



GEO-ENVIRONMENTAL CONSULTING

BEK Geo-Environmental Consulting

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



LAND OFF CHAPEL HILL, LONGRIDGE

Site Investigation & Ground Assessment



Prepared for:



Report Ref: BEK-21960-2

April 2024



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Project Quality Assurance Information Sheet

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Report Title	Site Investigation & Ground Assessment
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Prepared For	WILLIAM PYE LIMITED Shay Lane Industrial Estate Longridge Preston, PR3 3BT
Prepared By	BEK ENVIRO LIMITED No 2 Landwick Court Metcalf Drive Altham Business Park Lancashire BB5 5GY
Author(s)	Adam Hope BSc (Hons)
Checked	James Mashiter BSc (Hons) MSc
Authorised	Michael Buckley BSc (Hons) MSc MEnvSci CEnv
Contact	████████████████████ - ████████████████████ ██



LAND OFF CHAPEL HILL, LONGRIDGE

Site Investigation & Ground Assessment

PROJECT NO: 21960

REPORT REF: BEK-21960-2

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REVISION STATUS / HISTORY

Rev	Date	Issue / Comment	Prepared	Checked

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Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by BEK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

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

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Ian Pawson Limited, Job No. 4021, Drawing No. 3 entitled 'Plans & Elevations as Proposed', dated October 2021.	

1. INTRODUCTION

1.1 Appointment

1.1.1 BEK Enviro (BEK) has been commissioned by William Pye Limited to carry out a site investigation & contamination assessment for the land located off Chapel Hill, Longridge (hereafter referred to as 'the site'). The site investigation will inform a quantitative risk assessment with respect to contamination and will include a geotechnical assessment to provide recommendations for foundation design.

1.1.2 The site occupies an irregular shaped plot of land which is currently used for the storage of various construction/industrial machinery and materials.

1.1.3 The site location and layout is illustrated on BEK Drawing No 21960-1 and 21960-2, copies of which are presented in Appendix D.

1.2 Proposed Development

1.2.1 This report has been produced to support a planning application for the construction of four commercial units with associated infrastructure at the site.

1.2.2 The proposed development plan is presented on Ian Pawson Ltd Job No. 4021, Drawing No. 3. entitled 'Plans & Elevations as Proposed', dated October 2021, a copy of which is presented in Appendix D and an extract of which is provided below.

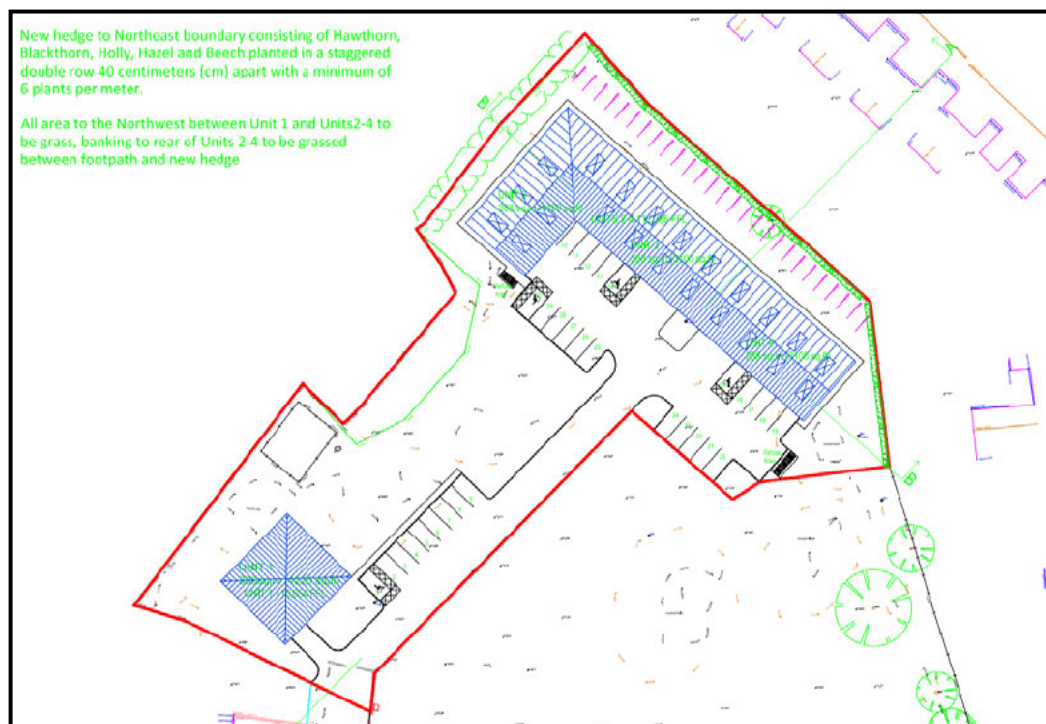


Figure 1: Extract from the Proposed Development

1.3 Objective & Scope of Work

- 1.3.1 The site investigation was undertaken by BEK during March 2024 in accordance with the recommendations detailed in the BEK Preliminary Risk Assessment (PRA), Report Ref: BEK-21960-1, dated November 2021.
- 1.3.2 This report has been prepared to provide a summary of the site details and ground conditions encountered as well as provide a geotechnical assessment for foundation design.
- 1.3.3 The PRA should be read in conjunction with this report.

1.4 Limitations

- 1.4.1 The conclusions and recommendations presented in this report are the result of our professional interpretation of the information currently available. BEK reserve the right to amend the conclusions and recommendations if further information becomes available.
- 1.4.2 However, it should be noted that much of the information has been derived from reports written by others and BEK takes no responsibility for the accuracy of that information. Notwithstanding the above, the reports reviewed have all been written by professional environmental consultants with a duty of care to provide relevant and accurate information.
- 1.4.3 The comments given in this report and the opinions expressed are based on review of reports provided to BEK, ground conditions encountered during site works and the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigations and therefore could not be taken into account.
- 1.4.4 The presence of invasive plant species (ie Japanese Knotweed) is outside the remit of this assessment.

2. BACKGROUND INFORMATION

2.0.1 This section provides an overview of the findings and recommendations presented in the PRA.

2.1 **Site Location, Layout & History**

2.1.1 The site is located off Chapel Hill, Longridge, approximately 10 km north-east of Preston City centre. The National Grid Reference for the centre of the site is 360396, 436862.

2.1.2 The site is an irregular shaped plot of land currently used for the storage of various construction/industrial machinery and materials.

2.1.3 Entrance to the site was through large metal gates located in the south-western site boundary. The north of the site is approximately 2.5 m higher than the south, with a steep embankment crossing the site, separating the two sections.

Site History

2.1.4 Based on historical maps there are cuttings and pits located in the south of the site from circa 1892 to 1977, associated with Chapel Hill Quarry. The quarry appears to have been infilled over time until circa 1994. A tank was located on site circa 1912. The north of the site appears to have remained untouched.

2.1.5 The quarry was infilled through landfilling operations. The landfill was operated by United Utilities and was reported to only accept non-biodegradable waste, however the presence of gas venting chimneys and gas monitoring probes identified during the walkover suggest that the site may be generating landfill gas. Elevated carbon dioxide was previously proven by BEK in the land to the south of the site.

2.2 **Environmental Setting**

Geology

2.2.1 The BGS website indicated that there are two published borehole records located in the both boreholes located in the north of the eastern portion of the site. The boreholes were drilled in September 1997 and describe topsoil at the surface, over 'firm to stiff brown silty sandy clay' to approximately 2 m, over 'firm to stiff brown fine stoned silty clay (glacial till)' to 6 m.

2.2.2 According to the Enviro+GeoInsight report there is a record of artificial ground (made ground) present beneath the south of the site. Historical mapping indicates the site was formally occupied by a quarry which has been infilled to restore site levels.

- 2.2.3 The superficial deposits underlying the site comprise low permeability Devensian Till (Boulder Clay). Superficial deposits encountered within the off-site borehole comprised clays to a depth of 7.92 m, underlain by 'Heavy Gravel' to a depth within excess of 10.11 m.
- 2.2.4 The solid geology underlying the site comprises the low permeability 'Kirkham Mudstone Member' of the 'Sidmouth Mudstone Formation'. Bedrock was not encountered within the off-site borehole.

Mining and Ground Stability

- 2.2.5 Information in the Enviro+GeoInsight Report indicates that the site is not located in an area which could have been affected by coal mining. As a result, BEK does not consider the risks from subsidence from historical coal mining activity to be in need of further consideration.
- 2.2.6 Historically, part of the site has been associated with Chapel Hill Quarry which would have been used for the extraction of sandstone.
- 2.2.7 Information in the Enviro+GeoInsight Report shows extensive records of surface ground workings on and immediately south of the site. All records are associated with historic quarries or ponds.
- 2.2.8 Furthermore there is a record of current ground workings on site, described as 'a surface mineral working' named 'Chapel Hill Quarry' and producing sandstone. The status of the working is 'ceased'.

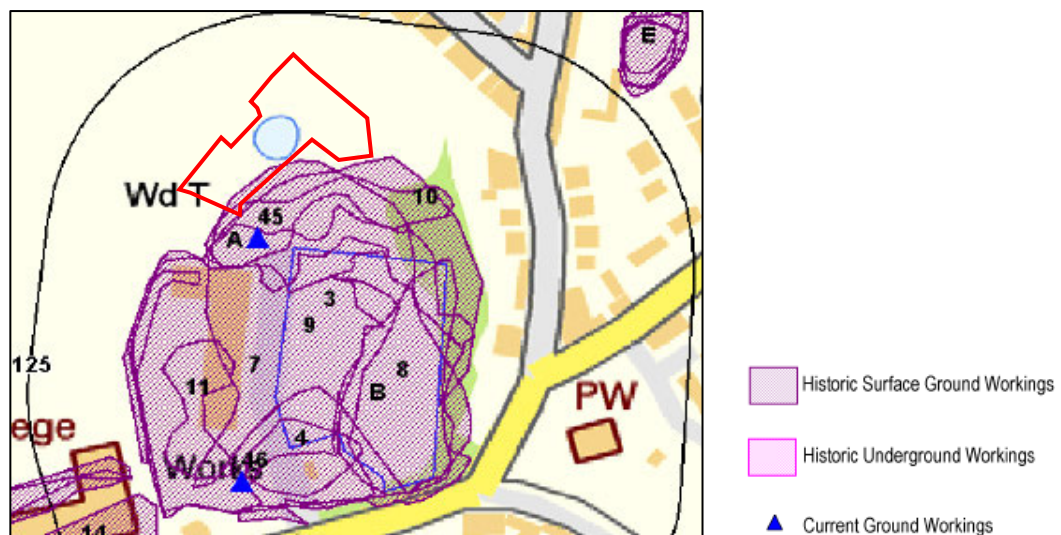


Figure 2: Ground Workings at the Site

- 2.2.9 The Enviro+GeoInsight Report provides hazard ratings associated with ground subsidence at the site, as summarised below:

Shrink-Swell Clay:	Very Low
Landslides:	Very Low
Ground Dissolution of Soluble Rocks:	Negligible
Compressible Deposits:	Very Low
Collapsible Deposits:	Very Low
Running Sands:	Very Low

- 2.2.10 It can be seen from the above that the site is unlikely to be affected by ground instability.

Hydrogeology

- 2.2.11 The underlying bedrock is classified as 'Secondary A Aquifer' which is described as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formally classified as minor aquifers'.
- 2.2.12 The Enviro+GeoInsight Report indicates the site is not located within a groundwater source protection zone.
- 2.2.13 The nearest groundwater abstraction is located approximately 156 m west of the site which is located at Mill Farm and named Singletons Dairy Ltd.

Hydrology

- 2.2.14 The Enviro+GeoInsight Report shows there are no surface water features located or within 250 m of the site on the site. However, Google earth images show a pond located adjacent to the north-western site boundary.
- 2.2.15 There are is one registered licensed discharge consent located within 250 m of the site. This is located approximately 230 m south-east of the site, described as 'sewage discharges - final/treated effluent - not water company', receiving water from the River Ribble.
- 2.2.16 The Environment Agency flood map indicates that the site is not at risk from flooding.

Contaminated Land & Landfill Activities

- 2.2.17 Information provided in the Enviro+GeoInsight Report indicates that there is a landfill site located on the site. The site was operated by United Utilities Water Limited and accepted non-biodegradable waste. Operational dates are not provided, however based on historic maps tipping is likely to have stopped sometime between 1990 and 1994.

- 2.2.18 The walkover identified the presence of an embankment across the site. The location of the embankment roughly correlates with the edge of the areas of ground workings and made ground shown on Figures 6 and 7. Based on historic maps, landfilling at Chapel Hill Quarry ceased circa 1994. BGS borehole records from 1997 located in an area to the north of the embankment describes topsoil over glacial till. Based on this, it can be assumed that the area of landfill/made ground is confined to the south of the embankment and the south of the site.
- 2.2.19 In addition, the Enviro+GeoInsight report indicates that a waste disposal centre is located approximately 100 m south of the site.
- 2.2.20 There have been no Environment Agency recorded no pollution incidents located within 250 m of the site.
- 2.2.21 The Enviro+GeoInsight Report has no recorded Part A(1), A(2), Part B or IPPC Authorised Activities within 250 m of the site.
- 2.2.22 According to the Enviro+GeoInsight Report the closest potentially contaminative land use is a recycling, reclamation and disposal site run by SITA UK Ltd located approximately 100 m south of the site.

Sensitive Land Uses

- 2.2.23 The site is not affected by any of the ecological systems identified as a statutory receptor in the DETR Circular 01/2006.

Radon

- 2.2.24 Groundsure reports that 'less than 1% of homes are above the action trigger level' and that no radon protective measures are necessary in the construction of new dwellings or extensions.

Unexploded Ordnance

- 2.2.25 The regional unexploded bomb risk map from Zetica (2014) indicates that the site is in an area at LOW risk from possible Unexploded Ordnance (UXO) resulting from the Second World War. BEK do not consider any further assessment to be required with respect to UXO.

2.3 Previous Site Investigation

- 2.3.1 Historically the Chapel Hill landfill site has been subject to site investigation and assessment by Wardell Armstrong. The investigation was undertaken on a larger site than the site boundary included within this assessment herein.

- 2.3.2 BEK does not have access to the reports, however limited information has been provided showing that the site was subject to extensive site investigation in 1993 and 2000. Copies of this information is presented in Appendix D.
- 2.3.3 Landfilling operations were carried out under a Waste Management License which includes a requirement to monitor environmental impact following closure. Although the specific requirements of this are unknown, it is assumed to include monitoring leachate and gas production.
- 3.3.4 Leachate monitoring data is available from 1993 from 14 locations, however the monitoring locations are unknown.
- 2.3.5 A Wardell Armstrong borehole and trial pit plan has been reviewed which shows the location of monitoring boreholes (a copy of which is available in Appendix D). The boreholes marked on the drawing were installed in 1993 and 2008, although it is suspected additional gas monitoring probes may have recently been installed (as observed during the site walkover). The only gas monitoring information available is provided on a Wardell Armstrong letter to the Environment Agency, dated June 2017 which covers the monitoring period from January to March 2017 inclusive.
- 2.3.6 Borehole 10A, Borehole 1, Borehole K and Borehole 2 are located on or close to the site. The Wardell Armstrong letter states that Borehole 2 recorded concentrations of carbon dioxide in excess of 1.5% on at least one occasion. There is no further information on these boreholes.
- 2.3.7 The Wardell Armstrong letter report does not provide the gas monitoring data sheets and it is unclear what the 'elevated levels of methane during all months' is based upon and the justification for concentrations of carbon dioxide in excess of 1.5% being of possible concern.
- 2.3.8 It is noted that the Wardell Armstrong Letter Report was written as part of the Environmental Permitting conditions for Environmental Permit No: EA EPR/TP3891 CU which may include conditions relating the permitted concentrations of methane and carbon dioxide permitted at the site which BEK does not have access to.
- 2.4 BEK Investigation**
- 2.4.1 In addition to the above, BEK has also undertaken ground investigation works at the Chapel Hill landfill site. The BEK investigation was carried out for William Pye and was undertaken on a site located immediately south of the current site. Report Ref: BEK-18457-2, Dated May 2019.

- 2.4.2 Five window sample boreholes were drilled within the footprint of the proposed new build and gas monitoring probes were installed within 3 of the borehole (the closest approximately 40 m south of the site). Samples were also recovered for chemical testing.
- 2.4.3 Made ground was encountered at each location to a depth in excess of 5.45 m and can be generalized as 'landfill material'.
- 2.4.4 BEK monitored the boreholes on 6 occasions between February and April 2019. No methane was recorded, however a Gas Screening Value of 0.224 l/hr for carbon dioxide for Borehole No WS5 and gas mitigation measures which adhere to Characteristic Situation 2 (CS2) were recommended for the new build.
- 2.4.5 No elevated chemical contaminants of concern were encountered at the site, however two samples proved positive for the presence of asbestos (samples recovered from Borehole No WS1 and WS2).
- 2.5 **Conclusions & Recommendations**
 - 2.5.1 Based on the findings of the Preliminary Risk Assessment, risks were identified to human health, controlled waters, flora and property (including services) with respect to the re-development of the site to commercial.
 - 2.5.2 BEK recommended that site investigation works should be carried out to characterise the shallow ground conditions and to quantify the potential risks identified. The site investigation would also provide sufficient information to support a geotechnical assessment to inform foundation design options.
 - 2.5.3 In addition, due to the potential risks from ground gas associated with the landfill located on site, BEK recommended that a gas monitoring probes be installed and monitored on six occasions over a three-month period.

3. SITE INVESTIGATION

3.1 General

- 3.1.1 This section provides a summary of the site investigation works undertaken by BEK during March 2024.
- 3.1.2 The site investigation has been designed to provide indicative information for the ground conditions across the site and to provide a quantitative assessment of potential risks associated with contamination and ground gas. The site investigation was also designed to provide recommendations with respect to foundation design.
- 3.1.3 Six exploratory locations were set out by the site engineer to establish representative conditions at the site. The exploratory locations are illustrated on BEK Drawing No 21960-3, a copy of which is presented in Appendix D.

3.2 Window Sample Boreholes

- 3.2.1 Six window samples were drilled using a window sample borehole rig to a maximum depth of 4.45 m. Borehole locations were set out by the site engineer in order to establish representative conditions at the site. In-situ testing (SPTs) were carried out in each of the boreholes.
- 3.2.2 The ground conditions were recorded by an engineer from BEK and samples were recovered for chemical testing. Gas and groundwater monitoring probes were installed in three of the boreholes (Borehole No WS1, WS2 & WS3), the details of which are presented in the borehole records.
- 3.2.3 Copies of the borehole records are presented in Appendix A. The window sample borehole locations are illustrated on BEK Drawing No 21960-3 presented in Appendix D.

3.3 Laboratory Testing

- 3.3.1 Following a review of the ground conditions, BEK selected representative samples for chemical testing based on the recommendations set out in the PRA, the findings of past site investigation work, and the ground conditions encountered during the investigation.
- 3.3.2 The samples were delivered to the UKAS laboratory of Envirolab for the following selected analysis:

Five samples were tested: Arsenic (Total), Cadmium (Total), Copper (Total), Lead (Total), Nickel (Total), Zinc (Total), Chromium (Total), Selenium (Total), Mercury (Total), Boron (Soluble), Hexavalent Chromium, Cyanide (Total), pH, 16 EPA Poly-Aromatic Hydrocarbons (PAH), Total Phenols, Total Sulphate, Sulphate 2:1 extract, Soil Organic Matter, Total Petroleum Hydrocarbon Compounds (TPH-CWG) and Asbestos Screen.

Three samples of natural strata were tested for pH and Sulphate 2:1 extract.

Three samples were subjected to Waste Acceptance Criteria (WAC) testing.

3.3.3 Copies of the chemical test results are presented in Appendix B.

Geotechnical Testing

3.3.4 Geotechnical testing was carried out on three bulk samples by the UKAS accredited laboratory of Murray Rix.

3.3.5 Three samples were tested for Plasticity Index testing and Natural Moisture Content.

3.3.6 Copies of the geotechnical test results are presented in Appendix C.

3.4 Ground Conditions

3.4.1 The south, south-west and central areas of the site are overlain by laterally continuous heterogeneous made ground to depths varying from 1.5 m (Borehole WS1) to 2.0 m (Borehole WS6).

Made Ground – South, South-West and Central Areas

3.4.2 Made ground present in the above areas of the site generally comprised the following subtypes:

‘Dark brown slightly ashy slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse stone of mixed lithologies, brick and concrete. Rare cobbles of whole/broken brick. Rare wood and coal’ – This strata was encountered at the surface of Borehole WS1 to a depth of 1.5 m.

‘Brown very clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse stone of mixed lithologies, brick and concrete. Occasional pockets of reddish brown clay. Rare cobbles of whole/broken brick. Rare wood and coal’ – This strata was encountered at the surface of Borehole WS2 to a depth of 1.8 m.

'Blackish brown very clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse stone of mixed lithologies, brick and concrete. Occasional pockets of reddish brown clay. Rare cobbles of whole/broken brick. Rare wood and coal' – This strata was encountered at the surface of Borehole WS6 to a depth of 2.0 m.

Natural Strata

- 3.4.3 Natural strata encountered at the site was fairly consistent and comprised the following two subtypes:

'Reddish brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to medium rounded to sub-rounded stone of mixed lithologies' was encountered beneath made ground in Boreholes WS1, WS2 & WS6 from a minimum depth of 1.5 m (Borehole WS1) to a maximum proven depth of 4.45 m.

'Grey/brown slightly sandy slightly gravelly CLAY with rare root traces. Sand is fine to coarse. Gravel is fine to medium rounded to sub-rounded stone of mixed lithologies' was encountered at the surface of Boreholes WS3, WS4 & WS5 to a maximum proven depth of 4.45 m.

- 3.4.4 Bedrock was not encountered during the site investigation works.

Visual Evidence of Contamination

- 3.4.5 Made ground encountered within Boreholes WS1, WS2 & WS6 contained rare occurrences of coal, whilst made ground encountered within Borehole WS1 was noted to be slightly ashy.

Groundwater

- 3.4.6 A summary of groundwater encountered during the site investigation is presented in Table 6 below:

Location	Depth to Water (m) bgl	Depth to Base (m) bgl	Comment
WS1	1.5	4.45	Borehole damp
WS2	2.0	4.45	Borehole damp

Table 1: Summary of Groundwater Encountered During Site Investigation

3.5 Environmental Monitoring

- 3.5.1 Gas and groundwater monitoring is ongoing and the results will be assessed within an addendum report which will be completed when the gas monitoring programme has been completed.

- 3.5.2 However, a summary of the monitoring undertaken to date (2 monitoring visits) is provided below.

Groundwater

- 3.5.3 Groundwater levels have been monitored in the boreholes and are summarised in Table 2 below.

Location	Depth to Water (m) bgl	Depth to Base (m) bgl
WS1	1.74 - 1.87	3.52 - 3.6
WS2	2.27 - 2.35	2.8 - 2.85
WS3	0.15 - 0.32	1.69 - 1.75

Table 2: Summary of Groundwater Encountered During Groundwater Monitoring

- 3.5.4 Note that this is the result of two monitoring visits. Seasonal variations in water levels cannot be accounted for over the short monitoring period.

Gas Monitoring

- 3.5.5 The boreholes have been monitored for ground gas on 2 occasions to date and a summary of the gas monitoring results are presented in Table 3 below.

Location	Range of Concentrations (% v/v)			Max Flow Rate (l/hr) (steady state)
	Carbon Dioxide	Methane	Oxygen	
WS1	0.7	0	19.7	0
WS2	0	0	20.3 - 20.5	0
WS3	0	0	20.3 - 20.5	0

Table 3: Summary of Gas Monitoring Data

- 3.5.6 It can be seen from the above table that all the gas flow rates are zero l/hr for all boreholes. This resulted GSVs for carbon dioxide and methane which fall below the lowest threshold (0.07 l/hr) for all locations at the site, meaning the site would be classified as Characteristic Situation 1 (very low risk) as per guidance document CIRIA C665 (Assessing Risks Posed by Hazardous Ground Gases to Buildings).

- 3.5.7 However, consideration must be given to the 'typical maximum' concentrations for methane (1%) and carbon dioxide (5%). Where concentrations exceed the typical maximum, consideration should be given to increasing the risk level. It can be seen from Table 8 above, that the typical maximum concentrations for carbon dioxide and methane were not exceeded after a total of two gas monitoring visits.

- 3.5.8 Based on the ground gas monitoring to date (2 monitoring visits), the risks from ground gas at the site are considered to be very low and it is anticipated that gas protection measures will not be required.
- 3.5.9 However, it should be noted that the above is a result of two monitoring visits and gas protection measures may still be deemed necessary dependant on the findings of the future gas monitoring visits.
- 3.5.10 The Gas Risk Assessment will be prepared as a separate report.

4. CONTAMINATION RISK ASSESSMENT

4.1 Potentially Significant Pollutant Linkages

4.1.1 Potentially significant pollutant linkages have been identified in the PRA as listed below:

- (i) Human Health - risks associated with contamination in the made ground and/or natural strata: risk via ingestion, inhalation (dust or vapour) or direct contact.
- (ii) Human Health - risks associated with indoor inhalation of volatile organic compounds and/or ground gas.
- (iii) Controlled Waters - risks associated with contamination in the site soil and made ground affecting water quality in the bedrock Secondary A aquifer, as well as the quality of perched water/surface water features on/within the vicinity of the site. Risks are associated with dissolution of contamination into perched water/leachate and lateral/vertical migration to water receptors.
- (iv) Property - risks associated with contamination affecting concrete, service pipes and flora.

4.2 Risk Assessment: Human Health Risks from Exposure to Contaminated Soil

4.2.1 The risks to human health have been assessed by inspection of shallow soils for the presence of elevated contaminants based on the expected contaminant findings detailed in the conceptual model and completion of a quantitative risk assessment.

4.2.2 The soil contamination concentrations have initially been compared to a range of generic assessment criteria. These include the use of the Land Quality Management and Chartered Institute of Environmental Health assessment criteria (S4ULs), the Contaminated Land: Applications in Real Environments assessment criteria (CL:AIRE) Category 4 Screening Levels (C4SLs) and the Atkins Atrisk Screening Criteria.

4.2.3 These assessment criteria have been derived using the CLEA model and fully justified input parameters. The derivation of the assessment criteria assumes a commercial end use. The initial assessment assumes a soil organic matter (SOM) of 1% as a conservative approach.

4.2.4 Table 4 summarises the chemical test results for the samples tested and lists the relevant assessment criteria and the samples with a concentration in excess of the assessment criteria. Note that only determinands with a concentration above the laboratory limit of detection are presented in the table below:

Determinands	Range of Concentrations (mg/kg)	Assessment Criteria (mg/kg)	Samples Fail
Arsenic	2 - 10	640 ¹	---
Cadmium	1.1 - 1.4	190 ¹	---
Copper	21 - 92	68000 ¹	---
Chromium	21 - 44	8600 ¹	---
Lead	16 - 250	6000 ²	---
Mercury	0.91 - 46.9	1100 ¹	---
Nickel	25 - 43	980 ¹	---
Selenium	<1 - 2	12000 ¹	---
Zinc	57 - 201	730000 ¹	---
Acenaphthene	<0.01 - 0.55	84000 ¹	---
Acenaphthylene	<0.01 - 0.08	83000 ¹	---
Anthracene	<0.02 - 1.2	520000 ¹	---
Benzo(a)anthracene	<0.04 - 5.28	170 ¹	---
Benzo(a)pyrene	<0.04 - 5.16	35 ¹	---
Benzo(b)fluoranthene	<0.05 - 6.32	44 ¹	---
Benzo(ghi)perylene	<0.05 - 2.84	3900 ¹	---
Benzo(k)fluoranthene	<0.07 - 2.24	1200 ¹	---
Chrysene	<0.06 - 5.61	350 ¹	---
Dibenzo(ah)anthracene	<0.04 - 0.58	3.5 ¹	---
Fluoranthene	<0.08 - 12.8	23000 ¹	---
Fluorene	<0.01 - 0.4	63000 ¹	---
Indeno(123-cd)pyrene	<0.03 - 3.17	500 ¹	---
Naphthalene	<0.03 - <0.3	190 ¹	---
Phenanthrene	<0.03 - 4.33	22000 ¹	---
Pyrene	<0.07 - 10.6	54000 ¹	---
Aliphatic HCs C12-C16	<1 - <2	59000 ¹	---
Aliphatic HCs C16-C21	<1 - 6	1600000 ^{*1}	---
Aliphatic HCs C21-C35	2 - 254	1600000 ^{*1}	---
Aromatic HCs C12-C16	<1 - 10	36000 ¹	---
Aromatic HCs C16-C21	1 - 85	28000 ¹	---
Aromatic HCs C21-C35	5 - 336	28000 ¹	---
Asbestos	Non Detected		

Table 4: Summary of Elevated Contaminants of Concern in Soils

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

2 Category 4 Screening Levels (C4SL)

- 4.2.5 It can be seen from the above that there are no elevated contaminants of concern when the soil chemical test results for the site are compared against assessment criteria for a commercial end use.
- 4.2.6 Notwithstanding the above, as BEK understands that the proposed development is to include limited soft landscaped areas, the soil chemical test results have also been compared to those for a Public Open Space Park end use in order to quantify the potential risks. This assessment again showed no elevated contaminants of concern.

4.3 Risk Assessment: Human Health Risks from Exposure to Hazardous Gases

- 4.3.1 Based on the ground gas monitoring to date (2 monitoring visits), the risks from ground gas at the site are considered to be very low. However, it should be noted that the above is a result of two monitoring visits and a Gas Risk Assessment will be prepared as a separate report on completion of the monitoring program.

4.4 Risk Assessment: Controlled Waters

- 4.4.1 Potential risks to the quality of surface water and groundwater have been identified in the ground conceptual model. The nearest surface water to the site is a pond located adjacent to the north-western site boundary. Superficial deposits were thought to be absent from the site and it was concluded that a direct pathway may exist between any contaminated perched water in the made ground deposits and the bedrock 'Secondary A' aquifer.
- 4.4.2 The site investigation encountered groundwater in two of the six exploratory locations. This water is considered to represent perched water held within the made ground/more permeable horizons of the superficial boulder clay; which was proved to be present during site investigation works. Risks to the water quality of the bedrock 'Secondary A' aquifer are therefore considered to be very low to negligible and will not be considered further.
- 4.4.3 However, risks still remain with respect to the shallow perched water which has the potential to migrate to the pond located adjacent to the north-western site boundary. BEK considered it prudent to recover groundwater samples from the borehole installations at the site. Two groundwater samples were recovered from Boreholes WS1 and WS3. The chemical test results for the groundwater samples recovered and the further risk assessment is presented below.

Chemical Test Results & Assessment

- 4.4.4 As part of a Tier 1 assessment the concentrations have been compared with the UK DWS Water Supply (Water Quality) Standards (DWS).
- 4.4.5 Where no UK DWS have been established professional judgement has been used to select alternative criteria derived from various sources, e.g. UK Environmental Quality Standards (EQS) derived from the River Basin Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2015), USEPA standards and the Scotland Private Water Supply Regulations (Scotland 2006 SI209).

4.4.7 This is considered to be a conservative approach and consistent with the EA “GP3” Framework¹. Note that only determinands with a concentration above the laboratory limit of detection are presented in the table.

Surface and Groundwater Concentrations

4.4.8 The assessment of the surface and groundwater concentrations is summarised in Table 5. Note that only determinands with a concentration above the laboratory limit of detection are presented in Table 5.

Determinand	Units	Range	Screening Criteria	Elevations
pH (w)	pH	6.96 – 7.16	6.0 – 9.0	---
Ammoniacal nitrogen as N (w)	mg/l	0.15 – 0.42	0.5 ⁵	---
Chloride (w)	mg/l	10 – 11	250 ²	---
Sulphate (w)	mg/l	21 – 57	250 ¹	---
DOC - Dissolved Organic Carbon (w)	mg/l	6.9 – 11.2	NA	WS1 & WS3
Arsenic (dissolved)	µg/l	2	10 ¹	---
Boron (dissolved)	µg/l	51 – 58	1000 ¹	---
Copper (dissolved)	µg/l	<4 – 23	2000 ¹	---
Nickel (dissolved)	µg/l	<2 – 4	20 ¹	---
Selenium (dissolved)	µg/l	<1 – 12	10 ¹	WS3
Zinc (dissolved)	µg/l	23 – 29	13.4 ¹	WS1 & WS3
Acenaphthene	µg/l	0.03 – 0.04	5.8 ³	---
Acenaphthylene	µg/l	<0.01 – 0.03	NA	WS1 & WS3
Anthracene	µg/l	0.02 – 0.03	0.1 ²	---
Benzo(a)anthracene	µg/l	0.02 – 0.06	0.018 ³	WS1 & WS3
Benzo(a)pyrene	µg/l	0.02 – 0.05	0.001 ¹	WS1 & WS3
Benzo(b)fluoranthene	µg/l	0.02 – 0.06	0.1 ¹	---
Benzo(ghi)perylene	µg/l	0.02 – 0.03	0.1 ¹	---
Benzo(k)fluoranthene	µg/l	0.02	0.1 ¹	---
Chrysene	µg/l	0.02 – 0.07	NA	WS1 & WS3
Fluoranthene	µg/l	0.06 – 0.21	0.0063 ²	WS1 & WS3
Fluorene	µg/l	0.03 – 0.04	3 ³	---
Indeno(123-cd)pyrene	µg/l	0.02 – 0.03	0.1 ¹	---
Naphthalene	µg/l	0.02	2.4 ²	---
Phenanthrene	µg/l	0.08 – 0.11	0.4 ³	---
Pyrene	µg/l	0.05 – 0.18	0.025 ³	WS1 & WS3
Aliphatic Hydrocarbons >C16-21	µg/l	<5 – 8	6000 ⁴	---
Aliphatic Hydrocarbons >C21-C35	µg/l	162 – 487	6000 ⁴	---
Aromatic Hydrocarbons >C8-C10	µg/l	7 – 9	100 ¹	---
Aromatic Hydrocarbons >C12-C16	µg/l	6 – 11	100 ¹	---
Aromatic Hydrocarbons >C16-C21	µg/l	17 – 29	90 ¹	---
Aromatic Hydrocarbons >C21-C35	µg/l	41 – 86	90 ¹	---

Table 5: Summary of Groundwater Assessment

¹ Environment Agency, 2013 “Groundwater Protection: Principles and Practice (GP3)”

- 1 DWS - UK DWS Water Supply (Water Quality) Regs (England & Wales 2000 SI 3184 & 2010 SI 994, Scotland 2001 SI 207, Northern Ireland 2007 No. 147)
- 2 EQS¹ - UK EQS Water Framework Directive (Standards and Classification Directions (England and Wales) 2015
- 3 USEPA - USEPA Region 3 Freshwater Screening Benchmarks (7/2006)
- 4 WHO DWS – World Health Organisation Drinking Water Standard
- 5 RPV –Scottish Resource Protection Value
- NA No criteria available

4.4.9 It can be seen from the above table that contaminant concentrations for the perched water samples recovered from Boreholes WS1 and WS3 were generally below the conservative assessment criteria.

4.4.10 Notwithstanding, marginally elevated concentrations of selenium, zinc, benzo(a)anthracene, benzo(a)pyrene, fluoranthene and pyrene were present within the perched water samples. In addition, concentrations of dissolved organic carbon, acenaphthylene, and chrysene were noted to be above the laboratory limit of detection where no assessment criteria are currently available.

Further Assessment - Groundwater Concentrations

4.4.11 The receptor to the marginally elevated contaminants identified is an off-site pond located adjacent to the north-western site boundary. The potential for the migration of contaminants to this receptor is considered unlikely as the pond is elevated above the level for which the groundwater samples were taken, and is elevated above the level for which the only two instances of groundwater were encountered during site investigation works (Borehole WS1 and WS3).

4.4.12 Moreover it is considered likely that the pond is clay-lined which would form an impermeable barrier to, and mitigate the migration of, any contamination to the receptor.

4.4.13 It should also be noted that due to poor re-charge rates, the groundwater samples were taken as 'grab samples' rather than purged water samples and these represent a worst-case scenario.

4.4.14 The assessment of the perched water contaminant concentrations is also considered to be inherently conservative and does not consider the effects of retardation and dispersion which would occur if the contamination was to migrate to the receptors identified.

4.4.15 Considering the above, the risks associated with the elevations of contaminants within the perched water samples are not considered to be significant to the receptors identified. Risks to the water environment are therefore considered to be very low and are not considered further.

4.5 Risk Assessment: Buildings

- 4.5.1 Risks to buildings include the assessment of the aggressive nature of the shallow ground with respect to concrete, the risks to the degradation of water pipes and flora due to contamination.

Risk to Concrete

- 4.5.2 To assess the potential risks to concrete, BEK has compared the previous site investigation data to assessment criteria presented in the BRE Special Digest 1: Concrete in Aggressive Ground.
- 4.5.3 The sulphate concentrations (water soluble 2:1) in the shallow ground range between <0.01 to 0.09 g/l which is below the maximum concentration for the BRE 2:1 water/soil extract concentration of Class DS-1 concrete.
- 4.5.4 With consideration to the range of pH values, the concrete classification suitable for the site would be DS-1 AC-1.

Risks to Services

- 4.5.5 Potable water supply pipes can be at risk from degradation if the shallow ground consists of specific organic contamination. Guidance published by UK WIR includes a methodology for the site investigation and risk assessment to determine pipe specification.
- 4.5.6 For brownfield sites, site investigation may be required along the intended route of the water pipeline and samples recovered from specific depths and tested for specific contaminants of concern.
- 4.5.7 On the basis of the ground conditions encountered, risks to water supply pipelines are considered to be medium, however it is recommended that consultation is undertaken with the water service supplier to confirm this.

Risks to Flora

- 4.5.8 Copper, nickel and zinc are toxic to plants. The effects of copper, nickel and zinc are often regarded as additive.
- 4.5.9 The assessment criteria used for copper, nickel and zinc, are 'pseudo total concentrations' are derived from BS3882:2007 as follows:

Phytotoxic Contaminant	pH Range		
	<6.0	6.0 to 7.0	>7.0
Zinc (nitric acid extractable)	<200	<200	<300
Copper (nitric acid extractable)	<100	<135	<200
Nickel (nitric acid extractable)	<60	<75	<110

Table 6: Limits for Phytotoxic Contaminants (Units mg/kg)

4.5.10 By comparing the chemical test results (Appendix B) to the concentrations in the above table, it can be seen that there are no elevated phytotoxic contaminants of concern.

4.6 Risk Assessment: Conclusions

4.6.1 Made ground has been found to be present in the south, south-west and central areas of the site to depths varying from 1.5 m (Borehole WS1) to 2.0 m (Borehole WS6). The made ground generally comprised multiple subtypes described as 'slightly sandy gravelly CLAY' and 'very clayey gravelly SAND' with varying proportions of brick, concrete, wood and coal.

4.6.2 The base of the made ground was proven at all exploratory locations for which it was encountered.

4.6.3 Natural strata encountered at the site was fairly consistent and comprised two subtypes described as 'Reddish brown slightly sandy slightly gravelly silty CLAY' and 'Grey/brown slightly sandy slightly gravelly CLAY'. The natural strata was proven to a depth of 4.45 m in all exploratory locations.

4.6.4 Visual/olfactory evidence of contamination was limited to made ground encountered within Borehole WS1 being described as 'slightly ashy'.

4.6.5 Based on the contamination assessment herein, and with respect to the change of use to commercial, the made ground has *not* been found to contain elevated contaminants of concern with respect to human health.

4.6.6 The assessment of perched groundwater has shown that there are marginally elevated concentrations of selenium, zinc, benzo(a)anthracene, benzo(a)pyrene, fluoranthene and pyrene within the groundwater samples recovered from the site.

4.6.7 Risks to the water quality of the bedrock 'Secondary A' aquifer are considered to be very low to negligible as impermeable Boulder Clay was proven to be laterally continuous during site investigation works.

- 4.6.8 Risks to the water quality of the off-site pond located adjacent to the north-western site boundary are also considered to be very low to negligible. This is due to the pond being situated at a higher elevation to that of both the groundwater samples and the groundwater encountered during site investigation works. It is also likely that the pond is clay-lined which would form an impermeable barrier to, and mitigate the migration of, any contamination to this receptor.
- 4.6.9 Potential risks to services pipes are considered to be medium but advice should be sought from the water supply provider. Risks to concrete are considered to be low and concrete classification of DS-1 AC-1 will be suitable for the site.
- 4.6.10 Based on limited information, risks from ground gas appear to be low. However, the gas monitoring programme is on-going and a Ground Gas Risk Assessment will be prepared as a separate report on completion of the monitoring.

5. GEOTECHNICAL ASSESSMENT

5.1 General

5.1.1 The proposed development consists of the construction of a new office building and 3 new industrial units. It is anticipated that the new office building will be formed using a steel frame to allow for an open plan working area, with precast concrete floor units to 1st floor and a concrete ground floor slab. It is assumed that masonry walling will also be adopted, with a lightweight metal composite roof cladding. The industrial units are presumed to be single storey lightweight portal frames with lightweight cladding to walls and roof and a ground floor concrete slab. The guidance given herein will therefore need to be reviewed in terms of the actual building type to be adopted, by a suitably qualified and experienced engineer.

5.1.2 Site investigation has confirmed that the site is primarily overlain by made ground varying in thickness up to 1.8 m. The made ground predominantly comprises sand, with gravels, cobbles, brick, concrete, wood and coal inclusions. Beneath the made ground at Borehole WS1, WS2 and WS6 there are soft/firm clays that become increasingly stiff with depth. At Borehole WS3, WS4 and WS5 the clays are at the surface and are stiff, becoming very stiff with depth. The clays extend to the bases of all 6 boreholes. Bedrock is not believed to have been encountered at any of the six borehole locations.

5.1.3 During drilling, damp soils were encountered in Borehole WS1 and WS2 at depths of 1.5 m and 2.0 m, respectively. The remaining boreholes remained dry during the course of the investigation. However, post investigation groundwater in the 3 gas wells (on 2 occasions) recorded the following water levels.

Location	Depth to Water (m) bgl	Depth to Base (m) bgl
WS1	1.74 - 1.87	3.52 - 3.6
WS2	2.27 - 2.35	2.8 - 2.85
WS3	0.15 - 0.32	1.69 - 1.75

Table 7: Summary of Groundwater Encountered During Groundwater Monitoring

5.1.4 Standard Penetration Tests (SPT) were conducted in the window sample boreholes, starting at a depth of 1.0 m and repeated at 1 m levels from 2 m onwards. The SPT results are summarised in Table 8 below.

Shear Readings (N)	Depth of Test			
	1.0 – 1.45m	2.0 - 2.45m	3.0 – 3.45m	4.0 – 4.45 m
WS1	8*	2	7	11
WS2	4*	7	11	14
WS3	12	15	16	18
WS4	12	12	16	19
WS5	8	12	14	18
WS6	6	8	11	11

Table 8: Window Sample SPT Results (* indicates readings in fill materials)

- 5.1.5 Clay samples were taken from boreholes WS1, WS4 & WS5. Atterberg tests were undertaken in the laboratory conditions to determine the plasticity index of the clay. The modified plasticity index for each sample was calculated in accordance with NHBC guidance and summarised in Table 9 below.

Location	Depth (m)	Plasticity Index (P.I.)	Retaining 425 Sieve	Passing 425 Sieve	Modified P.I. (%)
WS1	1.5 m	28	4.0%	96.0%	26.9
WS4	1.0 m	33	1.0%	99.0%	32.7
WS5	2.5 m	37	1.0%	99.0%	36.6
	Average	32.7		Average	32.1

Table 9: Plasticity Results

- 5.1.6 The plasticity results vary and can be categorised as medium to high volume change potential. Foundation formation depths should therefore be taken based on high volume change potential, requiring a footing depth of 1.05 m below existing or proposed ground level, whichever is the lower, in areas where clay soils are present. Clay heave potential must be considered as part of the foundation design and must be appraised in accordance with NHBC Ch.4.2 requirements.

5.2 Assessment and Conclusions

- 5.2.1 It is evident that there are two very separate areas of the site. At the south-west where the office block is to be located, there is significant made ground, which overlies soft clays that become stiff at depths of between 2 m and 3 m below the surface. At the north-east of the site, where the industrial units are to be located, stiff clays are encountered at the surface. Where the office block is located, bearing capacities of 75 kN/m² are found at a depth of 3.0 m below the surface, this improves to over 100 kN/m² at a depth of 4.0 m. Where the industrial units are to be located, the bearing capacities exceed 100 kN/m² at standard foundation depths.

- 5.2.2 It is understood that the small office building will be of masonry construction and may contain framework to allow for an internal open plan arrangement. Foundation loads from the frame could be up to 350 kN at column bases and up to 150 kN/m line loads to foundations. Subject to these loads being verified, spread foundations would need to extend to a depth of 4.0 m, which is likely to not be cost effective. The adoption of a piled raft for this structure should be considered.
- 5.2.3 In respect of the proposed industrial units, suitable bearing materials are close to the surface. Pad foundations and strip footings should be suitable to be formed at shallow depths, as point loads from the frames are likely to be of the order of 150 kN and foundation line loads of around 50 kN/m, although consideration should be given due to shallow groundwater that may be present in some locations.
- 5.2.4 All formations must be checked on site to confirm that the design bearing capacity is extent before foundations are installed. Should areas of poor ground be encountered, the excavations may require extending until suitable strata is found, and the design engineer's instruction must be sought.
- 5.2.5 For ground floor slabs; we would recommend that the industrial units have ground bearing reinforced concrete slabs, as competent clays are at surface level. In respect of the office block, the ground floor should either be suspended or be a part of a piled raft foundation.
- 5.2.6 As variations of the natural ground have been encountered across the site, adopting ground bearing slabs is not recommended. All ground floor slabs should be designed to be suspended and supported on walls or dwarf walls that are supported by the strip foundations.
- 5.2.7 Local trees may have a bearing on the proposed building foundations, which will need to be appraised by the foundation designer. Formation levels must be designed to comply with LABC requirements and NHBC Ch.4.2 guidance.
- 5.2.8 All foundation designs must be reviewed and designed by a suitably qualified design engineer. The above advice is based upon the ground condition information obtained during the survey. The design engineer must satisfy themselves that the information meets with their design requirements.

6. CONCLUSIONS & RECOMMENDATIONS

- 6.1 This report provides an assessment of the ground conditions based on the assessment of available site investigation information. The site investigation data has been assessed as part of a quantitative risk assessment to identify potential issues associated with contamination with respect to the proposed re-development of the site for commercial use. The report also provides recommendations for foundation design considering the redevelopment proposals.

Contamination Assessment

- 6.2 Based on the results of the contamination risk assessment undertaken at the site and with consideration to the environmental setting and the proposed redevelopment of the site for commercial use, no risks associated with ground contamination have been identified.
- 6.3 However, the following general recommendations are provided for the site re-development works:
- (i) Groundworkers should ensure that ground conditions across the site are the same as anticipated based in the information herein. Should ground conditions differ or there is visual/olfactory evidence for the presence of contamination, then works should cease and BEK notified as soon as possible.
 - (ii) All ground workers adopts suitable PPE when working on the site and consider the requirements of site specific risk assessments and working method statements.
 - (iii) The concrete classification suitable for the site would be DS-1 AC-1.
- 6.4 Risks from ground gas have been identified, however the gas monitoring programme is on-going and a Ground Gas Risk Assessment will be prepared as a separate report on completion of the monitoring.
- 6.5 BEK understands that several stockpiles are present on site and it is not currently known as to whether they will be used as part of the development works. Should these stockpiles be used in any part of the development, it will be a requirement to undertake testing to determine their suitability for reuse. Waste obligations will need to be considered if the stockpiled material is to be re-used or removed from site

Geotechnical Assessment

- 6.6 It is evident that there are two very separate areas of the site. At the south-west where the office block is to be located, there is significant made ground, which overlies soft clays that become stiff at depths of between 2 m and 3 m below the surface. At the north-east of the site, where the industrial units are to be located, stiff clays are encountered at the surface. Where the office block is located, bearing capacities of 75 kN/m^2 are found at a depth of 3.0 m below the surface, this improves to over 100 kN/m^2 at a depth of 4.0 m. Where the industrial units are to be located, the bearing capacities exceed 100 kN/m^2 at standard foundation depths.
- 6.7 It is understood that the small office building will be of masonry construction and may contain framework to allow for an internal open plan arrangement. Foundation loads from the frame could be up to 350 kN at column bases and up to 150 kN/m line loads to foundations. Subject to these loads being verified, spread foundations would need to extend to a depth of 4.0 m, which is likely to not be cost effective. The adoption of a piled raft for this structure should be considered.
- 6.8 In respect of the proposed industrial units, suitable bearing materials are close to the surface. Pad foundations and strip footings should be suitable to be formed at shallow depths, as point loads from the frames are likely to be of the order of 150kN and foundation line loads of around 50kN/m, although consideration should be given due to shallow groundwater that may be present in some locations.
- 6.9 All formations must be checked on site to confirm that the design bearing capacity is extent before foundations are installed. Should areas of poor ground be encountered, the excavations may require extending until suitable strata is found, and the design engineer's instruction must be sought.
- 6.10 For ground floor slabs; we would recommend that the industrial units have ground bearing reinforced concrete slabs, as competent clays are at surface level. In respect of the office block, the ground floor should either be suspended or be a part of a piled raft foundation.
- 6.11 As variations of the natural ground have been encountered across the site, adopting ground bearing slabs is not recommended. All ground floor slabs should be designed to be suspended and supported on walls or dwarf walls that are supported by the strip foundations.
- 6.12 Local trees may have a bearing on the proposed building foundations, which will need to be appraised by the foundation designer. Formation levels must be designed to comply with LABC requirements and NHBC Ch.4.2 guidance.

- 6.13 All foundation designs must be reviewed and designed by a suitably qualified design engineer. The above advice is based upon the ground condition information obtained during the survey. The design engineer must satisfy themselves that the information meets with their design requirements.

Waste Soil Management

- 6.14 Careful management of soils during the excavation works will ensure optimum utilisation of soil resources.
- 6.15 Excavated soils which require off-site disposal are anticipated to be classified in accordance with the following document: Guidance on the Disposal of “Contaminated Soils” Version 3 (April 2001); produced by the Environment Agency. On the basis it is considered likely that soils from the majority of the site would classify as “Non-hazardous”/“Inert” for disposal; however this is subject to confirmation of the potential landfill use.
- 6.16 In all cases where excess soils require off-site disposal, the materials needs to be managed under the appropriate legislation and consideration given to any remedial techniques that could be used to improve the soil.
- 6.17 If waste soils are to be re-used on site then a suitable permit exemption should be put in place (if appropriate) or a Material Management Plan should be prepared as part of compliance with the CL:AIRE Definition of Waste:Code of Practice.

Water Pipe Specification

- 6.18 Consideration should be given to the requirements of the water supply provider. They are likely to require the UKWIR risk assessment to be completed to determine the specification for the water pipes. It is recommended that the water supply provider is contacted and enquiries made.

APPENDIX A

Exploratory Logs



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 21960
PROJECT NAME Chapel Hill, Longridge
CLIENT PWA Planning

DATE 1st March 2024
DRILLING METHOD Window Sample Borehole
BOREHOLE NO WS1
SHEET 1/6

COMPLETION CASING uPVC SCREEN uPVC Factory Slotted

COMMENTS Borehole damp at 1.5 m

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Well Instal.	Graphic Log	Material Description	Elevation (m)
0.2	0.1	D= 0.1 m					MADE GROUND: Firm/stiff dark brown slightly ashy slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse stone of mixed lithologies, brick and concrete. Rare cobbles of whole/broken brick. Rare wood and coal	0.2
0.4								0.4
0.6								0.6
0.8								0.8
1	1.0 - 1.45	SPT (C) N= 8	2,2/2,2,2,2					1
1.2								1.2
1.4								1.4
1.6	1.5 - 2.0	B= 1.5 - 2.0 m					Soft becoming stiff reddish brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to medium rounded to sub-rounded stone of mixed lithologies	1.6
1.8								1.8
2	2.0	D= 2.0 m						2
2.2	2.0 - 2.45	SPT (C) N= 2	1,1/1,1,1					2.2
2.4								2.4
2.6								2.6
2.8								2.8
3	3.0 - 3.45	SPT (C) N= 7	1,1/1,2,2,2					3
3.2								3.2
3.4								3.4
3.6								3.6
3.8								3.8
4	4.0 - 4.45	SPT (C) N= 11	2,2/2,3,3,3					4
4.2								4.2
4.4								4.4
							Termination Depth at: 4.45 m	



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 21960
PROJECT NAME Chapel Hill, Longridge
CLIENT PWA Planning

DATE 1st March 2024
DRILLING METHOD Window Sample Borehole
BOREHOLE NO WS2
SHEET 2/6

COMPLETION CASING uPVC SCREEN uPVC Factory Slotted

COMMENTS Borehole damp at 2.0 m

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Well Instal.	Graphic Log	Material Description	Elevation (m)
0.2	0.25	D= 0.25 m					MADE GROUND: Very loose/loose blackish brown very clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse stone of mixed lithologies, brick and concrete. Occasional pockets of reddish brown clay. Rare cobbles of whole/broken brick. Rare wood and coal.	0.2
0.4								0.4
0.6								0.6
0.8								0.8
1	1.0 - 1.45	SPT (C) N= 4	1,1,1,1,1					1
1.2								1.2
1.4								1.4
1.6								1.6
1.8								1.8
2	2.0 - 2.45	SPT (C) N= 7	1,1/1,2,2,2				Firm becoming stiff reddish brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to medium rounded to sub-rounded stone of mixed lithologies	2
2.2								2.2
2.4	2.5	D= 2.5 m						2.4
2.6								2.6
2.8								2.8
3	3.0 - 3.45	SPT (C) N= 11	2,2/2,3,3,3					3
3.2								3.2
3.4								3.4
3.6								3.6
3.8								3.8
4	4.0 - 4.45	SPT (C) N= 14	2,3/3,3,4,4					4
4.2								4.2
4.4								4.4
							Termination Depth at: 4.45 m	



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 21960

PROJECT NAME Chapel Hill, Longridge

CLIENT PWA Planning

DATE 1st March 2024

DRILLING METHOD Window Sample Borehole

BOREHOLE NO WS3

SHEET 3/6

COMPLETION

CASING uPVC

SCREEN uPVC Factory Slotted

COMMENTS Borehole dry

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Well Instal.	Graphic Log	Material Description	Elevation (m)
0.2	0.3	D= 0.3 m					Stiff becoming very stiff grey/brown slightly sandy slightly gravelly CLAY with rare root traces. Sand is fine to coarse. Gravel is fine to medium rounded to sub-rounded stone of mixed lithologies	0.2
0.4								0.4
0.6								0.6
0.8								0.8
1	1.0 - 1.45	SPT (C) N= 12	2,2/3,3,3,3					1
1.2								1.2
1.4								1.4
1.6								1.6
1.8								1.8
2	2.0 - 2.45	SPT (C) N= 15	3,3/3,4,4,4					2
2.2								2.2
2.4								2.4
2.6								2.6
2.8								2.8
3	3.0 - 3.45	SPT (C) N= 16	3,3/4,4,4,4					3
3.2								3.2
3.4								3.4
3.6								3.6
3.8								3.8
4	4.0 - 4.45	SPT (C) N= 18	3,3/4,4,5,5					4
4.2								4.2
4.4								4.4
							Termination Depth at: 4.45 m	



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 21960
PROJECT NAME Chapel Hill, Longridge
CLIENT PWA Planning

DATE 1st March 2024
DRILLING METHOD Window Sample Borehole
BOREHOLE NO WS4
SHEET 4/6

COMPLETION **CASING** uPVC **SCREEN** uPVC Factory Slotted

COMMENTS Borehole dry

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Well Instal.	Graphic Log	Material Description	Elevation (m)
0.2	0.15	D= 0.15 m					Stiff becoming very stiff grey/brown slightly sandy slightly gravelly CLAY with rare root traces. Sand is fine to coarse. Gravel is fine to medium rounded to sub-rounded stone of mixed lithologies	0.2
0.4								0.4
0.6								0.6
0.8								0.8
1	1.0 - 1.45	SPT (C) N= 12	1,2/3,3,3,3					1
1.2								1.2
1.4	1.0 - 1.5	B= 1.0 - 1.5 m						1.4
1.6								1.6
1.8								1.8
2	2.0 - 2.45	SPT (C) N= 12	2,3/3,3,3,3					2
2.2								2.2
2.4								2.4
2.6								2.6
2.8								2.8
3	3.0 - 3.45	SPT (C) N= 16	3,3/4,4,4,4					3
3.2								3.2
3.4								3.4
3.6								3.6
3.8								3.8
4	4.0 - 4.45	SPT (C) N= 19	3,4/4,5,5,5					4
4.2							Termination Depth at: 4.45 m	4.2
4.4								4.4



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 21960

PROJECT NAME Chapel Hill, Longridge

CLIENT PWA Planning

DATE 1st March 2024

DRILLING METHOD Window Sample Borehole

BOREHOLE NO WS5

SHEET 5/6

COMPLETION

CASING uPVC

SCREEN uPVC Factory Slotted

COMMENTS Borehole dry

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Well Instal.	Graphic Log	Material Description	Elevation (m)
0.2							Stiff becoming very stiff grey/brown slightly sandy slightly gravelly CLAY with rare root traces. Sand is fine to coarse. Gravel is fine to medium rounded to sub-rounded stone of mixed lithologies	0.2
0.4	0.5	D= 0.5 m						0.4
0.6								0.6
0.8								0.8
1	1.0 - 1.45	SPT (C) N= 8	1,1/2,2,2,2					1
1.2								1.2
1.4								1.4
1.6								1.6
1.8								1.8
2	2.0 - 2.45	SPT (C) N= 12	2,3/3,3,3,3					2
2.2								2.2
2.4								2.4
2.6	2.5 - 3.0	B= 2.5 - 3.0 m						2.6
2.8								2.8
3	3.0 - 3.45	SPT (C) N= 14	3,3/3,3,4,4					3
3.2								3.2
3.4								3.4
3.6								3.6
3.8								3.8
4	4.0 - 4.45	SPT (C) N= 18	3,4/4,4,5,5					4
4.2								4.2
4.4								4.4
							Termination Depth at: 4.45 m	



GEO-ENVIRONMENTAL CONSULTANTS

GEO-ENVIRONMENTAL CONSULTING

PROJECT NUMBER 21960
PROJECT NAME Chapel Hill, Longridge
CLIENT PWA Planning

DATE 1st March 2024
DRILLING METHOD Window Sample Borehole
BOREHOLE NO WS6
SHEET 6/6

COMPLETION **CASING** uPVC **SCREEN** uPVC Factory Slotted

COMMENTS Borehole dry

Depth (m)	Depth (m)	Samples/ Test	Field Records	Water	Well Instal.	Graphic Log	Material Description	Elevation (m)
0.2							MADE GROUND: Loose blackish brown very clayey gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse stone of mixed lithologies, brick and concrete. Occasional pockets of reddish brown clay. Rare cobbles of whole/broken brick. Rare wood and coal.	0.2
0.4	0.5	D= 0.5 m						0.4
0.6								0.6
0.8								0.8
1	1.0 - 1.45	SPT (C) N= 6	1,1/1,1,2,2					1
1.2								1.2
1.4								1.4
1.6								1.6
1.8								1.8
2	2.0 - 2.45	SPT (C) N= 8	1,1/2,2,2,2				Firm/stiff becoming stiff reddish brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to medium rounded to sub-rounded stone of mixed lithologies	2
2.2								2.2
2.4								2.4
2.6								2.6
2.8								2.8
3	3.0	D= 3.0 m						3
3.2	3.0 - 3.45	SPT (C) N= 11	2,2/3,3,3,2					3.2
3.4								3.4
3.6								3.6
3.8								3.8
4	4.0 - 4.45	SPT (C) N= 11	2,2/2,3,3,3					4
4.2								4.2
4.4								4.4
							Termination Depth at: 4.45 m	

APPENDIX B

Chemical Test Results

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 24/02230
Issue Number: 1
Date: 13 March, 2024

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

Project Manager: ** USE THIS Mick Buckley/James Mashiter
Project Name: Chapel Hill, Longbridge
Project Ref: N/A
Order No: 8120-21960-AH
Date Samples Received: 04/03/24
Date Instructions Received: 05/03/24
Date Analysis Completed: 13/03/24



Envirolab Job Number: 24/02230

Client Project Name: Chapel Hill, Longbridge

Client Project Ref: N/A

Lab Sample ID	24/02230/1	24/02230/2	24/02230/3	24/02230/4	24/02230/5	24/02230/6	24/02230/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS4	WS6	WS1	WS4			
Depth to Top	0.10	2.00	0.25	0.15	0.50	1.50	1.00			
Depth To Bottom										
Date Sampled	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24			
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	6A	6A	4AB	6	6A	6	6			
% Stones >10mm _A	12.9	9.6	15.0	<0.1	15.7	<0.1	<0.1	% w/w	0.1	A-T-044
Asbestos in soil _D ^{M#}	NAD	NAD	NAD	NAD	NAD	-	-			A-T-045
Asbestos Matrix (visual) _D	-	-	-	-	-	-	-			A-T-045
Asbestos Matrix (microscope) _D	-	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	N/A	N/A	N/A	N/A	-	-			A-T-045
pH _D ^{M#}	7.57	8.05	8.76	8.58	7.91	8.36	8.59	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.05	0.04	0.09	0.01	0.05	0.04	<0.01	g/l	0.01	A-T-026s
Sulphate (acid soluble) _D ^{M#}	650	200	1100	250	500	-	-	mg/kg	200	A-T-028s
Cyanide (total) _A ^{M#}	<1	<1	<1	<1	<1	-	-	mg/kg	1	A-T-042sTCN
Phenols - Total by HPLC _A	<0.2	<0.2	<0.2	<0.2	<0.2	-	-	mg/kg	0.2	A-T-050s
Organic Matter _D ^{M#}	7.9	3.1	8.7	1.1	25.7	-	-	% w/w	0.1	A-T-032s
Arsenic _D ^{M#}	10	4	10	2	9	-	-	mg/kg	1	A-T-024s
Boron (water soluble) _D ^{M#}	<1.0	<1.0	<1.0	<1.0	<1.0	-	-	mg/kg	1	A-T-027s
Cadmium _D ^{M#}	1.4	1.2	1.1	1.4	1.2	-	-	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	92	24	68	24	36	-	-	mg/kg	1	A-T-024s
Chromium _D ^{M#}	21	33	21	44	22	-	-	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	-	-	mg/kg	1	A-T-040s
Lead _D ^{M#}	250	21	184	16	90	-	-	mg/kg	1	A-T-024s
Mercury _D	11.8	1.22	2.80	0.91	46.9	-	-	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	26	34	25	43	26	-	-	mg/kg	1	A-T-024s
Selenium _D ^{M#}	2	<1	<1	1	<1	-	-	mg/kg	1	A-T-024s
Zinc _D ^{M#}	172	57	201	64	95	-	-	mg/kg	5	A-T-024s

Envirolab Job Number: 24/02230

Client Project Name: Chapel Hill, Longbridge

Client Project Ref: N/A

Lab Sample ID	24/02230/1	24/02230/2	24/02230/3	24/02230/4	24/02230/5	24/02230/6	24/02230/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS4	WS6	WS1	WS4			
Depth to Top	0.10	2.00	0.25	0.15	0.50	1.50	1.00			
Depth To Bottom										
Date Sampled	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24			
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	6A	6A	4AB	6	6A	6	6			
PAH-16MS										
Acenaphthene _A ^{M#}	0.32	<0.01	0.20	<0.01	0.55	-	-	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	0.08	<0.01	0.06	<0.01	<0.10	-	-	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	0.89	<0.02	0.60	<0.02	1.20	-	-	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	5.28	<0.04	3.15	<0.04	3.01	-	-	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	5.16	<0.04	3.09	<0.04	2.93	-	-	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	6.32	<0.05	3.73	<0.05	3.16	-	-	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	2.84	<0.05	1.72	<0.05	1.87	-	-	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	2.24	<0.07	1.28	<0.07	1.22	-	-	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	5.61	<0.06	3.26	<0.06	3.45	-	-	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A	0.58	<0.04	0.34	<0.04	<0.40	-	-	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	12.8	<0.08	7.66	<0.08	6.09	-	-	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	0.25	<0.01	0.17	<0.01	0.40	-	-	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	3.17	<0.03	1.89	<0.03	2.06	-	-	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	0.04	<0.03	<0.03	<0.03	<0.30	-	-	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	4.33	0.03	2.76	<0.03	3.50	-	-	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	10.6	<0.07	6.36	<0.07	5.31	-	-	mg/kg	0.07	A-T-019s
Total PAH-16MS _A	60.5	<0.08	36.3	<0.08	34.8	-	-	mg/kg	0.01	A-T-019s

Envirolab Job Number: 24/02230

Client Project Name: Chapel Hill, Longbridge

Client Project Ref: N/A

Lab Sample ID	24/02230/1	24/02230/2	24/02230/3	24/02230/4	24/02230/5	24/02230/6	24/02230/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS1	WS2	WS4	WS6	WS1	WS4			
Depth to Top	0.10	2.00	0.25	0.15	0.50	1.50	1.00			
Depth To Bottom										
Date Sampled	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24	01-Mar-24			
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Matrix Code	6A	6A	4AB	6	6A	6	6			
TPH CWG with Clean Up										
Ali >C5-C6 _A	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	<1	<1	<1	<1	-	-	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1	<1	<1	-	-	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	<1	<1	2	-	-	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	2	<1	4	2	6	-	-	mg/kg	1	A-T-055s
Ali >C21-C35 _A ^{M#}	58	2	189	18	254	-	-	mg/kg	1	A-T-055s
Total Aliphatics _A	60	2	194	20	263	-	-	mg/kg	1	Calc-As Recd
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	<1	<1	<1	<1	-	-	mg/kg	1	A-T-055s
Aro >C10-C12 _A	<1	<1	<1	<1	1	-	-	mg/kg	1	A-T-055s
Aro >C12-C16 _A	5	<1	8	1	10	-	-	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	62	1	85	2	72	-	-	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	247	9	336	5	330	-	-	mg/kg	1	A-T-055s
Total Aromatics _A	314	10	429	8	412	-	-	mg/kg	1	Calc-As Recd
TPH (Ali & Aro >C5-C35) _A	374	12	623	28	675	-	-	mg/kg	1	Calc-As Recd
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	mg/kg	0.01	A-T-022s

Envirolab Job Number: 24/02230

Client Project Name: Chapel Hill, Longbridge

Client Project Ref: N/A

Lab Sample ID	24/02230/8							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS5									
Depth to Top	2.50									
Depth To Bottom										
Date Sampled	01-Mar-24									
Sample Type	SOIL									
Sample Matrix Code	6									
% Stones >10mm _A	<0.1							% w/w	0.1	A-T-044
pH _D ^{M#}	8.63							pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	0.02							g/l	0.01	A-T-026s

Report Notes

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
 The results reported herein relate only to the material supplied to the laboratory.
 The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
 Analytical results reflect the quality of the sample at the time of analysis only.
 Opinions and Interpretations expressed are outside our scope of accreditation.
 The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client.
 A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Key

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

Asbestos

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

Assigned Matrix Codes

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

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

Soil Chemical Analysis:

All results are reported as dry weight (<40°C).
 For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
 For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
 All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any “D” subscripts.

TPH by method A-T-007:

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

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

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

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

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

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

Envirolab Deviating Samples Report

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

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

Project: Chapel Hill, Longbridge

Clients Project No: N/A

Project No: 24/02230

Date Received: 05/03/2024 (am)

Cool Box Temperatures (°C): 6.4

NO DEVIATIONS IDENTIFIED

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

Envirolab Analysis Dates

Lab Sample ID	24/02230/1	24/02230/2	24/02230/3	24/02230/4	24/02230/5	24/02230/6	24/02230/7	24/02230/8
Client Sample No								
Client Sample ID/Depth	WS1 0.10m	WS1 2.00m	WS2 0.25m	WS4 0.15m	WS6 0.50m	WS1 1.50m	WS4 1.00m	WS5 2.50m
Date Sampled	01/03/24	01/03/24	01/03/24	01/03/24	01/03/24	01/03/24	01/03/24	01/03/24
A-T-019s	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024			
A-T-022s	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024			
A-T-024s	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024			
A-T-026s	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
A-T-027s	13/03/2024	13/03/2024	13/03/2024	13/03/2024	13/03/2024			
A-T-028s	13/03/2024	13/03/2024	13/03/2024	13/03/2024	13/03/2024			
A-T-031s	13/03/2024	13/03/2024	13/03/2024	13/03/2024	13/03/2024	13/03/2024	13/03/2024	13/03/2024
A-T-032s	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024			
A-T-040s	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024			
A-T-042sTCN	11/03/2024	11/03/2024	11/03/2024	11/03/2024	11/03/2024			
A-T-044	07/03/2024	07/03/2024	07/03/2024	07/03/2024	07/03/2024	07/03/2024	07/03/2024	07/03/2024
A-T-045	06/03/2024	06/03/2024	06/03/2024	06/03/2024	06/03/2024			
A-T-050s	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024			
A-T-055s	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024			
Calc-As Recd	12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024			

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

End of Report

Final Test Report

Envirolab Job Number: 24/02230
Issue Number: 1

Date: 26-Mar-24

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

Project Manager: ** USE THIS Mick Buckley/James Mashiter
Project Name: Chapel Hill, Longbridge
Project Ref: N/A
Order No: 8120-21960-AH

Date Samples Received: 4-Mar-24
Date Instructions Received: 5-Mar-24
Date Analysis Completed: 26-Mar-24

Notes - Soil analysis

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

For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

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

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts

For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations.

If results are in italic font they are associated with such quality control failures and may be unreliable.

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

Predominant Matrix Codes: 1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample

Secondary Matrix Codes: A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible and NAD indicates No Asbestos Detected.

Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

HWOL TPH Code: EH_CU_1D_AL: Extractable hydrocarbons - i.e. everything extracted by the solvent(s), Clean-up - e.g. by florisil, silica gel, GC - Single coil gas chromatography, Aliphatics only

Approved by:



Gemma Berrisford
Deputy Client Services Supervisor

Sample Details								
Lab Sample ID	Method	ISO17025	MCERTS	24/02230/1	Landfill Waste Acceptance Criteria Limits			
Client Sample Number					Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill	
Client Sample ID				WS1				
Depth to Top				0.1				
Depth to Bottom								
Date Sampled				01/03/2024				
Sample Type				Soil				
Sample Matrix Code				6A				
Solid Waste Analysis								
pH (pH Units) _D	A-T-031	N	N	7.57	-	>6	-	
ANC to pH 4 (mol/kg) _D	A-T-ANC	N	N	0.17	-	to be evaluated	to be evaluated	
ANC to pH 6 (mol/kg) _D	A-T-ANC	N	N	0.09	-	to be evaluated	to be evaluated	
Loss on Ignition (%) _D	A-T-030	N	N	10.7	-	-	10	
Total Organic Carbon (%) _D	A-T-032	N	N	8.81	3	5	6	
PAH Sum of 17 (mg/kg) _A	A-T-019	N	N	60.9	100	-	-	
Mineral Oil (mg/kg) _{A EH_CU_1D_AL}	A-T-007	N	N	108	500	-	-	
Sum of 7 PCBs (mg/kg) _A	A-T-004	N	N	<0.007	1	-	-	
Sum of BTEX (mg/kg) _A	A-T-022	N	N	<0.01	6	-	-	
Eluate Analysis				10:1 mg/l	10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic	A-T-025	N	N	0.004	0.040	0.5	25	
Barium	A-T-025	N	N	0.030	0.300	20	300	
Cadmium	A-T-025	N	N	<0.001	<0.01	0.04	5	
Chromium	A-T-025	N	N	<0.001	<0.01	0.5	70	
Copper	A-T-025	N	N	0.006	0.060	2	100	
Mercury	A-T-025	N	N	1.0130	10.1300	0.01	2	
Molybdenum	A-T-025	N	N	0.006	0.060	0.5	30	
Nickel	A-T-025	N	N	<0.002	<0.02	0.4	40	
Lead	A-T-025	N	N	0.007	0.070	0.5	50	
Antimony	A-T-025	N	N	0.004	0.040	0.06	5	
Selenium	A-T-025	N	N	<0.001	<0.01	0.1	7	
Zinc	A-T-025	N	N	0.018	0.180	4	200	
Chloride	A-T-026	N	N	<1.00	<10	800	25000	
Fluoride	A-T-026	N	N	0.4	4.0	10	500	
Sulphate as SO ₄	A-T-026	N	N	10	102	1000	50000	
Total Dissolved Solids	A-T-035	N	N	51	510	4000	100000	
Phenol Index	A-T-050	N	N	<0.01	<0.1	1	-	
Dissolved Organic Carbon	A-T-032	N	N	<2.0	<200	500	1000	
Leach Test Information								
pH (pH Units)	A-T-031	N	N	7.6				
Conductivity (µS/cm)	A-T-037	N	N	101				
Mass Sample (kg)				0.182				
Dry Matter (%)	A-T-044	N	N	96.2				
Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation								

Sample Details					Landfill Waste Acceptance Criteria Limits			
Lab Sample ID	Method	ISO17025	MCERTS	24/02230/3		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Client Sample Number								
Client Sample ID				WS2				
Depth to Top				0.25				
Depth to Bottom								
Date Sampled				01/03/2024				
Sample Type				Soil				
Sample Matrix Code				4AB				
Solid Waste Analysis								
pH (pH Units) _D	A-T-031	N	N	8.76		-	>6	-
ANC to pH 4 (mol/kg) _D	A-T-ANC	N	N	0.64		-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg) _D	A-T-ANC	N	N	0.1		-	to be evaluated	to be evaluated
Loss on Ignition (%) _D	A-T-030	N	N	6.9		-	-	10
Total Organic Carbon (%) _D	A-T-032	N	N	2.13		3	5	6
PAH Sum of 17 (mg/kg) _A	A-T-019	N	N	4.88		100	-	-
Mineral Oil (mg/kg) _{A EH_CU_ID_AL}	A-T-007	N	N	<10		500	-	-
Sum of 7 PCBs (mg/kg) _A	A-T-004	N	N	<0.007		1	-	-
Sum of BTEX (mg/kg) _A	A-T-022	N	N	<0.01		6	-	-
Eluate Analysis				10:1 mg/l	10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic	A-T-025	N	N	0.006	0.060	0.5	2	25
Barium	A-T-025	N	N	0.025	0.250	20	100	300
Cadmium	A-T-025	N	N	<0.001	<0.01	0.04	1	5
Chromium	A-T-025	N	N	<0.001	<0.01	0.5	10	70
Copper	A-T-025	N	N	0.006	0.060	2	50	100
Mercury	A-T-025	N	N	1.4240	14.2400	0.01	0.2	2
Molybdenum	A-T-025	N	N	0.004	0.040	0.5	10	30
Nickel	A-T-025	N	N	<0.002	<0.02	0.4	10	40
Lead	A-T-025	N	N	0.011	0.110	0.5	10	50
Antimony	A-T-025	N	N	0.006	0.060	0.06	0.7	5
Selenium	A-T-025	N	N	<0.001	<0.01	0.1	0.5	7
Zinc	A-T-025	N	N	0.019	0.190	4	50	200
Chloride	A-T-026	N	N	<1.00	<10	800	15000	25000
Fluoride	A-T-026	N	N	0.5	5.0	10	150	500
Sulphate as SO ₄	A-T-026	N	N	9	85	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	50	500	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.1	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<2.0	<200	500	800	1000
Leach Test Information								
pH (pH Units)	A-T-031	N	N	7.7				
Conductivity (µS/cm)	A-T-037	N	N	100				
Mass Sample (kg)				0.182				
Dry Matter (%)	A-T-044	N	N	96.3				
Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation								

Sample Details					Landfill Waste Acceptance Criteria Limits			
Lab Sample ID	Method	ISO17025	MCERTS	24/02230/7		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Client Sample Number								
Client Sample ID				WS4				
Depth to Top				1				
Depth to Bottom								
Date Sampled				01/03/2024				
Sample Type				Soil				
Sample Matrix Code				6				
Solid Waste Analysis								
pH (pH Units) _D	A-T-031	N	N	8.59		-	>6	-
ANC to pH 4 (mol/kg) _D	A-T-ANC	N	N	1.65		-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg) _D	A-T-ANC	N	N	0.8		-	to be evaluated	to be evaluated
Loss on Ignition (%) _D	A-T-030	N	N	5.4		-	-	10
Total Organic Carbon (%) _D	A-T-032	N	N	0.49		3	5	6
PAH Sum of 17 (mg/kg) _A	A-T-019	N	N	<0.08		100	-	-
Mineral Oil (mg/kg) _{A EH_CU_ID_AL}	A-T-007	N	N	<10		500	-	-
Sum of 7 PCBs (mg/kg) _A	A-T-004	N	N	<0.007		1	-	-
Sum of BTEX (mg/kg) _A	A-T-022	N	N	<0.01		6	-	-
Eluate Analysis				10:1 mg/l	10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic	A-T-025	N	N	<0.001	<0.01	0.5	2	25
Barium	A-T-025	N	N	0.095	0.950	20	100	300
Cadmium	A-T-025	N	N	<0.001	<0.01	0.04	1	5
Chromium	A-T-025	N	N	<0.001	<0.01	0.5	10	70
Copper	A-T-025	N	N	<0.004	<0.04	2	50	100
Mercury	A-T-025	N	N	<0.0005	<0.005	0.01	0.2	2
Molybdenum	A-T-025	N	N	0.004	0.040	0.5	10	30
Nickel	A-T-025	N	N	<0.002	<0.02	0.4	10	40
Lead	A-T-025	N	N	<0.001	<0.01	0.5	10	50
Antimony	A-T-025	N	N	<0.001	<0.01	0.06	0.7	5
Selenium	A-T-025	N	N	0.002	0.020	0.1	0.5	7
Zinc	A-T-025	N	N	0.006	0.060	4	50	200
Chloride	A-T-026	N	N	<1.00	<10	800	15000	25000
Fluoride	A-T-026	N	N	0.2	2.0	10	150	500
Sulphate as SO ₄	A-T-026	N	N	4	43	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	47	470	4000	60000	100000
Phenol Index	A-T-050	N	N	0.01	0.10	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<2.0	<200	500	800	1000
Leach Test Information								
pH (pH Units)	A-T-031	N	N	8.0				
Conductivity (µS/cm)	A-T-037	N	N	94				
Mass Sample (kg)				0.181				
Dry Matter (%)	A-T-044	N	N	96.8				
Stated acceptance limits are for guidance only and Envirolab cannot be held responsible for any discrepancies with current legislation								

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 24/02486
Issue Number: 1
Date: 20 March, 2024

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

Project Manager: ** USE THIS Mick Buckley/James Mashiter
Project Name: Chapel Hill, Longridge
Project Ref: 8131-21960-PC
Order No: 8131-21960-PC
Date Samples Received: 12/03/24
Date Instructions Received: 12/03/24
Date Analysis Completed: 20/03/24

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 24/02486

Client Project Name: Chapel Hill, Longridge

Client Project Ref: 8131-21960-PC

Lab Sample ID	24/02486/1	24/02486/2						Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS3								
Depth to Top	3.00	1.00								
Depth To Bottom										
Date Sampled	08-Mar-24	08-Mar-24								
Sample Type	WATER - GW	WATER - GW								
Sample Matrix Code	N/A	N/A								
pH (w) _A [#]	6.96	7.16						pH	0.01	A-T-031w
Ammoniacal nitrogen as N (w) _A [#]	0.42	0.15						mg/l	0.05	A-T-033w
Chloride (w) _A [#]	11	10						mg/l	1	A-T-026w
Sulphate (w) _A [#]	57	21						mg/l	1	A-T-026w
Cyanide (total) (w) _A [#]	<0.005	<0.005						mg/l	0.005	A-T-042wTCN
Phenols - Total by HPLC (w) _A	<0.10	<0.10						mg/l	0.01	A-T-050w
DOC - Dissolved Organic Carbon (w) _A [#]	6.9	11.2						mg/l	2	A-T-032w
Arsenic (dissolved) _A [#]	2	2						µg/l	1	A-T-025w
Boron (dissolved) _A [#]	58	51						µg/l	10	A-T-025w
Cadmium (dissolved) _A [#]	<0.2	<0.2						µg/l	0.2	A-T-025w
Copper (dissolved) _A	23	<4						µg/l	4	A-T-025w
Chromium (dissolved) _A [#]	<1	<1						µg/l	1	A-T-025w
Chromium (hexavalent) (w) _A [#]	<0.01	<0.01						mg/l	0.01	A-T-040w
Lead (dissolved) _A [#]	<1	<1						µg/l	1	A-T-025w
Mercury (dissolved) _A [#]	<0.1	<0.1						µg/l	0.1	A-T-025w
Nickel (dissolved) _A [#]	4	<2						µg/l	2	A-T-025w
Selenium (dissolved) _A [#]	<1	12						µg/l	1	A-T-025w
Zinc (dissolved) _A [#]	29	23						µg/l	2	A-T-025w

Envirolab Job Number: 24/02486

Client Project Name: Chapel Hill, Longridge

Client Project Ref: 8131-21960-PC

Lab Sample ID	24/02486/1	24/02486/2						Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS1	WS3								
Depth to Top	3.00	1.00								
Depth To Bottom										
Date Sampled	08-Mar-24	08-Mar-24								
Sample Type	WATER - GW	WATER - GW								
Sample Matrix Code	N/A	N/A								
PAH 16MS (w)										
Acenaphthene (w) _A [#]	0.03	0.04						µg/l	0.01	A-T-019w
Acenaphthylene (w) _A [#]	0.03	<0.01						µg/l	0.01	A-T-019w
Anthracene (w) _A [#]	0.02	0.03						µg/l	0.01	A-T-019w
Benzo(a)anthracene (w) _A [#]	0.02	0.06						µg/l	0.01	A-T-019w
Benzo(a)pyrene (w) _A [#]	0.02	0.05						µg/l	0.01	A-T-019w
Benzo(b)fluoranthene (w) _A [#]	0.02	0.06						µg/l	0.01	A-T-019w
Benzo(ghi)perylene (w) _A [#]	0.02	0.03						µg/l	0.01	A-T-019w
Benzo(k)fluoranthene (w) _A [#]	0.02	0.02						µg/l	0.01	A-T-019w
Chrysene (w) _A [#]	0.02	0.07						µg/l	0.01	A-T-019w
Dibenzo(ah)anthracene (w) _A [#]	<0.01	<0.01						µg/l	0.01	A-T-019w
Fluoranthene (w) _A [#]	0.06	0.21						µg/l	0.01	A-T-019w
Fluorene (w) _A [#]	0.04	0.03						µg/l	0.01	A-T-019w
Indeno(123-cd)pyrene (w) _A [#]	0.02	0.03						µg/l	0.01	A-T-019w
Naphthalene (w) _A [#]	0.02	0.02						µg/l	0.01	A-T-019w
Phenanthrene (w) _A [#]	0.08	0.11						µg/l	0.01	A-T-019w
Pyrene (w) _A [#]	0.05	0.18						µg/l	0.01	A-T-019w
Total PAH 16MS (w) _A [#]	0.47	0.94						µg/l	0.01	A-T-019w

Envirolab Job Number: 24/02486

Client Project Name: Chapel Hill, Longridge

Client Project Ref: 8131-21960-PC

Lab Sample ID	24/02486/1	24/02486/2								
Client Sample No										
Client Sample ID	WS1	WS3								
Depth to Top	3.00	1.00								
Depth To Bottom										
Date Sampled	08-Mar-24	08-Mar-24								
Sample Type	WATER - GW	WATER - GW								
Sample Matrix Code	N/A	N/A								
TPH CWG (w) with Clean Up										
Ali >C5-C6 (w) _A [#]	<1	<1						µg/l	1	A-T-022w
Ali >C6-C8 (w) _A [#]	<1	<1						µg/l	1	A-T-022w
Ali >C8-C10 (w) _A [#]	<5	<5						µg/l	5	A-T-055w
Ali >C10-C12 (w) _A [#]	<5	<5						µg/l	5	A-T-055w
Ali >C12-C16 (w) _A [#]	<5	<5						µg/l	5	A-T-055w
Ali >C16-C21 (w) _A [#]	<5	8						µg/l	5	A-T-055w
Ali >C21-C35 (w) _A [#]	162	487						µg/l	5	A-T-055w
Total Aliphatics (w) _A [#]	162	495						µg/l	5	Calc-As Recd
Aro >C5-C7 (w) _A [#]	<1	<1						µg/l	1	A-T-022w
Aro >C7-C8 (w) _A [#]	<1	<1						µg/l	1	A-T-022w
Aro >C8-C10 (w) _A	7	9						µg/l	5	A-T-055w
Aro >C10-C12 (w) _A [#]	<5	<5						µg/l	5	A-T-055w
Aro >C12-C16 (w) _A [#]	6	11						µg/l	5	A-T-055w
Aro >C16-C21 (w) _A [#]	17	29						µg/l	5	A-T-055w
Aro >C21-C35 (w) _A [#]	41	86						µg/l	10	A-T-055w
Total Aromatics (w) _A [#]	71	135						µg/l	10	Calc-As Recd
TPH (Ali & Aro >C5-C35) (w) _A	233	630						µg/l	10	Calc-As Recd
BTEX - Benzene (w) _A [#]	<1	<1						µg/l	1	A-T-022w
BTEX - Toluene (w) _A [#]	<1	<1						µg/l	1	A-T-022w
BTEX - Ethyl Benzene (w) _A [#]	<1	<1						µg/l	1	A-T-022w
BTEX - m & p Xylene (w) _A [#]	<1	<1						µg/l	1	A-T-022w
BTEX - o Xylene (w) _A [#]	<1	<1						µg/l	1	A-T-022w
MTBE (w) _A [#]	<1	<1						µg/l	1	A-T-022w

Report Notes

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
 The results reported herein relate only to the material supplied to the laboratory.
 The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
 Analytical results reflect the quality of the sample at the time of analysis only.
 Opinions and Interpretations expressed are outside our scope of accreditation.
 The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client.
 A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Key

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

Asbestos

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

Assigned Matrix Codes

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

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

Soil Chemical Analysis:

All results are reported as dry weight (<40°C).
 For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
 For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
 All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH by method A-T-007:

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

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

EPH CWG results have humics mathematically subtracted through instrument calculation.
 Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

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

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

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

Envirolab Deviating Samples Report

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

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

Project: Chapel Hill, Longridge

Clients Project No: 8131-21960-PC

Project No: 24/02486

Date Received: 12/03/2024 (am)

Cool Box Temperatures (°C): 11.7

NO DEVIATIONS IDENTIFIED

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

Envirolab Analysis Dates

Lab Sample ID	24/02486/1	24/02486/2
Client Sample No		
Client Sample ID/Depth	WS1 3.00m	WS3 1.00m
Date Sampled	08/03/24	08/03/24
A-T-019w	18/03/2024	18/03/2024
A-T-022w	18/03/2024	18/03/2024
A-T-025w	20/03/2024	20/03/2024
A-T-026w	14/03/2024	14/03/2024
A-T-031w	14/03/2024	14/03/2024
A-T-032w	19/03/2024	19/03/2024
A-T-033w	15/03/2024	15/03/2024
A-T-040w	14/03/2024	14/03/2024
A-T-042wTCN	14/03/2024	14/03/2024
A-T-050w	15/03/2024	15/03/2024
A-T-055w	15/03/2024	15/03/2024
Calc-As Recd	18/03/2024	18/03/2024

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

End of Report

APPENDIX C

Geotechnical Test Results

TEST REPORT

Client BEK Enviro Ltd

Address Suite One
No. 3 Mitton Road Business Park
Mitton Road
Whalley
Lancashire
BB7 9YE

Contract Chapel Hill,
Longridge

Job Number MRN 24115/8
Date of Issue 18 March 2024
Page 1 of 4

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

Murray Rix is the trading name of Murray Rix (Northern) Limited. Registered in England 2878361

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD

PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5

WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

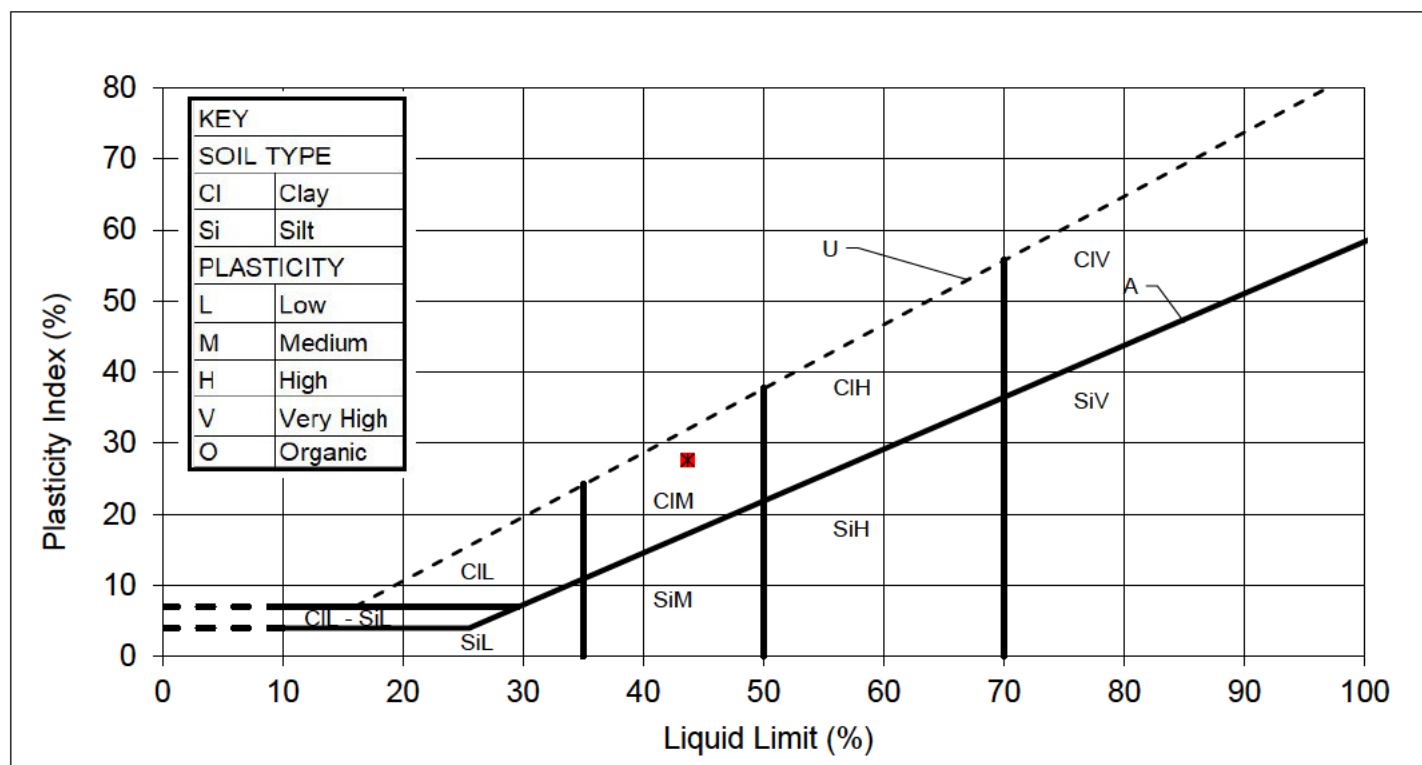
CLIENT	BEK Enviro Ltd
SITE	Chapel Hill, Longridge
JOB NUMBER	MRN 24115/8

SAMPLE LABEL	WS1 (1.5m)	DATE SAMPLED	01-Mar-24
SAMPLE No.	433301	DATE RECEIVED	04-Mar-24
DATE TESTED	05-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	16.4	41.2	1.057	
Determination 2 (avg)	16.7	41.4		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
26.5	44	16	28	96



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

18-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

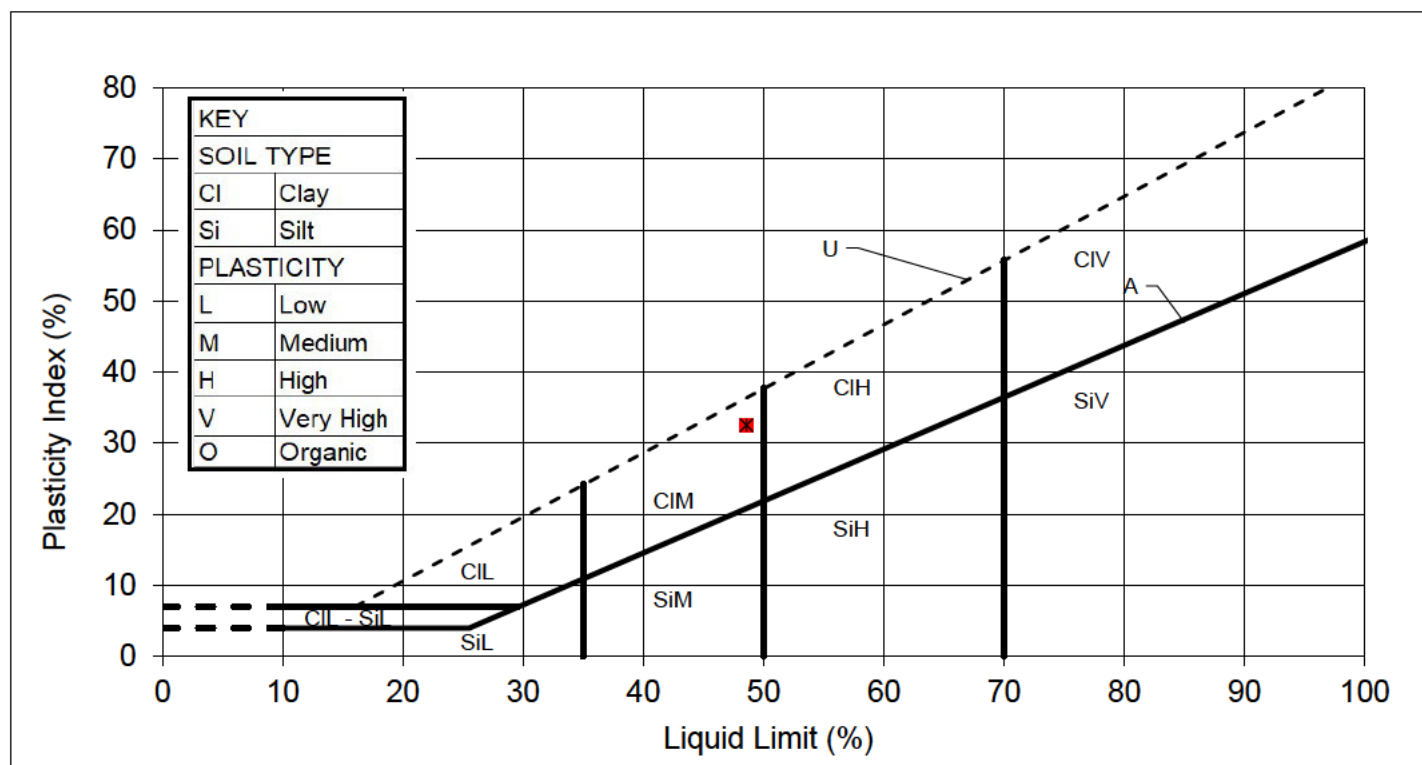
CLIENT	BEK Enviro Ltd
SITE	Chapel Hill, Longridge
JOB NUMBER	MRN 24115/8

SAMPLE LABEL	WS4 (1.0m)	DATE SAMPLED	01-Mar-24
SAMPLE No.	433302	DATE RECEIVED	04-Mar-24
DATE TESTED	05-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	16.7	46.2	1.054	
Determination 2 (avg)	16.6	46.0		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
22.5	49	16	33	99



REMARKS

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

18-Mar-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870



TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

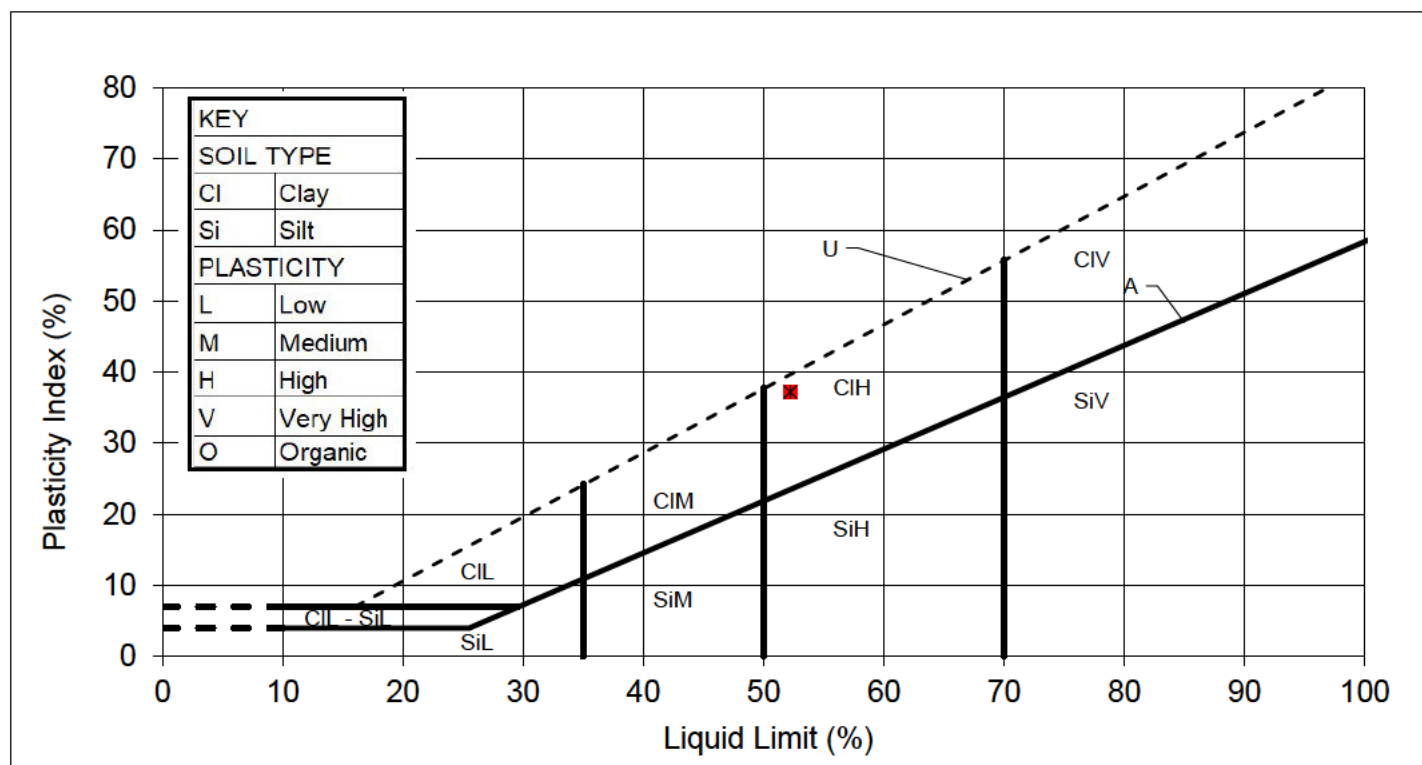
CLIENT	BEK Enviro Ltd
SITE	Chapel Hill, Longridge
JOB NUMBER	MRN 24115/8

SAMPLE LABEL	WS5 (2.5m)	DATE SAMPLED	01-Mar-24
SAMPLE No.	433303	DATE RECEIVED	04-Mar-24
DATE TESTED	05-Mar-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	17.4	49.9	1.045	
Determination 2 (avg)	17.5	50.0		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
23.8	52	15	37	99



REMARKS

SIGNED

NAME

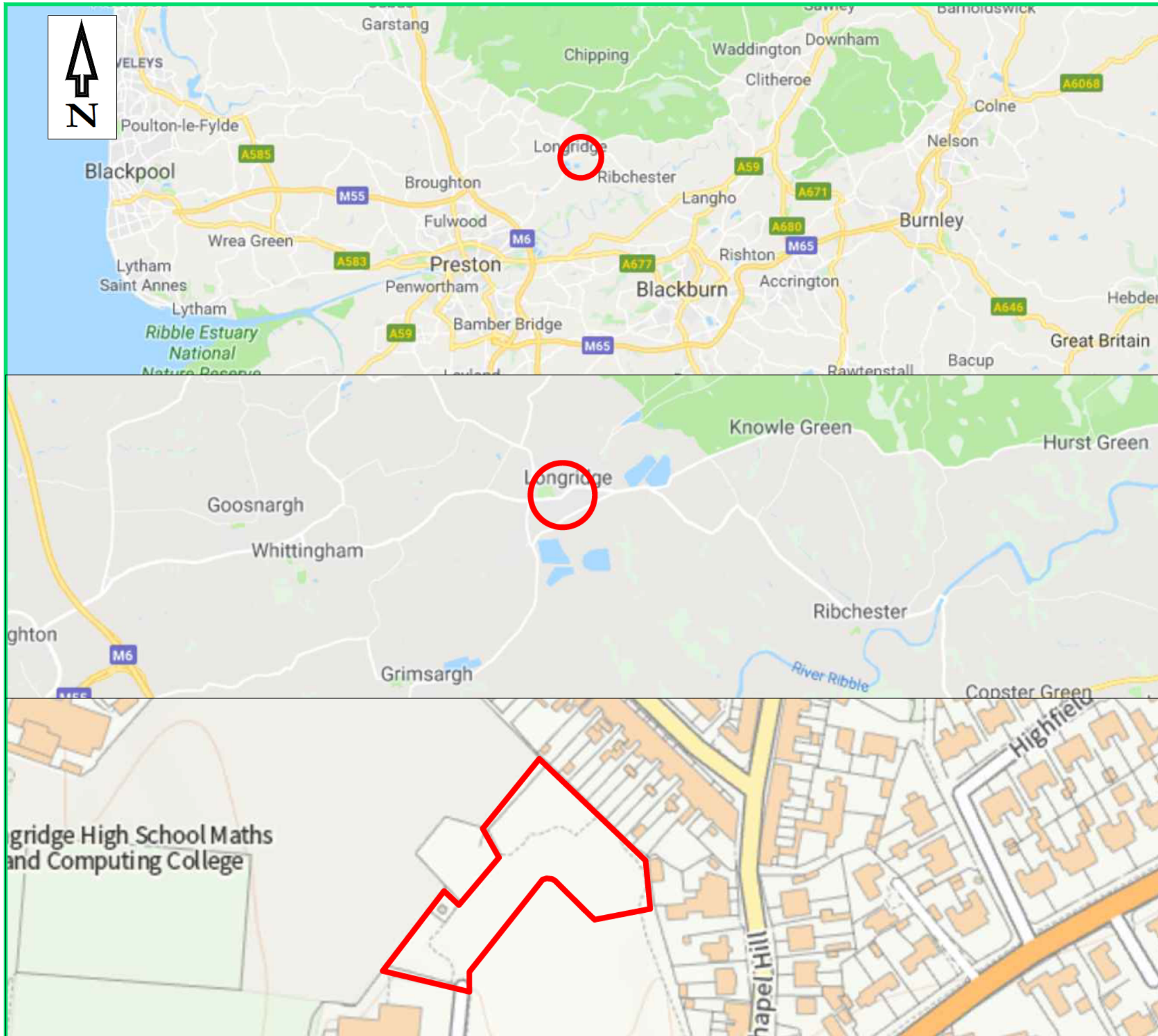
O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

18-Mar-24

APPENDIX D

Drawings



LEGEND

 SITE LOCATION

REV	DESCRIPTION	DATE	BY



GEO-ENVIRONMENTAL CONSULTING ENGINEERS
Suite One, No 3 Mitton Road Business Park, Mitton Road,
Whalley, Lancashire BB7 9YE
Tel: 01254 377622 Mob: 07906753583
Email: mbuckley@bekenviron.co.uk
Web: www.bekenviron.co.uk

CLIENT.

PWA PLANNING

JOB TITLE.

LAND AT CHAPEL HILL,
LONGRIDGE

DRAWING TITLE.

SITE LOCATION PLAN

SCALE © A3. NTS	DRAWN BY. D.E.	APPROVED BY. M.B.	DATE. 06/10/21
DRAWING No. 21960-1			REV. -



LEGEND

— SITE FOOTPRINT

REV	DESCRIPTION	DATE	BY



GEO-ENVIRONMENTAL CONSULTING ENGINEERS
Suite One, No 3 Mitton Road Business Park, Mitton Road,
Whalley, Lancashire BB7 9YE
Tel: 01254 377622 Mob: 07906753583
Email: mbuckley@bekenviro.co.uk
Web: www.bekenviro.co.uk

CLIENT.

PWA PLANNING

JOB TITLE.

LAND AT CHAPEL HILL,
LONGRIDGE

DRAWING TITLE.

SITE LAYOUT PLAN

SCALE © A3. NTS	DRAWN BY. D.E.	APPROVED BY. M.B.	DATE. 06/10/21
DRAWING No. 21960-2			REV. -



LEGEND

-  BEK WINDOW SAMPLE BOREHOLE
-  BEK WINDOW SAMPLE BOREHOLE (WITH GAS/GROUNDWATER MONITORING WELLS)

REV	DESCRIPTION	DATE	BY



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

CLIENT.

PWA PLANNING

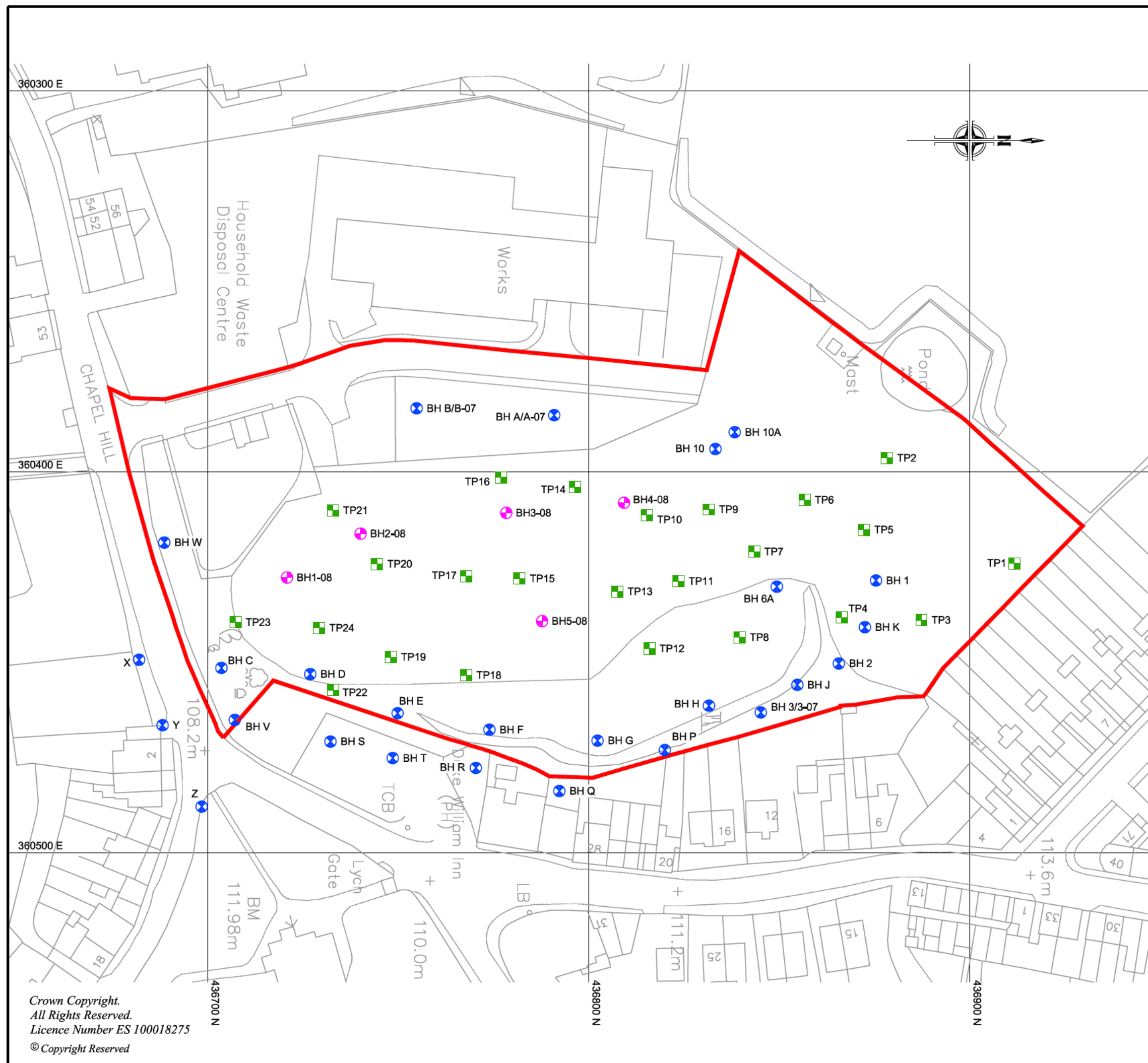
JOB TITLE.

LAND AT CHAPEL HILL,
LONGRIDGE

DRAWING TITLE.

SITE INVESTIGATION
LOCATION PLAN

SCALE © A3. NTS	DRAWN BY. D.E.	APPROVED BY. M.B.	DATE. 14/03/24
DRAWING No. 21960-3			REV. -



- REFERENCE**
- UNITED UTILITIES PROPERTY SOLUTIONS (UUPS) OWNERSHIP BOUNDARY
 - APPROXIMATE LOCATIONS OF:
 - TRIAL PIT (EXCAVATED 02/09/08 TO 02/09/08)
 - BOREHOLE (DRILLED 02/09/08 TO 08/09/08)
 - HISTORICAL GAS / GROUNDWATER MONITORING BOREHOLE (OLDEST BOREHOLES DRILLED IN 1993)

NOTE
BOUNDARY OF SITE OWNERSHIP AS PROVIDED TO WARDELL ARMSTRONG BY EMAIL FROM Mr W. Erlam OF UUPS, DATED 22/02/07.

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
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CLIENT	UNITED UTILITIES PROPERTY SOLUTIONS LIMITED				
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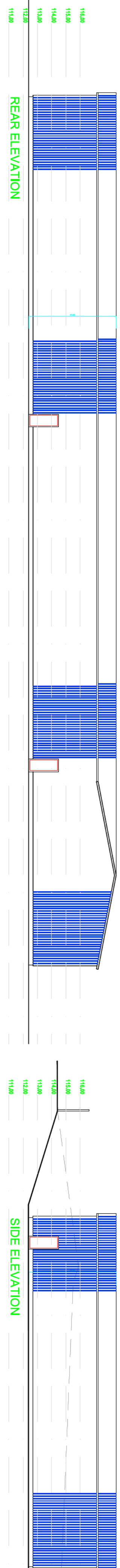
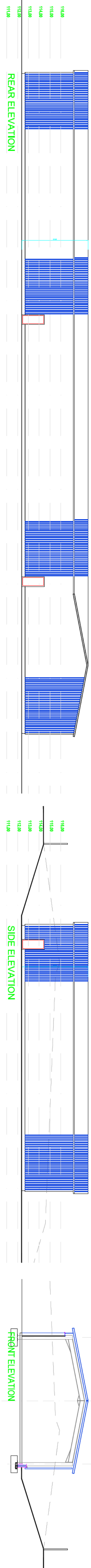
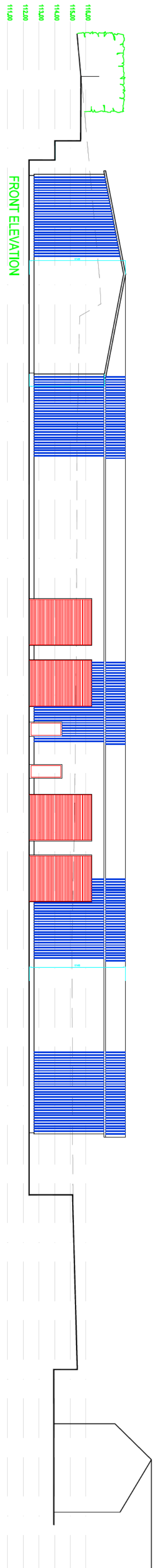
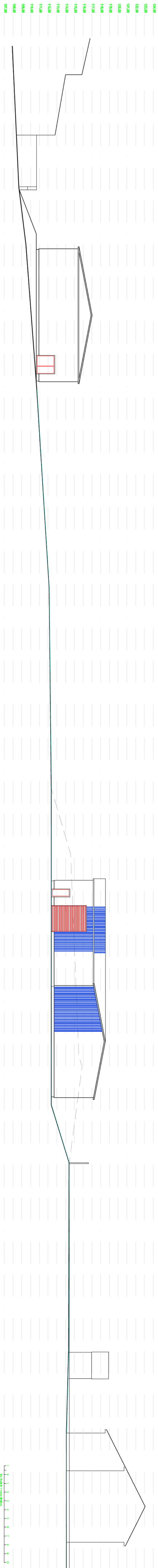
PROJECT	CHAPEL HILL LONGRIDGE				
---------	--------------------------	--	--	--	--

DRAWING TITLE	LOCATION OF BOREHOLES AND TRIAL PITS				
---------------	---	--	--	--	--

DRG No LE00141/102	SCALE 1:1000	DATE SEPTEMBER 2008
DRAWN BY J.P.V.	CHECKED BY	APPROVED BY

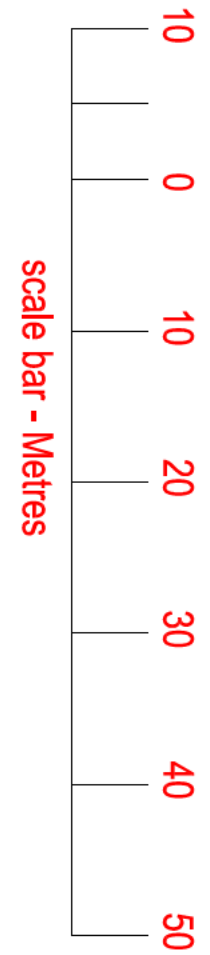
☐ STOKE-ON-TRENT (HEAD OFFICE)	TEL 0845 111 7777	☐ CARDIFF	TEL 029 2072 9191
☐ NEWCASTLE UPON TYNE	TEL 0191 232 0943	☐ SHEFFIELD	TEL 0114 245 6244
☐ WEST BROMWICH	TEL 0121 580 0909	☐ EDINBURGH	TEL 0131 555 3311
☐ LONDON	TEL 020 7287 2872	☐ LIVERPOOL	TEL 0151 494 5431



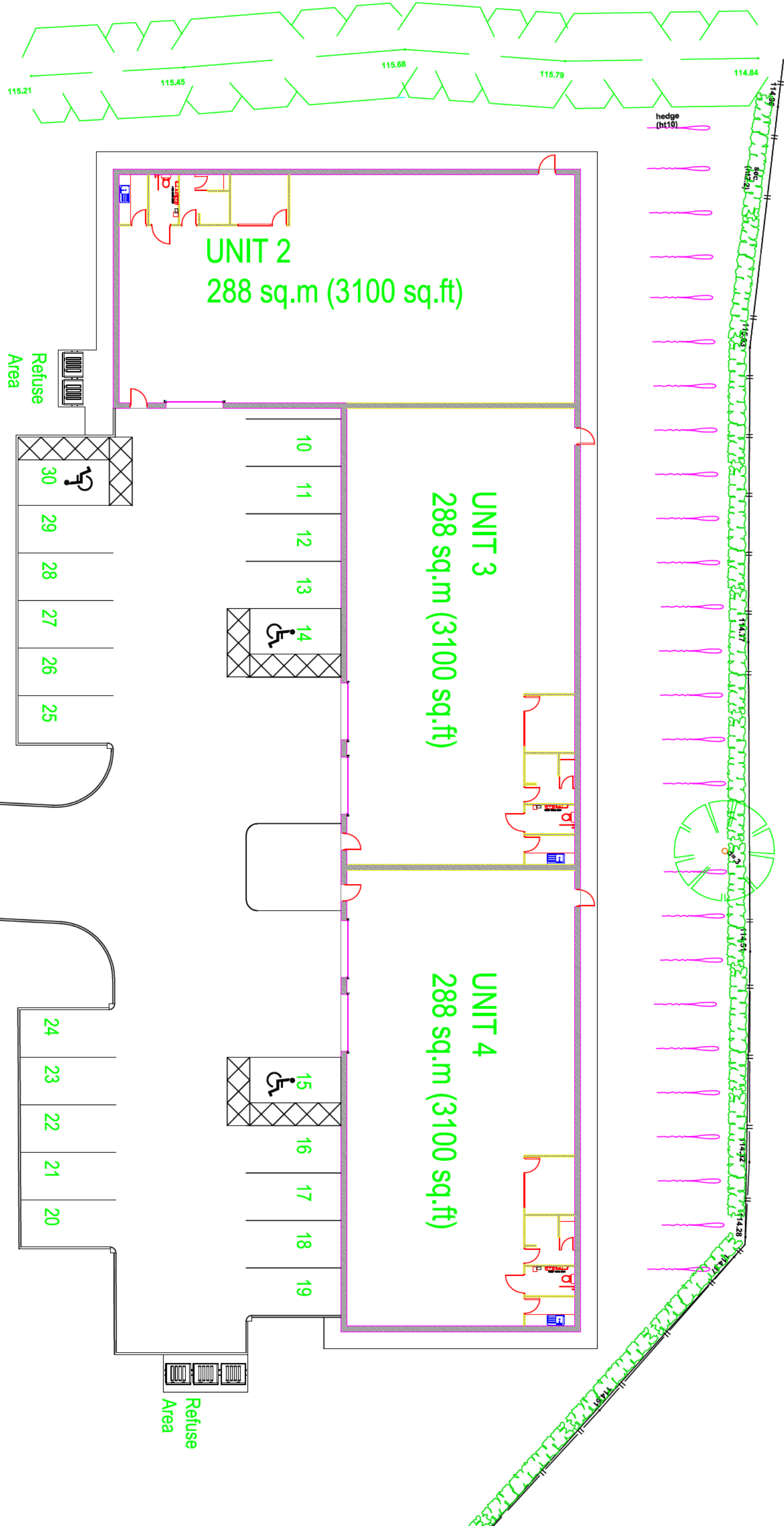


New hedge to Northeast boundary consisting of Hawthorn, Blackthorn, Holly, Hazel and Beech planted in a staggered double row 40 centimeters (cm) apart with a minimum of 6 plants per meter.

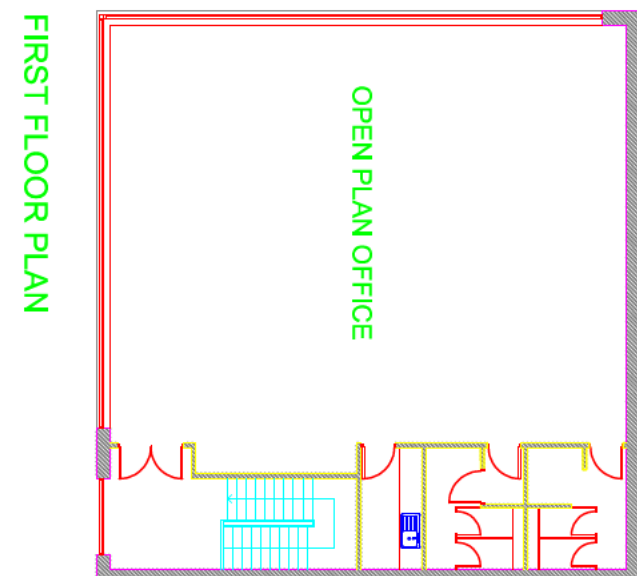
All area to the Northwest between Unit 1 and Units 2-4 to be grass, banking to rear of Units 2-4 to be grassed between footpath and new hedge



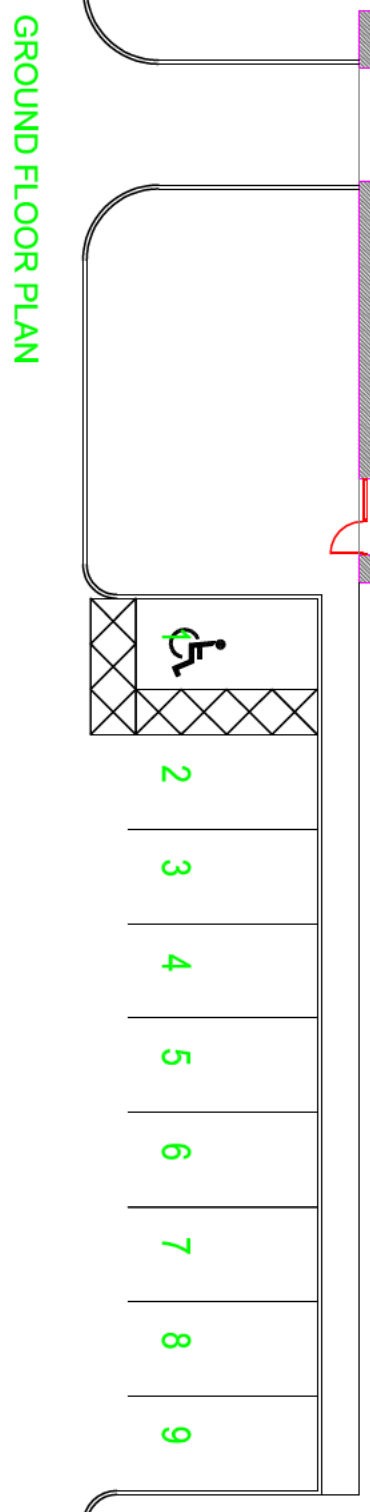
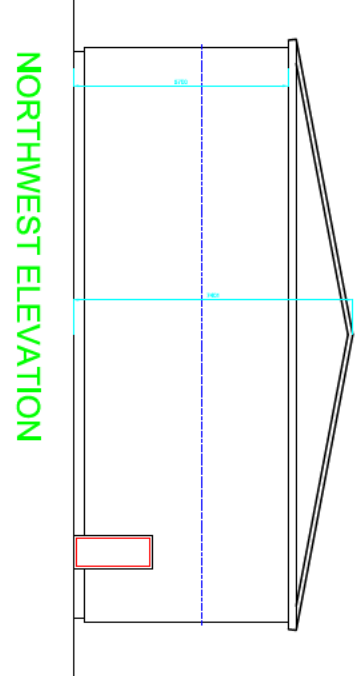
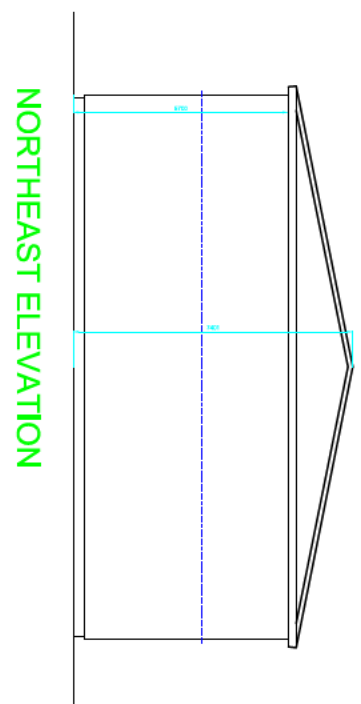
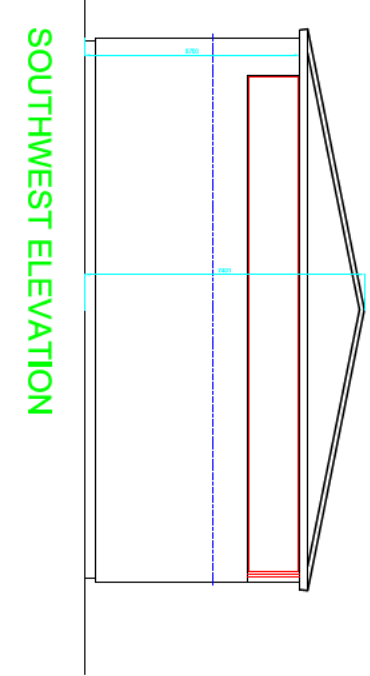
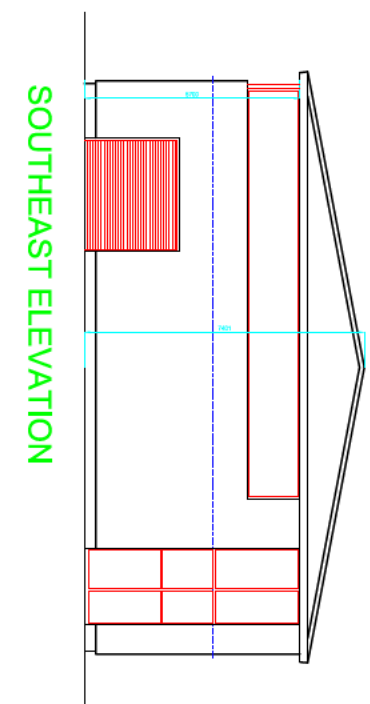
NORTH



Scale: 1:200



UNIT 1
196 sq.m per floor
392sq.m (4220 sq.ft)



CLIENT:
WILLIAM P/E LIMITED

Project:
LAND AT CHAPEL HILL,
LONGBRIDGE, PRESTON PR3 3BU
PLANS & ELEVATIONS AS PROPOSED

Scale: 1:200 1:500 Drawing No. Am.
By: I Parnson
Date: Oct 2021
Job No. 4021 / 3

ip
In Preston Ltd 26 Esplanade, Bursledon, Yockley, BB18 5DT
Architectural
Drawing
www.burysdon.com

Appendix