Ground Investigation Report (intrusive)

Ashbrow Road, Fartown, Huddersfield

SOIL AND STRUCTURES

Ground Investigation Report (intrusive)

Ashbrow Road, Fartown, Huddersfield

SOIL AND STRUCTURES

Report Status

Project Number	20459
Report Number	001
Revision	V01 – Issue for information
Date Issued	21 December 2024 (V01)

Report Author

Russell Bowman (Director) *BSc (Hons) MSc CEng CWEM MCIWEM*

Contents

The Ground Investigation Report has been written with reference to various sources of information. These are either appended or included as footnotes at the base of each respective page.

Guidance notes for: i) unexpected material encounters; and, ii) material suitability are included as annexes. These are intended to offer further context and advice on these different aspects of ground investigation and groundworks.

Appointment

Soil and Structures Ltd were instructed by Northlight Architectural Consultants Ltd (*the Client*) on behalf of Pennine Domestic Abuse Partnership in October 2024 to prepare a Ground Investigation Report (*this Report*) in support of a planned development on a parcel of land off Ashbrow Road, Fartown, Huddersfield (the Site).

Development proposals include for the erection of mixed-use development of retreat building and 5 dwellings with integral garages (planning ref. 2022/90852).

Reliance on the advice presented herein rests solely with the Client.

Scope and Context - General

In the ground everything is inter-related: from strength to pollution potential; through to, stability and drainage characteristics. Any groundworks completed as part of a development project will influence, and be influenced, by all these inter-related elements.

This Report seeks to reconcile the findings of intrusive fieldwork and laboratory testing with the Site setting, to offer as complete a picture of the ground as possible, as well as how these ground conditions stand to influence the proposed development.

This Report also present more specific advice as detailed below.

Scope and Context - Specific

The more specific, legal context of the advice given in this Report relates to an assessment of:

i) Potential ground-related hazards that may affect the development that is governed by health and safety law (various acts and regulations);

ii) The assessment of potential coal mining related hazards is governed by both health and safety law (various acts) and rooted within national planning policy that is governed by planning law (various regulations and orders); and,

iii) The suitability of the Site for its proposed end use that is rooted within national planning policy guidance (the National Planning Policy Framework) that is governed by planning law (various acts). The assessment of 'suitability' relates specifically to ground-related hazards of contamination, pollution and ground gases as set out within both the Environment Protection Act 1990 : Part 2A (2012) and Environment Agency guidance 'Land Contamination Risk Management' (LCRM) (2020).

In practice, this necessitates acceptance of this Report and its findings by the Mining Remediation Authority and the Local Planning Authority's contaminated land team; both statutory consultees.

Fieldwork

This Report references intrusive investigation fieldworks that were scoped and supervised by the author of the Report.

Background to this Report

This Report is preceded by a single ground-related report; a Phase 1 Environmental Desk Study and Coal Mining Risk Assessment prepared by Rogers Geotechnical Services Ltd ref. C4201/24/E/6429 dated 16 May 2024.

1.0 The Site and Proposed Development

1.1 The Site

Location and size: The Site comprises the site of a former, private dwelling and former landscaped garden (since having become overgrown). The private dwelling is understood to be in use as retreat centre with vehicular parking and access to the retreat centre (but not the main Site area) via a gated entrance in the north-western corner of the Site.

Access: At the point of the fieldworks, the Site was accessed on foot via the north-eastern corner (garage access) with excavator access (3CX excavator) only possible through demolition of an existing wall in the same corner.

Topography: The surface topography of the Site slopes towards the south-west. Levels fall from around 120 mAOD in the north-eastern corner to 108.5 mAOD in the south-western corner.

Utilities: Below ground utilities are understood not to be present beneath the Site with overhead lines present.

Existing structures: At the point of the fieldworks, the Site was occupied by the existing dwelling (No. 41 Ashbrow Road) and associated garage. Relic landscaping features, e.g. dry stone walls, steps and terracing were noted within the central portion of the Site together with two former, dilapidated out-buildings.

1.2 The Proposed Development

Development proposals: include for the erection of mixed-use development of retreat building and 5 dwellings with integral garages.

ⓘ ***Development works and risk:*** *An appreciation of the construction processes is essential for development-related risk assessments given the groundworks stand to meaningfully alter the level of risk, e.g. unstable slopes being removed by earthworks, or unsuitable material being exposed as part of the works.*

To enable this development, the following groundworks are likely to be required, N.B. listing is outline only.

> Preparation: Surface strip of existing vegetation, removal of relic structures, e.g. dry-stone wall, compost bins and former out-buildings, demolition of the former garage and recovery of existing Topsoil deposits.

> Earthworks: It is anticipated that some reprofiling of the Site will be required to suit formation levels; at this stage, the extent of this work is unknown.

> Utility Excavations: Excavation of new drainage and other utility alignments.

> Foundations: Construction of new sub-structures (foundations) followed by the structures

> Surfacing: Formation of hardstanding and soft landscaping including private gardens.

ⓘ ***Risk profile of the proposed development for human health:*** *The proposed development would see a former residential site (single private dwelling) developed for a mixed use, retreat and residential end use. The sensitivity of the development therefore remains unchanged if not slightly less sensitive (managed garden areas). Based on the history of the plot (single private dwelling) the likelihood of potentially harmful or polluting material being present was considered low. It is also noted that, at the point of investigation the Site (former landscaped garden) had become heavily overgrown with the existing residential dwelling having a very limited . Further commentary on this is presented within Section 2.0.*

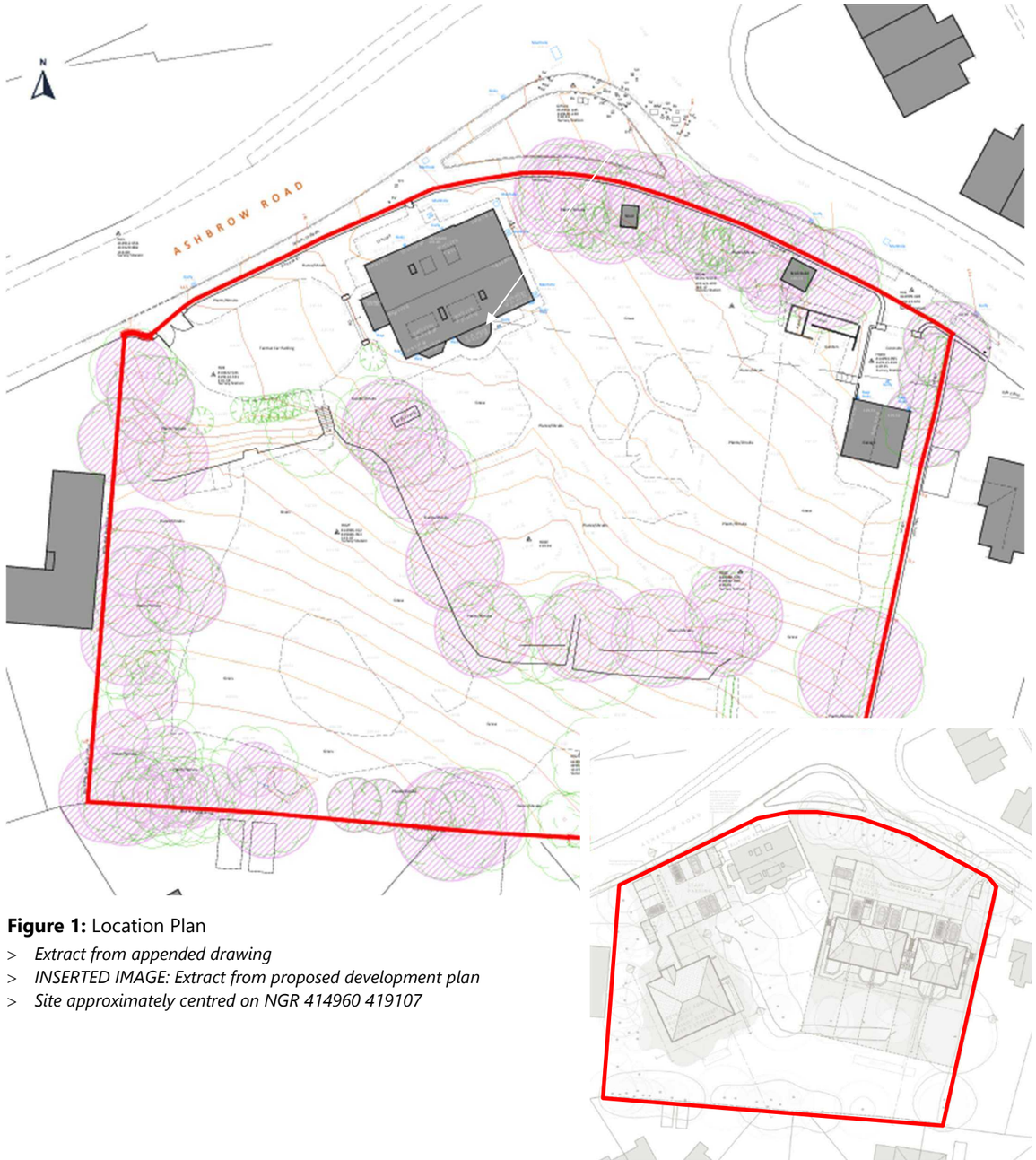


Figure 1: Location Plan

> *Extract from appended drawing*
> *INSERTED IMAGE: Extract from proposed development plan*
> *Site approximately centred on NGR 414960 419107*

2.0 Site Setting

ⓘ ***Background information***: *The Site setting is described within the 'Phase 1 Environmental Desk Study & Coal Mining Risk Assessment' prepared by Rogers Geotechnical Services Ltd ref. C4201/24/E/6429 dated 16 May 2024.*

The commentary within this section supplements that presented within the above report. A revised approach to the contaminated land matters is also proposed and described within the first info-box in Section 3.0.

Potentially harmful and polluting material: within the Rogers Geotechnical Services (RGS) reporting the risk presented by 'potentially contaminative sources' was assessed as being 'moderate' against various, theoretical pollutant linkages, e.g. groundwork operatives being exposed to vapours from potentially vapour generating material that is potentially present in the ground.

In other words, the risk was deemed to not be acceptably low, and further assessment was recommended.

In connection with this assessment, the RGS report highlighted the presence of former structures on the plot (Figure 2) whilst also noting; *"limited sources of Made Ground have been identified"* and, in this context, recommended that an intrusive investigation comprising a minimum of 3 sampling locations was completed with "*target areas… assessed during any investigation*". Thes

Potentially harmful material represents a possible hazard on all Brownfield sites, including this former residential plot.

Strictly, it is considered likely that sources of potentially harmful material exist on Site, e.g. discarded coal ash deposits associated with former coal fires in the dwelling and the former glasshouse (Figure 2).

However, despite this, the 'real risk' from this material needs to consider:

i) The fact this is a former residential plot across which a single former structure is present (glasshouse likely as part of a historic cottage garden) with the remainder of the Site a private garden, i.e. the background threat from this land is low (with respect to potentially harmful or polluting material).

ii) Any residual Made Ground deposits present on Site are anticipated to be physically unsuitable for re-use within proposed areas of soft landscaping (the area future residents stand to be more likely exposed to this material) notwithstanding their chemical suitability; and,

iii) The Site is due to be developed from a residential-to-residential end use where the sensitivity remains unchanged, noting that this doesn't remove the potential for potentially harmful material or polluting material to be present.

Taken together, this Report:

> Agrees with the general recommendation made within the RGS reporting - intrusive investigation for ground profiling and environmental sampling on a responsive basis to characterise the quality of materials that stand to be retained or recovered for re-use as part of the proposed development;

> Broadly agrees with the non-targeted approach for the intrusive investigation noting that the former glasshouse does represent a specific feature-of-interest for the investigation that warrants targeting; and,

> Does not agree with the value of assessing the risk presented by potential pollutant linkages at this stage of a project. The hazard has been identified and if and where potentially harmful or polluting material is encountered then, at that stage, further assessment would be warranted. Until then, there is too much uncertainty to offer a realistic assessment of the risk.

The requirement for ground gas monitoring was determined to be discretionary within the RGS report, if and where 'deep' Made Ground deposits were encountered.

Figure 2: Historical mapping extracts

> *Extract from 'Phase 1 Environmental Desk Study & Coal Mining Risk Assessment' prepared by Rogers Geotechnical Services Ltd*

> *LEFT HAND IMAGE: 1906-1907 mapping; RIGHT HAND IMAGE: 1958 mapping*

3.0 Intrusive Investigation and Laboratory Testing

The intrusive investigation (Table 1) was designed in general accordance with guidance for site investigation[1], with reference to the Site setting, the anticipated ground conditions, access arrangements and responding to the revealed ground conditions.

ⓘ ***Comments on the scope of the fieldwork:*** *The mapped presence of outcropping bedrock (Pennine Lower Coal Measures), restricted access arrangements (requiring prolonged preparatory works), overhead utilities, overground nature of the vegetation and local experience of the Author guided the use of machine excavated trial pits. In general, trial pits offer a much clearer impression of the ground conditions compared to smaller boreholes.*

An assessment of the likely consistency of ground conditions is offered however, it should be borne in mind that any ground investigation offers a snapshot of variations between exploratory hole positions cannot be ruled out.

This investigation is considered to have obtained sufficient data to inform design decisions and support revised risk assessments in relation to hazards associated with: coal mining; and, potentially harmful or polluting material.

Unexpected or unforeseen ground conditions may be encountered even when extensive investigation is completed. In this scenario, further investigation is not recommended.

Exploratory hole locations are illustrated on the Ground Model in Section 5.0 with descriptions of the materials encountered detailed within the following section, Section 4.0.

The exploratory hole logs are appended.

Permits: No specific permissions were required for the intrusive investigation fieldworks.

Table 1: Scope and Rationale of the Intrusive Investigation

Activity	Ref.	Rationale
Exploratory Holes		
6 machine excavated trial pits	TP101 to TP106	To confirm the ground conditions across the Site (general coverage) with specific attempts to target of the predicted position of the former glasshouse (TP104). It is noted that the overgrown nature of the vegetation and steeply profiled topography precluded access to the full extent of the Site (excavator was being resisted by the angle, thickets of brambles and tree saplings combined) with TP104 taken as close as practicable to the former glasshouse position.
In-Situ Testing		
Variable (falling) head testing in general accordance with current standards[2]	TP101 and TP102	To enable rates of infiltration or permeability to be evaluated within the targeted geology. This is one line of evidence to support infiltration potential being assessed. It should be noted that drainage into unsaturated or partially saturated soils and rocks (vadose zone) occurs under very different, typically more complex conditions compared to saturated soils. Specific attention should be given to the difference between percolation (through pre-saturated soils) and infiltration. In general, percolation occurs at slower rates as infiltration fills existing air voids within the soil. Various studies have suggested that adopting falling head test models (saturated soils) can offer a reliable, if conservative means to estimate drainage rates within unsaturated or partially saturated soil systems.
Other		
Logging of soil arisings from exploratory holes.	All holes	To characterise: ground conditions; existing foundations; and support classification of materials present in the ground. Material descriptions are detailed in the notes on the Ground Model in Section 5.0, the accompanying exploratory hole logs and strata depths on the plan itself.

Geotechnical samples were obtained from the cohesive residual soils (argillaceous rocks) to classify their volume change potential, pH and soluble sulphate content.

Environmental samples were not obtained in a targeted manner given the absence of any material identified as containing potentially harmful or polluting material but were obtained from the Topsoil deposits in two locations across the Site to allow the chemical suitability of this material for re-use to be assessed.

Ground gas monitoring was not undertaken given the lack of landfills or other sources of potential ground gas identified within 250 m of the Site or within the Site's soils (no evidence of potential ground gas 'hazards').

4.0 Ground Conditions– Anticipated and Revealed

Anticipated ground conditions: Based on the Site setting the presence of two main materials were anticipated across the Site: (1) surface coverings, e.g. Topsoil, over; (2) Pennine Lower Coal Measure deposits (likely recovered as residual soil grading into intact bedrock).

Revealed ground conditions: The intrusive investigation undertaken on Site confirmed the anticipated conditions with one variation and four observations:

> *Variation 1*: Relic structures (dilapidated sheds) are present on Site (not previously noted in the RGS report).

> Observation 1: No evidence of potentially harmful or polluting material was encountered in the relic structures, exploratory holes or the surface of the Site;

> *Observation 2:* No evidence of coal was revealed within the exploratory holes (*confirming the RGS analysis of the bedrock geology*) however, carbonaceous mudstone was recovered from TP104 (*that is common within the Elland Flag sequence of rocks that are indicated to underlie the Site*);

> *Observation 3:* Residual soils (completely weathered rock) were recovered immediately below the Topsoil deposits that grade to intact rock at depths of 0.50 m below ground level. Excavations with an 8 tonne excavator slowed rapidly below this depth. Sandstone was recovered from the northern portion of the Site with the rock recovered from the lower elevations of the Site mainly siltstone.

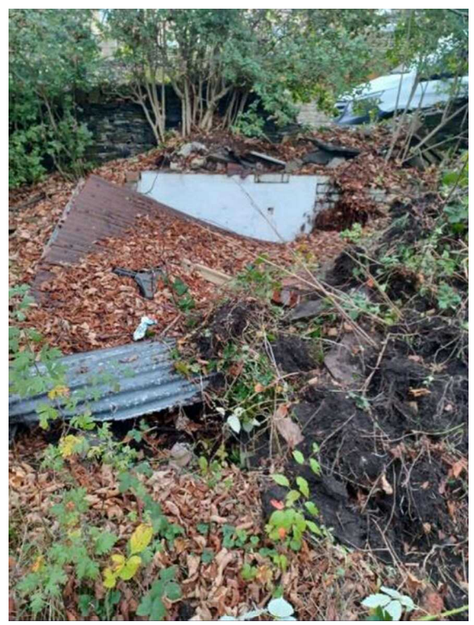
> *Observation 4:* Groundwater was not encountered within 1.10 m of the ground surface (deepest depth exploratory holes were taken). The groundwater table is considered likely to be hard to reliably predict given the layered, variably permeable nature of the Pennine Lower Coal Measures bedrock, i.e. 'layered' aquifers can exist with water being transported in discrete layers or more permeable rocks.

The Ground Model for the Site is presented in Section 5.0 and includes further commentary on the ground conditions.

[1] *Code of practice for design and installation of drainage fields for use in wastewater treatment. BS 6297:2007 (+A1:2008) or Part H of the Building Regulations*

[2] *BS 5930 (2015); BS 22282:2 (2012)*

Photograph 1: Stitched panorama taken from south-western corner of the Site panning left (north-west) to right (east)



Photograph 2 (left) and 3 (right): Former outbuildings – no evidence of potentially harmful or polluting material, e.g. asbestos containing material

Photograph 4: Texture of the carbonaceous mudstone (possible completely weathered / washed out coal) recovered from a depth of 0.40 m below ground level in TP104

Photograph 5: Texture of the sandstone recovered from a depth of 0.50 m below ground level in TP106

Photograph 6: Texture of the siltstone (and inferior sandstone) recovered from a depth of 1.00 m below ground level in TP101

INSERT: TP101 infiltration test pit (water in hole has been introduced and is not 'groundwater'

5.0 **Ground Model** – Plan

Key

Soil and Structures – November 2024 investigation

- Machine excavated trial pit
  - **ES** = Environmental samples
  - **D** = Small 'disturbed' sample (geotechnical)
- Infiltration test location
- Approximate massing of proposed structures
- Locations of select existing structures; small retaining walls landscaping) and boundary walls not highlighted
- Approximate massing of historic structures

Ground Conditions

During the fieldworks the Site was found to be very overgrown with saplings and bramble requiring extensive clearance works to access the exploratory hole positions

> Made Ground deposits were not encountered in any of the exploratory hole locations but may be encountered beneath existing and former structures and hardstanding (construction materials, e.g. sub-base).

> Pennine Lower Coal Measure (PLCM) deposits were encountered within all exploratory holes below the Topsoil to hole termination depths of between 0.75 to 1.20 m below ground level (very slow progress with 8 tonne excavator).

Geotechnical characteristics of Penning Lower Coal Measures based on exploratory hole logs, laboratory testing results and Author's experience of testing this geology local*ly*:

- 'Stiff' becoming 'very stiff' strength (soil classification), locally 'firm' with undrained shear strength (UCS) estimated to be upwards of 90 kN/m^2 around 0.50 m depth;
- 'Very poor' drainage characteristics;
- Medium volume change potential assumed (conservative assumption based on Author's experience in this geology);
- Low sulphate content (<*500 mg/l*); and
- Near neutral pH (*pH 6 to 8*).

> Groundwater was not encountered within 1.20 m of the ground surface

> No visual or olfactory evidence potentially harmful or polluting material was encountered on the Site or within any of the exploratory holes.

> Apart from the carbonaceous mudstone, no evidence of degradable material was encountered within the exploratory holes.

6.0 Ground Engineering – Risk Management & Design Considerations

The main design considerations include, but are not limited to;

> Low to moderate imposed loads of the proposed structures; and,

> The presence of intact bedrock deposits at shallow depth.

Based on the revealed ground conditions, the following ground-related hazards have been identified that could influence the proposed development.

⚠ **Shrink-swell** (volume change potential within the completely weathered bedrock).

⚠ **Sub-Structures** (relic footings and other sub-structures).

Laboratory analysis of the existing Topsoil deposits recorded the presence of elevated concentrations of Polycyclic Aromatic Hydrocarbons (PAHs); likely associated with coal ash. At the concentrations recorded, the existing Topsoil is provisionally deemed unsuitable for use and therefor the following hazard applies.

⚠ **Potentially harmful material** (suspected coal ash within the existing Topsoil deposits).

ⓘ ***Utilities:*** *Utility strikes represent one of the highest background threats of injury, death and programme delays of all the ground-related hazards. The presence of existing utilities is a hazard that presents for all groundworks activities and hence is generally subject to separate investigations and assessments by utility specialists. Reference is included within this Report for completeness.*

6.1 General Groundworks

Excavations are expected to be progressed at typical rates through the shallow Pennine Lower Coal Measures (to depths of around 0.50 m) employing a medium sized excavator, e.g. midi digger with any bucket.

However, excavations taken deeper than 0.50 m below ground level are expected to slow rapidly when more intact bedrock deposits are encountered. The use of a larger machine is likely to be required to maintain typical rates of excavation.

It is also noted that the exploratory holes were all terminated around 1.00 m depth due to very slow (scraping) progress using an 8 tonne 3CX excavator.

⚠ **Sub-Structures**: The presence of relic sub-structures may guide the requirement for a larger machine and/or the use of a breaker to support their excavation.

Based on the nature of the existing structures earmarked for demolition, either shallow concrete footings or no footings (timber shed) are anticipated.

In general, excavations are unlikely to require short-term temporary support given the shallow depth at which intact bedrock deposits are encountered.

ⓘ ***Excavation access*** *personnel access into any excavations should only be undertaken with adequate support and appropriate risk assessment. Further guidance is available*[3].

Excavations are expected to hold water with a pump likely to be required to remove water following periods of rain.

Earthworks (cut and fill) It is anticipated that some reprofiling of the Site will be required to suit formation levels; at this stage, the extent of this work is unknown.

Material suitability for re-use (geotechnical and environmental).

Recovery and re-use of excavation arisings is anticipated to be sought as part of the proposed works.

This is likely to include the existing Topsoil deposits with the predominantly argillaceous (mudrock) nature of the bedrock deposits likely to preclude their re-use as any load bearing fill (possible use as Landscaping Fill – Class 4).

⚠ **Potentially harmful material**: The existing Topsoil deposits were anticipated to be 'suitable for use' noting that, the former use of the Site is considered to have a low pollution potential.

Laboratory analysis (chemical) of the existing Topsoil deposits recorded the presence of elevated concentrations of Polycyclic Aromatic Hydrocarbons (PAHs); likely associated with coal ash.

The presence of PAHs is not unexpected but at the concentrations recorded (max 7.2 mg/kg) may present an unacceptable risk to human health that could render them unsuitable for re-use as part of the proposed development.

Re-use of a materials is central to sustainable development but should only be undertaken using materials that are suitable for use. Further commentary on the Topsoil's suitability is detailed within Section 6.4 that concludes by recommending:

- The existing Topsoil cannot be confirmed as being suitable for use at this stage – further testing is recommended.
- Based on an average Topsoil thickness of around 0.15 m (across the 6 exploratory holes) and a plan area of the Site of 4000 m^2 (across which Topsoil is recoverable; outside existing structures and likely tree protection zones) 600 m^3 of Topsoil is anticipated to be recovered. At this volume and based on the similar PAH concentrations in the existing samples, it is recommended that a further 6 samples of Topsoil are obtained if and where it's reuse as part of the proposed development is planned.
- Even if the Topsoil is not suitable for re-use as part of the proposed development, it is likely to be suitable for re-use as part of less sensitive developments, e.g. public open space or commercial end uses. It therefore represents a potential resource for onward sale/transfer.

Potentially polluting material: At the concentrations recorded and with reference to; i) the nature of the material likely resulting in the elevated concentrations of Polycyclic Aromatic Hydrocarbons and, ii) the very poor drainage characteristics of the shallow bedrock deposits, the risk presented to Controlled Waters is deemed low.

> For material re-use as an engineering or load-bearing fill the Engineer's approval will be required. Additional testing may be required to confirm grading and where necessary, a compaction regime if placed in load bearing situations, e.g. beneath ground bearing floor slabs or behind retaining walls.

> For all scenarios, developing a strategy for management of materials/soils in advance of the works is advised to minimise handling and maintain soil conditioning, e.g. not repeatedly handling or compacting Topsoil.

[3] *CIRIA Report 97 - Trenching Practice - Second Edition (1992)*

Waste classification of excavation arisings for any material surplus to requirements (requiring disposal) will need to be agreed with the groundwork contractor in line with current guidance[4].

The waste classification of soils is something that should be approached in a step-wise manner first confirming whether or not a soil is Hazardous or Non-Hazardous (through solid soil testing) followed by Waste Acceptance Criteria testing only when and where off-Site disposal is confirmed as the fate for the material.

In any event, groundworks contractors have direct access to landfill operators whose acceptance criteria can vary from month to month and, as such, are generally best placed to confirm waste classifications.

It is therefore recommended that any waste classification is confirmed with the appointed contractor in advance of the groundworks commencing with the following advice is offered on a preliminary basis.

Natural soils excavated are expected to be classed as Soil and Stones (EWC 17 05 04 – Mirror Non-Hazardous) if requiring off-Site disposal however, attention should be given to the potential presence of non-natural material that may change this classification and the possible requirement for WAC testing to confirm the disposal route.

If and where there are any questions relating to the waste classification process, these can be referred to the Author of this Report.

6.2 Structural Engineering

Proposed foundations in these ground conditions will be guided by the presence of high strength cohesive soils / completely weathered bedrock at shallow depths.

These conditions guide the use of shallow spread footings to support the proposed structures.

As an indicative solution, for centrally loaded liner (strip) footings up to 0.75 m wide that are formed at a minimum depth of 0.90 m below the reduced level within the very stiff to hard residual soils, an allowable bearing capacity of 150 kN/m^2 could be adopted as part of the foundation design (BS EN 1997-1 methodology based on a conservative estimate of the strength characteristics of the Pennine Lower Coal Measure deposits).

⚠ **Shrink-swell:** A minimum formation depth of 0.90 m below ground level is recommended to account for the presence of cohesive soils and mudrocks that can weather to a clay and a conservative assumption of the volume change potential (medium).

At these depths, the foundations will be formed within rock-like material the volume change potential of which will be limited and reducing with depth and therefore, even when accounting for the presence of trees and vegetation, a formation depth of no deeper than 1.50 m below ground level is recommended unless more weathered, clay-like material is recovered from the foundation excavation.

Provision of compressible material on the inner face of the foundations is also recommended.

> The presence of carbonaceous mudstone / washed out coal deposits (relatively low strength and degradable) beneath the Site directs the need for foundations to be taken through this material (encountered in TP104 only);

The material is too thin and too weathered/degraded to have been of economic value for extraction / mining historically with the next coal seam viable for extraction in the bedrock sequence too deep to present residual stability issues for the proposed structure.

> In any case, the material includes a degradable and potentially combustible content with the following risk mitigation advice relating to potential fire risk. Whilst coal fires are considered a low likelihood overall, coal fires have occurred, are occurring at present and can occur in the UK. If and where an underground fire develops, they are very difficult and costly to extinguish.

- All excavations advanced through the carbonaceous mudstone should be completed as soon as practicable to limit the amount of time it is exposed to the air and fire sources.
- All excavations advanced through the carbonaceous mudstone should be monitored for excessive dryness to limit the potential for spontaneous combustion or combustion to occur within the coal.
- A strict no-smoking policy should be adhered to on Site.
- If and where evidence of smouldering or fires within the carbonaceous mudstone deposits is observed the fire should be smothered with spoil and compacted, if safe to do so and the emergency services contacted alongside the Mining Remediation Authority's emergency mine hazard line **01623 646 333**. Dowsing with water SHOULD NOT be considered as this can lead to explosions.

Floor slabs in these ground conditions will be guided by the presence of cohesive soils.

These conditions guide the use of suspended ground floor slabs as part of the proposed structures with a minimum 150 mm clear void.

Buried concrete placed in all soils encountered as part of this investigation is recommended to be designed to suit DS-1 AC-1 classifications[5] based on the laboratory analysis results and Author's experience of testing the Pennine Lower Coal Measure deposits locally.

For buried concrete design purposes, groundwater should be regarded as 'mobile' (possible seasonal seepage flows).

6.3 Civil Engineering

Hard-standing sub-grades will be subject to final design levels being agreed however, based on the revealed ground conditions and likely formation levels (reduced levels), the sub-grade is expected to comprise stiff residual soil (clay).

In its current condition the residual soil is expected to offer 'good' support with a preliminary CBR of at least 5.0 % recommended when hardstanding is constructed from this formation (minimum depth 0.50 m below ground level).

Drainage of the existing Site is expected to be controlled by drainage to the existing piped network (across existing areas of 'hard' cover) and drainage to ground at very low rates (across existing areas of 'soft' cover).

Based on the revealed ground conditions (cohesive dominated material) and infiltration testing; 'very poor' rates of drainage exist at depths of around 1.2 ed and therefore reconnecting into the existing piped network is recommended.

[4] *Waste classification technical guidance - GOV.UK*
[5] *4.2 Building near trees - NHBC Standards 2021*

[5] *BRE Special Digest 1 (2005) Concrete in aggressive ground. 3rd Edition. (2017)*

Water supply pipes will likely all be laid within natural, residual soil deposits (c. 700 mm depth).

Where laid at these depths, in these deposits, the soils are expected to present a low risk to water supply pipes. The risk presented by the slightly elevated concentrations of PAHs within the shallow Topsoil deposits is not considered to present a risk to water supply pipes at these depths.

On this basis, the use of all suitable construction material is recommended for water supply pipes.

6.4 Landscaping

Soft landscaping: Extensive areas of new soft landscaping are planned as part of the proposed development.

Based on the revealed ground conditions and likely formation levels, the sub-grade across most garden areas is expected to comprise natural residual soil (weathered bedrock).

ⓘ ***Who is responsible for the landscaping design?*** *Where a 'cover system' or 'capping layer' is required to serve as a physical barrier between end users of the Site and chemically or physically unsuitable material below, then the thickness of the soft landscaping will be determined by the ground engineer / land quality consultant.*

Where a 'cover system' isn't required, the thickness of the soft landscaping will be determined by the landscape architect or architect.

In both cases, collaboration / consultation across both parties is recommended to ensure all objectives are met.

ⓘ ***Who decides if a material is suitable for use within soft landscaping?*** *The advice given within this Report relates to the chemical suitability of the Topsoil with respect to human health and not its suitability as a growing medium; that remains the role of the landscape architect.*

When soft landscaping is formed onto this material (weathered bedrock), the thickness of the soft landscaping can be determined by the landscape architect or architect. In general, a minimum Topsoil thickness of 150 mm is recommended by current guidance[6].

⚠ **Potentially harmful material**: Laboratory analysis (chemical) of the existing Topsoil deposits (2 samples) recorded the presence of elevated concentrations of Polycyclic Aromatic Hydrocarbons (PAHs); likely associated with coal ash.

The locations selected for sampling were generally non-targeted to obtain an initial indication of the Topsoil quality across the Site. TP104 is located close to the former glasshouse but is not considered close enough to be reflective of the soil quality beneath that former structure.

The presence of PAHs in the existing Topsoil is not unexpected but at the concentrations recorded (max 7.2 mg/kg) may present an unacceptable risk to human health that could render them unsuitable for re-use as part of the proposed development.

This first-pass screen: indicated that for the two samples tested, apart from PAHs, all chemical compounds were below Generic Assessment Criteria for this end use scenario.

ⓘ **Relevance of Generic Assessment Criteria**: It should be noted that Generic Assessment Criteria are, and need to be, conservative given the actual end use of the Site can't generally be confirmed with good confidence and future uses of the land not able to be predicted.

For example, the Generic Assessment Criteria used as part of this assessment assumes:

> 6 % soil organic matter - *valid here based on an arithmetic mean of 5.15 % across the Topsoil dataset*;

> In-ground planting of edible plants – *valid here (possible)*;

> A small-sized terrace garden - *valid here*; and,

> End users could include a female child from 0-6 years of age - *unknown here but assumed to be valid*.

Site-Specific Assessment Criteria: can be derived however, the sensitivity to frequency of use and duration of use is limited compared to other factors such as bioavailability which, for scenarios such as this, where the risk has initially been considered low, i.e. the Topsoil was anticipated to be suitable for use, can be discussed qualitatively alongside a consideration of the likely sources of the PAHs.

Statistical analysis: is not recommended at this stage on such a small dataset (N = 2).

Potential sources and forms of the PAHs: In this setting, the presence of elevated concentrations of PAHs within the Topsoil on Site may have arisen from the use of coal fires with the use of coal ash as a plant feed, or simply discarded across garden areas, common historically.

The elevated concentrations of PAHs in the two Topsoil samples are suggestive of a more disperse source, e.g. ash from fires, with no evidence of discrete pockets of ash or clinker within the samples obtained.

The elevated concentrations of PAHs being an 'on-Site' source is supported by the fact the 'normal background concentrations' of PAHs in Topsoil within the 'urban domain' are relatively elevated[7].

Other factors:

> Prior to testing, the Topsoil was anticipated to be chemically suitable for use. The fact that elevated concentrations of PAHs have been detected is not unexpected;

> The soil samples were obtained from 0.10 to 0.15 m depth to reflect the general quality of the soil's mass on the assumption that the area will be excavated prior to being re-landscaped. This assumes the existing Topsoil will be excavated and so material that was previously at these depths comes to the surface (where contact is more likely);

> The re-use of existing materials needs to be explored as far as possible to support more sustainable construction practices; and,

> A sample size of two is considered insufficient to derive meaningful conclusions from both the general pattern of PAH distribution and insufficient for meaningful statistical analysis.

It is therefore recommended that:

- The existing Topsoil cannot be confirmed as being suitable for use at this stage – further testing is recommended.

[6] *BS 3882:2015 Specification for topsoil*

[7] Technical Guidance Sheet on normal levels of contaminants in English soils

- Based on an average Topsoil thickness of around 0.15 m (across the 6 exploratory holes) and a plan area of the Site of 4000 m^2 (across which Topsoil is recoverable; outside existing structures and likely tree protection zones) 600 m^3 of Topsoil is anticipated to be recovered. At this volume and based on the similar PAH concentrations in the existing samples, it is recommended that a further 6 samples of Topsoil are obtained if and where it's reuse as part of the proposed development is planned.
- Even if the Topsoil is not suitable for re-use as part of the proposed development, it is likely to be suitable for re-use as part of less sensitive developments, e.g. public open space or commercial end uses. It therefore represents a potential resource for onward sale/transfer.
- As a general recommendation attention should be given to conducting a visual screen of Topsoil deposits recovered and re-used as part of the proposed development. If and where any material that either; differs from that described and illustrated herein, or appears to be physically unsuitable, e.g. sharps or excessive gravel, then the advice of the Author of this Report should be sought.

If required, imported soil forming materials, i.e. Topsoil and sub-soil, should be sourced from a reputable supplier and tested 'at source' to confirm they are suitability for use. The suitability of the imported soil forming material may also need to be confirmed in line with the local planning authority's guidance[8].

[8] *Verification requirements for cover systems (linking to regionally accepted guidance)*

7.0 Conclusions and Recommendations

7.1 Conclusions

In conclusion, the Ground Investigation Report finds that;

> Ground conditions: based on available information and the scope of this Report, the ground conditions on Site were found to be:

i) Broadly consistent with those anticipated noting the presence of relic structures on Site as the main variation (not previously identified) .

ii) Consistent in nature and strength characteristics (*'stiff to very stiff' consistency cohesive formation soils*) with the Pennine Lower Coal Measures proven to a depth of around 1.20 m below ground level, the depth of which was limited by the increasing strength of the material, i.e. the bedrock became less weathered.

> Further assessment is recommended including:

i) Additional sampling and laboratory analysis on the existing Topsoil deposits to support further assessment of their suitability for re-use as part of the proposed development.

Further investigation may also be required subject to any design changes, e.g. inclusion of basements, or requests from appointed contractors, e.g. waste classification.

> Risk mitigation is recommended to reduce the level of risk presented by three ground-related hazards to acceptably low levels details of which are presented within Section 6.0 of this Report alongside other ground engineering advice.

7.2 Recommendations

Recommended follow-on work includes:

1. Submission of the Ground Investigation Report to the project design team and other stakeholders, e.g. building control.

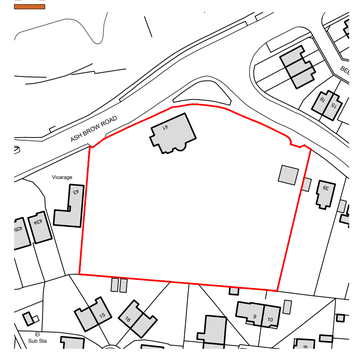
2. Submission of the Ground Investigation Report to the local planning authority for consultation with their Contaminated Land Team and the Mining Remediation Authority – two statutory consultees.

   Full discharge of the planning condition relating to 'mining stability' is recommended.

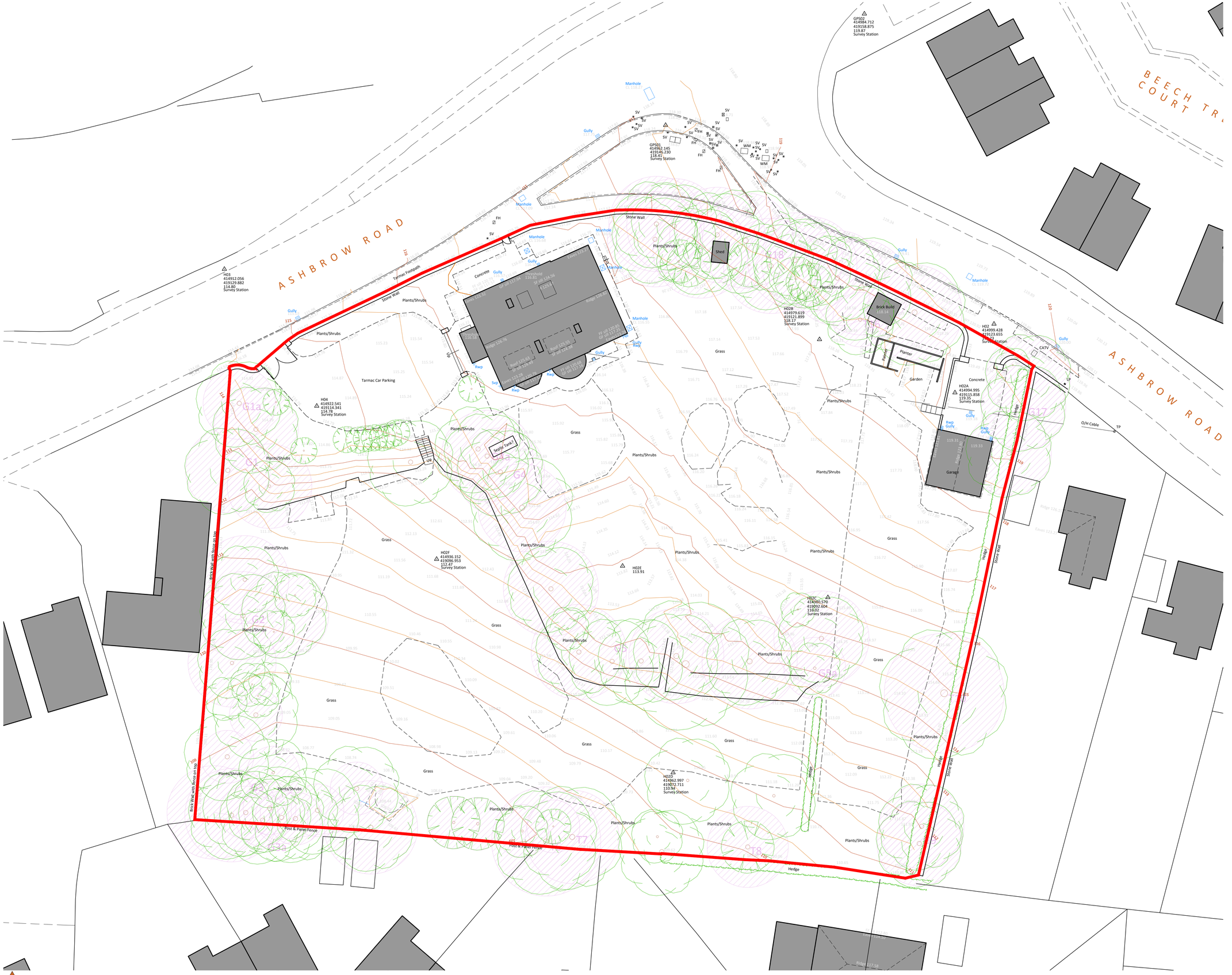
   Partial discharge of the planning condition(s) relating to 'contaminated land' is recommended. It is envisaged that the recommendation for further assessment of the Topsoil quality could be deferred to the construction stage of the project at which point the Site will be more accessible and the material will have been recovered and stockpiled allowing the overall mass of the material to be more readily inspected and representatively sampled.

   Full discharge of the planning condition(s) relating to 'contaminated land' will only be possible at the end of the project noting that the potential for unexpected material encounters remains until all groundwork is completed.

ⓘ ***Photographic diary of the groundworks:*** *It is recommended that a photographic record of the groundworks is maintained to document the physical condition and nature of the ground conditions across the Site. This will serve as a valuable record for the project as well as any future planned works on the Site.*



2 SITE LOCATION PLAN
SCALE 1:1250



1 SITE PLAN AS EXISTING
SCALE 1:200

Revisions

NORTHLIGHT ARCHITECTURE LTD
The Media Centre
7 Northumberland Street
Huddersfield
HD1 1RL
t : 07815 290495
f : 07815 290495
e : info@northlightarchitecture.com
w : www.northlightarchitecture.com

Client
Pennine Domestic Abuse Partnership

Project
Retreat/ Housing at
Ashbrow Road, Huddersfield

Drawing title
Existing Site Plan

PRE-PLANNING ENQUIRY

Scale @ A1	Drawn by
1:200	CG
Date	App'd
June '21	-
Drawing no	Rev
21-1151/(EX)01	-

RETREAT PARKING STATEMENT

The existing retreat building houses 8 residents and 3 to 4 staff members. The current parking provision of 7 spaces is split between the 3 or 4 staff, typically 1 or 2 residents with cars and 1 mini-bus.

The proposed retreat building will accommodate 10 residents and an additional 4 staff members. The additional 7 parking spaces provided under the proposed development will be split between the 4 staff, 2 residents and an additional mini-bus.

ASHBROW ROAD

BEECH TREE COURT

EXISTING RETREAT

New bin store to new retreat building to be constructed of suitable material to contain and prevent the spread of fire. in accordnce with BS5906:2005, Building Regs 2010 Part H6 and CFPA-E Guideline No 7:2022 F.

Bin collection point

Existing boundary wall rebuilt max height 900mm

Section of existing boundary wall removed to form site access

STAFF PARKING

max gradient 1:30

max gradient 1:15

5 No 3 BED HOUSING UNITS + GARAGES

Bin collection point

Bin store to new retreat building to be sited min 6m from building

RETREAT/ ADMIN BUILDING 514sqm/ 5532sqft OVER 2 STOREYS

T7 T8 T9 T10 T11 T18 T22 G23

A-A (0400)
B-B (0400)
C-C (0400)
D-D (0400)
E-E (0400)
X-X (0400)

1 SITE PLAN AS PROPOSED
SCALE 1:200

Rev E -08/08/22- Bin storage amended following LPA comments

Rev D -25/05/22- Retreat parking statement added, retreat bin storage and collection point added, max drive/ car parking gradients indicated.

Rev C -11/05/22- Housing roof plan and layout updated, bin stores and front garden walls/ fencing added, bin collection point relocated, drainage schematics updated, tree works updated in line with updated tree report

Rev B -17/02/22- Entrance to housing site & staff parking area to Retreat amended to co-ordinate with tree report

Rev A -24/01/22- Retreat building redesigned

Revisions

NORTHLIGHT ARCHITECTURE LTD
The Media Centre
7 Northumberland Street
Huddersfield
HD1 1RL
t : 07815 290495
t : 07815 290496
e : info@northlightarchitecture.com
w : www.northlightarchitecture.com

Client
Pennine Domestic Abuse Partnership

Project
Retreat/ Housing at
Ashbrow Road, Huddersfield

Drawing title
Proposed Site Plan

PLANNING APPLICATION

Scale @ A1	Drawn by
1:200	CG
Date	App'd
October '21	-
Drawing no	Rev
21-1151/(AL)01	E

SOIL AND STRUCTURES

Key to exploratory hole symbols and abbreviations

SAMPLE TYPES

ACM - Asbestos sample
AMAL - Amalgamated sample
B - Bulk disturbed sample
BLK - Block sample
C - Core sample
CBR - CBR test sample
D - Disturbed sample
ES - Environmental sample
EW - Environmental water sample
G - Gas sample
J - Jar sample
L - Liner sample
TW - Pushed thin wall sample
U - Undisturbed sample
UT - Undisturbed thin wall sample
W - Water sample

IN-SITU TESTS

HV - Hand shear vane
HV(r) - Hand shear vane residual
PID - Photo ionisation detector
PP - Hand penetrometer
SPT - Standard penetration test
SPT(C) - SPT using cone

GROUNDWATER

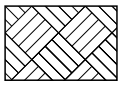
 Groundwater strike

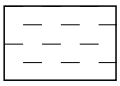
 Groundwater rest level

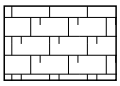
ROTARY CORE DETAILS

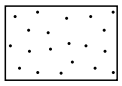
TCR - Total core recovery (%)
SCR - Solid core recovery (%)
RQD - Rock quality designation (%)
FI - Fracture index
NI - Non-intact core
AZCL - Assumed zone of core loss

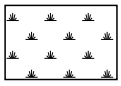
LEGEND

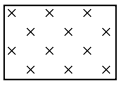
 Topsoil

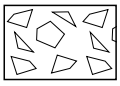
 Clay

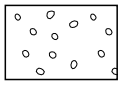
 Chalk

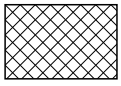
 Sand backfill

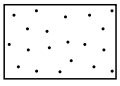
 Peat

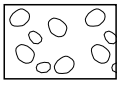
 Silt

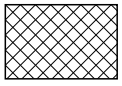
 Breccia

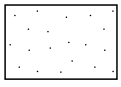
 Gravel backfill

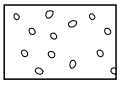
 Made ground

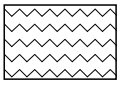
 Sand

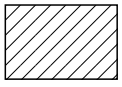
 Conglomerate

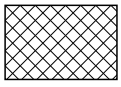
 Arisings

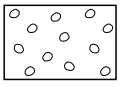
 Concrete

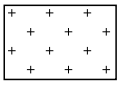
 Gravel

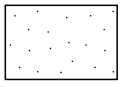
 Metamorphic

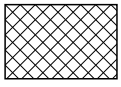
 Bentonite

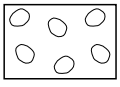
 Wood

 Cobbles

 Igneous

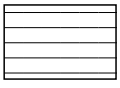
 Concrete

 Brick

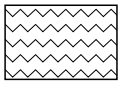
 Boulders

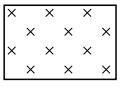
 Grout

 Bituminous material

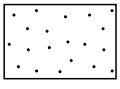
 Mudstone

 Plain pipe

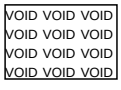
 Gypsum

 Siltstone

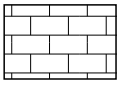
 Coal

 Sandstone

 Slotted pipe



Void

 Limestone

SOIL AND STRUCTURES

Trial Pit

TP101

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414987.00	419078.00	113.50	1:10

Project Name	Project No.	Start Date	End Date
Ashbrow Road, Fartown, Huddersfield	20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
		0.10 - 0.15	ES			(0.25)		Dark brown very sandy SILT with frequent rootlets and occasional roots up to 15 mm diameter. Sand is fine to medium. [TOPSOIL]
		0.30 - 0.50	D		113.25	0.25		Light greyish brown and light brown slightly gravelly SILT with stiff, friable consistency . Gravel is angular to sub-angular siltstone lithorelics. [RESIDUAL SOIL, PENNINE LOWER COAL MEASURES]
						(0.30)		
					112.95	0.55		Light greyish brown with dark brown and orange staining very to slightly weathered SILSTONE with very weak strength characteristics. [SILSTONE, PENNINE LOWER COAL MEASURES]
						(0.65)		
					112.30	1.20		*End of Trial Pit at 1.20m*

0.5
1.0
1.5
2.0

Remarks
PURPOSE: General coverage of the Site. TERMINATION: Very slow progress with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. IN-SITU TESTING: Infilration testing 300mm head of water. Test 1: 180 mins to fall 20mm. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions **Logger**

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP101

PHOTO PAGE

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414987.00	419078.00	113.50	1:10

Project Name	Project No.	Start Date	End Date
Ashbrow Road, Fartown, Huddersfield	20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Remarks
PURPOSE: General coverage of the Site. TERMINATION: Very slow progress with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. IN-SITU TESTING: Infilration testing 300mm head of water. Test 1: 180 mins to fall 20mm. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions **Logger**

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP102

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414941.00	419079.00	109.00	1:10
Project Name		**Project No.**	**Start Date**	**End Date**
Ashbrow Road, Fartown, Huddersfield		20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.20)		Brown very sandy SILT with frequent rootlets and occasional roots up to 25 mm diameter. Sand is fine to medium. [TOPSOIL]
					108.80	0.20		Brown becoming orange, light grey and light brown mottled slightly gravelly SILT with firm consistency becoming stiff with depth. Gravel is angular to sub-angular siltstone lithorelics. [RESIDUAL SOIL, PENNINE LOWER COAL MEASURES]
						(0.25)		
					108.55	0.45		Light greyish brown with dark brown and orange staining very to slightly weathered SILSTONE with very weak strength characteristics. [SILSTONE, PENNINE LOWER COAL MEASURES]
						(0.65)		
					107.90	1.10		*End of Trial Pit at 1.10m*

0.5
1.0
1.5
2.0

Remarks
PURPOSE: General coverage of the Site. TERMINATION: Scraping with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions

Logger

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP102

PHOTO PAGE

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414941.00	419079.00	109.00	1:10

Project Name	Project No.	Start Date	End Date
Ashbrow Road, Fartown, Huddersfield	20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Remarks
PURPOSE: General coverage of the Site. TERMINATION: Scraping with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions **Logger**

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP103

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414965.00	419077.00	110.50	1:10

Project Name	Project No.	Start Date	End Date
Ashbrow Road, Fartown, Huddersfield	20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.15)		Light greyish brown very sandy SILT with frequent rootlets and rare roots up to 20 mm diameter. Sand is fine to medium. [TOPSOIL]
					110.35	0.15		Light brown becoming orange, light grey and brown mottled slightly gravelly SILT with firm consistency becoming stiff with depth. Gravel is angular to sub-angular siltstone lithorelics. [RESIDUAL SOIL, PENNINE LOWER COAL MEASURES]
		0.30 - 0.50	D			(0.40)		
					109.95	0.55		Light greyish brown with dark brown and orange staining very to slightly weathered SILSTONE with very weak strength characteristics. [SILSTONE, PENNINE LOWER COAL MEASURES]
						(0.65)		
					109.30	1.20		*End of Trial Pit at 1.20m*

0.5
1.0
1.5
2.0

Remarks
PURPOSE: General coverage of the Site. TERMINATION: Scraping with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions

Logger

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP103

PHOTO PAGE

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414965.00	419077.00	110.50	1:10

Project Name	Project No.	Start Date	End Date
Ashbrow Road, Fartown, Huddersfield	20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Remarks
PURPOSE: General coverage of the Site. TERMINATION: Scraping with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions **Logger**

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP104

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414958.00	419093.00	111.50	1:10

Project Name	Project No.	Start Date	End Date
Ashbrow Road, Fartown, Huddersfield	20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.10)		Brown very sandy SILT with frequent rootlets and rare roots up to 10 mm diameter. Sand is fine to medium. [TOPSOIL]
		0.10 - 0.15	ES		111.40	0.10		Light brown becoming orange, light grey and brown mottled slightly gravelly SILT with firm to stiff consistency becoming stiff with depth. Gravel is angular to sub-angular siltstone lithorelics. [RESIDUAL SOIL, PENNINE LOWER COAL MEASURES]
						(0.25)		
					111.15	0.35		Dark grey with carbonaceous MUDSTONE with rare, fine to medium coal gravel and light grey siltstone marbelling. [CARBONACEOUS MUDSTONE, PENNINE LOWER COAL MEASURES]
						(0.10)		
					111.05	0.45		Light greyish brown with dark brown and orange staining very to slightly weathered SILSTONE with very weak strength characteristics. [SILSTONE, PENNINE LOWER COAL MEASURES]
						(0.65)		
					110.40	1.10		*End of Trial Pit at 1.10m*

0.5
1.0
1.5
2.0

Remarks
PURPOSE: General coverage of the Site and attempt to target the former glasshouse location (access restricted by slope and dense vegetation). TERMINATION: Scraping with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions

Logger

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP104

PHOTO PAGE

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414958.00	419093.00	111.50	1:10

Project Name	Project No.	Start Date	End Date
Ashbrow Road, Fartown, Huddersfield	20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Remarks
PURPOSE: General coverage of the Site and attempt to target the former glasshouse location (access restricted by slope and dense vegetation). TERMINATION: Scraping with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions **Logger**

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP105

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414987.00	419105.00	117.50	1:10
Project Name		**Project No.**	**Start Date**	**End Date**
Ashbrow Road, Fartown, Huddersfield		20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.15)		Dark brown very sandy SILT with frequent rootlets and rare roots up to 10 mm diameter. Sand is fine to medium. [TOPSOIL]
					117.35	0.15		Light brown becoming orange, light grey and brown mottled slightly gravelly SILT with firm consistency becoming stiff with depth. Gravel is angular to sub-angular siltstone lithorelics. [RESIDUAL SOIL, PENNINE LOWER COAL MEASURES]
						(0.50)		
					116.85	0.65		Light greyish brown with dark brown and orange staining very to slightly weathered SILSTONE with very weak strength characteristics. [SILSTONE, PENNINE LOWER COAL MEASURES]
						(0.45)		
					116.40	1.10		*End of Trial Pit at 1.10m*

0.5
1.0
1.5
2.0

Remarks
PURPOSE: General coverage of the Site. TERMINATION: Scraping with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions **Logger**

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP105

PHOTO PAGE

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414987.00	419105.00	117.50	1:10

Project Name	Project No.	Start Date	End Date
Ashbrow Road, Fartown, Huddersfield	20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Remarks
PURPOSE: General coverage of the Site. TERMINATION: Scraping with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions **Logger**

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP106

Sheet 1 of 1

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414973.00	419129.00	117.50	1:10

Project Name	Project No.	Start Date	End Date
Ashbrow Road, Fartown, Huddersfield	20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Inst/ Backfill	Water Levels	Samples and Tests: Depth (m)	Samples and Tests: Type/ Ref	Samples and Tests: Results	Level (m)	Depth (thickness) (m)	Strata: Legend	Strata: Description
						(0.10)		Brown very sandy SILT with frequent rootlets and frequent roots up to 20 mm diameter. Sand is fine to medium. [TOPSOIL]
					117.40	0.10		Light brown becoming orange, light grey and brown mottled very sandy slightly gravelly SILT with stiff, friable consistency. Sand is fine to medium. Gravel is angular to sub-angular siltstone lithorelics. [RESIDUAL SOIL, PENNINE LOWER COAL MEASURES]
						(0.35)		
					117.05	0.45		Light orangish brown with dark brown and grey staining very to slightly weathered SANDSTONE with weak strength characteristics. [SANDSTONE, PENNINE LOWER COAL MEASURES]
						(0.30)		
					116.75	0.75		*End of Trial Pit at 0.75m*

0.5
1.0
1.5
2.0

Remarks
PURPOSE: General coverage of the Site. TERMINATION: Scraping with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions

Logger

Checked By: RB **Approved By:** RB **Status:** FINAL

SOIL AND STRUCTURES

Trial Pit

TP106

PHOTO PAGE

Hole Type	Easting	Northing	Ground Level (m)	Scale
TP	414973.00	419129.00	117.50	1:10

Project Name	Project No.	Start Date	End Date
Ashbrow Road, Fartown, Huddersfield	20459	2024-11-15	2024-11-15

Client
Northlight Architectural Consultants Ltd

Contractor
Jagger Construction Services Ltd

Consultant
Soil and Structures Ltd

Remarks
PURPOSE: General coverage of the Site. TERMINATION: Scraping with toothless bucket on 3CX excavator. GROUNDWATER: None encountered. STABILITY: Stable througout depth. OTHER: No evidence of potentially polluting or harmful material.

Method, Plant, Stability, Dimensions **Logger**

Checked By: RB **Approved By:** RB **Status:** FINAL

Calculation Sheet
Soil Infiltration Rate

SOIL AND STRUCTURES

Project Details

Name	Ashbrow Road, Fartown, Huddersfield
Reference	20459

Test Dates

Start	15.11.2024
End	15.11.2024

Test Method

Method	Soil infiltration test
Guidance	BS6297:2005 (+A1:2008) or Building Regulations (Part H, 2015)

Weather

Preceding 24 hrs	Dry, 10 to 15 degrees
During test	Dry, 10 to 15 degrees

Test Comments

TP101	1 test completed. ~25l of water introduced.	
	Drain-down time recorded:	**Indirectly**
TP102	1 test completed. ~25l of water introduced.	
	Drain-down time recorded:	**Indirectly**

Author	Russell Bowman
	BSc (Hons) MSc CEng CWEM MCIWEM
Signed	

Calculation Sheet
Soil Infiltration Rate

SOIL AND STRUCTURES

Test Pit Reference

Test pit reference	TP101

Test Pit Dimesions

Width	0.30	m
Length	0.30	m
Depth	1.20	m
Area of base	0.09	m^2

Test Pit Geology

Base geology	Siltstone

Test 1

Test conditions	First test - percolating			
Drainage medium porosity	1	*Open pit 100% void*		
Water level at start (above base of pit)	0.30	m		
Water level at end (above base of pit)	0.15	m		
Effective storage depth	0.30	m		
Effective storage depth (75% full)	0.38	m		
Effective storage depth (25% full)	0.53	m		
Effective storage volume (V_{75-25})	0.0135	m^3		
Internal surface area (50% effective depth) (a_{50})	0.27	m^2		
Time for head to fall from 75% to 25% effective depth (t_{75-25})	10800	s	180	mins
			No fall in head over 3 hrs	
Soil infiltration rate (f) - BRE 365		m/s		
Soil percolation rate (Vp) - Part H Building Regulations	72.0	s/mm		
Soil infiltration rate (f) - Part H Building Regulations	4.63E-06	m/s		

Test 2

Test conditions	Re-test - infiltrating		
Drainage medium porosity	1	*Open pit 100% void*	
Water level at start (above base of pit)	0.30	m	
Water level at end (above base of pit)	0.15	m	
Effective storage depth	0.30	m	
Effective storage depth (75% full)	0.38	m	
Effective storage depth (25% full)	0.53	m	
Effective storage volume (V_{75-25})	0.014	m^3	
Internal surface area (50% effective depth) (a_{50})	0.27	m^2	
Time for head to fall from 75% to 25% effective depth (t_{75-25})	0	s	mins
Soil infiltration rate (f) - BRE 365		m/s	
Soil percolation rate (Vp) - Part H Building Regulations	0.0	s/mm	
Soil infiltration rate (f) - Part H Building Regulations	#DIV/0!	m/s	

Test 3

Test conditions	Re-test - infiltrating		
Drainage medium porosity	1	*Open pit 100% void*	
Water level at start (above base of pit)	0.30	m	
Water level at end (above base of pit)	0.15	m	
Effective storage depth	0.30	m	
Effective storage depth (75% full)	0.38	m	
Effective storage depth (25% full)	0.53	m	
Effective storage volume (V_{75-25})	0.0135	m^3	
Internal surface area (50% effective depth) (a_{50})	0.27	m^2	
Time for head to fall from 75% to 25% effective depth (t_{75-25})	0	s	mins
Soil infiltration rate (f) - BRE 365		m/s	
Soil percolation rate (Vp) - Part H Building Regulations	0.0	s/mm	
Soil infiltration rate (f) - Part H Building Regulations	#DIV/0!	m/s	

Testing Average (arithmetic mean)

Soil infiltration rate (f) - BRE 365		m/s
Soil percolation rate (Vp) - Part H Building Regulations	24.0	s/mm
Soil infiltration rate (f) - Part H Building Regulations	#DIV/0!	m/s

Calculation Sheet
Soil Infiltration Rate

SOIL AND STRUCTURES

Test Pit Reference

Test pit reference	TP102

Test Pit Dimesions

Width	0.30	m
Length	0.30	m
Depth	1.20	m
Area of base	0.09	m^2

Test Pit Geology

Base geology	Siltstone

Test 1

Test conditions	First test - percolating			
Drainage medium porosity	1	*Open pit 100% void*		
Water level at start (above base of pit)	0.30	m		
Water level at end (above base of pit)	0.15	m		
Effective storage depth	0.30	m		
Effective storage depth (75% full)	0.38	m		
Effective storage depth (25% full)	0.53	m		
Effective storage volume (V_{75-25})	0.0135	m^3		
Internal surface area (50% effective depth) (a_{50})	0.27	m^2		
Time for head to fall from 75% to 25% effective depth (t_{75-25})	10800	s	180	mins
			No fall in head over 3 hrs	
Soil infiltration rate (f) - BRE 365		m/s		
Soil percolation rate (Vp) - Part H Building Regulations	72.0	s/mm		
Soil infiltration rate (f) - Part H Building Regulations	4.63E-06	m/s		

Test 2

Test conditions	Re-test - infiltrating		
Drainage medium porosity	1	*Open pit 100% void*	
Water level at start (above base of pit)	0.30	m	
Water level at end (above base of pit)	0.15	m	
Effective storage depth	0.30	m	
Effective storage depth (75% full)	0.38	m	
Effective storage depth (25% full)	0.53	m	
Effective storage volume (V_{75-25})	0.014	m^3	
Internal surface area (50% effective depth) (a_{50})	0.27	m^2	
Time for head to fall from 75% to 25% effective depth (t_{75-25})	0	s	mins
Soil infiltration rate (f) - BRE 365		m/s	
Soil percolation rate (Vp) - Part H Building Regulations	0.0	s/mm	
Soil infiltration rate (f) - Part H Building Regulations	#DIV/0!	m/s	

Test 3

Test conditions	Re-test - infiltrating		
Drainage medium porosity	1	*Open pit 100% void*	
Water level at start (above base of pit)	0.30	m	
Water level at end (above base of pit)	0.15	m	
Effective storage depth	0.30	m	
Effective storage depth (75% full)	0.38	m	
Effective storage depth (25% full)	0.53	m	
Effective storage volume (V_{75-25})	0.0135	m^3	
Internal surface area (50% effective depth) (a_{50})	0.27	m^2	
Time for head to fall from 75% to 25% effective depth (t_{75-25})	0	s	mins
Soil infiltration rate (f) - BRE 365		m/s	
Soil percolation rate (Vp) - Part H Building Regulations	0.0	s/mm	
Soil infiltration rate (f) - Part H Building Regulations	#DIV/0!	m/s	

Testing Average (arithmetic mean)

Soil infiltration rate (f) - BRE 365		m/s
Soil percolation rate (Vp) - Part H Building Regulations	24.0	s/mm
Soil infiltration rate (f) - Part H Building Regulations	#DIV/0!	m/s

Soil and Structures Limited
89 Moorhead Lane
Shipley
BD18 4JW

e: russell@soilandstructures.co.uk

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

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

Analytical Report Number : 24-054951

Project / Site name:	Ashbrow Road, Huddersfield'	**Samples received on:**	15/11/2024
Your job number:		**Samples instructed on/ Analysis started on:**	20/11/2024
Your order number:		**Analysis completed by:**	02/12/2024
Report Issue Number:	1	**Report issued on:**	03/12/2024
Samples Analysed:	2 soil samples		

Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 24-054951
Project / Site name: Ashbrow Road, Huddersfield'

Lab Sample Number				385366	385367
Sample Reference				TP101	TP104
Sample Number				None Supplied	None Supplied
Water Matrix				N/A	N/A
Depth (m)				0.10-0.15	0.10-0.15
Date Sampled				08/11/2024	08/11/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	21	21
Total mass of sample received	kg	0.1	NONE	1.6	2
Asbestos					
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	DKI	DKI
General Inorganics					
pH (L099)	pH Units	N/A	MCERTS	7.5	7.5
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	110	340
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	54.8	170
Organic Matter (automated)	%	0.1	MCERTS	5	5.3
Speciated PAHs					
Naphthalene	mg/kg	0.05	MCERTS	1.1	0.62
Acenaphthylene	mg/kg	0.05	MCERTS	0.05	0.07
Acenaphthene	mg/kg	0.05	MCERTS	2.9	2.3
Fluorene	mg/kg	0.05	MCERTS	2	1.6
Phenanthrene	mg/kg	0.05	MCERTS	17	15
Anthracene	mg/kg	0.05	MCERTS	3.9	3.7
Fluoranthene	mg/kg	0.05	MCERTS	21	20
Pyrene	mg/kg	0.05	MCERTS	18	17
Benzo(a)anthracene	mg/kg	0.05	MCERTS	7.7	7.2
Chrysene	mg/kg	0.05	MCERTS	8.6	8.7
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	7.9	8.4
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	4.2	3.9
Benzo(a)pyrene	mg/kg	0.05	MCERTS	7.2	7.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	3.5	3.4
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.83	0.87
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.7	3.6
Total PAH					
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	110	102
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	24	24
Boron (water soluble)	mg/kg	0.2	MCERTS	1.3	1.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.7	1
Chromium (hexavalent) Low Level	mg/kg	1.2	NONE	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	35	77
Copper (aqua regia extractable)	mg/kg	1	MCERTS	88	130
Lead (aqua regia extractable)	mg/kg	1	MCERTS	110	140
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	25
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	170	360

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

Analytical Report Number : 24-054951
Project / Site name: Ashbrow Road, Huddersfield'

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
385366	TP101	None Supplied	0.10-0.15	Brown loam and clay with gravel and vegetation
385367	TP104	None Supplied	0.10-0.15	Brown loam and clay with gravel and vegetation

Analytical Report Number : 24-054951
Project / Site name: Ashbrow Road, Huddersfield'

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in Soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques	In-house method based on HSG 248, 2021	A001B	D	ISO 17025
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate (Walkley Black Method)	In-house method	L009B	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L038B	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES	In-house method based on Second Site Properties version 3	L038B	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
Speciated PAHs and/or Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds (including PAH) in soil by extraction in dichloromethane and hexane followed by GC-MS	In-house method based on USEPA 8270	L064B	D	MCERTS
Hexavalent chromium in soil (low level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	In-house method	L080-PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099-PL	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

Sample Deviation Report

Analytical Report Number : 24-054951

Project / Site name: Ashbrow Road, Huddersfield'

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP101	N/A	S	385366	bc	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	bc
TP104	N/A	S	385367	bc	Speciated PAHs and/or Semi-volatile organic compounds in soil	L064B	bc

Soil and Structures Limited
89 Moorhead Lane
Shipley
BD18 4JW

e: russell@soilandstructures.co.uk

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

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

Analytical Report Number : 24-055136

Project / Site name:	Ashdown Road	**Samples received on:**	15/11/2024
Your job number:		**Samples instructed on/ Analysis started on:**	21/11/2024
Your order number:		**Analysis completed by:**	02/12/2024
Report Issue Number:	1	**Report issued on:**	03/12/2024
Samples Analysed:	2 soil samples		

Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 24-055136
Project / Site name: Ashdown Road

Lab Sample Number				386521	386522
Sample Reference				TP101	TP103
Sample Number				None Supplied	None Supplied
Water Matrix				N/A	N/A
Depth (m)				0.30-0.50	0.30-0.50
Date Sampled				Deviating	Deviating
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Test Limit of detection**	**Test Accreditation Status**		
Stone Content	%	0.1	NONE	20.3	< 0.1
Moisture Content	%	0.01	NONE	14	19
Total mass of sample received	kg	0.1	NONE	0.5	0.4
General Inorganics					
pH (L099)	pH Units	N/A	MCERTS	8	7.6
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	73	73
Water Soluble SO_4 16hr extraction (2:1)	mg/l	1.25	MCERTS	36.6	36.4

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

Analytical Report Number : 24-055136
Project / Site name: Ashdown Road

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
386521	TP101	None Supplied	0.30-0.50	Brown clay with gravel and stones
386522	TP103	None Supplied	0.30-0.50	Brown clay

Analytical Report Number : 24-055136
Project / Site name: Ashdown Road

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically (up to 30°C)	In-house method	L019B	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight	In-house method based on British Standard Methods and MCERTS requirements.	L019B	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Sulphate, water soluble, in soil (16hr extraction)	In-house method	L038B	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement	In-house method	L099-PL	D	MCERTS

For method numbers ending in 'UK' or 'A' analysis have been carried out in our laboratory in the United Kingdom (Watford).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL' or 'B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Quality control parameter failure associated with individual result applies to calculated sum of individuals.
The result for sum should be interpreted with caution

Analytical Report Number : 24-055136
Project / Site name: Ashdown Road

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP101	N/A	S	386521	a	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
TP101	N/A	S	386521	a	pH in soil (automated)	L099-PL	a
TP103	N/A	S	386522	a	Sulphate, water soluble, in soil (16hr extraction)	L038B	a
TP103	N/A	S	386522	a	pH in soil (automated)	L099-PL	a

Material Suitability
Chemical Screening

SOIL AND STRUCTURES

Notes on Generic Assessment Criteria
1. Assumes sandy loam soil (default soil type)
2. Assumes 6% SOM
3. Assumes small terraced house
4. S4UL = Suitable 4 Use Levels (LQM/CIEH) - minimal risk
5. C4SL = Category 4 Screening Levels (DEFRA) - acceptably low risk
6. Bold GACs derived from SGV report input parameters in CLEA v1.071

	Material Description	Topsoil (on site)	Topsoil (on site)
	Lab Sample Number	385366	385367
	Sample Reference	TP101	TP104
	Sample Number	None Supplied	None Supplied
	Depth (m)	0.10-0.15	0.10-0.15
	Date Sampled	08/11/2024	08/11/2024
	Time Taken	None Supplied	None Supplied
	Generic Assessment Criteria	***Exceeds by more than x2***	***Exceeds by less than x2***
Analytical Parameter (Soil Analysis)	**Units** / **Detection** / **Accredit?**		
Stone Content	% / 0.1 / NONE	Not applicable	< 0.1	< 0.1
Moisture Content	% / N/A / NONE	Not applicable	21	21
Total mass of sample received	kg / 0.001 / NONE	Not applicable	1.6	2
Asbestos in Soil		Type	-	-
	Type / N/A / ISO 17025	Detected or not?	Not-detected	Not-detected
		Analyst	DKI	DKI
General Inorganics				
pH - Automated	pH Units / N/A / MCERTS	Review when <5 or >9	7.5	7.5
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg / 2.5 / MCERTS	Not applicable	110	340
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l / 0.00125 / MCERTS	Not applicable		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l / 1.25 / MCERTS	Not applicable	54.8	170
Organic Matter	% / 0.1 / MCERTS	GSV variable	5	5.3
Speciated PAHs		**S4UL** / **C4SL**		
Naphthalene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	1.1	0.62
Acenaphthylene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	0.05	0.07
Acenaphthene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	2.9	2.3
Fluorene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	2	1.6
Phenanthrene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	17	15
Anthracene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	3.9	3.7
Fluoranthene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	21	20
Pyrene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	18	17
Benzo(a)anthracene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	7.7	7.2
Chrysene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	8.6	8.7
Benzo(b)fluoranthene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	7.9	8.4
Benzo(k)fluoranthene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	4.2	3.9
Benzo(a)pyrene	mg/kg / 0.05 / MCERTS	> 5	**7.2**	**7.1**
Indeno(1,2,3-cd)pyrene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	3.5	3.4
Dibenz(a,h)anthracene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	0.83	0.87
Benzo(ghi)perylene	mg/kg / 0.05 / MCERTS	> Surrogate Marke	3.7	3.6
Coronene	mg/kg / 0.05 / NONE	-		
Total PAH				
Speciated Total EPA-16 PAHs	mg/kg / 0.8 / MCERTS	Not available	110	102
Phenols		**S4UL** / **C4SL**		
Total - Monohydric	mg/kg / 1 / MCERTS	420 <		
Heavy Metals / Metalloids		**S4UL** / **C4SL**		
Arsenic (aqua regia extractable)	mg/kg / 1 / MCERTS	> 37	24	24
Boron (water soluble)	mg/kg / 0.2 / MCERTS	290 <	1.3	1.1
Cadmium (aqua regia extractable)	mg/kg / 0.2 / MCERTS	> 22	0.7	1
Chromium (hexavalent)	mg/kg / 1.2 / MCERTS	21 <	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg / 1 / MCERTS	910 <	35	77
Copper (aqua regia extractable)	mg/kg / 1 / MCERTS	2400 <	88	130
Lead (aqua regia extractable)	mg/kg / 1 / MCERTS	> 200	110	140
Mercury (aqua regia extractable)	mg/kg / 0.3 / MCERTS	1 <	< 0.3	0.4
Nickel (aqua regia extractable)	mg/kg / 1 / MCERTS	130 <	24	25
Selenium (aqua regia extractable)	mg/kg / 1 / MCERTS	350 <	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg / 1 / MCERTS	3700 <	170	360