evolve

GEO-ENVIRONMENTAL

# Remediation Validation Report

**Project: Block A to Block C, Huddersfield Waterfront, Manchester Road, Huddersfield**

**Project No: EGE-23-09-18-01**

**Client: Hexa Consulting Limited**

Evolve Geo-Environmental Limited
C/O 15 Newland, Lincoln LN1 1 XG
www.evolvegeo-env.co.uk

# Report Details

| | |
|---|---|
| **Project Name** | Block A to Block C, Huddersfield Waterfront, Manchester Road, Huddersfield |
| **Client** | Hexa Consulting Limited |
| **Service** | Remediation Validation Report |
| **Date of Issue** | 11th October 2023 |
| **Project number** | EGE-23-09-18-01 |

# Author Details

| | |
|---|---|
| **Prepared By** | Paul Huteson *CEnv*<br>Director |
| **Authorised By** | Paul Bennett<br>Director |

# Quality Control

| Revision | Date | Made by | Description |
|---|---|---|---|
| 00 | 11th October 2023 | PH | - |



evolve
GEO-ENVIRONMENTAL

Paul Bennett
Director
paulb@evolvegeo-env.co.uk
Tel: 07946 041587

Paul Huteson
Director
paulh@evolvegeo-env.co.uk
Tel: 07946 041571

**Evolve Geo-Environmental Limited**
C/O 15 Newland, Lincoln LN1 1 XG
www.evolvegeo-env.co.uk

# Table of Contents

1.0 Authorisation, Context and Purpose ..... 2
1.1 Authorisation ..... 2
1.2 Context and Purpose ..... 2
1.3 Existing information ..... 2
1.4 Additional Background Information ..... 3
1.5 Limitations ..... 4
1.6 Proposed Development ..... 4
2.0 Site Details ..... 5
2.1 Site Setting ..... 5
3.0 Topsoil Validation Sampling ..... 9
3.1 Scope of Works ..... 9
3.2 Environmental Sample Rational and Sampling Methodology ..... 9
3.3 Ground Conditions ..... 9
3.4 Visual and Olfactory Evidence of Contamination ..... 11
4.0 Contaminated Land Assessment ..... 12
4.1 Background Information ..... 12
4.1.1 Human Health ..... 12
4.2 Human Health Generic Quantitative Risk Assessment ..... 12
4.2.1 Topsoil Analytical Summary ..... 12
Summary, Conclusions and ..... 16
5.0 Recommendations ..... 16

Drawings
Drawing I - Site Location Plan
Drawing II - Proposed Development Plan
Figures
Figure I - Current Landscape and Limitations Plan
Figure II - Approximate Intrusive Location Plan
Appendices
Appendix I - LA Correspondence (2017)
Appendix II - KDP Validation Report
Appendix III - Standard Limitations
Appendix IV - Photographic Log
Appendix V - Exploratory Logs
Appendix VI - Soil Chemical Analytical Results

evolve
GEO-ENVIRONMENTAL

# 1.0 Authorisation, Context and Purpose

## 1.1 Authorisation

Evolve Geo-Environmental Limited (EGE) was instructed by Hexa Consulting Limited (the 'Client') to undertake a Remediation Validation Report for Block A to Block C, Huddersfield Waterfront, Manchester Road, Huddersfield, HD1 3HU (the 'Site').

A Site Location Plan is included as Drawing I.

## 1.2 Context and Purpose

Planning was granted in 2014 (Blocks B and C) and 2016 (Block A) by Kirklees Council under the following Planning Applications:

- 2014/90411 relating to 2 no. blocks of Student accommodation (Block B and Block C);
- 2016/91026 relating to 168 Studio Apartments and Communal Areas (Block A).

It is understood that Block A, Block B and Block C were close to completion in 2017/2018, with a number of Planning Conditions outstanding at that time, including Condition 15 relating to contaminated land for both applications, which states:

*'Following completion of any measures identified in the approved Remediation Strategy or any approved revised Remediation Strategy a Validation Report shall be submitted to the Local Planning Authority. Unless otherwise agreed in writing with the Local Planning Authority, no part of the site shall be brought into use until such time as the remediation measures for the whole site have been completed in accordance with the approved Remediation Strategy or the approved revised Remediation Strategy and a Validation Report in respect of those remediation measures has been approved in writing by the Local Planning Authority.'*

Subsequent to funding issues and the previous contractor (Elements Construction Limited) entering administration, the Site remained vacant and unoccupied until the Site was acquired in 2021 with further external cladding works and interior fitting out required only for its initial planned student accommodation end-use to proceed.

As such, Condition 15 of both applications is required to be discharged prior to occupation as per the requirements of the original above Planning consent.

## 1.3 Existing information

EGE has been provided with/ obtained the following information:

- Proposed Site Plan, Mixed Use Scheme at Huddersfield, Block A, Drawing Number 121 dated 2014 by KDP Architects;
- Ground Investigation Report, Proposed Student Accommodation, Huddersfield Waterfront, Manchester Road, Huddersfield, Report Ref. 14-021 by Arc Environmental, dated 2nd May 2014;
- Location Plan – Block A, Student Accommodation at Huddersfield – Block A, Drawing No. LP, by KDP Architects dated 9th March 2016;
- LA Correspondence Email, 2015/91921 Blocks A - C Waterfront Manchester Road, Huddersfield by Ms. Alexandra Garry (Senior Environmental Health Officer) dated 20th November 2017;
- Validation Report, Manchester Road, Huddersfield by KDP Architects, dated September 2018;

- Letter Correspondence, Huddersfield Student Accommodation, Ref. 600519/MAJ/Remediation, dated 17th July 2023 by Hexa Consulting;
- Consultation Response, 2023/92180 – Land off Manchester Road, Huddersfield, HD1 3JA, Kirklees Council, dated 10th August 2023; and
- Consultation Response, 2023/92181 – Land Adjacent Manchester Road, Huddersfield, HD1 3JA, Kirklees Council, dated 10th August 2023.

It is understood that an Arc Environmental Remediation Method Statement exists for Block A to Block C, however, this has not been provided to EGE.

## 1.4 Additional Background Information

An LA correspondence, dated 2017 confirms the following and is included as Appendix I for ease of reference:

*'I've looked through our files regarding Contaminated Land for the student accommodation blocks A to C. The applicant has submitted a Phase II report by Arc Environmental dated 2 May 2014 (ref 14-021) and a subsequent Remediation Strategy by Arc Environmental dated June 2017. This information covers all three blocks. I have reviewed the information and therefore Conditions 11 to 13 inclusive can be discharged on both permission 2014/90411 and 2016/91026. I have not received any information to demonstrate that the remediation has been completed. Until the remediation of the site has been carried out as per the information supplied and validated Conditions 14 and 15 cannot be discharged at this stage.'*

Given the previous Contractor entered administration, limited information with respect to the required evidential information for the remediation works undertaken exists. In addition, given EGE has not been provided with the agreed Remediation Method Statement by Arc Environmental Limited, dated 2014, the required remediation measures that were required to be undertaken are currently unknown.

A Validation Report was however, undertaken by KDP Architects (included as Appendix II) for Block A to Block C, which indicates that the landscaping was completed and comprised the following:

*Where we have soft landscaping (Images 3 and 4) we can confirm these areas are backfilled with spoil, topped with taram layer and then 300mm stone and 300mm back mulch on top. Please see Appendix 2 for delivery notes for imported materials showing the imported clean cover materials and where they were sourced, these have been suitably screened and tested for human health prior to delivery. Levels of contaminants within imported materials do not exceed the Updated Level 1 Target concentrations as recommended in the Remediation Report.*

No other validation evidence for remediation measures undertaken were reported.

Subsequent LA correspondence reviewing the KDP Validation Report concluded that:

*'This provides information including photographs that shows that the majority of the site has been covered by buildings and hard landscaping. This effectively shows that there is an effective break in the pathway to contaminated materials in the ground at these areas. The report also advises that there are also six areas of soft landscaping in the development totalling 810sqm and that these have been covered with a geotex layer followed by 300mm of stone and topped with 30mm of black mulch. It says that appendix 2 of the report provides details of the imported material. However, Appendices 1 and 2 are missing from the report.*

*The information provided includes no evidence to demonstrate that either the thickness or quality of the materials in the capping layer for the soft landscaped areas are suitable and as*

*agreed and therefore fails to meet the requirements of condition 15. It is possible that this information may be present in the missing appendices. This information was requested in my e-mail of 05/03/2019 with no recorded response. As such condition 15 cannot be discharged at this point.'*

On this basis, additional assessment of the current topsoil quality and thickness was required in order to support the discharge of Planning Condition 15 of Application 2014/90411 and Condition 15 of Application 2016/91026.

## 1.5 Limitations

The EGE standard limitations are included as Appendix III. In addition, the following limitations also apply to this Assessment:

- Given the previous contractor entered administration and limited information regarding evidential information for the required remediation measures undertaken is available, and that EGE has not been provided with the previously agreed RMS, this Validation Report represents a topsoil thickness and quality assessment only. Any comment or reference on upgraded potable water pipes, ground gas protection measures, recording of previously unknown areas of contamination and other low level construction phase remediation measures are for information only and this Report is not designed to provide evidential information on these elements, if required; and
- Given the proximity of the Canal along the southern boundary and the severely overgrown nature of the landscaped areas in the south and west of the Site, access to these areas was limited. However, given that these areas are fenced off from the Site, no access to these areas will be afforded by future Site users and as such, represents a low risk of direct contact of any residual low-level contamination.

## 1.6 Proposed Development

The Site (under both applications) comprises the development of three multi-storey student accommodation blocks, known as Block A, Block B and Block C raised on stilts (with under croft parking and plant rooms at ground floor level) with associated access and landscaping.

A proposed development Plan is included as Drawing II.

# 2.0 Site Details

A summary of the current Site status, environmental setting and key historical features is presented below.

## 2.1 Site Setting

| | |
|---|---|
| **General Site Location** | The Site is located between Manchester Road, which forms the northern boundary and Huddersfield Narrow Canal (fed by the River Colne), which forms the southern boundary, approximately 800 m south-west of Huddersfield town centre. |
| **Current Site Use** | An EGE representative attended the Site on 3rd October 2023 to undertake an updated Site reconnaissance.<br><br>The Site was three multi-storey residential blocks that were undergoing internal modifications and fit out. Each block was raised on stilts, with open access parking and plant rooms at ground floor level. A vehicle ramp, required for access to Manchester Road was noted in the western corner of the Site.<br><br>Manchester Road on the northern boundary was some 6-7 meters above the Sites ground floor level and as such, a number of structural gabion baskets retaining features were present forming the northern boundary. Although proposed for landscaping, the gabion baskets were largely bare, with some construction waste noted (EGE was informed this was to be handpicked). It is understood that these areas are no longer to be landscaped as per the proposed development plan given no access to these areas is afforded and the areas cannot be maintained.<br><br>The southern boundary was formed by a narrow strip of landscaping between the new access road and the existing canal. This was noted to be heavily overgrown with buddleia, bramble and other self-set vegetation. It is understood that the area between the canal and the access road will be fenced for security reasons. As such, it is proposed that the landscaped areas are to be removed and concreted to facilitate the installation of the fencing.<br><br>In addition, landscaped areas were noted in the western part of the Site, level with the top of the access ramp. These areas were also heavily overgrown with buddleia and self-set vegetation, although the area was fenced off with heavy duty traffic strength steel fencing, mitigating access to this area to future Site users.<br><br>A current landscape and limitations plan with supporting photographs is included as Figure I. In addition, a further Photographic Log of the Site is included as Appendix IV. |
| **Previous Report Review** | *Ground Investigation Report, Proposed Student Accommodation, Huddersfield Waterfront, Manchester Road, Huddersfield, Report Ref. 14-021 by Arc Environmental, dated 2nd May 2014.*<br><br>The ground investigation was undertaken for the western part of the Huddersfield Waterfront Development (area of current assessment (Blocks A to C)), which comprised additional development to the west, including Kirklees College. |

| | |
|---|---|
| | The investigation comprised 9 no. cable percussive boreholes (CP1 to CP9), 3 no. Rotary cored boreholes (RBH1, RBH5 & RBH7 continued from the base of CP1, CP5 & CP7), 12 no. mechanically excavated trial pits (TP1 to TP12) and 3 no. mechanically excavated trenches.<br><br>Ground Conditions typically comprised Made Ground to an average depth of 2.20 m bgl including sandy gravel and gravelly sand with bricks, concrete, ash and clinker. Below Made Ground Alluvium comprising soft to firm sandy clay, organic sandy clays and silty sand was identified or sandy cobbly gravel interpreted as River Terrace Deposits to depths of up to 6.80 m bgl. Bedrock was identified from <1.00 m bgl to 7.00 m bgl and comprised weak mudstone and sandstone to the maximum drilled depth of circa 17.00 m bgl.<br><br>No evidence of contamination was identified during the investigation, however, ash and clinker was noted.<br><br>Groundwater was identified from 1.50 m bgl.<br><br>Ground gas monitoring was undertaken on three occasions from CP2, CP3, CP6, CP8 and CP9 during falling pressure, which identified the Site as a CS1, where no ground gas protection measures were required.<br><br>A total of 12 no. soil samples were scheduled for a suite of general contaminants of concern, including sTPH, sPAH, BTEX and MTBE, 10 heavy metals, cyanide, asbestos screen and VOC/SVOC.<br><br>A total of 5 no. water samples were scheduled for a similar suite of analysis.<br><br>Marginally elevated concentrations of lead, arsenic and individual PAH compounds were identified within soils above the Generic Assessment Criteria (GAC) for residential with plant uptake end-use. In addition, asbestos was identified in 6 of the 12 samples, including Chrysotile, Amosite and Crocidolite at shallow depths.<br><br>Significant groundwater contamination was not identified.<br><br>From the results of the Level 1: Risk Assessment and statistical analysis, it was concluded that arsenic contamination represented a risk towards the proposed end users. Similarly, the concentration of PAH's also represented a potential risk. The soils below the Site were not identified as being impacted by speciated TPH's (Total Petroleum Hydrocarbons), SVOC's, or VOC's.<br><br>Preliminary Remediation Options included:<br><br>▽ *When considering the elevated levels of contamination recorded and the presence of Asbestos, where buildings and areas of hardstanding are proposed then the source-pathway-receptor model will not exist and there is not considered to be a health risk to the future end users. However, in the limited areas of soft landscaping there is the potential for dermal contact, plant uptake and inhalation of dust/fibres.*<br><br>▽ *Taking into account the nature of the proposed development and ground conditions recorded, it is felt that the most suitable remedial option available is the installation of a clean cover system within all areas of soft landscaping. When considering the presence of asbestos, an estimated minimum 600mm thick cover is envisaged at this stage.*<br><br>▽ *It would be prudent to incorporate a geotextile membrane to act as a no dig layer with a minimum 300mm of clean stone and 300mm of* |

| | |
|---|---|
| | *topsoil placed on top. This method should be appropriate for this site, as there is no scope for private gardening by the future residents, although any remedial options would need to firstly be agreed with the Local Authority.*<br>▽ *The installation of these materials along with the geotextile will provide a suitable break layer in order remove the pathway from the potential source-pathway-receptor pollutant linkage, and isolate these materials within areas of soft landscaping across the site.*<br>▽ *In addition, when considering the future redevelopment works on this site, it is also recommended that the following precautions are undertaken in order to negate the potential acute risks posed towards the site construction workers and neighbouring sites;*<br>- *Avoid uncontrolled or widespread distribution of made ground over the site.*<br>- *Take measures to minimise dust generation.*<br>▽ *Where remedial works are completed across the site, confirmatory validation testing and photographic evidence of the chosen remediation strategy would be required by the Local Authority. In addition, if made ground materials are to be removed off-site, a supplementary site visit by a suitably qualified Geoenvironmental Engineer should be undertaken to confirm the removal of these materials, combined with appropriate off-site disposal consignment notes, etc. Where buildings and hardcover is present (i.e. access roads, car parks and footpaths) there will be no requirement to incorporate clean cover materials*.<br>In addition, the report stated:<br>*Prior to any remedial works being undertaken, a remediation strategy will need to be prepared, this should be agreed with the LA, and once implemented, the remediation work should be validated by a suitably qualified Geo-environmental Engineer to ensure that all works are being completed in strict accordance with the agreed Remediation Strategy.*<br>EGE has not been provided with a Remediation Strategy for review and it is unknown what details of the final cover system strategy was and agreed with the LA.<br>*Validation Report, Manchester Road, Huddersfield by KDP Architects, dated September 2018.*<br>The report was undertaken to address contaminated land Planning Conditions for two planning applications:<br>▽ Planning application 2014/90411, for the erection of two blocks (B & C) of student accommodation on land adjacent to Manchester Road, Huddersfield; and<br>▽ Planning application 2016/62/91026 for the erection of Block A,168 Bed Student Accommodation on the land adjacent to Manchester Road.<br>A summary of the Arc Environmental Report was provided as follows:<br>*ARC Ground Investigation Report found no hydrocarbon odours or dark staining was noted within the made ground during the fieldworks. There was* |

| | |
|---|---|
| | *also no obvious visual evidence of potential asbestos. However, ash and clinker deposits were noted within several of the exploratory positions.*<br><br>*Screening was then carried out as part of their Phase 2 Ground Investigation Report, the intrusive work indicated the presence of contamination required risk assessment and/or remediation, which has been carried out as per instructed in the Remediation Report. Generic and targeted organic soil and water contamination screening was previously carried out.*<br><br>*The total area of soft landscaping is approximately 810m$^2$ made up of 6 no. areas across the site ranging from 55m$^2$ to 200m$^2$. As advised, we have implemented a clean cover system for landscaped areas and it was recommended this cover will not be necessary below areas of hardstanding.*<br><br>*The thickness of cover implemented is 600mm and includes a 300mm thick compacted clean stone layer at its base. Under this is a taram layer (a geotextile membrane) to act as a no dig layer below the clean stone.*<br><br>As detailed by the senior contaminated land officer at Kirklees Council, there are no validation photographs evidencing the thickness of topsoil imported or chemical certification to confirm the topsoil is suitable for its intended use.<br><br>It is also noted that the author of the validation report is an architectural practice with no contaminated land professional, as such the report was not considered that been undertaken in accordance with the following:<br><br>*'All evidence and contamination reports must be prepared by a suitably competent person, as defined in Annex 2 of the National Planning Policy Framework 2021. Reports must be prepared in accordance with good practice and guidance'.*<br><br>It is noted that the 6 no. landscaped areas are not as existing requirements, for example no landscaping is proposed on top of the gabion basket retaining walls. A current landscape and limitations plan is included as Figure I. |

# 3.0 Topsoil Validation Sampling

EGE undertook topsoil validation sampling on the 3rd October 2023, following requirements to provide supplementary information on the topsoil quality and thickness to support the discharge of Planning Condition 15 of both Planning Application 2014/90411 and 2016/91026.

It is noted that this Assessment relates solely to the current chemical quality of the topsoil and the associated depths identified undertaken by hand digging techniques.

## 3.1 Scope of Works

The scope of works undertaken as part of this assessment includes the following:

- Excavation of 4 no. hand dug trial pits (HDTP101 to HDTP102) in accessible areas to a maximum depth of 0.40 m bgl by an EGE chartered environmentalist;
- Logging of soils in accordance with BS5930:2015+A1:2020;
- Completion of a photographic record of the excavations, demonstrating the thickness of the topsoil encountered;
- Submission of 4 no. soil samples from the existing topsoil to a UKAS and MCERTs accredited laboratory for 10 heavy metals, speciated Total Petroleum Hydrocarbons (sTPH), speciated Polyaromatic Hydrocarbons (sPAH16), pH, Total Organic Carbon (TOC) and asbestos screen; and
- Provision of a Topsoil Validation Report to support the discharge of Planning Condition 15 of Planning Application 2014/90411 and Planning Application 2016/91026.

An Approximate Intrusive Location Plan is included as Figure II.

A Photographic Log is included as Appendix IV and exploratory hole logs are included as Appendix V.

## 3.2 Environmental Sample Rational and Sampling Methodology

The locations were positioned based on the freely accessible available current landscaped areas.

Chemical testing was undertaken on topsoil samples collected from the hand excavated trial pits.

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite. Records of the samples taken as part of the Site investigation works, including their depths and location, are included within the exploratory hole records. All samples were submitted to a UKAS and MCERTs accredited laboratory (I2) with testing methodologies for each specific compound contained within the laboratory results included as Appendix VI.

## 3.3 Ground Conditions

A summary of the ground conditions identified at each location is presented below:

| Location | General Description | Depth Range (m bgl) | Thickness (m) | Comments |
|---|---|---|---|---|
| HDTP101 | Soft dark brown to dark grey gravelly sandy clay. Gravel is fine to coarse sub-rounded to sub-angular mixed lithologies including | 0.00 - 0.30 | 0.30 | - |

| | | | | |
|---|---|---|---|---|
| | sandstone, slate and rare brick. | | | |
| | Crushed concrete gravel | 0.30 - Unproven | - | Crushed concrete was identified assumed to be the former piling mat. This is also acting as a capillary 'hard to dig' layer. |
| HDTP102 | Soft dark brown to dark grey gravelly sandy clay. Gravel is fine to coarse sub-rounded to sub-angular mixed lithologies including sandstone, slate and rare brick. | 0.00 - 0.10 | 0.10 | - |
| | Concrete | 0.10 - Unproven | - | A concrete layer was identified sloping from the base of the road kerb stone to the top of the canal top keystone, creating a physical barrier between future Site users and underlying soils. |
| HDTP103 | Soft dark brown to dark grey gravelly sandy clay. Gravel is fine to coarse sub-rounded to sub-angular mixed lithologies including sandstone, slate and rare brick. | 0.00 - 0.10 | 0.10 | Area was heavily overgrown with buddleia and self-set vegetation. |
| | Sandy slate gravel | 0.10 - Unproven | - | Sandy slate gravel was identified acting as a capillary 'hard to dig' layer. In addition, given the proximity of the canal and ramped access for the development, including retaining features, it is likely that the majority of Made Ground in this area was removed as part of the significant engineering cut required. |
| HDTP104 | Soft dark brown occasionally grey mottled orange gravelly sandy clay. Gravel is fine to coarse sub-rounded to sub-angular mixed lithologies including sandstone and slate. Some bark mulch noted at surface. | 0.00 - 0.40 | 0.40 | Area was heavily overgrown with buddleia and self-set vegetation. |
| | Blue geotextile membrane and beige sandy sandstone gravel. | 0.40 - Unproven | - | Geotextile was identified at 0.40 m bgl, which was slightly removed to confirm materials below, which included a beige sandy sandstone gravel, acting as a capillary break 'hard to dig' layer. |

## 3.4 Visual and Olfactory Evidence of Contamination

Significant visual and olfactory evidence of contamination was not identified during the soil sampling exercise.

# 4.0 Contaminated Land Assessment

## 4.1 Background Information

### 4.1.1 Human Health

The presence of hazardous substances identified as part of the risk assessment is only of concern if an actual or potential unacceptable risk is deemed to be present. Legislation and guidance on the assessment of contaminated sites, requires a tiered risk-based approach.

This Section represents a Generic Quantitative Risk Assessment (GQRA) from information obtained through intrusive Site investigation and a comparison of Site contaminant levels against specific Generic Assessment Criteria (GAC). The general GAC utilised as part of this assessment include:

- Land Quality Management/CIEH S4ULs for Human Health Risk Assessment 2014 (LQM);
- Category 4 Screening Levels (C4SL) by DEFRA; and

A 5,000 mg/kg maximum value for Total TPH based on EGE professional opinion given the absence of specific GAC.

## 4.2 Human Health Generic Quantitative Risk Assessment

Given the proposed end-use of the Site (Student accommodation) the risk to Human Health has been assessed against the Residential with Plant uptake GAC, assuming 1% Soil Organic Matter (SOM), which is considered to represent a conservative approach to the risk assessment.

### 4.2.1 Topsoil Analytical Summary

A total of four (4 no.) soil samples were collected from the topsoil. These samples were submitted to a UKAS and MCERTs accredited laboratory for a suite of potential contaminants of concern. A summary of concentrations above laboratory detection limits are provided in the following table.

| Contaminant | Max Conc. (mg/kg) | GAC (mg/kg) | GAC Source | No. Exceed GAC / No. of samples | Location of Exceedances (depth) = Concentration (mg/kg) |
|---|---|---|---|---|---|
| Asbestos | Non-Detect | Detected | N/A | 0/4 | - |
| **Metals** | | | | | |
| Arsenic | 22 | 37 | LQM | 0/4 | - |
| Cadmium | 1.4 | 11 | LQM | 0/4 | - |
| Chromium III | 76 | 910 | LQM | 0/4 | - |
| Copper | 110 | 2,400 | LQM | 0/4 | - |
| Lead | 140 | 200 | C4SL | 0/4 | - |
| Mercury | 1.2 | 40 | LQM | 0/4 | - |
| Nickel | 31 | 130 | LQM | 0/4 | - |
| Zinc | 310 | 3,700 | LQM | 0/4 | - |
| **Monoaromatics and Oxygenates** | | | | | |
| Benzene | <0.005 | 0.2 | C4SL | 0/4 | - |
| Toluene | <0.005 | 130 | LQM | 0/4 | - |
| Ethylbenzene | <0.005 | 47 | LQM | 0/4 | - |
| p & m-xylene | <0.005 | 56 | LQM | 0/4 | - |
| o-xylene | <0.005 | 60 | LQM | 0/4 | - |
| MTBE | <0.005 | 49 | EIC | 0/4 | - |
| **Polycyclic Aromatic Hydrocarbons** | | | | | |
| Naphthalene | 0.42 | 2.3 | LQM | 0/4 | - |
| Acenaphthylene | 0.15 | 170 | LQM | 0/4 | - |
| Acenaphthene | 1.3 | 210 | LQM | 0/4 | - |
| Fluorene | 1.1 | 170 | LQM | 0/4 | - |
| Phenanthrene | 8.7 | 95 | LQM | 0/4 | - |
| Anthracene | 1.6 | 2,400 | LQM | 0/4 | - |
| Fluoranthene | 11 | 280 | LQM | 0/4 | - |
| Pyrene | 9.7 | 620 | LQM | 0/4 | - |
| Benzo[a]anthracene | 4.7 | 7.2 | LQM | 0/4 | - |
| Chrysene | 5.1 | 15 | LQM | 0/4 | - |
| Benzo[b]fluoranthene | 5.6 | 2.6 | LQM | 3/4 | HDTP104 (0.25) = 5.6<br>HDTP201 (0.20) = 3.6<br>HDTP202 (0.1) = 3.4 |
| Benzo[k]fluoranthene | 2.3 | 77 | LQM | 0/4 | - |
| Benzo[a]pyrene | 4.9 | 2.2 | LQM | 3/4 | HDTP104 (0.25) = 4.9<br>HDTP201 (0.20) = 2.8<br>HDTP202 (0.1) = 2.7 |

| Contaminant | Max Conc. (mg/kg) | GAC (mg/kg) | GAC Source | No. Exceed GAC / No. of samples | Location of Exceedances (depth) = Concentration (mg/kg) |
|---|---|---|---|---|---|
| Indeno(1,2,3-c,d)pyrene | 2.4 | 27 | LQM | 0/4 | - |
| Dibenz(a,h)anthracene | 0.72 | 0.24 | LQM | 0/4 | HDTP104 (0.25) = 0.72<br>HDTP202 (0.1) = 0.42<br>HDTP201 (0.20) = 0.40 |
| Benzo[g,h,i]perylene | 2.7 | 320 | LQM | 0/4 | - |
| Total PAH16 | 62.3 | N\A | - | - | - |
| **Petroleum Hydrocarbons** | | | | | |
| Aliphatic TPH >C5-C6 | <0.10 | 42 | LQM | 0/4 | - |
| Aliphatic TPH >C6-C8 | <0.10 | 100 | LQM | 0/4 | - |
| Aliphatic TPH >C8-C10 | <0.10 | 27 | LQM | 0/4 | - |
| Aliphatic TPH >C10-C12 | <1.0 | 130 | LQM | 0/4 | - |
| Aliphatic TPH >C12-C16 | 11 | 1,100 | LQM | 0/4 | - |
| Aliphatic TPH >C16-C21 | 28 | 65,000 | LQM | 0/4 | - |
| Aliphatic TPH >C21-C35 | 160 | 65,000 | LQM | 0/4 | - |
| Aromatic TPH >C5-C7 | <0.10 | 70 | LQM | 0/4 | - |
| Aromatic TPH >C7-C8 | <0.10 | 130 | LQM | 0/4 | - |
| Aromatic TPH >C8-C10 | <0.10 | 34 | LQM | 0/4 | - |
| Aromatic TPH >C10-C12 | <1.0 | 74 | LQM | 0/4 | - |
| Aromatic TPH >C12-C16 | 2.8 | 140 | LQM | 0/4 | - |
| Aromatic TPH >C16-C21 | 26 | 260 | LQM | 0/4 | - |
| Aromatic TPH >C21-C35 | 84 | 1,100 | LQM | 0/4 | - |
| Total TPH | 300 | 5,000 | EGE | 0/4 | - |

Notes:
C4SL = Category 4 Screening Levels (C4SLs) published by DEFRA.
LQM = Land Quality Management/CIEH S4Uls for Human Health Risk Assessment, 2014.
EGE = Evolve Geo-Environmental 'in-house' screening value based on professional judgement.

Although detectable concentrations of heavy metals and aliphatic/ aromatic hydrocarbons within the C12 to C16 carbon banding (heavy end) have been identified above laboratory detection limits, these are significantly below the most stringent guidance values for a residential with plant uptake end-use, which is considered overly conservative given the student accommodation end-use.

Marginally elevated concentrations of benzo(a)pyrene, benzo(b)fluoranthene and dibenzo(a,h)anthracene have been identified in samples collected from HDTP101, HDTP102 and HDTP104. Total organic carbon has been identified at average of 4.1%, as such, if these marginally elevated concentrations of individual PAH compounds were assessed against the residential without plant uptake GAC assuming 2.5 - 3.0% soil organic matter, which is considered more representative of the final Site use, concentrations identified from HDTP101 and HDTP102 would fall below the respective GAC values. HDTP104, would remain above

the residential without plant uptake thresholds, however it is worth noting that there is no access for future Site users to enter this area where HDTP104 was undertaken, given the steel, traffic strength fencing separating the landscaped area and the ramp for the access road. In addition, this area is heavily vegetated and is to remain vegetated further mitigating free access to the underlying soils.

Given total PAH identified is only 62.3 mg/kg, no risk to controlled waters is considered to exist from these low concentrations.

Concentrations of BTEX/MTBE have not been identified above laboratory detection limits.

No asbestos was identified.

Evidence of volatile vapours has not been identified.

No evidence of Non-Aqueous Phase Liquid (NAPL) was identified during sampling.

The chemical soil analytical results are included as Appendix VI.

# 5.0 Summary, Conclusions and Recommendations

EGE attended the Site to undertake a topsoil verification assessment for Block A, Block B and Block C to support the discharge of Planning Conditions related to contaminated land. The works were required given an absence of evidential information available following the previous contractor entering administration in 2018 and the current owner acquiring the Site in 2021.

The landscaped areas across the Site were installed in 2018 and have been left until present, as such were heavily overgrown with self-set vegetation, including buddleia and bramble.

No landscaping has been undertaken or is proposed on top of the gabion basket retaining walls along the northern boundary given no access to these will be available for on-going maintenance.

A total of four (4 no.) hand pits (HDTP101 to HDTP104) were undertaken in accessible landscaped areas which identified topsoil to depths between 0.10 m bgl and 0.40 m bgl. Where shallow topsoil was identified this was underlain by concrete and slate compacted gravel, which formed the structure between the road and the existing canal.

Either concrete, slate or concrete gravel was identified below topsoil in HDTP101, HDTP102 and HDTP103, acting as a capillary 'hard to dig' layer. A geotextile was identified in HDTP104 at 0.40 m bgl, with sandstone gravel below.

Following soil analytical testing, marginally elevated concentrations of benzo(a)pyrene, benzo(b)fluoranthene and dibenzo(a,h)anthracene were identified in samples collected from HDTP101, HDTP102 and HDTP104 only above the residential with plant uptake end-use GAC, which is considered conservative for the proposed student accommodation end-use.

In addition, it is noted that the landscaped areas in the west (HDTP104) are fenced off with heavy duty traffic strength steel fencing, restricting access of future Site users to this area. The thin strip of landscaping between the road and the canal along the southern boundary (HDTP102 and HDTP103) is understood to require fencing for security and as such, will likely be removed and concreted to facilitate the new fence, further mitigating the risk of future Site users encountering any residual contamination in the underlying soils.

The marginally elevated individual PAH identified in HDTP101, when assessed against the residential without plant uptake guidance values assuming 2.5 – 3.0 % soil organic matter fall below their respective thresholds. The residential without plant uptake GAC are considered a more representative assessment criteria from the proposed final end-use of the Site.

It is unlikely that the thickness of the topsoil identified (between 0.10 m and 0.40 m thick) is as per the agreed RMS, however given each location was identified to have a concrete or stone 'hard to dig' layer, it is considered that there is no direct or indirect exposure risk from residual contamination in the soils below the Site and future Site users. Any sub-surface maintenance works should be made aware of encountering low levels of contamination, including asbestos, and appropriate PPE and method statements be undertaken in accordance with their obligations under guidance and best practice, such as CAR2012.

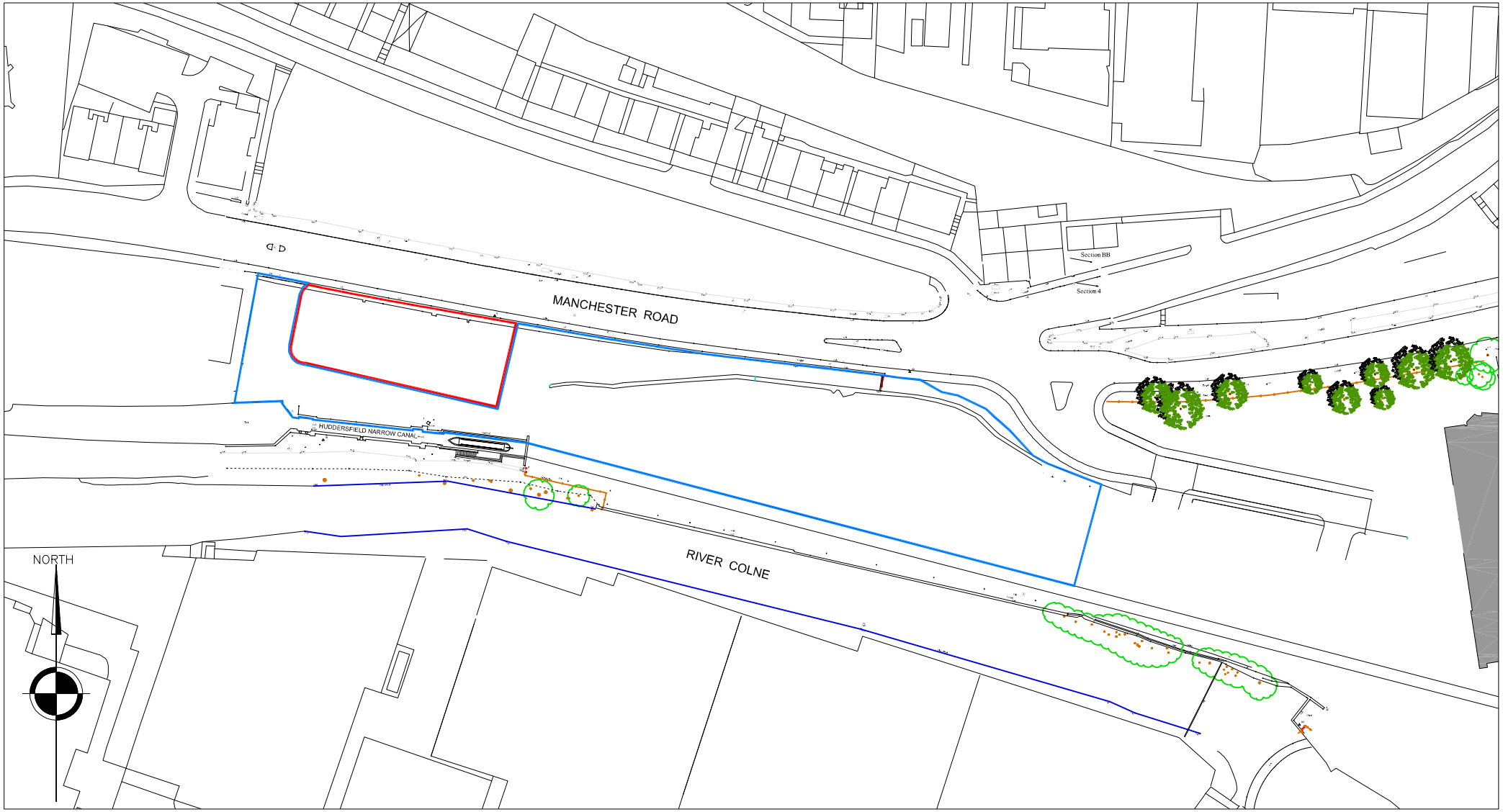
On this basis, given the topsoil in the limited areas of landscaping have not identified significant levels of contamination above the most stringent GAC, and that access to the landscaped areas will be mitigated by fencing, the risk to future Site users is considered very low and no further works is considered warranted in landscaped areas.

# Drawings

evolve
GEO-ENVIRONMENTAL

# Drawing I – Site Location Plan

evolve
GEO-ENVIRONMENTAL




Location Plan

Scale 1:1250

All dimensions to be checked on site. Figured dimensions to be read in preference to scaled. KDP accepts no responsibility for any unauthorised amendments to the drawing and does not permit unauthorised copying of the drawing. This drawing is copyright and remains the property of KDP unless otherwise agreed.

| Revisions | | | | |
|---|---|---|---|---|
| Rev | Date | Description | Init. | Check |
| - | - | - | - | - |

KDP ARCHITECTS

THE KEITH DAVIDSON PARTNERSHIP
CHARTERED ARCHITECTS - PROJECT MANAGEMENT - 3D VISUALISATION

13 Seymour Terrace
Seymour Street
Liverpool
L3 5PE

Telephone: +44 (0) 151 709 1777
Facsimile: +44 (0) 151 708 9998

Email: info@kdparchitects.com
Website: www.kdparchitects.com

PLANNING

Client: Elements Construction Ltd

Job title: Student Accomodation at Huddersfield - Block A

Drawing title: Location Plan - Block A Site

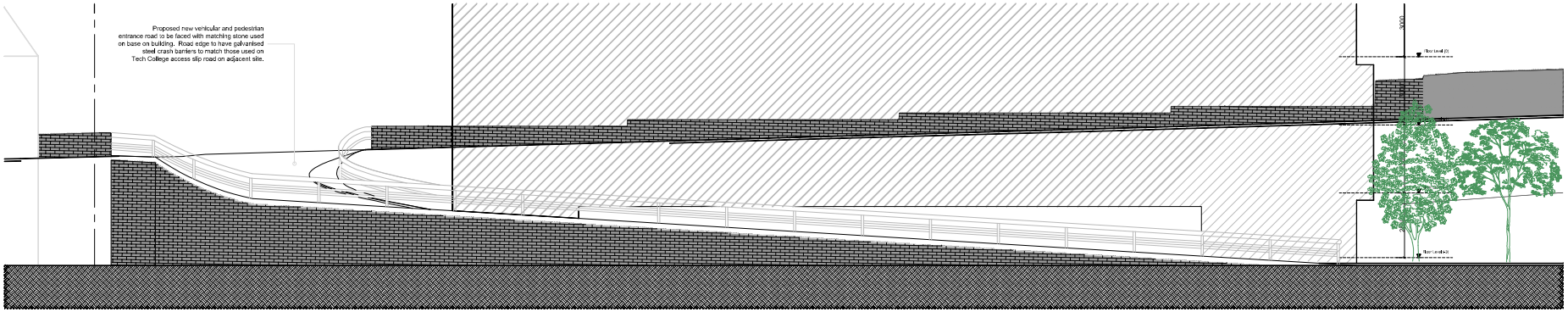
| Job number | Revision |
|---|---|
| 1283 | - |

Drawing number: LP

| Scale | Drawn | Checked | Date |
|---|---|---|---|
| see dwg | DB | SRD | 09.03.16 |

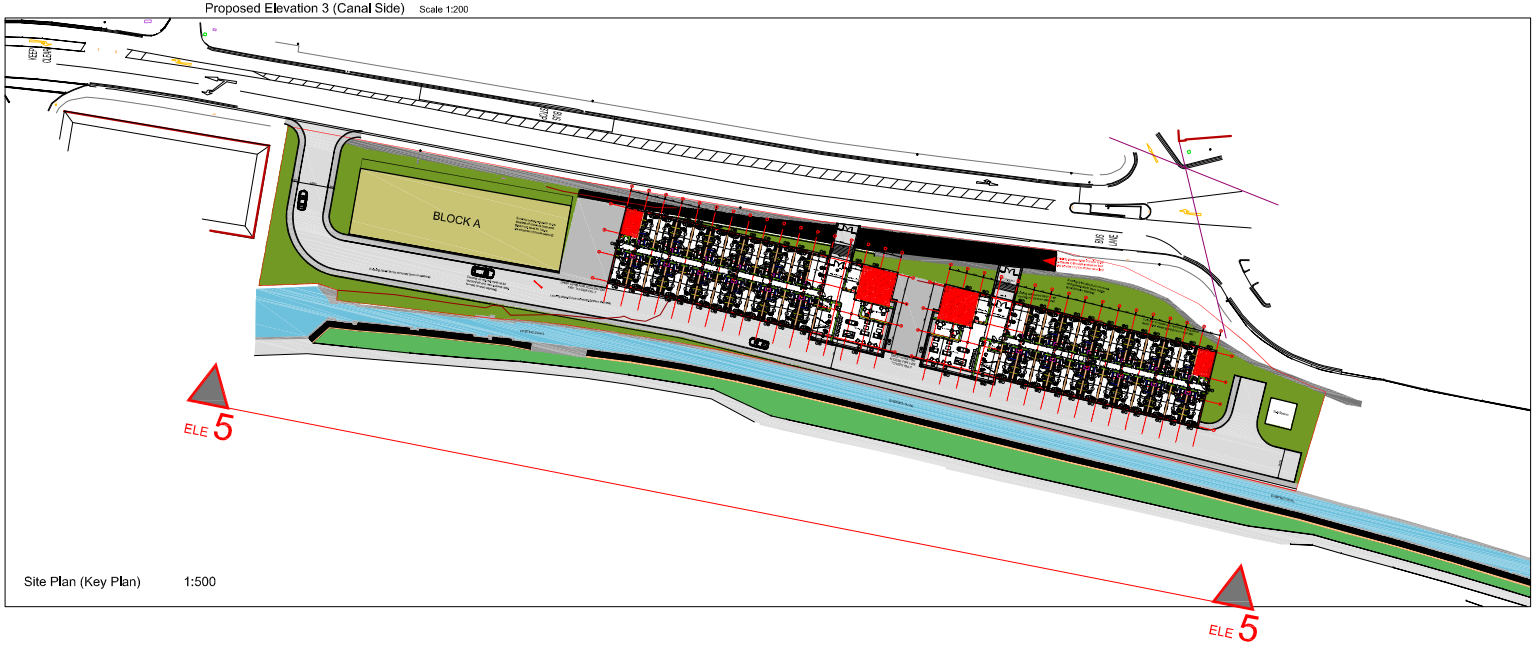
# Drawing II – Proposed Development Plan

evolve
GEO-ENVIRONMENTAL




Proposed Site Vehicle Entrance (Canal Side) Scale 1:100

Proposed Elevation 3 (Canal Side) Scale 1:200




Site Plan (Key Plan) 1:500

All dimensions to be checked on site. Figured dimensions to be read in preference to scaled. KDP accepts no responsibility for any unauthorised amendments to the drawing and does not permit unauthorised copying of the drawing. This drawing is copyright and remains the property of KDP unless otherwise agreed.

| Revisions | | | | |
|---|---|---|---|---|
| Rev | Date | Description | Ini. | Check |
| A | 06/2014 | Alterations to Stone Banding on Canal Elevation | DB | SRD |

| Revisions | | | | |
|---|---|---|---|---|
| Rev | Date | Description | Ini. | Check |

| Revisions | | | | |
|---|---|---|---|---|
| Rev | Date | Description | Ini. | Check |

KDP ARCHITECTS

THE KEITH DAVIDSON PARTNERSHIP
CHARTERED ARCHITECTS • PROJECT MANAGEMENT • 3D VISUALISATION

13 Seymour Terrace
Seymour Street
Liverpool
L3 5PE

Telephone: +44 (0) 151 709 1777
Facsimile: +44 (0) 151 708 9998

Email: info@kdparchitects.com
Website: www.kdparchitects.com

Planning

Client: Elements Construction Ltd.

Job title: Student Accomodation at Huddersfield.

Drawing title: Elevation 5 Canal Street Scene

| Job number | Revision |
|---|---|
| 1283 | A |

Drawing number: 220

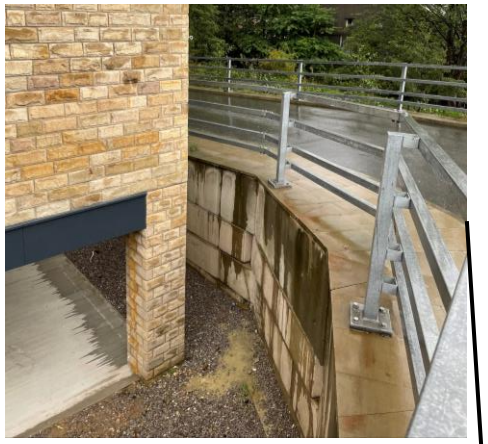
| Scale | Drawn | Checked | Date |
|---|---|---|---|
| 1:500@A1 | DB | SRD | 12/2013 |

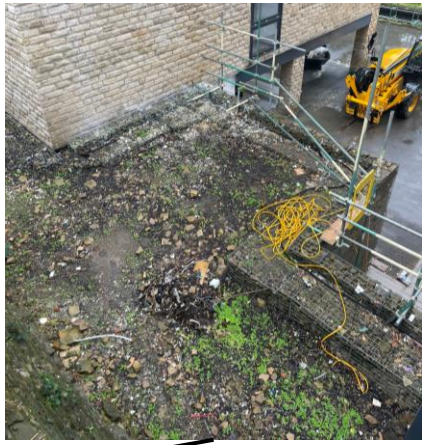
# Figures

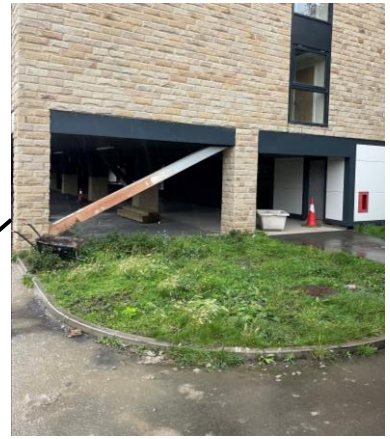
evolve
GEO-ENVIRONMENTAL

# Figure I – Current Landscape and Limitations Plan

evolve
GEO-ENVIRONMENTAL





| | |
|---|---|
| Figure No. and Title | I - Existing Landscaping and Limitations Plan |
| Project Name | Block A to C, Huddersfield Waterfront, Huddersfield |
| Client | Hexa Consulting Limited |
| Service | Geo-Environmental Investigation |
| Date of Issue | October 2023 |
| Project number | EGE-23-09-18-01 |

evolve
GEO-ENVIRONMENTAL

# Figure II – Approximate Intrusive Location Plan

evolve
GEO-ENVIRONMENTAL


| | |
|---|---|
| Figure No. and Title | Figure II – Approximate Topsoil Sampling Plan |
| Project Name | Block A to C, Huddersfield Waterfront, Manchester Road, Huddersfield |
| Client | Hexa Consulting Limited |
| Service | Topsoil Validation Sampling |
| Date of Issue | October 2023 |
| Project number | EGE-23-09-18-01 |

evolve
GEO-ENVIRONMENTAL

# Appendices

evolve
GEO-ENVIRONMENTAL

# Appendix I - LA Correspondence (2017)

evolve
GEO-ENVIRONMENTAL

# Appendix II – KDP Validation Report

evolve
GEO-ENVIRONMENTAL

# Manchester Road

## Huddersfield

## Validation Report

KDP Architects, September 2018

**CLIENT:** ELEMENTS CONSTRUCTION LTD

**DEVELOPMENT LOCATION:** LAND ADJACENT, MANCHESTER ROAD, HUDDERSFIELD

**DEVELOPMENT DESCRIPTION:** ERECTION OF 3 BLOCKS OF STUDENTS ACCOMMODATION

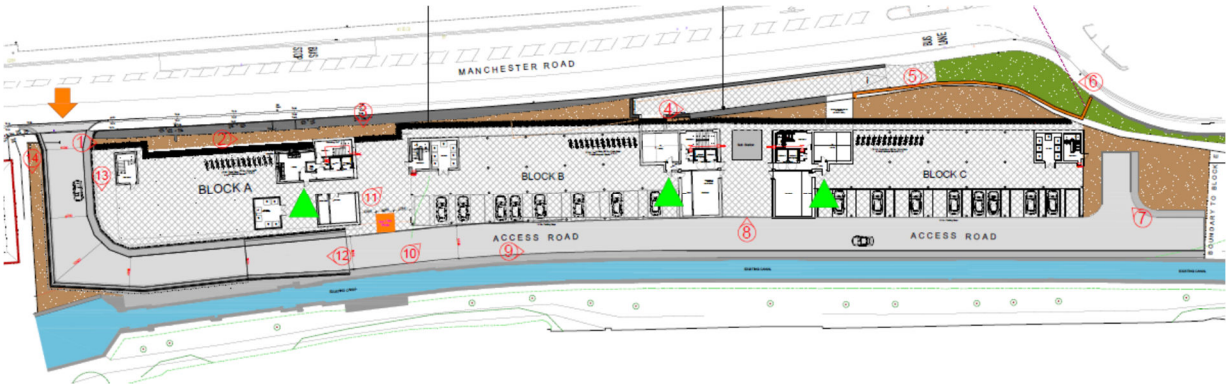
**PLANNING REFERECNES:** 2014/62/90411/W and 2016/62/91026/W

## Introduction

This report relates to two planning application. Planning application 2014/90411, this application is for the erection of two blocks (B & C) of student accommodation on land adjacent to Manchester Road, Huddersfield. The second planning application 2016/62/91026 is for the erection of Block A 168 Bed Student Accommodation on the land adjacent.

## Site Layout

Please see bleow for the site plan of the development showing the location Level 0- Canal Level for the landscaping. As can be seen, there is not much oportunity for landscaping on this narrow site. The underneath of the three blocks has been used as an undercroft for parking and cycle storage. The majority of the areas is hard standing, please see images 1 and 2 showing the road and undercroft areas.




Site Plan (please see appendix 1 for external photographs)

Image 1 : Entrance road

Image 2 : Undercroft

Where we have soft landscaping (Images 3 and 4) we can confirm these areas are backfilled with spoil, topped with taram layer and then 300mm stone and 300mm back mulch on top. Please see Appendix 2 for delivery notes for imported materials shwoing the imported clean cover materials and where they were sourced, these have been suitably screened and tested for human health prior to delivery. Levels of contaminants within imported materials do not exceed the Updated Level 1 Target concentrations as recommended in the Remidiation Report.

Image 3 : Shrubs

Image 2 : Mulch

Please see Appendix 1 for further photographic evidence of the external landscaping and their locations.

**Site contamination**

ARC Ground Invetigation Report found no hydrocarbon odours or dark staining was noted within the made ground during the fieldworks. There was also no obvious visual evidence of potential asbestos. However, ash and clinker deposits were noted within several of the exploratory positions.

Screening was then carried out as part of their Phase 2 Ground Investigation Report, the intrusive work indicated the presence of contaminanation required risk assessment and/or remedtion, which has been carried out as per instructed in the Remediation Report. Generic and targeted organic soil and water contamination screening was previously carried out.

The total area of soft landscaping is approximately 810m2 made up of 6 no. areas across the site ranging from 55m2 to 200m2. As advised we have implemented a clean cover system for landscaped areas and it was recommended this cover will not be necessary below areas of hardstanding. The thickness of cover implemented is 600mm and includes a 300mm thick compacted clean stone layer at its base. Under this is a taram layer (a geotextile membrane) to act as a no dig layer below the clean stone.

**APPENDIX 1 :**

**EXTERNAL PHOTOGRAPHS OF THE SITE**

**APPENDIX 2 :**

**DELIVERY NOTES OF IMPORTED MATERIALS**

# Appendix III – Standard Limitations

evolve
GEO-ENVIRONMENTAL

## Limitations

The conclusions and recommendations made in this Report are limited to those that can be made based on the findings of the investigation and in the context of the proposed development.

Where comments are made based on information obtained from third parties, EGE assumes that all third party information is true and correct. No independent action has been undertaken to validate the findings of third parties, unless specifically stated.

This Report has been prepared in accordance with our understanding of current best practice. However changes to best practice, guidance or legislation may necessitate revision of this Report after the date of issue.

EGE has prepared this Report for the sole use and reliance of the Client, in accordance with our Standard Conditions and Limitations issued with the proposal. This Report may not be used or relied upon by any unauthorised third party without the explicit written agreement of EGE. Third parties use the information at their own risk.

# Appendix IV – Photographic Log

evolve
GEO-ENVIRONMENTAL

# Photograph Record


Photograph I - Soil arisings from HDTP101


Photograph II - HDTP101 excavated to a depth of 0.30 m bgl with crushed concrete below (assumed former pilling mat) acting as a capillary break layer.


Photograph III - HDTP102, 0.1 m of topsoil over sloped concrete from road kerb stone to top keystone of canal.


Photograph IV - HDTP103, excavated to 0.10 m bgl where sandy slate gravel was identified acting as a capillary break.


Photograph V - HDTP104 excavated to 0.40 m bgl where blue geotextile was encountered. Geotextile lifted and beige sandy sandstone gravel identified below.

Photograph VI – Viewed west indicating the minimal landscaping between the access road and canal on the southern boundary. Canal to be ultimately fenced for security, limiting access to landscaped area.

Photograph VII – Ramped access road adjacent to southern elevation of Block A. Area well fenced and no means of access for future Site users to access landscaped areas.


Photograph VIII - Western landscaped area, with no means of access for future Site users to access landscaped areas.

Photograph IX - Northern elevation of Block A with gabion basket wall. Gravelled amenity surface. No landscaping proposed.

Photograph X – Northern elevation of Block A on top of gabion basket. No landscaping proposed. Litter pick to be undertaken. No physical access for future Site users to enter this area.

Photograph XI – Northern elevation of Block B viewed from Manchester Road on top of gabion baskets. No physical access for future Site users. No landscaping is proposed.

# Appendix V - Exploratory Logs

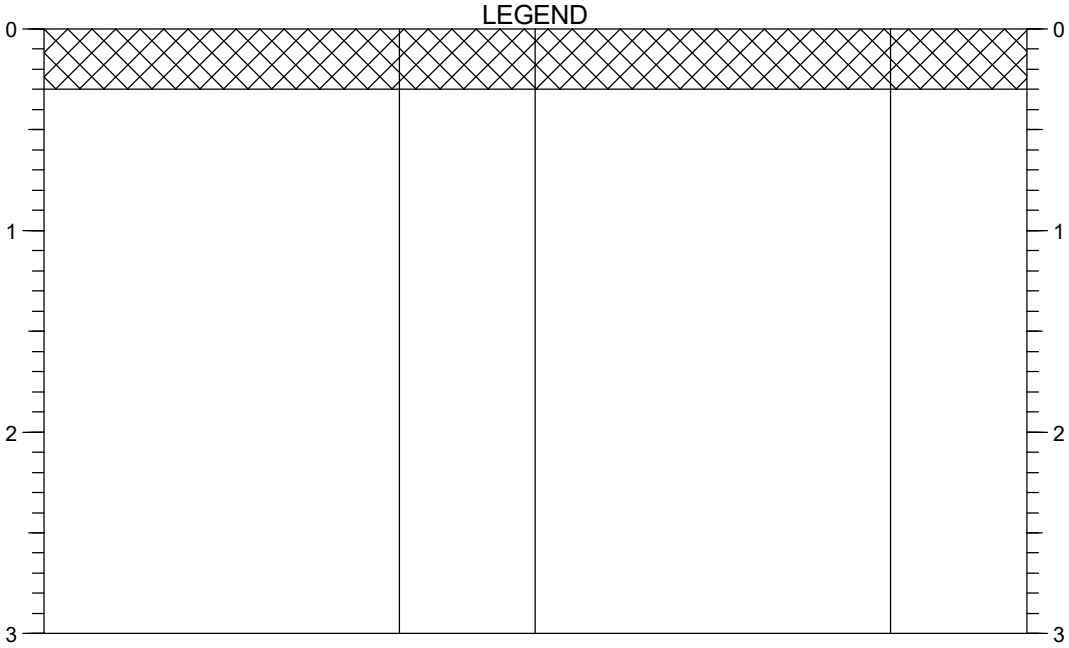
evolve
GEO-ENVIRONMENTAL

**Evolve Geo-Environmental**
**C/O 15 Newland, LN1 1XG**
**Tel: 07946 041571**
**Email: paulh@evolvegeo-env.co.uk**

evolve
GEO-ENVIRONMENTAL

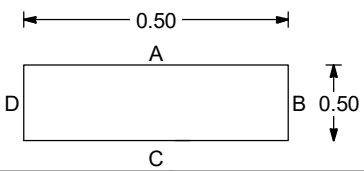
| Project: | Project No: | Hole ID: |
|---|---|---|
| **Manchester Road, Huddersfield** | **EGE-23-09-18-01** | **HDTP101** |
| **TRIAL PIT LOG** | Date: 03/10/2023 | Client: **Hexa Consulting** |

LEGEND




| STRATA | | | SAMPLES | | TESTS | |
|---|---|---|---|---|---|---|
| Depth | No | DESCRIPTION | Depth | No | Depth | Results |
| (0.30) 0.30 | | MADE GROUND: Soft dark brown to dark grey gravelly sandy clay. Gravel is fine to coarse sub-rounded to sub-angular mixed lithologies including sandstone, slate and rare brick. (TOPSOIL) | 0.20 | ES1 | | |
| | | Hand pit terminated at 0.30 m bgl given the presence of crushed concrete capillary break layer. Assumed former piling mat. | | | | |

Shoring/Support:
Stability:




Bearing: °


**REMARKS** :
1. Logged in general accordance with BS5930:2015+A1:2020;
2. No groundwater identified;
3. Hand pit remained stable;
4. Hand pit refused on crushed concrete gravel; and
5. Backfilled with arisings and nominally compacted.

| All measurements in metres unless otherwise stated | 3m/page | Scale: 1:37.5 | No Coordinate Data Available<br>No Datum Information Available |
|---|---|---|---|

| Plant Used: | Coordinates / Level (mAOD): | Logged By: | Checked By: | Approved By: |
|---|---|---|---|---|
| Hand Tools | | PH | PW | PB |

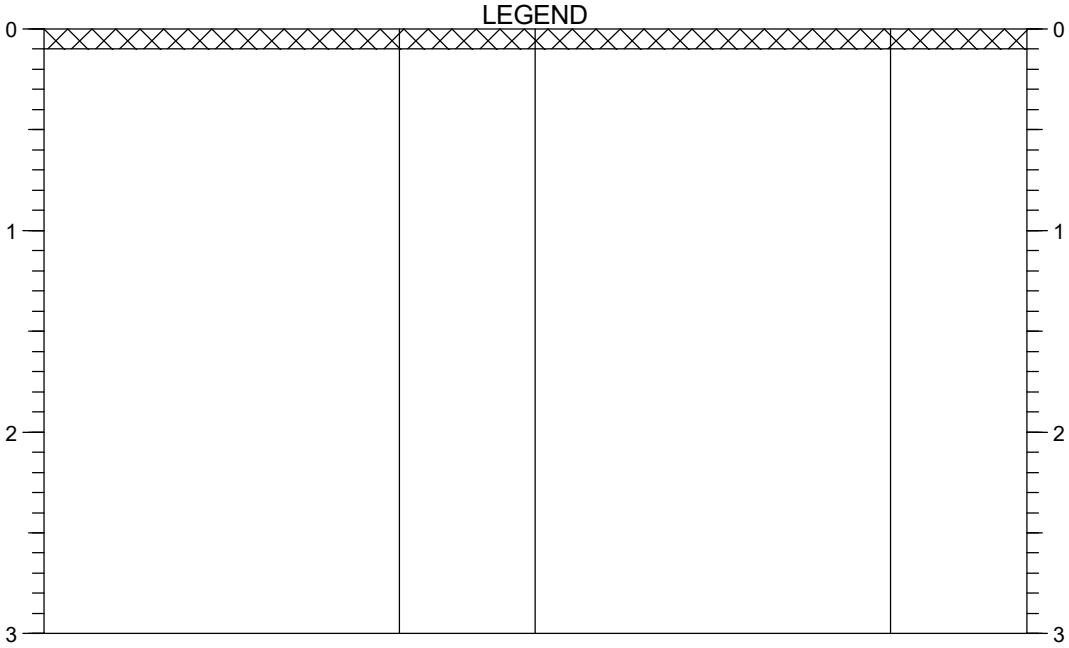
**Evolve Geo-Environmental**
**C/O 15 Newland, LN1 1XG**
**Tel: 07946 041571**
**Email: paulh@evolvegeo-env.co.uk**

evolve GEO-ENVIRONMENTAL

| Project: | Project No: | Hole ID: |
|---|---|---|
| **Manchester Road, Huddersfield** | **EGE-23-09-18-01** | **HDTP102** |

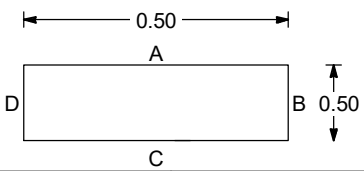
| **TRIAL PIT LOG** | Date: | Client: |
|---|---|---|
| | 03/10/2023 | **Hexa Consulting** |

LEGEND




| STRATA | | | SAMPLES | | TESTS | |
|---|---|---|---|---|---|---|
| Depth | No | DESCRIPTION | Depth | No | Depth | Results |
| 0.10 | | MADE GROUND: Soft dark brown to dark grey gravelly sandy clay. Gravel is fine to coarse sub-rounded to sub-angular mixed lithologies including sandstone, slate and rare brick. Frequent rootlets. (TOPSOIL) | 0.10 | ES1 | | |
| | | Hand pit terminated at 0..10 m bgl given the presence of sloped concrete from adjacent road kerbstone down to the canal top keystone. | | | | |

Shoring/Support:
Stability:




Bearing: °


**REMARKS** :

1. Logged in general accordance with BS5930:2015+A1:2020;
2. No groundwater identified;
3. Hand pit remained stable;
4. Hand pit refused on sloped concrete of adjacent road kerb stone and canal keystone; and
5. Backfilled with arisings and nominally compacted.

| All measurements in metres unless otherwise stated | 3m/page | Scale: 1:37.5 | No Coordinate Data Available<br>No Datum Information Available |
|---|---|---|---|

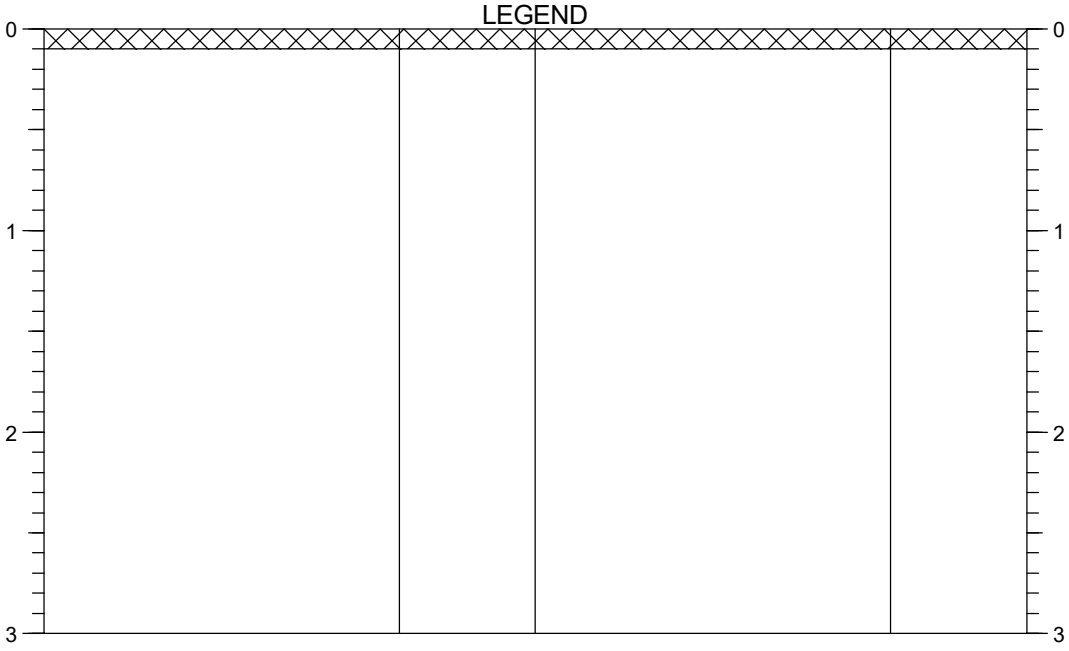
| Plant Used: | Coordinates / Level (mAOD): | Logged By: | Checked By: | Approved By: |
|---|---|---|---|---|
| Hand Tools | | PH | PW | PB |

**Evolve Geo-Environmental**
**C/O 15 Newland, LN1 1XG**
**Tel: 07946 041571**
**Email: paulh@evolvegeo-env.co.uk**

evolve GEO-ENVIRONMENTAL

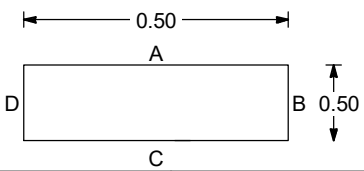
| Project: | Project No: | Hole ID: |
|---|---|---|
| **Manchester Road, Huddersfield** | **EGE-23-09-18-01** | **HDTP103** |
| **TRIAL PIT LOG** | Date: 03/10/2023 | Client: **Hexa Consulting** |

LEGEND




| STRATA | | | SAMPLES | | TESTS | |
|---|---|---|---|---|---|---|
| Depth | No | DESCRIPTION | Depth | No | Depth | Results |
| 0.10 | | MADE GROUND: Soft dark brown to dark grey gravelly sandy clay. Gravel is fine to coarse sub-rounded to sub-angular mixed lithologies including sandstone, slate and rare brick. (TOPSOIL) | 0.10 | ES1 | | |
| | | Hand pit terminated at 0.10 m bgl given the presence of sandy slate gravel acting as capillary break layer. | | | | |

Shoring/Support:
Stability:




Bearing: °


**REMARKS** :

1. Logged in general accordance with BS5930:2015+A1:2020;
2. No groundwater identified;
3. Hand pit remained stable;
4. Hand pit refused on crushed sandy slate gravel; and
5. Backfilled with arisings and nominally compacted.

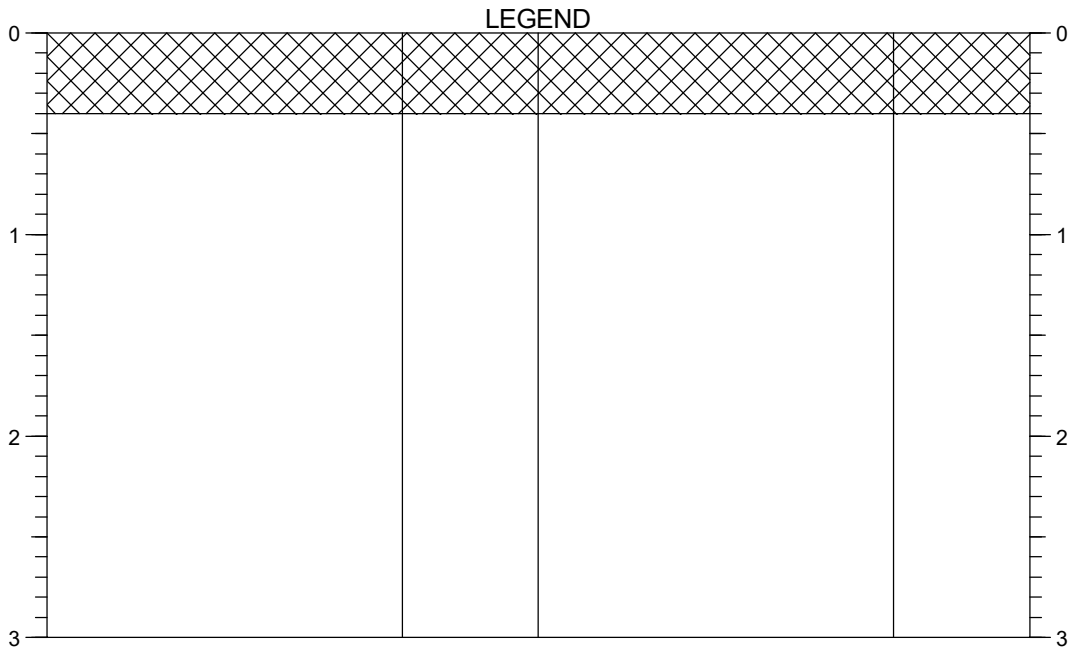
| | | |
|---|---|---|
| All measurements in metres unless otherwise stated | 3m/page Scale: 1:37.5 | No Coordinate Data Available<br>No Datum Information Available |

| Plant Used: | Coordinates / Level (mAOD): | Logged By: | Checked By: | Approved By: |
|---|---|---|---|---|
| Hand Tools | | PH | PW | PB |

**Evolve Geo-Environmental**
**C/O 15 Newland, LN1 1XG**
**Tel: 07946 041571**
**Email: paulh@evolvegeo-env.co.uk**

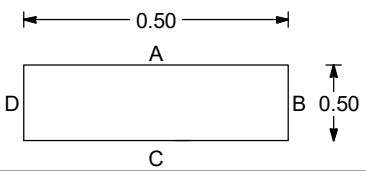
evolve GEO-ENVIRONMENTAL

| Project: | Project No: | Hole ID: |
|---|---|---|
| **Manchester Road, Huddersfield** | **EGE-23-09-18-01** | **HDTP104** |
| **TRIAL PIT LOG** | Date: 03/10/2023 | Client: **Hexa Consulting** |




| STRATA | | | SAMPLES | | TESTS | |
|---|---|---|---|---|---|---|
| Depth | No | DESCRIPTION | Depth | No | Depth | Results |
| (0.40)<br>0.40 | | MADE GROUND: Soft dark brown occasionally grey mottled orange gravelly sandy clay. Gravel is fine to coarse sub-rounded to sub-angular mixed lithologies including sandstone and slate. Some bark mulch noted at surface. (TOPSOIL) | 0.25 | ES1 | | |
| | | Hand pit terminated at 0.40 m bgl given the presence of blue geotextile membrane. | | | | |

Shoring/Support:
Stability:




Bearing: °


**REMARKS** :
1. Logged in general accordance with BS5930:2015+A1:2020;
2. No groundwater identified;
3. Hand pit remained stable;
4. Hand pit terminated on encountering blue geo textile at 0.30 m bgl; and
5. Backfilled with arisings and nominally compacted.

| | | |
|---|---|---|
| All measurements in metres unless otherwise stated | 3m/page Scale: 1:37.5 | No Coordinate Data Available<br>No Datum Information Available |

| Plant Used: | Coordinates / Level (mAOD): | Logged By: | Checked By: | Approved By: |
|---|---|---|---|---|
| Hand Tools | | PH | PW | PB |

# Appendix VI - Soil Chemical Analytical Results

evolve
GEO-ENVIRONMENTAL

**Paul Huteson**
Evolve Geo-Environmental Limited
15 Newland
Lincoln
Lincolnshire
LN1 1XG

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

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

# Analytical Report Number : 23-60118

| | | | |
|---|---|---|---|
| **Project / Site name:** | Hudders Field | **Samples received on:** | 04/10/2023 |
| **Your job number:** | | **Samples instructed on/ Analysis started on:** | 04/10/2023 |
| **Your order number:** | | **Analysis completed by:** | 11/10/2023 |
| **Report Issue Number:** | 1 | **Report issued on:** | 11/10/2023 |
| **Samples Analysed:** | 4 soil samples | | |

**Si**

Dominika Warjan
Reporting Specialist
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

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

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

**Analytical Report Number: 23-60118**
**Project / Site name: Hudders Field**

| **Lab Sample Number** | | | | 2832561 | 2832562 | 2832563 | 2832564 |
|---|---|---|---|---|---|---|---|
| **Sample Reference** | | | | HDTP/101 | HDTP/102 | HDTP/103 | HDTP/104 |
| **Sample Number** | | | | None Supplied | None Supplied | None Supplied | None Supplied |
| **Depth (m)** | | | | 0.20 | 0.10 | 0.10 | 0.25 |
| **Date Sampled** | | | | 03/10/2023 | 03/10/2023 | 03/10/2023 | 03/10/2023 |
| **Time Taken** | | | | None Supplied | None Supplied | None Supplied | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Limit of detection** | **Accreditation Status** | | | | |
| Stone Content | % | 0.1 | NONE | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Moisture Content | % | 0.01 | NONE | 15 | 26 | 23 | 23 |
| Total mass of sample received | kg | 0.001 | NONE | 0.8 | 0.9 | 0.8 | 0.8 |
| Asbestos in Soil | Type | N/A | ISO 17025 | Not-detected | Not-detected | Not-detected | Not-detected |
| Asbestos Analyst ID | N/A | N/A | N/A | PDO | PDO | PDO | PDO |
| **General Inorganics** | | | | | | | |
| pH - Automated | pH Units | N/A | MCERTS | 8.4 | 8.3 | 8 | 7.8 |
| Total Organic Carbon (TOC) - Automated | % | 0.1 | MCERTS | 2.4 | 6.2 | 3.4 | 4.4 |
| **Speciated PAHs** | | | | | | | |
| Naphthalene | mg/kg | 0.05 | MCERTS | 0.23 | 0.14 | 0.24 | 0.42 |
| Acenaphthylene | mg/kg | 0.05 | MCERTS | 0.06 | 0.09 | < 0.05 | 0.15 |
| Acenaphthene | mg/kg | 0.05 | MCERTS | 0.73 | 0.37 | 0.51 | 1.3 |
| Fluorene | mg/kg | 0.05 | MCERTS | 0.49 | 0.26 | 0.38 | 1.1 |
| Phenanthrene | mg/kg | 0.05 | MCERTS | 3.7 | 1.9 | 2.2 | 8.7 |
| Anthracene | mg/kg | 0.05 | MCERTS | 0.83 | 0.42 | 0.46 | 1.6 |
| Fluoranthene | mg/kg | 0.05 | MCERTS | 5.6 | 4.2 | 2.9 | 11 |
| Pyrene | mg/kg | 0.05 | MCERTS | 5 | 4.1 | 2.5 | 9.7 |
| Benzo(a)anthracene | mg/kg | 0.05 | MCERTS | 2.7 | 2.3 | 1.4 | 4.7 |
| Chrysene | mg/kg | 0.05 | MCERTS | 2.7 | 2.4 | 1.3 | 5.1 |
| Benzo(b)fluoranthene | mg/kg | 0.05 | ISO 17025 | 3.4 | 3.2 | 1.6 | 5.6 |
| Benzo(k)fluoranthene | mg/kg | 0.05 | ISO 17025 | 1.1 | 1.3 | 0.69 | 2.3 |
| Benzo(a)pyrene | mg/kg | 0.05 | MCERTS | 2.8 | 2.7 | 1.4 | 4.9 |
| Indeno(1,2,3-cd)pyrene | mg/kg | 0.05 | MCERTS | 1.5 | 1.4 | 0.78 | 2.4 |
| Dibenz(a,h)anthracene | mg/kg | 0.05 | MCERTS | 0.4 | 0.42 | 0.21 | 0.72 |
| Benzo(ghi)perylene | mg/kg | 0.05 | MCERTS | 1.6 | 1.5 | 0.87 | 2.7 |
| **Total PAH** | | | | | | | |
| Speciated Total EPA-16 PAHs | mg/kg | 0.8 | ISO 17025 | 32.7 | 26.7 | 17.5 | 62.3 |
| **Heavy Metals / Metalloids** | | | | | | | |
| Arsenic (aqua regia extractable) | mg/kg | 1 | MCERTS | 16 | 19 | 18 | 22 |
| Cadmium (aqua regia extractable) | mg/kg | 0.2 | MCERTS | 0.8 | 0.9 | 1.4 | < 0.2 |
| Chromium (hexavalent) | mg/kg | 1.8 | MCERTS | < 1.8 | < 1.8 | < 1.8 | < 1.8 |
| Chromium (III) | mg/kg | 1 | NONE | 27 | 76 | 20 | 26 |
| Chromium (aqua regia extractable) | mg/kg | 1 | MCERTS | 28 | 77 | 21 | 27 |
| Copper (aqua regia extractable) | mg/kg | 1 | MCERTS | 68 | 75 | 38 | 110 |
| Lead (aqua regia extractable) | mg/kg | 1 | MCERTS | 120 | 120 | 40 | 140 |
| Mercury (aqua regia extractable) | mg/kg | 0.3 | MCERTS | 0.6 | < 0.3 | < 0.3 | 1.2 |
| Nickel (aqua regia extractable) | mg/kg | 1 | MCERTS | 24 | 22 | 20 | 31 |
| Zinc (aqua regia extractable) | mg/kg | 1 | MCERTS | 180 | 230 | 310 | 170 |
| **Monoaromatics & Oxygenates** | | | | | | | |
| Benzene | µg/kg | 5 | MCERTS | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| Toluene | µg/kg | 5 | MCERTS | < 5.0## | < 5.0## | < 5.0 | < 5.0 |
| Ethylbenzene | µg/kg | 5 | MCERTS | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| p & m-xylene | µg/kg | 5 | MCERTS | < 5.0## | < 5.0## | < 5.0 | < 5.0 |
| o-xylene | µg/kg | 5 | MCERTS | < 5.0 | < 5.0 | < 5.0 | < 5.0 |
| MTBE (Methyl Tertiary Butyl Ether) | µg/kg | 5 | NONE | < 5.0 | < 5.0 | < 5.0 | < 5.0 |

**Analytical Report Number: 23-60118**
**Project / Site name: Hudders Field**

| **Lab Sample Number** | | | | 2832561 | 2832562 | 2832563 | 2832564 |
|---|---|---|---|---|---|---|---|
| **Sample Reference** | | | | HDTP/101 | HDTP/102 | HDTP/103 | HDTP/104 |
| **Sample Number** | | | | None Supplied | None Supplied | None Supplied | None Supplied |
| **Depth (m)** | | | | 0.20 | 0.10 | 0.10 | 0.25 |
| **Date Sampled** | | | | 03/10/2023 | 03/10/2023 | 03/10/2023 | 03/10/2023 |
| **Time Taken** | | | | None Supplied | None Supplied | None Supplied | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Limit of detection** | **Accreditation Status** | | | | |

**Analytical Report Number: 23-60118**
**Project / Site name: Hudders Field**

| **Lab Sample Number** | | | | 2832561 | 2832562 | 2832563 | 2832564 |
|---|---|---|---|---|---|---|---|
| **Sample Reference** | | | | HDTP/101 | HDTP/102 | HDTP/103 | HDTP/104 |
| **Sample Number** | | | | None Supplied | None Supplied | None Supplied | None Supplied |
| **Depth (m)** | | | | 0.20 | 0.10 | 0.10 | 0.25 |
| **Date Sampled** | | | | 03/10/2023 | 03/10/2023 | 03/10/2023 | 03/10/2023 |
| **Time Taken** | | | | None Supplied | None Supplied | None Supplied | None Supplied |
| **Analytical Parameter (Soil Analysis)** | **Units** | **Limit of detection** | **Accreditation Status** | | | | |
| **Petroleum Hydrocarbons** | | | | | | | |
| TPH-CWG - Aliphatic >EC5 - EC6 $_{HS\_1D\_AL}$ | mg/kg | 0.1 | NONE | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| TPH-CWG - Aliphatic >EC6 - EC8 $_{HS\_1D\_AL}$ | mg/kg | 0.1 | NONE | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| TPH-CWG - Aliphatic >EC8 - EC10 $_{HS\_1D\_AL}$ | mg/kg | 0.1 | NONE | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| TPH-CWG - Aliphatic >EC10 - EC12 $_{EH\_CU\_1D\_AL}$ | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| TPH-CWG - Aliphatic >EC12 - EC16 $_{EH\_CU\_1D\_AL}$ | mg/kg | 2 | MCERTS | 11 | 5 | 4.9 | 3 |
| TPH-CWG - Aliphatic >EC16 - EC21 $_{EH\_CU\_1D\_AL}$ | mg/kg | 8 | MCERTS | 28 | 20 | 9 | 9.7 |
| TPH-CWG - Aliphatic >EC21 - EC35 $_{EH\_CU\_1D\_AL}$ | mg/kg | 8 | MCERTS | 100 | 160 | 42 | 100 |
| TPH-CWG - Aliphatic (EC5 - EC35) $_{EH\_CU+HS\_1D\_AL}$ | mg/kg | 10 | NONE | 140 | 190 | 57 | 120 |
| TPH-CWG - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$ | mg/kg | 0.1 | NONE | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| TPH-CWG - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$ | mg/kg | 0.1 | NONE | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| TPH-CWG - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$ | mg/kg | 0.1 | NONE | < 0.10 | < 0.10 | < 0.10 | < 0.10 |
| TPH-CWG - Aromatic >EC10 - EC12 $_{EH\_CU\_1D\_AR}$ | mg/kg | 1 | MCERTS | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| TPH-CWG - Aromatic >EC12 - EC16 $_{EH\_CU\_1D\_AR}$ | mg/kg | 2 | MCERTS | < 2.0 | 2.8 | 2.1 | 5 |
| TPH-CWG - Aromatic >EC16 - EC21 $_{EH\_CU\_1D\_AR}$ | mg/kg | 10 | MCERTS | 19 | 19 | < 10 | 26 |
| TPH-CWG - Aromatic >EC21 - EC35 $_{EH\_CU\_1D\_AR}$ | mg/kg | 10 | MCERTS | 25 | 84 | < 10 | 61 |
| TPH-CWG - Aromatic (EC5 - EC35) $_{EH\_CU+HS\_1D\_AR}$ | mg/kg | 10 | NONE | 45 | 110 | 16 | 91 |

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

**Analytical Report Number : 23-60118**
**Project / Site name: Hudders Field**

* 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 * |
|---|---|---|---|---|
| 2832561 | HDTP/101 | None Supplied | 0.2 | Brown loam and clay with gravel and vegetation. |
| 2832562 | HDTP/102 | None Supplied | 0.1 | Brown loam and clay with gravel and vegetation. |
| 2832563 | HDTP/103 | None Supplied | 0.1 | Brown loam and clay with gravel and vegetation. |
| 2832564 | HDTP/104 | None Supplied | 0.25 | Brown loam and clay with gravel and vegetation. |

**Analytical Report Number : 23-60118**
**Project / Site name: Hudders Field**

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

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| Metals in soil by ICP-OES | Determination of metals in soil by aqua-regia digestion followed by ICP-OES. | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil. | L038-PL | D | MCERTS |
| Asbestos identification in soil | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques. | In house method based on HSG 248 | A001-PL | D | ISO 17025 |
| Moisture Content | Moisture content, determined gravimetrically. (30 oC) | In house method. | L019-UK/PL | W | NONE |
| Speciated EPA-16 PAHs in soil | Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards. Refer to CoA for analyte specific accreditation. | In-house method based on USEPA 8270 | L064-PL | D | MCERTS |
| pH in soil (automated) | Determination of pH in soil by addition of water followed by automated electrometric measurement. | In house method. | L099-PL | D | MCERTS |
| Stones content of soil | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight. | In-house method based on British Standard Methods and MCERTS requirements. | L019-UK/PL | D | NONE |
| Total organic carbon (Automated) in soil | Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate. | In house method. | L009-PL | D | MCERTS |
| BTEX and MTBE in soil (Monoaromatics) | Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited | In-house method based on USEPA8260. Refer to CoA for analyte specific accreditation | L073B-PL | W | MCERTS |
| Cr (III) in soil | In-house method by calculation from total Cr and Cr VI. | In-house method by calculation | L080-PL | W | NONE |
| TPHCWG (Soil) | Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID. Refer to CoA for band specific accreditation. | In-house method with silica gel split/clean up. | L088/76-PL | D | MCERTS |
| Hexavalent chromium in soil | Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry. | In-house method | L080-PL | W | MCERTS |

**Analytical Report Number : 23-60118**
**Project / Site name: Hudders Field**

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

| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|---|---|---|---|---|---|
| D.O. for Gravimetric Quant if Screen/ID positive | Dependent option for Gravimetric Quant if Screen/ID positive scheduled. | In house asbestos methods A001 & A006. | A006-PL | D | NONE |

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

## Information in Support of Analytical Results

### List of HWOL Acronyms and Operators

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

## - Quality control parameter has a high recovery (outside of limit); however the associated result is below the reporting limit, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.