use with the proposed development platform.
- 4.9.7 Areas will require appropriate geotechnical testing to demonstrate that the backfill material meets the required engineered standard.
- 4.10 Cut & Filling of Made Ground to Development Levels**
- 4.10.1 Where the proposed enabling work levels require the current landform to be cut, extreme care should be taken so as not to disturb the underlying stratum prior to the placement of the appropriate platform in compliance with the Engineers Specification.
- 4.10.2 Where the development levels require material to be filled, site derived made ground must be sorted in a controlled manner prior to replacement in accordance with the requirements of this specification for the intended land use.
- 4.10.3 The maximum dry density must be determined in laboratory conditions utilising UKAS accredited testing prior to the commencement of filling and compaction works. In-situ density testing may be required to demonstrate compliance with the Engineers Specification should the contractor opt to use cohesive fill material during the backfill operations.
- 4.11 Geotechnical Engineering Requirements: Highways, Driveways, Plots, POS and Gardens**
- 4.11.1 Made ground is present across the site, and it is strongly recommended that consultation regarding the specification of the highways should be made with the adopting authority regarding future highways. However, it is considered that the following options would be suitable to enable the construction of the highways.

- 4.11.2 Where made ground is present the following options are considered suitable. Excavation of the full thickness (up to a maximum of 2m) of made ground and either:
- a) Replacement with suitable aggregate in accordance with Series 600 (Earthworks) of The Highways Agency (HA) "Specification for Highway Works" 1998, or
 - b) Screening, selection and replacement (in accordance with Series 600) of suitable material in engineered layers. Unsuitable materials include soft or wet materials, biodegradables including topsoil, wood, scrap metal, frozen material and oversize.
- 4.11.3 Any residual made ground materials in the base of the excavation (i.e. in areas where the thickness of made ground exceeds 2m) should be inspected and (where necessary) any soft spots removed and replaced with suitable engineered fill.
- 4.11.4 Existing made ground beneath the site will likely offer CBR values of <1%.
- 4.11.5 Fill materials shall be placed to provide a minimum CBR value of 5 % below all roads, highways and parking areas. Following excavation, the sub formation should be proof rolled and any soft material inspected. Should the road/pavement formation fail to meet this requirement then the contractor shall remove soft areas to be replaced with suitable engineering material.
- 4.11.6 Plate bearing tests or in-situ CBRs, to enable determination of CBR values, shall be undertaken at the formation level of estate roads, at approximately 25 m linear centres or as specified by the RE.
- 4.11.7 The CBR Method Compaction for plots will depend upon the foundation type. This will be specified by the structural engineer.
- 4.11.8 Gardens & POS areas will require method compaction to ensure no settlement.
- 4.11.9 Confirmation that the material is chemically and geotechnically suitable for re-use shall be in accordance with the local authority requirements.
- 4.12 New Utilities**
- 4.12.1 It is strongly recommended that all statutory service bodies are consulted at an early stage with respect to the ground conditions within which they will lay services in order to enable them to assess at an early stage any potential abnormal costs.
- 4.12.2 Based on the degree of soil contamination identified in soils beneath the site, it is possible that the Water Supply Company will require an increase specification of water supply pipe for the proposed development. However, this should be confirmed, and an appropriate water supply risk assessment conducted for the site.

4.13 Removal of Water

- 4.13.1 Consideration must be given to the local pumping of water within service trenches, especially after periods of heavy rainfall due to the impermeable nature of the underlying clay soils.
- 4.13.2 Any waters encountered within the formation of earthworks excavations will be assessed and disposed of in a controlled and legislatively compliant manner.

4.14 Importation of Bulk Fill

- 4.14.1 Where there is a net shortfall of material required to achieve the proposed ground levels, it will be necessary to import natural inert soils and aggregate as per the engineering requirements.
- 4.14.2 Imported material must be certified as suitable for use in strict accordance with the chemical and geotechnical performance criteria in conjunction with the required duty of care notes and waste transfer exemption. If recycled aggregates are imported laboratory testing should be completed to demonstrate compliance with the WRAP Protocol. Where inert soils are imported laboratory testing should be completed in accordance with the requirements of the pertinent Environmental Permit (i.e. U1 Standard Rules) or CL:AIRE MMP for the re-use of clean naturally occurring soils.

4.15 Provision of Subsoil

- 4.15.1 Subsoil will need to be imported to site for use. Imported subsoil will require testing in line with the determinands present within Table 5. The garden and landscaped areas will require depth validation in line with the recommendations provided within Section 3.20.

4.16 Provision of Topsoil

- 4.16.1 No material that would be deemed suitable for use as topsoil is present on-site and as such there will be requirement to import suitable material for use within the proposed development.
- 4.16.2 Imported Topsoil will require testing in line with the determinands present within Table 5. The garden and landscaped areas will require depth validation in line with the recommendations provided within Section 3.20.

4.17 Post Enabling Works Requirements

Gas Protection Measures

- Gas mitigation measures in accordance with Characteristic Situation 2 are required within the apartment building in the north-east of the site.
- The apartment building is classified as a 'Type B' building (Managed Apartments) within BS8485:2015+A1:2019, meaning a 'gas score' of 3.5pts will be required for gas measures installed within the building. BEK understands the gas mitigation measures are to comprise a Passive sub-with good performance (2.5pts) and a Gas Resistant Membrane (2pts).
- The gas protection measures should be designed in accordance with BS8485:2015+A1 (2019) and installed in accordance with BRE Report 414 (2001). In addition, the gas protection membrane utilised should be robust enough to withstand the construction process and, if unreinforced, should be a minimum of 2000 gauge.
- Following construction and prior to being covered, the gas protection measures should be inspected for validation purposes in all residential plots, in accordance with the guidance and pro forma in CIRA C735.
- The scope of the installation and validation of the gas/vapour measures should be reported within a Gas Verification Plan
- In order to ensure that the ground gas protection measures recommended have been installed correctly, it is recommended that a physical inspection of the gas membrane and passive ventilation is undertaken with evidential photographs taken and letter reports compiled for every plot.

Clean Cover System

- A clean cover system should be installed within areas of soft landscaping at the site. Within private garden areas, the cover system will comprise a thickness of at least 600 mm of physically and chemically suitable imported topsoil and subsoil. Within soft-landscaped public open space areas, the cover system will comprise a thickness of at least 300 mm of physically and chemically suitable imported topsoil and subsoil.
- The topsoil component of the clean cover system should be a minimum of (but not restricted to) 150 mm in depth. The remainder of the clean cover (450 mm in private garden areas, 150 mm in POS areas) will be composed of subsoil.
- The clean cover system should be underlain by a 100 mm granular no-dig layer or a geotextile marker membrane in all areas of the site to prevent mixing.

4.18 Demonstration of Proposed Remediation Works to Break the Identified Pollutant Linkages

- 4.18.1 It is understood that the site is to be developed for a residential end-use with soft landscaping/gardens. Residences are to comprise 8No. dwelling houses and 1No. 3-storey building to form 15 flats.
- 4.18.2 Based upon the information obtained, the following table demonstrates the risks to human health which will be satisfactorily addressed by the anticipated remedial works across the site as proposed.

Receptor	Area of Concern	Mitigation
Human Health	Non-volatile contamination across the site in proposed garden/soft landscaped areas	Clean cover system in all soft landscaped areas to 600 mm including geotextile marker membrane or 100 mm granular no-dig layer at base
Damage to Buildings (fire & explosion)	Ground Gas Risk (North-east of site)	Gas Measures which adhere to Characteristic Situation 2 are to be installed within the residential apartment building. A Gas Verification Plan will be prepared for the site.
Water Pipes	Potable Water Supply Pipes	Appropriate water supply risk assessment and use of barrier pipe (if required)

Table 3: Summary of Remediation Works Required

4.19 Validation Sampling Protocol

- 4.19.1 In accordance with the current requirements of the regulatory authorities, validation samples will be collected from all materials that are to either be subject to movement under the protocols outlined within this Remediation Strategy, or for materials to be imported onto site to facilitate the proposed residential development.
- 4.19.2 Soil samples destined for chemical analysis will be collected at regular intervals in appropriate sampling containers. All samples will subsequently be stored in cooled boxes prior to submission to a UKAS accredited laboratory. All testing should be carried out to MCERTS standard where applicable.
- 4.19.3 All samples will be collected using appropriate PPE and sampling equipment that will be cleaned at each sampling location. A detailed copy of the sampling methodology, QA procedures and laboratory chain of custody forms will be documented within the site records and presented within the final validation report for the site.
- 4.19.4 Where materials are found to contain concentrations of potential contaminants at levels in excess of the generic screening criteria, an environmental consultant will undertake further assessment and recommendations on the appropriate use for the material in question, which may involve the disposal of such materials offsite to a suitable waste management facility.

- 4.19.5 The specification for validatory chemical testing at the site will be determined by the material source and proposed final use at the site. This will follow the guidance presented in the YALPAG document entitled 'Verification Requirements for Cover Systems' (Version 4.1, dated June 2021). An extract from the document is provided below.

Type	Number of Samples	Testing Schedule	Assessment Criteria
Please note that these guidelines apply to a typical residential development, and relaxation of the guidelines or more stringent requirements may apply dependent on local and site specific factors. Therefore, <u>all parameters need to be agreed with the Local Authority.</u>			
Virgin Quarried Material	1 or 2 depending on the type of stone utilised, to confirm the inert nature of the material.	Standard metals/metalloids (should include as a minimum As, Cd, Cr, CrVI, Cu, Hg, Ni, Pb, Se, Zn)	The assessment criteria need to be UK based, e.g. LQM S4ULs, Defra C4SLs or other similarly derived GACs.
Crushed Hardcore, Stone, Brick (excluding asphalt)	Minimum 1 per 500m ³	Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, total TPH. Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).	
Greenfield/ Manufactured Soils	Minimum 3 Dependent on source and receptor, between 1 per 50m ³ and 1 per 250m ³	Standard metals/metalloids (as above), PAH (16 USEPA speciation), asbestos, pH and soil organic matter (SOM) (or calculated from total organic carbon (TOC)).	
Brownfield/ Screened Soils	Minimum 6 Dependent on source and receptor, between 1 per 50m ³ and 1 per 100m ³	Standard metals/ metalloids (as above), PAH (16 USEPA speciation), TPH (CWG banded), asbestos, pH and SOM (or calculated from TOC). Any additional analysis dependant on the history of the donor site (e.g. phenol, total cyanide, BTEX, MTBE).	

Table 4: Summary of Soil Testing Frequency and Schedule (extract from YALPAG)

- 4.19.6 The sampling frequency may be varied at the discretion of the Engineer depending on the nature and variability of the imported material and its source (subject to Local Authority approval).

Validation Criteria for Imported Material

Determinand	Assessment Criteria (mg/kg)		
	Below Hardstanding Roads	Within Upper 600 mm of Private Gardens	Within Upper 300 mm of POS
Arsenic	640 ¹	37 ¹	79 ¹
Cadmium	190 ¹	11 ¹	120 ¹
Chromium	8600 ¹	910 ¹	1500 ¹
Chromium (Hexavalent)	33 ¹	6 ¹	7.7 ¹
Lead	2300 ²	200 ²	630 ²
Mercury	58 ¹	1.2 ¹	16 ¹
Nickel	980 ¹	180 ¹	230 ¹
Selenium	12000 ¹	250 ¹	1100 ¹
Copper	68000 ¹	2400 ¹	12000 ¹
Zinc	730000 ¹	3700 ¹	81000 ¹
Cyanide	34 ³	34 ³	34 ³
Phenol	760 ¹	210 ¹	4900 ¹
Naphthalene	15 ²	15 ²	11000 ²
Acenaphthene	84000 ¹	210 ¹	15000 ¹
Acenaphthylene	83000 ¹	170 ¹	15000 ¹
Fluorene	63000 ¹	170 ¹	9900 ¹
Phenanthrene	22000 ¹	95 ¹	3100 ¹
Anthracene	520000 ¹	2400 ¹	74000 ¹
Fluoranthene	23000 ¹	280 ¹	3100 ¹
Pyrene	54000 ¹	620 ¹	7400 ¹
Benzo(a)anthracene	170 ¹	7.2 ¹	29 ¹
Chrysene	350 ¹	15 ¹	57 ¹
Benzo(b)fluoranthene	44 ¹	2.6 ¹	7.1 ¹
Benzo(k)fluoranthene	1200 ¹	77 ¹	190 ¹
Benzo(a)pyrene	35 ¹	2.2 ¹	5.7 ¹
Indeno(1,2,3-cd)pyrene	500 ¹	27 ¹	82 ¹
Dibenzo(ah)anthracene	3.5 ¹	0.24 ¹	0.57 ¹
Benzo(ghi)perylene	3900 ¹	320 ¹	640 ¹
Aliphatic TPH C5 - C6	42 ¹	42 ¹	570000 ¹
Aliphatic TPH C6 - C8	100 ¹	100 ¹	600000 ¹
Aliphatic TPH C8 - C10	27 ¹	27 ¹	13000 ¹
Aliphatic TPH C10 - C12	130 ¹	130 ¹	13000 ¹
Aliphatic TPH C12 - C16	1100 ¹	1100 ¹	13000 ¹
Aliphatic TPH C16 - C21	65000 ^{1*}	65000 ^{1*}	250000 ¹
Aliphatic TPH C21 - C35	65000 ^{1*}	65000 ^{1*}	250000 ¹
Aromatic TPH C5 - C7	70 ¹	70 ¹	56000 ¹
Aromatic TPH C7 - C8	130 ¹	130 ¹	56000 ¹
Aromatic TPH C8 - C10	34 ¹	34 ¹	5000 ¹
Aromatic TPH C10 - C12	74 ¹	74 ¹	5000 ¹
Aromatic TPH C12 - C16	36000 ¹	140 ¹	5100 ¹
Aromatic TPH C16 - C21	28000 ¹	260 ¹	3800 ¹
Aromatic TPH C21 - C35	28000 ¹	1100 ¹	3800 ¹

Table 5: Validation Criteria – Imported Soils

- 1 CIEH/LQM Derived Assessment Criteria (S4ULs based on 1 % SOM)
- 2 Category 4 Screening Levels (C4SL)
- 3 Atkins ATRISK

4.19.7 Table 4 above provides a list of assessment criteria for assessing suitability of imported material to be used within the capping system and within road formation. The assessment criteria for lead at the site have collated from various sources including: the Land Quality Management and Chartered Institute of Environmental Health assessment criteria (S4ULs) and the Category 4 Screening Levels (C4SLs). Imported materials beneath roads and hardstanding or clean cover will be assessed against commercial land use criteria for non-volatile components where no direct contact human health pathway exists. Potentially volatile compounds will be assessed as per published residential land-use criteria.

4.20 Physical Validation

4.20.1 To mitigate risks associated with non-volatile ground contamination within the soft landscaped areas of the proposed development, it is recommended that a clean cover system should be installed within soft landscaped areas. Within private garden areas the cover system will comprise a thickness of at least 600 mm of physically and chemically suitable imported topsoil and subsoil. Within soft-landscaped public open space areas, the cover system should comprise a thickness of at least 300 mm of physically and chemically suitable imported topsoil and subsoil.

4.20.2 It is recommended that a suitably qualified and experienced engineer visit the areas of soft landscaping and undertake the excavation of a hand dug inspection pit to 600 mm/300 mm in relevant soft landscaped areas. BEK recommends one hole per garden plot and 5 holes across all impacted POS areas.

4.20.3 The engineer will record the thickness, depth and composition of both the topsoil and subsoil and would take validation photographs. In addition, if there is a requirement to import topsoil and subsoil, samples will be obtained for validation testing, as per the frequency outlined in Table 4 above.

4.20.4 BEK will ensure that the requirements of this Strategy are complied with. On satisfactory completion of the placement of clean cover BEK will provide a validation letter report.

4.20.5 This report will comprise relevant site records and act as certification that the remedial preparation works have been carried out in accordance with the Strategy.

4.20.6 Each validation report shall include the following:

- A description of the works undertaken
- Validation Photographs showing the appropriate thickness of clean cover and inspection pit in relation to the plot
- Chemical validation test results
- A statement that the works have been undertaken in accordance with the agreed Strategy

5.0 RECORD KEEPING & SITE INSPECTION

5.1 Site Manager

- The Site Manager shall be responsible for obtaining all relevant environmental permits for the works to be completed.
- The Site Manager shall be responsible for recording all environmental incidents at the site and be responsible for reporting it to the environmental consultant and the relevant regulatory bodies (if applicable).
- The Site Manager shall be responsible for recording and managing all material movements, including the location, type and volume of stockpiles created.
- The Site Manager shall be responsible for retaining copies of all delivery notes of materials imported to the site, which as a minimum should confirm the material source and volume.
- The Site Manager should ensure all wastes disposed of off-site are done so in a regulatory compliant manner and a copy of all Waste Transfer Notes and Consignments are retained for inspection.

5.2 Environmental Consultant

- The consultant will conduct spot checks on general site activities, material movements, working practices and record keeping to ensure the Remediation Strategy is being adhered to. The frequency of visits will ultimately be dependent on the type of site works being carried out, the risks associated with it and general workmanship.
- The consultant will obtain copies of all relevant documentation associated with disposal of waste off-site.
- The consultant will assess and compile all monitoring records (if undertaken).
- The consultant will ensure that all materials are sampled for validation and waste disposal purposes as necessary.
- The consultant will compile a photographic record of all key works undertaken.
- The consultant will complete a site visit diary, which includes a summary of the following:
 - Works undertaken
 - Plant, personnel and visitors present
 - Any unexpected ground conditions or contaminants
 - A summary of any sampling carried out

- Any other relevant environmental aspects relating to the works.

5.3 Validation Report

5.3.1 Following completion of the enabling works, the records listed above will be compiled into a Validation Report, summarising the works undertaken and confirming that they have been carried out in accordance with this Remediation Strategy.

5.3.2 The Validation Report will include the following:

- A summary of all works undertaken
- Provision of all relevant records and supporting evidence, including monitoring results, delivery and waste disposal records
- Copies of any regulatory correspondence relevant to the validation and site enabling works
- A summary and sketches (as appropriate) of excavations and material movements
- A selection of photographs providing evidence for the works
- Detailed drawings showing all sampling locations for both chemical and geotechnical testing
- Details of any previously unidentified contaminants, including remedial actions taken
- A statement confirming the works have been completed in compliance with this Remediation Strategy

6.0 CONTINGENCY PLAN & REGULATORY COMPLIANCE

6.1 Previously Unidentified Contaminants

- 6.1.1 Should any significantly impacted material be encountered during the development, then it should be excavated and stockpiled on an impermeable material and sampled and tested for an appropriate range of determinants.
- 6.1.2 Once the laboratory analysis of the material is available an assessment should be undertaken to determine whether it can be retained on-site as part of the Material Management Operations or whether it should be disposed off-site.
- 6.1.3 Depending on the nature of any such impact it may be necessary to undertake validation testing of the excavation faces in order to demonstrate that no such materials are left in-situ.

6.2 Regulatory Approvals

- 6.2.1 The conclusions and recommendations presented above are considered appropriate, based on the findings of the site investigation works undertaken by E3P and BEK. However, these recommendations cannot be guaranteed to gain regulatory approval and this report should be passed to the appropriate regulatory authorities and/or other organisations for their comment and approval prior to confirming remedial proposals, completing associated remedial/earthworks design and undertaking any works on site.

APPENDIX A

Trial Pit Logs



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24100	DATE 26th September 2024
PROJECT NAME Greenbrow Social Club	
CLIENT The Casey Group	TRIAL PIT NO TP1
	SHEET 1/7

COMPLETION 2.0 m
COMMENTS Trial pit dry. Pit terminated at 2.0 m due to refusal on likely bedrock

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Graphic Log	Material Description	Elevation (m)
0.2	0.1	D = 0.1 m				MADE GROUND: Concrete	0.2
0.4						MADE GROUND: Light reddish brown very sandy fine to coarse GRAVEL of angular concrete and mortar. Sand is fine to medium. Medium cobble content of concrete and mortar.	0.4
0.6			Shear Vane at 0.7 m: >120kPa			Reddish brown and grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium angular, highly weathered, blue/grey siltstone (bedrock pieces) increasing in abundance towards base of pit. Rare lenses of sandy clay. Refusal at base of pit (Likely Siltstone Bedrock).	0.6
0.8							0.8
1							1
1.2							1.2
1.4							1.4
1.6							1.6
1.8							1.8
2						Termination Depth at: 2.0 m	2
2.2							2.2
2.4							2.4
2.6							2.6
2.8							2.8
3							3
3.2							3.2



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24100	DATE 26th September 2024
PROJECT NAME Greenbrow Social Club	
CLIENT The Casey Group	TRIAL PIT NO TP2
	SHEET 2/7

COMPLETION 2.4 m

COMMENTS Trial pit dry. Pit terminated at 2.4 m due to refusal on likely bedrock

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Graphic Log	Material Description	Elevation (m)
0.2	0.2	D = 0.2 m				MADE GROUND: Grey slightly clayey very sandy fine to coarse GRAVEL of angular limestone and brick. Sand is fine to coarse. Low cobble content of angular limestone and whole/broken brick.	0.2
0.4						Reddish brown and grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium angular, highly weathered, blue/grey siltstone (bedrock pieces) increasing in abundance towards base of pit. Rare lenses of sandy clay. Refusal at base of pit (Likely Siltstone Bedrock).	0.4
0.6			Shear Vane at 0.7 m: >120kPa				0.6
0.8							0.8
1							1
1.2							1.2
1.4							1.4
1.6							1.6
1.8							1.8
2							2
2.2							2.2
2.4						Termination Depth at: 2.4 m	2.4
2.6							2.6
2.8							2.8
3							3
3.2							3.2



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24100	DATE 26th September 2024
PROJECT NAME Greenbrow Social Club	TRIAL PIT NO TP3
CLIENT The Casey Group	SHEET 3/7

COMPLETION 2.1 m
COMMENTS Trial pit dry. Pit terminated at 2.1 m due to refusal on likely bedrock

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Graphic Log	Material Description	Elevation (m)
0.2	0.15	D = 0.15 m				MADE GROUND: Grass onto dark brown organic slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine stone of mixed lithologies. Frequent rootlets. Rare glass, plastic and fragmented clay pipe	0.2
0.4						MADE GROUND: Brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium stone of mixed lithologies including siltstone. (Reworked Clay)	0.4
0.6							0.6
0.8							0.8
1			Shear Vane at 1.0 m: >120kPa			Reddish brown and grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium angular, highly weathered, blue/grey siltstone (bedrock pieces) increasing in abundance towards base of pit. Rare lenses of sandy clay. Refusal at base of pit (Likely Siltstone Bedrock).	1
1.2							1.2
1.4							1.4
1.6							1.6
1.8							1.8
2							2
2.2						Termination Depth at: 2.1 m	2.2
2.4							2.4
2.6							2.6
2.8							2.8
3							3
3.2							3.2



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24100	DATE 26th September 2024
PROJECT NAME Greenbrow Social Club	TRIAL PIT NO TP4
CLIENT The Casey Group	SHEET 4/7

COMPLETION 3.1 m

COMMENTS Trial pit dry. Pit terminated at 3.1 m due to refusal on likely bedrock. Pit atop a stockpile. Shear vane unsuitable

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Graphic Log	Material Description	Elevation (m)
0.2						MADE GROUND: Light brown very sandy fine to coarse GRAVEL of angular brick and concrete. Sand is fine to coarse. High cobble content of angular brick and concrete. Rare wood, plastic, wire and metal. (DEMOLITION STOCKPILE)	0.2
0.4							0.4
0.6							0.6
0.8							0.8
1							1
1.2							1.2
1.3	1.3	D = 1.3 m				Reddish brown and grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium angular, highly weathered, blue/grey siltstone (bedrock pieces) increasing in abundance towards base of pit. Rare lenses of sandy clay. Refusal at base of pit (Likely Siltstone Bedrock).	1.4
1.4							1.4
1.6							1.6
1.8							1.8
2							2
2.2							2.2
2.4							2.4
2.6							2.6
2.8							2.8
3							3
3.2						Termination Depth at: 3.1 m	3.2



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24100	DATE 26th September 2024
PROJECT NAME Greenbrow Social Club	TRIAL PIT NO TP5
CLIENT The Casey Group	SHEET 5/7

COMPLETION 1.1 m

COMMENTS Trial pit dry. Pit terminated at 1.4 m due to refusal on likely bedrock. Pit collapse from 1.4 to 1.1 m. Pit in former basement. Shear vane unsuitable

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Graphic Log	Material Description	Elevation (m)
0.2						MADE GROUND: Reddish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse. Rare brick and fragmented clay pipe	0.2
0.4							0.4
0.6							0.6
0.8						Reddish brown and grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium angular, highly weathered, blue/grey siltstone (bedrock pieces) increasing in abundance towards base of pit. Rare lenses of sandy clay. Refusal at base of pit (Likely Siltstone Bedrock).	0.8
1							1
1.2						Termination Depth at: 1.1 m	1.2
1.4							1.4
1.6							1.6
1.8							1.8
2							2
2.2							2.2
2.4							2.4
2.6							2.6
2.8							2.8
3							3
3.2							3.2



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24100

DATE 26th September 2024

PROJECT NAME Greenbrow Social Club

CLIENT The Casey Group

TRIAL PIT NO TP6

SHEET 6/7

COMPLETION 2.3 m

COMMENTS Trial pit dry. Pit terminated at 2.3 m due to refusal on likely bedrock

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Graphic Log	Material Description	Elevation (m)
0.2	0.25	D = 0.25 m				MADE GROUND: Light brown and grey sandy fine to coarse GRAVEL of limestone and stone of mixed lithologies. Sand is fine to coarse.	0.2
0.4						MADE GROUND: Grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium stone of mixed lithologies	0.4
0.6						Reddish brown and grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium angular, highly weathered, blue/grey siltstone (bedrock pieces) increasing in abundance towards base of pit. Rare lenses of sandy clay. Refusal at base of pit (Likely Siltstone Bedrock).	0.6
0.8			Shear Vane at 0.9 m: >112kPa				0.8
1							1
1.2							1.2
1.4							1.4
1.6							1.6
1.8							1.8
2							2
2.2							2.2
2.4						Termination Depth at: 2.3 m	2.4
2.6							2.6
2.8							2.8
3							3
3.2							3.2



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 24100	DATE 26th September 2024
PROJECT NAME Greenbrow Social Club	TRIAL PIT NO TP7
CLIENT The Casey Group	SHEET 7/7

COMPLETION 2.4 m

COMMENTS Trial pit dry. Pit terminated at 2.4 m due to refusal on likely bedrock

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Graphic Log	Material Description	Elevation (m)
0.2						MADE GROUND: Light brown and grey sandy fine to coarse GRAVEL of limestone and stone of mixed lithologies. Sand is fine to coarse.	0.2
0.4							0.4
0.6						Reddish brown and grey mottled slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to medium angular, highly weathered, blue/grey siltstone (bedrock pieces) increasing in abundance towards base of pit. Rare lenses of sandy clay. Refusal at base of pit (Likely Siltstone Bedrock).	0.6
0.8			Shear Vane at 0.8 m: >120kPa				0.8
1							1
1.2							1.2
1.4							1.4
1.6							1.6
1.8							1.8
2							2
2.2							2.2
2.4						Termination Depth at: 2.4 m	2.4
2.6							2.6
2.8							2.8
3							3
3.2							3.2

APPENDIX B

Trial Pit Photographs (Footprint of Former Social Club Building)

			
P1: Trial Pit TP1	P2: Trial Pit TP1		
			
P3: Trial Pit TP2	P4: Trial Pit TP2 (Arisings)		
			
P5: Trial Pit TP3	P6: Trial Pit TP3 (Arisings)		
 GEO-ENVIRONMENTAL CONSULTING			
Photographs 1 to 6			
Project No: 24100		Created By: AH	Date: October 2024
This appendix is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details adjacent. BEK accepts no liability for the misinterpretation or use of this illustration by any other parties.		Client: The Casey Group	
Site: Greenbrow Social Club, Wythenshawe			
Title: Annex B – Trial Pit Photographs			

				
P7: Trial Pit TP4	P8: Trial Pit TP4			
				
P9: Trial Pit TP5	P10: Trial Pit TP5			
				
P11: Trial Pit TP6	P12: Trial Pit TP6 (Arisings)			
				
Photographs 7 to 12				
This appendix is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details adjacent. BEK accepts no liability for the misinterpretation or use of this illustration by any other parties.		Project No: 24100	Created By: AH	Date: October 2024
Site: Greenbrow Social Club, Wythenshawe		Client: The Casey Group		
Title: Annex B – Trial Pit Photographs				

				
P13: Trial Pit TP7	P14: Trial Pit TP7			
				
Photographs 13 to 14				
This appendix is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details adjacent. BEK accepts no liability for the misinterpretation or use of this illustration by any other parties.	Site: Greenbrow Social Club, Wythenshawe	Project No: 24100	Created By: AH	Date: October 2024
	Title: Annex B – Trial Pit Photographs	Client: The Casey Group		

APPENDIX C

Trial Pit Photographs (Waste Removal Validation)

	
P1: General view of excavation	P2: Trial pit in the centre of the excavation (to base)
	
P3: Trial pit on the northern edge of excavation	P4: Trial pit on the eastern edge of excavation
	
P5: Trial pit on the southern edge of excavation	P6: Trial pit on the western edge of excavation
 BEK GEO-ENVIRONMENTAL CONSULTING	
Photographs 1 to 6	
This appendix is for illustrative purposes only and is for use only in conjunction with associated reports relating to the project details adjacent. BEK accepts no liability for the misinterpretation or use of this illustration by any other parties. Site: Greenbrow Social Club, Wythenshawe Title: Annex C – Trial Pit Photographs Project No: 24100 Created By: AH Date: October 2024 Client: The Casey Group	

APPENDIX D

Chemical Test Results

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 24/09379
Issue Number: 1

Date: 14 October, 2024

Client: BEK Enviro Ltd
2 Landwick Court
Metcalf Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

Project Manager: ** USE THIS Mick Buckley/James Mashiter
Project Name: Greenbrow Social Club, Wythenshawe
Project Ref: N/A
Order No: 8455-24100-AH
Date Samples Received: 27/09/24
Date Instructions Received: 30/09/24
Date Analysis Completed: 14/10/24

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 24/09379

Client Project Name: Greenbrow Social Club,
Wythenshawe

Client Project Ref: N/A

Lab Sample ID	24/09379/1	24/09379/2	24/09379/3	24/09379/4	24/09379/5	24/09379/6	24/09379/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	WS104			
Depth to Top	0.10	0.20	0.15	1.30	0.30	0.25	0.15			
Depth To Bottom										
Date Sampled	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24			
Sample Type	SOLID	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	7	4AE	4AE	6A	6AE	6AE	4AE			
% Stones >10mm _A	<0.1	31.7	3.0	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
Asbestos in soil _D [#]	NAD ^U	NAD	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	N/A	N/A	-			A-T-045
pH _D ^{M#}	10.59 ^U	8.61	6.79	8.67	8.22	7.53	-	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.40 ^U	0.07	<0.01	<0.01	0.14	<0.01	-	g/l	0.01	A-T-026s
Sulphate (acid soluble) _D ^{M#}	2200 ^U	490	640	300	430	210	-	mg/kg	200	A-T-028s
Cyanide (total) _A ^{M#}	<1 ^U	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	mg/kg	0.2	A-T-050s
Organic Matter _D ^{M#}	19.9 ^U	0.6	23.6	3.2	0.8	1.0	-	% w/w	0.1	A-T-032s
Arsenic _D ^{M#}	<1 ^U	3	20	<1	2	2	-	mg/kg	1	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0 ^U	<1.0	<1.0	<1.0	<1.0	<1.0	-	mg/kg	1	A-T-027s
Cadmium _D ^{M#}	<0.5 ^U	0.9	<0.5	<0.5	<0.5	<0.5	-	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	5 ^U	12	89	11	11	20	-	mg/kg	1	A-T-024s
Chromium _D ^{M#}	7 ^U	10	21	35	27	19	-	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-040s
Lead _D ^{M#}	11 ^U	31	170	4	10	12	-	mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17	0.59	<0.17	<0.17	<0.17	-	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	5 ^U	10	22	31	24	11	-	mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1 ^U	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-024s
Zinc _D ^{M#}	45 ^U	41	130	65	59	36	-	mg/kg	5	A-T-024s

Envirolab Job Number: 24/09379

Client Project Name: Greenbrow Social Club,
Wythenshawe

Client Project Ref: N/A

Lab Sample ID	24/09379/1	24/09379/2	24/09379/3	24/09379/4	24/09379/5	24/09379/6	24/09379/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	WS104			
Depth to Top	0.10	0.20	0.15	1.30	0.30	0.25	0.15			
Depth To Bottom										
Date Sampled	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24			
Sample Type	SOLID	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	7	4AE	4AE	6A	6AE	6AE	4AE			
Mercury, Speciated (tot+inorg+org(methyl)+elemental)										
Mercury (Elemental) _D	-	-	-	-	-	-	Appended	µg/kg	0.6	Subcon DETS D+G
Mercury (Inorganic) _D	-	-	-	-	-	-	Appended	µg/kg	100	Subcon DETS D+G
Mercury (Methyl) _D	-	-	-	-	-	-	Appended	µg/kg	100	Subcon DETS D+G
Mercury (SUBCON DETS) _D	-	-	-	-	-	-	Appended	mg/kg	0.05	Subcon DETS D+G

Envirolab Job Number: 24/09379

Client Project Name: Greenbrow Social Club,
Wythenshawe

Client Project Ref: N/A

Lab Sample ID	24/09379/1	24/09379/2	24/09379/3	24/09379/4	24/09379/5	24/09379/6	24/09379/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	WS104			
Depth to Top	0.10	0.20	0.15	1.30	0.30	0.25	0.15			
Depth To Bottom										
Date Sampled	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24			
Sample Type	SOLID	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	7	4AE	4AE	6A	6AE	6AE	4AE			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01 ^U	<0.01	0.04	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01 ^U	<0.01	0.02	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02 ^U	<0.02	0.19	<0.02	<0.02	<0.02	-	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04 ^U	0.04	0.75	<0.04	<0.04	<0.04	-	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04 ^U	<0.04	0.66	<0.04	<0.04	<0.04	-	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05 ^U	<0.05	0.91	<0.05	<0.05	<0.05	-	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05 ^U	<0.05	0.51	<0.05	<0.05	<0.05	-	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07 ^U	<0.07	0.32	<0.07	<0.07	<0.07	-	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	0.09 ^U	<0.06	0.86	<0.06	<0.06	<0.06	-	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04 ^U	<0.04	0.10	<0.04	<0.04	<0.04	-	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08 ^U	0.09	1.40	<0.08	<0.08	<0.08	-	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01 ^U	<0.01	0.02	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03 ^U	<0.03	0.56	<0.03	<0.03	<0.03	-	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03 ^U	<0.03	<0.03	<0.03	<0.03	<0.03	-	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	0.05 ^U	0.04	0.47	<0.03	<0.03	<0.03	-	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07 ^U	0.08	1.33	<0.07	<0.07	<0.07	-	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	0.14 ^U	0.25	8.14	<0.08	<0.08	<0.08	-	mg/kg	0.01	A-T-019s

Envirolab Job Number: 24/09379

Client Project Name: Greenbrow Social Club,
Wythenshawe

Client Project Ref: N/A

Lab Sample ID	24/09379/1	24/09379/2	24/09379/3	24/09379/4	24/09379/5	24/09379/6	24/09379/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	WS104			
Depth to Top	0.10	0.20	0.15	1.30	0.30	0.25	0.15			
Depth To Bottom										
Date Sampled	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24	26-Sep-24			
Sample Type	SOLID	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	7	4AE	4AE	6A	6AE	6AE	4AE			
TPH CWG with Clean Up										
Ali >C5-C6 _A	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<5	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<5 ^U	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<5 ^U	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<5 ^U	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	110 ^U	2	9	<1	<1	1	-	mg/kg	1	A-T-055s
Total Aliphatics _A	110	2	9	<1	<1	1	-	mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01 ^U	<0.01	<0.01	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01 ^U	<0.01	<0.01	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<5	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-055s
Aro >C10-C12 _A	<5	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-055s
Aro >C12-C16 _A	<5	<1	2	<1	<1	<1	-	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	7 ^U	3	9	<1	<1	<1	-	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	45 ^U	8	45	<1	1	<1	-	mg/kg	1	A-T-055s
Total Aromatics _A	52	12	56	<1	1	<1	-	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	162	14	65	<1	1	1	-	mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01 ^U	<0.01	<0.01	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01 ^U	<0.01	<0.01	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01 ^U	<0.01	<0.01	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01 ^U	<0.01	<0.01	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01 ^U	<0.01	<0.01	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01 ^U	<0.01	<0.01	<0.01	<0.01	<0.01	-	mg/kg	0.01	A-T-022s

Report Notes

General

- This report shall not be reproduced, except in full, without written approval from Envirolab.
- The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
- 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 within the same delivery, will be disposed of **four weeks** after the 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 our scope of accreditation.
- A deviating sample 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.
- If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
- Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

Key

Superscript “#”	Accredited to ISO 17025
Superscript “M”	Accredited to MCertS
Superscript “U”	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript “A”	Analysis performed on as-received Sample
Subscript “D”	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript “D” on Asbestos	Analysis performed on a dried aliquot of sample provided.
Subscript “A”	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
Trace	Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh.
N/A	Not applicable

Asbestos

Identification: 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

“Trace Asbestos Identified” will be reported if there is not enough present to verify the type.

Quantification: Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. 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. 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). “TRACE” will be reported as a quantification result.

PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs

Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.

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 by method A-T-007:

For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only. Results “with Clean up” indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:

EPH CWG results have humics mathematically subtracted through instrument calculation.

Where these humic substances have been identified in any IDs from “TPH CWG with clean up” please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

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.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park,
Altham, Lancashire , BB5 5GY

Project: Greenbrow Social Club, Wythenshawe

Clients Project No: N/A

Project No: 24/09379

Date Received: 30/09/2024 (am)

Cool Box Temperatures (°C): 15.2

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	24/09379/1	24/09379/2	24/09379/3	24/09379/4	24/09379/5	24/09379/6	24/09379/7
Client Sample No							
Client Sample ID/Depth	TP1 0.10m	TP2 0.20m	TP3 0.15m	TP4 1.30m	TP5 0.30m	TP6 0.25m	WS104 0.15m
Date Sampled	26/09/24	26/09/24	26/09/24	26/09/24	26/09/24	26/09/24	26/09/24
A-T-019s	07/10/2024	07/10/2024	07/10/2024	07/10/2024	07/10/2024	07/10/2024	
A-T-022s	02/10/2024	02/10/2024	02/10/2024	02/10/2024	02/10/2024	02/10/2024	
A-T-024s	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	
A-T-026s	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	
A-T-027s	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	
A-T-028s	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	
A-T-031s	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	
A-T-032s	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	
A-T-040s	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	
A-T-042sTCN	02/10/2024	02/10/2024	02/10/2024	02/10/2024	02/10/2024	02/10/2024	
A-T-044	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024
A-T-045	01/10/2024	01/10/2024	01/10/2024	01/10/2024	01/10/2024	01/10/2024	
A-T-050s	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	03/10/2024	
A-T-055s	02/10/2024	02/10/2024	02/10/2024	02/10/2024	02/10/2024	02/10/2024	
Calc-As Recd	02/10/2024	02/10/2024	02/10/2024	02/10/2024	02/10/2024	02/10/2024	

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



Certificate of Analysis

Certificate Number 24-21062

Issued: 11-Oct-24

Client Envirolab Ltd
Housesteads
Off Stockport Road
Hattersley
SK14 3QU

Our Reference 24-21062

Client Reference ~ (not supplied)

Order No ~ PO755243

Contract Title ~ 24/09379

Description One Soil sample.

Date Received 02-Oct-24

Date Started 02-Oct-24

Date Completed 11-Oct-24

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read "K. Bridgewood".

Kirk Bridgewood
General Manager



Normec DETS Limited

Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY

Symbol key at end of report Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

Page 1 of 3

Summary of Chemical Analysis

Soil Samples

Our Ref 24-21062

Client Ref ~

Contract Title ~ 24/09379

Lab No	2402918
	24/09379/7
Sample ID ~	
Depth ~	0.15
Other ID ~	WS104
Sample Type ~	SOIL
Sampling Date ~	26/09/2024
Sampling Time ~	n/s

Test	Method	LOD	Units	
Metals				
Mercury (Elemental)	DETSC 2333*	0.6	ug/kg	< 0.6
Mercury (Inorganic)	DETSC 2332*	100	ug/kg	3500
Mercury (Methyl)	DETSC 2332*	0.1	mg/kg	< 0.10
Mercury (Methyl)	DETSC 2332*	100	ug/kg	< 100
Mercury	DETSC 2325#	0.05	mg/kg	3.5

Information in Support of the Analytical Results

Our Ref 24-21062

Client Ref ~

Contract ~ 24/09379

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2402918	24/09379/7 0.15 SOIL	26/09/24	PG		
Key: P-Plastic G-Bag DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.					

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377. Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis. The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :- Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months
--

Key:

~ Sample details are provided by the client and can affect the validity of the results

* -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 24/09501
Issue Number: 1
Date: 07 October, 2024

Client: BEK Enviro Ltd
2 Landwick Court
Metcalf Drive
Altham Business Park
Altham
Lancashire
BB5 5GY

Project Manager: ** USE THIS Mick Buckley/James Mashiter
Project Name: Greenbrow Social Club, Wythenshawe
Project Ref: Not specified
Order No: 8460-24100-AH
Date Samples Received: 02/10/24
Date Instructions Received: 02/10/24
Date Analysis Completed: 07/10/24

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 24/09501

Client Project Name: Greenbrow Social Club,
Wythenshawe

Client Project Ref: Not specified

Lab Sample ID	24/09501/1	24/09501/2	24/09501/3	24/09501/4	24/09501/5			Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	VS-Hg-1	VS-Hg-2	VS-Hg-3	VS-Hg-4	VS-Hg-5					
Depth to Top										
Depth To Bottom										
Date Sampled	01-Oct-24	01-Oct-24	01-Oct-24	01-Oct-24	01-Oct-24					
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL					
Sample Matrix Code	6A	4AE	4AE	4ABE	5AE					
% Stones >10mm _A	<0.1	5.3	10.2	3.4	4.4			% w/w	0.1	A-T-044
Mercury _B	<0.17	2.16	1.45	<0.17	<0.17			mg/kg	0.17	A-T-024s

Report Notes

General

- This report shall not be reproduced, except in full, without written approval from Envirolab.
- The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
- 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 within the same delivery, will be disposed of **four weeks** after the 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 our scope of accreditation.
- A deviating sample 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.
- If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
- Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

Key

Superscript “#”	Accredited to ISO 17025
Superscript “M”	Accredited to MCertS
Superscript “U”	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript “A”	Analysis performed on as-received Sample
Subscript “D”	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript “D” on Asbestos	Analysis performed on a dried aliquot of sample provided.
Subscript “A”	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
Trace	Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh.
N/A	Not applicable

Asbestos

Identification: 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

“Trace Asbestos Identified” will be reported if there is not enough present to verify the type.

Quantification: Generally a 2 stage process including visual identification, hand picking and weighing, and fibre counting. 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. 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). “TRACE” will be reported as a quantification result.

PLEASE INFORM THE LABORATORY IF YOU WOULD LIKE THE STAGE 3 SEDIMENTATION PROCESS CARRIED OUT. Note this will be subcontracted.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs

Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.

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 by method A-T-007:

For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only. Results “with Clean up” indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:

EPH CWG results have humics mathematically subtracted through instrument calculation.

Where these humic substances have been identified in any IDs from “TPH CWG with clean up” please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

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.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: BEK Enviro Ltd, 2 Landwick Court, Metcalfe Drive, Altham Business Park,
Altham, Lancashire , BB5 5GY

Project: Greenbrow Social Club, Wythenshawe

Clients Project No:

Project No: 24/09501

Date Received: 02/10/2024 (am)

Cool Box Temperatures (°C): 13.9

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	24/09501/1	24/09501/2	24/09501/3	24/09501/4	24/09501/5
Client Sample No					
Client Sample ID/Depth	VS-Hg-1	VS-Hg-2	VS-Hg-3	VS-Hg-4	VS-Hg-5
Date Sampled	01/10/24	01/10/24	01/10/24	01/10/24	01/10/24
A-T-024s	07/10/2024	07/10/2024	07/10/2024	07/10/2024	07/10/2024
A-T-044	04/10/2024	04/10/2024	04/10/2024	04/10/2024	04/10/2024

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

APPENDIX E

Segregation Statement



SEGREGATION STATEMENT

COMPILED FOR: THE CASEY GROUP LTD

**SITE ADDRESS: FORMER GREENBROW SOCIAL CLUB,
GREENBROW ROAD, WYTHENSHAW M23 2TU**

COMPILED BY: NEIL WILLIAMS – DHI EXCAVATIONS LTD

Method of Segregation

Site Address: **Former Greenbrow Social Club, Greenbrow Road, Wythenshawe M23 2TU.**

Segregation Area: WS102

Location WS102 was chemically classified as Non-Hazardous due to elevations in Metals Concentrations as identified within Phase 2 Geoenvironmental Site Assessment Report reference: 17-305-R1-1.

DHI attended site to segregate area WS102 on Tuesday 24/09/2024. Location was plotted and segregation area marked out as per below drawings and images. Area was excavated to 0.4m/400mm as per reduce level dig specifications due to future use of the are as hardstanding/car park, small inclusions of made-ground were identified, no odour.

3 x loads were removed from site to Booth Ventures – Harwood quarry for disposal as Non Hazardous soils under permit reference: BV8741IL – Waste Transfer note reference: DHI/00-2229 listed below.

Drawing 1:



Segregation images:



Waste Transfer Note:

DHI Excavations Ltd

11 - 13 Church Street, Farnworth, Bolton. BL4 8AG



Duty of Care - Controlled Waste Transfer Note		Serial No. DHI/ 00-2229	Official use only
		SIC Code: 42.10/2	
A Description of the waste	1. How is the waste contained? ☒ Loose ☐ Skips ☐ Sacks ☐ Drums ☐ Other (Specify): 2. Describe the waste being transferred NON HAZARDOUS SPOIL AS PER ANALYSIS SUPPLIED LOCATION WS102 Classification CODE? 170504 3. QUANTITY: 100 ☐ kg ☒ Tonnes ☐ m3 Group number: 4. The Landfill Tax (Qualifying Material) Order Schedule 2011 ☐ Applicable		
B Producer Details	1. Full name (print): P CASEY AND CO LTD 2. Company Name, Address and Postcode: RYDINGS ROAD, ROCHDALE, OL12 9PS 3. Which of the following are you? (Please tick one or more boxes) A ☒ Waste Producer ☐ Soil Producer ☐ Waste collection/disposal authority ☐ Broker B ☐ Holder of Disposal/Management Licence ☐ Exempt from carrier Licence / Carrier number(S) Issued by: C ☐ Exempt from licensing requirements ☐ Exempt from carrier registration Reason:		
C Carrier Details	1. Full Name (print): DHI EXCAVATIONS LTD 2. Company Name, Address and Postcode: 11-13 CHURCH STREET, FARNWORTH, BOLTON, BL4 8AG ☒ Registered Carrier (give number): CBDU1811466 We have fulfilled our obligation with regards to the Waste Hierarchy Regulations 12 of Waste (England and Wales) Regulations 2011		
D Carrier Details	1. Place of Transfer: FORMER GREENBROW SOCIAL CLUB - GREENBROW ROAD, WYTHENSHAW, M23 2TU 2. Date of Transfer: 24/09/2024-23/09/2025 (for multiple transfer give between dates, see notes) 3. Name and address of broker arranging transfer (if applicable): WCL No. 4. Producers representatives Name (print): LADY LIONS Carriers representatives Name (print): NEIL WILLIAMS Sign: [Signature] Sign: [Signature]		
E Disposer Details ☐ Waste ☒ Soils	1. Full Name (print): BOOTH VENTURES LIMITED 2. Company Name, Address and Postcode: 78 CHORLEY NEW ROAD, BOLTON, BL1 4BY 3. Which of the following are you? (Please tick one or more boxes) ☒ Holder of waste disposal / management licence (give number): EPR/BV67411/L/V004 Issued by: EA ☐ Exempt from licence requirements (give reason):		
F Second Transfer (carrier to disposer)	1. Place of Transfer: HARWOOD QUARRY, BROOKFOLD LANE, HARWOOD, BOLTON, BL2 4LT 2. Date of Transfer: 24/09/2024-23/09/2025 (for multiple consignments give between dates) 3. Name and address of broker arranging transfer (if applicable): 4. Carriers Representatives Disposers Representatives Name (print): NEIL WILLIAMS Name (print): M. HAOEY Sign: [Signature] Sign: [Signature] Company name: DHI EXCAVATIONS LTD Company name: BOOTH VENTURES LIMITED		

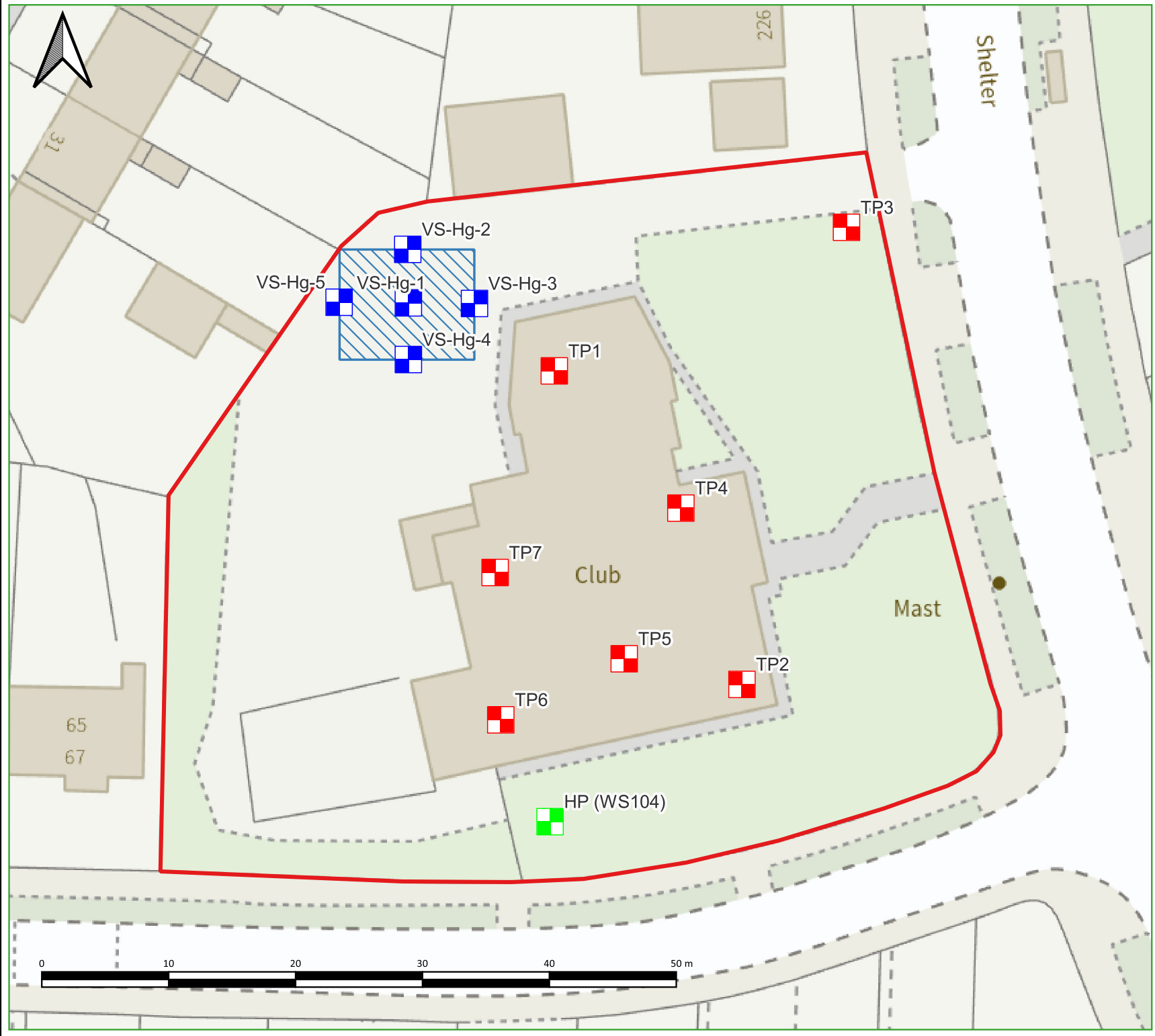
Important: This page must be retained by you, on a register held by you, for at least two years from the date of the last transfer to which the note applies.
White - DHI copy, Blue - Disposer copy, Yellow - Producer copy, Pink - Spare

APPENDIX F

Drawings



Location Symbols Approximate Window Sample Probehole Location (E3P Location February 2024) Approximate Window Sample Probehole Location with Install (E3P Location February 2024) Existing Building - No Access							Notes:			Client: Shape Consulting Engineers		Job No: 17-305	Date: 04.03.2024	Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk				
					Drawing No: 005	Scale: NTS @ A3												
<table><tr><td>P1</td><td>REVA</td><td>04,03,2024</td><td>CB</td><td>AS</td><td>AS</td></tr><tr><td>Phase</td><td>Issue</td><td>Date</td><td>Drawn</td><td>Checked</td><td>PM</td></tr></table>			P1	REVA	04,03,2024	CB	AS	AS	Phase	Issue	Date	Drawn	Checked		PM	Job Title: Greenbrow Social Club		Drawing Title: Exploratory Hole Location Plan
P1	REVA	04,03,2024	CB	AS	AS													
Phase	Issue	Date	Drawn	Checked	PM													



Key

- Red Line Boundary
- Hotspot Removal (Undertaken by DHI)
- TP Locations
- Hotspot Validation Samples Speciated
- Mercury Sample

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Rev:	Description	Date	BY



BEK
GEO-ENVIRONMENTAL CONSULTING

No.2 Landwick Court, Metcalf Drive, Altham Business Park,
Lancashire, BB5 5GY
Tel: 01254 377622 Mob:07906753583
Email: mbuckley@bekenviro.co.uk
Web: www.bekenviro.co.uk

Client: The Casey Group Limited

Job Title:
Greenbrow Social Club,
Wythenshawe

Drawing Title:
Intrusive Location Plan

Scale @ A3	Drawn By: AH	Approved By: MB	Date: 16/10/24
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Drawing No:
24100-1